

# Surface Water Supply of the United States 1951

## Part 12. Pacific Slope Basins in Washington and Upper Columbia River Basin

*Prepared under the direction of C. G. PAULSEN, Chief Hydraulic Engineer*

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GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1216

*Prepared in cooperation with the States  
of Idaho, Montana, and Washington and  
with other agencies*



**UNITED STATES DEPARTMENT OF THE INTERIOR**

**Douglas McKay, *Secretary***

**GEOLOGICAL SURVEY**

**W. E. Wrather, *Director***

## **PREFACE**

This report was prepared by the Geological Survey in cooperation with the States of Idaho, Montana, and Washington and with other agencies by personnel of the Water Resources Division under the direction of:

C. G. Paulsen	Chief Hydraulic Engineer
J. V. B. Wells	Chief, Surface Water Branch
B. J. Peterson	Chief, Annual Reports Section

### **District Engineers (Surface Water)**

T. R. Newell	Boise, Idaho
Frank Stermitz	Helena, Mont.
F. M. Veatch	Tacoma, Wash.

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SCOPE OF WORK

This volume is one of a series of 18 reports presenting measurements of stage, discharge and content of streams, lakes, and reservoirs in the United States during the water year ending September 30, 1951. Since 1888, when the United States Geological Survey first studied streamflow in relation to problems of irrigation, similar measurements have been made at more than 12,400 gaging stations in the 48 States and at many others in the Territories of Alaska and Hawaii. On September 30, 1951, the Geological Survey and cooperating organizations were maintaining 6,730 gaging stations, including those in Alaska and Hawaii. Miscellaneous discharge measurements were made at many other points in the 1951 water year.

COOPERATION

Many State, municipal, and private organizations have cooperated with the Geological Survey in this work by either furnishing or helping to collect data. Organizations that supplied data are acknowledged in station descriptions, and organizations that assisted in the collection of data through cooperative agreements with the Survey are:

Idaho: Idaho Department of Reclamation, M. R. Kulp, State reclamation engineer.

Montana: Office of State Engineer, F. E. Buck; State Water Conservator Board.

Washington: State Department of Conservation and Development, J. V. Rogers, director, succeeded by W. A. Galbraith, and C. J. Bartholet, supervisor of hydraulics for the department; State Department of Fisheries, Alvin Anderson, director, succeeded by R. J. Schoettler; State Department of Game, D. W. Clarke, director; State Department of Highways, W. A. Bugge, director; cities of Bellingham, Bremerton, Everett, Olympia, Seattle, and Tacoma; Intercounty River Improvement Commission; Grays Harbor County Utility District No. 1; Lewis County Public Utility District No. 1; Pend Oreille County Public Utility District No. 1; Douglas, Grant, Pend Oreille, Skagit, and Whatcom Counties, and Diking District No. 2 of Pend Oreille County.

Assistance in the form of funds or services was given by the Corps of Engineers, Department of the Army, in collecting records published herein for 19 gaging stations of which 4 were in Idaho, 4 in Montana, and 11 in Washington.

Assistance was also furnished by the Soil Conservation Service of the United States Department of Agriculture, the United States Department of the Army, the Weather Bureau of the United States Department of Commerce, Bureau of Reclamation and the Office of Indian Affairs of the United States Department of the Interior, and the United States Department of State. Acknowledgment is due to the Forest Service of the United States Department of

Agriculture and the Weather Bureau for occupation permits and furnishing special reports of watershed conditions and precipitation records.

Full cooperation exists between the Geological Survey of the United States Department of the Interior and the Water Resources Division, Department of Resources and Development, Canada. On waters adjacent to the international boundary certain stations are maintained jointly by the United States and Canada under the terms of the Boundary Waters Treaty of 1909, and others are maintained under a subsequent agreement between the two Governments. The records from all these stations are obtained in such a manner as to be equally acceptable and available in either country. These stations are herein designated "international gaging stations."

The following organizations aided in collecting records:

Idaho: Washington Water Power Co.

Montana: Montana Power Co.

Washington: Crown Zellerbach Corporation; Puget Sound Power & Light Co.;

Rayonier, Inc.; Washington Water Power Co., and Weyerhaeuser Timber Co.

#### DIVISION OF WORK

The stream gaging was done by the Water Resources Division of the Geological Survey, Carl G. Paulsen, chief hydraulic engineer, and Joseph V. B. Wells, chief of the Surface Water Branch. The data for stations in the several States were collected and prepared for publication under the supervision of the district engineers at the offices listed below. The records were reviewed and the manuscript prepared for publication under the direction of B. J. Peterson, chief, Annual Reports Section.

<u>State</u>	<u>District office</u>	<u>Address</u>
Idaho a/.....	Boise.....	429 Federal Building.
Montana b/.....	Helena.....	408 Federal Building.
Washington.....	Tacoma.....	207 Federal Building.

a/ Including Clark Fork near Heron, Mont.

b/ Except for Clark Fork near Heron.

Information of a more detailed nature than that published for most of the gaging stations given in this report is on file in the district offices listed above. Provisional records of discharge prior to publication, and other unpublished data concerning the gaging station records may usually be obtained from the district office.

#### DEFINITION OF TERMS AND ABBREVIATIONS

The terms of streamflow and other hydrologic data, as used in this report, are defined as follows:

Cubic foot per second (cfs) is 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.

Cubic feet per second per square mile (cfsm) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Runoff, in inches is the depth to which an area would be covered if all the water draining from it in a given period were uniformly distributed on its surface. The term is used for comparing runoff with rainfall, which is also usually expressed in inches.

Acre-foot is the quantity of water required to cover an acre to the depth of 1 foot and is equivalent to 43,560 cubic feet. The term is commonly used in relation to storage for irrigation.

Cfs-day is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, 1.983471 acre-feet, or 646,317 gallons, and represents a runoff of 0.0372 inch from 1 square mile.

Stage-discharge relation is the relation between gage height and the amount of water flowing in a channel, expressed as volume per unit of time.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, a long reach of the channel, or an artificial structure.

Contents is the volume of water in a reservoir. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

The drainage area of a stream at a specified location is that area, measured in a horizontal plane, which is so enclosed by a topographic divide that direct surface runoff from precipitation normally would drain by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise noted.

#### NEW DOWNSTREAM ORDER OF LISTING GAGING STATIONS

Beginning with the series of reports for the water year ending September 30, 1951, the order of listing gaging-station records has been changed. In this report, in a downstream direction along the main stem all stations on a tributary entering above a main-stem 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 stations on first rank, second rank, and other ranks of tributaries. To indicate the rank of any tributary on which a gaging station is situated and the stream to which it is immediately tributary, each indention in the listing of gaging stations in the table of contents of this report represents one rank. This new 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.

The order of listing used before the publication of the 1951 report listed first all stations on the main stem from headwaters toward mouth, then all stations on the uppermost tributary to the main stem from the tributary's source to mouth, and then all stations from source to mouth of the uppermost tributary to the tributary.

#### EXPLANATION OF DATA

The base data collected at gaging stations consist of records of stage and measurements of discharge. In addition, observations of factors affecting the stage-discharge relation, weather records, and other information are used to supplement base data in determining the daily flow. The records of stage are obtained either from direct readings on a nonrecording gage or from a water-stage recorder that gives a continuous record of fluctuations. Measurements of discharge are made with a current meter by the general methods adopted by the Geological Survey on the basis of experience in stream gaging since 1888. These

methods are described in Water-Supply Paper 888 and are also outlined in standard textbooks on the measurement of stream discharge. Typical structures in use at gaging stations are shown in figure 1.

Rating tables giving the discharge for any stage are prepared from stage-discharge relation curves defined by discharge measurements. If extensions to the rating curves are necessary to define the extremes of discharge, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs, and by other methods), velocity-area studies, and logarithmic plotting. The application of the daily mean gage height to those rating tables gives the daily mean discharge, from which the monthly and the yearly mean discharge are computed. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is determined by the shifting-control method, in which correction factors based on individual discharge measurements and notes by engineers and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is essentially the shifting-control method.

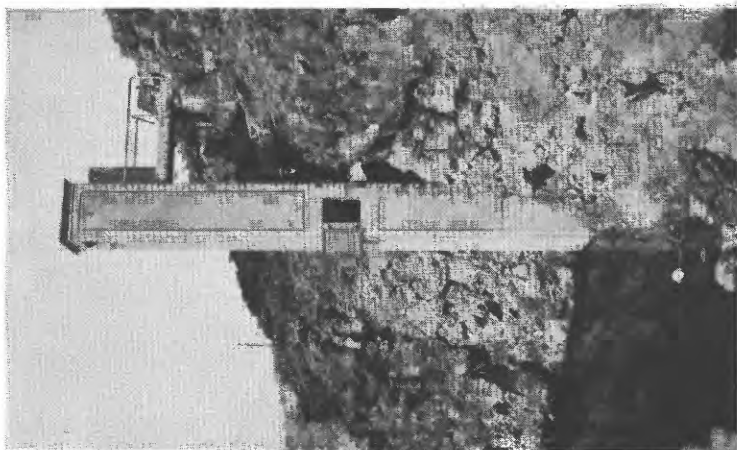
At some gaging stations the stage-discharge relation is affected by backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in determining discharge. Information requisite for determining the slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage. If so, the rate of change of stage is used as a factor in the determination of discharge.

At most gaging stations in the northern part of the United States and at some in the mountainous regions of other parts the stage-discharge relation is affected by ice during the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements, consideration being given to the available information on temperature and precipitation, notes by gage observers and engineers, and comparable records of discharge for other stations in the same or nearby basins. If the stage-discharge relation is affected by ice, this information is given in a note to the table. No mention is made of occasional days of ice effect if the degree of accuracy of daily records is not changed.

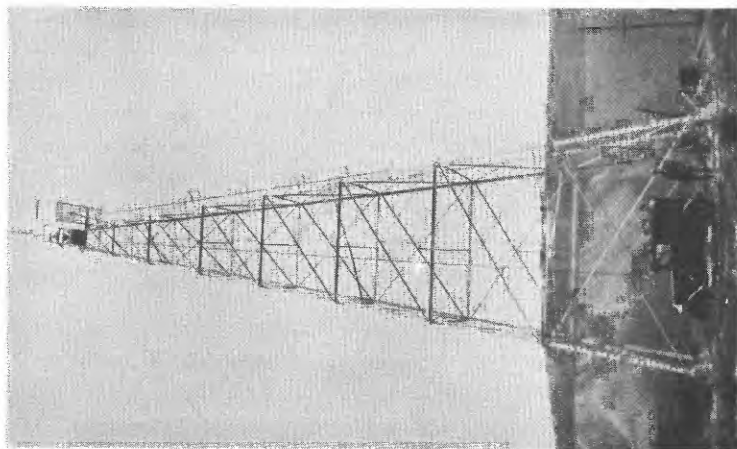
The data herein presented generally comprise a description of the station, a skeleton rating table, and a table showing the daily discharge and monthly and yearly discharge and runoff of the stream.

The description of the station gives the location, drainage area, records available, type and history of gages, average discharge, extremes of discharge, general remarks, and notations of revisions of the previously published record. The location of the gaging station and the drainage area are obtained from the most accurate maps available. River mileage, given under "Location" for some stations, is that determined and used by the Corps of Engineers unless otherwise noted. Under "Gage" are given the type of gage currently in use and the datum of the present gage above mean sea level, and a condensed history of the





4, COLUMBIA RIVER AT TRINIDAD, WASH.  
Recording-gage shelter and stilling well.



B, COLUMBIA RIVER AT TRINIDAD, WASH.  
East cable tower.

FIGURE 1.—GAGING-STATION STRUCTURES.

types of gages, locations, and datums of previous gages for which discharge records are generally equivalent to those at the present site. Under "Average discharge" is given the average discharge for the number of years indicated. It is not given for stations having fewer than five complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. Under "Extremes" are given the maximum discharge and gage height; the minimum discharge if there is little or no regulation; the minimum daily discharge if there is extensive regulation (also the minimum discharge if useful); and the minimum gage height (unless it is of no importance). Unless otherwise qualified, the maximum discharge corresponds to the crest-stage obtained by use of a water-stage recorder, a crest-stage indicator, or a non-recording gage read at the time of the crest. If the maximum gage height did not occur at the same time as the maximum discharge, it is given separately. Information pertaining to the accuracy of the records and conditions which affect the natural flow at the gaging station is given under "Remarks."

Previously published records of some stations have been found to be in error on the basis of data or information later obtained. Revisions of such records are usually published along with the current records in one of the annual reports. In order to make it easier to find such revised records, a paragraph headed "Revisions (water years)" has been added to the description of all stations for which revised records have been published. Listed therein are all the reports in which revisions have been published, each followed by the water years for which figures are revised in that report. In listing the report number, "W" means water-supply paper. In listing the water years only one number is given; for instance, 1933 stands for the water year October 1, 1932, to September 30, 1933. If no daily, monthly, or annual figures of discharge are concerned in the revision, that fact is brought out by notations after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff, in inches, are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff, in inches, resulting from a revision of the drainage area only are usually not published in the annual series of reports.

Skeleton rating tables are published for all stations except those at which the daily discharge for the greater part of the open-water period was determined by the shifting-control method, the slope method, or other special methods involving an equivalent adjustment to the gage height of more than one-tenth foot.

For stations equipped with water-stage recorders, except those on streams subject to sudden or rapid fluctuation, the daily table gives the discharge corresponding to the daily mean gage height. For stations subject to such fluctuation the daily mean gage height may not indicate the true daily mean discharge, which must be obtained by averaging the discharge for parts of the day or by using the discharge integrator, an instrument for obtaining the daily mean discharge from a continuous gage-height graph and containing, as an essential element, a curve representing the stage-discharge relation at the station.

For stations equipped with nonrecording gages, the table of daily discharge gives the discharge corresponding to once-daily readings of the gage, or to the mean of twice-daily readings, or to the mean gage height determined from gage-height graphs based on gage readings. For periods of rapidly changing stage, the daily mean discharge is determined from gage-height graphs based on gage readings, the frequency of which is stated in the station description.

In the table of daily discharge, the values for the maximum day and the minimum day for each month are underlined. If the value is repeated, it is underlined only on the first day of its occurrence.

In the monthly summary below the daily table, the line headed "Total" gives the sum of the daily values; it is the total cfs-days for the month. The line headed "Mean" gives the average flow in cubic feet per second during the month. Runoff for the month may be expressed in cubic feet per second per square mile (line headed "Cfsm"), or in inches (line headed "In."), or in acre-feet (line headed "Ac-ft"). Values for cubic feet per second per square mile and runoff, in inches, are omitted if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches.

In the yearly summary below the monthly summary, the values of maximum are the maximum daily discharges, not the momentary discharges when the water was at crest stage. Likewise, the minimums in this summary are the minimum daily discharges.

Peak discharges and the times of their occurrence and corresponding gage heights of most stations are listed below the table of daily and monthly discharge. All independent peaks above the selected base are given. The base discharge, which is given in parentheses, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man.

Footnotes to the table of daily discharge indicate periods when discharge was computed or estimated by unusual or special methods during periods of no gage-height record and ice effect, or by other effects that reduce the degree of accuracy of the records. Days on which discharge measurements were made are indicated by asterisk and footnote unless they were made at frequent regular intervals, in which instance the general frequency of discharge measurements is given under "Remarks" in the station description.

For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. A skeleton table of capacity at given stages is usually given in the first report in which data for the reservoir are published, but it is omitted from succeeding reports.

#### ACCURACY OF FIELD DATA AND COMPUTED RESULTS

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description states the degree of accuracy of the records. "Excellent" indicates that, in general, the error in the daily records is believed to be less than 5 per-

cent; "good," less than 10 percent; "fair," less than 15 percent; and "poor," probably more than 15 percent. The records of monthly and yearly mean discharge and runoff are, in general, more nearly accurate than the daily records.

Runoff at some stations, as indicated by the monthly mean, may vary widely from natural runoff, owing to diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, values of cubic feet per second per square mile and runoff, in inches, are not published unless storage or diversion records are included to indicate the extent of the regulation or diversion, or unless satisfactory adjustments can be made for changes in contents of reservoirs or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur when relatively large negative adjustments are made or when evaporation is large in comparison with the observed discharge.

Many gaging stations on streams in the irrigated areas of the United States are situated above most of the diversions from those streams, and therefore the discharge recorded does not actually show the water supply available at the stations for further development, because water must first be supplied to existing irrigation systems.

#### PUBLICATIONS

To facilitate publication of the annual series of reports, the area of the United States is divided into 14 parts whose boundaries coincide with certain natural drainage lines. Formerly, the results of streamflow measurements were published in 14 volumes, one for each of the 14 parts. Beginning with the reports for 1951, the records are published in 18 volumes, there being 2 volumes each for Parts 1, 2, 3, and 6. The boundaries of the various parts are indicated by the following list and the map in figure 2.

- Part 1. North Atlantic slope basins, in two volumes:
  - A, North Atlantic slope basins, Maine to Connecticut.
  - B, North Atlantic slope basins, New York to York River.
- 2. South Atlantic slope and eastern Gulf of Mexico basins, in two volumes:
  - A, South Atlantic slope basins, James River to Savannah River.
  - B, South Atlantic slope and eastern Gulf of Mexico basins, Ogeechee River to Pearl River.
- 3. Ohio River basin, in two volumes:
  - A, Ohio River basin except Cumberland and Tennessee River basins.
  - B, Cumberland and Tennessee River basins.
- 4. St. Lawrence River basin.
- 5. Hudson Bay and upper Mississippi River basins.
- 6. Missouri River basin, in two volumes:
  - A, Missouri River basin above Sioux City, Iowa.
  - B, Missouri River basin below Sioux City, Iowa.
- 7. Lower Mississippi River basin.
- 8. Western Gulf of Mexico basins.
- 9. Colorado River basin.
- 10. The Great Basin.
- 11. Pacific slope basins in California.
- 12. Pacific slope basins in Washington and upper Columbia River basin.
- 13. Snake River basin.
- 14. Pacific slope basins in Oregon and lower Columbia River basin.

Water-supply papers and other publications of the Geological Survey containing data on the water resources of the United States may be purchased or consulted as follows:

1. Copies may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., who will, on application, furnish lists giving prices. A list of Geological Survey publications may also be obtained by applying to the Director, Geological Survey, Washington, D. C.

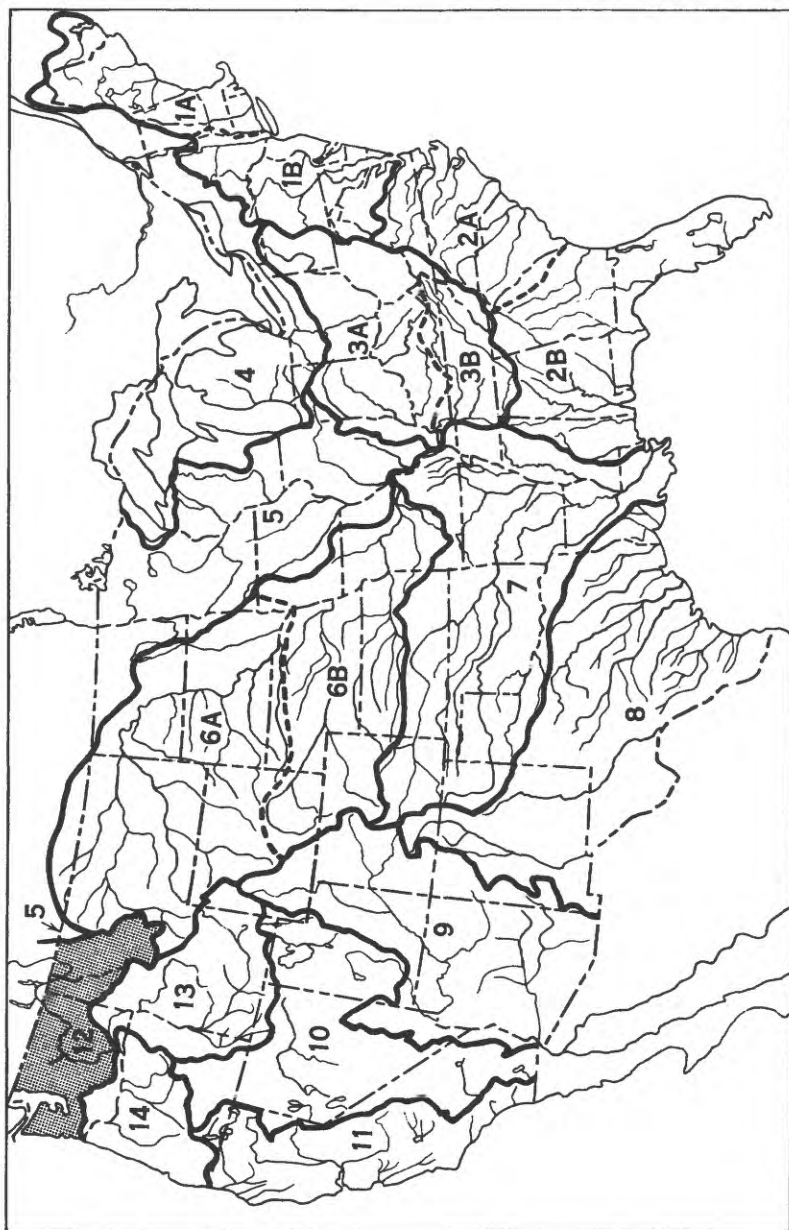


Figure 2.--Map of the United States showing areas covered by the 18 annual volumes on surface water supply. The shaded portion represents the area covered by this volume.

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

3. Sets are available for consultation in the offices of the Water Resources Division of the Geological Survey. Addresses of the offices in the area covered by this report are given on page 2.

Early records of the flow of streams in the United States are published in the reports listed below. In many of these reports records for years earlier than those indicated have been included for some streams.

Streamflow data for the years 1884-1901, in reports of the Geological Survey

(A = Annual Report; B = Bulletin; W = Water-Supply Paper)

Report	Character of data	Year
10th A, pt. 2	Descriptive information only.	
11th A, pt. 2	Monthly discharge and descriptive information.....	1884 to September 1890.
12th A, pt. 2	.....do.....	1884 to June 30, 1891.
13th A, pt. 5	.....do.....	1884-92.
14th A, pt. 2	Monthly discharge.....	1868-93.
B 131.....	Descriptions, measurements, gage heights, and ratings.....	1893-94.
16th A, pt. 2	Descriptive information only.	
B 140.....	Descriptions, measurements, gage heights, ratings, and monthly discharge.	1895.
W 11.....	Gage heights.....	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge.	1895-96.
W 15.....	Descriptions, measurements, and gage heights of streams east of the Mississippi River, and Missouri River and tributaries above Kansas River.	1897.
W 16.....	Descriptions, measurements, and gage heights of stream west of the Mississippi River, except Missouri River and tributaries above Kansas River.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge.	1897.
W 27.....	Measurements, ratings, and gage heights of streams east of the Mississippi River, and Missouri River and tributaries.	1898.
W 28.....	Measurements, ratings, and gage heights of streams west of the Mississippi River, except Missouri River and tributaries.	1898.
20th A, pt. 4	Monthly discharge.....	1898.
W 35 to 39....	Descriptions, measurements, gage heights, and ratings.....	1899.
21st A, pt. 4	Monthly discharge.....	1899.
W 47 to 52....	Descriptions, measurements, gage heights, and ratings.....	1900.
22d A, pt. 4.	Monthly discharge.....	1900.
W 65, 66.....	Descriptions, measurements, gage heights, and ratings.....	1901.
W 75.....	Monthly discharge.....	1901.

Reports on surface-water supply containing records from 1899 to date for drainage basins in this report are listed below. The data for any particular gaging station will, in general, be found in the reports covering the years during which the station was maintained.

Numbers of water-supply papers containing results of stream measurements in Pacific slope basins in Washington and upper Columbia River basin, 1899-1951

Year	W.S.P.no.	Year	W.S.P.no.	Year	W.S.P.no.	Year	W.S.P.no.	Year	W.S.P.no.
1899	38	1911	312	1922	552	1932	737	1942	962
1900	51	1912	332-A	1923	572	1933	752	1943	982
1901	66, 75	1913	362-A	1924	592	1934	767	1944	1012
1902	85	1914	392	1925	612	1935	792	1945	1042
1903	100	1915	412	1926	632	1936	812	1946	1062
1904	135	1916	442	1927	652	1937	832	1947	1092
1905	178	1917	462	1928	672	1938	862	1948	1122
1906	214	1918	482	1929	692	1939	882	1949	1152
1907-8	252	1919-20	512	1930	707	1940	902	1950	1182
1909	272	1921	532	1931	722	1941	932	1951	1216
1910	292								

The records at most of the stations discussed in these reports extend over many years. Miscellaneous measurements at many points other than regular gaging stations have been made each year and are published under "Miscellaneous discharge measurements" at the end of each report. The streams and points of measurement are listed in the same order as the streams and gaging stations in the body of the report. An index of the records obtained before 1904 has been published in Water-Supply Paper 119.

Each of the reports on the surface-water supply for the year 1939 (Water-Supply Paper 882 for the Pacific slope basins in Washington and the upper Columbia River basin) contains, for the area included in that report, a summary of yearly discharge at gaging stations at which 10 or more complete years of record had been collected. These summaries were reprinted separately.

Reports also have been published that are compilations of records for various areas, usually a single State or drainage basin. These reports contain records previously published (some of which may have been revised), as well as some records not contained in the annual series of water-supply papers. The following table lists reports of this type for the area covered by this report.

Reports containing compilations of records of discharge by States and drainage basins

Water-Supply Paper No.	Period	Report
492.....	1878-1919	Summary of hydrometric data in Washington.
870.....	1919-35	Summary of records of surface waters of Washington.
916.....	1898-1938	Surface waters of upper Columbia River basin (Mont., Idaho).

Records of discharge have been published also in State reports. Some of these are not contained in the publications of the Geological Survey or are revisions of records previously published in its water-supply papers. The following table contains a list of these reports for the area covered by this report.

State reports containing compilations of records of discharge

State	Period	Report	Issued by
Montana do	1898-1911 1898-1938	5th biennial report..... Water resources of Montana, Part 2, vol. IV.	Office of the State Engineer. Montana Agricultural Experiment Station.
Washington	1878-1933	Bull. 5, Monthly and yearly summaries of hydrometric data.	Department of Conservation and Development.

Note.--In addition to the records contained in the reports listed above, the following States have issued annual or biennial reports in which are contained records of discharge: Idaho, Montana, Washington.

The reports listed in the foregoing tables contain the customary records of discharge collected during the systematic operation of gaging stations. Detailed information on the stage and discharge of many streams during major floods has been included in special reports on these floods published by the Geological Survey. The more recent of these special reports also contain other pertinent hydrologic information and analyses and compilations of data relating to earlier notable floods. The following list gives the numbers and titles of these reports:

Water-Supply Paper No.	Title
771.....	Floods in the United States, magnitude and frequency.
847.....	Maximum discharges at stream-measurement stations through September 1938.
968-B.....	Floods of the Puyallup and Chehalis River basins, Washington.
1080.....	Floods of May-June 1948 in Columbia River basin.

## RECORDS OF DISCHARGE COLLECTED BY AGENCIES OTHER THAN THE GEOLOGICAL SURVEY

The table below contains a list of gaging stations for the area covered by this report, at which records of discharge were collected during the water year October 1950 to September 1951 by agencies other than the Geological Survey. The records of these stations are not contained in publications of the Geological Survey, nor have they been published elsewhere.

Records of discharge collected by agencies other than the Geological Survey

Stream	Location	Period	Collected by	Remarks
Crow Creek.....	At Montana Power sub-station near Thompson Falls, Mont.	1949-51	U. S. Forest Service..	Unpublished.
Flathead River.....	Near Kalispell, Mont...	1946-51*	Bureau of Reclamation.	†Unpublished since 1945.
Do.....	At Damon Ranch near Kalispell, Mont.	1946-51*	....do.....	Do.
Flint Creek, North Fork	At Georgetown Lake, near Anaconda, Mont.	1949-51†	U. S. Forest Service..	Unpublished.
Lake Whatcom.....	Bellingham, Wash.....	1923-51	City of Bellingham....	Do.
Little Blacktail Creek.	At Nine Mile Inn, near Butte, Mont.	1949-51†	U. S. Forest Service..	Do.
Prospect Creek.....	Below Montana Power Co. substation near Thompson Falls, Mont.	1949-51†	U. S. Forest Service..	Do.
Reservation drain.....	Alfalfa, Wash.....	1912-51	Office of Indian Affairs.	†Unpublished since 1923.
Satus Creek.....	Downstream from Dry Creek, near Toppenish, Wash.	1913-51	....do.....	†Unpublished since 1924.
Do.....	Near Satus, Wash.....	1932-51	....do.....	Unpublished.
Toppenish Creek.....	Near Fort Simcoe, Wash.	1909-51	Office of Indian Affairs.	†Unpublished since 1924.
Do.....	Near Alfalfa, Wash....	1932-51	....do.....	Unpublished.
Yakima River.....	Easton, Wash.....	1904, 1910-15, 1940-51	Bureau of Reclamation.	†Unpublished since 1915.

\* Gage heights only.

† Records for earlier years published in water-supply papers of Geological Survey.

\* Fragmentary.

Note.--Records of daily discharge for many canals and drains in Washington and Montana for 1951 and earlier years have been collected by the Bureau of Reclamation and the Office of Indian Affairs of the United States Department of the Interior in connection with irrigation and drainage projects. These records have not been published. The Northern Rocky Mountain Forest and Range Experiment Station collects records of runoff from an area of 960 acres on Benton Creek near Priest River, Idaho.

## HYDROLOGIC CONDITIONS

The water year 1951 was characterized by above normal runoff over most of the Pacific slope basins in Washington and upper Columbia River basin. For a description of floods in Washington in February see Water-Supply Paper 1227-D, "Summary of Floods in the United States during 1951," now in preparation. For two key stations in the area covered by this report, a comparison of monthly and yearly mean discharge during the 1951 water year with the median discharge for the 25-year period 1921-45 is shown in figure 3 on the opposite page.



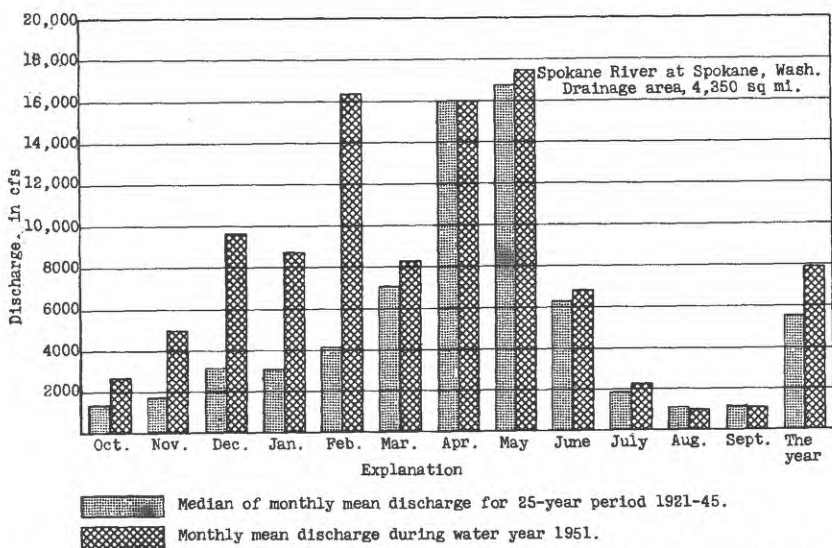
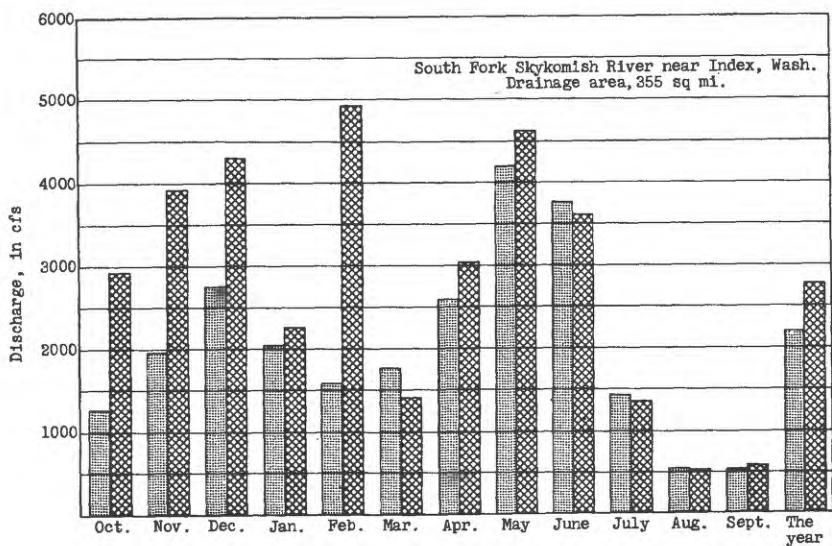


Figure 3.--Comparison of discharge at two key stations during 1951 water year with median discharge for 25-year period.

## GAGING-STATION RECORDS

## Pacific slope basins north of Columbia River

## NASELLE RIVER BASIN

Naselle River near Naselle, Wash.

Location.--Lat 46°22'25", long. 123°44'45", in SW $\frac{1}{4}$  sec. 1, T. 10 N., R. 9 W., on left bank 150 ft downstream from road crossing, 1 $\frac{1}{2}$  miles upstream from Salmon Creek, and 3 $\frac{1}{2}$  miles east of Naselle.

Drainage area.--55.3 sq mi (revised).

Records available.--May 1929 to September 1951.

Gage.--Staff gage and crest-stage indicator; gage read twice daily. Altitude of gage is 24 ft above mean sea level (by barometer).

Average discharge.--22 years, 427 cfs.

Extremes.--Maximum discharge during year, 6,830 cfs Feb. 9 (gage height, 12.10 ft, from graph based on gage readings); minimum observed, 19 cfs Sept. 21-24 (gage height, 1.74 ft).

1929-51: Maximum discharge, 10,400 cfs Jan. 22, 1935 (gage height, 15.9 ft, from floodmarks), from rating curve extended above 3,900 cfs; minimum observed, 19 cfs Sept. 12-14, 1949, Sept. 21-24, 1951; minimum gage height observed, 1.72 ft Aug. 29, 1935.

Remarks.--Records good. No diversion or regulation.

Revisions.--W 932: Drainage area.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1-4)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

2.1	36	3.6	463	7.0	2,470	1.7	15	3.3	410
2.3	64	4.0	637	8.0	3,270	1.9	38	3.6	520
2.5	102	4.5	880	9.0	4,070	2.1	76	4.0	680
2.7	150	5.0	1,140	10.0	4,900	2.3	120	4.5	920
3.0	238	5.5	1,440	11.0	5,800	2.5	170	5.0	1,170
3.3	345	6.0	1,770			2.7	220	5.5	1,460
						3.0	305	6.0	1,770

Note.--Same as preceding table above 6.0 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	52	1,170	1,350	980	312	284	459	172	80	40	29	25
2	49	*1,040	1,040	2,550	660	251	396	155	76	40	29	25
3	55	905	1,060	2,120	707	272	354	150	74	40	28	23
4	62	707	1,260	1,470	683	361	316	150	76	42	28	23
5	262	637	1,120	1,090	574	296	281	145	80	49	28	22
6	219	522	*1,530	830	592	272	257	140	76	54	26	22
7	614	455	1,380	660	2,670	269	240	145	76	47	26	32
8	522	387	1,200	548	2,400	245	222	132	72	42	25	64
9	349	341	1,060	451	5,440	*235	210	125	68	40	26	35
10	1,380	301	1,060	430	4,990	222	195	120	68	40	26	30
11	756	258	880	459	5,590	215	162	122	66	*35	28	28
12	459	232	707	418	1,840	620	175	125	68	35	30	26
13	330	205	574	1,040	1,170	895	*170	128	70	35	30	24
14	269	209	505	1,260	795	720	162	115	68	35	28	22
15	216	315	756	2,260	680	1,400	146	111	64	35	26	22
16	183	905	980	2,050	540	1,200	145	106	60	35	25	22
17	174	380	1,700	2,050	500	845	140	102	60	35	*25	22
18	294	756	1,170	*1,260	508	640	132	99	56	34	23	22
19	387	592	980	905	700	560	128	97	56	34	23	21
20	360	805	1,230	756	1,340	520	120	93	52	33	23	21
21	294	1,230	1,560	1,910	970	580	113	89	52	33	22	19
22	252	1,960	2,400	1,500	720	600	108	86	51	32	22	19
23	225	1,700	3,990	1,090	580	512	106	97	49	32	22	19
24	203	1,840	2,120	1,060	520	459	106	106	49	32	21	*22
25	155	2,190	1,380	1,230	445	420	102	*120	49	32	22	66
26	379	2,120	980	1,500	382	420	97	106	45	33	22	82
27	1,060	1,770	780	1,060	347	400	135	102	45	33	23	40
28	1,350	1,410	905	683	302	358	431	97	43	32	29	99
29	1,230	1,050	980	552	-	354	232	93	42	32	35	322
30	1,090	915	1,320	447	-	640	192	66	40	30	30	1,040
31	980	-	1,200	360	-	516	-	60	-	30	25	-
Total	14,210	27,798	39,157	34,979	35,157	15,561	6,044	3,604	1,631	1,131	807	2,260
Mean	458	927	1,263	1,128	1,256	503	201	116	61.0	36.5	26.0	76.0
Cfsm	8.28	16.8	22.8	20.4	22.7	9.10	3.63	2.10	1.10	0.660	0.470	1.37
In.	9.56	16.69	26.33	23.52	23.64	10.48	4.06	2.42	1.23	0.76	0.54	1.53
Ac-ft	26,190	55,140	77,670	69,380	69,730	30,900	11,990	7,150	3,630	2,240	1,600	4,520
Calendar year 1950: Max	4,810			Min 29	Mean 601	Cfsm 10.9	In. 147.43	Ac-ft 434,600				
Water year 1950-51: Max	5,440			Min 19	Mean 500	Cfsm 9.04	In. 122.76	Ac-ft 362,100				

\* Discharge measurement made on this day.

## NEMAH RIVER BASIN

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North Nemah River near South Bend, Wash.

Location.--Lat 46°29'30", long. 123°50'00", in SE $\frac{1}{4}$  sec. 30, T. 12 N., R. 9 W., on right bank 500 ft downstream from Finn Creek, 5 miles upstream from mouth, and 12 miles south of South Bend.

Drainage area.--18.0 sq mi.

Records available.--February 1946 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is about 50 ft above mean sea level (from topographic map).

Average discharge.--5 years, 124 cfs.

Extremes.--Maximum discharge during year, 1,420 cfs Feb. 9 (gage height, 7.78 ft); minimum, 4.7 cfs Sept. 21, 22, 23; minimum gage height, 1.37 ft Oct. 2, 3.  
1946-51: Maximum discharge, 1,550 cfs Dec. 11, 1946, Feb. 10, 1949; maximum gage height, 8.21 ft Dec. 11, 1946; minimum discharge, that of Sept. 21, 22, 23, 1951.

Remarks.--Records good except those for periods of no gage-height record, which are poor.  
No diversion or regulation.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 8

Feb. 9 to Sept. 30

1.3	9.8	2.3	125	4.0	452	1.4	4.3	2.6	136	5.0	667
1.5	24	2.6	178	4.5	556	1.6	14	3.0	214	6.0	905
1.7	43	3.0	259	5.0	667	1.8	29	3.5	324	7.0	1,180
2.0	80	3.5	354	6.0	905	2.0	49	4.0	437		
						2.3	88	4.5	552		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	15	297	392	335	137	a80	94	39	19.5	12	7.7	6.3
2	14.5	*278	326	767	207	a75	87	36	18.5	13	7.2	6.3
3	15	241	306	556	203	a85	80	34	19.5	13	7.7	6.3
4	22	205	335	402	197	a105	73	35	20	13.5	7.2	6.3
5	113	181	306	326	181	a90	68	34	19.5	13.5	7.2	5.9
6	86	158	442	268	199	a85	62	34	19.5	13.5	7.2	5.5
7	191	135	*382	237	644	a80	56	34	18.5	13	7.2	12
8	158	117	326	209	514	a75	54	30	18	12	7.2	10.5
9	108	103	344	191	1,180	a70	50	29	17.5	12	7.7	7.2
10	380	91	306	187	1,030	a65	48	29	17.5	11.5	7.7	6.3
11	239	83	259	195	831	a80	45	29	17.5	10.5	7.2	6.3
12	149	75	215	181	494	200	42	29	18.5	*10.5	7.7	5.9
13	104	71	181	367	313	280	41	29	18	10	7.2	5.5
14	84	80	156	402	227	232	*40	27	17.5	10	6.8	5.5
15	68	209	268	622	208	357	38	26	16	10	6.8	5.1
16	60	402	344	640	152	302	36	25	16	10	6.8	5.5
17	55	306	442	600	152	216	35	25	15	10	6.3	5.5
18	91	245	316	*382	175	169	34	23	15	10	*6.3	5.5
19	90	205	259	297	260	140	33	23	14.5	10	6.3	5.5
20	79	237	316	306	437	126	32	22	14	9.7	6.3	5.5
21	68	297	354	578	276	126	31	21	14	9.7	6.3	4.7
22	63	462	576	432	197	119	30	21	14	9.7	6.3	4.7
23	57	432	831	335	156	103	29	25	14	9.7	6.3	5.1
24	54	482	535	278	138	96	28	35	14	9.7	6.3	*5.9
25	92	524	362	297	121	90	27	33	13.5	10	6.3	17.5
26	117	524	306	316	105	87	27	26	13	9.7	6.3	10
27	269	472	278	259	90	81	61	24	13	8.7	6.8	12
28	392	392	382	215	a85	74	90	*24	12	8.7	10	31
29	335	306	326	185	-	81	54	23	12	8.7	9.2	184
30	288	412	422	164	-	138	45	21	11.5	8.2	7.2	196
31	268	-	364	146	-	105	-	20	-	8.2	7.2	1,150
Total	4,124.5	8,022	10,977	10,675	8,929	4,012	1,470	865	481.0	328.7	219.9	579.3
Mean	133	267	354	344	319	129	49.0	27.9	16.0	10.6	7.09	19.3
Cfsm	7.39	14.8	19.7	19.1	17.7	7.17	2.72	1.55	0.889	0.589	0.394	1.07
In.	8.52	16.57	22.68	22.06	18.45	8.29	3.04	1.79	0.99	0.68	0.45	1.20
Ac-ft	8,180	15,910	21,770	21,170	17,710	7,960	2,920	1,720	954	652	436	1,150

Calendar year 1950: Max 1,000 Min 11 Mean 166 Cfsm 9.22 In. 125.56 Ac-ft 120,500

Water year 1950-51: Max 1,180 Min 4.7 Mean 139 Cfsm 7.72 In. 104.72 Ac-ft 100,500

Peak discharge (base, 930 cfs).--Dec. 22 (9 p.m.) 980 cfs (6.31 ft); Jan. 2 (12:30 p.m.) 1,120 cfs (6.76 ft); Feb. 9 (1:30 p.m.) 1,420 cfs (7.78 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

## WILLAPA RIVER BASIN

## Willapa River at Lebam, Wash.

Location.--Lat 46°33'50", long. 123°33'50", in SW $\frac{1}{4}$  sec. 33, T. 13 N., R. 7 W., on left bank half a mile west of Lebam and 1 mile upstream from Walker Creek.

Drainage area.--41.4 sq mi.

Records available.--June 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 160 ft (from topographic map).

Extremes.--Maximum discharge during year, 3,460 cfs Feb. 9 (gage height, 13.80 ft); minimum, 1.4 cfs Sept. 22.

1948-51: Maximum discharge, 4,930 cfs Feb. 22, 1949 (gage height, 17.53 ft, from high-water mark in gage house), from rating curve extended above 2,200 cfs; minimum, that of Sept. 22, 1951.

Remarks.--Records excellent except those above 2,500 cfs and those for periods of shifting control, which are fair. No diversion or regulation.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

2.38	2.2	3.7	213	7.0	1,180
2.5	8.0	4.0	285	8.0	1,460
2.7	29	4.5	410	9.0	1,780
2.9	57	5.0	580	10.0	2,120
3.1	90	5.5	710	11.0	2,480
3.4	147	6.0	860	13.0	3,180

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.0	410	770	425	197	149	223	63	22	9.8	5.7	4.5
2	9.0	335	545	1,180	530	135	197	57	21	9.8	5.7	4.5
3	9.8	*273	500	1,190	635	139	177	54	20	9.8	6.3	4.5
4	14	225	515	755	575	188	160	62	21	11.5	6.3	4.0
5	48	195	425	515	425	175	145	62	21	13	6.3	3.5
6	44	166	530	360	398	164	133	56	21	15	5.7	4.5
7	54	147	545	322	980	158	125	59	21	13	5.7	9.8
8	71	*500	268	1,250	149	116	52	20	12	5.7	9.8	9.8
9	63	118	485	235	3,070	141	110	48	18	11.5	6.3	5.7
10	232	108	410	232	2,020	133	103	48	18	10.5	6.9	4.5
11	141	101	360	232	1,400	145	92	45	18	9.0	6.9	3.5
12	88	94	302	206	890	455	87	44	19	8.3	6.9	3.5
13	63	87	259	320	590	605	82	45	19	*8.3	6.9	3.5
14	56	92	232	410	425	500	76	42	18	8.3	6.3	2.6
15	46	235	572	1,400	360	800	*73	41	17	8.3	5.7	2.6
16	39	590	500	*1,280	288	650	70	38	12	8.3	5.7	3.0
17	37	560	665	1,220	271	455	67	37	13	8.3	5.1	3.0
18	101	425	515	740	283	348	62	36	12	8.3	4.0	3.5
19	139	360	425	530	348	290	59	33	11.5	8.3	*4.0	4.0
20	119	665	530	500	575	254	56	32	11.5	8.3	4.0	3.0
21	92	1,160	635	1,220	455	263	52	29	10.5	8.3	4.0	3.5
22	75	920	920	920	360	259	50	28	10.5	7.6	3.5	2.2
23	65	665	1,130	635	298	225	48	34	11.5	6.9	3.5	3.0
24	60	620	755	530	259	204	45	36	11.5	6.9	4.0	4.0
25	125	695	515	560	232	190	44	37	10.5	7.6	5.1	*6.3
26	199	695	385	605	204	181	42	*30	10.5	8.3	4.5	5.7
27	515	605	348	440	*179	166	76	28	10.5	7.6	5.1	3.5
28	860	530	425	348	162	153	129	29	9.8	6.9	6.9	14
29	560	425	372	280	-	181	82	27	9.8	6.9	6.3	30
30	425	755	515	242	-	292	70	25	9.8	6.3	5.7	85
31	410	-	530	211	-	259	-	24	-	6.3	4.0	-
Total	4,768.8	12,385	15,915	18,291	17,659	8,406	2,851	1,279	458.9	279.2	169.3	244.7
Mean	154	413	513	590	531	271	95.0	41.3	15.3	8.01	5.46	8.16
Cfsm	3.72	9.96	12.4	14.3	15.2	6.55	2.29	0.998	0.370	0.218	0.132	0.197
In.	4.28	11.13	14.30	16.43	15.86	7.55	2.56	1.15	0.41	0.25	0.15	0.22
Ac-ft	9,460	24,570	31,570	36,280	35,030	16,670	5,650	2,540	910	554	336	485

Calendar year 1950: Max 1,920 Min 7.2 Mean 260 Cfsm 6.28 In. 85.21 Ac-ft 188,200  
 Water year 1950-51: Max 3,070 Min 2.2 Mean 227 Cfsm 5.48 In. 74.29 Ac-ft 164,100

Peak discharge (base, 1,800 cfs).--Feb. 9 (1:30 p.m.) 3,460 cfs (13.80 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1-27, June 8 to Aug. 10, Aug. 24 to Sept. 23.

## Willapa River near Willapa, Wash.

Location.--Lat 46°39'00", long. 123°38'40", in NW¼ sec. 2, T. 13 N., R. 8 W., on right bank just below Mill Creek, 0.6 mile upstream from bridge, and 2½ miles southeast of Willapa.

Drainage area.--130 sq mi.

Records available.--August 1947 to September 1951 (fragmentary prior to August 1948).

Gage.--Water-stage recorder. Altitude of gage is 15 ft (by barometer). Prior to July 28, 1948, at site 60 ft upstream at different datum.

Extremes.--Maximum discharge during year, 10,300 cfs Feb. 9 (gage height, 21.86 ft); minimum, 15.5 cfs Sept. 22 (gage height, 2.93 ft).

1947-51: Maximum discharge, 11,400 cfs Feb. 22, 1949 (gage height, 24.22 ft), from rating curve extended above 7,300 cfs; minimum, that of Sept. 22, 1951.

Remarks.--Records excellent except those for period of shifting control, which are fair. No diversion or regulation.

Rating table, water year 1950-51, except period of shifting control (gage height, in feet, and discharge, in cubic feet per second)

2.8	12.5	4.0	137	6.0	750	12.0	3,600
3.0	22	4.3	195	7.0	1,150	14.0	4,800
3.2	36	4.6	270	8.0	1,550	16.0	6,000
3.4	54	5.0	390	9.0	2,050	18.0	7,400
3.7	89	5.5	565	10.0	2,550	20.0	8,800

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	46	1,390	2,550	1,470	710	565	790	238	97	42	27	26
2	43	1,230	1,950	3,560	1,510	512	650	215	93	42	26	25
3	45	*1,010	1,750	4,260	1,800	512	635	195	90	42	26	24
4	52	850	1,900	2,750	1,700	730	582	208	93	44	26	22
5	169	750	1,650	2,000	1,350	710	530	218	95	48	26	21
6	228	652	2,000	1,470	1,230	635	478	193	95	57	24	20
7	288	582	*2,050	1,230	3,200	600	456	208	93	52	24	23
8	354	512	1,850	1,010	3,660	582	408	185	89	44	24	46
9	297	450	1,700	870	8,790	530	372	175	84	43	24	34
10	1,060	411	1,470	850	7,610	495	339	171	81	43	27	25
11	725	372	1,310	850	5,340	478	324	171	79	39	29	22
12	397	342	1,110	770	3,170	1,110	315	161	82	35	29	20
13	276	318	950	1,230	2,150	1,950	300	167	82	*35	29	19
14	220	333	830	1,600	1,550	1,650	270	151	79	35	27	17.5
15	185	652	1,190	4,170	1,350	2,500	*258	148	74	35	24	17
16	159	1,750	1,650	4,020	1,110	2,350	250	137	69	35	24	16.5
17	141	1,750	2,250	*4,260	1,010	1,850	235	133	64	34	23	17
18	308	1,430	1,750	2,600	1,070	1,270	222	130	63	34	21	17
19	495	1,150	1,430	1,900	*1,190	1,070	208	119	61	33	*21	17.5
20	442	1,650	1,700	1,550	2,150	930	200	116	59	32	20	17.5
21	335	2,850	2,200	3,700	1,600	970	187	113	56	32	20	16.5
22	275	2,000	2,880	3,050	1,310	990	177	103	54	31	20	16
23	230	2,350	4,560	2,200	1,070	850	173	117	53	30	19	16
24	202	2,350	2,900	1,950	950	750	167	132	53	30	19	*17
25	385	2,550	2,050	2,000	850	690	159	171	52	31	20	35
26	730	2,650	1,470	2,250	750	670	153	*130	50	31	21	49
27	1,340	2,350	1,270	1,600	670	618	198	116	49	30	21	34
28	2,500	2,000	1,550	1,270	800	565	618	117	47	30	29	92
29	2,020	1,600	1,350	1,030	-	562	333	111	44	30	35	179
30	1,470	2,250	1,750	890	-	1,070	265	105	42	28	31	832
31	1,390	-	1,750	770	-	910	-	100	-	28	27	-
Total	16,803	41,534	56,770	63,130	59,450	29,494	10,292	4,754	2,122	1,135	763	1,733.5
Mean	542	1,384	1,831	2,036	2,123	951	343	153	70.7	56.6	24.6	57.8
Cfsm	4.17	10.6	14.1	15.7	16.3	7.32	2.64	1.18	0.544	0.282	0.189	0.445
In.	4.81	11.88	16.24	18.06	17.01	8.44	2.94	1.36	0.61	0.32	0.22	0.50
Ac-ft	33,330	82,360	112,600	125,200	117,900	58,500	20,410	9,450	4,230	2,250	1,510	3,440
Calendar year 1950: Max	6,630	Min	30	Mean	912	Cfsm	7.02	In.	95.19	Ac-ft	660,000	
Water year 1950-51: Max	8,790	Min	16	Mean	789	Cfsm	6.07	In.	82.39	Ac-ft	571,200	

Peak discharge (base, 5,000 cfs).--Dec. 23 (2 a.m.) 5,220 cfs (14.73 ft); Jan. 2 (12 p.m.) 5,460 cfs (15.12 ft); Jan. 17 (1 a.m.) 5,340 cfs (14.93 ft); Feb. 9 (5:30 p.m.) 10,300 cfs (21.86 ft).

\* Discharge measurement made on this day.

## North River near Raymond, Wash.

Location.--Lat 46°49', long. 123°51', in sec. 6, T. 15 N., R. 9 W., on left bank  $1\frac{1}{4}$  miles upstream from Salmon Creek and 10 miles northwest of Raymond.

Drainage area.--219 sq mi.

Records available.--August 1927 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 7.39 ft above mean sea level (Western Washington Electric Light & Power Co. benchmark).

Average discharge.--24 years, 936 cfs.

Extremes.--Maximum discharge during year, 14,800 cfs Feb. 11 (gage height, 11.0 ft, from high-water mark in well); minimum, 21 cfs Aug. 24 (gage height, 1.01 ft).  
1927-51: Maximum discharge, 35,000 cfs Dec. 10, 1933 (gage height, 15.8 ft, from floodmarks), from rating curve extended above 6,300 cfs; minimum, that of Aug. 24, 1951.

Remarks.--Records excellent except those for periods of no gage-height record, which are fair. No diversion or regulation.

Revisions (water years).--W 792: 1934. W 832: 1935-36.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.0	20	2.6	410	5.5	3,630
1.2	40	3.0	650	6.0	4,380
1.4	66	3.5	1,060	7.0	6,020
1.7	120	4.0	1,600	8.0	7,910
2.0	190	4.5	2,240	9.0	10,000
2.3	286	5.0	2,920	10.4	13,300

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	112	2,180	2,990	2,370	1,120	872	1,270	340	159	77	39	33
2	100	2,300	2,920	3,780	1,480	808	1,100	313	152	77	38	31
3	98	1,920	2,500	3,160	2,240	832	979	294	148	63	38	30
4	105	1,850	2,570	3,160	2,570	988	872	286	143	63	38	29
5	265	1,320	2,440	3,930	2,240	1,200	800	305	146	63	38	28
6	490	*1,170	2,990	2,850	1,920	1,080	728	332	150	72	37	28
7	824	1,020	3,630	2,180	3,700	961	678	301	152	72	36	37
8	864	880	*3,200	1,720	4,530	889	622	294	152	63	35	44
9	650	768	2,990	1,460	8,900	824	580	272	141	63	34	42
10	1,720	692	2,850	1,330	12,300	784	550	258	135	62	34	58
11	2,370	629	2,990	1,240	13,300	752	514	254	128	67	34	52
12	1,360	580	1,920	1,140	7,510	1,520	484	262	128	59	36	42
13	808	550	1,600	1,530	5,000	3,410	460	265	126	57	37	39
14	587	520	1,390	2,180	3,130	3,560	435	254	128	*56	37	35
15	466	760	1,500	3,560	2,370	3,560	415	241	124	55	37	33
16	396	1,780	2,240	4,840	1,920	4,380	396	229	118	53	36	32
17	353	2,110	3,130	*5,500	1,600	3,780	374	216	112	52	33	31
18	388	1,980	2,990	5,330	1,540	2,570	365	210	102	52	31	30
19	496	1,720	2,370	3,780	1,780	1,980	357	202	98	51	30	30
20	568	1,720	2,180	2,780	2,780	1,720	344	193	95	49	*28	30
21	484	2,180	2,500	3,200	2,780	1,660	324	187	93	47	26	30
22	425	3,080	3,080	4,080	2,110	1,720	305	180	89	45	24	29
23	383	3,930	5,160	3,780	1,660	1,660	294	182	85	44	23	29
24	349	4,530	6,020	3,060	1,410	1,410	282	213	80	42	22	30
25	388	4,680	4,840	2,920	1,290	1,270	276	241	80	42	22	*41
26	526	4,680	3,200	3,200	1,180	1,180	272	238	76	42	22	40
27	926	4,080	2,570	2,990	1,050	1,100	320	*210	78	41	22	48
28	2,110	3,200	2,570	2,240	943	988	587	187	78	42	23	102
29	2,500	2,570	2,440	1,780	-	943	556	182	74	41	24	363
30	2,040	2,500	2,370	1,440	-	1,250	401	177	70	42	24	907
31	1,780	-	2,570	1,250	-	1,500	-	167	-	47	33	-
Total	24,930	61,559	87,970	91,760	94,353	51,151	15,940	7,485	3,440	1,697	971	2,333
Mean	804	2,052	2,838	2,960	3,370	1,650	531	241	115	54.5	31.3	77.8
Offm	3.67	9.37	9.70	13.5	15.4	7.53	2.42	1.10	0.525	0.249	0.143	0.355
In.	4.23	10.45	14.94	15.58	16.02	8.69	2.71	1.27	0.58	0.23	0.16	0.40
Ac-ft	49,450	122,100	174,500	182,000	187,100	101,500	31,620	14,850	6,820	3,350	1,930	4,630

Calendar year 1950: Max 7,510 Min 50 Mean 1,358 Cfsm 6.20 In. 84.15 Ac-ft 983,000  
Water year 1950-51: Max 13,300 Min 22 Mean 1,215 Cfsm 5.55 In. 75.32 Ac-ft 879,800

Peak discharge (base, 4,000 cfs).--Nov. 25 (1:30 p.m.) 5,000 cfs (6.40 ft); Dec. 24 (4 p.m.) 6,200 cfs (7.12 ft); Jan. 4 (3:30 a.m.) 5,500 cfs (6.70 ft); Jan. 18 (3 a.m.) 5,670 cfs (6.78 ft); Jan. 22 (7 p.m.) 4,230 cfs (5.94 ft); Feb. 11 (time unknown) 14,800 cfs (11.0 ft); Mar. 16 (5 p.m.) 4,680 cfs (6.15 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record June 23 to July 13; discharge estimated on basis of records for stations on nearby streams.

## Chehalis River near Doty, Wash.

Location.--Lat 46°37'00", long. 123°16'40" in NW $\frac{1}{4}$  sec. 14, T. 13 N., R. 5 W., on right bank  $\frac{1}{2}$  miles upstream from Elk Creek,  $\frac{1}{2}$  miles south of Doty, and  $3\frac{1}{2}$  miles north of Pe Ell.

Drainage area.--113 sq mi.

Records available.--October 1939 to September 1951.

Gage.--Staff gage and crest-stage indicator; gage read twice daily. Datum of gage is 302.1 ft above mean sea level (river-profile survey).

Average discharge.--12 years, 544 cfs.

Extremes.--Maximum discharge during year, 15,700 cfs Feb. 9 (gage height, 15.93 ft); minimum observed, 19 cfs Aug. 25-27, Sept. 21, 22 (gage height, 0.84 ft).

1939-51: Maximum discharge, 18,100 cfs Feb. 7, 1945 (gage height, 17.80 ft, water over gage; discharge based on observer's estimate of maximum gage height); minimum observed, that of Aug. 25-27, Sept. 21, 22, 1951.

Remarks.--Records good. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.7	13	2.5	560	8.0	4,700
.9	28	3.0	810	9.0	5,800
1.1	52	4.0	1,400	10.0	7,000
1.4	110	5.0	2,100	11.0	8,500
1.7	201	6.0	2,850	12.0	9,650
2.0	325	7.0	3,700	14.0	12,600

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	55	1,340	*1,680	1,340	1,750	438	980	263	97	40	25	25
2	52	1,340	1,340	2,450	1,820	392	860	246	92	40	25	23
3	55	980	1,470	3,170	1,750	370	860	223	88	40	25	22
4	66	760	1,960	2,030	1,540	460	860	259	92	40	25	21
5	177	635	1,750	1,470	1,220	415	760	267	92	43	25	20
6	415	535	2,310	1,100	1,220	392	*660	251	90	46	25	20
7	415	438	2,170	920	2,530	370	635	234	86	46	25	31
8	592	415	2,100	760	4,400	348	560	212	82	43	25	63
9	415	392	1,540	660	12,600	325	510	198	78	40	*25	40
10	1,540	348	1,160	660	6,760	302	460	194	74	38	25	29
11	1,040	325	1,040	660	4,700	302	438	216	74	35	25	25
12	535	302	860	635	2,690	610	460	187	74	32	25	22
13	370	267	710	535	1,680	1,100	460	187	74	32	25	22
14	280	267	660	1,340	1,280	1,160	415	177	70	32	25	24
15	234	510	860	3,450	1,040	2,100	370	167	65	34	25	24
16	201	1,340	1,220	2,850	810	1,680	348	155	62	34	25	22
17	184	1,400	1,680	2,850	760	1,160	325	*148	62	32	24	22
18	*485	1,160	1,400	1,820	760	920	302	142	58	31	23	22
19	710	920	1,100	1,540	710	810	276	136	55	31	22	20
20	585	2,030	1,160	1,100	1,160	810	255	131	52	31	22	20
21	392	3,250	1,540	2,240	1,040	920	231	123	52	30	22	19
22	325	2,340	2,530	1,400	860	980	216	120	50	29	20	19
23	280	2,240	4,200	1,540	760	810	208	126	47	29	20	19.5
24	259	2,380	2,770	1,610	660	760	201	133	46	28	19.5	21
25	302	2,310	1,540	2,450	610	760	194	128	46	29	19	29
26	710	2,100	1,160	2,690	535	760	187	128	44	29	19	47
27	1,750	1,750	1,040	1,540	*485	760	710	123	43	29	19	34
28	2,170	1,400	1,280	1,300	460	710	635	118	*43	28	27	45
29	1,610	1,160	1,280	860	-	760	370	110	43	27	26	152
30	1,290	1,400	1,540	710	-	1,160	302	106	40	27	25	810
31	1,340	-	1,400	*635	-	1,160	-	101	-	26	25	-
Total	18,624	37,034	48,450	47,895	56,590	24,004	14,048	5,309	1,971	1,051	732.5	1,710.5
Mean	601	1,324	1,563	1,545	2,021	774	468	171	65.7	33.9	23.6	57.0
Cfsm	5.32	10.9	13.8	15.7	17.9	6.85	4.14	1.51	0.581	0.300	0.209	0.504
In.	6.13	12.19	15.95	15.76	18.62	7.90	4.62	1.75	0.65	0.35	0.24	0.56
Ac-ft	36,940	73,460	96,100	95,000	112,200	47,610	27,860	10,530	3,910	2,080	1,450	3,390

Calendar year 1950: Max 6,520 Min 37 Mean 783 Cfsm 6.93 In. 94.09 Ac-ft 567,000  
 Water year 1950-51: Max 12,600 Min 19 Mean 705 Cfsm 6.24 In. 84.72 Ac-ft 510,500

\* Discharge measurement made on this day.

## CHEHALIS RIVER BASIN

Newaukum River near Chehalis, Wash.

Location.--Lat 46°36'10", long. 122°56'45", on line between secs. 9 and 16, T. 13 N., R. 2 W., on left bank 2.2 miles southeast of Chehalis and 3.4 miles upstream from mouth.

Drainage area.--159 sq mi.

Records available.--March 1929 to September 1931, July 1942 to September 1951.

Gage.--Staff gage and crest-stage indicator; gage read twice daily. Altitude of gage is 195 ft (from topographic map).

Average discharge.--11 years, 482 cfs.

Extremes.--Maximum discharge during year, 5,240 cfs Feb. 9 (gage height, 11.58 ft), from rating curve extended above 3,800 cfs by logarithmic plotting; minimum observed, 14 cfs Aug. 22 (gage height, 0.80 ft).  
1929-31, 1942-51: Maximum discharge observed, 6,440 cfs Feb. 17, 1919 (gage height, 13.06 ft), from rating curve extended above 3,800 cfs by logarithmic plotting; minimum observed, 12 cfs Sept. 13, 14, 1949.

Remarks.--Records good except those for period of shifting control, which are fair. Cities of Chehalis and Centralia divert about 15 cfs for municipal use. No regulation.

Revisions (water years).--W 1012: 1943. W 1152: 1949(M).

Rating tables, water year 1950-51, except period of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

1.4	32	0.8	14	4.0	740
1.7	76	1.0	27	5.0	1,130
2.0	133	1.3	54	6.0	1,630
2.5	248	1.6	92	7.0	2,130
3.0	388	2.0	160	8.0	2,730
4.0	732	2.5	270	9.0	3,360
5.0	1,130	3.0	405	10.2	4,200

Note.--Same as following table above 5.0 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	45	970	1,980	1,090	583	435	740	180	95	41	24	27
2	42	1,090	1,430	2,850	970	405	635	160	92	40	24	26
3	45	970	1,380	2,970	1,280	378	600	160	89	39	23	24
4	46	770	2,030	2,250	1,280	600	565	170	96	42	23	24
5	127	732	1,630	1,630	970	565	*530	376	115	50	22	24
6	211	619	2,130	1,280	930	495	465	246	107	54	21	24
7	154	619	2,370	1,010	1,230	530	465	258	104	54	21	26
8	144	583	1,880	850	1,980	465	435	234	95	50	21	40
9	176	418	1,480	732	4,200	435	405	212	89	46	*21	44
10	732	373	1,180	694	*3,920	405	362	190	84	44	21	33
11	656	329	1,010	656	4,200	495	334	212	78	40	21	27
12	329	315	890	*656	2,910	1,430	321	321	81	37	24	24
13	223	288	583	810	1,880	2,370	321	282	82	33	26	23
14	199	288	694	1,090	1,380	2,030	321	212	77	33	24	21
15	211	890	770	1,980	1,180	2,430	295	190	73	33	20	21
16	152	2,790	970	2,130	1,010	2,310	282	170	70	33	19	21
17	137	3,090	1,050	2,810	890	1,480	258	*160	68	33	19	21
18	211	1,980	970	1,730	1,090	1,090	246	150	63	32	19	21
19	*344	1,130	850	1,330	1,050	970	246	141	66	32	17.5	21
20	329	1,580	770	1,230	1,280	930	223	132	65	32	16.5	21
21	248	1,930	1,050	2,850	1,130	930	201	123	62	32	15	21
22	211	2,490	1,230	2,310	1,330	850	190	115	56	32	14	21
23	176	2,910	3,780	1,680	775	740	180	123	56	32	15	21
24	154	2,650	2,310	1,730	670	705	170	141	54	31	16	23
25	154	2,550	1,730	1,930	635	705	170	170	52	30	16.5	39
26	315	1,730	1,230	1,730	*565	670	160	132	52	29	16.5	115
27	548	2,550	1,050	1,330	495	635	190	141	51	29	17.5	50
28	1,230	1,780	1,090	970	465	565	246	123	*49	28	*30	44
29	1,280	*1,330	1,050	770	-	635	234	141	46	27	36	107
30	970	1,880	1,180	656	-	775	201	132	42	26	36	246
31	1,010	-	1,090	583	-	850	-	107	-	25	30	-
Total	10,809	41,624	42,837	46,117	40,278	28,306	9,991	5,604	2,209	1,119	669.5	1,200
Mean	349	1,387	1,382	1,488	1,458	913	333	181	73.6	36.1	21.6	40.0
Ac-ft	21,440	82,560	84,970	91,470	79,890	56,140	19,820	11,120	4,380	2,220	1,330	2,380

Calendar year 1950: Max 4,920 Min 25 Mean 726 Ac-ft 525,400  
Water year 1950-51: Max 4,200 Min 14 Mean 632 Ac-ft 457,700

\* Discharge measurement made on this day.

Note.--Shifting-control method used Feb. 12 to Mar. 12.



## CHEHALIS RIVER BASIN

21

Skookumchuck River near Centralia, Wash.

Location.--Lat 46°47'15", long. 122°42'45", in SW 1/4 sec. 17, T. 15 N., R. 1 E., on left bank half a mile upstream from Bloody Run Creek, 4 1/2 miles upstream from Thompson Creek, and 12 miles northeast of Centralia.

Drainage area.--59.9 sq mi (revised).

Records available.--April 1929 to September 1931, October 1939 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 300.00 ft above mean sea level (river-profile survey). Apr. 1, 1929, to Sept. 30, 1931, staff gage at site 0.4 mile downstream at different datum. Oct. 9 to Nov. 29, 1939, staff gage at present site and datum.

Average discharge.--14 years, 227 cfs.

Extremes.--Maximum discharge during year, 3,980 cfs Feb. 9 (gage height, 46.06 ft); minimum, 18.5 cfs Aug. 22, 23, Sept. 20-24 (gage height, 39.23 ft).  
1929-31, 1939-51: Maximum discharge, 5,770 cfs Feb. 17, 1949 (gage height, 48.39 ft); minimum, 18 cfs Oct. 27-30, 1944.

Remarks.--Records excellent. No diversion or regulation.

Revisions (water years).--W 722: 1929-30.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

39.2	16.5	40.1	133	41.1	447	43.0	1,510
39.5	41	40.3	179	41.5	635	43.5	1,850
39.7	65	40.5	233	42.0	910	44.0	2,200
39.9	95	40.8	329	42.5	1,210	45.0	2,980

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	34	519	*685	366	262	184	329	115	68	33	22	22
2	32	561	519	1,200	585	174	305	109	65	*33	23	21
3	31	439	575	1,300	795	169	319	102	64	33	23	21
4	34	555	1,000	850	685	179	340	133	64	34	22	20
5	119	326	822	595	500	169	309	157	65	34	22	20
6	127	279	1,000	465	426	162	279	140	65	38	22	19
7	95	251	1,090	378	585	153	266	146	62	33	22	23
8	113	225	850	333	970	148	248	129	60	31	22	44
9	106	197	630	295	2,750	142	*225	115	57	30	22	26
10	517	182	482	273	2,200	133	205	115	55	29	*22	22
11	322	169	443	276	*2,500	133	195	151	52	28	23	21
12	187	157	393	263	1,510	622	208	165	55	27	24	21
13	140	146	344	340	880	622	227	140	53	27	23	20
14	133	140	315	460	610	551	216	125	52	27	22	20
15	115	334	333	*1,120	519	1,060	195	113	49	27	22	19
16	*99	1,120	418	1,000	418	850	187	108	48	27	21	19
17	92	850	482	1,060	386	514	182	106	45	26	20	19
18	135	585	430	660	374	382	169	97	44	25	20	19
19	202	386	378	482	359	329	155	*92	43	25	20	19
20	208	571	393	405	443	333	140	89	41	25	19	18.5
21	189	1,390	547	1,180	397	370	129	85	41	25	19	18.5
22	137	1,600	769	850	340	355	119	84	40	24	18.5	18.5
23	117	1,270	1,450	590	298	315	113	90	40	23	19	18.5
24	104	1,510	910	795	273	292	109	92	39	23	19	18.5
25	123	1,150	635	1,030	248	289	106	106	38	24	19	41
26	179	850	487	1,060	*225	292	106	84	37	25	19	33
27	536	1,270	413	712	208	285	117	81	37	23	20	24
28	910	850	469	514	195	266	184	81	35	23	46	38
29	712	571	430	405	-	308	160	79	34	22	31	50
30	518	635	447	336	-	382	133	73	33	22	23	174
31	465	-	393	298	-	366	-	71	-	22	22	-
Total	6,832	18,868	18,532	19,691	19,961	10,730	5,975	3,373	1,481	848	691.5	867.5
Mean	220	630	598	642	713	346	199	109	49.4	27.4	22.3	28.9
Cfsm	3.67	10.5	9.98	10.7	11.9	5.78	3.32	1.82	0.825	0.457	0.372	0.482
In.	4.24	11.73	11.51	12.35	12.39	6.66	3.71	2.09	0.92	0.53	0.43	0.54
Ac-ft	13,550	37,460	36,760	39,450	39,590	21,280	11,850	6,690	2,940	1,680	1,370	1,720

Calendar year 1950: Max 2,970 Min 24 Mean 375 Cfsm 6.26 In. 84.80 Ac-ft 271,200  
water year 1950-51: Max 2,750 Min 18.5 Mean 296 Cfsm 4.94 In. 67.10 Ac-ft 214,300

Peak discharge (base, 2,000 cfs).--Feb. 9 (5:30 p.m.) 3,980 cfs (46.06 ft).

\* Discharge measurement made on this day.

## CHEHALIS RIVER BASIN

Chehalis River near Grand Mound, Wash.

Location.--Lat 46°46'35", long. 123°02'05", in NE<sup>1</sup> sec. 22, T. 15 N., R. 3 W., on left bank at downstream side of highway bridge at Meadows, 1½ miles southwest of Grand Mound and 6 miles downstream from Skookumchuck River.

Drainage area.--895 sq mi (revised).

Records available.--October 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 123.27 ft above mean sea level, datum of 1929. Prior to Oct. 3, 1934, staff gage attached to bridge piling at right bridge abutment at datum 3.0 ft higher.

Average discharge.--23 years, 2,693 cfs.

Extremes.--Maximum discharge during year, 38,000 cfs Feb. 10 (gage height, 16.96 ft); minimum, 90 cfs Aug. 23-26 (gage height, 1.20 ft).

1928-51: Maximum discharge, 48,400 cfs Dec. 29, 1937 (gage height, 18.39 ft); minimum, that of Aug. 23-26, 1951.

Remarks.--Records good except those for period of shifting control, which are fair.

Cities of Centralia and Chehalis divert about 15 cfs from Newaukum River, a tributary, for municipal use. No regulation.

Revisions.--W 932: Drainage area.

Rating tables, water year 1950-51, except period of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9				Feb. 10 to Sept. 30					
1.9	212	3.6	1,420	1.2	90	2.9	900	7.0	5,700
2.1	306	4.0	1,820	1.4	148	3.2	1,120	8.0	7,400
2.3	414	4.5	2,370	1.6	215	3.6	1,450	10.0	11,200
2.6	605	5.0	2,920	1.8	293	4.0	1,820	12.0	15,600
2.9	822	6.0	4,200	2.0	380	4.5	2,340	14.0	21,600
3.2	1,060			2.3	530	5.0	2,910	16.3	33,100
Note. -- Same as following table above 6.0 ft.				2.6	710	6.0	4,200		

Note.--Same as following table above 6.0 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	257	5,860	11,400	7,220	3,280	2,500	4,480	1,030	490	212	136	145
2	246	6,700	10,800	7,940	3,660	2,230	3,920	949	470	204	133	133
3	234	5,540	8,860	15,400	7,400	2,070	3,530	893	455	212	133	124
4	239	4,340	9,810	15,900	7,400	2,450	3,400	907	455	215	133	118
5	316	3,660	10,800	12,900	7,400	3,270	3,150	1,360	470	223	133	115
6	877	3,160	10,400	9,430	5,860	2,850	*2,790	1,160	490	242	133	110
7	1,090	2,700	11,800	7,040	6,700	2,670	2,500	1,160	495	257	127	115
8	1,150	2,420	11,600	5,540	11,400	2,500	2,340	1,080	470	253	124	133
9	1,200	2,100	9,810	4,480	15,200	2,450	2,070	956	440	226	124	201
10	1,810	1,820	7,940	3,920	33,100	2,230	1,920	886	415	215	*124	208
11	4,920	1,670	6,360	3,660	*31,800	2,120	1,770	900	390	208	127	167
12	2,480	1,570	5,380	*3,530	26,200	4,340	1,680	1,080	380	194	136	145
13	1,470	1,420	4,340	3,530	18,400	11,800	1,680	1,010	390	184	139	130
14	1,150	1,330	3,660	5,700	13,300	11,400	1,630	956	390	174	142	121
15	997	1,680	3,660	9,910	9,050	11,200	1,500	879	371	170	133	118
16	*853	7,180	5,070	14,900	7,040	14,600	1,400	812	348	170	124	115
17	747	11,200	6,530	16,600	5,380	11,800	1,320	758	327	167	118	110
18	784	11,400	7,040	17,200	5,070	8,300	1,240	*734	314	167	112	107
19	1,820	8,480	6,020	13,500	4,770	6,190	1,200	698	301	164	107	107
20	2,540	7,400	5,380	10,000	5,380	5,220	1,120	662	297	161	101	104
21	1,980	11,600	7,580	13,500	*6,190	4,920	1,030	632	289	154	98	107
22	1,520	14,400	8,480	15,900	5,380	5,070	970	596	281	151	96	101
23	1,200	16,200	14,400	14,400	4,480	4,620	928	584	261	148	90	98
24	1,020	14,900	17,200	11,600	3,920	3,920	893	520	257	148	90	101
25	908	14,200	14,400	11,600	3,660	3,660	858	650	253	145	90	121
26	1,380	13,300	10,200	12,000	3,270	3,530	830	656	249	145	93	174
27	2,340	11,400	7,580	9,430	2,850	3,400	837	584	258	148	98	253
28	7,440	10,000	6,700	7,000	2,560	3,150	1,280	560	254	148	115	219
29	9,050	7,580	6,870	5,500	-	3,030	1,540	566	*230	148	154	253
30	7,040	*7,400	6,670	4,480	-	3,920	1,200	554	213	142	180	602
31	6,360	-	7,940	3,800	-	5,070	-	515	-	139	158	-
Total	65,420	212,610	264,880	297,510	260,100	156,480	55,006	25,387	10,669	5,634	3,801	4,655
Mean	2,110	7,087	8,545	9,597	9,289	5,048	1,834	819	356	182	123	155
Cfsm	2.36	7.92	9.55	10.7	10.4	5.64	2.05	0.915	0.397	0.203	0.137	0.173
In.	2.72	8.83	11.01	12.36	10.81	6.50	2.29	1.05	0.44	0.23	0.16	0.19
Ac-ft	129,800	421,700	525,400	590,100	515,900	310,400	109,100	50,350	21,160	11,170	7,540	9,230

Calendar year 1950: Max 26,000 Min 141 Mean 4,246 Cfsm 4.74 In. 64.4c Ac-ft 3,074,000  
 Water year 1950-51: Max 33,100 Min 90 Mean 3,732 Cfsm 4.17 In. 58.55 Ac-ft 2,702,000

Peak discharge (base, 13,000 cfs).--Nov. 23 (1 to 2 p.m.) 16,600 cfs (12.35 ft); Dec. 24 (5 a.m.) 17,800 cfs (12.77 ft); Jan. 5 (8:30 to 11 p.m.) 16,600 cfs (12.58 ft); Jan. 17 (9 to 10 p.m.) 17,500 cfs (12.73 ft); Feb. 10 (5 p.m.) 38,000 cfs (16.96 ft); Mar. 16 (10:30 a.m.) 15,200 cfs (11.77 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1-10, Nov. 24 to Dec. 23.

## Rock Creek at Cedarville, Wash.

Location.--Lat 46°52'05", long. 123°18'25", in SW<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub> sec. 15, T. 16 N., R. 5 W., on left bank 0.2 mile downstream from Williams Creek, 1 mile west of Cedarville, and 1<sup>1</sup>/<sub>2</sub> miles upstream from mouth.

Drainage area.--24.8 sq mi.

Records available.--July 1942 to October 1943 (fragmentary), June 1944 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 70 ft (from topographic map). Prior to Aug. 17, 1944, staff gage at railroad bridge three-quarters of a mile downstream at different datum.

Average discharge.--7 years (1944-51), 86.2 cfs.

Extremes.--Maximum discharge during year, 1,660 cfs Feb. 9 (gage height, 13.77 ft), from rating curve extended above 800 cfs; minimum, 0.4 cfs Aug. 21, 22, 23 (gage height, 2.09 ft).

1942-51: Maximum discharge, that of Feb. 9, 1951; minimum, 0.3 cfs Sept. 25, 1946.

Remarks.--Records good except those for periods of shifting control, which are fair. No regulation, but some diversion for irrigation.

Revisions (water years).--W 982: 1942. W 1092: 1945(M), 1946(M).

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

2.0	0.2	3.6	76	7.0	532
2.2	1.3	4.0	124	8.0	682
2.4	3.9	4.5	188	9.0	840
2.7	11.5	5.0	253	10.0	1,000
3.0	25	5.5	319	11.0	1,170
3.3	46	6.0	389	12.2	1,370

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3.3	220	286	201	95	76	120	20	8.9	1.2	1.1	1.1
2	2.8	201	240	375	139	70	106	19	8.9	1.4	1.1	1.1
3	3.1	158	214	577	188	69	94	18	9.8	1.6	1.2	1.0
4	6.8	128	227	431	234	90	82	20	10.5	2.2	1.2	1.0
5	18.5	107	240	305	194	100	72	23	12	2.5	1.2	.7
6	21	90	375	227	175	92	*64	19.5	13	5.4	1.2	.7
7	29	80	312	182	266	87	58	19	13.5	5.0	1.1	1.0
8	24	67	253	149	340	82	54	17	11.5	2.9	1.1	2.6
9	20	58	220	124	1,370	77	50	15.5	9.8	2.5	1.2	2.5
10	161	52	182	110	984	72	46	14.5	8.9	2.0	*1.4	1.8
11	78	48	161	99	728	70	43	17	8.1	1.7	1.5	1.4
12	38	46	136	87	487	271	40	17.5	10	1.2	1.4	1.2
13	26	41	118	113	305	445	38	16.5	11	1.2	1.2	1.0
14	19.5	40	105	168	227	326	36	15	10.5	1.2	1.2	1.0
15	16	56	129	431	188	532	34	14.5	10.5	1.2	1.0	.9
16	13	130	201	502	153	473	32	13	9.8	1.3	.9	.8
17	12.5	168	279	652	134	292	29	13	10.5	1.2	.7	*.9
18	19	188	227	369	122	220	28	13	9.2	1.1	.7	.8
19	30	152	188	279	122	188	28	*12.5	9.2	1.1	.6	.8
20	28	182	194	234	220	168	26	12	7.8	1.0	.6	.8
21	24	208	214	459	*194	162	24	11	6.8	1.0	.5	.7
22	22	361	347	475	159	161	23	11	5.4	1.0	.5	.6
23	19.5	389	712	326	137	141	22	12.5	5.2	1.0	.4	.6
24	18.5	417	475	280	122	124	21	13.5	5.4	1.0	.5	.7
25	20	389	292	253	110	112	20	14.5	4.7	1.2	.5	1.2
26	28	361	220	292	98	99	20	12	4.3	1.3	.6	2.1
27	88	266	188	234	87	88	23	11	4.1	1.3	.6	1.9
28	188	214	208	182	80	77	37	11	3.3	1.2	.9	9.5
29	182	175	201	152	-	74	27	10.5	*2.2	1.2	1.0	14
30	141	*214	227	*126	-	124	22	9.8	1.5	1.2	1.2	44
31	157	-	234	107	-	131	-	9.8	-	1.2	1.1	-
Total	1,457.5	5,206	7,603	8,499	7,858	5,093	1,319	456.1	246.3	51.5	29.4	98.4
Mean	47.0	174	245	274	274	164	44.0	14.7	8.21	1.66	0.95	3.28
Cfsm	1.90	7.02	9.88	11.0	11.0	6.61	1.77	0.593	0.331	0.067	0.036	0.132
In.	2.19	7.81	11.40	12.75	11.48	7.64	1.98	0.68	0.37	0.08	0.04	0.15
Ac-ft	2,890	10,330	15,080	16,860	15,190	10,100	2,620	905	489	102	58	195

Calendar year 1950: Max 883 Min 1.1 Mean 111 Cfsm 4.48 In. 60.81 Ac-ft 80,420

Water year 1950-51: Max 1,370 Min 0.4 Mean 103 Cfsm 4.15 In. 56.57 Ac-ft 74,820

Peak discharge (base, 800 cfs).--Feb. 9 (time unknown) 1,660 cfs (13.77 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1 to Dec. 5, Feb. 10 to Mar. 25, Apr. 10 to Sept. 29.

## CHEHALIS RIVER BASIN

## Cloquallum River at Elma, Wash.

Location.--Lat 47°00'20", long. 123°23'10", in S<sup>1</sup>W<sup>1</sup> sec. 36, T. 18 N., R. 6 W., on right bank 200 ft upstream from highway bridge, half a mile east of Elma, and 1.8 miles downstream from Wildcat Creek.

Drainage area.--65.8 sq mi (revised).

Records available.--July 1942 to October 1943 (fragmentary), July 1944 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 20 ft (from topographic map). Prior to Aug. 7, 1944, staff gage at site 550 ft downstream at different datum.

Average discharge.--7 years (1944-51), 259 cfs.

Extremes.--Maximum discharge during year, 4,470 cfs Feb. 9 (gage height, 11.04 ft); minimum, 13.5 cfs Sept. 13 (gage height, 1.86 ft).  
1942-51: Maximum discharge, that of Feb. 9, 1951; minimum, 6.8 cfs Sept. 15, 1945 (gage height, 1.43 ft).

Remarks.--Records good except those for periods of shifting control, which are fair, and those for period of no gage-height record, which are poor. Several small diversions on minor tributaries above station and some regulation by log pond on Wildcat Creek.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.8	14	3.3	320	6.0	1,350
2.0	38	3.6	410	7.0	1,810
2.2	70	4.0	535	8.0	2,360
2.4	107	4.5	710	9.0	2,970
2.7	168	5.0	910	10.0	3,670
3.0	240	5.5	1,110		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a28	622	790	395	410	260	288	109	67	37	24	23
2	a26	518	640	1,020	675	240	260	105	65	38	21	23
3	a25	485	622	1,280	750	240	240	103	65	38	25	22
4	a50	395	605	990	710	299	222	119	65	40	24	21
5	al00	353	518	750	588	285	208	127	67	41	24	18.5
6	al40	293	810	588	535	248	198	115	67	47	22	18.5
7	*198	260	810	500	630	240	188	*121	63	44	21	29
8	147	230	675	455	1,240	230	175	107	60	41	23	32
9	119	205	692	410	3,570	222	168	103	56	38	28	21
10	876	191	675	395	3,390	215	162	101	55	37	29	17.5
11	410	182	570	395	2,480	210	155	107	53	29	29	16
12	242	180	485	371	*1,680	635	153	101	55	24	29	16
13	182	168	425	485	1,150	950	147	98	56	24	25	15
14	153	168	380	552	870	770	145	94	55	24	23	15
15	135	222	455	1,150	750	1,260	139	92	50	25	22	15
16	123	344	552	1,280	605	1,110	135	88	48	28	23	15
17	117	*329	810	1,560	552	750	131	86	47	26	22	14
18	137	311	658	1,070	500	605	129	81	46	26	21	15
19	225	278	552	870	500	518	127	81	44	26	19.5	19.5
20	184	380	552	750	710	485	123	79	*44	26	19.5	18.5
21	162	692	588	1,380	570	518	119	77	46	26	19.5	16
22	147	1,010	877	1,200	485	518	117	74	44	28	19.5	17.5
23	137	908	1,760	930	425	*440	113	79	42	29	18.5	17.5
24	131	1,280	1,560	850	395	380	111	81	41	29	18.5	19.5
25	135	1,390	1,150	890	395	362	109	83	41	28	19.5	33
26	164	1,380	790	1,110	344	329	107	74	40	28	19.5	23
27	248	1,010	658	810	299	288	123	70	41	*28	22	23
28	485	750	640	640	299	262	160	72	40	26	31	62
29	485	552	*535	518	272	285	125	75	38	26	32	74
30	410	710	*535	470	-	268	113	72	37	26	28	137
31	470	-	440	425	-	326	-	68	-	25	*23	-
Total	6,591	15,794	21,809	24,489	25,660	13,748	4,688	2,842	1,538	956	725.0	807.0
Mean	213	526	704	790	916	443	156	91.7	51.3	30.8	23.4	26.9
Cfsm	3.24	7.99	10.7	12.0	13.9	6.73	2.37	1.39	0.780	0.468	0.356	0.409
In.	3.73	8.83	12.33	13.84	14.50	7.77	2.65	1.61	0.87	0.54	0.41	0.46
Ac-ft	13,070	31,330	43,280	46,570	50,900	27,270	9,300	5,640	3,050	1,900	1,440	1,600
Calendar year 1950:	Max	2,020	Min	24	Mean	334	Cfsm	5.08	In.	68.79	Ac-ft	241,900
Water year 1950-51:	Max	3,570	Min	14	Mean	328	Cfsm	4.98	In.	67.64	Ac-ft	237,300

Peak discharge (base, 1,500 cfs).--Nov. 25 (10 p.m.) 1,810 cfs (6.84 ft); Dec. 27 (5 p.m.) 2,130 cfs (7.55 ft); Jan. 2 (9:30 p.m.) 1,560 cfs (6.63 ft); Jan. 17 (2 a.m.) 1,760 cfs (6.88 ft); Jan. 21 (1:30 p.m.) 1,510 cfs (6.44 ft); Feb. 9 (7:30 p.m.) 4,470 cfs (11.04 ft); Mar. 15 (5:30 p.m.) 1,560 cfs (6.51 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

Note.--Shifting-control method used Oct. 11 to Nov. 28, Dec. 26 to Jan. 2, May 12 to Sept. 30.

## Chehalis River at South Elma, Wash.

Location.--Lat 46°49'00", long. 123°24'40", in NE<sup>1</sup>/<sub>4</sub> sec. 10, T. 17 N., R. 6 W., on left bank 200 ft upstream from highway bridge at South Elma, 1.1 miles downstream from Cloquallum River.

Drainage area.--1,420 sq mi, approximately.

Records available.--July 1942 to December 1944 (fragmentary), October 1946 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 15 ft (from topographic map). Prior to Apr. 1, 1947, wire-weight gage at bridge 200 ft downstream at same datum.

Average discharge.--5 years (1946-51), 5,057 cfs.

Extremes.--Maximum discharge during year, 38,400 cfs Feb. 11 (gage height, 76.93 ft); minimum, 204 cfs Aug. 22 (gage height, 55.75 ft).  
1942-44, 1946-51: Maximum discharge, that of Feb. 11, 1951; minimum observed, 202 cfs Sept. 12, 1944 (gage height, 55.43 ft).

Remarks.--Records good except those for periods of shifting control or no gage-height record, which are fair. Cities of Centralia and Chehalis divert approximately 15 cfs from Newauum River, a tributary, for municipal use. Many minor diversions from main stream and tributaries for domestic use and irrigation. No regulation.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

55.6	180	58.0	2,170	66.0	12,400
55.9	370	59.0	3,170	68.0	15,700
56.2	585	60.0	4,270	70.0	19,400
56.5	815	61.0	5,400	72.0	23,500
57.0	1,250	62.0	6,600	74.0	28,500
57.5	1,680	64.0	9,300	77.0	38,800

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	496	8,460	14,000	10,800	6,360	4,710	6,730	2,020	1,020	475	276	300
2	461	8,320	15,500	11,400	6,860	4,490	6,120	1,870	984	468	276	288
3	454	8,180	14,500	16,800	9,750	4,270	5,520	1,770	943	461	276	276
4	489	8,660	13,500	20,600	11,800	4,360	5,280	1,770	927	475	276	258
5	638	5,880	14,300	21,400	11,600	5,160	5,040	2,070	943	475	270	240
6	*847	5,160	16,400	18,300	9,750	5,160	4,600	2,270	975	510	270	234
7	1,590	4,490	17,000	13,400	10,500	4,820	4,270	2,070	975	503	270	264
8	1,590	4,050	17,100	10,000	14,600	4,600	4,050	2,070	943	496	264	300
9	1,540	5,610	16,600	8,180	23,700	4,490	3,830	*1,920	911	496	264	294
10	4,570	3,170	15,000	7,120	23,600	4,270	3,610	1,770	863	475	270	321
11	5,280	2,970	11,900	6,600	37,600	4,050	3,390	1,720	831	447	270	335
12	4,490	2,770	9,600	6,240	36,400	5,730	3,170	1,770	823	426	276	300
13	2,870	2,570	8,180	6,240	33,800	12,200	3,070	1,870	823	412	276	282
14	2,170	2,470	7,120	7,640	29,400	15,900	2,970	1,720	815	405	270	258
15	1,820	2,570	6,860	11,400	22,100	17,100	2,870	1,640	791	384	270	246
16	1,590	4,560	8,040	16,800	14,700	18,600	2,770	1,590	743	370	258	240
17	1,460	9,450	10,800	22,200	11,000	19,400	2,570	1,500	712	363	246	234
18	1,460	11,900	11,300	24,000	9,300	16,200	2,470	1,410	682	356	234	234
19	2,120	11,800	10,400	23,300	6,740	11,800	2,420	1,360	668	349	228	234
20	3,070	9,600	9,600	19,400	9,450	9,450	2,320	1,320	645	342	222	228
21	2,970	*11,000	10,600	17,500	9,900	8,460	2,170	1,280	*630	335	216	222
22	2,370	15,700	*12,600	20,000	9,160	*8,320	2,070	1,230	600	335	216	222
23	2,020	19,000	17,600	22,000	7,900	7,900	1,970	1,190	585	328	216	222
24	1,720	21,800	22,700	21,200	6,990	6,990	1,920	1,190	578	314	216	228
25	1,640	22,200	24,900	19,200	6,480	6,360	1,870	1,280	570	314	210	262
26	1,770	22,700	22,200	20,600	6,000	6,120	1,770	1,280	548	314	210	300
27	3,070	20,000	16,400	18,600	5,520	5,760	1,770	1,190	532	307	216	335
28	6,340	17,000	13,000	15,400	5,040	5,520	2,120	1,140	510	*307	246	555
29	9,600	13,700	11,600	11,300	-	5,160	2,570	1,100	503	300	270	562
30	9,300	11,900	11,100	8,740	-	5,880	2,320	1,100	489	294	282	992
31	8,180	-	11,000	7,250	-	6,600	-	1,060	-	282	*321	-
Total	87,985	293,840	421,400	463,610	408,200	249,850	97,620	48,540	22,562	12,118	7,881	9,268
Mean	2,838	9,795	13,590	14,960	14,580	8,060	3,254	1,566	752	391	254	310
Cfsm	2.00	6.90	9.57	10.5	10.3	5.68	2.29	1.10	0.530	0.275	0.179	0.218
In.	2.30	7.70	11.04	12.14	10.69	6.54	2.56	1.27	0.59	0.32	0.21	0.24
Ac-ft	174,500	582,800	835,800	919,600	809,700	495,600	193,600	96,280	44,750	24,040	15,630	18,420
Calendar year 1950: Max	34,200	Min	294	Mean	6,568	Cfsm	4.63	In.	62.80	Ac-ft	4,755,000	
Water year 1950-51: Max	37,600	Min	210	Mean	5,816	Cfsm	4.10	In.	55.60	Ac-ft	4,211,000	

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Shifting-control method used Oct. 1-10, May 11 to Sept. 30.

## Satsop River near Satsop, Wash.

Location.--Lat 47°00'05", long. 123°29'40", in sec. 36, T. 18 N., R. 7 W., in west pier of bridge on U. S. Highway 410, 1 mile west of Satsop and 1½ miles upstream from mouth.

Drainage area.--290 sq mi, approximately (revised).

Records available.--March 1929 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, datum of 1929. Prior to Mar. 19, 1938, staff gage at site 60 ft downstream at datum 20.9 ft higher.

Average discharge.--22 years, 1,927 cfs.

Extremes.--Maximum discharge during year, 36,200 cfs Feb. 9 (elevation, 36.91 ft); minimum, 197 cfs Sept. 16-24.

1929-51: Maximum discharge, 52,500 cfs Jan. 22, 1935 (elevation, 38.9 ft, from floodmarks), from rating curve extended above 17,000 cfs; minimum discharge, 166 cfs Sept. 21, 1938.

Remarks.--Records good except those for periods of no gage-height record, which are fair. No diversion or regulation.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

24.0	305	28.0	6,650	24.3	197	29.0	7,030
24.2	440	28.0	9,150	24.6	340	30.0	9,560
24.4	600	30.0	11,800	25.0	620	31.0	12,500
24.7	880	31.0	14,600	25.5	1,080	32.0	15,800
25.0	1,190	32.0	17,600	26.0	1,650	33.0	19,500
25.5	1,780	33.0	21,100	26.5	2,300	34.0	23,500
26.0	2,560	34.0	24,600	27.0	3,030	35.0	27,600
27.0	4,440	35.1	28,800	28.0	4,830	36.0	32,000

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	370	3,740	4,760	3,840	2,640	1,770	2,300	970	564	315	247	220
2	354	3,460	3,940	5,510	4,540	1,650	2,100	890	548	315	247	215
3	344	3,560	3,740	8,150	5,730	1,590	2,100	835	540	315	247	206
4	398	3,180	3,740	5,960	5,070	1,710	2,100	862	533	315	242	202
5	820	2,390	3,460	4,650	4,240	1,650	1,900	980	526	315	242	202
6	1,280	2,150	6,420	3,840	3,650	1,490	1,700	862	519	330	242	202
7	*2,390	2,070	6,420	3,270	7,400	1,450	1,650	853	505	325	238	224
8	3,090	1,850	5,960	2,820	12,500	1,380	1,530	808	491	315	238	295
9	2,150	1,600	5,730	2,560	*28,700	1,320	1,420	*772	477	315	238	266
10	44,000	1,470	8,400	2,560	32,000	1,270	1,320	754	463	305	238	228
11	43,000	1,410	5,730	2,820	19,100	1,230	1,270	763	456	295	238	215
12	42,200	1,290	4,440	2,820	*9,830	2,160	1,280	763	456	295	233	206
13	1,660	1,190	5,650	4,860	6,560	3,690	1,300	756	456	295	238	202
14	1,410	1,120	2,180	4,180	5,030	3,270	1,220	692	449	295	233	202
15	1,230	1,200	3,740	7,650	4,240	4,430	1,160	668	428	290	228	202
16	1,040	2,230	5,070	7,650	3,600	5,140	1,110	644	421	285	228	197
17	1,000	2,310	7,150	7,650	3,270	3,690	1,080	636	414	280	224	197
18	1,410	2,150	5,510	5,960	3,030	3,030	1,050	620	400	276	224	197
19	1,780	2,000	4,440	4,960	3,030	2,730	1,020	604	400	276	224	197
20	2,000	*2,480	6,190	4,340	4,140	2,580	940	588	*394	271	220	197
21	1,920	3,840	8,900	5,960	3,600	2,660	880	564	376	271	220	197
22	1,360	7,900	8,400	5,960	3,190	*2,860	844	548	364	271	215	197
23	1,240	6,420	10,400	4,960	2,800	2,580	808	588	358	266	215	197
24	1,140	9,150	12,500	5,510	2,580	2,300	799	684	352	266	220	202
25	1,410	10,600	10,400	9,650	2,440	2,230	772	1,160	346	266	220	242
26	1,720	11,400	6,650	13,100	2,230	2,160	754	844	340	261	220	276
27	2,480	6,150	6,190	7,150	2,030	2,030	826	736	340	*261	224	252
28	4,040	6,900	*7,650	5,070	1,900	1,900	1,900	684	335	261	233	340
29	3,650	5,180	6,190	3,940	-	1,960	1,410	652	325	256	233	1,460
30	3,270	4,860	5,730	3,360	-	2,800	1,090	636	320	256	*224	1,770
31	3,560	-	4,650	2,910	-	2,510	-	596	-	252	224	-
Total	57,712	118,050	189,330	165,630	189,070	75,220	39,633	22,992	12,896	8,810	7,157	9,405
Mean	1,862	3,935	6,107	5,343	6,752	2,362	1,321	742	430	287	231	314
Cfs/m	6.42	15.6	21.1	18.4	23.3	8.14	4.56	2.56	1.48	0.990	0.797	1.08
In.	7.40	15.14	24.28	21.64	24.25	9.39	5.08	2.95	1.65	1.14	0.92	1.21
Ac-ft	114,500	234,100	375,500	328,500	375,000	145,200	78,610	45,600	25,580	17,670	14,200	18,650

Calendar year 1950: Max 18,300 Min 212 Mean 2,779 Cfs/m 9.58 In. 130.07 Ac-ft 2,012,000  
 Water year 1950-51: Max 32,000 Min 197 Mean 2,449 Cfs/m 8.44 In. 114.65 Ac-ft 1,773,000

Peak discharge (base, 13,500 cfs).--Nov. 25 (11 p.m.) 15,500 cfs (31.30 ft); Dec. 23 (11:30 p.m.) 13,700 cfs (30.72 ft); Jan. 26 (5:30 a.m.) 17,000 cfs (31.77 ft); Feb. 9 (6 p.m.) 36,200 cfs (36.91 ft).

\* Discharge measurement made on this day.

No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Discharge computed from once-daily tape-gage readings Oct. 13-16, Oct. 18 to Nov. 19.

Wynoochee River at Oxbow, near Aberdeen, Wash.

Location.--Lat 47°20', long. 123°39', in SW<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub> sec. 1, T. 21 N., R. 8 W., on left bank at Oxbow 25 miles northeast of Aberdeen.

Drainage area.--68 sq mi, approximately (revised).

Records available.--May 1925 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 500 ft (by barometer). May 19 to Nov. 6, 1925, staff gage at site 600 ft downstream at different datum. Nov. 7, 1925, to Sept. 3, 1947, water-stage recorder at site 1½ miles downstream at datum 444.0 ft above mean sea level (levels by city of Aberdeen).

Average discharge.--26 years, 772 cfs.

Extremes.--Maximum discharge during year, 14,200 cfs Feb. 9 or 10 (gage height, 21.1 ft, from high-water mark), from rating curve extended above 5,000 cfs on basis of slope-area determination at gage height 25.46 ft; minimum, 92 cfs Sept. 21-24 (gage height, 0.48 ft), may have been slightly lower during that period due to faulty gage heights.

1925-51: Maximum discharge, 18,000 cfs Jan. 22, 1935 (gage height, 30.3 ft, from floodmarks, site and datum then in use), from rating curve extended above 5,300 cfs; minimum, 64 cfs Jan. 27, 1949.

Remarks.--Records good except those for periods of doubtful or no gage-height record, which are fair. No diversion or regulation.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-9

Oct. 10 to Sept. 30

1.2	109	2.3	735	0.4	80	2.1	700	6.0	4,26C
1.4	178	2.6	1,000	.6	115	2.5	980	7.0	5,06C
1.6	270	3.0	1,390	.9	185	3.0	1,420	9.0	6,60C
1.8	381	3.5	1,890	1.2	280	3.5	1,890	11.0	8,00C
2.0	511	4.0	2,390	1.5	395	4.0	2,390	13.0	9,40C
				1.8	535	5.0	3,560	15.0	10,60C

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	134	1,560	1,100	1,330	830	a485	795	550	312	172	117	99
2	128	1,380	956	1,640	1,000	a450	788	505	308	172	115	99
3	134	1,420	948	1,890	1,510	a430	879	485	319	170	115	97
4	310	1,240	964	1,380	1,240	a480	956	590	304	168	115	95
5	1,190	1,110	1,170	1,150	1,060	a440	879	682	290	170	113	95
6		*991	1,040	2,190	1,040	a420	809	602	276	175	113	95
7	1,990	885	1,740	940	1,280	a400	809	596	262	168	113	121
8	2,160	788	1,420	886	3,720	a380	748	*525	252	162	113	135
9	1,700	724	2,760	816	db,880	a360	658	500	246	160	113	129
10	4,400	676	3,990	908	*10,500	a340	602	545	252	158	111	101
11	1,460	646	2,190	1,040	*45,060	a320	607	652	259	152	111	97
12	1,010	618	1,690	956	2,890	670	748	629	256	150	111	97
13	795	590	1,330	1,510	2,040	760	837	520	248	150	109	95
14	706	570	1,200	1,790	1,600	629	760	476	245	148	*109	94
15	629	607	1,940	2,140	1,510	1,120	730	467	252	145	109	94
16	585	724	1,990	1,790	1,280	980	748	510	248	142	111	94
17	560	706	2,290	1,420	1,200	730	760	545	236	138	107	94
18	948	646	1,510	1,240	1,050	607	640	476	221	135	107	94
19	1,090	618	1,800	1,130	1,030	585	575	418	212	133	105	94
20	872	900	3,540	996	988	688	480	391	*206	131	105	94
21	706	*1,560	*3,630	1,130	908	*802	462	440	203	131	101	d92
22	629	2,790	3,180	1,100	816	809	467	490	200	129	101	d92
23	575	2,140	3,560	1,000	754	694	476	694	194	127	101	d92
24	545	2,790	4,980	1,100	712	629	480	1,080	194	127	101	d95
25	1,220	4,740	2,990	3,380	646	658	485	768	188	127	99	121
26	1,070	4,340	1,840	5,880	585	682	480	560	185	125	99	105
27	1,790	2,890	2,190	2,090	545	652	646	500	182	*123	99	*105
28	1,990	2,190	2,240	1,510	510	607	1,380	467	180	123	101	401
29	1,740	1,460	1,790	1,280	-	851	830	413	178	121	105	1,960
30	1,510	1,330	2,190	1,140	-	1,040	640	343	175	119	*101	2,010
31	1,420	-	1,510	924	-	893	-	315	-	119	99	-
Total	34,987	43,679	66,418	46,526	55,052	19,591	21,154	16,754	7,085	4,470	3,327	7,086
Mean	1,129	1,458	2,143	1,501	1,966	632	705	540	236	144	107	236
Ac-ft	69,400	86,640	131,700	92,280	109,200	38,860	41,960	33,230	14,050	8,870	6,600	14,050

Calendar year 1950: Max 6,230 Min 97 Mean 1,043 Ac-ft 755,200  
Water year 1950-51: Max 10,500 Min 92 Mean 894 Ac-ft 646,800

Peak discharge (base, 6,800 cfs).--Oct. 10 (4 a.m.) 7,020 cfs (9.60 ft); Nov. 25 (3 p.m.) 7,300 cfs (10.00 ft); Dec. 9 (7:30 p.m.) 8,070 cfs (11.07 ft); Dec. 24 (5:30 p.m.) 8,880 cfs (9.42 ft); Jan. 26 (6:30 a.m.) 8,280 cfs (11.44 ft); Feb. 9 or 10 (time unknown) 14,200 cfs (21.1 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

d Doubtful gage-height record; discharge computed from reconstructed gage-height graph based on recorded graph and high-water mark, or used as recorded.

## HUMPTULIPS RIVER BASIN

## Humptulips River near Humptulips, Wash.

Location.--Lat 47°13'45", long. 123°56'30", in NE $\frac{1}{4}$  sec. 17, T. 20 N., R. 10 W., on right bank at abandoned bridge site, 1 mile southeast of Humptulips, 2.5 miles upstream from Stevens Creek, and 3 $\frac{1}{2}$  miles downstream from forks.

Drainage area.--125 sq mi.

Records available.--May 1933 to January 1935, July 1942 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 117.4 ft above mean sea level (river-profile survey). Prior to Jan. 14, 1935, water-stage recorder and July 1, 1942, to Feb. 27, 1950, staff gage at same site and datum.

Average discharge.--10 years (1933-34, 1942-51), 1,313 cfs.

Extremes.--Maximum discharge during year, 25,500 cfs Feb. 9 (gage height, 11.24 ft); minimum, 94 cfs Sept. 5, 6 (gage height, 0.77 ft).

1933-35, 1942-51: Maximum discharge, 33,000 cfs Jan. 22, 1935 (gage height, 12.7 ft, from floodmarks); minimum observed, 82 cfs Sept. 11, 1944.

Revisions.--The figures of maximum discharge for some water years have been revised, as shown in the following table. They supersede those published in the water-supply papers indicated.

Water-Supply Paper	Water year	Date	Gage height (feet)	Discharge (cfs)
767.....	1933-34	Dec. 9	9.7	18,800
792.....	1934-35	Jan. 22	12.7	33,000
982.....	1942-43	Apr. 1	7.9	11,800
1012.....	1943-44	Dec. 3	9.6	18,400
1042.....	1944-45	Feb. 7	11.02	24,500
1062.....	1945-46	Apr. 11	8.02	12,200
1092.....	1946-47	Jan. 25	9.62	17,200
1152.....	1948-49	Feb. 22	9.8	19,200

Remarks.--Records good except those for period of no gage-height record or shifting control, which are fair. No diversion or regulation.

Revisions.--Revised figures of discharge for high-water periods in the water years 1934-35, 1943-46 are given herewith. They supersede those published in Water-Supply Papers 767, 792, 982, 1012, 1042, 1062.

Day (water year)	Discharge (cfs)	Day (water year)	Discharge (cfs)
1933-34		1943-44	
Dec. 6.....	8,890	Dec. 2.....	10,100
9.....	11,700	3.....	12,900
11.....	8,420		
12.....	9,920	1944-45	
18.....	8,500	Jan. 7.....	10,800
20.....	8,980	12.....	10,800
21.....	13,200	Feb. 7.....	14,100
22.....	10,200	8.....	11,800
		Mar. 20.....	8,900
1934-35		1945-46	
Oct. 25.....	8,030	Nov. 14.....	8,900
Nov. 5.....	10,600	Feb. 24.....	10,800
1942-43		Apr. 11.....	10,500
Apr. 2.....	9,200		

Month	Cfs-days	Maximum	Minimum	Mean	Per square mile	Runoff in inches	Runoff in acre-feet
December 1933.....	175,020	13,200	750	5,646	45.2	52.07	347,100
Water year 1933-34..	565,669	13,200	150	1,550	12.4	163.24	1,122,000
October 1934.....	46,930	8,030	199	1,514	12.1	13.96	93,080
November.....	92,450	10,600	1,350	5,082	24.7	27.51	183,400
Calendar year 1934..	510,176	10,600	150	1,398	11.2	151.77	1,012,000
April 1943.....	57,037	9,200	750	1,901	15.2	16.97	113,100
Water year 1942-43..	380,392	9,200	126	1,042	8.34	113.18	754,400
December 1943.....	64,288	12,900	546	2,074	16.6	19.13	127,500
Calendar year 1943..	337,632	12,900	126	925	7.40	107.46	669,600
Water year 1943-44..	317,764	12,900	82	868	6.94	97.53	630,200
January 1945.....	88,568	10,800	645	2,857	22.9	23.35	175,700
February.....	74,793	14,100	788	2,671	21.4	22.25	148,300
March.....	74,761	8,900	696	2,412	19.3	22.24	148,300
Water year 1944-45..	454,708	14,100	101	1,246	9.97	135.29	901,900
November 1945.....	76,856	8,900	696	2,562	20.5	22.87	152,400
Calendar year 1945..	530,752	14,100	101	1,454	11.6	157.92	1,053,000
February 1946.....	65,330	10,800	1,060	2,333	18.7	19.44	129,600
April.....	88,930	10,500	785	1,964	15.7	17.53	116,900
Water year 1945-46..	527,348	10,800	139	1,445	11.6	155.89	1,046,000
Calendar year 1946..	497,315	10,800	145	1,363	10.9	147.95	986,500

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

1.0	220	3.0	1,860	6.0	7,030	0.7	82	2.5	1,050	5.0	4,610
1.3	350	3.5	2,470	7.0	9,550	.9	121	3.0	1,590	6.0	6,810
1.6	520	4.0	3,200	8.0	12,500	1.2	214	3.5	2,210	7.0	9,500
2.0	820	4.5	3,860	9.0	16,000	1.5	343	4.0	2,910	8.0	12,500
2.5	1,300	5.0	4,950	10.1	20,400	2.0	641	4.5	3,650	9.1	16,400



Discharge, in cubic feet per second, of Humptulips River near Humptulips, Wash.,  
water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	296	2,470	2,100	2,220	1,340	820	1,440	654	400	182	119	105
2	280	2,180	1,740	3,360	2,960	755	1,360	566	394	182	119	101
3	276	2,100	1,680	4,570	2,820	763	1,390	521	374	182	117	99
4	412	1,860	1,680	3,040	2,400	795	1,410	579	363	179	114	97
5	*1,630	1,740	1,680	2,280	1,980	715	1,270	715	353	176	114	96
6	1,460	1,630	3,120	1,860	1,740	685	1,170	586	338	207	114	94
7	a3,000	1,460	2,820	1,630	5,240	656	1,140	*600	324	190	114	124
8	a5,500	1,240	2,540	1,460	7,820	613	1,040	546	310	176	114	218
9	a2,500	1,090	3,720	1,310	20,200	600	952	508	301	170	114	140
10	a5,000	982	6,370	1,460	*16,400	552	863	508	292	167	114	124
11	3,120	883	3,600	1,580	8,090	566	829	559	292	157	114	117
12	1,920	796	2,740	1,520	*4,510	1,370	925	586	296	154	114	108
13	1,410	740	2,040	2,680	3,210	1,890	970	527	292	154	114	103
14	1,130	708	1,680	3,690	2,410	1,540	880	478	274	154	110	103
15	928	847	2,280	3,940	2,210	2,480	812	449	266	151	110	101
16	796	1,400	2,670	4,030	1,770	2,340	812	449	262	148	108	101
17	708	*1,410	3,520	3,780	1,650	1,710	804	449	257	145	106	101
18	1,200	1,250	2,400	2,820	1,510	1,410	731	427	249	145	106	101
19	1,460	1,090	2,220	2,280	1,650	1,280	685	400	*245	137	103	101
20	1,320	1,460	4,430	1,920	1,950	*1,360	606	379	237	134	103	99
21	1,000	2,100	5,340	2,820	1,710	1,550	566	366	226	132	101	97
22	874	4,030	4,760	2,470	1,470	1,710	514	374	222	134	101	97
23	764	5,200	5,340	2,160	1,290	1,460	502	527	218	132	99	97
24	708	4,570	7,820	2,740	1,220	1,270	478	968	214	129	99	103
25	1,410	5,530	5,540	6,380	1,120	1,280	473	1,020	207	129	99	245
26	1,580	5,540	3,520	7,300	1,010	1,290	467	685	200	*129	99	170
27	2,340	4,760	*3,860	3,600	925	1,260	641	566	193	126	99	137
28	3,200	3,690	4,300	2,340	846	1,150	1,710	534	190	126	110	572
29	2,670	2,600	3,120	1,740	-	1,580	997	508	186	124	*106	2,340
30	2,340	2,540	3,600	1,580	-	1,950	755	455	182	121	106	3,440
31	2,470	-	2,740	1,410	-	1,650	-	422	-	121	103	-
Total	52,702	65,676	104,970	85,910	101,451	38,637	27,192	16,913	8,147	4,691	3,363	9,529
Mean	1,700	2,189	3,386	2,771	3,623	1,253	906	546	272	151	108	318
Cfsm	13.6	17.5	27.1	22.2	29.0	10.0	7.25	4.37	2.18	1.21	0.864	2.54
In.	15.68	19.54	31.23	25.56	30.18	11.55	8.09	5.03	2.42	1.40	1.00	2.84
Ac-ft	104,500	130,300	208,200	170,400	201,200	77,030	53,930	33,550	16,160	9,300	6,670	18,900
Calendar year 1950: Max	12,500	Min	174	Mean	1,714	Cfsm	13.7	In.	186.13	Ac-ft	1,241,000	
Water year 1950-51: Max	20,200	Min	94	Mean	1,423	Cfsm	11.4	In.	154.52	Ac-ft	1,030,000	

Peak discharge (base, 12,000 cfs).--Feb. 9 (12 m.) 25,500 cfs (11.24 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Shifting-control method used Feb. 11 to Mar. 13.

## QUINULT RIVER BASIN

Quinault River at Quinault Lake, Wash.

Location.--Lat 47°27'30", long. 123°53'30", in sec. 25, T. 23 N., R. 10 W., on left bank at outlet of Quinault Lake, 50 ft downstream from Olympic Highway bridge, U. S. Highway 101, and 4 miles southwest of Quinault.

Drainage area.--264 sq mi.

Records available.--October 1911 to September 1951 (December 1922 to July 1924, monthly records only in Water-Supply Paper 870).

Gage.--Water-stage recorder. Datum of gage is 184.60 ft above mean sea level (Washington State highway benchmark). Prior to Jan. 1, 1913, staff gage on south shore of Quinault Lake 3 miles northeast of present site and Jan. 1, 1913, to Sept. 30, 1916, staff gage at mouth of Canoe Creek, 4 miles northeast of present site, at datum 1.06 ft higher. Oct. 1, 1916, to May 2, 1935, water-stage recorder at site 300 ft downstream from present site at datum 0.36 ft higher than present datum.

Average discharge.--40 years, 2,711 cfs.

Extremes.--Maximum discharge during year, 36,700 cfs Feb. 10 (gage height, 17.24 ft); minimum, 340 cfs Sept. 23, 24 (gage height, 2.18 ft).  
1911-22, 1924-51: Maximum discharge, 42,300 cfs Nov. 27, 1949 (gage height, 18.60 ft), from rating curve extended above 25,000 cfs; minimum, 276 cfs Sept. 12, 1944 (gage height, 1.96 ft).

Remarks.--Records excellent except those for periods of no gage-height record, which are fair. No diversions of consequence. Natural regulation by Quinault Lake.

Revisions.--W 442: Drainage area.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-5

Oct. 6 to Sept. 30

2.7	700	2.1	300	3.5	1,370	8.0	8,960
3.0	940	2.3	410	4.0	1,920	10.1	13,700
3.3	1,210	2.6	500	5.0	3,270	14.0	25,200
3.6	1,500	3.0	900	6.0	4,950	17.0	35,900

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	820	4,590	5,130	5,130	2,830	1,740	2,360	2,200	2,100	1,920	764	428
2	748	4,590	4,240	5,320	3,660	1,640	2,220	1,920	2,100	1,920	756	416
3	716	4,590	3,740	6,480	4,950	1,580	2,220	1,900	2,160	1,860	733	404
4	764	4,770	3,500	5,700	4,590	1,580	2,350	*2,040	2,290	1,800	719	404
5	*1,500	4,770	3,420	4,590	3,980	1,580	2,500	2,400	2,290	1,690	705	392
6	2,360	4,160	5,130	3,900	3,420	1,470	2,550	2,300	2,290	1,580	684	386
7	3,740	3,740	6,280	3,340	5,130	1,420	2,500	2,620	2,220	1,470	663	374
8	5,700	3,200	6,080	3,040	10,600	1,320	2,500	2,550	2,160	1,370	649	306
9	5,510	2,830	6,280	2,760	25,500	1,320	2,450	2,480	2,100	1,320	642	524
10	10,800	2,480	14,400	2,760	*35,100	1,260	2,300	2,550	2,160	1,320	628	512
11	9,200	2,290	11,700	2,760	25,400	1,210	2,200	2,830	2,220	1,320	614	488
12	6,080	2,100	9,420	2,690	14,400	1,420	2,500	3,120	2,290	1,320	600	458
13	4,410	1,920	7,280	3,340	9,420	1,800	2,800	2,900	2,360	1,320	586	440
14	3,340	1,800	5,700	4,240	6,880	1,860	3,100	2,620	2,420	1,270	572	428
15	2,760	1,800	5,510	5,510	5,700	2,290	2,900	2,480	2,620	1,240	558	410
16	2,360	*2,040	6,480	6,280	4,770	2,830	2,700	2,550	2,690	1,200	544	398
17	2,040	2,160	7,700	5,700	4,160	2,620	2,800	2,760	2,550	1,170	530	392
18	2,220	2,160	6,880	4,770	3,740	2,290	2,900	2,760	2,480	1,150	524	380
19	2,970	1,980	5,890	3,900	3,500	2,100	2,600	2,620	*2,360	1,120	518	374
20	3,120	2,040	*8,120	3,340	3,580	*2,040	2,400	2,480	2,290	1,050	512	362
21	2,760	2,690	11,500	3,580	3,270	2,160	2,200	2,480	2,160	999	506	350
22	2,420	4,950	11,700	3,580	2,970	2,290	2,160	2,690	2,160	963	506	345
23	2,160	5,700	10,800	3,270	2,690	2,220	2,040	3,200	2,160	945	500	345
24	1,920	8,120	13,900	3,820	2,480	2,100	1,900	3,980	2,160	936	488	350
25	2,690	10,600	14,200	9,860	2,360	1,980	1,860	4,410	2,100	927	476	410
26	3,980	15,200	9,860	13,200	2,160	1,980	1,860	3,740	2,040	*700	464	422
27	5,130	14,700	8,330	8,980	1,980	1,920	1,860	3,270	1,980	868	458	428
28	6,880	10,800	7,700	6,280	1,860	1,860	1,980	2,970	1,980	844	458	607
29	6,480	8,120	6,480	4,590	-	1,920	2,700	2,690	1,920	820	*458	1,520
30	5,510	6,080	6,880	3,740	-	2,420	2,400	2,420	1,920	796	452	3,420
31	4,950	-	6,080	3,120	-	2,420	-	2,220	-	782	440	-
Total	116,038	146,970	240,310	149,570	201,080	58,640	71,810	84,150	66,730	58,188	17,707	16,673
Mean	3,743	4,699	7,752	4,825	7,181	1,892	2,394	2,715	2,224	1,232	571	556
Cfs/m	14.2	18.6	29.4	18.3	27.2	7.17	9.07	10.3	8.42	4.67	2.16	2.11
In.	16.35	20.7	33.85	21.07	28.33	8.26	10.12	11.85	9.40	5.38	2.49	2.35
Ac-ft	230,200	291,500	476,600	296,700	398,800	116,300	142,400	166,900	132,400	75,740	35,120	33,070

Peak discharge (base, 12,000 cfs).--Oct. 10 (2 p.m.) 12,400 cfs (9.47 ft); Nov. 27 (1 a.m.) 16,800 cfs (11.18 ft); Dec. 10 (11 a.m.) 15,500 cfs (10.69 ft); Dec. 22 (2 a.m.) 12,200 cfs (9.45 ft); Dec. 24 (10:30 p.m.) 16,800 cfs (11.15 ft); Jan. 26 (2:30 a.m.) 14,200 cfs (10.25 ft); Feb. 10 (11:30 a.m.) 36,700 cfs (17.24 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Apr. 4 to May 3, May 5-6; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

## Hoh River near Spruce, Wash.

Location.--Lat 47°48'20", long. 124°06'20", in sec. 34, T. 27 N., R. 11 W., on left bank 1 mile downstream from Maple Creek, 2¼ miles downstream from Spruce, and 5 miles downstream from South Fork.

Drainage area.--208 sq mi (revised).

Records available.--August 1926 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 320 ft (river-profile survey).

Average discharge.--25 years, 1,958 cfs.

Extremes.--Maximum discharge during year, 22,400 cfs Feb. 10 (gage height, 15.17 ft); minimum, 435 cfs Oct. 3; minimum gage height, 0.83 ft Sept. 23.

1926-51: Maximum discharge, 38,700 cfs Nov. 26, 1949 (gage height, 22.2 ft, from high-water marks), from rating curve extended above 13,000 cfs on basis of slope-area determination of peak flow; minimum, 247 cfs Nov. 14, 15, 1929; minimum gage height, 0.68 ft Oct. 18, 19, 1946.

Maximum stage known since at least 1906, that of Nov. 26, 1949.

Remarks.--Records good except those for period of no gage-height record, which are fair. No diversion or artificial regulation. Large diurnal fluctuation during summer months caused by melting glaciers at source.

Revisions (water years).--W 1182: 1935(M).

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	
1		492	2,650	2,560	2,930	1,940	1,370	1,550	1,140	1,350	1,830	1,040	588
2		463	2,470	2,140	4,570	4,470	1,280	1,520	1,060	1,400	1,830	1,040	605
3		463	3,130	2,020	4,450	3,860	1,280	1,660	1,040	1,500	1,800	1,020	657
4		*1,110	2,830	1,860	3,330	2,930	1,340	1,800	*1,250	1,550	1,490	990	657
5		2,300	2,830	1,980	2,740	2,380	1,220	1,690	1,450	1,600	1,310	919	675
6		1,660	2,380	3,970	2,380	2,140	1,140	1,660	1,400	1,500	1,220	874	675
7		3,760	2,060	3,530	2,220	5,770	1,090	1,690	1,600	1,400	1,140	874	961
8		4,580	1,760	2,830	2,060	*9,870	1,040	1,580	1,500	1,400	1,140	919	1,250
9		3,480	1,520	5,050	1,860	19,400	1,020	1,430	1,450	1,400	1,250	919	896
10		8,230	1,400	8,720	1,900	19,600	942	1,370	1,600	1,500	1,370	919	790
11		3,550	1,310	5,500	1,760	10,800	942	1,400	1,800	1,550	1,430	874	675
12		2,470	1,190	4,330	1,660	6,400	1,380	1,860	1,700	1,600	1,460	810	640
13		1,900	1,090	3,330	2,680	4,690	1,660	2,060	1,500	1,700	1,490	770	657
14		1,620	1,060	2,830	2,560	3,750	1,550	1,940	1,400	1,850	1,460	790	675
15		1,370	1,160	3,640	4,510	3,530	2,450	1,900	1,350	1,900	1,370	831	712
16		1,190	*1,310	3,640	3,530	3,030	2,220	1,980	1,600	1,800	1,370	831	750
17		1,090	1,280	4,450	3,030	2,740	1,860	2,020	1,800	1,700	1,430	810	750
18		1,430	1,140	3,130	2,470	2,560	*1,580	1,830	1,600	1,600	1,370	770	712
19		1,900	1,060	*3,530	2,060	2,560	1,400	1,620	1,400	*1,550	1,220	810	657
20		1,550	1,520	6,170	1,940	2,560	1,580	1,430	1,350	1,520	1,090	874	622
21		1,280	2,200	6,720	2,560	2,300	1,830	1,310	1,500	1,550	1,060	919	572
22		1,120	3,430	5,840	2,220	2,060	1,760	1,220	1,800	1,550	1,090	874	555
23		1,020	3,750	6,040	2,140	1,980	1,550	1,160	2,100	1,520	1,160	790	539
24		942	5,150	9,270	4,700	1,900	1,490	1,140	2,300	1,690	1,220	731	555
25		3,510	8,200	6,680	11,300	1,830	1,550	1,190	1,800	1,690	1,190	693	790
26		2,560	9,160	4,450	7,460	1,660	1,580	1,160	1,600	1,620	*1,090	675	640
27		4,360	6,660	4,690	4,330	1,520	1,550	1,370	1,550	1,580	1,040	675	572
28		4,690	4,820	4,330	3,130	2,460	1,430	1,830	1,500	1,620	1,060	*693	1,850
29		3,640	3,640	3,760	2,560	-	1,830	1,490	1,400	1,720	1,020	622	4,030
30		2,930	2,930	4,450	2,220	-	1,980	1,280	1,350	1,600	990	588	3,340
31		2,560	-	3,330	1,940	-	1,720	-	1,300	-	1,020	572	-
Total	73,220	85,090	134,780	99,200	129,490	46,614	47,140	47,190	47,710	40,010	25,516	28,030	
Mean	2,362	2,836	4,348	3,204	4,625	1,504	1,571	1,522	1,590	1,291	823	934	
Cfsm	11.4	13.6	20.9	15.4	22.2	7.23	7.55	7.32	7.64	6.21	3.96	4.49	
In.	13.09	15.21	24.10	17.74	23.15	8.33	8.43	8.44	8.53	7.15	4.56	5.01	
Ac-ft	145,200	168,800	267,300	196,800	256,800	92,460	93,500	93,600	94,630	79,360	50,610	55,600	
Calendar year 1950: Max			11,300	Min	463	Mean	2,371	Cfsm	11.4	In.	154.71	Ac-ft	1,716,000
Water year 1950-51: Max			19,600	Min	463	Mean	2,203	Cfsm	10.6	In.	143.74	Ac-ft	1,595,000

Peak discharge (base, 10,000 cfs).--Oct. 10 (7 a.m.) 12,000 cfs (10.88 ft); Nov. 25 (3:30 p.m.) 13,000 cfs (11.36 ft); Dec. 9 (11 p.m.) 12,200 cfs (10.95 ft); Dec. 24 (4 p.m.) 12,600 cfs (11.21 ft); Jan. 25 (7:30 p.m.) 13,200 cfs (11.48 ft); Feb. 10 (4 a.m.) 22,400 cfs (15.17 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record May 5 to June 18; discharge estimated on basis of records for stations on nearby streams.

## QUILLAYUTE RIVER BASIN

Soleduck River near Fairholm, Wash.

Location.--Lat 48°02'30", long. 123°57'30", in lot 4, sec. 35, T. 30 N., R. 10 W., on right bank 300 ft downstream from South Fork, 2.5 miles southwest of Fairholm, and 17 miles east of Beaver.

Drainage area.--83.8 sq mi (revised).

Records available.--October 1917 to September 1921, October 1933 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,060 ft (from topographic map). October 1917 to September 1921, water-stage recorder and Oct. 4 to Nov. 4, 1933, staff gage at same site at datum 1.2 ft higher.

Average discharge.--22 years, 610 cfs.

Extremes.--Maximum discharge during year, 10,800 cfs Feb. 9 (gage height, 10.40 ft); minimum, 66 cfs Sept. 23, 24 (gage height, 0.80 ft).  
1917-21, 1933-51: Maximum discharge, 23,500 cfs Nov. 26, 1949 (gage height, 16.42 ft from high-water mark in well), from rating curve extended above 5,300 cfs on basis of slope-area determination of peak flow; minimum, 51 cfs Sept. 11, 12, 1944 (gage height, 1.07 ft).

Remarks.--Records excellent except those for periods of no gage-height record, which are fair. No diversion or regulation.

Revisions (water years).--W 1182: 1918-19, 1920(M), 1921, 1934-48 (maximum only 1940, 1943, 1947-48).

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.8	66	2.3	390	5.0	2,440
1.0	91	2.6	505	5.5	3,030
1.2	120	3.0	695	6.0	3,670
1.4	153	3.5	1,000	7.0	5,100
1.7	216	4.0	1,410	8.0	6,670
2.0	295	4.5	1,900	9.0	8,300

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	118	840	840	1,000	1,040	383	489	429	422	394	141	84
2	117	840	722	1,700	a1,650	358	489	400	437	386	138	83
3	*114	1,110	670	1,460	a1,500	352	564	*400	485	362	136	82
4	185	1,110	625	1,070	a900	349	670	493	497	313	134	81
5	523	1,000	695	870	a760	328	645	568	505	301	131	79
6	414	870	1,550	780	a650	319	640	577	461	290	126	78
7	1,050	750	1,410	750	2,790	313	645	645	437	273	123	91
8	1,040	625	1,070	695	4,350	298	605	568	441	268	123	138
9	906	550	2,010	645	8,300	292	541	546	445	271	122	101
10	2,900	497	3,090	635	7,920	284	505	640	473	282	122	90
11	965	457	2,160	590	*3,540	282	528	780	497	276	120	83
12	615	418	1,600	559	2,000	453	750	670	514	265	118	81
13	473	397	1,150	900	1,410	473	930	532	554	260	116	78
14	400	383	1,000	900	1,150	411	810	501	572	249	112	77
15	349	*386	1,320	1,800	1,040	810	750	510	568	234	112	74
16	319	411	1,360	1,190	900	722	810	670	501	221	110	73
17	290	586	*1,600	930	840	*559	870	722	469	216	108	73
18	394	355	1,150	750	750	493	750	559	*445	211	104	72
19	514	343	1,190	645	722	461	645	501	433	198	102	71
20	449	586	2,480	645	695	501	559	493	422	191	99	68
21	376	1,110	2,790	780	635	554	497	546	429	182	98	67
22	331	1,410	2,380	670	582	514	461	670	437	176	97	67
23	304	1,760	2,440	625	536	473	437	900	449	174	94	67
24	290	2,380	3,670	3,180	518	465	429	930	441	172	92	70
25	1,030	3,810	2,440	5,550	477	501	433	695	433	*170	91	99
26	900	3,540	1,550	2,550	441	523	433	564	411	166	88	84
27	2,020	2,380	1,550	1,320	422	514	514	541	400	159	*92	86
28	2,220	1,650	1,410	965	397	481	645	541	404	155	131	234
29	1,550	1,190	1,280	780	-	564	559	485	408	151	102	600
30	1,040	1,000	1,360	645	-	572	477	437	397	146	91	445
31	840	-	1,070	605	-	523	-	418	-	144	87	-
Total	23,036	32,544	49,632	36,184	46,715	14,125	18,080	17,931	13,787	7,256	3,460	3,476
Mean	743	1,085	1,601	1,167	1,668	458	603	578	460	234	112	116
Cfs/m	8.87	12.9	19.1	13.9	19.9	5.44	7.20	6.90	5.49	2.79	1.34	1.38
In.	10.22	14.44	22.03	16.06	20.73	6.27	8.02	7.96	6.12	3.22	1.54	1.54
Ac-ft	45,690	64,550	98,440	71,770	92,660	28,020	35,860	35,570	27,350	14,390	6,860	6,890

Calendar year 1950: Max 4,500 Min 114 Mean 828 Cfs/m 9.88 In. 133.98 Ac-ft 599,700  
Water year 1950-51: Max 8,300 Min 67 Mean 729 Cfs/m 8.70 In. 118.15 Ac-ft 528,000

Peak discharge (base, 6,000 cfs).--Jan. 25 (2 p.m.) 6,670 cfs (7.97 ft); Feb. 9 (6 a.m.) 10,800 cfs (10.40 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for Hoh River near Spruce.

## Lake Mills at Glines Canyon near Port Angeles, Wash.

Location.--Lat 48°00'05", long. 123°36'00", on Elwha River, in SE $\frac{1}{4}$  sec. 17, T. 29 N., R. 7 W., at Glines Canyon, 4 miles upstream from Elwha and 11 miles southwest of Port Angeles.

Drainage area.--245 sq mi.

Records available.--April 1927 to September 1951. Prior to September 1950, change in contents published with tables of monthly discharge for Elwha River at McDonald Bridge, near Port Angeles.

Gage.--Staff gage read twice daily. Datum of gage is 19.74 ft below mean sea level, datum of 1929, supplementary adjustment 1947.

Extremes.--Maximum contents observed during year, 39,250 acre-ft Dec. 23 (gage height, 611.4 ft); minimum observed, 36,110 acre-ft Sept. 23 (gage height, 604.0 ft).  
1927-51: Maximum contents observed during period, 39,940 acre-ft Dec. 22, 1936 (gage height, 613.0 ft).

Remarks.--Reservoir is formed by concrete dam, completed in 1927. Total capacity, 37,790 acre-ft at gage height 608 ft (top of gates). Figures given herein represent total contents. Water is used for power by Crown Zellerbach Corp.

Cooperation.--Gage-height record furnished by Crown Zellerbach Corp. Capacity curve furnished by Thebo Starr and Anderton, Inc., constructors of the dam.

Monthly gage height and contents, water year October 1950 to September 1951

Date	Gage height (feet)†	Contents (acre-feet)†	Change in contents during month (acre-feet)
Sept. 30.....	606.7	37,240	-
Oct. 31.....	609.7	38,520	+1,280
Nov. 30.....	609.7	38,520	0
Dec. 31.....	609.8	38,560	+40
Calendar year 1950.....	-	-	-130
Jan. 31.....	610.5	38,860	+300
Feb. 28.....	609.2	38,310	-550
Mar. 31.....	608.1	37,830	-480
Apr. 30.....	608.5	38,000	+170
May 31.....	609.1	38,260	+260
June 30.....	610.1	38,690	+430
July 31.....	609.5	38,440	-250
Aug. 31.....	606.5	37,160	-1,280
Sept. 30.....	610.0	38,650	+1,490
Water year 1950-51.....	-	-	+1,410

† Gage height and contents at 12 p.m. based on twice-daily staff gage readings.

## ELWHA RIVER BASIN

Elwha River at McDonald Bridge, near Port Angeles, Wash.

Location.--Lat 48°03'20", long. 123°34'55", in NE 1/4 sec. 33, T. 30 N., R. 7 W., on right bank 300 ft upstream from site of McDonald Bridge (now removed), half a mile upstream from Little River, 7 miles upstream from mouth, and 8 miles southwest of Port Angeles.

Drainage area.--269 sq mi (revised).

Records available.--October 1897 to December 1901, October 1918 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 200.0 ft above mean sea level, datum of 1929. Prior to Jan. 1, 1902, wire-weight gage at McDonald Bridge at different datum. Dec. 9, 1918, to May 1, 1936, water-stage recorder under McDonald Bridge at datum 7.4 ft higher.

Average discharge.--37 years, 1,447 cfs (adjusted for storage since April 1927).

Extremes.--Maximum discharge during year, 14,300 cfs Feb. 9 (gage height, 17.87 ft); minimum, 187 cfs July 22 (gage height, 7.24 ft); minimum daily, 266 cfs Sept. 9.

1897-1901, 1918-51: Maximum discharge, 30,000 cfs Nov. 26, 1949 (gage height, 24.20 ft); minimum daily, 10 cfs Oct. 3, 1938.

Remarks.--Records good. Flow regulated by Lake Mills Reservoir (usable capacity, 38,650 acre-ft). No diversions.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9					Feb. 10 to Sept. 30				
8.1	356	11.5	2,900	7.4	235	10.5	2,160		
8.3	439	12.0	3,560	7.8	380	11.0	2,650		
8.6	579	13.0	5,010	8.1	505	11.5	3,170		
9.0	795	14.0	6,630	8.5	705	12.0	3,740		
9.5	1,110	15.0	8,390	9.0	1,000	13.0	5,060		
10.0	1,470	16.0	10,300	9.5	1,340	14.0	6,630		
10.5	1,870	17.0	12,300	10.0	1,730				
11.0	2,320								

Note.--Same as preceding table above 14.0 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	356	1,560	2,430	2,320	1,550	1,270	897	1,570	1,770	2,200	893	444
2	502	1,640	2,140	2,860	2,370	1,200	1,160	1,410	1,770	2,300	908	380
3	*516	2,300	1,900	2,450	2,100	1,130	1,160	*1,300	2,060	2,360	1,020	366
4	*561	2,570	1,860	2,220	1,450	940	1,270	1,410	2,140	1,890	810	630
5	1,080	2,470	1,780	1,920	1,710	1,100	1,580	1,610	2,070	1,850	794	668
6	946	2,040	2,670	1,840	1,550	1,100	1,340	1,640	2,120	1,650	1,060	566
7	1,080	1,650	2,640	1,740	*2,380	1,000	1,380	1,920	2,020	1,430	957	544
8	1,830	1,510	2,230	1,560	4,790	1,000	1,270	1,980	2,070	1,310	854	277
9	1,590	1,280	3,420	1,550	11,200	910	1,580	1,980	2,160	1,730	836	266
10	4,740	1,280	6,500	1,550	11,800	880	1,580	2,100	2,140	1,730	743	609
11	1,890	1,280	5,170	1,510	7,480	820	1,380	2,700	2,440	1,690	732	624
12	1,430	1,030	3,800	1,510	5,410	1,060	1,570	2,470	2,540	1,650	380	724
13	1,280	1,220	3,290	1,510	4,260	1,060	2,070	2,230	2,610	1,650	785	494
14	1,280	1,110	2,960	1,320	2,770	970	2,120	2,150	2,920	1,650	693	463
15	1,060	*1,010	3,000	2,280	2,540	1,240	1,980	2,020	3,160	1,410	731	374
16	884	1,110	*3,080	2,080	2,750	*1,340	2,070	2,390	2,850	1,600	638	386
17	884	1,010	3,530	1,870	2,500	1,200	2,300	2,870	2,650	1,510	713	468
18	1,080	1,010	2,900	1,670	2,210	978	2,200	2,510	*2,550	1,340	690	453
19	1,320	861	3,080	1,590	2,250	1,060	2,200	2,200	2,430	1,340	444	470
20	1,320	1,070	4,550	1,390	1,940	1,110	1,810	2,070	2,280	1,300	699	438
21	1,100	1,350	4,980	1,530	1,770	1,200	1,610	2,500	2,200	1,300	768	465
22	872	1,660	5,120	1,550	1,690	1,160	1,550	2,730	2,260	858	676	436
23	978	2,170	4,940	1,390	1,570	1,000	1,570	3,450	2,350	1,240	699	350
24	978	3,670	7,750	2,070	1,490	1,030	1,490	3,460	2,280	1,270	690	369
25	1,380	5,830	5,980	4,410	1,390	1,000	1,490	2,980	2,400	*1,270	671	383
26	1,590	7,110	4,710	4,000	1,450	1,030	1,490	2,550	2,280	1,200	317	435
27	2,280	6,080	3,800	2,590	1,340	1,060	1,570	2,420	2,190	1,160	*706	412
28	2,740	4,330	3,580	2,000	1,270	1,030	1,770	2,150	2,180	1,060	663	374
29	2,050	3,210	2,900	1,690	-	1,060	1,690	2,020	2,140	846	579	573
30	1,680	3,160	3,180	1,710	-	1,200	1,570	1,940	2,110	1,130	584	1,210
31	1,480	-	2,170	1,590	-	1,160	-	1,730	-	1,080	586	-
Total	42,757	68,283	112,140	61,270	86,970	33,298	48,517	68,460	69,140	46,005	22,319	14,651
Mean	1,379	2,276	3,617	1,976	3,106	1,074	1,617	2,208	2,305	1,484	720	468
Ac-ft	84,810	135,400	222,400	121,500	172,500	66,050	96,230	135,800	137,100	91,250	44,270	29,060
(†)	+1,280	0	+40	+300	-550	-480	+170	+260	+430	-250	-1,280	+1,490

Adjusted for change in reservoir contents

Mean	1,400	2,276	3,617	1,981	3,097	1,066	1,620	2,213	2,311	1,490	699	513
Cfs/m	5.20	8.46	13.4	7.36	11.5	3.95	6.02	8.23	8.39	5.50	2.60	1.91
In.	6.00	9.44	15.50	6.49	11.99	4.57	6.72	9.49	9.58	6.34	3.00	2.13
Ac-ft	86,090	135,400	222,400	121,800	172,000	65,570	96,400	136,100	137,500	91,000	42,990	30,550

Observed

Calendar year 1950: Max	7,750	Min	356	Mean	2,091	Ac-ft	1,514,000
Water year 1950-51: Max	11,800	Min	266	Mean	1,846	Ac-ft	1,336,000

Adjusted

Calendar year 1950: Mean	2,091	Cfs/m	7.77	In.	105.52	Ac-ft	1,514,000
Water year 1950-51: Mean	1,846	Cfs/m	6.87	In.	93.25	Ac-ft	1,336,000

\* Discharge measurement made on this day.

† Change in contents, equivalent in acre-feet, in Lake Mills Reservoir, furnished by Crown Zellerbach Corp.

## Dungeness River near Sequim, Wash.

Location.--Lat 48°00'40", long. 123°07'50", in SW $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 12, T. 29 N., R. 4 W., on right bank three-quarters of a mile upstream from Canyon Creek,  $4\frac{1}{2}$  miles southwest of Sequim, and  $11\frac{1}{2}$  miles upstream from mouth.

Drainage area.--156 sq mi.

Records available.--July 1897 to July 1898, June 1923 to September 1930, June 1937 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 620 ft (from topographic map). July 5, 1897, to July 28, 1898, wire-weight gage at bridge 2 miles downstream at different datum. June 1923 to Sept. 30, 1930, staff gage just above fish hatchery diversion half a mile downstream at different datum. June 19 to Aug. 12, 1937, staff gage at present site at datum 1.9 ft higher.

Average discharge.--21 years (1923-30, 1937-51), 347 cfs.

Extremes.--Maximum discharge during year, 4,600 cfs Feb. 9 (gage height, 6.53 ft); minimum, 118 cfs Sept. 23-24, 1897-98, 1923-30, 1937-51: Maximum discharge, 6,820 cfs Nov. 27, 1949 (gage height, 7.3 ft), from rating curve extended above 2,000 cfs on basis of slope-area determination of peak flow; minimum observed, 77 cfs Sept. 10, 1938.

Remarks.--Records good except those for periods of shifting control, which are fair. No diversion or regulation.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	142	290	537	638	378	364	278	364	506	749	326	172
2	140	299	470	674	493	349	286	*354	524	741	317	167
3	*132	518	441	703	506	340	326	359	576	718	312	164
4	142	645	399	589	430	340	383	420	603	666	304	164
5	221	609	388	524	388	321	404	493	616	569	299	161
6	181	499	576	493	*359	312	383	537	603	518	278	161
7	239	409	569	470	487	308	404	576	603	499	270	175
8	383	364	506	441	821	299	404	576	623	506	266	204
9	304	321	812	414	3,020	295	388	596	674	549	266	181
10	895	304	1,830	404	2,910	282	373	652	711	582	262	167
11	481	286	1,320	394	1,790	274	388	888	756	569	262	158
12	340	266	1,050	364	1,110	278	458	813	788	543	242	150
13	286	254	854	359	888	282	556	681	845	549	228	145
14	258	*242	741	354	756	270	576	623	948	549	224	142
15	235	246	726	688	681	340	562	623	993	537	235	142
16	217	246	*718	603	609	*312	569	734	862	524	235	145
17	204	239	796	543	569	274	616	837	813	512	224	145
18	278	232	703	458	524	262	623	764	*772	512	210	142
19	262	224	711	409	499	262	556	681	756	458	210	140
20	258	270	813	383	476	282	499	666	711	436	210	135
21	232	340	966	399	476	299	458	696	703	414	210	125
22	214	354	993	383	470	282	425	804	711	414	217	123
23	197	388	1,110	349	458	270	404	1,000	741	436	207	120
24	188	764	1,800	414	453	262	399	888	772	*430	*194	118
25	373	1,440	1,540	711	420	270	414	756	756	425	178	135
26	359	2,340	1,090	788	399	270	420	681	718	394	178	125
27	549	1,800	904	623	378	266	436	659	696	368	188	123
28	481	984	796	506	364	266	441	603	688	364	349	175
29	383	726	703	453	-	295	420	543	726	354	246	246
30	317	616	659	425	-	304	383	518	726	335	207	286
31	278	-	589	394	-	278	-	493	-	330	188	-
Total	9,169	16,515	26,090	15,350	21,112	9,108	13,232	19,878	21,520	15,550	7,542	4,736
Mean	296	550	842	495	754	294	441	641	717	502	243	158
Cfsm	1.90	3.53	5.40	3.17	4.83	1.88	2.83	4.11	4.60	3.22	1.56	1.01
In.	2.19	3.94	6.22	3.66	5.03	2.17	3.15	4.74	5.13	3.71	1.80	1.13
Ac-ft	18,190	32,760	51,750	30,450	41,880	18,070	26,250	39,430	42,680	30,840	14,960	9,390

Calendar year 1950: Max 2,340 Min 132 Mean 520 Cfsm 3.33 In. 45.30 Ac-ft 376,800  
 water year 1950-51: Max 3,020 Min 118 Mean 493 Cfsm 3.16 In. 42.87 Ac-ft 356,800

Peak discharge (base, 1,000 cfs).--Oct. 10 (7:30 a.m.) 1,460 cfs (4.70 ft); Nov. 26 (5:30 to 6:30 p.m.) 2,730 cfs (5.57 ft); Dec. 10 (2:30 a.m.) 2,080 cfs (5.23 ft); Dec. 24 (5 p.m.) 2,230 cfs (5.29 ft); Feb. 9 (9:45 a.m.) 4,600 cfs (6.53 ft); May 23 (8 to 9 a.m.) 1,070 cfs (4.48 ft); June 15 (1 to 4 a.m.) 1,070 cfs (4.48 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Nov. 27 to Sept. 30.

## LITTLE QUILCENE RIVER BASIN

Little Quilcene River near Quilcene, Wash.

Location.--Lat 47°50'15", long. 122°53'15", in NE $\frac{1}{4}$  sec. 14, T. 27 N., R. 2 W., on left bank 60 ft downstream from highway bridge,  $1\frac{1}{4}$  miles northwest of Quilcene, and  $1\frac{1}{2}$  miles upstream from mouth.

Drainage area.--19.6 sq mi (revised).

Records available.--August 1926 to October 1927, July 1951 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 90 ft (from topographic map). Aug. 25, 1926, to Oct. 4, 1927, staff gage at site 120 ft upstream at different datum.

Extremes.--Maximum discharge during period, 31 cfs Aug. 28 (gage height, 2.24 ft); minimum, 5.9 cfs Sept. 20, 21 (gage height, 1.90 ft).  
1926-27, 1951: Maximum discharge observed, 259 cfs Jan. 2, 1927 (gage height, 3.00 ft, site and datum then in use), from rating curve extended above 130 cfs; minimum, 4.1 cfs Sept. 1, 1926 (gage height, 0.86 ft, site and datum then in use).

Remarks.--Records excellent except those for periods of no gage-height record, which are good. No known diversion or regulation.

Discharge, in cubic feet per second July to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1										13	12	8.2
2										13	11.5	7.7
3										13	11.5	7.2
4										14	10.5	7.2
5										15.5	10	7.2
6										15.5	9.6	7.2
7										15	9.6	7.2
8										15	9.6	10.5
9										14.5	9.6	9.1
10										14.5	*9.6	8.2
11										13	10	7.7
12										13	10	7.2
13										13	9.6	7.2
14										13	9.6	6.8
15										13	9.6	6.8
16										13	9.1	6.3
17										13	8.6	6.3
18										13	8.2	6.3
19										13	7.7	6.3
20										13	7.7	6.3
21										12.5	7.2	5.9
22										12	7.2	6.3
23										12	7.2	6.3
24										*11.5	7.2	6.8
25										12.5	7.2	7.2
26										15	7.2	7.2
27										15	7.7	7.2
28										15	19	7.7
29										13	12	8.2
30										12.5	9.1	8.6
31										12.5	*8.6	-
Total										416.5	293.2	218.3
Mean										13.4	9.46	7.28
Cfsm										0.684	0.483	0.371
In.										0.79	0.56	0.41
Ac-ft										826	582	433

Calendar year : Max Min Mean Cfsm In. Ac-ft  
Water year : Max Min Mean Cfsm In. Ac-ft

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations or nearby streams.





## DOSEWALLIPS RIVER BASIN

Dosewallips River near Brinnon, Wash.

Location (revised).--Lat 47°43'35", long. 123°00'30", in SW $\frac{1}{4}$  sec. 24, T. 28 N., R. 3 W., on left bank half a mile upstream from Corrigena ranger station, 5 $\frac{1}{2}$  miles northwest of Brinnon, and 7 $\frac{1}{2}$  miles upstream from mouth.

Drainage area.--93.7 sq mi (revised).

Records available.--October 1930 to October 1949, May 1951 to September 1951 (discontinued).

Gage.--Water-stage recorder. Altitude of gage is 250 ft (from topographic map).

Average discharge.--19 years, 445 cfs.

Extremes.--Maximum discharge during period, 1,420 cfs June 14 (gage height, 4.43 ft); minimum not determined, occurred sometime during period of no gage-height record Sept. 13-30.

1930-49, 1951: Maximum discharge, 10,900 cfs Nov. 5, 1934 (gage height, 9.57 ft), from rating curve extended above 4,500 cfs; minimum, 65 cfs Dec. 4, 1936 (gage height, 1.71 ft).

Remarks.--Records good except those for periods of no gage-height record, which are fair. No diversion or regulation.

Rating table, May 23 to Sept. 30, 1951 (gage height, in feet, and discharge, in cubic feet per second)

1.9	97	3.0	436
2.0	118	3.6	765
2.5	248	4.2	1,200

Discharge, in cubic feet per second, May to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1								-	615	900	323	159
2								-	645	880	316	157
3								-	729	850	312	157
4								-	765	780	302	157
5								-	778	640	284	157
6								-	772	542	271	157
7								-	765	526	264	177
8								-	784	542	264	207
9								-	817	603	261	174
10								-	893	627	*258	162
11								-	970	615	258	154
12								-	970	585	242	150
13								-	*1,040	597	230	145
14								-	1,160	574	227	140
15								-	1,200	542	230	135
16								-	1,080	526	227	130
17								-	1,000	*521	221	125
18								-	935	492	212	122
19								-	935	441	210	120
20								-	886	406	215	117
21								-	865	389	218	113
22								-	879	397	221	110
23								1,380	935	414	210	107
24								1,200	935	410	196	106
25								1,000	900	397	182	130
26								872	872	373	177	125
27								824	851	357	174	120
28								765	879	349	201	250
29								693	900	342	185	500
30								645	920	331	169	600
31								615	-	327	*162	-
Total								-	26,675	16,255	7,222	5,183
Mean								-	889	524	235	172
Cfsm								-	9.49	5.58	2.49	1.84
In.								-	10.59	6.45	2.87	2.05
Ac-ft								-	52,910	32,240	14,320	10,240

Calendar year  
Water year

: Max  
: Max

Min  
Min

Mean  
Mean

Cfsm  
Cfsm

In.  
In.

Ac-ft  
Ac-ft

\* Discharge measurement made on this day.

Note.--No gage-height record June 29 to July 5, Sept. 13-30; discharge estimated on basis of records for stations on nearby streams.

## Duckabush River near Brinnon, Wash.

Location.--Lat 47°41'00", long. 123°00'40", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 1, T. 25 N., R. 3 W., on left bank  $\frac{1}{2}$  miles upstream from mouth and 5 miles west of Brinnon.

Drainage area.--66.5 sq mi (revised).

Records available.--August to December 1910 (gage heights only), December 1910 to December 1911, June 1938 to September 1951. Published as "near Duckabush" 1910-11.

Gage.--Water-stage recorder. Datum of gage is 241.49 ft above mean sea level, datum of 1929. Aug. 19, 1910, to Dec. 31, 1911, staff gage at same site at different datum.

Average discharge.--13 years (1938-51), 381 cfs.

Extremes.--Maximum discharge during year, 4,190 cfs Feb. 9 (gage height, 7.21 ft); minimum, 50 cfs Sept. 23, 24 (gage height, 1.85 ft).  
1910-11, 1938-51: Maximum discharge, 8,960 cfs Nov. 26, 1949 (gage height, 10.06 ft), from rating curve extended above 1,800 cfs on basis of slope-area determination of peak flow; minimum, 45 cfs Oct. 26, 28, 29, 1942 (gage height, 1.36 ft).

Remarks.--Records good except those for periods of doubtful gage-height record, which are fair, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.9	50	3.2	480	5.0	1,760
2.2	110	3.6	700	5.5	2,250
2.5	191	4.0	950	6.0	2,750
2.8	299	4.5	1,330	7.0	3,930

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	78	700	800	500	350	200	320	376	403	500	161	80
2	*78	680	550	520	400	190	337	*350	440	490	158	78
3	78	900	520	480	420	180	408	350	510	485	153	78
4	134	800	520	450	350	170	480	460	530	412	148	76
5	475	600	600	420	300	165	470	565	520	350	145	76
6	312	480	1,000	400	*268	160	445	565	515	320	134	76
7	800	426	900	380	790	155	475	616	520	307	132	84
8	850	367	750	360	2,170	150	455	570	510	307	129	115
9	700	320	1,500	350	3,670	145	412	560	525	324	127	88
10	1,200	295	1,500	370	2,680	140	390	616	555	341	124	78
11	480	280	1,100	360	1,330	135	403	790	592	337	122	74
12	385	253	900	350	900	170	540	664	580	324	120	72
13	299	240	800	500	700	220	682	550	628	320	115	68
14	253	*238	750	480	550	210	652	515	*712	312	108	64
15	217	253	*1,580	700	500	*455	622	525	754	287	108	63
16	191	280	1,410	550	450	350	646	640	682	276	106	61
17	191	268	1,450	450	420	280	706	748	616	276	101	61
18	d445	249	985	400	380	246	664	622	580	268	99	59
19	d480	228	1,170	380	350	242	565	540	560	246	99	59
20	363	303	1,580	360	330	291	490	555	535	228	99	57
21	283	d475	1,760	330	310	303	430	622	525	214	99	55
22	242	500	1,580	310	290	276	394	742	535	221	97	54
23	211	750	1,760	290	270	249	372	950	555	217	95	52
24	235	1,000	2,000	500	260	235	367	820	545	*217	*90	52
25	900	2,000	1,290	1,200	250	238	376	682	520	214	86	64
26	700	2,100	950	900	230	249	390	565	510	201	82	61
27	1,100	1,400	790	600	220	246	495	550	495	188	84	59
28	1,000	1,000	718	500	210	238	604	495	485	182	101	117
29	800	800	622	430	-	385	510	440	495	179	95	354
30	700	650	640	390	-	398	430	408	505	175	86	361
31	600	-	550	370	-	341	-	390	-	167	82	-
Total	14,778	16,935	32,825	14,580	19,548	7,412	14,530	17,841	16,437	8,883	3,485	2,716
Mean	477	531	1,059	470	698	239	484	576	548	287	112	90.5
Cfsm	7.17	9.49	15.9	7.07	10.5	3.59	7.28	8.66	8.24	4.32	1.68	1.36
In.	8.26	10.59	18.36	8.15	10.93	4.15	8.13	9.98	9.19	4.97	1.95	1.52
Ac-ft	29,310	37,560	65,110	28,920	38,770	14,700	28,820	35,390	32,600	17,620	6,910	5,390
Calendar year 1950: Max	2,360	Min	76	Mean	533	Cfsm	8.02	In.	108.77	Ac-ft	365,800	
Water year 1950-51: Max	3,670	Min	52	Mean	471	Cfsm	7.08	In.	96.18	Ac-ft	341,100	

Peak discharge (base, 2,500 cfs).--Probably Nov. 26 (time and discharge unknown); Feb. 9 (2 a.m.) 4,190 cfs (7.21 ft).

\* Discharge measurement made on this day.

d Doubtful gage-height record; discharge computed from reconstructed gage-height graph based on recorded graph, and records for nearby stations.

Note.--No gage-height record Oct. 7-10, Oct. 25 to Nov. 5, Nov. 13, Nov. 22 to Dec. 14, Jan. 3 to Feb. 5, Feb. 12 to Mar. 14; discharge estimated on basis of records for stations on nearby streams.

## HAMMA HAMMA RIVER BASIN

Hamma Hamma River near Eldon, Wash.

Location--Lat 47°35'20", long. 123°07'00", in NW $\frac{1}{4}$  sec. 7, T. 24 N., R. 3 W., on left bank a quarter of a mile downstream from Watson Creek, 4 $\frac{1}{2}$  miles northwest of Eldon, and 6 miles upstream from mouth.

Drainage area--51.3 sq mi.

Records available--June to September 1951.

Gage--Water-stage recorder. Altitude of gage is 510 ft (from topographic map).

Extremes--Maximum discharge during period not determined, probably occurred sometime during period of no gage-height record in September; minimum, 43 cfs probably Sept. 23, 24 (gage height, 0.70 ft, from recorded range in stage).

Remarks--Records excellent except those for periods of no gage-height record, which are fair. No diversion or regulation.

Discharge, in cubic feet per second, June to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1									-	292	100	58
2									-	284	98	56
3									-	276	96	55
4									-	258	94	55
5									-	233	92	54
6									-	*216	88	54
7									-	203	86	54
8									-	193	84	55
9									-	193	83	55
10									-	199	*83	55
11									-	196	81	55
12									-	190	79	54
13									-	187	77	52
14									-	184	75	50
15									-	178	73	50
16									-	169	72	49
17									-	163	70	a48
18									-	158	70	a47
19									-	152	68	a47
20									-	147	66	a46
21									-	139	63	a45
22									-	134	63	a44
23									-	*134	63	a43
24									-	129	61	a43
25									-	*127	60	a50
26									-	122	58	a47
27									-	115	60	a44
28									-	111	61	a100
29									292	109	60	a280
30									295	107	58	a300
31									-	102	*58	-
Total									-	5,400	2,300	2,045
Mean									-	174	74.2	68.2
Cfsm									-	3.39	1.45	1.35
In.									-	3.91	1.67	1.48
Ac-ft									-	10,710	4,560	4,060
Calendar year	: Max		Min		Mean		Cfsm		In.	Ac-ft		
Water year	: Max		Min		Mean		Cfsm		In.	Ac-ft		

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

## Eagle Creek near Lilliwaup, Wash.

Location.--Lat 47°29'10", long. 123°04'40", in NW $\frac{1}{4}$  sec. 16, T. 23 N., R. 3 W., on left bank 750 ft upstream from mouth and 2 $\frac{1}{2}$  miles northeast of Lilliwaup.

Drainage area.--7.06 sq mi.

Records available.--June to September 1951 (discontinued).

Gage.--Water-stage recorder. Altitude of gage is 10 ft (from topographic map).

Extremes.--Maximum discharge during period, 25 cfs Sept. 29 (gage height, 1.83 ft), from rating curve extended above 11 cfs; minimum, 6.9 cfs Sept. 20 (gage height, 1.42 ft).

Remarks.--Records good except those for period of no gage-height record, which are poor.  
No diversion or regulation.

Discharge, in cubic feet per second, June to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1									a13.0	9.1	8.4	8.0
2									a12.5	9.5	8.4	8.0
3									a12.5	9.5	8.4	8.0
4									a12.5	9.5	8.4	7.6
5									a12.5	9.5	8.0	7.6
6									a12	9.1	8.0	8.0
7									a11.5	9.1	8.0	9.5
8									a11	9.1	8.0	8.4
9									a11	8.7	*8.4	8.0
10									a11	8.7	8.4	8.0
11									a10.5	8.4	8.4	7.6
12									*a10.5	8.4	8.4	7.6
13									10.5	8.7	8.0	7.6
14									10.5	8.7	8.0	7.6
15									10.5	8.7	8.0	7.6
16									10.5	8.7	8.0	7.6
17									10.5	8.4	7.6	7.6
18									9.9	*8.4	7.6	7.6
19									9.9	8.4	7.6	7.6
20									9.5	8.0	7.6	7.3
21									9.5	8.0	7.6	7.3
22									9.5	8.0	7.6	7.3
23									9.5	8.0	7.6	7.3
24									9.5	8.0	8.0	7.3
25									9.1	8.4	8.0	7.6
26									9.1	8.4	8.0	7.3
27									9.1	8.0	8.7	8.4
28									*9.1	8.0	9.1	9.5
29									9.1	8.0	8.4	14.5
30									9.1	8.4	*8.0	12.5
31									-	8.4	8.0	-
Total									314.9	266.6	250.6	245.8
Mean									10.5	8.60	8.08	8.19
Cfsm									1.49	1.22	1.14	1.16
In.									1.66	1.40	1.32	1.29
Ac-ft									625	529	497	488
Calendar year	: Max		Min		Mean		Cfsm		In.		Ac-ft	
Water year	: Max		Min		Mean		Cfsm		In.		Ac-ft	

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of 1 discharge measurement and records for stations on nearby streams.

## FINCH CREEK BASIN

Finch Creek at Hoodsport, Wash.

Location.--Lat 47°24'20", long. 123°08'50", in SE $\frac{1}{4}$  sec. 11, T. 22 N., R. 4 W., on right bank in Hoodsport a quarter of a mile upstream from mouth.

Drainage area.--3.45 sq mi.

Records available.--June to September 1951 (discontinued).

Gage.--Water-stage recorder. Altitude of gage is 20 ft (from topographic map).

Extremes.--Maximum discharge during period, 27 cfs Sept. 29; maximum gage height, 1.40 ft June 13, 14; minimum discharge, 11 cfs Aug. 31.

Remarks.--Records excellent except those for period of no gage-height record, which are poor. No diversion or regulation.

Discharge, in cubic feet per second, June to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1									a20	15.5	13	11.5
2									a19.5	15.5	13	11.5
3									a19.5	15	13.5	11.5
4									a19.5	15	13.5	11.5
5									a19.5	15	13	11.5
6									a19	15	13	11.5
7									a18.5	15	13	13
8									a18	15	13	13
9									a18	15	*13	13
10									a18	15	13	12.5
11									a17.5	15	12.5	12.5
12									*a17.5	15	12.5	13
13									17	14.5	12	13
14									16.5	14.5	12	13
15									16.5	14.5	12	12.5
16									16.5	14.5	12	12.5
17									16.5	14.5	12	12.5
18									16.5	*14.5	12	12.5
19									16.5	14.5	12	12.5
20									16.5	14	12	12.5
21									16.5	14	12	12.5
22									16.5	14	12	12
23									16.5	14	11.5	12
24									16.5	14	11.5	12.5
25									16	14	11.5	12.5
26									16	14	11.5	12
27									16	14	11.5	12.5
28									*15.5	13.5	11.5	14
29									15.5	13.5	11.5	19.5
30									15.5	13	*11.5	19
31									-	13	11.5	-
Total									517.5	447.5	379.5	385.5
Mean									17.2	14.4	12.2	12.8
Cfsm									4.99	4.17	3.54	3.71
In.									5.58	4.82	4.09	4.16
Ac-ft									1,030	888	753	765
Calendar year	: Max		Min	Mean		Cfsm		In.	Ac-ft			
Water year	: Max		Min	Mean		Cfsm		In.	Ac-ft			

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of 1 discharge measurement and records for stations on nearby streams.

North Fork Skokomish River below Staircase Rapids, near Hoodsport, Wash.

Location.--Lat 47°30'55", long. 123°19'45", in NW¼ sec. 4, T. 23 N., R. 5 W., on left bank three-quarters of a mile upstream from Lake Cushman, 2 miles upstream from Dry Creek, and 1½ miles northwest of Hoodsport.

Drainage area.--60.2 sq mi (revised).

Records available.--July 1924 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 760.85 ft above mean sea level (river-profile survey). July 30, 1924, to Oct. 31, 1934, water-stage recorder on opposite bank at same datum, Nov. 1, 1934 to Nov. 10, 1941, several staff gages at approximately same site on opposite bank at same datum.

Average discharge.--27 years, 469 cfs.

Extremes.--Maximum discharge during year, 7,030 cfs Feb. 10 (gage height, 7.69 ft); minimum, 52 cfs Sept. 24 (gage height, 1.47 ft).

1924-51: Maximum discharge 24,200 cfs Nov. 26, 1949 (gage height, 12.2 ft, from high-water mark), from rating curve extended above 1,500 cfs on basis of slope-area determination of peak flow; minimum recorded, 16 cfs Sept. 23, 1930 (gage height, 1.12 ft).

Remarks.--Records good except those for period of shifting control, which are fair. No diversion or regulation.

Rating table, water year 1950-51, except period of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.5	52	2.6	347	4.5	1,640
1.7	82	2.9	488	5.0	2,190
1.9	120	3.2	647	6.0	3,570
2.1	168	3.6	890	7.0	5,420
2.3	230	4.0	1,190		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	84	858	763	775	388	305	401	449	483	425	138	76
2	82	825	670	800	464	289	434	411	524	411	135	74
3	*89	1,190	520	763	473	278	544	434	581	392	129	72
4	356	1,070	630	664	425	270	653	620	576	334	127	71
5	800	890	828	592	383	255	642	698	566	297	118	71
6	598	722	1,540	544	370	241	620	704	539	286	114	71
7	1,150	608	1,320	514	1,270	237	664	745	534	270	112	116
8	1,230	529	1,030	468	2,400	227	630	658	524	266	114	114
9	1,040	459	2,870	439	5,220	220	576	653	539	270	112	84
10	2,200	420	2,840	488	5,220	204	550	769	581	278	110	74
11	858	392	1,900	483	2,560	200	598	890	592	270	106	71
12	581	356	*1,400	439	1,590	237	788	734	*581	262	102	68
13	449	*334	1,070	664	1,190	266	960	603	603	255	98	68
14	383	313	995	642	995	244	858	571	658	244	96	65
15	334	318	1,640	925	890	425	813	592	693	227	96	65
16	293	322	1,690	734	800	388	890	757	636	220	96	65
17	278	297	1,790	582	728	318	925	794	581	217	95	62
18	687	270	1,230	503	642	289	858	658	566	207	91	60
19	745	259	1,400	434	608	286	710	581	529	*188	91	59
20	544	334	2,140	401	560	326	598	598	503	180	91	58
21	420	658	2,370	397	514	347	519	704	498	171	93	56
22	360	925	2,070	360	468	326	488	825	493	174	*91	55
23	318	1,080	2,020	339	439	301	464	1,070	508	177	87	53
24	309	1,500	2,430	641	*416	*297	468	1,030	493	174	86	55
25	1,420	3,320	1,690	1,540	388	309	488	794	473	165	82	77
26	960	3,420	1,270	1,230	360	322	508	647	454	155	80	62
27	1,640	2,190	1,150	788	343	309	*525	614	434	150	82	62
28	1,500	1,540	1,030	598	326	309	825	550	425	150	86	237
29	1,150	1,110	995	514	-	473	636	488	434	147	84	1,090
30	890	925	1,110	449	-	483	519	449	430	140	82	814
31	751	-	890	406	-	425	-	449	-	138	77	-
Total	22,499	27,434	45,391	19,126	30,430	9,406	19,252	20,539	16,031	7,240	3,101	4,025
Mean	726	914	1,464	617	1,087	303	642	663	534	234	100	134
Cfsm	12.1	15.2	24.3	10.2	18.1	5.03	10.7	11.0	8.87	3.89	1.66	2.23
In.	13.90	16.95	28.04	11.82	18.80	5.81	11.89	12.69	9.90	4.47	1.92	2.49
Ac-ft	44,650	54,410	90,030	37,940	60,360	18,660	38,190	40,740	31,800	14,360	6,150	7,980

Calendar year 1950: Max 3,420 Min 82 Mean 695 Cfsm 11.54 In. 156.62 Ac-ft 502,800  
 Water year 1950-51: Max 5,220 Min 53 Mean 615 Cfsm 10.22 In. 138.68 Ac-ft 445,200

Peak discharge (base, 3,000 cfs).--Oct. 10 (4 a.m.) 3,660 cfs (6.04 ft); Nov. 25 (2:30 p.m.) 5,850 cfs (7.15 ft); Dec. 9 (7 p.m.) 5,420 cfs (7.04 ft); Dec. 21 (7 p.m.) 3,410 cfs (5.91 ft); Dec. 24 (2 p.m.) 3,180 cfs (5.73 ft); Feb. 10 (2 a.m.) 7,030 cfs (7.69 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Apr. 13 to Sept. 29.

## SKOKOMISH RIVER BASIN

North Fork Skokomish River near Hoodsport, Wash.

Location.--Lat 47°25'20", long. 123°13'10", in SW $\frac{1}{4}$  sec. 5, T. 22 N., R. 4 W., at city of Tacoma dam 4 miles northwest of Hoodsport.

Drainage area.--93.7 sq mi (revised).

Records available.--August 1910 to September 1911 (gage heights and discharge measurements only), February 1913 to September 1930, October 1930 to September 1935 (annual discharge only), October 1950 to September 1951 (monthly discharge only), in reports of Geological Survey. October 1911 to September 1933 (monthly discharge only), in State Water-Supply Bulletin 5.

Gage.--Discharge determined from record of power output and Lake Cushman elevations, plus spillway discharge when present. Prior to Sept. 23, 1911, staff gage and February 1913 to September 1923, water-stage recorder at approximately same site at altitude of about 500 ft. October 1923 to September 1930, water-stage recorder 1 mile downstream at different datum.

Average discharge.--25 years (1911-35, 1950-51), 751 cfs (adjusted for storage).

Extremes.--Not determined since regulation began in Lake Cushman.

Remarks.--Records fair. No diversion of consequence. Flow regulated in Lake Cushman since October 1925 for power by city of Tacoma.

Cooperation.--Records of power output and elevations of Lake Cushman furnished by city of Tacoma.

Monthly discharge, in cubic feet per second, water year October 1950 to September 1951

Month	Observed				Change in contents in Lake Cushman Reservoir (acre-feet)	Adjusted for change in reservoir contents			
	Discharge in second-feet			Runoff in acre-feet		Runoff in acre-feet	Discharge in second-feet		Runoff in inches
	Maximum	Minimum	Mean				Mean	Per square mile	
October.....	2,070	377	1,167	71,780	-740	71,040	1,155	12.3	14.22
November.....	2,150	707	1,402	83,440	+2,920	86,360	1,451	15.5	17.28
December.....	3,120	1,500	2,268	139,500	-410	139,100	2,262	24.1	27.83
Calendar year 1950	3,120	00	1,005	727,900	+6,770	734,700	1,015	10.8	147.02
January.....	2,120	772	1,498	92,140	-26,630	65,510	1,065	11.4	13.11
February.....	2,820	761	1,596	88,650	+7,940	96,590	1,739	18.6	19.33
March.....	1,310	661	1,166	71,700	-41,480	30,240	492	5.25	6.05
April.....	1,210	0	633	37,680	+10,700	48,380	813	8.68	9.68
May.....	638	0	340	20,910	+26,360	48,270	801	8.55	9.86
June.....	431	0	100	5,960	+28,410	35,370	594	6.34	7.08
July.....	350	0	180	9,870	+5,850	15,720	256	2.73	3.15
August.....	396	0	184	11,320	-4,740	6,580	107	1.14	1.32
September.....	1,070	0	315	18,720	-6,480	12,240	206	2.20	2.45
Water year 1950-51	3,120	0	900	651,700	+4,720	656,400	907	9.68	131.36



## Deer Meadow Creek near Hoodsport, Wash.

Location.--Lat 47°25'00", long. 123°13'30", in NW¼ sec. 8, T. 22 N., R. 4 W., on left bank a quarter of a mile upstream from mouth and 4 miles west of Hoodsport.

Drainage area.--0.28 sq mi.

Records available.--August 1950 to August 1951 (destroyed by high water from blasting beaver dam upstream on Oct. 4, 1951).

Gage.--Water-stage recorder. Elevation of gage is 690 ft (from topographic map).

Extremes.--Maximum discharge during period, 60 cfs Feb. 9, 1951 (gage height, 2.00 ft); minimum, 0.5 cfs Aug. 27, Sept. 7, 1950. Discharge on Oct. 4, 1951 (when gage was destroyed by blasting beaver dam upstream), probably greater than that of Feb. 9, 1951.

Remarks.--Records good except those for periods of no gage-height record, which are fair. No diversion or regulation.

Rating table, Aug. 17, 1950, to Aug. 31, 1951 (gage height, in feet, and discharge, in cubic feet per second)

0.85	0.5	1.3	6.0
1.0	1.7	1.5	13.5
1.1	1.4	1.7	26
1.2	2.3	1.9	49
1.2	3.8		

Discharge, in cubic feet per second, 1950-51

1950											
Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1	-	0.6	9	-	0.7	17	1.0	0.7	25	0.7	1.3
2	-	.6	10	-	.8	18	.8	.6	26	.7	*1.2
3	-	.6	11	-	.8	19	1.0	.6	27	.6	.9
4	-	.7	12	-	.7	20	.9	.6	28	.7	.8
5	-	.7	13	-	.7	21	.7	*.6	29	.6	.8
6	-	.7	14	-	.6	22	.7	.7	30	.7	.8
7	-	.6	15	-	.6	23	1.0	.6	31	.7	-
8	-	.7	16	-	.6	24	.9	1.1			
Total										-	22.0
Mean										-	0.75
Cfsm										-	2.61
In.										-	2.92
Ac-ft										-	44

\* Discharge measurement made on this day.

1950-51

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.7	6.6	8.1	6.3	5.5	3.6	3.3	2.1	1.3	1.0	0.8	
2	.7	6.6	7.8	8.8	6.9	3.6	3.3	2.2	1.4	.9	.9	
3	.8	5.7	7.2	7.8	6.3	3.9	3.1	2.1	1.1	.9	.8	
4	1.2	5.5	6.9	7.5	6.0	3.6	3.1	2.3	1.2	.9	.8	
5	2.0	4.5	7.5	6.6	5.5	3.4	3.0	2.3	1.4	.9	.9	
6	1.7	4.3	9.6	6.0	5.5	3.4	2.8	2.2	1.5	.9	.9	
7	3.0	4.1	9.6	6.0	9.6	3.4	2.7	2.1	1.4	1.0	.9	
8	2.3	*3.8	8.1	5.5	19	3.5	2.8	2.0	1.4	1.9	.8	
9	2.4	3.4	12.5	5.5	2.6	3.1	2.6	1.9	1.4	1.0	.8	
10	6.6	3.6	12.5	5.7	*57	2.7	2.6	1.9	1.2	1.0	.8	
11	4.5	3.6	*9.6	5.5	20	3.0	2.3	2.1	1.3	1.0	.8	
12	3.4	3.4	7.8	6.0	14	4.1	2.3	2.0	*1.4	1.0	.8	
13	3.0	3.3	6.9	5.7	11	3.8	2.2	1.9	1.4	1.0	.8	
14	2.6	3.1	7.2	8.5	9.2	3.8	2.2	1.7	1.2	1.0	.8	
15	2.3	4.7	8.8	13	7.8	5.0	3.8	1.8	1.1	.9	.8	
16	2.1	5.0	12.5	12.5	6.9	5.5	2.3	1.7	1.2	1.0	.7	
17	2.3	5.0	14	8.8	6.6	5.0	1.5	1.7	1.1	.9	.7	
18	3.9	4.1	10.5	8.1	5.5	4.1	2.1	1.6	1.1	*.9	.8	
19	3.8	4.1	10	6.6	6.6	3.9	2.0	1.6	1.2	.9	.8	
20	3.4	5.7	11.5	7.8	6.3	3.9	1.9	1.6	1.2	.8	.8	
21	3.1	12	12.5	7.8	*5.7	4.1	2.0	1.5	1.2	.9	.8	
22	a2.9	12.5	11.5	7.2	5.5	4.1	2.1	1.4	1.0	.9	.8	
23	a2.7	11	12.5	7.2	5.2	3.8	1.9	1.7	1.0	.8	*.8	
24	a2.6	9.6	13	14	5.0	*3.6	1.9	1.9	1.0	.8	a.8	
25	a3.5	17.5	11	24	4.5	3.8	1.9	1.6	1.0	.8	a.8	
26	a5.0	*14	9.2	12.5	4.3	3.6	1.7	1.6	1.0	.8	a.8	
27	a7.0	11	9.2	8.5	4.3	3.3	*3.0	1.3	1.0	.9	a.8	
28	a8.0	9.2	8.5	a7.0	3.9	3.0	3.3	1.4	1.0	.9	a.9	
29	a7.0	7.8	8.5	a6.0	-	3.9	2.6	1.3	1.0	.8	a.8	
30	a6.0	10.5	7.5	*5.2	-	4.1	2.2	1.4	1.0	.8	a.8	
31	a5.0	-	6.3	5.0	-	3.4	-	1.4	-	.9	a.8	
Total	105.5	205.2	298.3	252.6	279.6	116.8	74.5	55.3	35.7	28.1	25.1	
Mean	3.40	6.84	9.62	8.15	9.99	3.77	2.48	1.78	1.19	0.91	0.81	
Cfsm	12.1	24.4	34.4	29.1	35.7	13.5	8.86	6.36	4.25	3.25	2.89	
In.	14.01	27.25	39.62	33.55	37.14	15.51	9.90	7.35	4.74	3.73	3.35	
Ac-ft	209	407	592	501	555	232	148	110	71	56	50	

Calendar year : Max Min Mean Cfsm In. Ac-ft  
Water year : Max Min Mean Cfsm In. Ac-ft

Peak discharge (base, 20 cfs).--Nov. 21 (9 p.m.) 20 cfs (1.67 ft); Nov. 25 (8:30 a.m.) 21 cfs (1.66 ft); Jan. 25 (7 a.m.) 34 cfs (1.81 ft); Feb. 9 (8:30 a.m.) 60 cfs (2.00 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

## SKOKOMISH RIVER BASIN

Dow Creek near Hoodsport, Wash.

Location.--Lat 47°24'40", long. 123°11'15", in E½ sec. 9, T. 22 N., R. 4 W., on left bank 1 mile upstream from mouth and 2½ miles west of Hoodsport.

Drainage area.--1.67 sq mi.

Records available.--August 1950 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 600 ft (from topographic map).

Extremes.--Maximum discharge during period, 543 cfs Feb. 9 (gage height, 2.72 ft); minimum, 0.02 cfs Sept. 14, 15, 16, 20, 21; minimum gage height, 0.52 ft Oct. 1, 2.

Remarks.--Records fair except those for period of no gage-height record, which are poor. No regulation. City of Tacoma diverts about one third of a cubic foot per second for use of Cushman powerplant operators' village.

Rating table, Aug. 17, 1950, to Sept. 30, 1951 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Aug. 17 to Feb. 9)

1.1	0.02	1.5	6.6	2.0	85
1.2	.6	1.6	11.5	2.2	120
1.3	1.6	1.7	19.5	2.4	210
1.4	3.6	1.8	31	2.7	400

Discharge, in cubic feet per second, 1950-51

1950											
Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1	-	0.2	9	-	0.2	17	0.2	0.2	25	0.4	0.6
2	-	.2	10	-	.2	18	.3	.1	26	.3	*.3
3	-	.2	11	-	.2	19	.4	.1	27	.3	.2
4	-	.2	12	-	.2	20	.4	.1	28	.4	.1
5	-	.2	13	-	.2	21	.3	*.1	29	.3	.1
6	-	.2	14	-	.2	22	.4	.1	30	.3	-
7	-	.2	15	-	.2	23	.6	.3	31	.3	-
8	-	.2	16	-	.2	24	.5	.6			
Total.....										-	6.2
Mean.....										-	0.21
Cfsm.....										-	0.126
In.....										-	0.14
Ac-ft.....										-	12

\* Discharge measurement made on this day.

1950-51												
Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.1	17	18	7.2	12.5	7.2	8.5	2.3	1.2	0.5	0.1	0.1
2	.1	13	15	8.5	18	6.6	8.0	2.1	1.2	.4	.1	.1
3	.2	8.5	13	8.0	17	6.3	7.6	1.9	1.2	.4	.1	.1
4	.4	6.9	10	6.9	16.5	5.9	7.2	1.9	1.2	.4	.1	.1
5	.7	5.6	12.5	5.6	14	5.6	6.9	1.8	1.2	.4	.2	.1
6	.6	5.0	31	5.6	15	5.3	6.3	1.9	1.1	.4	.2	.1
7	3.4	3.9	29	5.0	48	5.0	5.9	1.9	1.1	.4	.1	.3
8	2.3	3.4	21	4.4	128	4.7	5.6	1.8	1.1	.3	.1	.1
9	2.3	2.7	40	4.1	344	4.4	5.3	1.9	1.1	.5	.1	.1
10	2.3	2.5	48	5.3	132	4.4	5.0	1.8	1.1	.5	.1	.1
11	5.0	2.3	*30	6.6	68	4.4	4.7	1.9	1.0	.3	.1	.1
12	2.3	1.9	16.5	6.6	46	8.0	4.7	1.9	*1.0	.3	.1	.1
13	1.5	1.9	11	10	37	8.5	4.4	1.8	.9	.3	.1	.1
14	1.1	1.8	10	11.5	31	*8.5	4.1	1.8	.8	.3	.1	.1
15	.8	2.7	18.5	26	28	16.5	4.1	1.6	.8	.2	.1	.1
16	.7	5.9	28	21	23	15	3.9	1.8	.7	.2	.1	.1
17	.7	5.6	38	17	22	12.5	3.6	1.8	.6	.2	.1	.1
18	3.1	4.7	24	11	18.5	10	3.4	1.6	.6	*.2	.1	.1
19	5.3	4.4	18	8.5	18.5	10	3.4	1.5	.6	.2	.1	.1
20	4.1	8.5	28	7.6	13	11.5	3.4	1.5	.6	.2	.1	.1
21	2.9	24	30	10	*14	13	3.4	1.4	.6	.1	.1	.1
22	2.1	40	28	9.6	12.5	11.5	3.1	1.4	.6	.1	.1	.1
23	1.8	29	30	a9	11.5	10	3.1	1.5	.6	.1	*.1	.1
24	1.6	4.3	31	a30	11	9.6	2.7	1.8	.6	.1	.1	.1
25	3.1	136	25	a80	9.6	9.0	2.7	1.5	.6	.2	.1	.1
26	4.4	*72	17	a45	9.0	8.5	2.5	1.4	.6	.2	.1	.1
27	9.6	38	15.5	a28	8.0	8.0	*3.6	1.4	.5	.1	.1	.2
28	*19.5	28	15.5	a22	7.6	7.6	4.7	1.4	.5	.1	.2	.5
29	17	18.5	12.5	a19	-	9.0	2.9	1.2	.5	.1	.1	1.2
30	11.5	21	10	a15	-	9.6	2.3	1.2	.5	.1	.1	1.4
31	9.6	-	8.5	*13	-	9.0	-	1.2	-	.1	.1	-
Total	140.8	557.7	682.5	467.0	1,133.2	265.1	137.0	51.9	24.7	7.5	3.4	6.1
Mean	4.54	18.6	22.0	15.1	40.5	8.55	4.57	1.67	0.82	0.24	0.11	0.20
Cfsm	2.72	11.1	13.2	9.04	24.3	5.12	2.74	1.00	0.491	0.144	0.066	0.120
In.	3.14	12.42	15.20	10.40	25.24	5.90	3.05	1.16	0.55	0.17	0.08	0.14
Ac-ft	279	1,110	1,350	926	2,250	526	272	103	49	15	6.7	12

Calendar year 1950: Max - Min - Mean - Cfsm - In. - Ac-ft -  
Water year 1950-51: Max 344 Min 0.1 Mean 9.53 Cfsm 5.71 In. 77.45 Ac-ft 6,900

Peak discharge (base, 250 cfs).--Nov. 25 (10:30 a.m.) 252 cfs (2.17 ft); Feb. 9 (7 a.m.) 543 cfs (2.72 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

## McTaggart Creek near Hoodsport, Wash.

Location.--Lat 47°24'50", long. 123°14'25", in N $\frac{1}{2}$  sec. 7, T. 22 N., R. 4 W., on left bank three-quarters of a mile upstream from mouth and  $4\frac{1}{4}$  miles west of Hoodsport.

Drainage area.--1.29 sq mi.

Records available.--August 1950 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 770 ft (from topographic map).

Extremes.--Maximum discharge during period, 170 cfs Feb. 9 (gage height, 4.04 ft); no flow Aug. 17 to Oct. 6, 1950, June 13 to Sept. 28, 1951.

Remarks.--Records fair. No diversion or regulation. Station established Aug. 17, 1950; there was no flow during the remainder of the water year 1950.

Rating table, Aug. 17, 1950, to Sept. 30, 1951 (gage height,  
in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1-15, 30, Nov. 1,  
8-24, Feb. 10 to Mar. 11)

1.0	0	1.8	9.3	3.0	62
1.2	.6	2.0	14.5	3.5	103
1.4	2.3	2.3	25	4.0	157
1.6	5.2	2.6	38		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0	6.7	16	13	12	5.8	4.4	1.2	0.3			0
2	0	a6.0	14	15	14	5.4	4.2	1.2	.3			0
3	0	a5.4	13.5	13.5	13	5.2	4.1	1.2	.3			0
4	0	a4.8	12.5	12	12	5.0	3.9	1.2	.2			0
5	0	a4.2	13.5	11	11.5	4.9	3.6	1.2	.2			0
6	0	a3.9	22	10	11.5	4.6	3.5	1.2	.2			0
7	1.6	a3.7	19.5	9.6	23	4.2	3.3	1.2	.2			0
8	.7	*3.6	17	8.9	54	4.1	3.2	1.1	.2			0
9	.8	3.5	26	8.6	131	4.1	3.0	1.0	.1			0
10	5.8	3.3	28	9.3	106	3.8	2.7	1.0	.1			0
11	2.4	3.1	*23	10.5	56	3.8	2.7	1.0	.1			0
12	1.4	3.0	19	9.8	56	4.6	2.6	*1.0	.1			0
13	1.0	2.8	16	13	29	4.2	2.4	.9	0			0
14	.7	2.6	14.5	14	23	4.1	2.2	.9	0			0
15	.5	2.6	18	25	18	6.2	2.1	.8	0			0
16	a.5	3.6	23	20	15.5	5.8	2.0	.7	0			0
17	a.5	3.5	27	16.5	14	5.0	1.9	.7	0			0
18	a1.5	3.2	21	14.5	12.5	4.9	1.8	.7	*0			0
19	a3.5	3.2	20	12.5	12	4.7	1.7	.7	0			0
20	a2.8	4.7	23	12	11.5	4.7	1.6	.6	0			0
21	a2.3	10.5	25	12.5	*9.8	5.4	1.5	.6	0			0
22	a2.1	15	25	11	9.3	5.2	1.4	.5	0			0
23	a1.9	15	26	10.5	8.4	5.0	1.4	.6	0			0
24	a1.7	20	27	19	8.2	*4.9	1.2	.8	0			0
25	a2.3	45	25	44	7.3	4.7	1.2	.6	0			0
26	a3.0	*38	21	33	6.9	4.6	*1.2	.5	0			0
27	a5.0	29	20	23	6.3	4.4	2.0	.5	0			0
28	a7.8	24	20	18	6.0	4.2	2.2	.4	0			0
29	a7.0	19	18.5	15.5	-	4.7	1.6	.4	0			1.0
30	5.8	19	16.5	*13.5	-	4.9	1.4	.4	0			.2
31	a4.8	-	14.5	12.5	-	4.6	-	.4	-			-
Total	67.4	312.1	625.0	471.2	677.7	147.7	72.0	25.2	2.3	0	0	1.2
Mean	2.17	10.4	20.2	15.2	24.2	4.76	2.40	0.81	0.08	0	0	0.04
Cfsm	1.68	8.06	15.7	11.8	18.6	3.69	1.86	0.628	0.062	0	0	0.031
In.	1.94	9.00	18.02	13.58	19.54	4.26	2.06	0.73	0.07	0	0	0.05
Ac-ft	134	619	1,240	955	1,340	293	143	50	4.6	0	0	2.4

Calendar year 1950: Max - Min - Mean - Cfsm - In. - Ac-ft -  
Water year 1950-51: Max 131 Min 0 Mean 6.58 Cfsm 5.10 In. 69.25 Ac-ft 4,760

Peak discharge (base 50 cfs).--Nov. 25 (12:30 p.m.) 65 cfs (3.04 ft); Jan. 25 (1 to 3 p.m.) 56 cfs (2.91 ft); Feb. 9 (4:30 a.m.) 170 cfs (4.04 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

## SKOKOMISH RIVER BASIN

North Fork Skokomish River near Potlatch, Wash.

Location (revised).--Lat 47°19'40", long. 123°14'30", in NW $\frac{1}{4}$  sec. 7, T. 21 N., R. 4 W., on left bank 1 mile upstream from mouth, 6 miles southwest of Potlatch, and 7 miles downstream from city of Tacoma's Cushman Dam No. 2.

Drainage area.--117 sq mi, includes 99 sq mi above Cushman Dam No. 2 which is normally noncontributing.

Records available.--March 1944 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 63.49 ft above mean sea level (levels by city of Tacoma). Prior to Nov. 27, 1949 (destroyed by flood of Nov. 27, 1949) and Mar. 18 to May 9, 1950, water-stage recorder at site 200 ft downstream at present datum.

Average discharge.--6 years (1944-49, 1950-51), 131 cfs.

Extremes.--Maximum discharge during year, 3,280 cfs Feb. 10 (gage height, 8.64 ft), minimum, 1.3 cfs Sept. 5, 14, 16.  
1944-51: Maximum discharge, 4,800 cfs about Nov. 27, 1949 (gage height, 9.66 ft, from high-water mark); minimum recorded, that of Sept. 5, 14, 16, 1951.

Remarks.--Records good except those for period of shifting control, which are fair. In normal years practically entire flow of river is diverted at Cushman Dam No. 2.

Rating table, water year 1950-51, except period of shifting control (gage height, in feet, and discharge, in cubic feet per second)

2.0	1.0	3.6	225	6.0	1,370
2.2	5.8	4.0	357	7.0	2,050
2.5	26	4.5	561	8.1	2,880
2.8	57	5.0	790		
3.2	125	5.5	1,070		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.4	200	1,060	1,120	642	85	73	38	16.5	5.4	3.3	2.6
2	*9.0	174	1,040	1,120	682	85	67	35	15.5	6.6	3.6	2.6
3	10.5	145	1,150	1,160	705	89	65	34	15	7.0	3.6	2.1
4	16.5	123	658	1,080	566	77	61	35	15	6.6	3.6	1.6
5	31	103	187	1,030	*567	146	58	33	16.5	6.6	3.3	*1.6
6	27	91	576	973	226	132	55	33	15.5	7.4	3.0	1.9
7	67	77	1,080	1,070	453	150	52	33	15	7.0	3.0	5.1
8	46	64	1,070	512	924	144	51	31	14.5	6.6	3.0	5.4
9	44	*60	1,460	551	2,440	150	49	29	13	6.6	3.3	3.6
10	522	56	1,640	474	*2,830	93	46	28	12.5	5.8	3.6	2.8
11	1,040	53	1,150	366	2,460	136	44	30	12.5	5.4	3.6	2.3
12	1,130	50	1,120	394	1,980	250	43	28	14.5	5.1	3.6	2.1
13	1,130	47	1,010	478	1,690	*255	43	27	*12.5	5.1	3.6	1.7
14	599	46	1,010	438	1,310	196	44	26	11	5.1	3.0	1.4
15	415	63	*1,190	678	1,240	342	40	25	10.5	5.1	3.0	1.6
16	427	119	1,210	786	1,160	318	38	24	9.6	*5.1	2.8	1.6
17	164	174	1,430	722	1,200	210	37	24	8.4	5.1	2.6	1.9
18	92	123	1,220	628	1,240	145	36	22	7.9	4.7	2.6	2.1
19	105	100	998	532	1,140	230	36	22	6.2	5.1	2.3	2.1
20	125	174	1,290	416	1,270	174	34	21	5.8	5.1	2.1	1.7
21	77	427	1,770	506	804	230	32	20	5.8	4.7	1.9	1.6
22	61	605	2,050	660	678	250	31	20	6.2	4.4	1.9	1.7
23	56	407	1,990	608	701	202	30	22	5.1	4.4	1.9	1.9
24	55	448	1,740	654	166	100	*28	27	5.4	4.4	1.9	1.7
25	63	624	1,700	1,200	127	79	27	23	6.2	4.7	1.9	2.6
26	73	650	1,730	1,260	107	191	27	21	5.8	4.7	2.1	1.4
27	121	607	1,600	718	101	178	39	20	5.8	4.7	2.1	1.6
28	208	1,100	1,520	578	92	94	68	18.5	5.1	4.4	3.0	9.0
29	200	960	1,190	714	-	93	47	18.5	4.7	4.1	2.8	34
30	169	1,100	1,100	653	-	100	40	17.5	4.7	4.1	3.0	46
31	164	-	1,210	649	-	84	-	17	-	3.3	2.8	-
Total	7,255.4	9,170	39,129	22,707	27,501	5,008	1,341	802.5	302.7	164.4	87.8	149.3
Mean	234	306	1,262	732	982	162	44.7	25.9	10.1	5.30	2.83	4.98
Ac-ft	14,390	18,190	77,610	45,040	54,550	9,930	2,660	1,590	600	326	174	296

Calendar year 1950: Max - Min - Mean - Ac-ft -  
 Water year 1950-51: Max 2,830 Min 1.4 Mean 311 Ac-ft 225,400

\* Discharge measurement made on this day.

Note.--Shifting-control method used Nov. 8 to Dec. 20.

# SKOKOMISH RIVER BASIN

49

South Fork Skokomish River near Potlatch, Wash.

Location.--Lat 47°24', long. 123°18', in NW¼ sec. 22, T. 22 N., R. 5 W., on right bank at head of canyon, 2 miles downstream from Brown Creek and 7½ miles west of Potlatch.

Drainage area.--65.6 sq mi (revised).

Records available.--October 1923 to September 1932, September 1946 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 456 ft (by barometer).

Average discharge.--14 years, 560 cfs (13 years, 545 cfs).

Extremes.--1949-50: Maximum discharge during water year, 16,500 cfs Nov. 26 (gage height, 17.75 ft), from rating curve extended above 5,600 cfs on basis of logarithmic plotting; minimum not determined, occurred sometime during period of no gage-height record in September.

1950-51: Maximum discharge during water year, 11,500 cfs Feb. 9 (gage height, 13.30 ft), from rating curve extended above 5,600 cfs on basis of logarithmic plotting; minimum, 64 cfs Sept. 21-24 (gage height, 0.93 ft).

1923-32, 1946-51: Maximum discharge, that of Nov. 26, 1949; minimum, 38 cfs Sept. 15, 1926.

Remarks.--Records excellent except those for periods of shifting control, which are good for 1951 water year and fair for 1950 water year, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating tables, October 1949 to September 1951, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1, 1949, to Oct. 10, 1950

Oct. 10, 1950, to Sept. 30, 1951

1.2	89	3.5	695	0.9	60	3.5	760
1.4	117	4.0	945	1.1	85	4.0	1,020
1.7	163	5.0	1,560	1.4	130	5.0	1,700
2.0	217	6.0	2,350	1.7	184	6.0	2,540
2.3	280	7.0	3,250	2.0	244	7.0	3,500
2.6	355	9.0	5,310	2.3	310	8.0	4,500
3.0	485	11.0	7,680	2.6	390	10.0	6,900
				3.0	530	12.0	9,700

Discharge, in cubic feet per second, 1949-51

1949-50

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	107	243	4,350	1,110	370	962	708	650	713	464	165	135
2	102	215	3,560	918	350	950	718	646	731	428	170	130
3	100	194	*1,840	820	330	3,080	641	593	760	409	165	130
4	157	180	1,360	736	350	3,270	573	565	775	406	160	125
5	219	170	1,260	677	375	2,570	569	557	740	393	160	130
6	178	160	1,120	650	553	1,890	623	521	605	370	155	125
7	155	153	962	589	482	1,350	585	485	533	*336	155	120
8	140	296	845	541	464	1,110	537	497	541	342	155	115
9	301	1,010	750	513	409	984	505	541	561	344	150	120
10	313	870	668	513	409	850	497	610	614	294	145	115
11	422	2,800	597	457	400	760	632	800	677	267	140	110
12	325	2,290	553	426	436	692	1,070	1,070	726	254	140	110
13	267	2,060	505	415	810	605	1,130	1,090	650	256	140	105
14	225	1,860	482	381	855	557	984	1,010	589	256	160	105
15	215	1,180	482	375	2,760	573	1,680	923	569	241	*713	100
16	194	885	460	352	2,130	973	2,040	825	672	231	332	100
17	187	731	464	336	1,310	1,480	2,030	790	785	221	237	95
18	170	628	422	328	1,100	1,360	1,250	695	690	219	191	100
19	158	541	390	409	1,070	1,310	1,030	628	682	219	170	105
20	149	468	367	2,430	934	1,130	1,060	618	677	211	160	95
21	141	426	361	3,660	*855	978	1,020	664	597	200	155	90
22	134	1,010	412	2,400	1,010	945	880	708	525	200	150	90
23	128	1,180	1,010	1,380	1,070	918	765	628	509	198	172	90
24	123	1,210	1,040	1,010	1,610	956	686	577	446	196	235	110
25	120	2,240	950	800	3,140	840	*614	*623	406	185	184	150
26	122	7,630	912	690	5,000	760	581	775	378	180	165	208
27	147	7,440	3,390	581	1,930	780	561	840	406	177	160	160
28	1,230	2,990	6,340	513	1,220	722	533	740	446	219	150	*130
29	581	2,090	5,630	470	-	628	533	641	501	184	145	117
30	370	1,690	1,870	420	-	565	573	610	482	168	140	110
31	*285	-	1,340	400	-	541	-	614	-	166	135	-
Total	7,466	44,840	42,692	25,300	31,732	35,079	25,848	21,534	17,986	8,232	5,754	3,525
Mean	241	1,495	1,377	816	1,133	1,132	862	695	600	268	186	118
Cfsm	3.67	22.8	21.0	12.4	17.3	17.3	13.1	10.6	9.15	4.05	2.84	1.80
In.	4.23	25.42	24.20	14.34	17.99	19.89	14.65	12.21	10.20	4.67	3.28	2.00
Ac-ft	14,810	88,940	84,680	50,180	62,940	69,580	51,270	42,710	35,670	16,330	11,410	6,990

Calendar year 1949: Max 7,630 Min 79 Mean 626 Cfsm 9.54 In. 129.55 Ac-ft 453,200  
Water year 1949-50: Max 7,630 Min 79 Mean 740 Cfsm 11.3 In. 153.06 Ac-ft 535,500

Peak discharge (base, 3,800 cfs).--Nov. 26 (10:30 p.m.) 16,500 cfs (17.75 ft); Dec. 1 (9 p.m.) 7,850 cfs (11.14 ft); Dec. 28 (2:30 p.m.) 7,700 cfs (11.02 ft); Jan. 21 (3:30 a.m.) 5,000 cfs (8.70 ft); Feb. 15 (6 p.m.) 4,310 cfs (8.07 ft); Feb. 26 (2 a.m.) 8,600 cfs (11.77 ft); Mar. 3 (9:30 p.m.) 5,750 cfs (9.38 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 29 to Feb. 4, Aug. 2-14, 20-22, Aug. 27 to Sept. 25, Sept. 27; discharge estimated on basis of records for station near Union. Shifting-control method used Oct. 1 to Nov. 25, Nov. 28 to Jan. 20, Sept. 28-30.

## SKOKOMISH RIVER BASIN

Discharge, in cubic feet per second, of South Fork Skokomish River near  
Potlatch, Wash., 1949-51--Continued

1950-51

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	106	1,380	1,040	1,050	760	420	606	510	315	180	98	76
2	102	1,200	888	1,150	1,010	399	615	458	318	179	98	75
3	110	1,200	845	1,260	1,210	390	740	430	330	175	98	72
4	193	1,040	882	1,040	1,070	381	855	514	320	168	97	72
5	825	888	1,010	898	920	358	780	592	310	166	96	71
6	740	755	2,240	795	845	345	740	558	297	166	92	71
7	1,410	642	1,860	725	2,180	338	760	570	286	161	91	102
8	1,480	550	1,470	665	4,360	322	700	510	281	152	91	108
9	1,180	463	2,900	620	9,020	310	628	486	279	146	90	88
10	5,230	430	3,560	770	8,280	303	574	530	281	143	90	78
11	1,320	399	2,060	893	3,600	303	584	602	286	141	90	73
12	840	369	1,560	820	1,860	381	750	550	284	137	88	72
13	615	342	1,180	1,360	1,500	438	850	458	*275	135	88	72
14	494	325	*1,060	1,410	1,250	427	775	420	277	134	86	71
15	420	345	1,920	2,040	1,150	755	730	405	286	132	85	70
16	375	366	2,100	1,580	1,030	745	745	455	275	130	84	68
17	352	363	2,370	1,190	948	574	775	483	264	*128	82	67
18	871	358	1,470	986	950	490	695	424	248	126	81	67
19	1,070	315	1,510	830	610	458	806	384	242	122	81	67
20	850	530	2,580	750	760	518	526	375	230	121	78	66
21	620	1,360	2,770	775	710	602	476	390	224	118	78	65
22	498	2,380	2,460	715	656	592	438	434	222	115	77	64
23	424	1,740	2,360	665	*602	526	414	574	220	114	*77	64
24	396	2,530	3,070	1,700	570	483	411	735	216	114	75	67
25	1,140	4,380	2,300	3,830	530	490	417	646	208	114	75	82
26	1,210	3,810	1,620	3,000	494	518	*434	483	202	112	73	75
27	1,900	2,860	1,700	1,640	469	502	579	427	196	110	75	75
28	2,190	2,150	1,720	1,220	444	472	1,140	390	190	106	81	226
29	*1,740	1,480	1,460	1,020	-	642	770	358	186	104	81	1,230
30	1,330	1,240	1,680	898	-	760	592	335	182	103	81	1,240
31	1,170	-	1,240	805	-	658	-	318	-	102	77	-
Total	29,201	36,190	56,885	37,100	46,088	14,898	19,685	14,804	7,730	4,154	2,634	4,694
Mean	942	1,206	1,835	1,197	1,717	481	656	478	259	134	85.0	156
Cfsm	14.4	18.4	28.0	18.2	26.2	7.33	10.0	7.29	3.93	2.04	1.30	2.38
In.	16.55	20.52	32.25	21.05	27.26	8.45	11.16	8.39	4.38	2.35	1.49	2.66
Ac-ft	57,920	71,780	112,800	73,590	95,380	29,550	39,040	29,360	15,330	8,240	5,220	9,310
Calendar year 1950: Max	5,000	Min	90	Mean	814	Cfsm	12.4	In.	168.53	Ac-ft	589,600	
Water year 1950-51: Max	9,020	Min	64	Mean	756	Cfsm	11.5	In.	156.49	Ac-ft	547,500	

Peak discharge (base, 3,800 cfs).--Oct. 10 (5:20 a.m.) 4,980 cfs (8.20 ft); Nov. 25 (4 p.m.) 7,180 cfs (10.20 ft); Dec. 9 (8 p.m.) 6,000 cfs (9.25 ft); Dec. 20 (8 p.m.) 4,100 cfs (7.60 ft); Dec. 24 (4 p.m.) 3,940 cfs (7.34 ft); Jan. 25 (10 p.m.) 5,280 cfs (8.65 ft); Feb. 9 (7:30 a.m.) 11,500 cfs (13.30 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1-10, Sept. 30.

## South Fork Skokomish River near Union, Wash.

Location.--Lat 47°20'30", long. 123°16'30", in NE $\frac{1}{4}$  sec. 2, T. 21 N., R. 5 W., on right bank  $2\frac{1}{2}$  miles upstream from confluence with North Fork and Vance Creek and 8 miles west of Union.

Drainage area.--79.6 sq mi (revised).

Records available.--August 1931 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 110 ft (by barometer). Prior to Sept. 19, 1931, staff gage at same site at datum 2.32 ft higher.

Average discharge.--20 years, 681 cfs.

Extremes.--Maximum discharge during year, 12,300 cfs Feb. 9 (gage height, 9.02 ft), from rating curve extended above 4,400 cfs by logarithmic plotting; minimum, 70 cfs Sept. 20-24 (gage height, 2.86 ft).

1931-51: Maximum discharge, 21,600 cfs Jan. 22, 1935, Nov. 26, 1949 (gage height, 11.0 ft), from rating curves extended above 11,000 cfs and 4,400 cfs, respectively; minimum, 62 cfs Sept. 18, 1938.

Revisions: The maximum discharge for water year 1950 has been revised to 21,600 cfs Nov. 26, 1949 (gage height, 11.0 ft), from rating curve extended above 4,400 cfs by logarithmic plotting; superseding figure published in Water-Supply Paper 1182.

Remarks.--Records good. No diversion or regulation.

Revisions.--Revised figures of discharge in cubic feet per second for high-water periods in the water year 1950, superseding those published in Water-Supply Paper 1182, are given herein:

Oct. 28..... 1,240	Dec. 27..... 4,030	Feb. 15..... 2,960
Nov. 26..... 7,920	28..... 7,870	25..... 3,320
27..... 8,110	29..... 4,810	26..... 5,880
Dec. 1..... 5,030	Jan. 21..... 4,590	Mar. 3..... 3,350
2..... 4,700		

Revised peak discharges.--Nov. 26 (11 p.m.) 21,600 cfs; Dec. 1 (10 p.m.) 8,460 cfs; Dec. 28 (2 p.m.) 9,080 cfs; Feb. 26 (3 a.m.) 8,770 cfs; Mar. 3 (11:30 p.m.) 6,620 cfs.

Month	Cfs-days	Maximum	Minimum	Mean	Per square mile	Runoff in inches	Runoff in acre-feet
October 1949.....	7,701	1,240	106	248	3.12	3.60	15,270
November.....	51,252	8,110	171	1,708	21.5	23.95	101,700
December.....	82,297	7,870	729	2,010	25.3	29.11	123,600
Calendar year 1949.....	273,165	8,110	85	748	9.40	127.63	541,900
January 1950.....	34,839	4,590	494	1,124	14.1	16.28	69,100
February.....	39,323	5,880	435	1,404	17.6	18.37	78,000
March.....	42,635	3,980	675	1,375	17.3	19.92	84,570
Water year 1949-50.....	331,379	8,110	106	908	11.4	154.85	657,400

Rating tables, October 1949 to September 1951 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Nov. 30, Dec. 4-27, Dec. 31, 1949, to Jan. 20, 1950, Jan. 23 to Feb. 15, Aug. 23 to Oct. 4, 1950, Nov. 22-25, 1950, Sept. 28-30, 1951)

Oct. 1, 1949, to Nov. 25, 1950				Nov. 26, 1950, to Sept. 30, 1951			
3.3	89	5.5	1,900	2.8	58	5.0	1,550
3.6	171	6.0	2,630	3.1	130	5.5	2,260
4.0	351	7.0	4,380	3.6	300	6.0	3,200
4.5	710	8.0	6,750	4.0	550	7.0	5,600
5.0	1,250	9.0	9,730	4.5	990	8.4	10,000

## SKOKOMISH RIVER BASIN

South Fork Skokomish River near Union, Wash.--Continued

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	126	1,450	1,310	1,140	*728	529	654	543	330	181	102	80
2	121	1,270	1,140	1,290	970	492	654	494	330	178	102	80
3	*121	1,190	1,090	1,390	1,140	480	728	466	335	175	102	80
4	159	1,040	1,110	1,170	1,020	459	827	515	335	172	102	*78
5	856	868	1,310	1,030	872	431	782	590	320	169	100	78
6	729	758	2,670	940	809	410	728	566	310	169	100	78
7	1,500	666	2,260	900	2,220	404	737	582	300	166	97	95
8	1,530	584	1,810	854	5,140	386	710	529	296	163	95	102
9	1,120	*530	3,060	827	9,740	368	646	508	292	160	95	88
10	3,300	494	4,380	900	9,210	358	606	529	296	160	90	80
11	1,400	473	2,360	1,010	4,400	356	598	590	296	160	88	78
12	847	434	1,840	970	2,330	466	719	574	296	157	88	76
13	632	422	*1,490	1,410	1,720	*529	827	494	*292	154	88	76
14	523	392	1,310	1,470	1,410	522	746	452	296	145	85	74
15	467	428	2,100	2,060	1,280	827	710	438	296	136	85	72
16	415	467	2,430	1,690	1,120	836	719	459	292	133	83	72
17	403	467	2,920	1,310	1,040	662	746	501	280	130	83	72
18	816	441	1,840	1,090	930	566	694	452	268	130	83	72
19	1,060	409	1,770	950	920	529	622	417	256	*127	80	72
20	878	615	2,880	890	872	558	550	398	246	124	80	70
21	666	1,500	3,360	930	809	638	501	410	239	119	80	70
22	560	2,710	2,800	890	755	654	466	445	232	110	80	70
23	487	2,200	2,590	845	702	590	445	558	228	108	80	70
24	453	3,130	3,400	1,350	678	543	438	694	225	108	83	72
25	1,080	5,140	2,610	4,280	638	550	*445	646	222	105	80	80
26	1,240	4,850	1,800	3,620	606	558	445	480	211	105	80	76
27	1,900	3,600	1,820	1,770	566	550	582	431	200	105	80	78
28	2,360	2,470	1,840	1,270	543	529	1,100	398	194	102	83	228
29	1,690	1,820	1,620	1,040	-	646	773	362	190	102	83	1,170
30	1,400	1,560	1,730	910	-	782	622	345	187	102	78	1,290
31	1,270	-	1,350	809	-	710	-	335	-	102	80	-
Total	30,289	42,378	66,000	41,005	53,168	16,916	19,820	15,201	8,090	4,257	2,715	4,777
Mean	977	1,413	2,129	1,323	1,899	546	661	490	270	137	87.6	159
Cfsm	12.3	17.8	26.7	16.6	23.9	6.86	8.30	6.16	3.39	1.72	1.10	2.00
In.	14.15	19.80	30.84	19.16	24.84	7.90	9.26	7.10	3.78	1.99	1.27	2.23
Ac-ft	60,080	84,060	130,900	81,330	105,500	33,550	39,310	30,150	16,050	8,440	5,390	9,480

Calendar year 1950: Max 5,880 Min 121 Mean 956 Cfsm 12.0 In. 162.98 Ac-ft 691,800  
 Water year 1950-51: Max 9,740 Min 70 Mean 835 Cfsm 10.5 In. 142.32 Ac-ft 604,200

Peak discharge (base, 6,000 cfs).--Nov. 25 (3:30 p.m.) 7,930 cfs (8.02 ft); Dec. 9 (8:30 p.m.) 7,220 cfs (7.54 ft); Jan. 25 (10 p.m.) 8,440 cfs (7.28 ft); Feb. 9 (6 a.m.) 12,300 cfs (9.02 ft).  
 \* Discharge measurement made on this day.



## Skokomish River near Potlatch, Wash.

Location.--Lat 47°19'00", long. 123°11'05", in NW $\frac{1}{4}$  NW $\frac{1}{4}$  sec. 15, T. 21 N., R. 4 W., on left bank half a mile upstream from U. S. Highway 101, 2.8 miles downstream from confluence of North and South Forks, 4.7 miles southwest of Potlatch, and 5.5 miles upstream from mouth. Prior to Apr. 19, 1951, on right bank.

Drainage area.--230 sq mi (revised).

Records available.--July 1943 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 19.35 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. Prior to May 22, 1947, water-stage recorder at same site and datum. May 22 to July 23, 1947, staff gage at site 50 ft downstream at present datum. July 24, 1947, to Apr. 18, 1951, water-stage recorder on right bank at datum 2.87 ft lower than present datum.

Average discharge.--8 years, 1,170 cfs.

Extremes.--Maximum discharge during year, 19,200 cfs Feb. 10 (gage height, 14.31 ft); minimum, 156 cfs Sept. 20-23 (gage height, 0.43 ft).

1943-51: Maximum discharge, 19,200 cfs Nov. 27, 1949, Feb. 10, 1951; maximum gage height, 14.51 ft Nov. 27, 1949; minimum discharge, 125 cfs Sept. 14-17, 1944 (gage height, -0.01 ft).

Remarks.--Records fair. In normal years practically entire flow of North Fork is diverted at dam No. 2 and returned to sea through Cushman powerplant No. 2.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Apr. 18

Apr. 19 to Sept. 30

3.4	185	5.5	1,890	10.0	8,700	0.4	145
3.7	340	6.0	2,470	11.0	10,800	.7	270
4.0	520	7.0	3,750	12.0	13,300	1.0	455
4.5	890	8.0	5,200	14.0	18,300	1.5	800
5.0	1,360	9.0	6,830			2.0	1,260
						2.5	1,780

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	210	2,350	2,710	2,790	*1,920	926	1,160	820	500	331	230	180
2	*200	2,040	2,480	2,990	2,560	874	1,120	740	500	331	225	180
3	200	1,890	2,450	3,430	2,820	874	1,200	700	510	326	225	173
4	255	1,640	2,270	2,920	2,470	858	1,320	780	520	320	220	173
5	842	1,400	1,920	2,580	2,210	834	1,270	900	500	310	216	*173
6	990	1,220	3,850	2,350	1,770	834	1,170	860	460	320	216	170
7	1,910	1,120	4,040	2,230	3,750	818	1,170	920	448	315	216	189
8	2,110	998	3,520	1,770	8,500	778	1,130	800	442	310	212	230
9	1,600	908	5,100	1,580	17,500	770	1,050	770	435	305	212	216
10	5,140	*842	7,440	1,670	*17,600	730	989	800	429	300	212	189
11	2,910	794	4,600	1,800	10,500	702	962	900	*435	295	207	180
12	2,270	751	*3,820	1,800	5,990	962	1,030	860	435	275	202	180
13	1,950	681	3,220	2,650	4,390	1,160	1,190	780	435	270	202	173
14	1,400	653	2,900	2,970	3,520	*1,120	1,130	720	435	275	202	173
15	1,140	702	3,850	3,790	3,130	1,550	1,050	670	440	270	202	170
16	1,040	866	4,580	3,710	2,770	1,800	1,050	680	440	*270	198	170
17	826	962	5,700	3,120	2,630	1,440	1,070	760	430	270	194	166
18	1,130	882	4,060	2,600	2,530	1,200	1,050	680	420	266	189	162
19	1,550	786	3,550	2,220	2,460	1,110	900	650	470	261	189	166
20	1,370	1,010	5,160	1,900	2,550	1,120	820	580	390	252	184	162
21	1,090	2,510	6,630	2,130	2,070	1,250	760	620	370	243	180	159
22	955	4,900	6,400	2,230	1,870	1,350	700	680	360	243	180	156
23	826	3,390	6,120	2,040	1,770	1,250	680	820	362	243	180	156
24	762	4,660	7,380	2,670	1,530	1,100	*680	1,020	364	238	176	170
25	1,430	7,360	6,540	7,140	1,160	1,030	*680	980	364	243	176	173
26	1,580	6,770	4,620	7,200	1,080	1,050	700	820	364	243	180	180
27	2,780	5,340	4,300	3,920	1,030	1,100	935	700	358	238	180	180
28	3,390	4,350	4,540	2,870	962	1,020	1,520	640	353	234	184	266
29	2,770	3,340	3,650	2,530	-	1,090	1,160	590	342	234	189	1,050
30	2,180	3,100	3,620	2,220	-	1,400	935	550	331	234	184	1,760
31	2,030	-	3,530	2,030	-	1,270	-	510	-	230	180	-
Total	48,798	68,134	134,230	87,850	112,042	33,370	30,581	23,280	12,642	8,495	6,142	7,825
Mean	1,574	2,273	4,330	2,834	3,602	1,076	1,019	751	421	274	198	261
Ac-ft	96,770	135,300	266,200	174,200	222,200	66,190	60,660	46,180	25,080	16,850	12,180	15,520
Calendar year 1950: Max	10,700			Min 165		Mean 1,704		Ac-ft 1,233,000				
Water year 1950-51: Max	17,600			Min 156		Mean 1,571		Ac-ft 1,137,000				

Peak discharge (base, 8,400 cfs).--Nov. 25 (6 p.m.) 11,700 cfs (11.36 ft); Dec. 9 (1:30 p.m.) 9,660 cfs (10.48 ft); Dec. 20 (12 p.m.) 8,120 cfs (9.71 ft); Dec. 24 (7:30 p.m.) 8,120 cfs (9.71 ft); Jan. 25 (12 p.m.) 10,700 cfs (10.95 ft); Feb. 10 (6 a.m.) 19,200 cfs (14.31 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Apr. 19-26, May 1 to June 6, June 13-24; discharge estimated on basis of records for stations on North and South Forks near Potlatch.

## Union River near Bremerton, Wash.

Location.--Lat 47°31'50", long. 122°47'00", in SW¼ sec. 34, T. 24 N., R. 1 W., on right bank 500 ft upstream from highway bridge, a quarter of a mile upstream from Hazel Creek, and 7 miles west of Bremerton.

Drainage area.--3.16 sq mi (revised).

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 398.0 ft above mean sea level (by closed stadia traverse).

Average discharge.--6 years, 12.4 cfs.

Extremes.--Maximum discharge during year, 378 cfs Feb. 9 (gage height, 3.50 ft); minimum, 0.3 cfs part of each day Aug. 19-27, Sept. 20-22.  
1946-51: Maximum discharge, that of Feb. 9, 1951; maximum gage height, 3.85 ft Feb. 22, 1949; minimum discharge, 0.3 cfs on many days in August and September 1950 and 1951.

Remarks.--Records good. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.3	0.2	2.0	70
.6	1.7	2.3	106
.6	4.0	2.6	153
1.1	11.0	2.9	210
1.4	24	3.2	279
1.7	43		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.6	30	27	25	16	10	8.2	3.2	1.5	0.8	0.5	0.5
2	.6	26	26	37	33	9.3	7.7	5.0	1.4	.8	.4	.5
3	.6	22	37	46	36	9.0	7.4	2.9	1.4	.8	.5	.5
4	.9	19	38	36	33	8.8	7.0	2.7	*1.7	.8	.5	.4
5	1.7	16	*36	27	28	7.7	6.5	2.7	1.6	.8	.5	.4
6	1.4	*14	58	22	26	7.2	6.5	2.7	1.5	.8	.4	.4
7	2.4	12	60	18.5	55	6.7	6.3	2.8	1.5	.8	.4	.6
8	3.3	10.5	48	16.5	158	6.5	5.8	2.7	1.4	.8	.4	.6
9	3.0	9.3	52	14	269	*6.3	5.4	2.7	1.3	.8	.4	.5
10	13	8.8	55	14	*151	6.1	5.2	2.5	1.3	.7	.5	.5
11	5.9	7.7	42	14	83	6.5	5.0	2.4	1.3	*.6	.5	.4
12	5.8	7.2	33	13	50	14	4.9	2.2	1.4	.6	.5	.5
13	5.0	6.7	26	20	35	22	4.7	2.0	1.4	.6	.5	.4
14	4.5	6.5	22	22	26	24	4.5	2.0	1.3	.6	.4	.4
15	3.7	12.5	28	49	22	35	4.3	2.0	1.2	.6	.4	.4
16	3.3	42	40	53	18	34	4.2	1.9	1.2	.6	.4	.4
17	3.0	50	58	42	17.5	26	4.2	1.9	1.1	.6	.4	.4
18	4.9	37	46	32	16.5	21	3.8	1.9	1.0	.6	.4	.4
19	7.0	27	39	28	19	17	*3.6	1.8	1.0	.6	.4	.4
20	6.3	40	48	25	28	14.5	3.4	1.7	.9	.6	.4	.4
21	6.1	62	63	47	28	13.5	3.2	1.7	.9	.5	*.3	.3
22	5.4	54	56	*46	22	12.5	2.7	1.6	.9	.5	.4	.4
23	5.2	45	69	41	19	11.5	2.9	1.7	.9	.5	.4	.4
24	5.2	49	74	65	17	10.5	3.7	1.8	1.0	.5	.4	.5
25	6.1	85	56	*164	14.5	10	3.0	1.7	.9	.6	.4	.6
26	8.8	79	40	107	13	9.6	2.9	1.7	.9	.6	.4	.5
27	14	54	32	56	11.5	9.0	3.7	1.7	.9	.6	.4	.7
28	28	40	28	36	10.5	8.2	5.4	1.8	.8	.5	.7	1.8
29	40	30	26	26	-	8.5	3.8	1.7	.8	.5	.7	2.3
30	38	32	30	21	-	10	3.3	1.6	.8	.5	.7	2.6
31	31	-	28	17	-	9.0	-	1.7	-	.5	.6	-
Total	264.7	934.2	1,321	1,180.0	1,253.5	403.9	143.2	66.4	35.2	18.7	14.2	19.1
Mean	8.54	31.1	42.6	38.1	44.8	13.0	4.77	2.14	1.17	0.64	0.46	0.64
Cfs/m	2.70	9.84	13.5	12.1	14.2	4.11	1.51	0.677	0.370	0.203	0.145	0.203
In.	5.12	10.99	15.55	13.89	14.75	4.75	1.69	0.76	0.41	0.23	0.17	0.22
Ac-ft	525	1,850	2,620	2,340	2,490	801	284	132	70	39	28	38

Calendar year 1950: Max 216 Min 0.3 Mean 17.1 Cfs/m 5.41 In. 73.45 Ac-ft 12,380  
Water year 1950-51: Max 269 Min 0.3 Mean 15.5 Cfs/m 4.91 In. 66.55 Ac-ft 11,220

Peak discharge (base, 120 cfs).--Jan. 25 (8:30 p.m.) 184 cfs (2.77 ft); Feb. 9 (4:30 a.m.) 378 cfs (3.50 ft).

\* Discharge measurement made on this day.

## Union River near Belfair, Wash.

Location.--Lat 47°28'20", long. 122°49'40", in NE $\frac{1}{4}$  sec. 20, T. 23 N., R. 1 W., on left bank at highway bridge 1 mile north of Belfair and 2 miles upstream from mouth.

Drainage area.--19.2 sq mi (revised).

Records available.--July 1947 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 45.6 ft above mean sea level (by closed stadia traverse).

Extremes.--Maximum discharge during year, 1,230 cfs Feb. 9 (gage height, 6.77 ft); minimum, 17.5 cfs Oct. 1 (gage height, 1.36 ft).  
1947-51: Maximum discharge, 1,610 cfs Feb. 22, 1949 (gage height, 7.81 ft), from rating curve extended above 600 cfs; minimum, 13 cfs Sept. 29, 1947.

Remarks.--Records fair. City of Bremerton diverts annually about 3,100 acre-ft several miles above station for municipal use. The diversion varies from almost no flow in August and September to as much as 10 cfs during the winter months.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Feb. 10 to Mar. 6,  
Aug. 18 to Sept. 30)

Oct. 1 to Feb. 9				Feb. 10 to Sept. 30			
1.3	14	3.0	240	1.7	17	3.5	307
1.5	26	3.5	333	2.0	38	4.0	418
1.7	43	4.0	454	2.3	74	4.5	536
2.0	80	4.5	543	2.6	125	5.0	668
2.3	125	5.0	668	3.0	203		
2.6	173	6.0	960				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	17.5	83	141	92	114	66	59	44	34	26	23	24
2	18	67	110	157	198	61	56	43	33	26	24	24
3	18	54	124	168	184	61	56	42	33	27	24	24
4	19.5	46	118	131	167	61	54	42	*35	28	24	23
5	25	38	*106	104	146	58	54	41	34	27	24	23
6	21	35	181	88	139	*58	53	41	33	28	24	23
7	26	32	183	77	223	55	53	41	*33	27	23	25
8	27	28	149	69	425	55	52	41	32	27	23	24
9	24	26	167	64	948	54	52	40	32	27	23	24
10	70	25	187	66	*589	53	52	39	32	26	24	24
11	36	24	149	69	346	55	50	40	32	*26	24	24
12	29	23	118	60	223	105	50	39	32	25	24	24
13	26	23	96	90	173	123	49	38	32	25	24	24
14	25	22	90	88	142	118	49	38	32	25	23	23
15	24	36	124	189	125	159	48	38	31	24	22	23
16	23	125	157	189	109	144	48	38	30	24	22	23
17	23	133	214	179	114	116	*47	37	30	24	22	23
18	30	96	155	139	100	98	46	37	30	24	22	23
19	38	66	141	125	114	87	46	36	29	24	22	23
20	27	94	173	112	146	80	*44	36	29	25	*21	22
21	23	149	214	223	121	77	43	36	29	25	22	22
22	22	154	194	201	105	71	43	36	29	25	23	23
23	21	127	232	*165	95	68	43	36	29	24	22	23
24	21	155	249	214	88	66	44	36	29	24	23	24
25	24	256	192	*413	82	67	43	36	28	24	23	25
26	32	259	149	364	76	64	43	36	28	24	23	24
27	47	176	125	214	71	60	49	35	27	24	24	26
28	88	131	125	167	67	59	59	35	27	23	23	33
29	104	101	107	141	-	64	47	36	27	24	24	35
30	*98	152	118	130	-	71	45	35	26	23	25	35
31	80	-	104	119	-	63	-	34	-	23	24	-
Total	1,107.0	2,736	4,692	4,607	5,430	2,397	1,477	1,182	917	778	718	740
Mean	35.7	91.2	151	149	194	77.3	49.2	38.1	30.6	25.1	23.2	24.7
Ac-ft	2,200	5,430	9,310	9,140	10,770	4,750	2,930	2,340	1,820	1,540	1,420	1,470
Calendar year 1950: Max	894			Min 16.5		Mean 72.5		Ac-ft 52,520				
Water year 1950-51: Max	948			Min 17.5		Mean 73.4		Ac-ft 53,120				

Peak discharge (base, 400 cfs).--Jan. 25 (11 p.m.) 509 cfs (4.34 ft); Feb. 9 (8 a.m.) 1,230 cfs (6.77 ft).

\* Discharge measurement made on this day.

## MISSION CREEK BASIN

Mission Lake near Bremerton, Wash.

Location.--Lat 47°32', long. 122°50', in NE 1/4 sec. 32, T. 24 N., R. 1 W., on west shore 300 ft from lake outlet and 9 1/2 miles west of Bremerton.

Drainage area.--1.91 sq mi.

Records available.--June 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 513.0 ft above mean sea level (by closed stadia traverse).

Extremes.--Maximum gage height during year, 4.62 ft Feb. 9; minimum, 1.52 ft Sept. 23, 24, 1945-51: Maximum gage height, 6.36 ft Feb. 22, 1949; minimum, that of Sept. 23, 24, 1951.

Remarks.--No diversion or regulation.

Gage height, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.77	-	3.20	2.92	2.88	2.61	2.68	2.53	2.46	2.25	1.93	1.69
2	1.77	2.76	3.13	3.00	3.03	2.61	2.65	2.51	2.46	2.24	1.92	1.68
3	1.77	2.74	3.10	3.09	3.09	2.62	2.64	2.49	2.46	2.23	1.91	1.67
4	1.81	2.72	3.08	3.07	3.07	2.63	2.63	2.49	2.47	2.22	1.90	1.66
5	1.88	2.68	3.05	3.00	3.02	2.63	2.63	2.48	2.47	2.21	1.89	1.65
6	1.90	2.66	3.19	2.93	2.98	2.63	2.63	2.48	2.46	2.21	1.88	1.64
7	1.95	2.63	3.28	2.88	3.13	2.63	2.64	2.49	2.45	2.20	1.87	1.66
8	-	2.60	3.23	2.83	3.58	2.63	2.64	2.49	2.45	2.19	1.87	1.67
9	-	2.57	3.25	2.78	4.52	2.63	2.64	2.49	2.45	2.19	1.86	1.66
10	-	2.55	3.35	2.76	4.43	2.62	2.63	2.49	2.43	2.18	1.85	1.66
11	-	2.55	3.29	2.76	4.03	2.63	2.60	2.50	2.43	2.16	1.84	1.64
12	-	2.53	3.18	2.73	3.64	2.73	2.59	2.50	2.44	2.13	1.83	1.64
13	-	2.52	3.06	2.78	3.58	2.76	2.59	2.49	2.44	2.13	1.83	1.63
14	-	2.52	2.98	2.81	3.19	2.78	2.55	2.48	2.43	2.11	1.82	1.61
15	-	2.61	2.99	3.03	3.07	2.89	2.56	2.48	2.43	2.10	1.82	1.60
16	-	2.88	3.05	3.20	2.97	2.97	2.56	2.48	2.42	2.08	1.81	1.59
17	-	3.07	3.22	3.23	2.90	2.97	2.56	2.48	2.41	2.08	1.80	1.59
18	-	3.08	3.21	3.16	2.86	2.94	2.56	2.48	2.40	2.07	1.78	1.58
19	-	3.02	3.17	3.09	2.85	2.90	2.55	2.47	2.39	2.07	1.77	1.58
20	-	3.12	3.20	3.03	2.90	2.87	2.53	2.47	2.38	2.06	1.76	1.56
21	-	3.39	3.33	3.18	2.87	2.83	2.51	2.46	2.36	2.04	1.75	1.53
22	-	3.43	3.35	3.23	2.83	2.80	2.49	2.45	2.35	2.03	1.73	1.53
23	-	3.34	3.39	3.18	2.80	2.77	2.48	2.46	2.34	2.02	1.72	1.53
24	-	3.33	3.49	3.27	2.77	2.72	2.47	2.47	2.33	2.02	1.71	1.53
25	-	3.49	3.42	3.72	2.74	2.69	2.47	2.47	2.33	2.00	1.70	1.55
26	-	3.65	3.28	3.90	2.71	2.68	2.47	2.47	2.32	1.99	1.69	1.54
27	-	3.53	3.17	3.62	2.67	2.65	2.52	2.47	2.31	1.98	1.69	1.55
28	-	3.34	3.09	3.36	2.64	2.64	2.59	2.47	2.29	1.98	1.71	1.65
29	-	3.18	3.02	3.16	-	2.68	2.58	2.46	2.27	1.97	1.70	1.74
30	-	3.22	3.00	3.03	-	2.73	2.55	2.45	2.26	1.96	1.69	1.85
31	-	-	2.97	2.93	-	2.72	-	2.45	-	1.94	1.68	-

## Mission Creek near Bremerton, Wash.

Location.--Lat 47°32', long. 122°50', in NE¼NW¼ sec. 32, T. 24 N., R. 1 W., on west shore of Mission Lake, 300 ft upstream from lake outlet and 9½ miles west of Bremerton.

Drainage area.--1.91 sq mi (revised).

Records available.--June 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 513.0 ft above mean sea level (by closed stadia traverse).

Average discharge.--6 years, 6.78 cfs.

Extremes.--Maximum discharge during year, 90 cfs Feb. 9 (gage height, 4.62 ft); no flow on many days.

1945-51: Maximum discharge, 96 cfs Feb. 22, 1949 (gage height, 6.36 ft); no flow at times each year.

Remarks.--Records good except those for period of shifting control, which are fair, and those for period of no gage-height record, which are poor. No diversion. Natural regulation by Mission Lake.

Rating tables, water year 1950-51, except period of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 8

Feb. 9 to Sept. 30

1.8	0	2.8	13	2.44	0	3.3	27
2.0	.3	3.0	18.5	2.5	1.5	3.6	39
2.2	1.4	3.3	28	2.6	4.0	4.0	57
2.4	3.9	3.6	40	2.8	9.5	4.5	84
2.6	7.8	4.0	57	3.0	16		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0	11.5	25	16	15	4.2	6.0	2.2	*0			
2	0	*12	23	18.5	19.5	4.2	5.2	1.8	0			
3	0	11	22	21	21	4.5	5.0	1.2	0			
4	0	10.5	21	21	21	4.8	4.8	1.2	.2			
5	0	9.6	20	18.5	19	4.8	4.8	.8	.2			
6	.1	9.0	*25	16.5	18	*4.8	4.8	.8	0			
7	.2	8.4	*28	15	23	4.8	5.0	1.0	0			
8	.6	7.8	26	13.5	40	4.8	5.0	1.0	0			
9	1.5	7.2	27	12.5	84	4.8	5.0	1.0	0			
10	2.8	6.8	30	12	*81	4.5	4.8	1.0	0			
11	2.5	6.8	28	12	*58	4.8	4.0	1.2	0	(*)		
12	2.3	6.4	24	11	41	7.4	3.8	1.2	0			
13	2.1	6.2	20	12	30	8.3	3.8	1.0	0			
14	1.9	6.2	18	13	23	8.9	2.8	.8	0			
15	1.7	8.1	18	19.5	18.5	12.5	3.0	.8	0			
16	1.6	15	20	25	15	15	3.0	.8	0			
17	1.5	21	26	26	12.5	15	3.0	.8	0			
18	1.6	21	25	24	11.5	14	3.0	.8	0			
19	2.0	19	24	21	11	12.5	2.8	.2	0			
20	1.9	22	25	19.5	12.5	11.5	*2.2	.2	0		(*)	
21	1.8	32	30	24	11.5	10.5	1.8	0	0			
22	1.8	33	30	26	10.5	9.5	1.2	0	0			
23	1.7	30	32	24	9.5	8.6	1.0	0	0			
24	1.7	30	36	*27	8.6	7.1	.8	.2	0			
25	2	36	33	45	7.7	6.2	.8	.2	0			
26	3.5	42	28	52	6.8	6.0	.8	.2	0			
27	5	37	24	41	5.8	5.2	2.0	.2	0			
28	8	30	21	31	5.0	5.0	3.8	.2	0			
29	10	24	19	24	-	6.0	3.5	0	0			
30	12.5	26	18.5	19.5	-	7.4	2.8	0	0			
31	11.5	-	17.5	16.5	-	7.1	-	0	-			
Total	83.8	545.5	764.0	678.0	639.9	234.7	100.3	20.8	0.4	0	0	0
Mean	2.70	18.2	24.6	21.9	22.9	7.57	3.34	0.67	0.01	0	0	0
Cfsm	1.41	9.53	12.9	11.5	12.0	3.96	1.75	0.351	0.0052	0	0	0
In.	1.83	10.62	14.88	13.20	12.46	4.57	1.95	0.41	0.008	0	0	0
Ac-ft	168	1,080	1,520	1,340	1,270	466	199	41	0.8	0	0	0

Calendar year 1950: Max 84 Min 0 Mean 9.59 Cfsm 5.02 In. 68.151 Ac-ft 6,950  
 Water year 1950-51: Max 84 Min 0 Mean 8.40 Cfsm 4.40 In. 59.728 Ac-ft 6,080

Peak discharge (base, 35 cfs).--Nov. 26 (3 a.m.) 43 cfs (3.68 ft); Dec. 24 (2 p.m.) 3° cfs (3.51 ft); Jan. 28 (2 to 3 a.m.) 54 cfs (3.95 ft); Feb. 9 (2 p.m.) 90 cfs (4.62 ft).

\* Discharge measurement or observation of no flow made on this day.

Note.--No gage-height record Oct. 8 to Nov. 1; discharge estimated on basis of records for stations on nearby streams. Shifting-control method used May 5 to June 30.

## Mission Creek near Belfair, Wash.

Location.--Lat 47°29'20", long. 122°51'40", in NW¼ sec. 18, T. 23 N., R. 1 W., on left bank 3 miles northwest of Belfair and 5 miles upstream from mouth.

Drainage area.--4.37 sq mi (revised).

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 330.0 ft above mean sea level (by closed stadia traverse).

Average discharge.--6 years, 12.7 cfs.

Extremes.--Maximum discharge during year, 278 cfs Feb. 9 (gage height, 5.20 ft); no flow Sept. 16, 21, 22.

1945-51: Maximum discharge, 403 cfs Feb. 22, 1949 (gage height, 6.10 ft, from graph based on gage readings); no flow Sept. 16, 21, 22, 1951.

Remarks.--Records fair except those for period of no gage-height record, which are poor. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Jan. 26 to Mar. 10, Sept. 2-30)

0.8	0.0	2.4	28
.9	.1	2.7	40
1.1	.9	3.0	55
1.3	2.6	3.3	73
1.5	5.3	3.6	94
1.7	8.7	4.0	128
1.9	12.5	4.5	178
2.1	18	5.0	237
		5.2	264

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.2	12.5	54	28	29	13.5	9.3	2.6	0.8	0.6	0.3	0.2
2	.2	*12.5	46	34	40	11.5	8.5	2.5	.8	.5	.3	.2
3	.2	11.5	44	44	46	11	7.5	2.2	.8	.6	.3	.2
4	.2	10.5	40	39	44	11	6.8	2.1	.9	.6	.3	.1
5	.3	9.3	38	34	39	10.5	5.8	1.9	.9	.6	.2	.1
6	.2	8.2	49	29	36	9.8	5.3	1.7	.8	.5	.2	.1
7	.4	6.8	56	25	51	9.6	4.9	1.6	*.8	.5	.2	.2
8	.3	5.5	52	22	102	*9.4	4.6	1.5	.8	.5	.2	.1
9	.3	4.4	*54	20	257	9.1	4.4	1.5	.7	.5	.2	.1
10	.6	3.8	66	18.5	212	8.2	4.7	1.5	.7	.5	.3	.1
11	.2	3.2	58	18.5	137	7.7	4.3	1.5	.8	.4	.2	.1
12	.2	2.7	48	16.5	90	11.5	4.0	1.4	.8	.4	.2	.1
13	.1	2.6	39	19	65	15	3.6	1.4	.7	*.5	.2	.1
14	.2	2.4	34	21	50	16.5	3.1	1.2	.7	.5	.2	.1
15	.2	6.6	35	38	41	22	2.9	1.1	.6	.5	.2	.1
16	.2	21	42	50	35	25	2.5	1.1	.6	.4	.2	0
17	.2	34	57	53	30	24	2.3	1.1	.6	.4	.2	.1
18	.3	34	52	46	27	22	*2.2	1.0	.6	.4	.2	.1
19	.4	30	48	40	26	20	2.3	1.0	.6	.5	.2	.1
20	.2	34	52	36	32	18	*2.7	1.0	.6	.4	.2	.1
21	.2	54	63	54	30	16	2.6	1.0	.6	.4	*.2	0
22	.2	60	64	58	27	14	2.5	.9	.6	.4	.2	0
23	.2	54	71	52	24	12.5	2.3	1.0	.6	.4	.2	.1
24	.2	56	79	55	22	12.5	2.2	1.1	.6	.4	.2	.1
25	.2	87	69	101	20	12	2.1	1.0	.6	.4	.2	.1
26	.4	96	56	*128	18	10.5	1.8	.9	.6	.4	.2	.1
27	.5	76	48	90	16.5	9.6	2.2	.9	.6	.4	.2	.1
28	.6	58	42	65	15	8.7	4.2	.9	.6	.4	.2	.1
29	.8	46	36	a50	-	8.9	3.6	.9	.5	.4	.2	.1
30	8.4	54	35	a40	-	9.8	3.1	.9	.5	.4	.2	.1
31	10.5	-	31	34	-	9.1	-	.8	-	.3	.2	-
Total	27.3	896.5	1,558	1,358.5	1,561.5	408.9	118.3	41.2	20.4	14.1	6.7	3.1
Mean	0.88	29.9	50.3	43.8	55.8	13.2	3.94	1.33	0.68	0.45	0.22	0.10
Cfsm	0.201	6.84	11.5	10.0	12.8	3.02	0.902	0.304	0.156	0.103	0.050	0.025
In.	0.25	7.63	13.26	11.56	13.29	3.48	1.01	0.35	0.17	0.12	0.06	0.03
Ac-ft	54	1,780	3,090	2,690	3,100	811	235	82	40	28	13	6.1

Peak discharge (base, 60 cfs).--Nov. 25 (8 to 10 p.m.) 108 cfs (3.78 ft); Dec. 10 (5 to 6 a.m.) 69 cfs (3.23 ft); Dec. 24 (2 p.m.) 80 cfs (3.40 ft); Jan. 26 (1 to 2 a.m.) 142 cfs (4.04 ft); Feb. 9 (8 a.m.) 278 cfs (5.20 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage.

## Gold Creek near Bremerton, Wash.

Location.--Lat 47°33'20", long. 122°48'30", in NE1/4 sec. 21, T. 24 N., R. 1 W., on right bank about 1 mile upstream from mouth and 7 miles west of Bremerton.

Drainage area.--1.54 sq mi (revised).

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 750.9 ft above mean sea level (by closed stadia traverse).

Average discharge.--6 years, 6.13 cfs.

Extremes.--Maximum discharge during year, 153 cfs Feb. 9 (gage height, 2.81 ft); minimum, 0.3 cfs Aug. 27, Sept. 3, 19, 20, 23, 24.  
1945-51: Maximum discharge, 253 cfs Nov. 26, 1949 (gage height, 3.17 ft); minimum, 0.2 cfs Aug. 14, 1950 (gage height, 0.75 ft).

Remarks.--Records fair. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.78	0.3	1.7	24
.9	.8	1.9	37
1.1	3.0	2.1	54
1.3	7.8	2.3	75
1.5	14	2.5	100

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.6	10.5	11	10.5	9.0	6.3	4.8	1.7	*1.0	0.5	0.5	0.4
2	.5	9.0	11	17	17	5.8	4.5	1.5	1.0	.5	.5	.4
3	.5	7.8	15.5	19.5	17	5.5	4.3	1.8	.9	.5	.5	.4
4	.8	6.8	16	15.5	14.5	5.5	4.0	1.7	1.0	.6	.5	.4
5	1.4	5.5	15.5	12	12	5.0	3.8	1.8	.9	.6	.4	.4
6												
7	1.0	*5.3	*28	10.5	11.5	4.8	3.8	1.8	.9	.6	.4	.4
8	2.0	4.5	26	9.5	24	4.5	3.6	2.0	.9	.6	.4	.6
9	1.7	3.6	19.5	8.8	71	*4.5	3.4	1.8	.9	.6	.4	.5
10	5.0	3.4	25	8.3	99	4.3	3.4	1.7	.9	.6	.4	.4
					*82	4.0	3.2	1.6	.9	.6	.5	.4
11	2.5	3.2	17.5	8.5	30	4.3	3.2	1.6	.9	*.7	.5	.4
12	2.1	3.0	13	7.8	19	7.3	3.0	1.5	1.0	.6	.4	.4
13	1.7	3.0	11	9.8	15	8.0	2.8	1.4	.9	.5	.5	.4
14	1.6	2.8	10	10.5	12	9.3	3.0	1.4	.9	.6	.5	.4
15	1.6	7.5	12.5	22	11	14	3.0	1.3	.8	.6	.5	.4
16	1.5	26	17.5	23	9.8	14	2.7	1.4	.8	.6	.5	.4
17	1.6	27	27	17	9.8	10.5	2.7	1.4	.7	.6	.4	.4
18	3.4	16	19	14	9.0	8.8	2.2	1.3	.8	.5	.4	.4
19	3.4	10.5	17	12	10.0	7.8	*2.1	1.3	.8	.6	.4	.4
20	3.0	21	20	11	13.5	7.0	2.1	1.4	.7	.6	.4	.4
21	3.0	34	26	19.5	12.5	6.8	1.8	1.2	.7	.6	*.4	.4
22	2.8	23	23	18.5	10.5	6.0	1.7	1.2	.6	.6	.4	.4
23	2.7	17.5	34	16	9.3	6.0	1.8	1.2	.6	.5	.4	.3
24	2.4	18.5	30	28	8.8	5.3	1.8	1.2	.6	.5	.4	.3
25	2.8	36	22	68	8.3	5.3	1.8	1.1	.6	.5	.4	.4
26	3.2	31	17	*41	7.5	5.0	1.8	1.1	.6	.5	.4	.4
27	5.8	21	13	22	7.0	4.8	2.1	1.0	.6	.5	.4	.4
28	10.5	15	11.5	15	6.5	4.5	2.8	1.0	.6	.5	.5	1.0
29	15.5	11.5	10.5	12	-	4.8	2.1	1.0	.6	.5	.4	1.4
30	12.5	13.5	12.5	10	-	6.0	2.0	1.0	.6	.5	.4	1.3
31	10.0	-	11.5	9.3	-	5.0	-	1.0	-	.5	.4	-
Total	109.2	401.4	564.0	514.8	536.5	200.7	85.3	45.4	23.7	17.3	13.7	14.6
Mean	3.52	13.4	18.2	16.6	19.2	6.47	2.84	1.40	0.79	0.56	0.44	0.49
Cfs/m	2.29	8.70	11.8	10.8	12.5	4.20	1.84	0.909	0.513	0.364	0.286	0.318
In.	2.64	9.69	13.62	12.43	12.96	4.85	2.06	1.05	0.57	0.42	0.33	0.35
Ac-ft	217	796	1,120	1,020	1,060	398	169	86	47	34	27	29

Calendar year 1950: Max 120 Min 0.3 Mean 7.93 Cfs/m 5.15 In. 69.88 Ac-ft 5,740  
Water year 1950-51: Max 99 Min 0.3 Mean 6.92 Cfs/m 4.49 In. 60.97 Ac-ft 5,000

Peak discharge (base, 100 cfs).--Dec. 23 (6 p.m.) 140 cfs (2.74 ft); Feb. 9 (4 a.m.) 153 cfs (2.81 ft).

\* Discharge measurement made on this day.

## Tahuya River near Bremerton, Wash.

Location.--Lat. 47°33'00", long. 122°50'30", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 19, T. 24 N., R. 1 W., on left bank  $1\frac{1}{4}$  miles downstream from Tahuya Lake and 10 miles west of Bremerton.

Drainage area.--6.12 sq mi.

Records available.--May 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 539 ft above mean sea level (by closed stadia traverse).

Average discharge.--6 years, 22.2 cfs.

Extremes.--Maximum discharge during year, 460 cfs Feb. 9 (gage height, 5.44 ft); minimum, 0.2 cfs on many days during August and September.

1945-51: Maximum discharge, that of Feb. 9, 1951; maximum gage height, 5.58 ft Nov. 27, 1949; minimum discharge, 0.1 cfs Sept. 22-26, 1947, Sept. 1-10, 12, 13, 1949.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. Small diversions for domestic use. No regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 8

Feb. 9 to Sept. 30

2.58	0.4	3.3	53	2.25	0.2	3.5	108
2.7	3.3	3.6	95	2.4	1.9	4.0	193
2.9	14.5	4.1	184	2.6	7.0	4.5	280
3.1	31			2.9	25	5.2	406
				3.2	60		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.4	46	67	43	25	20	16	11	1.5	0.8	0.5	0.2
2	.4	*43	61	54	56	17	14	6.4	1.4	.8	.5	.2
3	.5	36	69	69	61	16	12.5	5.3	1.3	.8	.4	.2
4	.6	31	72	65	61	17	11.5	2.4	1.5	.8	.4	.2
5	1.2	29	67	56	56	15	11.5	3.3	1.5	.8	.4	.2
6	1.0	28	*94	46	49	13	10.5	2.4	1.5	.8	.4	.2
7	1.6	28	108	40	76	14	10	3.3	*1.5	.8	.4	.3
8	1.6	25	90	35	172	*12	9.7	3.6	1.5	.8	.4	.3
9	1.9	22	95	30	397	11.5	9.2	3.3	1.3	.8	.4	.3
10	4.6	20	118	30	271	11	8.8	2.2	1.3	.8	.3	.3
11	2.9	18.5	98	31	*162	11	8.0	2.7	1.1	*.7	.3	.2
12	2.5	17	74	29	118	23	8.0	2.2	1.3	.7	.3	.2
13	2.2	16	61	35	91	33	7.7	2.2	1.3	.7	.3	.2
14	2.2	15	53	37	69	41	7.7	2.1	1.3	.7	.3	.2
15	2.5	28	57	72	59	62	7.4	2.1	1.1	.7	.3	.2
16	2.5	95	72	89	47	70	7.0	2.1	1.1	.7	.3	.2
17	2.5	135	106	84	45	57	6.4	2.9	1.0	.7	.2	.2
18	5.4	108	95	69	40	47	6.4	3.6	1.0	.7	.2	.2
19	6.7	74	82	58	45	37	6.1	3.1	1.0	.7	.2	.2
20	5.8	88	89	47	59	32	6.4	2.1	1.0	.6	.2	.2
21	6.3	141	111	74	57	31	5.5	2.2	.9	.6	*.2	.2
22	6.3	121	106	83	51	27	4.9	1.6	.9	.6	.2	.2
23	6.3	101	111	76	43	23	4.7	2.1	.9	.6	.2	.2
24	6.3	103	118	*88	39	19.5	3.3	1.9	1.1	.6	.2	.3
25	7.6	133	101	169	34	18	2.7	1.9	.9	.6	.2	.3
26	10	148	79	180	30	16.5	2.7	1.8	.9	.6	.2	.2
27	17	114	65	106	25	14.5	4.9	1.8	.9	.5	.3	.3
28	23	86	58	70	22	14	8.8	1.8	.8	.5	.3	.7
29	48	69	49	57	-	14	6.1	1.6	.8	.5	.3	.8
30	51	70	52	40	-	19	10	1.6	.8	.5	.3	.8
31	43	-	49	30	-	17.5	-	1.5	-	.5	.3	-
Total	273.8	1,988.5	2,525	1,992	2,260	773.5	237.9	86.1	34.5	21.0	9.4	8.4
Mean	8.83	66.3	81.5	64.3	80.7	25.0	7.93	2.78	1.15	0.68	0.30	0.28
Cfsm	1.44	10.8	13.3	10.5	13.2	4.08	1.30	0.454	0.188	0.111	0.049	0.046
In.	1.66	12.08	15.34	12.10	13.73	4.70	1.45	0.52	0.21	0.13	0.06	0.05
Ac-ft	543	3,940	5,010	3,950	4,480	1,530	472	171	68	42	19	17
Calendar year 1950: Max	391			Min 0.2		Mean 30.8	Cfsm 5.03	In. 68.21	Ac-ft 22,260			
Water year 1950-51: Max	397			Min 0.2		Mean 28.0	Cfsm 4.58	In. 62.03	Ac-ft 20,240			

Peak discharge (base, 130 cfs).--Nov. 17 (5:30 a.m.) 144 cfs (3.89 ft); Nov. 21 (9 a.m. to 12:30 p.m.) 146 cfs (3.90 ft); Nov. 26 (3:30 p.m.) 157 cfs (3.96 ft); Dec. 23 (10 p.m.) 135 cfs (3.84 ft); Jan. 25 (11 p.m.) 226 cfs (4.32 ft); Feb. 9 (9 a.m.) 460 cfs (5.44 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 30 to Feb. 1, Feb. 26 to Mar. 7, July 16 to Aug. 20; discharge estimated on basis of weather records, recorded range in stage, and records for stations on nearby streams. Shifting-control method used Feb. 9-25, June 26 to July 15, Aug. 21 to Sept. 30.



## Panther Lake near Bremerton, Wash.

Location.--Lat 47°31', long. 122°51', in NE¼NW¼ sec. 6, T. 23 N., R. 1 W., on south shore on lake 9 miles southwest of Bremerton.

Records available.--March 1945 to September 1951 (fragmentary).

Gage.--Staff gage read at infrequent intervals. Datum of gage is 491.5 ft above mean sea level (by closed stadia traverse).

Extremes.--1945-51: Maximum gage height, 9.39 ft probably Feb. 10, 1951, from high-water mark; minimum observed, 5.74 ft Sept. 16, 1949.

Remarks.--No diversion or regulation.

Revisions (water years).--W 1152: 1945-48.

Gage height, in feet, 1950-51			
Nov. 7.....	7.38	Feb. 11.....	9.18
Dec. 7.....	8.25	June 5.....	7.12
Jan. 29.....	8.24	Aug. 21.....	6.02
Feb. 10.....	9.39		

## Panther Creek near Bremerton, Wash.

Location.--Lat 47°31'40", long. 122°52'00", in NW¼ sec. 31, T. 24 N., R. 1 W., on left bank half a mile downstream from Panther Lake and 11 miles west of Bremerton.

Drainage area.--1.00 sq mi.

Records available.--June 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 486 ft above mean sea level (by closed stadia traverse).

Average discharge.--6 years, 3.15 cfs.

Extremes.--Maximum discharge during year, 63 cfs Feb. 9 (gage height, 2.78 ft); no flow on many days.

1945-51: Maximum discharge, 199 cfs Feb. 22, 1949 (gage height, 3.02 ft); no flow at times each year.

Remarks.--Records good except those below 0.5 cfs or above 15 cfs, which are fair, and those for periods of no gage-height record, which are poor. No diversion. Natural regulation by Panther Lake.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.8	0	1.6	13
.9	.3	1.9	19
1.0	.8	2.2	30
1.2	3.2	2.5	45
1.4	7.9		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0	2.0	13	6.5	6.0	2.7	1.8	0.5	(*)			
2	0	2.0	12	8.8	10.5	2.4	1.8	.4				
3	0	1.6	12	11	11.5	2.2	1.5	.4				
4	0	1.5	10.5	8.8	9.5	2.1	1.4	.4				
5	0	1.4	9.5	7.3	8.2	2.0	1.3	.3				
6	0	1.2	12.5	6.2	7.3	1.8	1.2	.3				
7	0	.9	*12.5	5.4	12.5	1.8	1.1	.3				
8	0	.8	12	5.0	24	*1.7	1.0	.3				
9	0	.7	13.5	4.5	44	1.7	1.0	.2				
10	0	.6	15	4.3	*34	1.5	.9	.2				
11	0	.6	12.5	4.3	25	1.5	.8	.2				
12	0	.6	10.5	4.1	19.5	2.7	.8	.2				
13	0	.5	8.4	5.4	15.5	4.5	.7	.1				
14	0	.5	7.3	6.0	13	4.5	.6	.1				
15	0	1.4	8.8	12	11.5	5.7	.6	.1				
16	0	10.5	12	12	8.8	5.4	.5	.1				
17	0	11	13.5	12.5	7.6	4.5	.5	.1				
18	0	8.2	12	12	6.8	4.1	*.5	.1				
19	.1	6.8	11	10.5	6.8	3.7	.4	.1				
20	.1	12	13	9.5	8.2	3.5	.4	.1				
21	.1	15.5	14.5	15	7.0	3.2	.3	.1				
22	.1	14	14	14.5	6.2	2.8	.3	.1				
23	.1	13	16	12.5	5.4	2.7	.3	.1				
24	.1	14	17	15	4.5	2.4	.3	.1				
25	.1	20	14.5	*22	4.3	2.1	.2	.1				
26	.1	19	12	20	3.7	2.0	.2	.1				
27	.3	15.5	11.5	15.5	3.3	1.8	.3	.1				
28	1.8	13	9.9	12	3.0	1.7	.5	.1				
29	2.7	12	8.4	a10	-	1.7	.5	.1				
30	2.4	12.5	8.4	a8.5	-	2.0	.5	.1				
31	*1.8	-	7.3	a7	-	2.0	-	0				
Total	9.8	213.3	365.0	308.1	327.6	84.4	22.2	5.5	0	0	0	0
Mean	0.32	7.11	11.8	9.94	11.7	2.72	0.74	0.18	0	0	0	0
Cfsm	0.320	7.11	11.8	9.94	11.7	2.72	0.740	0.180	0	0	0	0
In.	0.36	7.93	13.57	11.46	12.18	3.14	0.83	0.20	0	0	0	0
Ac-ft	19	423	724	611	650	167	44	11	0	0	0	0

Calendar year 1950: Max 28 Min 0 Mean 4.13 Cfsm 4.13 In. 56.08 Ac-ft 2,990  
Water year 1950-51: Max 44 Min 0 Mean 3.66 Cfsm 3.66 In. 49.67 Ac-ft 2,650

Peak discharge (base, 20 cfs).--Nov. 25 (5:30 p.m.) 26 cfs (2.12 ft); Jan. 25 (8 p.m.) 26 cfs (2.12 ft); Feb. 9 (4:30 a.m.) 63 cfs (2.78 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

## Tahuya River near Belfair, Wash.

Location.--Lat 47°29'40", long. 122°54'20", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 10, T. 23 N., R. 2 W., on left bank  $\frac{3}{4}$  miles downstream from Panther Creek and 5 miles northwest of Belfair.

Drainage area.--16.5 sq mi.

Records available.--May 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 353 ft above mean sea level (by closed stadia traverse).

Average discharge.--6 years, 47.6 cfs.

Extremes.--Maximum discharge during year, 780 cfs Feb. 9 (gage height, 7.41 ft); no flow Oct. 1-6, July 11, 12, July 15 to Sept. 30.

1945-51: Maximum daily discharge, 1,000 cfs Jan. 22, 1950; no flow at times each year.

Remarks.--Records good except those for periods of shifting control, which are fair. Small diversions for domestic use. No regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Jan. 25				Jan. 26 to Sept. 30			
1.85	0.0	3.0	57	2.1	0.0	4.0	172
1.9	.1	3.3	87	2.3	1.6	4.5	247
2.0	.6	3.6	122	2.5	8.5	5.0	327
2.2	5.0	4.0	174	2.7	19	5.5	414
2.4	13	4.5	247	2.9	34	6.0	505
2.6	25	5.0	327	3.2	64	6.5	600
2.8	40	5.5	414	3.5	102	7.0	700

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0	87	173	100	52	36	30	15	2.0	0.2		
2	0	82	144	118	109	32	28	14	1.8	.2		
3	0	*68	148	163	155	29	26	10.5	1.6	.2		
4	0	58	143	147	144	29	24	8.5	1.6	.2		
5	0	50	132	126	112	28	22	7.7	1.6	.2		
6	0	43	187	108	92	25	21	7.3	*1.6	.2		
7	.1	39	*217	95	176	*25	19.5	6.9	1.6	.2		
8	.1	34	188	85	397	24	19	6.3	1.3	.2		
9	.2	31	210	76	700	23	18	6.5	1.1	.2		
10	.6	28	286	75	543	22	16.5	6.1	1.1	.2		
11	2.0	24	217	79	*378	22	16	5.7	1.1	0		
12	4.4	22	163	77	247	43	14	5.3	1.1	*0		
13	3.8	20	129	96	175	88	14	5.3	1.1	.2		
14	3.3	18.5	112	110	130	93	13.5	4.5	.9	.2		
15	3.0	28	126	178	103	112	13.5	4.5	.9	0		
16	2.8	143	170	224	84	120	12.5	4.1	.9	0		
17	2.5	240	247	210	76	99	11.5	3.8	.7	0		
18	4.7	195	202	164	70	81	*11.5	3.8	.7	0		
19	7.7	135	170	159	69	68	10.5	4.9	.6	0		
20	9.0	163	195	124	103	58	9.7	4.5	.4	0		
21	7.3	294	247	195	101	51	9.3	3.8	.4	0		
22	6.3	278	232	217	86	49	8.9	3.5	.2	0		
23	5.9	210	254	184	72	41	8.1	2.9	.2	0		
24	5.6	224	286	210	62	38	7.7	2.9	.2	0		
25	5.9	338	232	397	53	35	7.3	2.9	.2	0		
26	10	352	174	405	48	32	6.5	2.9	.2	0		
27	20	262	143	262	42	31	7.3	2.6	.2	0		
28	52	195	132	157	39	28	17	2.3	.2	0		
29	84	150	117	*106	-	28	15	2.3	.2	0		
30	90	159	118	79	-	35	12	2.0	.2	0		
31	82	-	112	82	-	33	-	2.0	-	0		
Total	413.2	5,970.5	5,606	4,768	4,418	1,458	450.8	165.9	25.9	2.4	0	0
Mean	13.3	132	181	154	158	47.0	15.0	5.35	0.88	0.08	0	0
Cfs/m	0.806	8.00	11.0	9.33	9.58	2.85	0.909	0.324	0.052	0.0045	0	0
In.	0.93	8.95	12.64	10.75	9.96	3.29	1.02	0.37	0.06	0.005	0	0
Ac-ft	820	7,880	11,120	9,460	8,760	2,890	894	329	51	4.8	0	0

Calendar year 1950: Max 1,000 Min 0 Mean 69.3 Cfs/m 4.20 In. 57.03 Ac-ft 50,170

Water year 1950-51: Max 700 Min 0 Mean 58.3 Cfs/m 3.53 In. 47.98 Ac-ft 42,210

Peak discharge (base, 450 cfs).--Jan. 25 (11 p.m.) 505 cfs (5.75 ft); Feb. 9 (7:30 a.m.) 780 cfs (7.41 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Nov. 18 to Jan. 27, Feb. 14 to Mar. 15.

## Dewatto Creek near Dewatto, Wash.

Location.--Lat 47°28'10", long. 123°01'30", in sec. 23, T. 23 N., R. 3 W., on right bank 1½ miles upstream from mouth and 2 miles northeast of Dewatto.

Drainage area.--17.6 sq mi.

Records available.--July 1947 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 55 ft (from topographic map).

Extremes.--Maximum discharge during year, 1,160 cfs Feb. 9 (gage height, 5.86 ft), from rating curve extended above 780 cfs; minimum, 11 cfs Sept. 20, 21, 22.  
1947-51: Maximum discharge, 1,630 cfs Nov. 27, 1949 (gage height, 6.75 ft), from rating curve extended above 780 cfs; minimum, 9.6 cfs Sept. 22, 1950.

Remarks.--Records good except those for periods of shifting control, which are fair. No diversion or regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Nov. 25

Nov. 26 to Sept. 30

1.6	10	2.7	117	1.5	8	3.2	220
1.8	20	3.0	169	1.7	18	3.5	286
2.0	36	3.3	232	2.0	41	4.0	420
2.2	54	3.6	304	2.3	74	4.5	580
2.4	75	4.0	414	2.6	115	5.0	780
				2.9	163	5.6	1,030

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	11.5	111	192	102	102	72	56	42	25	17	14	12.5
2	11.5	101	160	138	183	69	54	39	24	17	13.5	12.5
3	12	*83	154	177	216	69	52	38	24	17	13.5	12.5
4	17.5	70	135	149	194	68	50	39	25	17.5	14	12.5
5	28	60	126	126	158	66	49	38	*25	17.5	13.5	11.5
6	23	52	176	109	141	64	47	37	24	18	13	12
7	38	47	190	98	254	*62	46	37	24	17.5	13	15
8	28	43	*172	91	508	60	45	37	24	17	13	14
9	25	38	210	83	1,000	59	44	36	24	17	13.5	13
10	85	36	286	90	720	58	42	35	23	16.5	14	12.5
11	55	34	208	101	391	63	41	36	23	16	14	12
12	38	32	158	95	243	127	40	35	23	*15	14	12
13	30	31	127	133	181	144	40	33	23	16	13.5	11.5
14	26	30	116	141	151	124	40	33	22	16	13	11.5
15	24	48	154	228	133	133	39	32	22	16	13	11.5
16	22	135	226	248	118	120	37	32	21	16	12.5	11.5
17	22	214	310	214	115	101	37	31	21	16	12	11.5
18	39	169	220	176	105	88	*37	30	21	16	12	11.5
19	48	117	177	153	121	80	36	30	20	16.5	12	11.5
20	46	160	208	140	153	74	36	29	19.5	16.5	*11.5	11
21	38	287	270	256	135	70	35	29	18	16	11.5	11
22	35	260	248	265	118	66	35	28	18	16	11.5	12
23	30	202	259	212	105	62	35	29	18	15	11.5	11.5
24	28	208	274	216	98	59	34	30	18	16	11.5	11.5
25	30	348	216	350	91	59	34	29	18	16	11.5	12
26	36	363	170	406	84	56	33	28	18	16.5	11.5	12
27	57	245	151	248	79	54	46	28	18	16	13.5	13.5
28	111	183	149	170	75	70	70	27	17.5	14.5	15	24
29	145	144	135	*155	-	59	50	27	17	14.5	14	30
30	123	172	127	116	-	69	46	27	17	14.5	13.5	34
31	106	-	112	105	-	60	-	26	-	14	13	-
Total	1,564.5	4,003	5,816	5,271	5,972	2,367	1,286	1,007	635.0	501.0	400.5	415.0
Mean	44.0	133	188	170	213	76.4	42.9	32.5	21.2	16.2	12.9	13.8
Cfsm	2.50	7.56	10.7	9.66	12.1	4.34	2.44	1.85	1.20	0.920	0.733	0.784
In.	2.88	8.46	12.29	11.14	12.62	5.00	2.72	2.13	1.34	1.06	0.85	0.88
Ac-ft	2,710	7,940	11,540	10,450	11,850	4,690	2,550	2,000	1,260	994	794	823

Calendar year 1950: Max 780 Min 10 Mean 88.6 Cfsm 5.03 In. 68.37 Ac-ft 64,190  
Water year 1950-51: Max 1,000 Min 11 Mean 79.6 Cfsm 4.52 In. 61.37 Ac-ft 57,600

Peak discharge (base, 350 cfs).--Nov. 25 (7:30 p.m.) 475 cfs (4.19 ft); Jan. 26 (1 a.m.) 495 cfs (4.23 ft); Feb. 9 (9 a.m.) 1,160 cfs (5.86 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1-9, Apr. 28 to Aug. 13.

## Dogfish Creek near Poulsbo, Wash.

Location.--Lat 47°45'10", long. 122°38'30", in SW $\frac{1}{4}$  sec. 11, T. 26 N., R. 1 E., on left bank half a mile upstream from mouth and 1 mile north of Poulsbo. Prior to Nov. 2, 1950, at site 200 ft downstream.

Drainage area.--6.77 sq mi.

Records available.--July 1947 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is about 20 ft (from topographic map). Prior to Nov. 2, 1950, at site 200 ft downstream at datum 1.75 ft lower.

Extremes.--Maximum discharge during year, 127 cfs Feb. 9 (gage height, 3.44 ft); minimum, 1.8 cfs July 30.

1947-51: Maximum discharge, 265 cfs about Feb. 22, 1949 (gage height, 8.82 ft, site and datum then in use, from high-water mark on gage house), by contracted-opening de-termination; minimum, 1.8 cfs Aug. 13, 1947, July 30, 1951.

Remarks.--Records good except those above 60 cfs and those for periods of shifting control, which are fair. Small diversion for irrigation. No regulation.

Revisions (water years).--W 1122: 1947(M).

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Nov. 2 to Feb. 9

Feb. 10 to Sept. 30

1.3	3.8	2.2	49	1.1	1.9	1.7	19.5
1.5	9.6	2.5	72	1.3	5.6	1.9	30
1.7	19	2.8	94	1.5	11.5	2.1	42
1.9	30						

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3.6	8.0	19.5	10	5.6	9.6	6.9	5.6	3.9	3.0	3.0	3.7
2	3.6	6.7	14	25	36	8.0	6.3	5.4	3.9	3.0	3.1	3.5
3	3.6	6.1	13	15	17.5	8.0	6.3	5.1	3.9	3.1	3.1	3.5
4	5.8	5.3	8.6	9.3	14.5	8.3	6.1	5.1	5.6	3.9	3.3	3.3
5	5.3	6.7	10	6.7	11	8.6	6.1	5.1	4.9	3.5	3.1	3.3
6	4.5	5.6	20	5.8	12.5	8.6	6.1	5.1	4.9	3.5	3.0	3.5
7	4.3	5.3	22	5.1	44	8.6	5.8	6.1	4.7	3.1	3.1	4.1
8	8.3	4.8	*14.5	4.8	69	8.6	6.1	5.8	4.5	3.3	3.1	4.1
9	6.1	4.3	31	4.6	90	*8.9	5.8	5.1	4.1	3.1	3.1	3.9
10	7.7	4.8	25	6.1	*41	8.3	5.6	5.1	3.9	3.1	3.1	3.7
11	5.4	*5.6	18.5	7.3	26	10.5	5.4	9.9	4.1	2.8	3.1	3.5
12	4.8	5.8	12	5.1	20	23	5.4	6.6	4.7	2.6	3.1	3.3
13	4.5	5.3	8.6	5.3	17	15.5	5.4	5.6	4.3	*2.6	3.1	3.1
14	4.4	5.6	10.5	4.8	15.5	12	5.4	5.1	4.1	3.0	3.0	3.1
15	4.2	30	25	51	16	12	5.4	5.1	3.9	3.1	3.0	3.1
16	4.2	38	29	33	14	9.6	5.1	4.9	3.5	3.0	3.0	3.1
17	4.3	22	27	26	17.5	8.3	5.1	5.1	3.5	3.1	3.0	3.1
18	5.6	13.5	15.5	18.5	15	8.0	5.1	5.4	3.5	3.5	2.8	3.3
19	5.0	10.5	19.5	17	18.5	7.4	*5.1	4.9	3.5	3.5	2.6	3.3
20	4.8	31	18	15	18	7.1	5.1	4.5	3.3	3.3	2.6	3.1
21	4.7	23	14.5	76	14	7.1	5.1	4.3	3.1	3.1	*2.6	3.1
22	4.7	14.5	16	*32	12	7.1	4.9	4.1	2.6	3.1	2.8	3.3
23	4.7	16.5	20	20	11	6.9	4.9	4.1	3.1	3.0	3.0	3.5
24	5.2	16	15.5	18	10.5	6.9	4.9	4.3	3.1	3.0	3.1	3.9
25	6.4	30	12	18	10	7.1	4.9	4.3	3.1	3.1	3.0	4.3
26	6.4	18	8.6	17.5	9.6	8.0	4.7	4.3	3.1	3.0	3.1	4.1
27	9.1	14.5	7.0	9.6	8.9	7.1	6.6	4.3	3.1	3.0	3.9	4.3
28	10.5	11.5	7.3	6.4	8.6	6.6	8.9	4.5	3.0	3.1	5.6	7.1
29	8.8	8.6	6.1	5.3	-	7.7	6.6	4.5	3.0	3.1	4.1	6.3
30	7.1	25	18.5	4.6	-	9.3	6.1	4.3	3.8	3.0	3.9	6.3
31	6.1	-	9.3	4.6	-	7.1	-	4.1	-	3.0	3.7	-
Total	171.7	402.5	496.0	487.4	603.2	279.8	171.2	157.7	112.9	96.6	99.1	114.8
Mean	5.54	13.4	16.0	15.7	21.5	9.03	5.71	5.09	3.76	3.12	3.20	3.63
Cfsm	0.818	1.98	2.36	2.32	3.18	1.33	0.843	0.752	0.555	0.461	0.473	0.566
In.	0.94	2.21	2.72	2.68	3.31	1.54	0.94	0.87	0.62	0.53	0.54	0.63
Ac-ft	341	798	984	967	1,200	555	340	313	224	192	197	228

Calendar year 1950: Max 73 Min 2.9 Mean 9.72 Cfsm 1.44 In. 19.50 Ac-ft 7,040  
 Water year 1950-51: Max 90 Min 2.6 Mean 8.75 Cfsm 1.29 In. 17.53 Ac-ft 6,340

Peak discharge (base, 70 cfs).--Nov. 15 (12 p.m.) 95 cfs (2.82 ft); Jan. 15 (6:30 a.m.) 91 cfs (2.76 ft); Jan. 21 (5 a.m.) 112 cfs (3.11 ft); Feb. 9 (2:30 a.m.) 127 cfs (3.44 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1 to Nov. 15, Feb. 13 to Apr. 14.

## MINTER CREEK BASIN

Huge Creek near Wauna, Wash.

Location--Lat 47°23'20", long. 122°41'50", at north line sec. 20, T. 22 N., R. 1 E., on right bank at downstream side of bridge an eighth of a mile upstream from mouth and 2½ miles west of Wauna.

Drainage area--5.51 sq mi (revised).

Records available--July 1947 to September 1951.

Gage--Water-stage recorder. Altitude of gage is 100 ft (from topographic map). Prior to June 26, 1951, water-stage recorder at same site at datum 0.86 ft higher.

Extremes--Maximum discharge during year, 391 cfs Feb. 9 (gage height, 3.64 ft, datum then in use); minimum, 3.9 cfs Oct. 15, 16, 17.  
1947-51: Maximum discharge, that of Feb. 9, 1951; minimum, 3.2 cfs Sept. 1, 1950.

Remarks--Records good except those for periods of no gage-height record, which are poor.  
No diversion or regulation.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4.8	9.7	40	23	23	18	13	8.5	7	6.6	5.2	5.0
2	4.8	7.2	25	45	47	17	12	8.5	7	6.6	5.0	5.0
3	5.1	6.8	22	42	48	17	12	8	7	6.4	5.0	4.8
4	6.4	6.4	19	33	43	17.5	11	8	7	6.1	4.8	4.8
5	8.6	6.1	*17	26	35	17	11	8	*7	6.4	4.8	4.8
6	6.4	5.8	35	24	32	*14.5	11	8	7	6.6	4.6	4.8
7	6.4	*6.1	40	22	49	14	10	8	7	6.4	4.6	5.2
8	7.2	5.8	35	19.5	61	14	10	7.5	7	6.4	4.8	5.2
9	6.4	5.8	40	18.5	*250	13.5	10	7.5	7	6.4	4.8	5.0
10	16	5.8	45	18.5	*173	16	9.5	7.5	7	*6.1	5.0	4.8
11	6.4	5.8	35	19	*104	18	9	7.5	7	5.8	4.8	4.8
12	5.4	5.8	30	16.5	78	28	9	7.5	7	5.8	4.8	4.8
13	5.1	5.8	25	19	61	30	9	7.5	7	5.8	4.8	4.8
14	4.5	5.8	22	21	47	26	9	7.5	7	6.1	4.8	4.6
15	4.2	8.1	28	40	40	34	8.5	7.5	7	5.8	4.8	4.6
16	3.9	11	33	46	34	28	*8.5	7.5	7	5.6	4.6	4.6
17	4.2	9.7	38	48	36	25	8.5	7.5	6.5	5.4	4.6	4.6
18	6.1	7.6	30	42	32	20	8	7.5	6.5	5.4	4.6	4.8
19	7.6	7.6	28	39	34	18	8	7.5	6.5	5.6	4.6	4.8
20	5.4	12.5	35	37	38	16.5	8	7.5	6.5	5.4	*4.4	4.6
21	4.8	15	42	62	30	16	8	7.5	6.5	5.4	4.6	4.6
22	4.8	25	43	57	28	15	7.5	7.5	6.5	5.4	4.6	4.6
23	4.8	20	60	*47	24	14	7.5	7.5	6	5.4	4.6	4.8
24	4.5	30	59	47	23	13	7.5	7.5	6	5.4	4.8	5.2
25	4.8	45	46	51	22	13	7.5	7.5	6	5.4	4.8	5.4
26	5.1	50	36	57	20	12	7.5	7	6.4	5.4	4.8	5.0
27	8.1	35	32	42	19	12	7.5	7	6.6	5.4	5.0	5.6
28	11.5	30	32	32	18	11	12	7	6.6	5.4	5.6	6.8
29	10	27	28	28	-	13	10	7	6.4	5.2	5.2	7.1
30	10	32	30	26	-	16	9	7	6.4	5.2	5.0	7.1
31	8.1	-	26	22	-	14	-	7	-	5.2	5.0	-
Total	201.4	454.2	1,056	1,070.0	1,449	549.0	279	234	201.4	175.5	149.4	152.6
Mean	6.50	15.1	34.1	34.5	51.8	17.7	9.30	7.55	6.71	5.79	4.82	5.09
Cfsm	1.18	2.74	6.19	6.26	9.40	3.21	1.69	1.37	1.22	1.05	0.875	0.924
In.	1.36	3.07	7.13	7.22	9.78	3.71	1.88	1.58	1.36	1.21	1.01	1.03
Ac-ft	399	901	2,090	2,120	2,870	1,090	553	464	399	356	296	303

Calendar year 1950: Max 200 Min 3.6 Mean 16.9 Cfsm 3.07 In. 41.52 Ac-ft 12,190  
 Water year 1950-51: Max 250 Min 3.9 Mean 16.4 Cfsm 2.98 In. 40.34 Ac-ft 11,840

\* Discharge measurement made on this day.

Note.--No gage-height record Nov. 21 to Dec. 13, Mar. 10, Mar. 24 to June 25; discharge estimated on basis of 3 discharge measurements and records for stations on nearby streams.

Mason Lake near Union, Wash.

Location.--Lat 47°19'15", long. 122°57'15", in SE $\frac{1}{4}$  sec. 8, T. 21 N., R. 2 W., on right shore  $7\frac{1}{2}$  miles southeast of Union.

Drainage area.--20.2 sq mi.

Records available.--July to September 1951.

Gage.--Staff gage read once daily. Altitude of gage is 190 ft (from topographic map).

Extremes.--Maximum gage height observed during period, 2.40 ft Sept. 29, 30; minimum observed, 1.93 ft Aug. 7, 8.

High water during period Mar. 25 to Apr. 1, 1951, reached a stage of 7.5 ft, from high-water marks.

Remarks.--Records good. No diversion. Beaver dams at outlet cause some change in lake elevation.

Gage height, in feet, July to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1										-	1.98	2.18
2										-	1.97	2.19
3										-	1.96	2.20
4										-	1.95	2.20
5										-	1.94	2.22
6										-	1.94	2.24
7										-	1.93	2.28
8										-	1.93	2.28
9										-	1.96	2.28
10										-	1.96	2.28
11										-	1.98	2.29
12										-	1.98	2.30
13										-	1.98	2.30
14										-	2.00	2.32
15										-	2.00	2.32
16										-	2.02	2.32
17										-	2.04	2.32
18										-	2.06	2.32
19										-	2.06	2.32
20										-	2.06	2.32
21										-	2.06	2.34
22										-	2.06	2.34
23										-	2.06	2.34
24										-	2.08	2.34
25										-	2.08	2.33
26										-	2.08	2.32
27										-	2.10	2.30
28										-	2.14	2.32
29										-	2.16	2.40
30										1.98	2.16	2.40
31										1.98	2.18	-

Shumocher Creek near Union, Wash.

Location.--Lat 47°19'10", long. 122°59'20", in SW $\frac{1}{4}$  sec. 7, T. 21 N, R. 2 W., on right bank a quarter of a mile upstream from mouth and 6 miles southeast of Union.

Drainage area.--12.2 sq mi.

Records available.--June to October 1951 (discontinued).

Gage.--Water-stage recorder. Altitude of gage is 190 ft (from topographic map).

Extremes.--Maximum discharge during period, 19.5 cfs Oct. 2 (gage height, 1.04 ft); minimum, 4.0 cfs Sept. 27 (gage height, 0.69 ft).

Remarks.--Records excellent except those for periods of no gage-height record, which are fair. No regulation or diversion.

Discharge, in cubic feet per second, June to October 1951

Day			June	July	Aug.	Sept.	Oct.				
1			14.0	11.5	8.7	6.6	13.5				
2			13.5	11.5	8.1	6.6	19				
3			13.5	12	8.7	6.6	15.5				
4			14.5	11.5	8.7	6.1	9.6				
5			15	11.5	8.3	6.1	7.4				
6			15	12.5	8.3	6.6	7.0				
7			14.5	11.5	8.3	7.4	7.4				
8			14	11.5	8.3	7.9	6.1				
9			14	11.5	8.3	7.0	6.1				
10			14	11.5	8.3	7.0	6.6				
11			13.5	11	8.3	6.6	7.4				
12			14	11	8.3	6.6	-				
13			14	11	8.3	6.1	-				
14			14	10.5	7.9	6.1	-				
15			13.5	10.5	7.9	6.1	-				
16			13.5	10.5	7.4	6.1	-				
17			13.5	10	7.4	5.7	-				
18			13.5	10	7.4	5.7	-				
19			13.5	10	7.4	6.1	-				
20			13.5	10	7.4	5.7	-				
21			13.5	9.6	7.4	5.3	-				
22			12.5	9.6	7.4	5.3	-				
23			12	*9.6	7.4	5.7	-				
24			12	9.6	*7.4	6.1	-				
25			12	9.6	7.4	6.6	-				
26			12	9.6	7.4	*5.7	-				
27			*12	9.6	7.0	5.7	-				
28			12	9.1	8.7	9.1	-				
29			11.5	9.1	*7.9	12	-				
30			11.5	9.1	7.4	16.5	-				
31			-	8.7	7.0	-	-				
Total			399.5	324.2	245.1	206.7	-				
Mean			13.3	10.5	7.91	6.89	-				
Cfs/m			1.09	0.861	0.648	0.565	-				
In.			1.22	0.99	0.75	0.63	-				
Ac-ft			792	643	486	410	-				
Calendar year	: Max	Min	Mean		Cfs/m	In.	Ac-ft				
Water year	: Max	Min	Mean		Cfs/m	In.	Ac-ft				

\* Discharge measurement made on this day.

Note.--No gage-height record June 1-13, 20-26, Aug. 17-23; discharge estimated on basis of records for stations on nearby streams.



Deer Creek near Shelton, Wash.

Location.--Lat 47°16'00", long. 123°00'15", in NW¼ sec. 36, T. 21 N., R. 3 W., on left bank three-quarters of a mile upstream from mouth and 6 miles northeast of Shelton.

Drainage area.--13.6 sq mi.

Records available.--December 1942 to September 1943, August 1948 to September 1951 (discontinued).

Gage.--Water-stage recorder. Altitude of gage is 20 ft (from topographic map). Dec. 29, 1942, to Sept. 30, 1943, staff gage at same site at different datum.

Extremes.--Maximum discharge during period May to September, 95 cfs Sept. 29 (gage height, 1.94 ft); minimum, 17.5 cfs part of each day Aug. 16-20 (gage height, 1.34 ft).  
1942-43, 1948-51: Maximum discharge, 386 cfs Feb. 22, 1949 (gage height, 5.13 ft); minimum observed, 16 cfs Sept. 24, 25, 27-29, 1943.

Remarks.--Records fair. No diversion or regulation.

Discharge, in cubic feet per second, May to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1								-	27	23	18.5	21
2								-	26	23	18.5	21
3								-	26	24	19.5	21
4								-	28	23	19.5	20
5								-	*29	25	18.5	20
6								-	28	27	18.5	20
7								-	26	24	18.5	24
8								-	26	23	18.5	24
9								-	26	23	19.5	22
10								-	25	22	19.5	21
11								-	24	21	19.5	20
12								-	25	21	19.5	20
13								-	24	21	19.5	19.5
14								-	24	21	19.5	19.5
15								-	23	20	19.5	18.5
16								-	23	19.5	18	18.5
17								-	24	19.5	18	18
18								-	25	19.5	10	18.5
19								-	25	20	18	18.5
20								-	25	20	18	18.5
21								-	25	19.5	18.5	18
22								-	24	19.5	18.5	18
23								-	23	*19.5	18.5	18
24								34	24	19.5	18.5	18.5
25								32	23	20	19.5	21
26								30	23	20	18.5	*18.5
27								29	*23	20	19.5	22
28								29	22	20	25	35
29								29	22	20	22	45
30								28	22	20	21	58
31								27	-	18.5	21	-
Total								-	740	656.0	597.0	675.5
Mean								-	24.7	21.2	19.3	22.5
Cfs/m								-	1.82	1.56	1.42	1.65
In.								-	2.02	1.79	1.63	1.85
Ac-ft								-	1,470	1,300	1,180	1,340
Calendar year	: Max		Min		Mean		Cfs/m		In.		Ac-ft	
Water year	: Max		Min		Mean		Cfs/m		In.		Ac-ft	

\* Discharge measurement made on this day.

## CRANBERRY CREEK BASIN

Cranberry Creek near Shelton, Wash.

Location.--Lat 47°16'00", long. 123°00'30", in NW¼ sec. 36, T. 21 N., R. 3 W., on left bank half a mile upstream from mouth and 6 miles northeast of Shelton.

Drainage area.--15.2 sq mi.

Records available.--December 1942 to September 1943, August 1948 to September 1951 (discontinued).

Gage.--Water-stage recorder. Altitude of gage is 25 ft (from topographic map). Prior to Sept. 30, 1943, staff gage at same site and datum.

Extremes.--Maximum discharge during year, 860 cfs Feb. 9 (gage height, 7.12 ft); minimum, 5.7 cfs Aug. 23 (gage height, 1.92 ft).  
1942-43, 1948-51: Maximum discharge, that of Feb. 9, 1951; minimum, 4.7 cfs Sept. 3, 11, 13, 1949 (gage height, 1.87 ft).

Remarks.--Records fair except those for periods of doubtful or no gage-height record, which are poor. Some diversion. No regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Nov. 20 to Feb. 8)

1.9	5.1	3.0	81	5.0	410
2.1	12	3.5	145	5.5	510
2.3	22	4.0	220	6.0	670
2.6	42	4.5	310	7.0	840

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.5	73	116	79	77	60	42	27	15.5	9.8	7.8	8.4
2	9.1	59	98	114	*134	57	41	25	15	9.8	7.8	8.4
3	9.1	52	90	168	182	55	40	25	15.5	9.8	7.8	8.4
4	11	44	82	145	178	59	38	25	15.5	9.8	7.8	7.8
5	13.5	39	74	123	152	55	34	26	17	10	7.5	7.8
6	13	31	120	102	132	52	34	26	16.5	11	7.5	8.1
7	23	27	124	86	175	49	32	27	*16	10	7.5	9.5
8	19	23	111	74	212	48	31	25	15.5	10	7.8	9.5
9	18	20	*104	65	*680	*47	30	24	15.5	10	7.8	9.1
10	64	*18	115	62	800	45	30	23	15.5	9.8	8.1	8.4
11	37	17.5	100	63	570	46	28	25	15.5	9.1	7.8	8.1
12	28	17.5	81	58	390	78	28	24	15.5	9.1	7.8	7.8
13	22	17	65	77	280	96	25	23	15	9.1	7.8	7.5
14	18.5	16.5	56	83	205	91	26	21	*14.5	9.1	7.8	7.5
15	16	27	70	144	160	104	a27	20	14	9.1	7.8	7.5
16	14.5	58	86	172	126	105	a28	20	13.5	9.1	7.5	7.5
17	13.5	48	123	205	115	99	*28	20	13.5	9.1	7.2	7.5
18	17	40	112	182	110	89	27	18	13.5	*8.4	7.2	7.2
19	26	48	96	169	106	77	27	18	13	8.4	6.9	7.2
20	22	76	99	146	111	68	27	17.5	13	7.8	6.9	6.9
21	18.5	102	123	205	106	63	25	17.5	12.5	7.8	6.9	6.5
22	16.5	151	128	212	103	58	25	17.5	11.5	7.8	6.9	6.5
23	15.5	152	178	185	99	52	24	16	12	*7.8	6.9	6.9
24	16.5	187	228	176	96	48	*22	19	11.5	7.8	*6.9	7.2
25	15	198	198	187	86	47	21	18.5	11	7.5	6.9	8.1
26	18.5	228	164	212	76	45	21	18	10.5	7.5	6.9	*7.8
27	28	182	144	188	69	43	27	17.5	10.5	7.2	7.8	8.4
28	41	146	145	154	64	42	37	17	9.8	7.5	10	12
29	43	114	127	124	-	43	31	17	8.8	7.8	8.8	18
30	43	109	114	102	-	48	29	15.5	9.8	7.8	8.8	26
31	49	-	94	85	-	44	-	15.5	-	7.8	8.4	-
Total	708.2	2,320.5	3,566	4,150	5,594	1,913	885	650.5	407.4	272.6	236.9	267.5
Mean	22.8	77.4	115	134	200	61.7	29.5	21.0	13.6	8.79	7.64	8.92
Cfsm	1.50	5.09	7.57	8.82	13.2	4.06	1.94	1.38	0.895	0.578	0.503	0.587
In.	1.73	5.68	8.72	10.15	13.69	4.68	2.17	1.59	1.00	0.67	0.58	0.65
Ac-ft	1,400	4,600	7,070	8,230	11,100	3,790	1,760	1,290	808	541	470	531

Calendar year 1950: Max 350 Min 7.5 Mean 64.1 Cfsm 4.22 In. 57.25 Ac-ft 46,400  
Water year 1950-51: Max 800 Min 6.5 Mean 57.5 Cfsm 3.78 In. 51.31 Ac-ft 41,590

Peak discharge (base, 200 cfs).--Nov. 25 (9 p.m.) 260 cfs (4.75 ft); Dec. 24 (7:30 a.m.) 228 cfs (4.75 ft); Jan. 17 (6 a.m.) 205 cfs (4.76 ft); Jan. 22 (2:30 a.m.) 220 cfs (4.88 ft); Jan. 26 (8 a.m.) 220 cfs (4.95 ft); Feb. 9 (10:30 p.m.) 860 cfs (7.12 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Doubtful gage-height record Feb. 18 to Apr. 14; discharge estimated on basis of weather records and records for stations on nearby streams.

## Johns Creek near Shelton, Wash.

Location.--Lat 47°15'00", long. 123°05'15", in NE¼ sec. 5, T. 20 N., R. 3 W., on left bank 2½ miles upstream from mouth and 3 miles north of Shelton.

Drainage area.--17.7 sq mi.

Records available.--December 1942 to September 1943, August 1948 to September 1951 (discontinued).

Gage.--Water-stage recorder. Altitude of gage is 200 ft (from topographic map). Prior to Sept. 30, 1943, staff gage at same site at different datum.

Extremes.--Maximum discharge during periods October, May to September, 28 cfs Sept. 29 (gage height, 0.88 ft); minimum, 3.9 cfs Sept. 22 (gage height, 0.29 ft).  
1942-43, 1948-51: Maximum discharge recorded, 211 cfs Mar. 5, 1950 (gage height, 3.37 ft); minimum, that of Sept. 22, 1951.

Remarks.--Records good. No diversion or regulation.

Revisions.--W 1182: Drainage area.

Rating table, May 24 to Sept. 30, 1951 (gage height, in feet, and discharge, in cubic feet per second)

0.30	4.1
.40	6.1
.50	8.7
.70	16.5
.90	29

Discharge, in cubic feet per second, May to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	6.7							-	15	9.3	7.1	6.3
2	6.4							-	15	9.6	7.1	5.9
3	6.4							-	14.5	9.6	6.8	5.5
4	7.7							-	14.5	9.6	7.1	4.9
5	-							-	16	9.9	6.8	4.7
6	-							-	*15.5	10.5	6.6	4.7
7	-							-	14.5	9.9	6.6	5.5
8	-							-	14.5	9.9	6.3	5.9
9	-							-	14	9.6	6.6	5.9
10	-							-	13.5	9.6	6.6	5.3
11	-							-	13.5	8.4	6.8	4.9
12	-							-	14	8.4	6.6	4.7
13	-							-	13.5	8.4	6.6	4.7
14	-							-	13.5	8.4	6.3	4.9
15	-							-	13	8.4	6.3	4.7
16	-							-	12.5	8.1	6.1	4.7
17	-							-	11.5	7.9	5.9	4.7
18	-							-	11.5	7.9	6.3	4.5
19	-							-	11	7.9	5.9	4.7
20	-							-	10.5	7.9	5.9	4.5
21	-							-	10	7.6	6.1	4.3
22	-							-	10	7.6	5.9	4.3
23	-							-	10	7.6	5.7	4.3
24	-							20	10	*7.6	*5.9	4.5
25	-							19	10	7.6	5.7	5.7
26	-							17.5	*10	7.6	5.7	*5.5
27	-							17	10	7.4	6.3	7.4
28	-							16.5	9.6	7.4	8.7	10
29	-							15.5	9.6	7.1	7.9	16.5
30	-							15.5	9.6	7.1	7.6	26
31	-							15	-	7.1	6.8	-
Total	-							-	370.3	260.9	202.6	190.1
Mean	-							-	12.3	8.42	6.54	6.34
Cfsm	-							-	0.695	0.476	0.369	0.358
In.	-							-	0.78	0.55	0.43	0.40
Ac-ft	-							-	734	517	402	377
Calendar year	: Max		Min		Mean		Cfsm		In.		Ac-ft	
Water year	: Max		Min		Mean		Cfsm		In.		Ac-ft	

\* Discharge measurement made on this day.

## GOLDSBOROUGH CREEK BASIN

Goldsborough Creek near Shelton, Wash.

Location.--Lat 47°12'50", long. 123°10'50", in southwest corner of sec. 15, T. 20 N., R. 4 W., on right bank 3½ miles west of Shelton and 5½ miles upstream from mouth.

Drainage area.--31.7 sq mi.

Records available.--June to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 205 ft (from topographic map).

Extremes.--Maximum discharge during period, 101 cfs Sept. 30 (gage height, 2.72 ft); minimum, 16 cfs Sept. 23 (gage height, 1.75 ft).

Remarks.--Records fair. No diversion or regulation.

Discharge, in cubic feet per second, June to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1									-	28	21	21
2									-	28	21	21
3									-	27	21	21
4									-	27	21	20
5									-	28	21	19.5
6									-	29	21	19.5
7									-	28	21	24
8									-	27	21	24
9									-	27	21	21
10									-	26	20	19.5
11									-	26	20	18.5
12									-	24	20	18.5
13									-	24	20	18
14									-	25	20	17.5
15									-	24	19.5	17.5
16									-	24	20	17.5
17									-	24	20	17.5
18									-	*23	20	17.5
19									-	23	20	18
20									-	23	19.5	17.5
21									-	23	19	17.5
22									-	23	*19	17.5
23									-	22	19	17
24									-	22	19	18.5
25									*31	22	18.5	26
26									30	23	19	22
27									29	22	19.5	*22
28									29	21	22	38
29									28	21	*21	45
30									27	21	21	83
31									-	21	21	-
Total									-	756	626.0	695.0
Mean									-	24.4	20.2	23.2
Cfsm									-	0.581	0.481	0.552
In.									-	0.67	0.55	0.62
Ac-ft									-	1,500	1,240	1,380
Calendar year	: Max			Min	Mean			Cfsm	In.	Ac-ft		
Water year	: Max			Min	Mean			Cfsm	In.	Ac-ft		

\* Discharge measurement made on this day.

## Goldsborough Creek at Shelton, Wash.

Location.--Lat 47°12'30", long. 123°06'00", in NE¼ sec. 19, T. 20 N., R. 3 W., on right bank at upstream side of railroad bridge in Shelton, 1 mile upstream from mouth.

Drainage area.--44.8 sq mi.

Records available.--December 1942 to September 1943, June to September 1951 (discontinued).

Gage.--Water-stage recorder. Altitude of gage is 20 ft (from topographic map). Prior to Sept. 30, 1943, staff gage at downstream side of bridge at different datum.

Extremes.--Maximum discharge during period, 48 cfs Sept. 30 (gage height, 2.14 ft); minimum, 4.9 cfs Aug. 22, 23 (gage height, 1.00 ft).  
1942-43, 1951: Maximum discharge observed, 950 cfs Feb. 6, 1943 (gage height, 3.96 ft, site and datum then in use); minimum, that of Aug. 22, 23, 1951.

Remarks.--Records good. Possibly up to 30 cfs diverted for use in lumber and pulp industry during June and July and possibly 15 cfs during August and September according to employees of companies involved. No regulation.

Discharge, in cubic feet per second, June to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1									a32 17	17	10	5.4
2									a31 17.5	17.5	10	5.6
3									a30 16	16	10.5	6.6
4									a29 24	24	10.5	7.7
5									a30 30	30	11	6.7
6									*28 28	28	8.7	7.7
7									27 25	25	7.3	9.2
8									28 15	15	7.1	8.7
9									25 12.5	12.5	7.1	7.9
10									24 17.5	17.5	7.3	7.7
11									23 16	16	7.3	7.7
12									23 13.5	13.5	7.1	7.7
13									23 13	13	7.5	6.4
14									23 13	13	7.5	5.7
15									22 13	13	7.1	5.2
16									20 12.5	12.5	6.9	5.2
17									19.5 12	12	7.1	5.4
18									19.5 12	12	6.9	5.4
19									19.5 11.5	11.5	6.7	5.3
20									19.5 *10.5	*10.5	6.9	5.3
21									18 10	10	5.4	5.3
22									18 10	10	*5.3	5.2
23									18 9.9	9.9	5.2	5.3
24									17.5 9.6	9.6	5.2	5.7
25									17.5 9.6	9.6	5.3	6.9
26									17.5 9.6	9.6	5.0	5.9
27									17.5 10	10	5.4	*5.6
28									*17 9.4	9.4	6.7	13
29									17 9.4	9.4	5.6	23
30									16 10.5	10.5	5.7	41
31									- 11	11	5.6	-
Total									668.0	456.5	220.9	250.4
Mean									22.3	14.1	7.13	8.35
Cfsm									0.405	0.256	0.150	0.152
In.									0.45	0.30	0.15	0.17
Ac-ft									1,320	866	438	497
Calendar year	: Max		Min		Mean		Cfsm		In.		Ac-ft	
Water year	: Max		Min		Mean		Cfsm		In.		Ac-ft	

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

## MILL CREEK BASIN

Mill Creek at Shelton, Wash.

Location.--Lat 47°11'45", long. 123°05'45", in NW $\frac{1}{4}$  sec. 29, T. 20 N., R. 3 W., on right bank a quarter of a mile south of Shelton and  $2\frac{1}{4}$  miles downstream from Lake Isabella.

Drainage area.--19.5 sq mi.

Records available.--December 1942 to September 1943, May to September 1951 (discontinued).

Gage.--Water-stage recorder. Altitude of gage is 110 ft (from topographic map). Prior to Sept. 30, 1943, staff gage at same site at different datum.

Extremes.--Maximum discharge during period not determined, probably occurred sometime during period of no gage-height record Sept. 27-30; minimum, 11.5 cfs Aug. 22-27, Sept. 20-25 (gage height, 1.38 ft).

1942-43, 1951: Maximum discharge observed, 474 cfs Feb. 7, 1943 (gage height, 3.40 ft, datum then in use); minimum observed, 11 cfs Sept. 15, 1943 (gage height, 0.59 ft, datum then in use).

Remarks.--Records excellent except those for period of no gage-height record, which are good. No diversion or regulation.

Discharge, in cubic feet per second, May to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1								-	29	18	13.5	12.5
2								-	28	17.5	13.5	12.5
3								-	28	17.5	13.5	12.5
4								-	28	17	13.5	12.5
5								-	28	17.5	13	12
6								-	*27	18	13	12
7								-	26	18.5	13	12.5
8								-	25	18	13	13
9								-	25	18	12.5	13
10								-	25	18	12.5	13
11								-	24	17	12.5	13
12								-	24	16	12.5	13
13								-	24	16	12.5	12.5
14								-	24	15.5	12.5	12.5
15								-	24	15.5	12.5	12
16								-	23	15	12.5	12
17								-	22	15	12	12
18								-	22	14.5	12	12
19								-	21	14	12	12
20								-	21	14	12	11.5
21								-	21	14	12	11.5
22								-	20	14	*11.5	11.5
23								-	20	14	11.5	11.5
24								-	19.5	14	11.5	11.5
25								-	18.5	*13.5	11.5	12
26								-	*18.5	14	11.5	12.5
27								-	18	14	12	12.5
28								-	18	14	13.5	a18
29								31	18	14	13	a25
30								31	18	13.5	13	a40
31								30	-	13.5	12.5	-
Total								-	687.5	483.0	387.5	414.0
Mean								-	22.9	15.6	12.5	13.8
Cfsm								-	1.17	0.800	0.641	0.708
In.								-	1.31	0.92	0.74	0.79
Ac-ft								-	1,360	958	769	821
Calendar year	: Max		Min		Mean		Cfsm		In.	Ac-ft		
Water year	: Max		Min		Mean		Cfsm		In.	Ac-ft		

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

## SKOOKUM CREEK BASIN

75

Skookum Creek at Kamilche, Wash.

Location.--Lat 47°07'30", long. 123°06'50", in NW $\frac{1}{4}$  sec. 19, T. 19 N., R. 3 W., on right bank three-quarters of a mile southwest of Kamilche and 3 miles upstream from mouth.

Drainage area.--17.2 sq mi.

Records available.--June to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 35 ft (from topographic map).

Extremes.--Maximum discharge during period, 33 cfs Sept. 30 (gage height, 2.37 ft); minimum, 0.7 cfs Sept. 16 (gage height, 1.36 ft).

Remarks.--Records excellent. No diversion or regulation.

Discharge, in cubic feet per second, June to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1									-	2.6	1.7	1.7
2									-	2.6	1.8	1.7
3									-	2.7	1.8	1.6
4									-	2.6	1.8	1.4
5									-	*2.7	1.7	1.3
6									-	3.6	1.7	1.4
7									-	2.7	1.7	2.0
8									-	2.3	1.7	2.3
9									-	2.3	1.8	1.8
10									-	2.3	1.9	1.5
11									-	1.9	1.8	1.4
12									-	1.8	1.8	1.3
13									-	1.9	1.8	1.3
14									-	2.1	1.7	1.2
15									-	2.0	1.6	<u>1.1</u>
16									-	2.0	1.5	1.1
17									-	1.9	1.5	1.3
18									-	2.0	1.5	1.3
19									-	2.0	1.4	1.4
20									-	2.0	1.4	1.3
21									-	1.9	1.4	1.3
22									-	1.9	<u>1.3</u>	1.3
23									-	*1.8	1.3	1.3
24									-	1.8	*1.3	1.4
25									-	1.9	1.4	2.8
26									-	1.9	1.4	1.9
27									-	1.9	1.5	*2.0
28									-	1.8	<u>2.7</u>	6.7
29									-	1.8	*1.9	7.2
30									2.8	1.8	1.7	<u>14.5</u>
31									2.6	<u>1.7</u>	1.7	-
Total									-	66.2	51.2	69.8
Mean									-	2.13	1.65	2.33
Cfsm									-	0.124	0.096	0.135
In.									-	0.14	0.11	0.15
Ac-ft									-	131	102	138
Calendar year	: Max		Min		Mean		Cfsm		In.	Ac-ft		
Water year	: Max		Min		Mean		Cfsm		In.	Ac-ft		

\* Discharge measurement made on this day.

## KENNEDY CREEK BASIN

Kennedy Creek near New Kamilche, Wash.

Location.--Lat 47°05'30", long. 123°05'45", in NE $\frac{1}{4}$  sec. 31, T. 19 N., R. 3 W., on left bank 1 mile south of New Kamilche and 2 miles upstream from mouth.

Drainage area.--18.7 sq mi.

Records available.--May to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 30 ft (from topographic map).

Extremes.--Maximum discharge during period, 14 cfs Sept. 30 (gage height, 1.88 ft); minimum, 2.8 cfs Aug. 23-27 (gage height, 1.53 ft).

Remarks.--Records excellent. Small amount of diversion for irrigation. No regulation.

Discharge, in cubic feet, per second May to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1								-	10.5	5.7	4.2	3.4
2								-	10	5.7	4.2	3.4
3								-	9.8	5.7	4.2	3.4
4								-	9.8	5.7	4.2	3.4
5								-	*10	6.0	3.9	3.4
6								-	10	6.9	3.9	3.4
7								-	10	6.6	3.9	4.2
8								-	9.8	6.5	3.9	4.5
9								-	9.4	5.7	3.9	3.9
10								-	9.1	5.7	3.9	3.6
11								-	8.8	5.4	3.9	3.4
12								-	8.8	5.1	3.9	3.4
13								-	8.8	5.1	3.9	3.4
14								-	8.8	5.1	3.6	3.4
15								-	8.1	4.8	3.4	3.1
16								-	7.8	4.5	3.4	3.1
17								-	8.5	4.5	3.4	3.1
18								-	11.5	*4.5	3.1	3.1
19								-	12	4.8	3.1	3.1
20								-	11.5	5.1	3.1	3.1
21								-	9.8	5.1	3.1	3.1
22								-	7.5	5.1	*3.1	3.1
23								-	6.9	5.1	2.8	3.1
24								-	6.9	5.1	2.6	3.4
25								12.5	*6.6	4.8	2.8	4.2
26								12	6.6	4.8	2.8	4.2
27								11	6.5	4.5	3.4	*3.6
28								11	6.0	4.5	5.1	6.0
29								11.5	6.0	4.5	3.9	7.2
30								11	5.7	4.2	3.4	12
31								11	-	4.2	3.4	-
Total								-	261.3	160.8	111.6	118.7
Mean								-	8.71	5.19	3.60	3.96
Cfsm								-	0.466	0.278	0.193	0.212
In.								-	0.52	0.32	0.22	0.24
Ac-ft								-	518	319	221	235
Calendar year	: Max		Min		Mean		Cfsm		In.		Ac-ft	
Water year	: Max		Min		Mean		Cfsm		In.		Ac-ft	

\* Discharge measurement made on this day.



## Deschutes River near Rainier, Wash.

Location.--Lat 46°51'10" long. 122°40'00", in SW $\frac{1}{4}$  sec. 22, T. 16 N., R. 1 E., on right bank half a mile downstream from mouth of outlet from Reichel Lake and 2 $\frac{1}{2}$  miles south-east of Rainier.

Drainage area.--88.7 sq mi (revised).

Records available.--June 1949 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is about 350 ft (from topographic map).

Extremes.--Maximum discharge during year, 3,570 cfs Feb. 9 (gage height, 10.60 ft); minimum, 26 cfs parts of each day Sept. 21-25 (gage height, 2.65 ft).  
1949-51: Maximum discharge, 3,940 cfs Dec. 28, 1949 (gage height, 11.06 ft); minimum, that of Sept. 21-25, 1951.

Remarks.--Records good. Probably some diversion for irrigation and domestic use. No regulation.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)

2.6	22	4.0	284	6.5	1,170
2.8	42	4.5	423	7.0	1,400
3.0	66	5.0	579	8.0	1,910
3.5	117	5.5	758	9.0	2,510
3.6	182	6.0	955	10.0	3,150

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	41	380	758	394	350	252	355	146	72	43	36	35
2	39	495	562	1,070	705	234	327	135	70	43	36	32
3	39	380	613	1,380	995	224	330	127	68	43	35	31
4	39	300	1,060	835	796	241	358	139	68	42	35	30
5	68	257	875	613	596	236	338	184	68	43	33	29
6	109	218	1,080	483	514	224	306	159	69	45	33	30
7	85	201	1,120	408	665	211	284	159	68	43	32	31
8	76	184	875	366	1,120	206	275	144	66	42	33	39
9	91	*168	694	335	*2,660	201	257	133	62	44	33	40
10	242	152	546	319	2,400	192	236	131	62	43	33	32
11	298	141	530	316	2,510	187	221	166	60	43	33	30
12	159	133	483	298	1,770	358	*228	187	62	40	33	29
13	113	121	423	324	1,020	666	252	164	61	42	33	28
14	102	113	394	423	739	546	252	141	58	41	32	30
15	104	240	408	1,150	630	*1,040	234	127	57	41	32	27
16	86	1,080	546	1,080	546	1,000	221	*117	56	41	32	27
17	78	816	596	1,080	483	613	216	113	54	40	*31	27
18	90	562	514	702	468	468	201	109	53	39	31	27
19	137	366	453	530	438	394	189	104	52	*40	31	27
20	182	699	453	475	498	394	170	98	52	40	31	27
21	144	1,350	596	1,320	468	438	155	95	50	39	30	27
22	115	1,300	658	958	423	453	146	85	49	40	29	26
23	98	1,080	1,350	666	380	394	141	95	49	39	30	27
24	86	1,350	915	758	346	358	131	98	50	40	29	26
25	111	1,080	648	1,020	324	341	127	104	49	40	28	28
26	184	816	498	1,080	300	341	127	95	48	40	29	36
27	429	1,120	438	758	279	327	131	88	46	39	30	31
28	935	796	438	546	262	303	189	86	45	39	46	32
29	752	579	*423	438	-	319	206	88	44	38	48	49
30	468	666	438	380	-	394	173	88	44	38	38	109
31	408	-	423	344	-	394	-	78	-	36	33	-
Total	5,908	17,111	19,798	20,829	22,665	11,929	6,774	3,789	1,712	1,266	1,028	997
Mean	191	570	639	672	809	385	226	122	57.1	40.8	35.2	33.2
Cfsm	2.15	6.43	7.20	7.58	9.12	4.34	2.55	1.38	0.644	0.460	0.374	0.374
In.	2.48	7.17	8.30	8.73	9.50	5.00	2.84	1.59	0.72	0.53	0.43	0.42
Ac-ft	11,720	33,940	39,270	41,310	44,960	23,660	13,440	7,520	3,400	2,510	2,040	1,980
Calendar year 1950: Max	3,080			Min 28		Mean 375		Cfsm 4.23	In. 57.27	Ac-ft: 271,500		
Water year 1950-51: Max	2,660			Min 26		Mean 312		Cfsm 3.52	In. 47.71	Ac-ft: 225,800		

Peak discharge (base, 2,000 cfs).--Feb. 9 (10:30 p.m.) 3,570 cfs (10.60 ft).

\* Discharge measurement made on this day.

## Deschutes River near Olympia, Wash.

Location.--Lat 47°00'40", long. 122°53'40", in NW $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 35, T. 18 N., R. 2 W., on left bank  $\frac{1}{2}$  miles upstream from mouth and 2 $\frac{1}{2}$  miles south of Olympia.

Drainage area.--164 sq mi.

Records available.--April 1945 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 80 ft (from topographic map).

Average discharge.--6 years, 434 cfs.

Extremes.--Maximum discharge during year, 4,600 cfs Feb. 10 (gage height, 7.92 ft); minimum, 96 cfs Sept. 17-19, 21, 22 (gage height, 2.00 ft).  
1945-51: Maximum discharge, that of Feb. 10, 1951; minimum, 66 cfs Oct. 11, 1946.

Remarks.--Records good except those for periods of no gage-height record, which are poor. Small diversions above station for irrigation. No regulation.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9				Feb. 10 to Sept. 30			
2.2	109	4.0	640	2.0	96	4.0	700
2.4	148	4.5	875	2.2	132	4.5	930
2.7	217	5.0	1,140	2.4	176	5.0	1,180
3.0	300	5.5	1,440	2.7	250	5.5	1,470
3.3	390	6.0	1,780	3.0	340	6.0	1,780
3.6	480	7.0	2,850	3.3	430	7.0	2,850
				3.6	540	8.0	4,900

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	118	485	1,140	620	620	600	620	307	195	136	115	110
2	117	560	975	861	775	560	560	292	193	136	115	111
3	115	500	900	2,040	1,380	540	560	280	188	136	115	108
4	118	415	1,200	1,440	1,260	560	580	289	*188	138	115	106
5	136	363	1,350	1,020	1,000	580	580	328	188	136	113	104
6		177	324	1,320	825	825	540	540	316	186	138	113
7		175	297	1,500	725	850	520	500	313	186	138	115
8		159	280	1,410	660	1,410	520	500	298	181	136	111
9		168	*260	1,110	800	2,580	500	465	280	178	134	111
10		230	246	925	560	4,200	482	448	271	174	130	113
11		415	235	800	540	*3,200	465	424	292	171	128	113
12		271	222	775	520	3,360	*640	421	325	171	128	113
13		212	217	680	520	2,140	1,100	430	316	167	126	113
14		186	210	640	600	*1,530	1,000	444	286	164	126	111
15		186	227	620	1,020	1,290	1,160	424	268	160	126	111
16		175	932	725	1,540	1,160	1,620	406	253	160	126	110
17		166	1,050	825	1,710	1,060	1,080	397	248	158	124	110
18		168	850	775	1,290	1,000	880	385	242	155	124	108
19		200	580	680	1,000	955	785	370	238	155	122	108
20		240	640	640	850	955	740	355	230	153	*122	108
21		233	1,320	775	1,310	955	762	331	225	151	121	106
22		205	1,570	825	1,780	880	785	*300	220	151	122	106
23		186	1,600	1,500	1,230	808	740	a280	220	149	121	106
24		170	1,570	1,470	1,080	762	680	a270	225	151	121	106
25		166	1,600	1,050	1,380	720	660	a260	225	147	121	106
26		233	1,290	825	1,540	680	640	a280	222	147	121	104
27		289	1,230	*750	1,260	660	620	a300	212	145	121	108
28		900	1,320	702	975	620	580	*319	210	142	119	110
29		900	975	702	800	-	580	a330	210	138	117	*126
30		620	900	680	702	-	640	325	208	138	117	119
31		520	-	680	660	-	660	-	208	-	115	111
Total	8,154	22,248	28,949	31,658	37,635	22,219	12,404	8,057	4,930	3,926	3,454	3,134
Mean	263	742	934	1,021	1,344	717	413	260	164	127	111	104
Cfs/m	1.60	4.52	5.70	6.23	8.20	4.37	2.52	1.59	1.00	0.774	0.677	0.634
In.	1.85	5.03	6.58	7.18	8.53	5.04	2.81	1.83	1.12	0.89	0.78	0.71
Ac-ft	16,170	44,130	57,420	62,790	74,650	44,070	24,600	15,980	9,780	7,790	6,650	6,220
Calendar year 1950: Max	3,540				Min 106	Mean 578	Cfs/m 3.51	In. 47.67	Ac-ft 416,800			
Water year 1950-51: Max	4,200				Min 96	Mean 512	Cfs/m 3.12	In. 42.35	Ac-ft 370,400			

Peak discharge (base, 2,000 cfs).--Jan. 3 (10:30 a.m.) 2,250 cfs (6.49 ft); Jan. 22 (1:30 a.m.) 2,140 cfs (6.41 ft); Feb. 10 (11 a.m.) 4,600 cfs (7.92 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for station near Rainier.

## WOODLAND CREEK BASIN

79

Woodland Creek near Olympia, Wash.

Location.--Lat 47°04'20", long. 122°49'00", in SW $\frac{1}{4}$  sec. 4, T. 18 N., R. 1 W., on left bank 1 mile upstream from mouth and 4.4 miles northeast of Olympia.

Drainage area.--24.3 sq mi (revised).

Records available.--June 1949 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 25 ft (from topographic map).

Extremes.--Maximum discharge during year, 204 cfs Feb. 9 (gage height, 4.46 ft); minimum, 11.5 cfs Sept. 15 (gage height, 1.45 ft).  
1949-51: Maximum discharge, that of Feb. 9, 1951; minimum, 10 cfs Sept. 23, 1949 (gage height, 1.39 ft).

Remarks.--Records good except those for periods of shifting control, which are fair. Some diversion for domestic use. No regulation.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.5	12	2.6	67
1.7	19.5	3.0	92
2.0	33	3.5	127
2.3	49	4.1	175

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	17	26	40	45	67	78	63	44	32	25	18.5	15
2	17	21	33	66	81	75	62	42	*32	24	18	15
3	16.5	19.5	36	63	86	74	60	42	34	24	18	15
4	16	18.5	42	60	81	77	59	47	34	24	18	14.5
5	19	18	36	57	77	76	58	45	34	24	18	14.5
6	17	17.5	47	53	75	74	57	45	34	24	18	14.5
7	17.5	17	48	51	81	72	56	45	34	23	17.5	15
8	17	16.5	42	50	84	73	54	43	34	23	18	15
9	17	16.5	41	49	*175	72	54	42	33	23	18	15
10	26	*17	39	48	159	71	54	41	33	23	18	15
11	17.5	17	38	49	163	73	53	42	33	22	17.5	*14.5
12	17	17	36	47	151	69	52	42	33	22	17.5	14.5
13	17	17	34	47	135	99	52	40	32	22	17	14
14	17	17	34	49	124	*91	51	40	32	22	17	13.5
15	16	19.5	38	72	116	99	50	40	31	21	17	13.5
16	16	24	40	78	110	92	50	38	31	21	16.5	13.5
17	16	26	41	84	110	88	50	38	30	21	16	13.5
18	17	22	38	75	102	84	49	38	30	21	16	13
19	17.5	21	37	74	99	81	48	36	29	20	16	13
20	16.5	26	38	71	102	79	48	36	29	19.5	15.5	13
21	16	28	37	99	96	78	47	34	28	*19.5	15.5	13
22	15.5	31	53	99	91	75	47	34	28	19.5	15	12.5
23	15	30	77	88	87	72	47	34	28	19.5	15	13.5
24	15	32	67	85	85	71	45	34	28	20	15	14
25	15.5	34	61	83	84	70	45	34	26	20	15	15
26	16	29	*56	83	82	69	45	34	27	20	15	14
27	20	32	53	78	79	67	*47	33	26	19.5	15.5	15
28	24	30	53	74	77	66	47	33	26	19.5	17	16
29	21	27	51	71	-	67	45	32	25	19.5	15.5	16.5
30	19.5	40	50	69	-	66	45	32	25	19.5	15.5	17
31	18.5	-	47	68	-	63	-	31	-	19	15.5	-
Total	543.5	707.0	1,383	2,085	2,859	2,391	1,540	1,191	910	664.0	515.5	431.0
Mean	17.5	23.6	44.6	67.3	102	77.1	51.3	39.4	30.3	21.4	16.6	14.4
Cfs/m	0.720	0.971	1.84	2.77	4.20	3.17	2.11	1.58	1.25	0.881	0.683	0.593
In.	0.83	1.08	2.12	3.19	4.38	3.66	2.36	1.82	1.39	1.02	0.79	0.66
Ac-ft	1,080	1,400	2,740	4,140	5,670	4,740	3,050	2,360	1,800	1,320	1,020	855

Calendar year 1950: Max 113 Min 15 Mean 39.5 Cfs/m 1.63 In. 22.05 Ac-ft 28,570  
Water year 1950-51: Max 175 Min 12.5 Mean 41.7 Cfs/m 1.72 In. 23.30 Ac-ft 30,180

Peak discharge (base, 110 cfs).--Jan. 21 (11:30 p.m.) 110 cfs (3.23 ft); Feb. 9 (1:37 p.m.) 204 cfs (4.46 ft); Mar. 12 (7 p.m.) 113 cfs (3.28 ft).  
\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1 to Dec. 22, Mar. 17 to July 18, Aug. 1 to Sept. 28.

## McALLISTER CREEK BASIN

McAllister Springs near Olympia, Wash.

Location.--Lat 47°01'45", long. 122°43'25", in SE $\frac{1}{4}$  sec. 19, T. 18 N., R. 1 E., on right side of stilling pool just above city of Olympia control gates, 8 miles east of Olympia.

Records available.--March to September 1951.

Gage.--Water-stage recorder. Altitude of gage is about sea level. Auxiliary water-stage recorder 30 ft downstream from base gage.

Extremes.--Maximum discharge during period, 44 cfs Mar. 25 (gage height, 4.32 ft); maximum gage height, 4.60 ft July 6; minimum discharge, 22 cfs Sept. 25; minimum gage height, 2.73 ft June 30.

Remarks.--Records good except those for periods of estimated discharge, which are fair. City of Olympia diverts 2 to 8 cfs for municipal use. Gage pool regulated by low dam and flashboards. Backwater from tides occurs daily.

Discharge, in cubic feet per second, March to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1						-	35	34	31	28	25	27
2						-	36	33	*29	28	25	27
3						-	35	32	30	28	26	27
4						-	36	33	31	28	26	26
5						-	35	33	32	28	27	26
6						-	34	34	32	28	27	26
7						-	35	33	32	28	25	26
8						-	35	32	32	28	25	27
9						-	34	32	30	28	26	28
10						-	33	32	30	27	27	27
11						-	33	33	31	27	27	26
12						-	33	33	32	27	27	26
13						-	32	33	31	27	26	25
14						†36	†40	33	30	27	25	26
15						-	33	30	30	27	26	25
16						-	33	30	29	26	25	25
17						-	32	31	31	26	25	25
18						-	34	31	30	26	25	*25
19						-	34	30	30	26	26	25
20						35	34	32	28	*26	25	25
21						36	34	32	29	*26	25	26
22						36	34	*31	30	27	25	25
23						36	35	35	29	26	25	25
24						36	35	33	31	26	25	25
25						38	34	33	29	27	25	24
26						37	34	33	29	27	26	25
27						36	*33	37	29	26	26	26
28						34	35	34	29	26	27	25
29						35	34	32	29	27	27	26
30						35	33	33	29	26	27	26
31						34	-	30	-	26	27	-
Total						-	1,020	1,005	904	834	801	773
Mean						-	34.0	32.4	30.1	26.9	25.8	25.8
Ac-ft						-	2,020	1,990	1,790	1,650	1,590	1,530

Calendar year : Max Min Mean Ac-ft  
 Water year : Max Min Mean Ac-ft

\* Discharge measurement made on this day.

† Result of discharge measurement.

Note.--Stage-fall-discharge relation indefinite June 26 to July 20, July 24, 25, Aug. 10, 11, 21-24, Sept. 15-19; discharge interpolated or estimated on basis of pumping records furnished by city of Olympia.

## Nisqually River near National, Wash.

Location.--Lat 46°45'50", long. 122°05'00", in SW<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub> sec. 29, T. 15 N., R. 6 E., on right bank 100 ft downstream from railroad bridge, 1 mile west of National, 2½ miles west of Ashfork, and 3 miles upstream from Mineral Creek.

Drainage area.--133 sq mi.

Records available.--May 1942 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,410 ft (from topographic map).

Average discharge.--9 years, 762 cfs.

Extremes.--Maximum discharge during year, 7,170 cfs Feb. 11 (gage height, 8.75 ft); minimum, 249 cfs Aug. 31, Sept. 1, 2 (gage height, 3.26 ft).

1942-51: Maximum discharge, 9,610 cfs Nov. 27, 1949 (gage height, 9.60 ft); minimum not determined, probably less than 135 cfs during period of doubtful gage-height record Oct. 2-30, 1942.

Remarks.--Records good. No diversion. Slight regulation at low flow by powerplant of Mount Rainier National Park on Paradise River.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

3.2	232	6.0	2,160
3.5	325	6.5	2,790
3.8	442	7.0	3,510
4.1	587	7.5	4,350
4.5	828	8.0	5,330
5.0	1,190	8.4	6,210
5.5	1,620		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	283	889	1,150	1,000	592	396	492	636	636	932	571	255
2	270	1,080	967	1,190	763	373	521	587	683	896	530	258
3	276	1,770	932	1,150	713	373	631	598	732	896	516	283
4	425	1,480	1,310	967	636	380	796	862	732	757	511	315
5	648	1,310	1,400	815	577	361	835	1,000	744	626	497	354
6	626	1,040	2,160	726	577	339	835	1,000	763	561	497	408
7	882	932	2,160	672	1,120	329	896	1,040	769	501	501	434
8	932	802	1,620	609	1,820	329	896	1,000	744	511	492	417
9	808	701	1,530	566	4,800	315	862	967	789	530	506	392
10	1,780	654	1,480	540	*5,230	305	*828	1,190	835	677	545	417
11	1,350	592	*1,530	516	6,210	302	842	1,930	855	677	525	*318
12	967	545	1,440	482	3,280	380	1,040	1,530	876	*689	451	352
13	744	511	1,190	530	2,040	460	1,270	1,230	932	744	413	400
14	683	482	1,040	561	1,530	434	1,400	1,000	1,000	744	442	438
15	571	511	1,040	757	1,270	751	1,310	889	1,150	720	492	446
16	501	571	1,080	707	1,040	744	1,270	967	1,120	672	492	464
17	478	535	1,120	*683	932	609	1,310	1,190	1,000	732	492	478
18	561	487	1,000	592	835	545	1,230	*1,150	932	726	497	464
19	642	451	1,040	535	751	535	1,040	1,000	896	592	525	446
20	648	604	1,120	506	707	592	876	1,000	896	540	571	434
21	556	889	1,270	648	620	631	757	1,040	896	556	*620	384
22	511	1,780	1,720	551	571	604	695	1,230	896	609	540	392
23	469	1,980	1,920	501	530	545	654	1,480	896	660	425	377
24	451	3,280	2,600	720	506	521	648	1,350	932	642	373	357
25	707	3,140	1,980	1,080	487	521	683	1,230	835	609	380	451
26	648	2,790	1,480	1,400	460	535	726	967	835	551	400	302
27	876	3,000	1,270	1,150	425	506	763	889	842	561	392	270
28	1,040	2,160	1,190	896	*408	487	848	828	876	566	446	318
29	967	1,580	1,150	757	-	511	802	720	932	556	315	361
30	882	1,350	1,120	677	-	525	720	636	967	540	289	896
31	*757	-	1,000	609	-	497	-	598	-	556	258	-
Total	21,939	37,896	45,009	23,093	39,430	14,735	26,476	31,734	26,011	20,129	14,504	11,861
Mean	708	1,263	1,452	745	1,408	475	885	1,024	867	649	468	395
Cfsm	5.32	9.50	10.9	5.60	10.6	3.57	6.64	7.70	6.52	4.88	3.52	2.97
In.	6.13	10.60	12.59	6.46	11.05	4.12	7.40	8.87	7.27	5.63	4.06	3.32
Ac-ft	43,520	75,170	89,270	45,800	78,210	29,230	52,510	62,940	51,590	39,930	28,770	23,530

Calendar year 1950: Max 3,920 Min 270 Mean 1,017 Cfsm 7.65 In. 103.76 Ac-ft 736,000  
 Water year 1950-51: Max 6,210 Min 255 Mean 657 Cfsm 6.44 In. 87.48 Ac-ft 620,500

Peak discharge (base 4,800 cfs)--Feb. 11 (8 a.m.) 7,170 cfs (8.75 ft).

\* Discharge measurement made on this day.

## NISQUALLY RIVER BASIN

Mineral Creek near Mineral, Wash.

Location.--Lat 46°44'20", long. 122°08'20", in SW<sup>1</sup> sec. 35, T. 15 N., R. 5 E., on right bank three-eighths of a mile downstream from railroad bridge, 1 mile upstream from mouth, and 2½ miles northeast of Mineral.

Drainage area.--75.0 sq mi.

Records available.--June 1942 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,340 ft (from topographic map).

Average discharge.--9 years, 367 cfs.

Extremes.--Maximum discharge during year, 5,390 cfs Feb. 9 (gage height, 7.65 ft), from rating curve extended above 3,500 cfs; minimum, 23 cfs Aug. 19, 21, 23, 24 (gage height, 1.46 ft).

1942-51: Maximum discharge, that of Feb. 9, 1951; minimum, 23 cfs Sept. 10-13, 1944, Aug. 19, 21, 23, 24, 1951.

Remarks.--Records good. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Jan. 26 to Feb. 18, Mar. 15-17, 21, 22, Apr. 3-19, 28, May 5, 11, 12, July 21 to Aug. 27, Aug. 30 to Sept. 7, Sept. 9-25, 27)

1.3	23	2.6	291	4.5	1,360
1.5	38	2.9	408	5.0	1,780
1.7	60	3.2	543	6.0	2,770
2.0	112	3.6	750	7.5	4,650
2.3	192	4.0	990		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	56	664	750	577	412	195	375	328	139	48	32	30
2	54	750	597	1,020	723	180	396	306	131	48	31	29
3	53	654	618	1,150	855	178	501	306	129	47	31	27
4	63	572	958	778	691	180	607	430	136	48	31	26
5	204	501	958	612	563	169	597	524	139	48	31	26
6	284	430	1,440	505	*496	160	563	478	141	50	29	26
7	220	412	1,480	434	1,060	152	582	474	141	48	27	29
8	246	379	1,130	388	2,050	150	558	417	139	46	27	46
9	256	348	990	348	4,650	141	529	396	117	44	29	35
10	835	517	865	352	*3,460	131	501	458	106	42	29	30
11	696	298	835	317	4,370	129	501	618	102	42	29	29
12	434	274	750	284	2,150	284	592	534	102	40	30	27
13	324	253	638	363	1,400	438	723	434	99	39	29	26
14	277	236	563	447	1,020	388	778	363	91	39	29	26
15	235	295	607	618	835	835	723	328	86	39	27	26
16	204	451	675	582	675	778	691	324	82	*39	27	26
17	195	434	723	635	607	582	680	344	76	40	26	26
18	270	371	623	478	538	474	628	306	71	40	24	26
19	288	324	572	388	478	442	538	266	67	39	24	24
20	288	638	572	348	478	474	*447	246	64	36	24	24
21	256	1,100	*723	520	417	529	396	246	61	35	24	24
22	230	1,360	990	460	363	501	351	249	59	34	*24	24
23	210	1,360	1,960	379	328	434	328	270	58	34	24	24
24	190	2,450	1,360	805	306	404	321	260	57	34	24	24
25	195	1,870	1,020	1,560	288	396	328	*240	56	32	24	35
26	200	1,520	778	1,690	253	396	348	223	56	34	24	42
27	350	1,690	723	1,130	223	379	375	201	54	34	24	34
28	620	1,280	750	805	214	363	492	198	52	32	58	45
29	720	958	723	638	-	383	447	208	50	31	41	52
30	*648	865	696	554	-	430	379	175	49	31	35	310
31	558	-	592	447	-	388	-	147	-	32	32	-
Total	9,657	23,054	26,659	19,350	29,883	11,063	15,275	10,277	2,710	1,225	900	1,178
Mean	312	768	860	624	1,067	357	509	332	90.3	59.5	29.0	39.3
Cfsm	4.16	10.2	11.5	8.32	14.2	4.76	6.79	4.43	1.20	0.527	0.387	0.524
In.	4.79	11.43	13.22	9.60	14.82	5.49	7.57	5.10	1.34	0.61	0.45	0.58
Ac-ft	19,150	45,730	52,880	38,380	59,270	21,940	30,300	20,380	5,380	2,430	1,790	2,340

Calendar year 1950: Max 2,990 Min 31 Mean 497 Cfsm 6.63 In. 90.02 Ac-ft 360,000

Water year 1950-51: Max 4,650 Min 24 Mean 414 Cfsm 5.52 In. 75.00 Ac-ft 300,000

Peak discharge (base, 2,700 cfs).--Nov. 24 (5 a.m.) 2,880 cfs (6.10 ft); Feb. 9 (5 p.m.) 5,390 cfs (7.65 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Oct. 22-29, June 21 to July 12; discharge estimated on basis of record for Tilton River near Cinebar.

## Alder Reservoir at Alder, Wash.

Location.--Lat 46°48'05", long. 122°18'30", in NW¼ sec. 9, T. 15 N., R. 4 E., at Alder Dam on Nisqually River, 1 mile west of Alder and 4½ miles upstream from Mashel River.

Drainage area.--286 sq mi.

Records available.--November 1944 to September 1951.

Gage.--Water-stage recorder. Datum of gage is that used by city of Tacoma, which is 7.91 ft below mean sea level, datum of 1929 (levels by city of Tacoma). Prior to July 8, 1946, staff gage at same site and datum.

Extremes.--Maximum contents during year, 213,100 acre-ft Aug. 28, 29 (gage height, 1,200.78 ft); minimum, 158,280 acre-ft Apr. 3 (gage height, 1,180.01 ft).  
1944-51: Maximum contents, 220,320 acre-ft July 26, 1950 (gage height, 1,203.23 ft); minimum observed (since reservoir first filled), 93,990 acre-ft Feb. 16, 1949 (gage height, 1,147.61 ft).

Remarks.--Reservoir is formed by concrete arch dam; storage began Nov. 7, 1944; dam completed in 1945. Capacity, 158,700 acre-ft between gage heights 1,114 ft (lower limit of operating range) and 1,200 ft (top of spillway gates). Dead storage, 52,100 acre-ft. Water is used by city of Tacoma for power development. Figures given herein represent total contents.

Capacity table (gage height, in feet, and contents, in acre-feet)  
(Prepared by city of Tacoma from project surveys and maps)

1,180	158,280
1,190	185,270
1,200	210,840
1,205	225,640

Gage height, at 12 p.m., in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	192.42	192.58	189.57	189.06	189.38	190.24	180.52	183.33	187.56	194.18	199.18	200.39
2	191.63	191.90	190.37	190.10	190.01	189.61	180.22	182.84	187.87	194.56	199.23	200.26
3	191.18	191.69	190.79	190.93	190.69	189.05	180.12	182.28	187.82	194.94	199.33	200.18
4	190.80	191.56	190.87	190.96	191.26	188.68	180.36	182.13	187.40	195.24	199.38	200.10
5	190.85	191.02	190.72	190.54	191.25	188.10	180.77	182.66	187.10	195.40	199.45	200.10
6	190.71	190.59	191.19	190.23	191.19	187.32	181.14	183.23	186.68	195.53	199.48	200.11
7	191.15	190.71	190.90	189.72	192.76	186.48	181.49	183.21	186.36	195.59	199.56	200.19
8	191.92	190.81	189.61	189.23	193.95	185.68	182.36	183.28	186.13	195.68	199.59	200.21
9	192.10	190.74	189.07	189.03	196.77	184.80	182.65	183.42	186.33	195.75	199.63	200.16
10	193.93	190.61	189.23	188.87	196.08	183.95	182.78	183.98	186.77	195.93	199.70	200.09
11	195.22	190.72	189.84	188.62	196.46	183.41	182.78	185.28	187.06	196.14	199.83	199.94
12	195.79	190.93	190.51	188.36	196.46	182.91	183.06	186.14	187.32	196.29	199.90	199.77
13	196.04	190.52	190.78	188.55	195.82	182.66	183.79	187.26	187.51	196.58	199.85	199.41
14	196.05	189.92	190.78	189.04	194.17	182.34	184.65	187.42	187.78	196.82	199.87	199.12
15	195.81	189.58	191.14	189.82	192.97	183.26	185.50	187.20	187.95	197.01	199.90	199.17
16	195.57	189.47	191.32	190.36	192.08	183.82	186.00	186.98	188.62	197.20	199.93	199.21
17	195.12	189.40	191.28	190.94	191.80	183.96	186.58	186.92	189.20	197.45	200.00	198.89
18	194.91	189.22	190.66	191.17	192.70	184.00	186.94	186.91	189.10	197.57	200.04	198.52
19	195.09	188.97	190.09	191.13	192.92	183.80	186.93	187.02	189.33	197.70	200.17	198.21
20	195.18	189.08	189.60	191.22	193.18	183.67	186.73	187.76	189.77	197.78	200.24	197.87
21	195.15	190.33	189.38	191.89	193.14	183.68	186.35	187.61	190.15	197.89	200.47	197.47
22	194.76	192.17	190.25	191.91	193.03	183.53	186.06	187.68	190.58	198.03	200.57	197.43
23	194.16	195.59	192.10	191.68	192.67	183.26	185.52	186.01	191.01	198.19	200.54	197.10
24	193.50	195.38	190.79	192.39	192.32	182.97	185.02	188.14	191.48	198.42	200.53	196.62
25	193.40	194.99	188.94	192.85	192.24	182.81	184.56	188.18	191.80	198.62	200.51	196.13
26	193.47	193.49	188.16	192.80	191.86	182.52	184.14	188.15	192.18	198.64	200.64	195.48
27	194.47	193.43	188.08	192.06	191.38	182.17	183.86	188.68	192.50	198.72	200.71	194.76
28	195.29	192.61	188.30	191.09	190.82	181.74	184.01	188.39	192.88	198.65	200.78	194.15
29	195.18	190.82	188.54	190.61	-	181.41	184.01	188.12	193.35	199.10	200.69	194.17
30	194.25	189.69	188.89	190.31	-	181.02	183.74	188.29	193.72	199.17	200.63	194.97
31	193.13	-	186.87	189.81	-	180.75	-	187.96	-	199.22	200.53	-

Note.--Add 1,000.00 ft to obtain gage height.

Monthly gage height and contents, water year October 1950 to September 1951

Date	Gage height (feet)†	Contents (acre-feet)	Change in contents during month (acre-feet)
Sept. 30.....	1,192.90	190,740	-
Oct. 31.....	1,193.13	191,350	+610
Nov. 30.....	1,189.69	182,480	-8,870
Dec. 31.....	1,188.87	180,380	-2,100
Calendar year 1950.....	-	-	+52,800
Jan. 31.....	1,189.81	182,790	+2,410
Feb. 28.....	1,190.82	185,360	+2,570
Mar. 31.....	1,180.75	160,020	-25,340
Apr. 30.....	1,183.74	167,310	+7,290
May 31.....	1,187.96	178,060	+10,750
June 30.....	1,193.72	192,910	+14,850
July 31.....	1,199.22	208,580	+15,670
Aug. 31.....	1,200.53	212,380	+3,800
Sept. 30.....	1,194.97	196,250	-16,130
Water year 1950-51.....	-	-	+5,510

† Gage height and contents at 12 p.m.

## NISQUALLY RIVER BASIN

## Nisqually River at La Grande, Wash.

Location.--Lat 46°50'30", long. 122°19'40", in SE $\frac{1}{4}$  sec. 29, T. 16 N., R. 4 E., on right bank half a mile downstream from city of Tacoma powerplant, half a mile northwest of La Grande, and three-quarters of a mile upstream from Mashel River.

Drainage area.--292 sq mi (revised).

Records available.--September 1906 to December 1911 (fragmentary), October 1919 to September 1931, December 1943 to September 1951. Published as "near La Grande" 1906-11, 1919-31.

Gage.--Water-stage recorder. Altitude of gage is 490 ft (from topographic map). Sept. 5, 1906, to Sept. 8, 1910, staff gage just below site of diversion dam 4 miles upstream at different datum. January 1910 to December 1911, staff gage at La Grande powerhouse site; datum at mean sea level (levels by city of Tacoma). January 1920 to September 1931, water-stage recorder at approximately same site as that of first staff gage at datum 921.17 ft above mean sea level (levels by city of Tacoma). Dec. 7, 1943, to Jan. 12, 1945, water-stage recorder 600 ft downstream from La Grande powerhouse at different datum.

Average discharge.--22 years (1906-8, 1909-10, 1919-31, 1944-51), 1,368 cfs.

Extremes.--Maximum discharge during year, 15,400 cfs Feb. 10 (gage height, 8.50 ft); minimum, 193 cfs Mar. 11 (gage height, 2.27 ft); minimum daily, 414 cfs Sept. 5, 6, 8, 1906-10, 1919-31, 1943-51. Maximum discharge, 19,500 cfs Dec. 12, 1921 (gage height, 15.6 ft, site and datum then in use); practically no flow on many occasions at site near La Grande as result of regulation.

Remarks.--Records good except those for period of shifting control, which are fair. Flow regulated by city of Tacoma powerplant at La Grande since February 1944, by Alder Reservoir (see p. 83) since November 1944, and by La Grande Reservoir (usable capacity, 1,050 acre-ft) since 1944.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	944	*3,210	2,970	2,230	2,150	1,590	1,500	1,790	1,460	476	469	455
2	1,080	3,150	1,300	2,720	1,820	1,580	1,680	1,610	732	504	462	441
3	1,180	3,010	1,840	2,740	1,800	1,540	1,650	1,800	970	532	455	448
4	982	2,990	3,290	2,770	1,530	*1,060	1,680	1,830	1,580	532	455	441
5	1,000	2,910	3,550	2,680	1,890	1,710	1,470	1,530	1,470	525	434	414
6	1,180	2,450	4,550	2,340	1,850	1,660	1,500	1,120	1,590	511	455	414
7	742	1,690	5,410	2,360	1,460	1,710	1,390	1,680	1,480	511	448	420
8	488	1,580	5,360	2,240	4,030	1,680	941	1,660	1,320	511	455	414
9	1,030	1,530	4,020	1,670	*8,550	1,700	1,380	1,430	767	511	490	420
10	973	1,510	2,860	1,780	12,600	1,610	1,610	1,380	552	511	455	576
11	839	1,190	2,440	1,670	14,100	*1,300	*1,690	1,570	788	476	441	568
12	850	973	2,080	1,660	8,720	1,850	1,600	1,470	774	*483	434	593
13	853	1,850	2,070	1,340	5,890	1,680	1,630	606	938	490	455	865
14	1,080	1,770	2,430	1,180	5,900	1,670	1,600	1,390	848	490	448	889
15	1,150	2,010	2,010	1,720	4,720	1,710	1,480	1,750	1,170	490	441	460
16	1,110	2,070	2,330	1,870	3,600	1,680	1,770	1,770	555	483	*434	454
17	1,330	1,910	2,720	1,740	2,650	1,580	1,760	1,870	537	483	427	919
18	1,160	1,700	*3,080	1,620	771	1,400	1,810	1,700	1,260	483	427	992
19	938	1,640	2,980	1,710	1,460	1,660	1,940	1,430	844	476	420	912
20	1,000	2,080	2,980	1,540	1,560	1,640	1,930	537	553	476	455	918
21	997	1,950	3,010	1,700	1,560	1,690	1,860	1,630	553	483	441	934
22	1,230	2,520	2,850	1,900	1,510	1,730	1,610	1,710	576	476	441	480
23	1,470	3,000	4,950	1,950	1,730	1,710	1,830	1,680	532	504	483	850
24	1,470	5,020	6,820	1,960	1,620	1,630	1,780	1,740	490	476	441	1,050
25	1,290	6,730	6,190	3,260	1,190	1,480	1,890	1,670	553	497	441	1,220
26	1,060	7,520	4,060	4,690	1,570	1,660	1,780	1,370	553	462	434	1,190
27	1,060	8,040	2,760	4,190	1,570	*1,670	1,820	673	560	448	511	1,250
28	1,690	5,430	2,410	3,670	1,610	1,690	1,760	*1,540	546	455	476	1,210
29	2,590	5,440	2,320	2,670	-	1,720	1,680	1,500	525	434	455	475
30	3,140	4,560	2,240	2,200	-	1,810	1,800	750	525	483	455	639
31	5,210	-	2,420	2,160	-	1,630	-	1,350	-	511	469	-
Total	39,116	89,213	100,280	69,830	99,211	50,240	49,821	45,736	25,601	15,183	14,007	21,311
Mean	1,262	2,974	3,235	2,253	3,543	1,621	1,661	1,475	853	490	452	710
Ac-ft	77,590	177,000	198,900	138,500	196,800	99,650	98,820	90,720	50,780	30,120	27,780	42,270
( $\pm$ )	+689	-8,934	-2,115	+2,464	+2,435	-25,380	+7,313	+10,800	+14,750	+15,470	+3,750	-15,750

## Adjusted for change in reservoir contents

Mean	1,273	2,825	3,201	2,293	3,587	1,208	1,783	1,651	1,101	741	512	446
Cfsm	4.36	9.67	11.0	7.85	12.3	4.14	6.11	5.65	3.77	2.54	1.75	1.53
In.	5.03	10.79	12.64	9.05	12.79	4.77	6.81	6.52	4.21	2.93	2.02	1.70
Ac-ft	78,280	168,100	198,800	141,000	199,200	74,270	106,100	101,500	65,530	45,590	31,510	26,520

## Observed

Calendar year 1950: Max	7,520	Min	389	Mean	1,942	Ac-ft	1,406,000
Water year 1950-51: Max	14,100	Min	414	Mean	1,697	Ac-ft	1,229,000

## Adjusted

Calendar year 1950: Mean	2,015	Cfsm	6.90	In.	93.67	Ac-ft	1,459,000
Water year 1950-51: Mean	1,705	Cfsm	5.84	In.	79.26	Ac-ft	1,234,000

\* Discharge measurement made on this day.

† Change in contents in Alder and La Grande Reservoirs, equivalent in acre-feet.

Note.--Shifting-control method used Oct. 1 to Feb. 9, May 31 to Sept. 30.



Mashel River near La Grande, Wash.

Location.--Lat 46°51'25" (revised), long. 122°18'05" (revised), in NE<sup>1</sup>/<sub>4</sub> sec. 21, T. 16 N., R. 4 E., on right bank 50 ft below bridge, 2 miles upstream from mouth, and 2 miles northeast of La Grande.

Drainage area.--80.7 sq mi (revised).

Records available.--October 1940 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 619.53 ft above mean sea level, datum of 1929, supplementary adjustment of 1947.

Average discharge.--11 years, 223 cfs.

Extremes.--Maximum discharge during year, 2,880 cfs Feb. 11 (gage height, 7.19 ft); minimum, 5.0 cfs Sept. 4 (gage height, 1.96 ft).  
1940-51: Maximum discharge, 7,980 cfs Dec. 11, 1946 (gage height, 9.30 ft), from rating curve extended above 3,200 cfs; minimum, that of Sept. 4, 1951.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. Small diversion for city of Eatonville water supply. Some regulation at low water by millpond in Eatonville.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-27

Oct. 28 to Sept. 30

2.3	19.5	1.9	5.0	3.5	365
2.5	46	2.0	10.5	4.0	560
2.8	108	2.2	28	4.5	790
3.1	195	2.4	57	5.0	1,060
3.5	335	2.6	97	5.5	1,370
4.0	545	2.8	145	6.0	1,740
		3.1	231	6.6	2,260

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1												
2	42	*368	628	574	237	84	299	138	57	18	10	15
3	33	532	472	1,210	480	74	330	122	54	18	10	13
4	30	480	540	870	516	70	348	113	54	18	10	12
5	30	396	605	695	404	80	432	161	57	18	8.8	10
6	122	330	865	508	323	76	390	250	68	20	8.8	10
7	180	263	940	390	316	70	337	195	97	18	9.4	10
8	132	247	*940	327	725	61	337	225	115	7.2	10.5	8.8
9	189	231	718	293	1,050	61	310	204	111	15.5	10.5	28
10	201	201	592	260	*1,940	59	273	169	95	15.5	11	21
11	371	184	476	247	1,620	55	237	178	80	15	11	15.5
12												
13	351	169	436	244	2,220	52	*225	480	72	*16.5	11	14
14	198	161	390	228	1,370	*420	296	480	74	16.5	11	13.5
15	135	148	354	273	815	556	372	320	66	16.5	*10.5	13
16	135	142	306	390	600	428	354	231	61	16.5	10	11
17	130	296	362	790	520	514	320	*175	54	15.5	10	10.5
18	101	628	424	*650	416	718	306	156	51	15.5	10	10
19	96	544	408	650	358	484	296	150	43	15	10	9.4
20	119	372	396	440	327	368	253	130	40	14	10	8.3
21	111	280	340	337	286	337	207	113	37	13.5	10	8.8
22	124	189	330	361	a260	376	164	99	34	13.5	9.4	7.8
23	108	940	334	1,000	a210	432	135	97	32	13.5	8.8	7.2
24	91	1,470	482	605	a180	408	115	97	31	13	8.8	6.6
25	78	1,180	970	440	a160	340	106	108	28	13	8.8	6.6
26	65	1,180	718	695	a140	313	102	125	27	13.5	a8.5	7.8
27	130	1,000	592	940	a130	316	106	138	25	14	a8.5	28
28	158	765	472	915	a110	390	115	104	24	13.5	a9.0	a45
29	427	940	404	628	a100	358	125	89	22	13	a12	a22
30	695	718	404	444	a90	310	244	82	21	12	57	a19
31	512	548	390	365	-	316	266	86	25	12	31	a50
32	396	628	428	289	-	372	178	72	22	10.5	21	a250
33	334	-	382	250	-	334	-	65	-	10	17	-
Total	5,824	15,530	16,078	16,408	15,883	9,132	7,578	5,152	1,581	454.2	392.3	691.8
Mean	1.88	51.8	51.9	52.9	56.7	295	253	166	52.7	14.7	12.7	23.1
Cfs/m	2.33	6.42	6.43	6.56	7.03	3.66	3.14	2.06	0.653	0.182	0.157	0.286
In.	2.68	7.16	7.41	7.56	7.32	4.21	3.49	2.37	0.73	0.21	0.18	0.32
Ac-ft	11,550	30,800	31,890	32,540	31,500	18,110	15,030	10,220	3,140	901	778	1,370

Calendar year 1950: Max 2,310 Min 13 Mean 306 Cfs/m 3.79 In. 51.52 Ac-ft 221,800  
Water year 1950-51: Max 2,220 Min 6.6 Mean 259 Cfs/m 3.21 In. 43.64 Ac-ft 187,800

Peak discharge (base, 1,500 cfs).--Nov. 22 (2 p.m.) 2,080 cfs (6.31 ft); Jan. 2 (2 p.m.) 1,620 cfs (5.85 ft); Feb. 11 (2:30 p.m.) 2,680 cfs (7.19 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

Note.--Shifting-control method used Oct. 28 to Jan. 1, Feb. 9-19, Mar. 1-15, Aug. 13-23, Aug. 28 to Sept. 25.

## NISQUALLY RIVER BASIN

Ohop Creek near Eatonville, Wash.

Location.--Lat 46°52'50", long. 122°16'38", in SE<sup>1</sup> sec. 10, T. 16 N., R. 4 E., on left bank 400 ft downstream from Lynch Creek, 600 ft downstream from outlet of Ohop Lake, and 1 mile northwest of Eatonville.

Drainage area.--35.0 sq mi.

Records available.--June 1927 to September 1932, September 1941 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 519.8 ft above mean sea level (from stadia traverse). June 1, 1927, to Sept. 30, 1932, water-stage recorder at same site at datum 2.79 ft higher. Sept. 6, 1941, to Mar. 17, 1942, staff gage at present site and datum.

Average discharge.--15 years, 65.1 cfs.

Extremes.--Maximum discharge during year, 1,020 cfs Feb. 11 (gage height, 4.55 ft, from graph based on fragmentary gage-height record, from rating curve extended above 530 cfs; minimum, 3.6 cfs Aug. 21, 22, 23, 25, 26, 27 (gage height, 1.52 ft). 1927-32, 1941-51: Maximum discharge, 1,600 cfs Dec. 11, 1946 (gage height, 5.97 ft); minimum, 2.3 cfs Aug. 22, 23, 1944.

Remarks.--Records good except those for periods of no gage-height record, which are fair. No diversion.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.5	3.0	2.7	147
1.7	10.5	3.0	225
1.9	24	3.3	330
2.1	44	3.6	460
2.4	87	4.0	670

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	19.5	98	197	181	92	68	65	29	19.5	8.9	6.6	4.9
2	18.5	138	169	326	115	65	65	27	17	*7.1	5.6	4.6
3	17	107	211	308	145	60	65	26	16.5	6.6	5.2	4.9
4	19.5	91	370	258	147	55	65	27	15.5	7.1	4.9	4.3
5	39	82	298	217	136	60	60	32	15.5	7.1	4.6	4.3
6	49	73	310	179	125	55	60	28	14.5	7.6	4.3	4.3
7	34	65	*283	154	164	55	55	28	14.5	7.1	4.3	4.6
8	58	61	225	138	189	55	50	27	13.5	6.6	4.3	9.8
9	53	53	184	121	*388	50	50	26	12	6.6	4.6	8.9
10	140	48	152	111	406	50	*48	25	12	6.2	4.9	12
11	115	45	129	101	642	50	48	73	15.5	6.6	4.9	10.5
12	77	42	119	92	654	70	49	67	28	7.1	4.9	10
13	64	39	107	98	379	150	50	48	25	13	4.9	9.8
14	65	37	98	125	266	170	48	*42	23	12	4.9	9.8
15	65	44	91	189	222	200	48	37	22	11	*4.9	9.8
16	55	113	91	*184	189	350	44	33	20	11	5.2	8.9
17	49	127	89	237	166	250	37	30	18.5	10.5	4.6	8.4
18	46	121	87	189	154	180	35	27	17	10	4.6	8.4
19	46	96	85	161	149	120	35	26	16.5	9.8	4.6	8.4
20	48	115	81	143	143	110	34	24	15.5	9.8	4.6	8.4
21	44	255	84	286	132	110	33	23	14.5	9.4	4.0	8.0
22	39	326	109	243	117	100	30	22	13.5	8.9	4.0	7.6
23	36	338	269	197	105	100	30	22	13.5	8.9	4.9	7.6
24	33	362	208	240	100	90	29	27	12.5	8.9	4.3	11
25	38	338	187	258	92	85	28	36	12	8.4	4.0	31
26	42	255	157	246	89	85	26	28	11	8.4	4.0	28
27	76	280	138	200	*79	80	26	24	11	8.0	4.3	23
28	127	231	125	159	68	75	30	24	10.5	8.0	15.5	23
29	109	189	113	127	-	75	39	25	10	8.0	10	24
30	*96	184	123	115	-	70	32	22	9.8	7.6	6.2	54
31	84	-	125	101	-	65	-	21	-	7.1	5.6	-
Total	8,01.5	4,353	5,014	5,682	5,653	3,158	1,314	956	467.8	263.3	164.2	372.2
Mean	58.1	145	162	183	202	102	43.8	30.8	15.6	8.49	5.30	12.4
Cfsm	1.66	4.14	4.63	5.23	5.77	2.91	1.25	0.880	0.446	0.243	0.151	0.354
In.	1.91	4.63	5.33	6.04	6.01	3.36	1.40	0.102	0.50	0.28	0.17	0.40
Ac-ft	3,570	8,630	9,950	11,270	11,210	6,260	2,610	1,900	928	522	326	738

Calendar year 1950: Max 578 Min 4.3 Mean 91.9 Cfsm 2.63 In. 35.62 Ac-ft 66,500  
Water year 1950-51: Max 654 Min 4.0 Mean 80.0 Cfsm 2.29 In. 31.05 Ac-ft 57,910

Peak discharge (base, 270 cfs).--Nov. 22 (about 5 p.m.) 480 cfs (3.64 ft); Dec. 4 (about 9 a.m.) 428 cfs (3.53 ft); Dec. 23 (about 1 a.m.) 326 cfs (3.29 ft); Jan. 2 (about 4 p.m.) 406 cfs (3.48 ft); Jan. 21 (about 1 p.m.) 346 cfs (3.34 ft); Feb. 11 (about 5 p.m.) 1,020 cfs (4.55 ft); probably Mar. 16 (time unknown) 402 cfs (3.47 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Mar. 2 to Apr. 9; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

## Nisqually River near McKenna, Wash.

Location.--Lat 46°51'15", long. 122°27'10", in SE $\frac{1}{4}$  sec. 20 T. 16 N., R. 3 E., on right bank 800 ft downstream from Elbow Creek, three-quarters of a mile upstream from Tanwax Creek, and 7.4 miles southeast of McKenna.

Drainage area.--445 sq mi.

Records available.--August 1941 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 373.6 ft above mean sea level (from stadia traverse). Prior to Oct. 1, 1941, staff gage at same site and datum.

Average discharge.--10 years, 1,723 cfs.

Extremes.--Maximum discharge during year, 17,700 cfs Feb. 11 (gage height, 11.37 ft); minimum, 364 cfs July 17; minimum daily, 416 cfs Sept. 6.

1941-51: Maximum discharge, that of Feb. 11, 1951; minimum, 85 cfs Oct. 19, 1945 (gage height, 2.57 ft); minimum daily, 176 cfs Jan. 30, 1945.

Remarks.--Records good except those for periods of no gage-height record, which are fair. Water diverted above station by Yelm Irrigation District. Major portion of flow regulated by Alder Reservoir and city of Tacoma powerplant at La Grande.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,020	3,380	4,030	2,790	2,370	1,880	1,900	1,960	1,510	443	501	483
2	1,150	*3,480	1,840	4,270	2,330	*1,870	2,100	1,950	825	501	489	480
3	1,250	3,250	2,380	4,350	2,360	1,760	2,100	1,920	998	508	483	449
4	1,140	3,170	4,760	3,950	2,030	1,410	2,200	1,980	1,550	520	483	460
5	1,220	3,030	4,770	3,550	2,240	1,930	2,000	1,810	1,510	520	454	426
6												
7	1,530	2,580	5,640	2,960	2,170	1,960	1,900	1,440	1,650	520	478	416
8	1,010	1,680	6,710	2,820	2,220	1,930	1,800	1,760	1,580	501	483	421
9	1,708	1,560	6,600	2,700	5,180	1,940	1,400	1,940	1,450	514	478	443
10	1,370	1,480	5,360	2,120	10,500	1,960	1,600	1,320	514	501	443	
	1,470	1,430	3,660	1,960	*14,800	1,870	1,800	1,570	624	520	483	604
11												
12	1,450	1,130	3,100	1,950	16,100	1,570	1,900	1,980	864	478	472	613
13	1,200	882	2,620	1,910	10,700	2,220	1,900	1,940	848	*495	449	641
14	1,140	1,460	2,530	1,620	6,810	2,570	*2,000	1,020	1,030	495	483	944
15	1,350	1,600	2,530	1,620	6,380	2,400	2,020	1,600	956	501	478	1,010
16	1,480	1,980	2,440	2,490	5,300	2,790	1,870	1,850	1,240	501	478	500
17												
18	1,350	2,460	2,810	2,520	4,100	2,810	2,080	2,000	636	495	472	454
19	1,590	2,290	3,350	2,520	3,310	2,400	2,050	*1,940	537	489	472	996
20	1,480	1,930	3,650	2,100	1,490	2,050	2,040	1,930	1,300	495	472	1,110
21	1,200	1,660	3,460	*2,090	2,010	2,190	2,180	1,620	927	489	443	1,060
22	1,250	2,310	3,420	1,890	1,970	2,220	2,110	750	565	489	*478	1,000
23												
24	1,200	2,770	3,490	2,980	2,030	2,400	2,050	1,610	545	489	472	1,020
25	1,500	3,860	3,430	2,760	2,000	2,500	1,830	1,770	558	489	466	497
26	1,730	4,440	6,060	2,530	2,130	2,300	1,960	1,750	526	526	478	869
27	1,760	6,530	8,210	2,700	2,080	2,200	1,910	1,790	472	489	454	1,120
28	1,660	6,180	7,420	4,390	1,620	2,000	2,030	1,830	520	508	449	1,320
29												
30	1,370	8,740	4,960	6,140	1,920	2,100	1,910	1,510	526	489	432	1,360
31	1,580	7,800	3,450	5,250	1,910	2,200	1,960	846	526	478	539	1,360
	2,440	6,500	2,930	4,270	1,900	2,100	1,990	1,540	520	483	533	1,280
	3,240	6,300	2,770	3,170	-	2,100	1,990	1,600	495	443	520	521
	3,580	5,630	2,700	2,450	-	2,400	2,000	890	501	501	495	694
	3,460	-	2,870	2,400	-	2,100	-	1,420	-	552	495	-
Total	48,858	103,492	124,060	91,220	119,960	66,130	58,590	51,146	26,719	15,435	14,863	22,974
Mean	1,576	3,450	4,002	2,943	4,284	2,133	1,953	1,650	891	498	479	766
Ac-ft	96,910	205,300	246,100	180,900	237,900	131,200	116,200	101,400	53,000	30,610	29,480	45,570
Calendar year 1950: Max			8,740		Min 350		Mean 2,329		Ac-ft 1,686,000			
Water year 1950-51: Max			16,100		Min 416		Mean 2,037		Ac-ft 1,475,000			

\* Discharge measurement made on this day.

Note.--No gage-height record Mar. 21 to Apr. 13; discharge estimated on basis of records for nearby stations.

## NISQUALLY RIVER BASIN

## Nisqually River at McKenna, Wash.

Location (revised).--Lat 46°56'00", long. 122°33'35", in SE¼NW¼ sec. 28, T. 17 N., R. 2 E., on left bank 100 ft downstream from bridge at McKenna and 8½ miles downstream from Tanwax Creek.

Drainage area.--517 sq mi (revised).

Records available.--October 1947 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 275 ft (from topographic map).

Extremes.--Maximum discharge during year, 16,900 cfs Feb. 11 (gage height, 11.30 ft); minimum, 92 cfs Sept. 5 (gage height, 1.42 ft).

1947-51: Maximum discharge, that of Feb. 11, 1951; minimum, 42 cfs Sept. 19, 1948 (gage height, 0.98 ft).

Remarks.--Records good except those for periods of shifting control, which are fair.

Major portion of flow regulated by Alder Reservoir and city of Tacoma powerplant at La Grande. Yelm irrigation project and Centralia power canal divert water above station.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.4	92	2.8	765	5.5	3,910
1.6	133	3.1	1,020	6.0	4,680
1.8	194	3.5	1,400	7.0	6,460
2.0	274	4.0	1,930	8.0	8,560
2.2	370	4.5	2,530	9.5	12,100
2.5	550	5.0	3,200	11.0	16,100

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.
1	758	2,990	3,860	2,440	2,130	1,580	1,600	1,600	1,100	161	221	153
2	752	5,140	2,860	3,670	2,150	*1,550	1,710	1,590	525	191	168	128
3	912	2,910	2,060	3,900	2,180	1,490	1,730	1,560	638	191	158	128
4	850	2,800	4,270	3,580	1,920	1,090	1,810	1,620	1,030	205	158	133
5	907	2,700	4,300	3,260	2,050	1,590	1,610	1,500	1,200	205	150	105
6	1,130	2,340	5,070	2,660	2,000	1,640	1,600	1,320	1,210	205	144	97
7	750	*1,570	6,180	2,530	2,060	1,610	1,450	1,230	1,200	191	155	112
8	365	1,290	5,920	2,420	4,150	1,610	1,130	1,690	1,100	198	147	128
9	955	1,170	4,710	1,800	*8,890	1,610	1,280	1,280	700	198	168	128
10	1,080	1,120	3,280	1,710	14,100	1,540	1,470	1,250	348	198	155	212
11	1,160	842	2,800	1,650	15,500	1,240	1,590	1,570	458	178	150	234
12	875	640	2,290	1,590	12,000	1,910	*1,580	1,630	460	191	131	254
13	795	1,040	2,240	1,360	7,210	2,400	1,590	840	603	194	139	420
14	925	1,250	2,230	1,340	6,560	2,200	1,640	1,100	604	194	147	561
15	1,170	1,600	2,140	2,200	5,690	2,530	1,490	1,380	801	198	159	270
16	1,030	2,180	2,380	2,400	4,170	2,660	1,690	*1,640	399	178	139	138
17	1,150	2,000	2,980	2,460	3,440	2,240	1,690	1,590	227	174	*141	444
18	1,180	1,710	*3,160	2,050	1,470	1,820	1,660	1,590	814	174	139	637
19	916	1,430	3,100	*1,990	1,840	1,910	1,800	1,290	604	*171	122	598
20	917	1,980	5,070	1,700	1,820	1,950	1,750	557	297	171	131	568
21	882	2,570	3,070	2,690	1,810	1,980	1,690	1,090	236	164	136	574
22	1,090	3,480	3,000	2,700	1,760	2,020	1,470	1,360	249	168	128	256
23	1,330	4,120	5,000	2,420	1,830	1,950	1,540	1,350	217	184	136	356
24	1,400	5,620	7,200	2,490	1,830	1,820	1,550	1,400	178	171	128	619
25	1,350	7,150	6,590	3,680	1,380	1,700	1,640	1,460	511	178	124	856
26	1,050	7,580	4,530	5,460	1,840	1,770	1,540	1,170	550	168	108	934
27	1,160	6,970	4,770	3,180	1,610	1,840	1,580	578	498	161	155	875
28	1,980	5,760	2,600	5,860	1,560	1,790	1,590	1,080	425	161	168	869
29	2,840	5,520	2,470	3,090	-	1,790	1,610	1,220	209	144	181	343
30	3,110	5,070	2,400	2,280	-	2,020	1,650	577	194	111	155	272
31	3,080	-	2,570	2,200	-	1,760	-	982	-	171	153	-
Total	37,812	90,352	110,390	82,350	114,540	56,630	47,730	40,094	17,585	5,597	4,575	11,400
Mean	1,220	3,012	3,561	2,656	4,091	1,827	1,591	1,293	586	181	148	380
As-ft	75,000	179,200	219,000	163,300	227,200	112,300	94,670	79,530	34,880	11,100	9,070	22,610
Calendar year 1950: Max	10,100				158	Mean	2,091	As-ft	1,514,000			
Water year 1950-51: Max	15,500			Min	97	Mean	1,696	As-ft	1,228,000			

\* Discharge measurement made on this day.

Note.--Shifting-control method used May 27 to Aug. 12, Aug. 22 to Sept. 30.

## Clover Creek near Tillicum, Wash.

Location.--Lat 47°08'40", long. 122°30'10", on west line sec. 12, T. 19 N., R. 2 E., on right bank  $1\frac{1}{2}$  miles upstream from mouth and  $2\frac{1}{2}$  miles northeast of Tillicum.

Drainage area.--70.3 sq mi (revised).

Records available.--June 1949 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 270 ft (from topographic map).

Extremes.--Maximum discharge during year, 568 cfs Feb. 12 (gage height, 4.64 ft); minimum, 0.8 cfs Sept. 21, 22, 23 (gage height, 1.30 ft).

1949-51: Maximum discharge, that of Feb. 12, 1951; no flow Oct. 20-26, 29, Nov. 1-9, 1949.

Remarks.--Records excellent except those for periods of shifting control, which are fair, and those for period of no gage-height record, which are poor. Some diversion for domestic use. Probably some regulation.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.3	0.4	2.9	85
1.5	2.8	3.2	115
1.7	8.0	3.5	154
2.0	21	3.9	215
2.3	37	4.3	330
2.6	56	4.7	640

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.7	16	71	128	143	180	128	60	35	16.5	7.7	1.9
2	7.7	15	78	*139	148	172	122	58	34	16	7.4	1.9
3	*7.7	15.5	86	157	157	168	120	58	34	16	7.1	1.6
4	8.8	15.5	93	170	167	167	115	58	*34	16	6.8	1.6
5	10	15.5	105	167	*170	165	112	57	34	17	6.5	1.6
6	7.7	15	116	160	167	162	111	56	33	16	6.8	1.6
7	7.7	*15	134	151	167	157	107	55	32	15	6.5	2.1
8	8.0	15	137	144	172	155	103	54	32	15	6.2	1.6
9	9.6	15	134	139	242	153	102	52	30	15	5.9	1.5
10	15	15	125	135	422	150	98	51	30	14.5	3.8	*1.4
11	12	15	119	130	488	146	96	52	28	14	3.0	1.4
12	11.5	14.5	116	127	532	160	95	50	28	13.5	3.0	1.2
13	11	14.5	*113	123	*440	*194	93	50	27	13.5	3.0	1.2
14	12	14.5	112	122	410	229	90	48	27	13	3.2	1.2
15	10.5	16.5	112	130	410	245	87	47	26	13	3.6	1.0
16	10	18	111	138	392	242	87	47	26	13	3.4	1.0
17	10	18	110	157	392	229	83	47	25	*12.5	3.4	1.0
18	10.5	17.5	108	172	365	208	82	45	24	11.5	3.4	1.0
19	10.5	a17.5	107	174	345	195	79	44	24	11	3.2	1.0
20	9.6	a20	106	170	318	186	75	42	24	11	3.0	.9
21	9.6	a23	104	178	281	178	71	41	24	11	2.6	.9
22	9.2	a27	111	198	252	176	68	41	22	11	2.1	.9
23	8.8	50	125	206	233	171	67	40	22	10.5	1.5	.8
24	8.8	34	150	198	219	164	*66	41	20	10.5	1.5	1.2
25	10	39	164	188	208	160	67	40	20	10	1.4	1.2
26	9.6	44	157	182	201	155	64	39	19	9.6	1.2	1.0
27	13.5	50	*146	177	194	148	65	38	18	9.2	2.4	1.2
28	13.5	55	139	170	186	143	65	38	18	8.8	2.2	1.6
29	13.5	59	134	162	-	136	63	36	18	8.4	1.9	3.2
30	14	62	132	155	-	134	62	35	17.5	8.0	1.9	2.4
31	14	-	130	147	-	130	-	35	-	8.4	1.9	-
Total	322.0	748.5	3,683	4,894	7,821	5,358	2,641	1,455	785.5	388.4	117.5	42.1
Mean	10.4	25.0	119	158	279	173	88.0	46.9	26.2	12.5	3.79	1.40
Cfs/m	0.148	0.356	1.69	2.25	3.97	2.46	1.25	0.667	0.373	0.178	0.054	0.020
In.	0.17	0.40	1.95	2.59	4.14	2.83	1.40	0.77	0.42	0.21	0.06	0.02
Ac-ft	659	1,480	7,310	9,710	15,510	10,630	5,240	2,890	1,560	770	235	84

Calendar year 1950: Max 284 Min 4.5 Mean 71.4 Cfs/m 1.02 In. 13.79 Ac-ft 51,690  
 Water year 1950-51: Max 532 Min 0.8 Mean 77.4 Cfs/m 1.10 In. 14.96 Ac-ft 56,060

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for Chambers Creek below Leach Creek, near Steilacoom.

Note.--Shifting-control method used Oct. 1 to Nov. 1, Feb. 14 to Sept. 30.

## CHAMBERS CREEK BASIN

Chambers Creek below Leach Creek, near Steilacoom, Wash.

Location.--Lat 47°12', long. 122°32', in NE 1/4 sec. 27, T. 20 N., R. 2 E., on left bank a quarter of a mile downstream from Leach Creek, 1 1/2 miles downstream from outlet of Steilacoom Lake, and 3 miles northeast of Steilacoom.

Drainage area.--104 sq mi (revised).

Records available.--December 1937 to September 1940, July 1943 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 80 ft (from topographic map).

Average discharge.--10 years (1938-40, 1943-51), 116 cfs.

Extremes.--Maximum discharge during year, 661 cfs Feb. 11 (gage height, 3.12 ft); minimum not determined, probably occurred sometime during period of no gage-height record in August or September.

1937-40, 1943-51: Maximum discharge, that of Feb. 11, 1951; minimum, 34 cfs Aug. 16, 1940, Aug. 30, Oct. 25, 1944.

Remarks.--Records good except those for periods of no gage-height record, or shifting control, which are fair. Some regulation by gates at outlet of Steilacoom Lake. Some diversions for domestic use and for irrigation of small garden plots.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 14

Feb. 15 to Sept. 30

0.9	58	0.1	41	1.5	277
1.1	80	.3	64	2.0	397
1.3	107	.5	91	2.5	540
1.6	156	.8	139	3.0	710
2.0	231	1.1	195		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	80	90	156	265	301	424	310	146	111	73	62	50
2	80	94	152	270	321	397	299	144	111	72	60	50
3	*59	90	161	275	351	397	288	142	109	72	60	49
4	63	90	185	295	321	397	288	150	109	72	60	49
5	75	88	201	301	*321	384	277	148	108	72	59	48
6	68	88	218	311	357	384	271	140	106	73	58	49
7	70	86	220	301	361	371	266	136	106	72	57	52
8	61	86	220	301	381	384	264	132	104	72	56	54
9	79	84	251	291	566	371	260	130	103	70	54	51
10	101	*84	261	291	578	358	256	129	100	69	54	*50
11	80	83	251	291	639	358	250	137	87	69	54	50
12	75	81	235	281	632	424	243	137	87	69	56	49
13	78	80	222	281	650	*410	239	134	87	69	55	49
14	84	80	231	281	*639	438	235	130	84	69	55	48
15	94	84	235	301	640	481	231	130	74	68	54	48
16	90	89	237	301	622	466	227	130	74	68	54	48
17	88	89	235	301	622	466	223	130	76	*67	53	49
18	88	86	229	311	570	452	215	129	76	67	53	50
19	86	85	229	321	605	438	209	125	73	67	52	50
20	76	94	231	321	605	410	203	124	69	67	52	50
21	74	104	227	368	570	397	195	120	70	67	51	50
22	72	100	251	344	540	384	185	120	70	67	50	50
23	70	108	281	344	525	384	180	119	72	65	49	51
24	69	118	281	356	496	371	*176	120	74	65	49	50
25	72	116	291	356	481	358	170	119	74	64	48	52
26	78	113	*291	356	452	358	165	117	73	64	48	52
27	86	158	291	344	458	346	160	124	72	64	52	54
28	90	127	291	331	424	334	156	124	74	64	56	52
29	90	128	281	311	-	334	152	*120	76	64	54	54
30	88	158	281	311	-	322	150	114	74	63	52	56
31	88	-	270	301	-	310	-	114	-	62	51	-
Total	2,432	2,939	7,392	9,613	13,968	12,108	6,743	4,014	2,583	2,106	1,678	1,514
Mean	78.5	98.0	238	310	499	391	225	129	86.1	67.9	54.1	50.5
Ac-ft	4,820	5,850	14,660	19,070	27,710	24,020	13,370	7,960	5,120	4,180	3,350	3,000
Calendar year 1950: Max 596 Min 57 Mean 181 Ac-ft 130,700												
Water year 1950-51: Max 650 Min 48 Mean 184 Ac-ft 133,100												

\* Discharge measurement made on this day.

Notes.--No gage-height record Oct. 20 to Nov. 9, Dec. 31 to Jan. 4, Apr. 21 to May 9, Aug. 2 to Sept. 17; discharge estimated on basis of 2 discharge measurements, recorded range in stage, and records for stations on nearby streams. Shifting-control method used Oct. 1-19, Nov. 10 to Dec. 30, Jan. 5 to Feb. 14.

## Kapowsin Creek near Kapowsin, Wash.

Location.--Lat 46°59'45", long. 122°11'45", in NE $\frac{1}{4}$  sec. 5, T. 17 N., R. 5 E., or right bank half a mile downstream from Kapowsin Lake, and  $1\frac{1}{2}$  miles east of Kapowsin.

Drainage area.--23.0 sq mi.

Records available.--June 1927 to October 1932, October 1941 to September 1951.

Gage.--Water-stage recorder and log control. Datum of gage is 561 ft above mean sea level (from stadia traverse). Prior to Oct. 8, 1932, water-stage recorder at same site at datum approximately 3 ft lower. Oct. 1, 1941, to Mar. 31, 1942, staff gage at present site and datum 0.15 ft higher than present gage.

Average discharge.--15 years, 49.1 cfs.

Extremes.--Maximum discharge during year, 582 cfs Feb. 12 (gage height, 5.37 ft); minimum, 0.9 cfs Aug. 23-27 (gage height, 1.72 ft).  
1927-32, 1941-51: Maximum discharge, 605 cfs Dec. 12, 1946 (gage height, 5.69 ft); minimum, that of Aug. 23-27, 1951.

Remarks.--Records good. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.7	0.7	3.0	94
1.8	2.1	3.3	139
2.0	7.2	3.6	193
2.2	16	4.0	275
2.4	30	4.4	362
2.6	48	4.8	453
2.8	69	5.2	546

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.0	70	167	108	84	55	61	22	15.5	4.4	1.6	1.8
2	7.6	79	146	176	97	51	57	21	14.5	4.1	1.8	1.6
3	7.6	*76	137	241	122	49	54	21	14	*4.4	1.8	1.6
4	8.3	71	193	235	122	52	51	21	13.5	4.1	1.8	1.4
5	11.5	64	229	203	111	51	49	21	13.5	4.1	1.8	1.4
6	13.5	59	*248	169	102	47	47	21	13.5	3.9	1.6	1.4
7	15	55	258	142	107	44	44	21	13	3.6	1.4	2.1
8	17.5	50	215	126	128	44	43	21	13	3.4	1.4	2.3
9	21	46	180	111	279	44	*41	20	12.5	3.2	1.4	2.3
10	36	43	151	98	407	42	38	20	13	3.2	1.4	2.3
11	55	39	129	89	*476	40	37	24	13	2.9	1.4	2.1
12	53	38	117	81	546	51	35	28	12.5	2.9	1.4	2.1
13	44	34	105	79	407	107	34	28	12	2.9	1.4	2.1
14	41	33	95	88	222	122	32	*28	12	2.7	1.4	2.1
15	38	33	90	112	235	154	30	26	11.5	2.7	*1.4	2.1
16	34	38	88	126	195	205	28	24	10.5	2.7	*1.3	2.1
17	32	51	89	161	161	169	27	23	9.9	2.5	1.2	2.3
18	31	58	86	*156	148	137	26	22	9.1	2.5	1.2	2.1
19	33	56	81	134	134	116	26	21	8.3	2.5	1.0	2.1
20	34	60	77	114	120	104	26	18.5	8.0	2.5	1.0	2.1
21	34	125	84	136	108	98	25	18	7.6	2.3	1.0	2.1
22	33	193	94	167	97	95	24	17.5	7.2	2.3	1.0	1.9
23	30	239	165	148	89	88	22	16.5	6.9	2.3	1.0	1.9
24	29	273	184	142	81	79	22	16.5	6.6	2.3	.9	1.9
25	28	286	163	158	75	75	21	18	6.0	2.3	.9	2.7
26	31	246	142	185	*71	74	21	18.5	5.5	2.1	.9	2.5
27	41	241	128	172	64	71	21	18.5	5.2	2.1	1.3	2.5
28	61	223	117	146	59	68	22	18	5.2	2.1	2.7	3.6
29	79	185	105	120	-	65	22	17.5	4.9	1.9	1.9	4.9
30	79	167	105	104	-	66	22	16.5	4.7	1.9	1.9	12.5
31	73	-	102	91	-	65	-	16	-	1.8	1.8	-
Total	1,059.0	3,231	4,272	4,319	4,921	2,528	1,008	643.0	302.6	88.6	44.0	75.9
Mean	34.2	108	138	139	176	81.5	33.6	20.7	10.1	2.86	1.42	2.53
Cfsm	1.49	4.70	6.00	6.04	7.65	3.54	1.46	0.900	0.439	0.124	0.062	0.110
In.	1.71	5.22	6.91	6.98	7.96	4.09	1.53	1.04	0.49	0.14	0.07	0.12
Ac-ft	2,100	6,410	8,470	8,570	9,760	5,010	2,000	1,280	600	176	87	151
Calendar year 1950: Max	418			Min 2.9	Mean 73.1	Cfsm 3.18	In. 43.12	Ac-ft 52,920				
Water year 1950-51: Max	546			Min 0.9	Mean 61.6	Cfsm 2.68	In. 36.36	Ac-ft 44,610				

Peak discharge (base, 160 cfs).--Nov. 25 (12 m. to 2:30 p.m.) 286 cfs (4.05 ft); Dec. 7 (12:30 a.m. to 2:30 p.m.) 269 cfs (3.97 ft); Dec. 24 (12 to 2 a.m.) 187 cfs (3.57 ft); Jan. 3 (9:30 a.m. to 12 m.) 246 cfs (3.86 ft); Jan. 37 (2 to 8 p.m.) 170 cfs (3.48 ft); Jan. 22 (5 to 8 a.m.) 172 cfs (3.49 ft); Jan. 26 (2 p.m.) 191 cfs (3.59 ft); Feb. 12 (1 to 3 a.m.) 582 cfs (5.37 ft); Mar. 16 (7 a.m. to 1 p.m.) 213 cfs (3.70 ft).

\* Discharge measurement made on this day.

## Puyallup River near Orting, Wash.

Location.--Lat 47°02'30", long. 122°12'20", in SW $\frac{1}{4}$  sec. 17, T. 18 N., R. 5 E., on right bank 500 ft downstream from highway bridge, 4 miles south of Orting, and  $\frac{7}{8}$  miles upstream from Carbon River.

Drainage area.--170 sq mi, approximately.

Records available.--September 1931 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 357.5 ft above mean sea level (unadjusted). Prior to Feb. 5, 1946, water-stage recorder at site 450 ft upstream at datum 3.9 ft higher. Water-stage recorder 200 ft upstream at different datum used during periods in 1942-46, when gage heights at other gage were affected by sluggish intakes.

Average discharge.--20 years, 702 cfs.

Extremes.--Maximum discharge during year, 6,250 cfs Feb. 11 (gage height, 8.03 ft); minimum, 92 cfs Aug. 30 (gage height 2.23 ft); minimum daily, 239 cfs Oct. 3, 1931-51: Maximum discharge not determined, occurred Dec. 9 or 10, 1933; minimum, 53 cfs Mar. 16, 1941; minimum daily, 123 cfs Dec. 4, 1936.

Remarks.--Records good except those for periods of shifting control or no gage-height record, which are fair. Some regulation by Electron powerplant of Puget Sound Power & Light Co.

Revisions (water years).--W 832: Drainage area. W 932: 1937-39. W 967: 1934.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Nov. 24				Nov. 25 to Sept. 30			
2.9	225	4.1	880	3.8	650	6.0	2,850
3.1	290	4.5	1,260	4.1	860	6.5	3,600
3.3	370	5.0	1,830	4.5	1,190	7.0	4,410
3.5	465	5.5	2,590	5.0	1,660	7.4	5,110
3.8	650			5.5	2,210		

Note.--Same as preceding table below 3.8 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	258	776	1,240	980	a620	a420	504	415	460	706	538	266
2	*252	970	1,050	1,510	832	a400	487	392	482	671	504	295
3	239	1,340	1,100	1,420	932	a380	538	392	532	699	509	299
4	581	1,110	1,870	1,180	832	a420	636	530	538	606	492	303
5	629	1,030	1,710	988	741	a390	629	685	550	509	482	318
6	588	816	2,450	846	699	a365	587	643	601	465	465	364
7	650	744	2,090	769	1,260	342	622	706	678	406	487	423
8	872	664	1,610	727	1,820	334	608	643	594	425	465	514
9	713	574	1,560	664	*4,000	326	*580	622	601	492	470	389
10	2,220	552	1,560	656	3,760	314	544	755	643	*544	504	397
11	1,300	498	1,510	587	*5,110	302	538	1,350	643	538	476	326
12	872	460	1,370	562	3,060	652	664	1,120	657	594	445	322
13	713	425	1,190	664	2,040	980	818	876	727	643	415	358
14	768	410	1,070	790	1,510	839	853	713	769	636	425	374
15	629	440	1,060	1,000	1,280	1,630	818	*643	804	615	492	406
16	544	550	1,060	940	1,080	1,320	825	699	797	562	*482	445
17	520	*568	1,080	1,040	980	968	832	846	811	650	430	455
18	556	532	988	*853	916	832	783	776	727	706	470	450
19	671	476	996	769	825	762	678	692	678	568	526	406
20	699	706	1,050	692	790	769	568	650	664	487	544	397
21	580	1,480	1,160	1,060	706	783	504	713	671	492	601	342
22	498	2,710	1,420	932	636	727	465	860	671	544	550	358
23	455	2,180	2,850	811	808	650	445	1,080	650	636	460	334
24	425	2,160	1,870	1,100	a560	615	430	1,050	650	629	374	314
25	762	2,710	1,560	1,420	a520	601	450	1,040	615	550	370	493
26	643	2,210	1,190	1,170	*a490	629	460	776	615	509	362	358
27	974	2,580	1,060	1,240	*a460	594	465	671	608	526	362	276
28	1,110	1,760	1,030	996	a440	544	504	629	636	556	478	335
29	934	1,370	972	a860	-	550	509	562	713	532	322	370
30	616	1,320	972	a730	-	568	465	504	720	520	302	1,080
31	699	-	884	a640	-	520	-	470	-	520	282	-
Total	21,940	35,001	42,582	29,096	37,507	19,546	17,809	22,469	19,519	17,538	14,085	11,728
Mean	708	1,167	1,374	939	1,340	651	594	725	651	566	454	391
Cfs/m	4.16	6.86	8.08	5.52	7.88	3.71	3.49	4.26	3.83	3.33	2.67	2.30
In.	4.80	7.66	9.32	6.37	8.21	4.28	3.90	4.92	4.27	3.84	3.08	2.57
Ac-ft	45,520	69,420	84,460	57,710	74,390	38,770	35,320	44,610	38,720	34,790	27,940	23,280

Calendar year 1950: Max 4,610 Min 239 Mean 918 Cfs/m 5.40 In. 73.31 Ac-ft 664,600  
Water year 1950-51: Max 5,110 Min 239 Mean 791 Cfs/m 4.65 In. 63.22 Ac-ft 572,900

Peak discharge (base, 4,500 cfs).--Feb. 11 (1:30 p.m.) 6,250 cfs (8.03 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of 2 discharge measurements and records for station at Alderton.

Note.--Shifting-control method used Oct. 10 to Nov. 24, Dec. 24 to Jan. 28, Feb. 2-8.



Carbon River near Fairfax, Wash.

Location.--Lat 47°01'30", long. 122°02'00", in SW $\frac{1}{4}$  sec. 22, T. 18 N., R. 6 E., on left bank  $\frac{1}{4}$  miles northwest of Fairfax and 12 miles upstream from Voights Creek.

Drainage area.--81.1 sq mi (revised).

Records available.--November 1910 to July 1912, March 1929 to September 1951. Published as "at Fairfax" 1910-12.

Gage.--Water-stage recorder. Altitude of gage is 1,220 ft above mean sea level (from topographic map). Prior to July 13, 1912, staff gage at railroad crossing  $\frac{1}{4}$  miles upstream at different datum.

Average discharge.--22 years (1929-51), 414 cfs.

Extremes.--Maximum discharge during year, 4,770 cfs Feb. 9 (gage height, 6.20 ft); minimum, 134 cfs Sept. 23, 24 (gage height, 1.42 ft).  
1910-12, 1929-51: Maximum discharge, 8,030 cfs Dec. 9, 1933 (gage height, 10.2 ft), from rating curve extended above 500 cfs; minimum, 40 cfs (estimated) Jan. 20, 1930.

Remarks.--Records good except those for periods of shifting control or no gage-height record, which are fair. Diversions by lumber industry returned to river above gage. No regulation.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.4	130	3.2	960
1.6	175	3.6	1,350
1.8	225	4.0	1,750
2.0	280	4.5	2,350
2.3	385	5.0	2,970
2.6	535	5.5	3,680
2.9	750		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	192	398	681	486	a340	218	292	256	*310	547	271	142
2	182	496	589	751	a430	208	286	240	345	530	268	142
3	182	840	608	730	a400	200	298	235	403	502	262	148
4	242	688	1,150	571	365	200	385	286	421	486	256	160
5	342	674	1,160	460	331	200	440	475	403	465	256	170
6	361	524	1,870	398	328	192	430	455	450	365	253	185
7	455	465	1,260	369	628	192	426	486	314	*259	240	
8	595	*403	896	353	1,000	175	426	440	440	289	277	304
9	621	357	772	320	*3,420	172	408	445	460	295	286	228
10	*1,890	324	800	304	2,970	165	377	608	513	314	283	222
11	*1,220	307	856	292	*2,970	158	361	1,190	535	328	283	170
12	680	283	779	280	1,750	362	430	840	571	328	245	*180
13	513	265	808	349	1,110	660	660	628	634	338	235	170
14	541	253	530	418	800	513	744	480	702	365	248	175
15	475	259	475	*502	*660	1,100	647	426	772	377	265	178
16	403	268	445	475	535	920	647	518	751	349	265	188
17	381	265	412	465	470	602	681	751	640	342	250	200
18	394	248	385	365	421	470	614	640	589	377	242	202
19	496	238	373	320	390	416	496	508	541	377	259	188
20	571	304	450	298	369	426	416	480	518	349	289	188
21	455	589	634	394	338	455	369	547	513	317	314	165
22	377	1,330	902	342	314	430	331	702	518	301	298	148
23	334	1,430	1,750	307	292	385	304	960	518	298	242	140
24	304	2,730	1,200	674	280	353	292	1,050	535	301	212	138
25	353	*2,030	1,100	1,220	262	334	*289	1,000	518	304	202	295
26	328	1,700	786	1,430	245	338	304	674	513	301	200	240
27	394	1,700	640	950	235	334	310	571	486	292	198	172
28	435	1,240	*614	821	225	320	307	496	470	285	256	180
29	430	844	571	a480	-	310	304	408	502	280	198	220
30	398	816	547	a400	-	314	283	365	530	271	180	779
31	353	-	470	a350	-	307	-	328	-	271	152	-
Total	14,877	22,368	24,333	15,642	21,878	11,419	12,557	17,488	15,581	10,876	7,704	6,237
Mean	480	746	785	505	781	368	419	564	519	351	249	208
Cfs/m	5.92	9.20	9.68	6.23	9.63	4.54	5.17	6.95	6.40	4.33	3.07	2.56
In.	6.62	10.26	11.16	7.17	10.03	5.24	5.76	8.02	7.14	4.99	3.53	2.86
Ac-ft	29,510	44,370	48,260	31,030	43,390	22,650	24,910	34,690	30,900	21,570	15,280	12,370

Calendar year 1950: Max 2,730 Min 150 Mean 567 Cfs/m 6.99 In. 94.94 Ac-ft 410,600  
Water year 1950-51: Max 3,420 Min 138 Mean 496 Cfs/m 6.12 In. 82.98 Ac-ft 358,900

Peak discharge (base, 1,800 cfs).--Oct. 10 (1 p.m.) 2,840 cfs (4.85 ft); Nov. 24 (6:30 a.m.) 4,130 cfs (5.84 ft); Dec. 6 (9:30 a.m.) 2,450 cfs (4.82 ft); Dec. 22 (10 p.m.) 2,090 cfs (4.62 ft); Jan. 28 (3:30 a.m.) 1,860 cfs (4.28 ft); Feb. 9 (5:30 p.m.) 4,770 cfs (6.20 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Shifting-control method used Oct. 1 to Jan. 28, Feb. 4-8.

## PUYALLUP RIVER BASIN

South Prairie Creek at South Prairie, Wash.

Location.--Lat 47°08'30", long. 122°05'30", in NE1/4NW1, sec. 18, T. 19 N., R. 6 E., on right bank 0.3 mile northeast (revised) of South Prairie and 5 miles upstream from mouth.

Drainage area.--77.5 sq mi.

Records available.--June 1949 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 375 ft (from topographic map).

Extremes.--Maximum discharge during year, 3,550 cfs Feb. 11 (gage height, 7.23 ft); minimum, 24 cfs Sept. 5, 6, 7.  
1949-51: Maximum discharge, that of Feb. 11, 1951; minimum, that of Sept. 5, 6, 7, 1951.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. Small amount of diversion for domestic use. No regulation.

Revisions.--W 1182: Drainage area.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.2	21	3.1	435
1.3	29	3.5	605
1.5	48	4.0	860
1.7	71	4.5	1,170
1.9	99	5.0	1,520
2.2	156	5.5	1,920
2.5	231	6.0	2,360
2.8	324	6.5	2,830

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	60	294	431	468	212	189	228	122	*113	69	41	32
2	56	459	356	995	342	179	220	113	116	86	40	28
3	55	451	459	920	419	177	234	111	120	*66	39	26
4	65	331	1,170	850	348	186	289	148	122	64	40	26
5	131	294	950	515	291	172	257	202	124	63	38	25
6	148	223	1,520	408	269	163	237	172	137	64	37	24
7	120	226	1,040	342	*499	152	234	189	163	63	37	32
8	228	*184	675	314	775	154	218	172	146	59	36	60
9	263	161	528	289	*2,300	152	199	163	135	58	38	45
10	836	146	459	251	1,920	143	184	209	131	57	39	35
11	*559	135	467	228	2,650	143	182	447	131	54	38	33
12	279	122	435	212	1,730	424	226	331	137	50	38	*30
13	184	113	356	269	1,010	750	279	328	137	50	38	30
14	194	108	317	366	725	805	266	243	148	51	37	29
15	186	106	294	451	623	1,140	234	207	141	50	35	28
16	146	122	285	435	515	*890	243	212	124	50	36	28
17	141	143	301	520	471	592	243	240	111	49	37	27
18	186	143	285	366	443	447	212	194	104	48	35	28
19	311	120	269	294	392	396	192	161	89	48	34	29
20	338	234	272	251	366	408	161	148	96	47	32	29
21	240	924	317	374	331	439	143	156	92	45	33	28
22	186	1,380	456	348	301	389	133	194	90	44	34	28
23	152	1,170	1,100	301	276	334	126	243	88	44	34	28
24	131	1,610	775	610	263	301	122	308	87	44	34	31
25	148	*1,200	700	920	246	301	*120	282	83	42	34	56
26	148	830	511	1,100	226	324	120	184	80	43	34	67
27	209	1,040	435	836	212	298	122	168	78	41	34	45
28	291	750	*385	418	199	276	139	154	75	41	71	49
29	317	551	338	a300	-	276	156	141	74	41	58	78
30	282	479	408	a240	-	269	139	126	71	40	42	332
31	240	-	352	207	-	246	-	116	-	39	37	-
Total	6,830	14,049	16,646	13,976	18,354	10,915	5,838	6,182	3,353	1,590	1,190	1,360
Mean	220	468	537	451	656	352	195	199	112	51.3	38.4	45.3
Cfsm	2.84	6.04	6.93	5.82	8.46	4.54	2.52	2.57	1.45	0.662	0.495	0.585
In.	3.28	6.74	7.99	6.71	8.81	5.24	2.80	2.97	1.61	0.76	0.57	0.65
Ac-ft	13,550	27,870	33,020	27,720	36,400	21,650	11,580	12,260	6,650	3,150	2,360	2,700
Calendar year 1950: Max	2,120	Min	35	Mean	314	Cfsm	4.05	In.	54.53	Ac-ft	227,100	
Water year 1950-51: Max	2,650	Min	24	Mean	275	Cfsm	3.55	In.	48.13	Ac-ft	198,900	

Peak discharge (base, 2,000 cfs).--Nov. 24 (6:30 a.m.) 2,220 cfs (5.85 ft); Dec. 6 (7:30 a.m.) 2,090 cfs (5.67 ft); Feb. 11 (2:30 p.m.) 3,550 cfs (7.23 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Shifting-control method used July 23 to Sept. 30.

Puyallup River at Alderton, Wash.

Location.--Lat 47°11'05", long. 122°13'45", on line between sec. 25, T. 20 N., R. 4 E., and sec. 30, T. 20 N., R. 5 E., on right bank at highway bridge No. 78 on State Highway 5E, 1 mile north of Alderton, 1 mile south of Sumner, and 1½ miles upstream from Stuck River.

Drainage area.--438 sq mi.

Records available.--October 1914 to February 1927, October 1943 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, unadjusted. Prior to Nov. 17, 1943, staff or chain gages at practically same site. Prior to Aug. 5, 1918, at datum 50.00 ft higher; Aug. 5, 1918, to Feb. 1, 1927, at datum 49.00 ft higher.

Average discharge.--20 years (1914-26, 1943-51), 1,601 cfs.

Extremes.--Maximum discharge during year, 17,100 cfs Feb. 11 (gage height, 54.89 ft); minimum, 367 cfs Sept. 24 (gage height, 47.61 ft).

1914-27, 1943-51: Maximum discharge, 22,600 cfs Dec. 11, 1946 (gage height, 56.80 ft); minimum observed, 228 cfs Sept. 22, 1924.

Remarks.--Records excellent except those for periods of shifting control, which are fair. Some regulation by Electron powerplant of Puget Sound Power & Light Co.

Revisions.--W 870: Drainage area.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

47.7	430	49.0	1,790	51.5	6,760
47.9	580	49.5	2,560	52.0	8,120
48.1	750	50.0	3,420	53.0	11,100
48.4	1,040	50.5	4,410	54.0	14,200
48.7	1,380	51.0	5,520		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	557	1,580	2,800	2,400	1,540	1,230	1,360	1,020	1,040	1,590	980	493
2	529	2,240	2,400	4,000	*1,860	1,170	1,300	920	1,100	1,500	970	493
3	522	2,800	2,480	4,200	2,320	1,130	1,380	930	1,200	1,500	960	516
4	710	2,560	4,410	3,150	1,940	1,240	1,620	1,060	1,280	1,440	940	548
5	1,340	2,480	4,500	2,640	1,600	1,140	1,680	1,580	1,270	1,270	940	508
6	1,480	2,090	6,250	2,240	1,540	1,080	1,540	1,480	1,410	1,170	880	572
7	1,480	1,780	5,230	2,020	2,480	1,040	1,580	1,640	1,540	1,040	870	*696
8	1,940	*1,570	3,610	1,940	4,000	1,020	1,570	1,500	1,460	1,000	850	940
9	2,140	1,320	3,060	1,690	*10,800	990	1,440	1,420	1,380	*1,070	860	696
10	4,890	1,200	2,980	1,590	11,700	970	1,360	1,730	1,540	1,170	900	696
11	4,100	1,070	2,890	1,540	14,200	940	1,330	3,330	1,540	1,170	890	572
12	2,160	980	2,800	1,450	9,560	1,710	1,510	2,720	1,570	1,190	795	516
13	1,620	860	2,400	1,500	5,880	3,150	1,860	2,160	1,720	1,280	741	572
14	1,640	831	2,240	2,020	4,410	2,720	2,090	1,750	1,790	1,340	732	580
15	1,580	813	2,020	2,400	3,610	4,200	1,940	1,500	2,090	1,310	813	596
16	1,200	1,100	1,940	2,400	3,150	4,100	1,940	1,570	2,020	1,230	822	660
17	1,220	1,160	2,020	2,800	2,890	2,020	2,020	1,790	1,280	759	669	
18	1,270	1,120	1,790	2,240	2,640	2,320	1,860	1,860	1,660	1,420	795	705
19	1,660	920	*1,750	1,940	2,400	2,090	1,650	*1,540	1,570	1,270	840	628
20	1,860	1,420	1,790	1,730	2,240	2,090	1,390	1,420	1,510	1,100	890	596
21	1,500	3,610	2,400	2,400	2,090	2,090	1,230	1,500	1,500	1,020	970	564
22	1,230	5,640	2,400	2,320	1,860	2,020	1,130	1,780	1,520	1,050	990	516
23	1,040	5,880	6,780	2,020	1,760	1,790	*1,040	2,400	1,500	1,160	813	500
24	950	8,400	4,730	2,560	1,640	1,650	1,020	2,560	1,520	1,190	652	500
25	1,300	6,760	4,100	4,000	1,540	1,620	1,030	2,720	1,480	1,120	636	741
26	1,330	5,520	3,150	4,950	1,430	1,680	1,040	1,860	1,440	1,040	628	723
27	1,650	6,000	2,720	3,330	1,320	1,620	1,050	1,650	1,440	1,040	620	508
28	2,160	4,200	2,480	2,480	1,270	1,500	1,120	1,500	1,410	1,040	870	548
29	2,020	3,330	2,320	2,090	-	1,500	1,200	1,340	1,500	1,040	723	669
30	1,750	2,980	2,560	1,730	-	1,520	1,150	1,190	1,580	1,010	580	1,940
31	1,520	-	2,320	1,570	-	1,460	-	1,080	-	1,010	558	-
Total	50,348	82,194	95,160	75,320	103,670	55,670	43,430	52,710	45,370	37,060	23,265	19,461
Mean	1,624	2,740	3,070	2,430	3,702	1,798	1,448	1,710	1,512	1,195	815	649
Cfsm	3.71	6.26	7.01	5.55	8.45	4.10	3.31	3.88	3.45	2.73	1.86	1.48
In.	4.27	6.98	8.08	6.40	8.80	4.73	3.68	4.48	3.85	3.15	2.15	1.65
Ac-ft	99,660	165,000	188,700	149,400	205,560	110,400	86,140	104,500	89,990	73,510	50,110	36,600

Calendar year 1950: Max 8,630 Min 501 Mean 2,113 Cfsm 4.82 In. 65.48 Ac-ft 1,530,000  
Water year 1950-51: Max 14,200 Min 493 Mean 1,879 Cfsm 4.29 In. 58.23 Ac-ft 1,360,000

Peak discharge (base, 6,400 cfs).--Oct. 10 (5 p.m.) 7,830 cfs (51.99 ft); Nov. 24 (12 m.) 10,500 cfs (52.83 ft); Dec. 8 (11:30 a.m.) 8,120 cfs (52.02 ft); Dec. 23 (2:30 a.m.) 7,560 cfs (51.85 ft); Feb. 11 (4:30 p.m.) 17,100 cfs (54.89 ft); Mar. 15 (5:30 p.m.) 6,760 cfs (51.50 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1-10, May 23 to Sept. 4.

## White River at Greenwater, Wash.

Location.--Lat 47°08'50", long. 121°38'50", in SE¼ sec. 10, T. 19 N., R. 9 E., on right bank three-quarters of a mile southeast of Greenwater, three-quarters of a mile upstream from Greenwater River, and 25 miles upstream from Buckley.

Drainage area.--216 sq mi.

Records available.--September 1911 to May 1912 (fragmentary), March 1929 to September 1951. Published as "near Enumclaw" 1911-12.

Gage.--Water-stage recorder. Altitude of gage is 1,725 ft (from topographic map). Prior to May 6, 1912, staff gage at site 2 miles upstream at different datum.

Average discharge.--22 years (1929-51), 828 cfs.

Extremes.--Maximum discharge during year, 5,550 cfs Feb. 9 (gage height, 5.92 ft); minimum, 325 cfs Sept. 27.

1911-12, 1929-51: Maximum discharge, 12,100 cfs Dec. 21, 1933 (gage height, 9.38 ft); minimum, 120 cfs Nov. 2, 1935 (gage height, 1.69 ft).

Remarks.--Records good except those for periods of shifting control or no gage-height record, which are poor. No diversion or regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9				Feb. 10 to Sept. 30			
2.2	332	3.3	1,100	2.6	290	4.0	1,450
2.4	428	3.6	1,410	2.8	390	4.5	2,210
2.6	543	4.0	1,910	3.0	510	5.0	3,160
2.8	678	4.5	2,710	3.3	730	5.5	4,560
3.0	833	5.2	4,220	3.6	990		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	373	867	1,470	963	678	594	666	846	1,030	1,440	828	402
2	360	*901	1,280	1,100	657	580	714	802	1,080	1,400	810	402
3	360	1,220	1,190	1,130	588	559	844	910	1,170	1,400	802	408
4	388	1,240	1,240	981	576	566	1,090	954	1,220	1,370	786	402
5	563	1,270	1,300	850	562	552	1,130	1,200	1,210	1,350	762	414
6	501	1,120	2,200	753	543	538	1,100	1,220	1,250	1,260	738	438
7	531	1,040	2,050	693	595	510	1,190	1,240	1,220	1,200	722	510
8	657	945	*1,660	657	777	504	1,160	1,200	1,190	1,150	722	517
9	801	850	1,860	629	3,860	498	1,100	1,250	1,280	1,220	714	456
10	1,730	817	1,840	608	*4,230	486	1,030	1,600	1,400	1,280	722	444
11	1,470	785	1,910	588	3,850	474	1,020	2,750	1,480	1,200	682	402
12	1,020	769	1,780	576	3,270	504	1,220	2,210	1,580	1,200	636	390
13	867	746	1,580	608	2,300	559	1,580	1,720	1,670	1,300	615	396
14	936	708	1,420	622	1,800	*552	1,760	1,420	1,760	1,280	615	402
15	833	693	1,310	716	1,520	828	1,700	1,280	1,850	1,200	643	408
16	753	708	1,240	671	1,270	837	1,650	1,420	1,890	1,060	650	426
17	730	686	1,230	650	1,130	714	1,760	1,770	1,900	1,080	629	450
18	785	643	1,140	602	1,040	658	1,740	1,760	1,850	1,150	615	358
19	892	608	1,140	588	963	636	1,510	1,590	1,750	1,100	608	408
20	936	678	1,190	576	900	690	1,250	1,480	1,680	*1,040	658	385
21	833	999	1,290	576	828	754	1,110	1,580	1,630	1,010	690	365
22	746	1,780	1,510	*556	786	730	1,020	1,800	1,600	1,010	666	360
23	708	1,840	2,620	531	746	674	*972	2,300	1,600	1,040	573	355
24	686	3,530	2,360	608	714	650	945	2,210	1,580	1,020	524	370
25	1,030	*1,100	2,050	842	690	658	936	2,050	1,540	954	504	486
26	884	3,640	1,700	1,230	643	666	963	1,720	1,480	909	498	375
27	1,070	3,750	1,460	936	622	658	972	1,580	1,420	909	498	385
28	1,050	2,710	1,360	753	615	650	1,010	*1,440	1,400	909	559	365
29	1,060	2,050	1,220	657	-	682	981	1,260	1,400	875	468	365
30	945	1,740	1,170	650	-	706	918	1,130	1,400	864	432	873
31	867	-	1,040	629	-	666	-	1,050	-	837	*402	-
Total	25,365	43,433	47,610	22,529	36,753	19,333	35,061	46,622	44,510	34,995	19,771	12,667
Mean	818	1,448	1,536	727	1,313	624	1,169	1,504	1,484	1,129	638	422
Cfsm	3.79	6.70	7.11	3.37	6.08	2.89	5.41	6.96	6.87	5.23	2.95	1.95
In.	4.37	7.48	8.20	3.88	6.33	3.33	6.04	8.03	7.66	6.03	3.40	2.18
Ac-ft	50,310	86,150	94,430	44,690	72,900	38,350	69,540	92,470	88,280	69,410	39,220	25,120

Calendar year 1950: Max 4,100 Min 350 Mean 1,209 Cfsm 5.60 In. 76.01 Ac-ft 875,400  
 Water year 1950-51: Max 4,230 Min 335 Mean 1,065 Cfsm 4.93 In. 66.93 Ac-ft 770,900

Peak discharge (base, 2,000 cfs).--Oct. 10 (11:30 a.m.) 2,440 cfs (4.28 ft); Nov. 25 (8 p.m.) 5,270 cfs (5.51 ft); Dec. 6 (12 m.) 2,533 cfs (4.28 ft); Dec. 23 (4 a.m.) 2,800 cfs (4.45 ft); Feb. 9 (7:30 p.m.) 5,550 cfs (5.92 ft); May 11 (9:30 a.m.) 3,160 cfs (5.00 ft); May 23 (10 p.m.) 2,380 cfs (4.62 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record June 11 to July 19; discharge estimated on basis of records for stations on nearby streams. Shifting-control method used Oct. 10 to Feb. 9, July 20 to Aug. 29.

# PUYALLUP RIVER BASIN

97

Greenwater River at Greenwater, Wash.

Location.--Lat 47°09'15", long. 121°38'00", in NW¼NW¼ sec. 11, T. 19 N., R. 9 E., on left bank 1 mile upstream from mouth, 1 mile east of Greenwater, and 17 miles east of Buckley.

Drainage area.--74.4 sq mi (revised).

Records available.--September 1911 to August 1912 (fragmentary), May 1929 to September 1951. Published as "near Enumclaw" 1911-12.

Gage.--Water-stage recorder. Altitude of gage is 1,725 ft above mean sea level (from topographic map). Prior to Aug. 10, 1912, staff gages at approximately same site but different datums. May 1, 1929, to Aug. 14, 1934, water-stage recorder at site 900 ft upstream at different datum.

Average discharge.--22 years (1929-51), 205 cfs.

Extremes.--Maximum discharge during year, 1,130 cfs Feb. 11, May 11; maximum gage height, 4.78 ft Feb. 11; minimum discharge, 35 cfs Sept. 23, 24 (gage height, 2.13 ft).  
1911-12, 1929-51: Maximum discharge, 4,140 cfs Dec. 9, 1933 (gage height, 9.24 ft, site and datum then in use), from rating curve extended above 1,000 cfs; minimum, 23 cfs Oct. 7, 1934 (gage height, 2.06 ft).

Remarks.--Records good except those for periods of shifting control, which are fair.  
No diversion or regulation.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

2.1	31	3.3	260
2.3	51	3.6	375
2.5	77	4.0	565
2.7	111	4.5	890
3.0	177	5.0	1,300

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	52	140	406	343	175	146	214	299	335	190	71	49
2	51	*153	343	420	172	140	239	284	327	180	70	47
3	49	260	319	434	167	138	319	278	331	172	69	47
4	50	267	331	351	160	144	429	331	339	167	67	46
5	57	257	335	295	153	138	429	452	335	160	67	46
6	62	233	424	260	146	131	406	470	351	158	64	44
7	61	222	447	236	151	127	442	475	351	144	64	46
8	66	203	*398	222	190	123	416	470	347	135	63	51
9	82	185	371	206	815	121	380	465	347	131	62	46
10	178	172	380	193	*1,000	117	351	535	351	*127	61	44
11	144	163	460	180	1,040	115	351	930	359	123	61	44
12	106	151	515	172	815	119	456	860	371	117	59	43
13	90	144	465	193	570	133	576	808	371	115	59	42
14	97	135	411	208	452	*138	614	668	375	111	57	42
15	97	133	359	208	380	225	582	565	402	109	56	41
16	87	133	323	203	323	248	570	540	402	102	55	39
17	85	129	295	198	284	211	604	598	388	98	53	39
18	88	125	278	177	260	187	587	592	363	97	53	38
19	91	115	264	165	239	185	525	545	339	95	52	38
20	83	125	254	149	227	200	456	510	315	95	52	37
21	88	236	278	149	211	230	406	500	299	91	51	36
22	82	642	343	*146	200	222	371	540	284	90	51	36
23	77	632	632	142	193	206	*343	614	270	87	51	35
24	76	808	620	170	182	195	327	638	264	85	51	35
25	87	801	576	257	175	206	315	632	254	83	50	49
26	87	838	520	420	163	211	315	576	239	80	49	44
27	121	801	447	331	158	211	327	520	230	79	48	40
28	149	686	438	254	151	208	331	*480	219	79	56	39
29	163	545	406	225	-	216	339	438	211	77	55	42
30	153	416	398	208	-	219	323	398	200	76	53	47
31	144	-	355	185	-	214	-	367	-	74	*51	-
Total	2,913	9,850	12,391	7,300	9,152	5,424	12,343	16,378	9,569	3,525	1,781	1,292
Mean	94.0	328	400	235	327	175	411	528	319	114	57.5	43.1
Cfs/m	1.28	4.41	5.38	3.16	4.40	2.35	5.52	7.10	4.29	1.53	0.773	0.579
In.	1.46	4.92	6.19	3.65	4.57	2.71	6.17	8.19	4.78	1.76	0.89	0.65
Ac-ft	5,780	19,540	24,580	14,480	18,150	10,760	24,480	32,490	18,980	6,990	3,530	2,560

Calendar year 1950: Max 1,210 Min 47 Mean 320 Cfs/m 4.30 In. 58.45 Ac-ft 232,000  
Water year 1950-51: Max 1,040 Min 35 Mean 252 Cfs/m 3.39 In. 45.94 Ac-ft 182,300

Peak discharge (base, 500 cfs).--Nov. 22 (4:30 p.m.) 962 cfs (4.52 ft); Dec. 12 (5 a.m.) 525 cfs (3.86 ft); Dec. 23 (3 p.m.) 662 cfs (4.13 ft); Feb. 11 (4 p.m.) 1,130 cfs (4.78 ft); Apr. 14 (7 a.m.) 626 cfs (4.01 ft); May 11 (11 p.m.) 1,130 cfs (4.69 ft); May 24 (11:30 p.m.) 674 cfs (4.11 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Nov. 22 to Feb. 9, Mar. 16 to July 6, July 19 to Sept. 25.

## PUYALLUP RIVER BASIN

## Mud Mountain Reservoir near Buckley, Wash.

Location.--Lat 47°08', long. 121°56', in SE $\frac{1}{4}$  sec. 8, T. 19 N., R. 7 E., on left bank of reservoir just upstream from Mud Mountain Dam on White River,  $\frac{1}{2}$  miles southeast of Buckley, and 6 miles downstream from Clearwater River.

Records available.--October 1944 to September 1951.

Gage.--Staff gage read once daily. Datum of gage is mean sea level (levels by Corps of Engineers).

Extremes.--Maximum contents observed during year, 18,500 acre-ft Feb. 10 (elevation, 1,073.4 ft); no pool Aug. 8 to Sept. 29.  
1944-51: Maximum contents observed since dam was completed, that of Feb. 10, 1951.

Remarks.--Reservoir, for flood control, is formed by earth-fill dam. Embankment completed in 1942. Capacity, 106,000 acre-ft at spillway crest, elevation, 1,215 ft. Storage is not retained but is dissipated as soon after a flood as is possible without creating damaging flows downstream in order to have the maximum capacity available for any following flood which might develop. Storage began on small scale in 1942.

Cooperation.--Records of reservoir elevations furnished by Corps of Engineers.

Contents, in acre-feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	95	124	13,600	1,050	113	179	191	127	134	233	141	0
2	95	299	10,800	1,050	168	179	158	113	141	233	149	0
3	95	590	7,980	2,810	141	179	249	127	179	233	149	0
4	72	578	5,440	2,480	141	179	856	181	218	158	149	0
5	72	218	4,750	1,310	127	179	1,310	691	218	127	89	0
6	57	141	6,640	179	127	179	1,170	708	259	127	72	0
7	57	134	10,400	191	233	179	1,160	726	284	141	72	0
8	72	107	10,800	179	519	179	1,140	726	204	158	0	0
9	72	80	8,980	179	6,730	179	958	578	303	191	0	0
10	1,830	95	8,940	168	18,500	179	491	979	413	191	0	0
11	3,670	95	7,940	168	17,800	179	323	3,320	641	191	0	0
12	1,310	95	7,960	141	16,100	218	779	7,480	743	168	0	0
13	169	83	7,100	141	18,400	369	1,730	8,660	988	158	0	0
14	120	83	5,410	266	17,900	323	1,850	7,470	1,200	141	0	0
15	95	83	3,530	204	16,100	840	1,930	4,930	1,850	141	0	0
16	77	95	1,860	158	13,300	2,080	1,710	2,220	2,470	141	0	0
17	95	95	743	218	10,000	726	1,820	2,170	2,460	141	0	0
18	107	95	271	141	6,260	218	1,770	2,870	2,030	141	0	0
19	191	107	266	141	2,560	191	1,480	2,950	1,530	134	0	0
20	218	113	303	141	233	218	641	2,370	1,130	127	0	0
21	169	750	691	141	218	218	191	1,760	688	127	0	0
22	134	3,300	253	141	233	266	158	1,800	578	127	0	0
23	95	9,640	4,330	154	233	191	158	2,900	578	141	0	0
24	95	15,300	8,580	258	233	191	149	4,530	578	127	0	0
25	134	17,900	10,300	1,540	191	191	149	5,780	438	127	0	0
26	120	17,800	10,500	5,000	191	191	149	5,620	340	127	0	0
27	233	17,100	9,190	5,780	191	191	149	4,730	249	127	0	0
28	-	15,800	7,370	4,030	179	191	149	3,390	233	127	0	0
29	-	15,400	5,480	1,510	-	191	149	2,040	218	127	0	0
30	201	15,400	3,790	113	-	218	141	204	218	127	0	168
31	130	-	2,230	113	-	191	-	149	-	120	0	-

Monthly elevation and contents, water year October 1950 to September 1951

Date	Elevation (feet)†	Contents (acre-feet)	Change in contents during month (acre-feet)
Sept. 30.....	918.0	95	-
Oct. 31.....	923.0	127	+32
Nov. 30.....	1,060.5	14,540	+14,410
Dec. 31.....	971.7	1,620	-12,920
Calendar year 1950.....	-	-	-360
Jan. 31.....	921.0	113	-1,510
Feb. 28.....	929.0	179	+66
Mar. 31.....	930.0	191	+12
Apr. 30.....	924.1	135	-56
May 31.....	925.1	142	+7
June 30.....	932.4	224	+82
July 31.....	923.4	130	-94
Aug. 31.....	0	0	-130
Sept. 30.....	*915.5	80	+80
Water year 1950-51.....	-	-	-15

† Elevation at 12 p.m. determined from 1 daily observation.

\* Estimated.

## White River near Buckley, Wash.

Location.--Lat 47°09'05", long. 121°57'00", in SW 1/4 sec. 8, T. 19 N., R. 7 E., on right bank 0.7 mile upstream from Red Creek, 1 mile downstream from Mud Mountain Reservoir, 3 miles east of Buckley, and 8 miles downstream from Clearwater River.

Drainage area.--403 sq. mi.

Records available.--October 1928 to November 1933, October 1938 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, datum of 1929. Oct. 26 to Dec. 9, 1928, staff gage and Dec. 9, 1928, to Nov. 30, 1933, water-stage recorder at site 3 miles upstream at different datum. Nov. 26, 1938, to Feb. 14, 1939, staff gage at present site and datum.

Average discharge.--18 years, 1,387 cfs.

Extremes.--Maximum discharge during year, 9,650 cfs Feb. 12 (elevation, 806.70 ft); minimum, 424 cfs Sept. 23 (elevation, 799.42 ft).

1928-33, 1938-51: Maximum discharge, 17,000 cfs Feb. 26, 1932 (gage height, 17.5 ft, site and datum then in use), from rating curve extended above 4,000 cfs; minimum, 10 cfs Sept. 26, 1948 (elevation, 796.92 ft); minimum daily, 72 cfs Oct. 13, 1942. Maximum stage known, 23.4 ft in December 1933 from floodmarks, at former site (discharge, 28,000 cfs, from rating curve extended above 3,000 cfs).

Remarks.--Records good except those for periods of shifting control, which are fair, and those for period of no gage-height record, which are poor. No diversion. Flow regulated by Mud Mountain Reservoir for flood control (see preceding page).

Cooperation.--Water-stage recorder inspected by employees of Corps of Engineers.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

799.5	455	802.5	2,350
800.0	635	803.0	2,900
800.5	860	804.0	4,250
801.0	1,140	805.0	5,970
801.5	1,480	806.0	8,020
802.0	1,880	806.5	9,170

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	520	1,520	3,810	2,450	1,300	992	1,300	1,410	1,710	1,970	965	520
2	*504	1,840	3,670	2,500	1,480	968	1,380	1,340	*1,750	1,880	938	520
3	504	2,300	3,550	2,840	1,490	958	1,650	1,300	1,840	1,680	910	520
4	538	2,500	3,400	2,780	1,340	965	1,970	1,480	1,880	1,750	910	520
5	810	2,560	3,270	2,560	1,240	910	2,100	1,680	1,880	1,550	860	538
6	810	2,200	3,400	1,880	1,170	880	2,100	1,970	1,970	1,440	860	575
7	810	2,020	3,530	1,590	1,380	835	2,100	2,020	1,970	1,340	835	655
8	1,020	1,790	3,530	1,520	2,060	810	2,100	1,970	1,880	1,300	835	742
9	1,140	1,590	3,400	1,410	3,020	810	2,080	1,970	1,970	*1,410	860	635
10	2,200	1,480	3,400	1,300	7,580	765	1,880	2,060	2,020	1,440	860	595
11	2,840	1,410	3,400	1,240	*9,170	742	1,750	2,450	2,100	1,380	835	538
12	2,450	1,300	*3,270	1,170	6,400	955	1,970	2,840	2,200	1,340	765	520
13	1,340	1,240	3,270	1,300	3,670	1,410	2,400	2,900	2,250	1,410	720	520
14	1,380	1,170	3,140	1,840	3,670	1,410	2,840	2,960	2,350	1,410	720	520
15	1,270	*1,170	2,960	1,750	3,670	1,840	2,720	3,620	2,500	1,340	765	538
16	1,110	1,200	2,720	1,750	3,530	*2,500	2,620	2,840	2,560	1,300	765	555
17	1,080	1,200	2,400	1,790	3,530	2,150	2,780	2,560	2,560	1,300	765	595
18	1,170	1,110	2,020	1,550	3,140	1,550	2,720	2,670	2,500	1,380	720	595
19	1,440	1,050	1,870	1,380	2,840	1,440	2,560	2,670	2,450	1,240	720	555
20	1,590	1,270	1,970	1,240	1,910	1,520	2,250	2,620	2,350	1,140	*765	520
21	1,340	2,500	2,250	1,300	1,520	1,670	1,840	2,560	2,200	1,080	810	487
22	1,170	3,140	2,150	1,200	1,410	1,630	1,630	2,560	2,100	1,080	810	471
23	1,050	3,810	2,940	*1,140	1,340	1,480	1,520	2,670	2,100	1,140	898	455
24	992	4,540	3,270	1,450	1,270	1,380	*1,450	2,840	2,100	1,140	835	471
25	1,300	*6,350	3,400	2,200	1,240	1,380	1,440	3,020	2,060	1,080	595	675
26	1,240	7,580	3,400	2,840	1,110	1,440	1,480	2,960	2,020	1,050	595	555
27	1,480	6,350	3,400	2,960	1,080	1,410	1,480	2,900	1,970	1,020	595	455
28	1,750	5,330	3,270	2,840	1,020	1,340	1,590	2,780	1,920	1,050	765	487
29	1,750	3,950	3,140	a2,400	-	1,390	1,590	2,560	1,920	992	615	538
30	1,670	3,950	3,020	a1,900	-	1,440	1,550	2,250	1,920	992	555	1,450
31	1,480	-	2,780	a1,500	-	1,340	-	1,790	-	965	520	-
Total	39,748	79,420	95,080	57,600	73,440	40,267	58,830	74,420	63,000	40,789	23,566	17,320
Mean	1,282	2,647	3,067	1,858	2,623	1,299	1,961	2,401	2,100	1,316	760	577
Ac-ft	78,840	157,500	188,600	114,200	145,700	79,870	116,700	147,600	125,000	80,900	46,740	34,350
(+)	+32	+14,410	-12,920	-1,510	+66	+12	-56	+7	+82	-94	-130	+80

Adjusted for change in reservoir contents

Mean	1,283	2,889	2,857	1,833	2,625	1,299	1,960	2,401	2,102	1,314	758	579
Cfsm	3.16	7.17	7.09	4.55	6.51	3.22	4.86	5.96	5.22	3.26	1.88	1.44
In.	3.67	8.00	8.17	5.24	6.78	3.72	5.42	6.87	5.82	3.76	2.17	1.60
Ac-ft	78,870	171,900	175,700	112,700	145,900	79,880	116,600	147,600	125,100	80,810	46,610	34,430

Observed

Calendar year 1950: Max	7,580	Min	504	Mean	2,098	Ac-ft	1,519,000
Water year 1950-51: Max	9,170	Min	455	Mean	1,818	Ac-ft	1,316,000

Adjusted

Calendar year 1950: Mean	2,098	Cfsm	5.21	In.	70.66	Ac-ft	1,519,000
Water year 1950-51: Mean	1,818	Cfsm	4.51	In.	61.22	Ac-ft	1,316,000

\* Discharge measurement made on this day.

† Change in contents in Mud Mountain Reservoir, in acre-feet, furnished by Corps of Engineers.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Shifting-control method used Oct. 10 to Dec. 26, Apr. 18 to May 15.

## PUYALLUP RIVER BASIN

Lake Tapps near Sumner, Wash.

Location.--Lat 47°14'20", long. 122°11'30", in sec. 8, T. 20 N., R. 5 E., 1 mile east of Dieringer and 3 miles northeast of Sumner.

Drainage area.--12.5 sq mi.

Records available.--October 1934 to September 1951. Prior to September 1950, change in contents published with tables of monthly discharge for Puyallup River at Puyallup.

Gage.--Staff gage read hourly. Datum of gage is at mean sea level (levels by Puget Sound Power and Light Co.).

Extremes.--Maximum contents observed during year, 48,100 acre-ft Dec. 1, 7, June 15, 25 (elevation, 540.0 ft); minimum, 27,910 acre-ft Mar. 13 (elevation, 530.48 ft).  
1934-51: Maximum contents observed during period, 48,100 acre-ft July 16, 1941, July 14, 21, 28, Aug. 4, 1947, July 12, 1948, Apr. 25, June 24, 25, July 3, 1949, Dec. 1, 7, 1950, June 15, 25, 1951 (elevation, 540.0 ft); minimum, 11,630 acre-ft Nov. 2, 1935 (elevation, 519.23 ft).  
The Puget Sound Power and Light Co. reports a minimum observed lake elevation of 505.70 ft June 24, 1912.

Remarks.--Reservoir is formed on natural lake into which a great part of the low-water flow of White River is diverted. Usable capacity, 50,400 acre-ft between elevations 505 and 541 ft. Storage used for power.

Cooperation.--Gage-height record and contents curve furnished by Puget Sound Power and Light Co.

Monthly elevation and contents, water year October 1950 to September 1951

Date	Elevation (feet)†	Contents (acre-feet)	Change in contents during month (acre-feet)
Sept. 30.....	538.80	45,460	-
Oct. 31.....	539.22	46,380	+920
Nov. 30.....	539.69	47,420	+1,040
Dec. 31.....	537.65	42,930	-4,490
Calendar year 1950.....	-	-	-4,200
Jan. 31.....	538.18	44,100	+1,170
Feb. 28.....	536.57	40,550	-3,550
Mar. 31.....	531.77	30,440	-10,110
Apr. 30.....	534.56	36,180	+5,740
May 31.....	538.54	44,890	+8,710
June 30.....	539.60	47,220	+2,330
July 31.....	539.60	47,220	0
Aug. 31.....	538.40	44,580	-2,640
Sept. 30.....	539.43	46,850	+2,270
Water year 1950-51.....	-	-	+1,390

† Elevation at midnight.



Stuck River near Sumner, Wash.

Location.--Lat 47°15'00", long. 122°14'35", in NE¼SW¼ sec. 1, T. 20 N., R. 4 E., on right bank 300 ft downstream from bridge, 3 miles north of Sumner, and 4½ miles upstream from mouth.

Drainage area.--470 sq mi (revised).

Records available.--January 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (Intercounty River Improvement Commission benchmark).

Average discharge.--6 years, 736 cfs.

Extremes.--Maximum discharge during year, 12,200 cfs Feb. 11 (gage height, 59.47 ft); minimum, 64 cfs Sept. 15.  
1945-51: Maximum discharge, 13,100 cfs Dec. 14, 1946 (gage height, 59.74 ft); minimum, 43 cfs Oct. 19, 1946.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. A yearly average of 600 to 900 cfs diverted above gage into Lake Tapps for Dieringer powerplant of Puget Sound Power and Light Co. High flow influenced by regulation in Mud Mountain Reservoir (see p. 98).

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	113	190	2,820	1,300	450	203	222	139	168	213	107	88
2	113	523	3,000	1,650	350	189	222	136	147	189	101	88
3	113	364	3,940	1,940	250	198	222	121	151	189	101	92
4	118	475	3,340	1,940	300	227	253	129	143	184	101	88
5	135	426	2,520	1,530	300	222	416	143	143	136	101	*88
6	127	286	2,620	500	250	213	512	189	151	132	98	98
7	108	202	2,820	350	*490	198	496	222	159	152	98	104
8	132	179	2,620	500	555	203	696	237	151	125	92	104
9	132	158	2,520	450	*2,800	203	466	203	139	125	95	98
10	326	142	2,520	400	7,190	184	303	208	155	125	88	98
11	710	142	2,430	350	11,000	184	213	504	222	125	85	95
12	650	137	2,450	300	*8,700	444	213	1,020	326	114	79	82
13	283	135	2,380	350	3,850	568	459	1,160	326	114	76	76
14	187	132	2,300	300	3,610	402	1,100	1,190	364	111	76	71
15	171	140	2,200	150	2,840	480	1,040	1,750	576	114	76	71
16	155	*150	2,120	300	2,330	1,010	918	1,040	705	111	74	79
17	142	174	1,980	250	2,190	820	940	658	982	111	74	79
18	163	174	1,730	350	1,980	364	1,010	740	694	*114	71	*88
19	205	158	625	500	1,630	264	841	810	608	114	71	82
20	205	196	*355	350	962	243	624	1,120	488	111	71	82
21	185	492	485	350	390	237	309	820	376	107	74	79
22	168	735	783	250	274	227	198	584	352	95	71	76
23	153	1,080	2,920	250	248	*213	1,630	2,180	291	85	71	76
24	145	1,470	2,340	300	237	203	1,520	2,210	303	101	68	76
25	153	2,920	2,340	700	222	198	*1,520	1,180	297	101	74	92
26	163	4,700	2,430	1,450	208	198	1,560	*1,150	243	98	76	79
27	179	5,040	2,720	1,810	198	198	1,160	1,060	227	98	82	76
28	197	4,200	3,610	1,450	194	195	198	940	208	601	107	82
29	208	2,920	3,170	1,450	-	237	172	750	194	530	98	98
30	190	2,820	2,120	2,380	-	237	152	466	194	159	95	125
31	182	-	1,690	1,000	-	222	-	213	-	114	88	-
Total	6,141	30,760	72,078	25,150	53,998	9,184	19,588	23,272	9,441	5,078	2,639	2,610
Mean	198	1,025	2,325	811	1,928	296	653	751	315	164	85.1	87.0
Ac-ft	12,180	61,010	143,000	49,880	107,100	18,220	38,850	46,160	18,730	10,070	5,230	5,180
Calendar year 1950:	Max	5,250		Min	62	Mean	1,024	Ac-ft	741,000			
Water year 1950-51:	Max	11,000		Min	68	Mean	712	Ac-ft	515,600			

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 6-25, Jan. 31 to Feb. 6; discharge estimated on basis of records for stations on nearby streams. Shifting-control method used Oct. 1 to Nov. 25, Feb. 13 to Apr. 10.

## PUYALLUP RIVER BASIN

## Puyallup River at Puyallup, Wash.

Location.--Lat 47°12'20", long. 122°19'30", in NE¼ sec. 20, T. 20 N., R. 4 E., on left bank 1 mile upstream from bridge at Clarks Creek, 1 mile northwest of Puyallup, and 7 miles upstream from mouth.

Drainage area.--948 sq mi.

Records available.--May 1914 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, datum of 1929. Prior to Dec. 3, 1919, at site 1¼ miles upstream at different datum, Dec. 3, 1919, to Nov. 9, 1935, at site 500 ft upstream at datum 9.61 ft higher than present datum.

Average discharge.--37 years, 3,273 cfs (adjusted for storage in Lake Taops since October 1934, and Mud Mountain Reservoir October 1944 to September 1947).

Extremes.--Maximum discharge during year, 29,800 cfs Feb. 11 (gage height, 22.98 ft); minimum, 780 cfs Sept. 3 (gage height, 8.61 ft); minimum daily, 868 cfs Sept. 1, 1914-51. Maximum discharge, 57,000 cfs Dec. 10, 1933 (gage height, 31.0 ft, present datum); minimum, probably less than 350 cfs Nov. 24, 28, Dec. 1, 3-5, 1929.

Remarks.--Records good. All diverted water returned to river above gage. Large part of flow of White River diverted into Lake Tapps (usable capacity, 50,400 acre-ft) returned via Stuck River above station. Flood flow regulated by Mud Mountain Reservoir on White River. Some pondage on tributaries and upper Puyallup River. Diurnal fluctuation caused by powerplants above station.

Revisions.--W 832: Drainage area.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,020	3,500	6,800	4,700	3,800	2,900	2,910	2,750	3,040	3,460	2,080	868
2	1,510	4,640	6,290	6,350	*4,100	2,850	2,980	2,660	3,000	3,590	2,060	874
3	1,500	4,660	6,370	7,790	4,330	2,810	3,130	2,600	2,780	3,460	2,050	860
4	1,500	4,750	8,530	6,700	3,670	2,790	3,320	2,770	3,060	2,900	1,780	1,220
5	2,310	4,580	7,780	5,900	3,750	2,870	3,450	3,070	3,200	3,310	1,660	1,480
6	2,680	3,900	9,840	4,920	3,600	2,890	3,390	2,660	3,230	3,100	2,130	1,420
7	2,150	3,820	9,530	4,080	4,610	2,720	3,320	3,350	3,340	2,900	1,990	*1,330
8	2,230	3,580	7,800	4,080	6,310	2,740	3,170	3,340	3,310	2,440	2,020	1,460
9	3,520	3,180	6,990	3,850	*14,800	2,700	3,320	3,220	3,230	2,850	2,060	1,130
10	6,860	2,960	6,480	3,440	*21,200	2,530	3,130	3,400	3,370	*2,280	2,040	1,580
11	6,810	2,550	6,470	3,300	25,800	2,360	3,010	5,060	3,720	2,220	1,380	1,410
12	4,820	1,970	6,540	3,100	*21,300	3,580	3,150	5,340	3,910	2,590	1,120	1,340
13	3,830	2,610	5,870	2,940	11,900	5,150	3,710	4,460	3,900	2,730	1,740	1,310
14	3,470	2,590	5,560	3,850	9,880	4,510	4,320	4,620	4,180	2,640	1,600	1,360
15	2,470	2,600	5,350	4,180	8,200	5,950	3,740	4,650	4,500	2,550	1,980	1,100
16	2,850	*2,840	5,100	4,550	6,960	6,690	*4,250	4,460	4,570	2,660	2,110	1,010
17	2,420	3,070	3,980	5,110	6,330	5,160	4,330	4,390	4,650	2,650	2,060	1,580
18	3,020	2,750	4,460	4,910	5,260	3,810	4,320	4,630	4,340	2,880	1,270	1,720
19	3,640	1,760	*3,680	4,240	5,060	3,770	3,990	4,360	4,180	2,740	1,130	1,600
20	3,810	3,060	3,770	3,610	4,970	3,600	3,670	4,550	3,980	2,580	1,970	1,420
21	3,240	5,460	4,420	3,660	3,860	3,830	3,120	4,360	3,830	2,470	1,980	1,410
22	2,630	7,830	4,450	4,500	3,510	3,720	2,430	4,330	3,780	1,440	2,240	1,050
23	2,440	9,040	11,400	3,870	3,360	3,610	3,940	6,270	3,600	2,360	2,180	882
24	2,200	12,000	8,650	3,910	3,220	3,410	4,080	6,730	3,700	2,560	2,020	1,340
25	3,110	12,700	7,760	5,970	2,620	3,040	4,040	5,690	3,700	2,430	990	1,780
26	3,170	13,700	6,960	7,870	3,030	*3,130	4,180	5,060	3,570	2,090	950	1,520
27	3,580	13,300	6,800	7,650	2,940	3,350	4,010	4,570	3,550	2,050	1,990	1,520
28	3,570	10,800	7,920	5,920	2,870	3,260	2,870	4,450	3,500	1,890	2,110	1,170
29	3,320	7,510	7,280	5,230	-	3,120	2,650	*3,830	3,610	2,220	1,600	1,040
30	3,640	7,190	5,790	4,800	-	3,210	2,890	3,560	3,640	2,260	1,380	1,130
31	3,490	-	5,280	4,200	-	3,140	-	3,100	-	1,940	1,430	-
Total	96,810	165,120	203,900	149,180	201,240	109,400	104,820	128,730	109,950	80,060	55,100	40,934
Mean	3,123	5,504	6,577	4,812	7,187	3,529	3,494	4,153	3,665	2,583	1,777	1,364
Ac-ft	192,000	327,500	404,400	295,900	399,200	217,000	207,900	255,300	218,100	158,800	109,300	81,190
(†)	+920	+1,040	-4,490	+1,170	-3,550	-10,110	+5,740	+8,710	+2,330	0	-2,640	+2,270

Adjusted for change in lake contents

	Mean	Cfs	Ac-ft	Mean	Cfs	Ac-ft	Mean	Cfs	Ac-ft	Mean	Cfs	Ac-ft
Mean	3,137	5,521	6,504	4,832	7,123	3,365	3,590	4,294	3,704	2,583	1,735	1,403
Cfs	-	-	-	-	-	-	-	-	-	-	-	-
In.	-	-	-	-	-	-	-	-	-	-	-	-
Ac-ft	192,900	328,500	399,900	297,100	395,600	206,900	213,600	264,000	220,400	158,800	106,700	83,460

Observed

Calendar year 1950: Max	14,700	Min	970	Mean	4,664	Ac-ft	3,376,000
Water year 1950-51: Max	25,800	Min	868	Mean	3,960	Ac-ft	2,867,000

Adjusted

Calendar year 1950: Mean	4,658	Cfs	-	In.	-	Ac-ft	-
Water year 1950-51: Mean	3,961	Cfs	4.18	In.	56.72	Ac-ft	2,868,000

\* Discharge measurement made on this day.

† Change in contents in Lake Tapps, in acre-feet, furnished by Puget Sound Power & Light Co.

## Snow Creek near Lester, Wash.

Location.--Lat 47°15', long. 121°24', in NW¼NW¼ sec. 3, T. 20 N., R. 11 E., on right bank a quarter of a mile upstream from mouth and 5½ miles northeast of Lester.

Drainage area.--11.9 sq mi.

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,950 ft (from topographic map).

Average discharge.--6 years, 70.0 cfs.

Extremes.--Maximum discharge during year, 842 cfs Feb. 9 (gage height, 4.69 ft); minimum, 4.1 cfs Sept. 15, 16, 20-24 (gage height, 2.11 ft).

1945-51: Maximum discharge, 988 cfs Dec. 11, 1946 (from rating curve extended above 160 cfs); maximum gage height, that of Feb. 9, 1951; minimum discharge, that of Sept. 15, 16, 20-24, 1951.

Remarks.--Records excellent except those for periods of no gage-height record, which are fair. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

2.1	3.8	3.0	105
2.2	8.3	3.3	168
2.3	14.5	3.6	250
2.5	32	3.9	364
2.7	57	4.4	640

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	13	70	92	82	a58	30	58	101	82	51	7.8	5.8
2	12	92	76	89	a58	29	68	92	91	30	7.8	5.8
3	11	140	67	96	a52	a28	96	96	100	28	7.8	5.8
4	12	157	80	76	47	a28	133	133	101	25	7.2	5.8
5	17.5	148	53	64	43	a27	138	180	94	23	7.2	5.4
6	28	125	50	57	39	a26	133	182	94	23	7.8	5.4
7	36	119	49	52	39	a25	146	178	101	22	7.8	6.8
8	39	101	*45	48	74	a24	131	159	98	21	7.8	7.2
9	44	84	54	44	*539	a24	121	164	96	19	7.2	5.8
10	152	70	60	42	584	a23	111	219	100	18.5	7.2	5.4
11	170	61	98	39	545	a22	113	336	100	17.5	7.2	5.4
12	100	54	125	37	300	a22	153	260	96	16.5	7.2	4.9
13	70	48	105	40	182	24	197	175	91	16	7.2	4.5
14	61	44	89	43	136	24	203	144	94	15	7.2	4.5
15	52	40	76	37	105	53	*187	133	98	14.5	7.2	4.1
16	45	38	70	34	87	53	187	157	91	14.5	6.8	4.1
17	42	36	70	36	76	47	200	*192	81	14	*6.8	4.5
18	*47	32	68	32	67	44	190	173	74	13	6.8	4.5
19	54	30	71	29	60	44	155	142	*68	12.5	6.2	4.5
20	54	32	87	28	54	48	125	131	63	12.5	6.2	4.1
21	50	84	138	28	50	54	103	142	60	12	6.2	4.1
22	47	339	228	26	47	52	92	180	56	11	6.2	4.1
23	42	268	460	25	43	48	89	206	53	11	5.8	4.1
24	39	304	323	42	40	47	91	211	50	10.5	5.8	4.1
25	43	323	264	87	38	49	98	214	48	*10	5.8	11
26	40	312	182	150	36	54	107	159	45	10	5.8	*7.2
27	57	271	138	111	33	57	117	136	42	9.4	5.8	6.2
28	68	195	115	a88	32	54	140	121	39	9.4	8.8	7.8
29	76	146	105	a75	-	56	142	101	36	8.8	7.2	11
30	70	115	100	a66	-	54	121	89	34	8.3	6.8	4.4
31	63	-	89	a62	-	53	-	82	-	8.3	6.2	-
Total	1,654.5	3,877	3,605	1,765	3,474	1,223	3,943	5,048	2,276	495.2	214.8	207.9
Mean	53.4	129	116	56.9	124	39.5	131	163	75.9	18.0	6.93	6.33
Cfsm	4.49	10.8	9.75	4.78	10.4	3.32	11.0	13.7	6.38	1.34	0.582	0.582
In.	5.17	12.12	11.27	5.52	10.86	3.82	12.32	15.78	7.11	1.55	0.67	0.65
Ac-ft	3,280	7,690	7,150	3,500	6,890	2,430	7,820	10,010	4,510	982	426	412
Calendar year 1950: Max	460			Min 6.8	Mean 87.3	Cfsm 7.34	In. 99.57	Ac-ft 63,180				
Water year 1950-51: Max	594			Min 4.1	Mean 76.1	Cfsm 6.39	In. 86.84	Ac-ft 55,100				

Peak discharge (base, 350 cfs).--Oct. 10 (12 m.) 382 cfs (3.94 ft); Nov. 22 (4 p.m.) 405 cfs (3.99 ft); Nov. 25 (9 p.m.) 382 cfs (3.94 ft); Dec. 23 (3 to 4 p.m.) 504 cfs (4.18 ft); Feb. 9 (8:30 p.m.) 842 cfs (4.69 ft); May 11 (7 to 11 a.m.) 445 cfs (4.07 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

## Friday Creek near Lester, Wash.

Location.--Lat 47°13', long. 121°27', in SE 1/4 sec. 18, T. 20 N., R. 11 E., on left bank 0.4 mile upstream from mouth and 2 miles northeast of Lester.

Drainage area.--4.55 sq mi (revised).

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Concrete control since Aug. 9, 1951. Altitude of gage is about 1,760 ft (from topographic map).

Average discharge.--6 years, 29.5 cfs.

Extremes.--Maximum discharge during year, 262 cfs Feb. 11; maximum gage height, 4.57 ft Nov. 22; minimum, 2.1 cfs Sept. 20-24, 27, 28.

1945-51: Maximum discharge, 497 cfs Dec. 11, 1946 (gage height, 4.90 ft); minimum, 1.3 cfs Sept. 26-29, Oct. 2, 3, 1949.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor. No diversion or regulation.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Nov. 22

Nov. 22 to Aug. 2

Aug. 3 to Sept. 30

3.1	3.4	3.9	72	2.5	2.9	3.6	73	2.5	1.3
3.3	11.5	4.2	135	2.7	7.4	3.9	131	2.7	6.0
3.6	33	4.5	218	3.0	19.5	4.2	230	2.9	16
				3.3	40				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.8	30	38	31	b20	12.5	21	36	39	11.5	3.8	2.8
2	5.5	37	31	40	b18	12	25	33	42	10.5	3.6	2.8
3	5.2	53	27	41	16	11.5	30	35	44	10	3.5	2.8
4	5.8	53	24	29	14.5	11	40	44	45	9.6	3.5	2.6
5	8.3	48	22	23	14	10.5	40	58	43	9.0	3.5	2.6
6	11.5	42	23	20	12	10	40	60	43	9.6	3.5	2.6
7	12.5	38	23	18	14	9.6	45	60	48	8.3	3.5	*3.3
8	13.5	31	*22	17	35	9.3	45	56	46	8.0	3.5	3.6
9	14	27	28	15.5	*210	9.0	40	57	44	7.7	3.6	2.6
10	90	23	31	14.5	184	8.6	38	76	44	7.1	3.6	3.1
11	53	20	49	14	199	8.3	40	161	44	6.8	3.6	2.8
12	31	18.5	56	13	110	8.3	50	108	42	6.5	3.6	2.6
13	23	17	45	16	69	10.5	55	72	40	6.2	3.6	2.4
14	22	16	37	22	51	12	59	40	40	6.0	3.6	2.2
15	18.5	15.5	31	16.5	42	24	*56	53	39	6.0	3.3	2.2
16	16.5	15	29	14	36	26	57	60	36	5.8	3.3	2.2
17	16	14	30	14	31	19.5	60	*72	33	5.5	*3.1	2.2
18	*17.5	12.5	28	12.5	28	18	57	65	30	5.5	3.1	2.2
19	20	12	29	11.5	24	18.5	49	57	*28	5.2	3.1	2.2
20	20	13.5	36	10	23	21	41	54	25	5.2	3.1	2.2
21	17.5	45	50	10	21	25	35	58	23	5.0	3.1	2.1
22	16	188	77	9.6	20	21	31	70	21	4.8	3.1	2.1
23	15.5	122	168	8.6	19	18	29	84	20	4.6	3.1	2.1
24	15	136	117	13.5	18	18	29	89	18.5	4.6	2.8	2.1
25	16.5	124	95	40	17	19	30	86	17	*4.4	2.8	5.7
26	22	108	66	54	15	20	33	68	16	4.4	2.8	*2.6
27	20	98	49	35	14	22	38	58	14.5	4.2	2.8	2.2
28	23	75	44	27	13	20	46	54	13.5	4.2	2.8	3.1
29	26	57	41	b25	-	21	46	49	12.5	4.0	3.6	4.4
30	23	46	38	b22	-	20	41	44	12	4.0	3.1	14
31	21	-	53	b20	-	21	-	40	-	3.8	2.8	-
Total	625.1	1,535.0	1,417	663.2	1,287.5	495.1	1,247	1,976	963.0	158.0	103.4	92.4
Mean	20.2	51.2	45.7	21.4	46.0	16.0	41.6	63.7	32.1	6.39	3.34	3.08
Cfsm	4.44	11.3	10.0	4.70	10.1	3.52	9.14	14.0	7.05	1.40	0.734	0.677
In.	5.11	12.55	11.58	5.42	10.52	4.05	10.19	16.15	7.87	1.82	0.85	0.76
Ac-ft	1,240	3,040	2,810	1,320	2,550	982	2,470	3,920	1,910	393	205	185

Calendar year 1950: Max 188 Min 3.4 Mean 34.1 Cfsm 7.49 In. 101.75 Ac-ft 24,680  
 Water year 1950-51: Max 210 Min 2.1 Mean 29.0 Cfsm 6.37 In. 86.67 Ac-ft 21,020

Peak discharge (base, 150 cfs).--Nov. 22 (6:30 a.m.) 242 cfs (4.57 ft); Dec. 23 (1 p.m.) 188 cfs (4.09 ft); Feb. 11 (10 a.m.) 262 cfs (4.27 ft); May 11 (12:30 a.m.) 178 cfs (4.06 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Mar. 24 to Apr. 14, Aug. 3-8; discharge estimated on basis of records for stations on nearby streams.

Green River near Lester, Wash.

Location.--Lat 47°12'30", long. 121°33'20", in NE $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 20, T. 20 N., R. 10 E., on right bank  $\frac{1}{4}$  miles downstream from McCain Creek and 3 miles west of Lester.

Drainage area.--104 sq mi.

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,465 ft (from topographic map).

Average discharge.--6 years, 456 cfs.

Extremes.--Maximum discharge during year, 4,790 cfs Feb. 9 (gage height, 9.60 ft); minimum, 27 cfs Sept. 21 (gage height, 3.01 ft).

1945-51: Maximum discharge, 9,200 cfs probably Dec. 11, 1946 (gage height, 12.7 ft, from high-water mark in well), from rating curve extended above 2,600 cfs; minimum, that of Sept. 21, 1951.

Remarks.--Records good except those for period of no gage-height record, which are fair. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

3.0	26	3.8	100	5.0	420	7.0	1,677
3.2	40	4.1	154	5.5	640	7.5	2,147
3.4	55	4.4	226	6.0	920	8.0	2,677
3.6	74	4.7	316	6.5	1,260	9.0	3,920

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	69	371	690	640	347	210	420	520	424	152	50	39
2	64	424	565	690	330	200	540	484	432	144	49	38
3	60	590	488	690	340	198	770	488	452	138	48	37
4	80	715	448	690	319	200	1,020	640	472	134	47	36
5	72	715	399	565	a300	186	980	950	452	127	46	35
6	99	640	399	476	a280	174	890	950	456	129	45	34
7	114	615	*399	416	a330	167	950	950	472	118	44	*40
8	130	540	382	374	a600	161	830	890	456	110	45	48
9	167	460	444	340	*3,220	156	740	890	444	106	46	41
10	986	402	520	316	3,390	150	980	1,160	444	100	46	38
11	690	360	740	294	3,140	144	690	2,190	452	96	47	39
12	436	323	1,020	275	1,990	148	920	1,670	440	92	48	36
13	319	287	800	303	1,260	167	1,260	1,160	420	90	47	34
14	294	269	665	460	920	188	1,260	1,620	420	87	44	33
15	260	248	565	392	715	448	*1,160	770	436	85	44	31
16	226	240	520	357	590	436	1,120	830	410	81	43	31
17	213	229	496	336	520	350	1,190	*1,050	368	80	*42	30
18	*223	208	480	297	448	316	1,120	950	333	76	41	30
19	254	190	476	272	406	319	890	770	*310	75	41	30
20	269	200	484	246	371	368	715	690	284	73	41	30
21	254	592	800	240	340	444	590	690	269	70	39	29
22	232	2,160	927	223	316	406	520	830	254	68	39	28
23	213	1,850	2,500	205	300	357	484	1,020	237	65	39	28
24	198	2,090	2,190	240	290	340	484	1,020	226	64	39	30
25	210	2,040	1,760	540	272	371	520	1,080	213	*63	38	45
26	213	2,090	1,380	1,120	248	410	540	830	200	60	37	*44
27	281	1,800	1,020	860	232	424	590	690	188	59	36	34
28	396	1,420	690	615	224	410	665	615	176	56	47	36
29	468	1,050	770	500	-	424	690	540	167	55	49	44
30	432	830	740	440	-	428	615	492	158	53	44	125
31	392	-	690	385	-	396	-	444	-	52	41	-
Total	8,294	23,948	24,647	13,997	22,035	9,096	24,143	27,873	10,465	2,758	1,354	1,153
Mean	268	798	795	452	787	293	805	899	349	88.0	43.7	38.4
Cfm	2.58	7.67	7.64	4.35	7.57	2.82	7.74	8.64	3.56	0.856	0.420	0.369
In.	2.97	8.56	8.81	5.01	7.88	3.25	8.63	9.97	3.74	0.99	0.48	0.41
Ac-ft	16,450	47,500	48,890	27,760	43,710	18,040	47,890	55,290	20,760	5,470	2,690	2,290

Calendar year 1950: Max 2,500 Min 44 Mean 559 Cfm 5.38 In. 73.00 Ac-ft 405,000  
 Water year 1950-51: Max 3,390 Min 28 Mean 465 Cfm 4.47 In. 60.70 Ac-ft 336,700

Peak discharge (base, 1,500 cfs).--Nov. 22 (4:30 p.m.) 3,140 cfs (8.37 ft); Dec. 23 (8:30 a.m.) 2,620 cfs (7.95 ft); Feb. 9 (8 p.m.) 4,790 cfs (9.60 ft); May 11 (12 m.) 2,400 cfs (7.77 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

## DUWAMISH RIVER BASIN

Smay Creek near Lester, Wash.

Location.--Lat 47°15'40", long. 121°33'50", in SW $\frac{1}{4}$  sec. 32, T. 21 N., R. 10 E., on right bank  $3\frac{1}{2}$  miles upstream from mouth and  $4\frac{1}{2}$  miles northwest of Lester.

Drainage area.--8.71 sq mi (revised).

Records available.--September 1946 to September 1951.

Gage.--Water-stage recorder and concrete control. Altitude of gage is 1,900 ft (from topographic map). Prior to Dec. 12, 1946, water-stage recorder 200 ft upstream at datum 4.28 ft higher, destroyed by high water of Dec. 11, 1946. Jan. 24 to June 4, 1947, water-stage recorder at present site at datum 1.40 ft higher than present datum.

Average discharge.--5 years, 56.2 cfs.

Extremes.--Maximum discharge during year, 457 cfs Feb. 9 (gage height, 4.49 ft); minimum, 6.6 cfs Sept. 23, 24 (gage height, 2.53 ft).  
1946-51: Maximum discharge not determined, probably occurred Dec. 11, 1946, when recorder was dislodged by high water; minimum, 6.2 cfs Oct. 17-19, 1946 (gage height, 0.92 ft, site and datum then in use).

Remarks.--Records good. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

2.5	5.0	3.4	91
2.6	8.4	3.7	157
2.8	19	4.0	247
3.0	36	4.3	366
3.2	59		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	11.5	54	89	82	51	34	40	79	56	24	11.5	8.8
2	11	66	77	99	51	32	43	71	56	24	11	8.4
3	10.5	68	68	103	49	30	51	68	58	23	11	8.4
4	11.5	95	64	88	44	30	68	76	59	22	10.5	8.4
5	14.5	86	58	74	43	30	77	97	58	22	10	8.4
6	15.5	77	64	68	40	29	77	103	58	21	10	8.0
7	17	71	68	60	45	27	82	103	62	20	10	*8.8
8	18	64	*65	56	77	26	82	97	60	19.5	10	9.2
9	21	58	68	52	352	26	76	95	59	19	10	8.8
10	118	54	70	49	*357	25	71	115	59	18	9.6	8.8
11	97	49	89	46	356	24	71	199	59	17.5	9.6	8.8
12	64	45	111	44	240	24	84	165	56	17.5	9.6	8.0
13	49	43	105	54	160	27	107	124	55	17	9.6	7.6
14	45	40	89	55	124	26	115	101	54	17	9.6	7.6
15	39	38	81	52	101	36	*111	91	54	17	9.2	7.6
16	34	37	79	49	86	37	113	93	51	16	9.2	7.6
17	32	34	77	47	76	34	122	107	47	15.5	*9.2	7.2
18	*36	30	76	44	68	34	118	*103	44	15	9.2	7.2
19	39	29	79	42	62	34	103	91	43	14.5	9.2	7.2
20	39	32	84	39	58	34	88	84	*40	14	8.8	7.2
21	38	66	101	38	52	36	79	84	38	13.5	8.8	6.9
22	37	249	135	36	50	34	70	95	37	13	8.8	6.9
23	34	224	265	34	46	34	64	111	34	13	8.8	6.9
24	32	247	224	51	44	34	60	118	34	13	8.4	6.9
25	32	247	179	77	41	36	60	122	32	*13	8.4	*10.5
26	30	230	104	109	40	40	62	101	30	12.5	8.4	8.4
27	38	193	118	91	37	41	74	88	29	12	8.4	7.6
28	41	157	105	74	36	41	105	81	28	12	11	8.4
29	45	126	95	65	-	41	101	72	27	12	10	10.5
30	46	107	93	60	-	41	89	65	25	11.5	9.6	22
31	44	-	86	55	-	40	-	60	-	11.5	8.8	-
Total	1,139.5	2,956	3,102	1,893	2,796	1,017	2,463	3,059	1,402	510.5	296.2	257.0
Mean	36.8	97.9	100	61.1	99.9	32.8	82.1	98.7	46.7	16.5	9.55	8.57
Cfs/m	4.23	11.2	11.5	7.01	11.5	3.77	9.43	11.3	5.36	1.89	1.10	0.984
In.	4.87	12.54	13.24	8.08	11.94	4.34	10.52	13.06	5.99	2.18	1.26	1.10
Ac-ft	2,260	5,820	6,150	3,750	5,550	2,020	4,890	6,070	2,780	1,010	588	510

Calendar year 1950: Max. 265 Min. 9.6 Mean 70.3 Cfs/m 8.07 In. 109.61 Ac-ft 50,910  
Water year 1950-51: Max. 366 Min. 6.9 Mean 57.2 Cfs/m 6.57 In. 89.12 Ac-ft 41,400

Peak discharge (base, 200 cfs).--Nov. 22 (2 p.m.) 295 cfs (4.13 ft); Dec. 23 (5 p.m.) 287 cfs (4.11 ft); Feb. 9 (7:30 p.m.) 457 cfs (4.49 ft); May 11 (3:30 p.m.) 217 cfs (3.91 ft).

\* Discharge measurement made on this day.

## Charley Creek near Eagle Gorge, Wash.

Location.--Lat 47°15'00", long. 121°47'00", in SW 1/4 sec. 3, T. 20 N., R. 8 E., on left bank 300 ft downstream from Beaverdam Lake Creek, 1 1/2 miles south of Eagle Gorge, and 1 1/2 miles upstream from mouth.

Drainage area.--11.0 sq mi (revised).

Records available.--September 1946 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,350 ft (from topographic map).

Average discharge.--5 years, 76.6 cfs.

Extremes.--Maximum discharge during year, 1,510 cfs Feb. 11 (gage height, 5.71 ft), from rating curve extended above 570 cfs by logarithmic plotting; minimum, 9.9 cfs Sept. 23, 24, (gage height, 1.12 ft).

1946-51: Maximum discharge, that of Feb. 11, 1951; maximum gage height, 6.17 ft Dec. 11, 1946; minimum discharge, 7.2 cfs Oct. 19, 1946.

Revisions.--The maximum discharge for the water year 1950 has been revised to 810 cfs Mar. 4, 1950 (gage height, 4.55 ft), superseding figure published in Water-Supply Paper 1182.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 11 to Sept. 30

1.4	20	2.3	104	1.1	9.5	2.1	71	4.0	555
1.6	32	2.6	149	1.3	14	2.5	126	4.5	785
1.8	48	3.0	232	1.5	22	3.0	232	5.0	1,070
2.0	68			1.8	42	3.5	374		

Note.--Same as following table above 3.0 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	24	112	107	154	70	43	59	87	45	18	12.5	11
2	23	132	95	306	104	42	66	79	43	17.5	12.5	11
3	22	232	95	225	107	42	86	77	42	17	12	10.5
4	24	165	117	153	91	42	116	91	40	17	12	10.5
5	48	114	126	118	79	40	113	113	39	17	12	10.5
6	49	108	276	101	74	38	107	112	39	17	12	*10.5
7	47	105	254	90	104	36	110	112	40	17	12	11.5
8	67	94	175	80	276	34	106	109	37	16.5	12	11.5
9	71	81	147	74	862	33	92	103	36	16	12	10.5
10	411	74	149	67	618	32	82	110	34	15.5	12	11
11	228	66	194	62	821	31	81	187	33	15.5	12	11
12	117	58	185	61	315	40	100	162	33	15	12	10.5
13	84	54	147	166	203	52	139	121	33	15	12	10.5
14	75	51	121	144	148	52	148	99	31	15	11.5	10.5
15	61	49	107	114	120	120	135	84	30	14.5	11.5	10.5
16	54	50	105	110	103	130	135	81	29	14.5	*11.5	10.5
17	51	48	125	105	95	95	140	82	28	14	11.5	10.5
18	68	45	120	86	84	80	128	*77	27	14	11.5	10.5
19	*91	42	*108	76	78	70	112	69	26	14	11.5	10.5
20	89	127	101	68	73	80	95	62	*25	13.5	11.5	12
21	79	250	95	65	68	90	83	61	24	13.5	11.5	10
22	68	515	159	58	64	85	75	64	23	13.5	11.5	10
23	59	397	348	57	60	75	68	75	22	13.5	11	10
24	53	489	292	184	56	65	64	90	22	13.5	11	10
25	52	315	312	298	53	70	63	84	21	13.5	11	22
26	49	234	194	265	50	82	*64	72	20	*13.5	11	*11.5
27	65	220	154	156	48	*84	77	67	20	13	11	10.5
28	79	185	160	112	45	75	106	61	19.5	13	15.5	15.5
29	92	151	149	96	-	70	110	56	19	13	11.5	16
30	89	128	146	84	-	67	99	51	18.5	12.5	11.5	60
31	83	-	121	74	-	61	-	47	-	12.5	11	-
Total	2,472	4,691	4,984	3,809	5,019	1,956	2,959	2,745	899.0	458.5	365.0	389.0
Mean	79.7	156	161	123	179	63.1	98.6	88.5	30.0	14.8	11.8	13.0
Cfs/m	7.25	14.2	14.6	11.2	16.3	5.74	8.96	8.05	2.73	1.35	1.07	1.18
In.	8.36	15.86	16.85	12.88	16.97	6.61	10.00	9.28	3.04	1.55	1.23	1.32
Ac-ft	4,900	9,300	9,890	7,560	9,960	3,860	5,870	5,440	1,780	909	724	772

Calendar year 1950: Max 556 Min 12 Mean 98.5 Cfs/m 8.95 In. 121.58 Ac-ft 71,320  
 Water year 1950-51: Max 971 Min 10 Mean 84.2 Cfs/m 7.65 In. 103.95 Ac-ft 60,980

Peak discharge (base, 300 cfs).--Oct. 10 (11:30 a.m.) 595 cfs (4.12 ft); Nov. 23 (11:30 p.m.) 640 cfs (4.21 ft); Dec. 6 (9 p.m.) 315 cfs (3.31 ft); Dec. 23 (12 m.) 410 cfs (3.61 ft); Jan. 2 (4:30 p.m.) 361 cfs (3.46 ft); Jan. 25 (6:30 p.m.) 407 cfs (3.60 ft); Feb. 11 (4 a.m.) 1,510 cfs (5.71 ft).

Note.--No gage-height record Dec. 16-18, Feb. 19 to Mar. 26; discharge estimated on basis of recorded range in stage and records for stations on nearby streams. Shifting-control method used Feb. 11-18, Mar. 27 to Apr. 5, Apr. 13 to May 14.

## Bear Creek near Eagle Gorge, Wash.

Location.--Lat 47°17'00", long. 121°48'10", in NW¼ sec. 28, T. 21 N., R. 8 E., on left bank a quarter of a mile upstream from mouth and 2½ miles northwest of Eagle Gorge.

Drainage area.--4.25 sq mi (revised).

Records available.--September 1946 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,000 ft (from topographic map). Prior to Sept. 8, 1949, water-stage recorder 25 ft upstream at same datum.

Average discharge.--5 years, 26.8 cfs.

Extremes.--Maximum discharge during year, 830 cfs Feb. 11 (gage height, 4.00 ft), from rating curve extended above 70 cfs on basis of slope-area determination of peak flow; minimum, 0.7 cfs Sept. 16-24.

1946-51: Maximum discharge, that of Feb. 11, 1951; minimum recorded, 0.1 cfs Sept. 27-29, Oct. 3 and about Oct. 18, 19, 1946.

Remarks.--Records good except those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Nov. 23

Nov. 24 to Sept. 30

0.7	5.1	0.4	0.7	1.8	115
.9	12.5	.5	4.4	2.1	171
1.1	24	.8	12.0	2.5	264
1.3	42	1.0	24	3.0	415
1.6	81	1.2	40	3.5	600
2.0	151	1.5	73		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	6.9	52	36	58	20	10	27	23	9.2	3.6	1.6	1.3
2	6.0	63	28	89	30	9	32	19.5	8.4	3.6	1.6	1.3
3	5.4	76	29	78	30	9	42	18	8.0	3.6	1.4	1.3
4	6.9	60	45	59	27	9	52	21	7.3	3.4	1.4	1.1
5	26	44	49	43	26	8	45	24	7.3	3.4	1.3	1.0
6	30	42	78	34	25	8	39	23	8.0	3.4	1.1	*1.0
7	26	49	81	28	30	8	41	21	8.4	3.4	1.1	1.1
8	37	39	66	24	100	8	36	19.5	7.3	3.4	1.1	1.7
9	37	30	56	21	400	8	29	18.5	6.9	2.9	1.1	1.4
10	132	24	57	18.5	300	7	25	20	6.6	2.9	1.3	1.1
11	76	20	65	16.5	*550	7	25	43	6.6	2.7	1.3	1.1
12	42	17	67	17	300	8	36	39	6.6	2.5	1.3	1.1
13	28	14	53	55	150	16	*47	30	6.9	2.5	1.3	1.0
14	26	12.5	42	66	110	15	41	25	6.6	2.3	1.3	.9
15	20	*11.5	35	48	80	43	38	20	6.2	2.3	1.3	.9
16	17	13.5	34	43	60	45	38	18	5.9	2.3	*1.3	.7
17	*15	13.5	56	50	50	32	38	15.5	5.6	2.3	1.3	.7
18	28	13	51	*36	40	27	33	14	5.2	2.3	1.1	.7
19	50	11	41	30	33	26	28	12.5	5.2	2.3	1.1	.7
20	44	38	38	23	27	30	22	11	5.2	2.3	1.0	.7
21	32	92	38	20	23	40	18	10	5.0	2.3	1.0	.7
22	26	136	52	17	20	*33	15.5	9.6	*5.0	2.3	1.0	.7
23	21	94	90	15	18	29	14	14	4.7	2.3	1.0	.7
24	17.5	126	82	70	16	26	13.5	*28	4.4	2.3	.9	.7
25	19	81	82	90	14	30	13	33	4.4	2.1	.9	5.6
26	23	72	66	70	12	53	13.5	23	4.1	*1.9	.9	2.7
27	35	71	61	45	11	45	18	18.5	3.8	1.7	.9	*1.6
28	44	*63	62	35	*10	36	27	15.5	3.6	1.6	3.1	5.0
29	51	53	56	30	-	34	29	13	3.8	1.6	1.9	5.9
30	44	44	56	26	-	32	26	11.5	3.8	1.6	1.4	31
31	39	-	48	22	-	28	-	10.5	-	1.6	1.4	-
Total	1,010.7	1,475.0	1,700	1,277.0	2,512	719	901.5	622.1	180.2	78.7	39.7	75.4
Mean	32.6	49.2	54.8	41.2	89.7	23.2	30.0	20.1	6.01	2.54	1.28	2.51
Cfsm	7.67	11.6	12.9	9.69	21.1	5.46	7.06	4.73	1.41	0.598	0.301	0.581
In.	8.84	12.91	14.88	11.37	21.98	6.29	7.89	5.44	1.58	0.69	0.35	0.66
Ac-ft	2,000	2,950	3,370	2,530	4,980	1,430	1,790	1,230	357	156	79	150

Calendar year 1950: Max 212 Min 2.0 Mean 31.6 Cfsm 7.44 In. 101.04 Ac-ft 22,900  
 Water year 1950-51: Max 550 Min 0.7 Mean 29.0 Cfsm 6.82 In. 92.68 Ac-ft 21,000

Peak discharge (base, 180 cfs).--Oct. 10 (11 a.m.) 192 cfs (2.20 ft); Nov. 24 (2 a.m.) 182 cfs (2.15 ft); Feb. 11 (time unknown) 830 cfs (4.00 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 19 to Mar. 21; discharge estimated on basis of 2 discharge measurements and records for stations on nearby streams.



## Green River near Palmer, Wash.

Location.--Lat 47°17'40", long. 121°49'20", in SW 1/4 sec. 20, T. 21 N., R. 8 E., on right bank 1 1/2 miles upstream from diversion dam and intake of Tacoma water-supply system, 2 1/2 miles downstream from North Fork, and 4 miles southeast of Palmer.

Drainage area.--231 sq mi.

Records available.--October 1931 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 912.6 ft above mean sea level (river-profile survey). Prior to Nov. 18, 1931, staff gage at same site at datum 3.91 ft lower.

Average discharge.--20 years, 1,074 cfs.

Extremes.--Maximum discharge during year, 14,500 cfs Feb. 9 (gage height, 16.28 ft); minimum, 110 cfs Sept. 22, 23 (gage height, 3.60 ft).  
1931-51: Maximum discharge, 23,200 cfs Dec. 11, 1946 (gage height, 19.95 ft); minimum, 81 cfs Sept. 4, 5, 1934.

Remarks.--Records good except those for periods of no gage-height record, which are fair.  
No diversion or regulation.

Revisions (water years).--W 1062: 1932-34, 1935(M), 1938(M).

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-10				Oct. 11 to Sept. 30			
4.3	181	6.0	960	3.6	110	6.5	1,220
4.5	250	6.5	1,220	3.8	155	7.0	1,490
4.7	325	7.0	1,500	4.0	215	8.0	2,140
5.0	460	8.0	2,140	4.3	315	9.0	2,930
5.3	610	9.5	3,400	4.6	420	10.0	3,920
5.6	760			5.0	580	11.0	5,100
				5.5	780	13.0	8,000
				6.0	960	15.0	11,800

Discharge, in cubic feet per second, water year october 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	243	1,240	1,930	1,930	1,090	760	1,160	1,290	940	368	167	135
2	225	1,550	1,610	2,750	1,160	720	1,350	1,160	940	354	164	130
3	207	2,070	1,430	3,020	1,320	720	1,730	1,140	940	343	164	128
4	218	2,070	1,490	2,280	1,160	720	2,210	1,350	960	336	161	126
5	336	1,860	1,490	1,860	1,070	660	2,210	1,860	940	326	158	124
6	402	1,730	2,070	1,550	1,000	640	2,000	1,930	960	322	155	*124
7	420	1,670	2,350	1,380	1,160	600	2,140	1,930	1,020	308	152	132
8	540	1,460	2,000	1,240	2,000	580	1,930	1,790	960	287	152	148
9	610	1,260	1,790	1,140	10,700	580	1,730	1,670	940	280	152	138
10	3,330	1,120	1,930	1,050	10,100	560	1,610	2,000	920	270	152	130
11	2,430	1,020	2,280	980	*11,000	540	1,610	3,560	920	252	150	132
12	1,460	940	2,670	940	6,710	820	2,000	3,110	900	239	152	130
13	1,070	860	2,280	1,400	4,030	800	*2,510	2,280	890	235	152	126
14	960	820	1,930	1,790	2,930	800	2,590	1,860	860	230	148	122
15	860	*780	1,670	1,520	2,350	1,580	2,350	1,610	860	227	145	118
16	760	780	1,550	1,380	1,930	1,670	2,280	1,610	820	221	*142	116
17	*740	780	1,670	1,380	1,670	1,250	2,430	1,930	760	218	140	116
18	840	740	1,610	*1,160	1,490	1,090	2,280	1,860	700	212	138	116
19	1,000	700	1,520	1,070	1,350	1,070	2,000	1,550	680	209	135	114
20	1,000	880	1,610	980	1,260	1,140	1,670	1,380	640	206	132	114
21	920	1,730	2,070	960	1,160	1,320	1,400	1,350	600	197	130	112
22	840	6,270	2,460	880	1,090	1,260	1,240	1,520	*560	194	130	112
23	780	5,040	5,750	840	1,050	1,120	1,140	1,860	540	191	130	112
24	740	a5,800	4,970	1,290	980	1,050	1,090	*2,000	520	188	130	116
25	740	a5,000	4,140	2,510	940	1,090	1,120	2,070	500	188	128	176
26	720	84,500	3,110	3,610	880	1,260	1,160	1,730	468	*185	128	167
27	900	a3,900	2,590	2,590	840	1,290	1,290	1,430	444	182	130	*135
28	1,070	*3,200	2,350	1,930	*780	1,220	1,670	1,290	420	179	155	155
29	1,240	2,670	2,210	1,550	-	1,240	1,670	1,190	399	176	158	179
30	1,190	2,280	2,140	1,350	-	1,240	1,490	1,090	382	173	150	560
31	1,120	-	2,000	1,190	-	1,140	-	980	-	170	145	-
Total	27,911	64,720	70,670	49,700	73,200	30,340	53,060	53,380	22,373	7,464	4,525	4,343
Mean	900	2,157	2,618	1,603	2,614	979	1,769	1,722	746	241	145	145
Cfsm	3.90	9.34	9.66	6.94	11.3	4.24	7.66	7.45	3.23	1.04	0.632	0.628
In.	4.49	10.42	11.37	8.00	11.78	4.98	8.54	8.59	3.60	1.20	0.73	0.70
Ac-ft	55,360	128,400	140,100	98,580	145,200	60,180	105,200	105,900	44,580	14,800	8,980	8,610

Calendar year 1950: Max 7,759 Min 154 Mean 1,534 Cfsm 6.64 In. 90.16 Ac-ft 1,111,000  
Water year 1950-51: Max 11,000 Min 112 Mean 1,265 Cfsm 5.48 In. 74.30 Ac-ft 915,700

Peak discharge (base, 6,000 cfs).--Nov. 22 (4 p.m.) 8,170 cfs (13.10 ft); Dec. 23 (3 to 4 p.m.) 6,290 cfs (11.66 ft); Feb. 9 (8 p.m.) 14,500 cfs (16.28 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge computed on basis of records for nearby stations.

## DUWAMISH RIVER BASIN

Big Soos Creek near Auburn, Wash.

Location.--Lat 47°19'00", long. 122°08'40", in SE $\frac{1}{4}$  sec. 10, T. 21 N., R. 5 E., on right bank three-quarters of a mile downstream from Covington Creek and 4 miles northeast of Auburn. Prior to Aug. 14, 1951, at site 700 ft upstream.

Drainage area.--53.9 sq mi.

Records available.--August 1944 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 150 ft (from topographic map). Prior to Aug. 14, 1951, at site 700 ft upstream at different datum.

Average discharge.--6 years (1944-50), 131 cfs.

Extremes.--Maximum discharge observed during year, 1,570 cfs Feb. 10 (gage height, 5.57 ft); minimum discharge, 22 cfs Aug. 21, 22, 23, 24, 25.

1944-51: Maximum discharge, that of Feb. 10, 1951; minimum, 22 cfs Aug. 30, Sept. 9, Oct. 21, 1944, Aug. 21, 22, 23, 24, 25, 1951.

Remarks.--Records fair. Several small diversions for farm use above station. City of Seattle regulates flow of Little Soos Creek, a tributary.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	32	94	315	367	215						31	26
2	31	100	299	460	250						30	26
3	30	87	303	518	300						30	25
4	31	82	327	473	300						29	*25
5	57	76	303	439	290						28	24
6	49	75	371	395	270						27	24
7	37	75	423	359	330						26	26
8	46	71	415	335	*391						25	26
9	49	68	375	303	750						24	24
10	39	66	359	284	*1,560						24	25
11	76	58	347	270	-						24	25
12	49	63	335	253	-						26	24
13	42	63	307	250	-						25	24
14	41	62	292	239	-						24	24
15	39	68	284	278	-						24	24
16	36	82	284	281	-						24	24
17	37	*89	281	303	-						24	24
18	46	87	264	278	-						24	24
19	60	82	253	260	-						23	24
20	51	100	*250	253	-						*23	24
21	45	150	248	323	-						22	24
22	44	173	287	363	-						22	24
23	44	196	395	327	-						23	24
24	42	281	455	335	-						22	24
25	54	288	423	347	-						23	29
26	68	260	383	367	-						24	26
27	70	*351	363	351	-						26	26
28	62	351	347	288	-						37	28
29	85	303	323	253	-						30	31
30	78	295	367	240	-						27	47
31	78	-	375	225	-						26	-
Total	1,628	4,196	10,351	9,997	-	-	-	-	-	-	797	775
Mean	52.5	140	333	322	-	-	-	-	-	-	25.7	25.8
Cfsm	0.974	2.60	6.18	5.97	-	-	-	-	-	-	0.477	0.479
In.	1.12	2.90	7.13	6.90	-	-	-	-	-	-	0.55	0.53
Ac-ft	3,250	8,320	20,490	19,650	-	-	-	-	-	-	1,580	1,540

Calendar year 1950: Max 833 Min 28 Mean 176 Cfsm 5.27 In. 44.24 Ac-ft 127,200  
 Water year 1950-51: Max - Min - Mean - Cfsm - In. - Ac-ft -

Peak discharge (base, 400 cfs).--Dec. 7 (11 p.m.) 443 cfs (5.45 ft); Dec. 24 (3 a.m.) 478 cfs (5.43 ft); Jan. 3 (2 a.m.) 560 cfs (5.53 ft); Feb. 10 (about 4 p.m.) 1,570 cfs (5.57 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 30 to Feb. 7, Feb. 9, Aug. 1-13; discharge computed on basis of records for stations on nearby streams. Gage washed out during flood of Feb. 10; reestablished Aug. 14. No discharge record computed for period Feb. 11 to July 31.

## Green River near Auburn, Wash.

Location.--Lat 47°18'15", long. 122°12'10", in lot 3, sec. 17, T. 21 N., R. 5 E., on left bank 1½ miles east of Auburn and 2 miles downstream from Big Soos Creek.

Drainage area.--386 sq mi.

Records available.--August 1936 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, datum of 1939. Prior to Oct. 19, 1936, staff gage at same site at datum 46.32 ft higher.

Average discharge.--15 years, 1,298 cfs.

Extremes.--Maximum discharge during year, 18,400 cfs Feb. 10 (elevation, 67.03 ft); minimum, 93 cfs Sept. 22, 23 (elevation, 54.56 ft).  
1936-51: Maximum discharge, 22,000 cfs Dec. 11, 1946 (elevation, 68.16 ft); minimum discharge, that of Sept. 22, 23, 1951; minimum elevation, 54.21 ft Sept. 1-3, 1945.

Remarks.--Records good except those for periods of no gage-height record, which are fair. City of Tacoma diverts about 108 cfs from river near Palmer, several miles above station for municipal use. No regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1 to Nov. 22)

54.5	75	56.0	990	60.0	5,800
54.7	140	56.5	1,480	61.0	7,250
54.9	224	57.0	2,030	62.0	8,830
55.1	324	57.5	2,620	64.0	12,400
55.4	505	58.0	3,220	66.0	16,300
55.7	730	59.0	4,460		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	282	1,280	2,620	a2,600	1,590	1,430	1,590	1,590	1,090	424	180	148
2	258	1,720	2,200	a3,700	1,760	1,380	1,700	1,430	1,060	428	184	140
3	240	1,970	2,030	a4,200	2,200	1,330	1,980	1,380	1,060	416	180	133
4	236	2,180	2,260	a3,500	1,980	1,380	2,440	1,430	1,090	404	176	126
5	314	2,020	2,140	3,040	1,760	1,330	2,560	1,920	1,080	404	172	*119
6	483	1,820	2,680	2,560	1,640	1,230	2,380	2,080	1,080	398	164	116
7	448	1,820	3,220	2,260	1,860	1,180	2,440	2,080	1,120	386	160	119
8	531	1,620	2,800	2,030	*2,560	1,170	2,320	2,030	1,110	369	156	126
9	706	1,420	2,440	1,860	10,700	1,150	2,080	1,920	1,050	352	156	136
10	2,530	1,280	2,380	1,760	*15,500	1,110	1,920	2,080	1,020	335	160	133
11	3,110	1,200	2,500	1,640	14,700	1,080	1,860	3,340	1,010	314	160	130
12	1,720	1,070	3,220	1,480	11,800	1,430	2,030	3,580	1,010	308	160	122
13	1,240	988	2,920	1,590	6,950	1,760	2,620	2,620	990	305	160	116
14	1,050	954	2,440	2,380	4,980	1,640	2,800	2,080	963	293	156	108
15	954	922	2,200	2,260	4,200	2,160	2,620	1,810	945	282	148	105
16	842	930	2,030	2,080	3,580	2,680	2,500	1,700	918	277	144	105
17	778	*970	2,080	2,260	3,100	2,140	2,620	1,920	873	272	140	108
18	810	946	2,030	1,920	2,920	1,860	2,560	1,980	810	*262	140	108
19	1,100	858	1,920	1,760	2,620	1,760	2,320	1,700	770	248	136	108
20	1,140	979	*1,980	1,590	2,500	1,760	1,980	1,540	750	238	133	105
21	1,030	2,390	2,440	1,760	2,260	1,920	1,760	1,480	698	229	133	105
22	946	5,440	2,620	1,760	2,080	*1,920	1,540	1,540	658	224	126	102
23	874	6,650	6,350	1,590	1,980	1,760	1,430	1,810	620	220	122	96
24	802	6,950	6,360	1,760	1,860	1,640	1,380	1,980	590	220	116	96
25	794	6,080	5,240	3,040	1,810	1,590	1,330	2,200	575	215	116	112
26	842	5,660	4,200	4,720	1,700	1,760	*1,380	*1,860	547	215	116	160
27	882	*5,110	3,460	3,700	1,590	1,810	1,430	1,590	519	211	122	172
28	1,140	4,330	3,100	2,740	1,540	1,760	1,810	1,480	492	202	172	160
29	1,380	3,460	2,920	2,200	-	1,700	1,860	1,380	472	198	176	184
30	1,380	2,980	a2,800	1,920	-	1,760	1,760	1,280	446	189	176	361
31	1,280	-	a2,700	1,760	-	1,640	-	1,170	-	189	156	-
Total	30,102	75,981	90,280	73,420	113,720	50,220	61,000	57,980	25,396	9,035	4,696	3,599
Mean	971	2,533	2,912	2,368	4,061	1,620	2,033	1,870	847	291	151	132
As-ft	59,710	150,700	179,100	145,600	225,600	99,610	121,000	115,000	50,370	17,920	9,310	7,850
Calendar year 1950: Max			9,520	Min	178	Mean	1,918	As-ft	1,369,000			
Water year 1950-51: Max			15,500	Min	96	Mean	1,632	As-ft	1,182,000			

Peak discharge (base, 6,000 cfs).--Nov. 23 (12:30 a.m.) 9,000 cfs (62.13 ft); Dec. 23 (9 p.m.) 7,700 cfs (61.30 ft); Feb. 10 (1 a.m.) 18,400 cfs (67.02 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

## North Fork Cedar River near Lester, Wash.

Location.--Lat 47°19'00", long. 121°29'30", in S½ sec. 11, T. 21 N., R. 10 E., on left bank at falls 1½ miles upstream from confluence with South Fork and 7½ miles north of Lester.

Drainage area.--8.8 sq mi, approximately.

Records available.--October 1944 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 2,420 ft (from topographic map).

Average discharge.--6 years (1945-51), 76.4 cfs.

Extremes.--Maximum discharge during year, 1,200 cfs Feb. 9 (gage height, 7.60 ft), from rating curve extended above 300 cfs; minimum, 8.5 cfs Sept. 23, 24.  
1944-51: Maximum discharge, 1,600 cfs Jan. 7, 1945 (gage height, 7.37 ft), from rating curve extended above 200 cfs; minimum, 8.2 cfs Oct. 18, 19, 1946 (gage height, 1.53 ft).

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	23	75	80	77	40	32	36	90	101	62	14.5	11
2	22	92	67	75	43	31	40	80	113	59	14.5	11
3	21	172	59	73	40	30	50	75	131	58	14	11
4	23	168	53	62	38	29	*70	95	132	55	14	10
5	35	163	48	55	35	28	81	140	118	50	13.5	9
6	40	135	49	50	33	27	83	145	135	51	13.5	9
7	55	120	47	46	*40	26	91	155	154	49	13.5	11
8	59	97	44	44	69	25	86	140	144	46	13	12
9	70	81	51	40	830	24	79	200	143	44	13	10
10	*347	69	59	38	590	24	74	300	150	41	*12.5	10
11	164	60	93	36	458	23	75	400	152	37	12.5	9.8
12	101	51	105	35	220	22	97	300	161	35	13	9.8
13	81	46	*91	36	137	26	132	240	153	35	12.5	9.6
14	74	*44	80	35	104	25	135	170	197	31	12	9.4
15	59	40	71	33	87	40	137	150	206	29	12	9.3
16	50	39	69	30	75	37	129	190	166	27	12	9.3
17	48	36	79	32	65	35	141	*247	143	26	12	9.1
18	64	32	77	30	57	33	158	192	151	25	11.5	9.1
19	78	30	79	28	52	34	114	155	122	24	11.5	*9.1
20	*77	34	96	26	48	36	92	148	113	22	11	8.9
21	67	61	150	26	46	36	82	167	*109	21	11	8.7
22	59	134	249	25	42	36	74	247	102	20	11	8.7
23	52	131	494	24	40	35	71	325	99	19	11	8.5
24	46	206	325	38	39	34	70	304	92	18	10.5	8.9
25	51	274	274	72	37	35	75	276	88	17	10.5	13.5
26	46	265	174	110	37	36	81	192	81	16.5	10.5	*10
27	64	256	128	87	35	36	83	161	73	*16.5	10.5	9.3
28	64	175	109	67	33	36	105	133	72	16	15.5	11
29	67	121	98	60	-	37	114	112	69	16	12.5	16
30	64	97	96	52	-	36	100	100	65	15	*12	53
31	61	-	85	47	-	35	-	97	-	15	11	-
Total	2,134	3,304	3,580	1,489	3,370	979	2,735	5,728	3,715	994.0	382.0	345.0
Mean	68.8	110	115	48.0	120	31.6	81.2	185	124	32.1	12.3	11.5
Cfsm	7.82	12.5	13.1	5.45	13.6	3.59	10.4	21.0	14.1	3.65	1.40	1.31
In.	9.02	13.96	15.13	6.29	14.24	4.14	11.56	24.20	15.70	4.20	1.61	1.46
Ac-ft	4,230	6,550	7,100	2,950	6,680	1,940	5,420	11,360	7,370	1,970	758	684

Calendar year 1950: Max 494 Min 13 Mean 90.0 Cfsm 10.3 In. 140.26 Ac-ft 65,820  
Water year 1950-51: Max 830 Min 8.5 Mean 78.8 Cfsm 8.95 In. 121.51 Ac-ft 57,010

Peak discharge (base, 400 cfs).--Oct. 10 (12 m.) 515 cfs (6.20 ft); Dec. 23 (1:30 p.m.) 725 cfs (6.56 ft); Feb. 9 (4 p.m.) 1,200 cfs (7.60 ft); probably May 11 (time unknown) 620 cfs (6.14 ft).  
\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 29 to Feb. 6, Mar. 1-14, 17-19, Apr. 30 to May 16, Aug. 31 to Sept. 10; discharge estimated on basis of records for stations on nearby streams. Shifting-control method used Oct. 1 to Jan. 14, Jan. 24-26, Feb. 8-28, Mar. 15, 16, Mar. 20 to Apr. 29, May 17 to July 6, Sept. 30.

## South Fork Cedar River near Lester, Wash.

Location.--Lat 47°18'30", long. 121°31'00", in SW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> (revised) sec. 15, T. 21 N., R. 10 E., on left bank half a mile (revised) upstream from mouth and 7 miles north-west of Lester.

Drainage area.--6.0 sq mi, approximately.

Records available.--October 1944 to September 1951.

Gage.--Water-stage recorder. Concrete control since Aug. 31, 1951. Altitude of gage is 2,300 ft (from topographic map).

Average discharge.--6 years (1945-51), 44.4 cfs.

Extremes.--Maximum discharge during year, 664 cfs Feb. 9 (gage height, 6.07 ft), from rating curve extended above 190 cfs; minimum, 2.6 cfs Sept. 23, 24.  
1944-51: Maximum discharge, 878 cfs Jan. 7, 1945 (gage height, 4.86 ft), from rating curve extended above 125 cfs; maximum gage height, that of Feb. 9, 1951; minimum, that of Sept. 23, 24, 1951.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-9			Oct. 10 to Aug. 31			Aug. 31 to Sept. 30		
2.6	6.7		2.7	2.9	3.4	27	4.6	178
3.0	10.5		2.9	6.4	3.7	51	4.9	244
3.2	16		3.0	8.9	4.0	84	5.2	328
3.4	24		3.2	16	4.3	126	5.6	468
							2.8	2.1
							2.9	4.2
							3.1	11
							3.3	23

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.1	50	50	51	a27	16.5	19	58	46	19	*5.1	3.7
2	8.1	64	40	50	a30	15.5	19.5	50	48	17.5	4.9	3.7
3	8.1	103	34	46	24	15	23	49	53	16.5	4.9	3.7
4	8.1	110	29	40	21	15	*34	63	54	15	4.7	3.7
5	11.1	103	25	33	18.5	14.5	42	100	50	14.5	4.7	3.4
6	14.6	87	26	30	17	13	45	105	51	14	4.7	3.4
7	16.7	77	24	27	*20	13	49	107	56	12.5	4.6	4.2
8	19.5	65	23	22	47	13	51	97	55	11.5	4.6	4.4
9	23	54	26	22	48	12.5	49	98	55	11.5	4.6	3.4
10	204	46	28	19.5	350	11.5	45	140	56	11	*4.2	3.4
11	124	39	48	17.5	313	11.5	43	252	56	10.5	4.2	3.4
12	76	33	71	16.5	167	11	52	163	53	9.8	4.2	3.2
13	55	29	*65	17.5	111	11.5	79	114	51	9.2	4.2	3.0
14	46	*26	55	17	78	11	89	90	53	8.9	*4.1	2.8
15	36	23	46	15	61	20	87	85	55	8.6	4.0	2.8
16	31	21	42	14.5	50	19	89	*94	49	8.4	4.0	2.8
17	28	18.5	44	15	43	19	98	117	44	7.9	4.1	2.8
18	31	16	44	15	38	19	96	105	40	7.6	4.1	3.0
19	34	15	46	12	34	19	80	87	38	7.4	4.1	*2.8
20	*35	16	57	11	30	18.5	66	78	36	7.2	4.0	2.8
21	34	31	94	13	28	18.5	55	83	*35	6.9	4.0	2.8
22	32	145	161	13	25	19	49	108	33	6.6	4.0	2.8
23	33	139	370	9.5	23	18.5	44	126	32	6.6	4.0	2.6
24	27	180	249	19	22	18.5	42	131	29	6.4	3.8	2.6
25	27	196	190	40	20	18.5	41	132	27	5.9	3.6	5.2
26	27	188	134	89	19	18.5	42	104	26	5.5	3.6	3.2
27	33	163	96	70	18	19	51	85	23	*5.5	3.6	2.8
28	36	122	77	53	17	19	71	75	23	5.5	5.1	3.2
29	40	88	68	44.5	-	19	76	64	22	5.3	4.2	5.2
30	40	65	63	a38	-	19	66	54	20	5.3	*4.0	18
31	38	-	56	a33	-	18.5	-	48	-	5.1	*3.7	-
Total	1,184.3	2,312.5	2,381	914.0	2,112.5	505.0	1,692.5	3,056	1,269	293.1	131.6	114.8
Mean	38.2	77.1	76.8	29.5	75.4	16.3	56.4	98.6	42.3	9.45	4.25	3.83
Cfm	6.37	12.8	12.8	4.92	12.6	2.72	9.40	16.4	7.05	1.58	0.708	0.638
In.	7.34	14.33	14.76	5.67	13.09	3.13	10.49	18.94	7.87	1.82	0.82	0.71
Ac-ft	2,350	4,590	4,720	1,810	4,190	1,000	3,360	6,060	2,520	581	261	228

Calendar year 1950: Max 370 Min 6.2 Mean 54.7 Cfm 9.12 In. 123.84 Ac-ft 39,630  
Water year 1950-51: Max 461 Min 2.6 Mean 43.7 Cfm 7.28 In. 98.97 Ac-ft 31,670

Peak discharge (base, 200 cfs).--Oct. 10 (10:30 a.m.) 281 cfs (5.04 ft); Nov. 25 (9 p.m.) 227 cfs (4.89 ft); Dec. 23 (1:50 p.m.) 441 cfs (5.53 ft); Feb. 9 (1:50 p.m.) 664 cfs (6.07 ft); May 11 (9 a.m.) 284 cfs (5.07 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Shifting-control method used Nov. 27 to Dec. 22, Aug. 20-31.

Cedar River below Bear Creek, near Cedar Falls, Wash.

Location.--Lat 47°20'40", long. 121°33'00", in SE 1/4 sec. 32, T. 22 N., R. 10 E., on right bank 500 ft downstream from Bear Creek and 12 miles southeast of Cedar Falls.

Drainage area.--25.4 sq mi.

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,880 ft (from topographic map).

Average discharge.--6 years, 190 cfs.

Extremes.--Maximum discharge during year, 1,800 cfs Feb. 9 (gage height, 6.30 ft); minimum, 18 cfs Sept. 20-24 (gage height, 2.68 ft).  
1945-51: Maximum discharge, 1,940 cfs Dec. 11, 1946 (gage height, 6.32 ft); minimum, that of Sept. 20-24, 1951.

Remarks.--Records good. No diversion or regulation.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9				Feb. 10 to Sept. 30			
2.9	37	4.3	393	2.6	13.5	4.1	312
3.1	59	4.6	523	2.8	26	4.5	477
3.3	89	5.0	740	3.0	44	5.0	740
3.5	129	5.4	1,010	3.2	70	5.5	1,090
3.7	185	5.9	1,420	3.5	126	6.0	1,510
4.0	282			3.8	207		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	45	194	218	218	127	96	116	236	220	118	31	22
2	43	238	182	248	132	92	128	213	236	109	30	22
3	41	377	152	248	122	92	154	207	270	103	29	22
4	43	381	134	200	111	90	*210	287	278	94	29	20
5	59	377	118	170	105	86	239	396	253	84	28	20
6	73	328	120	152	98	83	239	417	270	83	28	19.5
7	86	310	120	137	*111	80	264	426	308	75	27	23
8	102	255	111	122	215	76	253	392	289	72	27	24
9	*116	212	129	114	1,370	73	239	409	285	70	*27	21
10	761	176	145	107	1,290	73	226	557	293	66	26	21
11	422	155	228	102	1,250	67	226	905	301	62	26	21
12	265	134	275	98	746	69	293	835	285	60	26	19.5
13	197	*120	246	111	491	75	396	464	282	57	26	19
14	173	111	*212	116	368	72	421	388	312	55	26	19
15	142	105	182	103	285	120	396	356	324	51	25	18.5
16	118	100	179	102	233	111	405	417	274	49	24	18.5
17	111	94	200	98	204	101	430	*509	242	48	24	18.5
18	139	86	194	93	181	97	430	456	226	45	24	19
19	*167	83	209	89	167	99	368	384	217	42	23	*19
20	161	94	251	87	156	103	293	352	201	41	23	18
21	147	218	366	94	146	107	242	368	*198	40	23	18
22	129	500	491	83	156	105	213	477	190	59	22	18
23	118	468	1,010	78	128	101	198	557	184	38	22	18
24	109	630	842	116	120	99	195	562	173	38	22	18
25	114	716	698	209	113	103	198	543	164	37	22	31
26	105	680	477	370	107	111	210	434	156	35	21	23
27	147	646	362	268	101	113	242	376	148	*33	22	19.5
28	158	486	517	209	87	111	320	324	144	32	22	24
29	161	350	282	185	-	120	320	274	136	31	25	28
30	158	282	268	155	-	116	278	236	188	31	24	22
31	145	-	235	142	-	111	-	220	-	31	*23	-
Total	4,753	8,906	8,955	4,624	8,710	2,952	8,142	12,757	6,987	1,769	787	701.0
Mean	153	297	289	149	311	95.2	271	412	233	57.1	25.4	23.4
Cfs/m	6.02	11.7	11.4	5.87	12.2	3.75	10.7	16.2	9.17	2.25	1.00	0.921
In.	8.96	13.04	13.11	6.77	12.75	4.32	11.92	18.68	10.23	2.59	1.15	1.03
Ac-ft	9,430	17,660	17,760	9,170	17,280	5,860	16,150	25,300	13,860	3,510	1,660	1,390
Calendar year 1950:	Max 1,010	Min 32	Mean 226	Cfs/m 8.90	In. 120.87	Ac-ft 163,600						
Water year 1950-51:	Max 1,370	Min 18	Mean 192	Cfs/m 7.56	In. 102.55	Ac-ft 138,900						

Peak discharge (base, 1,000 cfs).--Oct. 10 (11:30 a.m.) 1,010 cfs (5.38 ft); Dec. 23 (2 p.m.) 1,170 cfs (5.63 ft); Feb. 9 (8 p.m.) 1,800 cfs (6.30 ft).

\* Discharge measurement made on this day.

## Cedar River near Cedar Falls, Wash.

Location.--Lat 47°22'20", long. 121°37'30", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 23, T. 22 N., R. 9 E., on left bank 2 miles upstream from Cedar Lake and 8 miles southeast of Cedar Falls.

Drainage area.--41.8 sq mi.

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is about 1,560 ft (from topographic map).

Average discharge.--6 years, 304 cfs.

Extremes.--Maximum discharge during year not determined, probably occurred sometime Feb. 9-11 (gage height, 9.94 ft, from high-water mark in well, backwater from Cedar Lake); minimum, 26 cfs Sept. 21-23 (gage height, 2.15 ft).  
1945-51: Maximum discharge, that which occurred sometime during period Feb. 9-11, 1951; minimum, that of Sept. 21-23, 1951.

Remarks.--Records good except those for periods of backwater or no gage-height record, which are fair. No diversion or regulation.

Rating tables, water year 1950-51, except periods of backwater (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Dec. 5-20, Jan. 10 to Feb. 8)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

2.2	55	3.6	415	2.1	22	4.0	470
2.4	83	4.0	570	2.4	51	4.5	675
2.7	142	4.5	790	2.7	92	5.0	850
3.0	220	5.0	1,040	3.0	144	5.5	1,150
3.3	313	5.5	1,300	3.3	210	6.0	1,540
				3.6	288		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	76	349	390	450	220	185	222	344	288	148	47	34
2	70	415	320	490	244	157	234	309	303	136	45	34
3	67	590	270	530	250	150	*268	300	334	131	45	32
4	70	590	240	450	226	152	340	357	337	122	44	32
5	97	570	212	390	212	144	360	499	315	115	43	30
6	131	474	241	340	*192	138	357	527	334	110	43	30
7	144	454	300	300	223	134	377	544	384	102	42	34
8	179	384	307	260	404	129	360	499	360	97	40	42
9	*214	320	281	235	a2,600	127	334	491	353	92	*40	34
10	*1,170	281	281	217	a2,400	122	315	670	353	86	40	32
11	771	250	360	192	a2,500	118	315	1,330	357	82	40	32
12	429	229	470	182	a1,750	122	384	920	344	77	42	30
13	333	*209	443	223	a1,350	146	480	625	337	76	40	30
14	307	195	*370	253	a1,300	138	491	491	360	74	38	28
15	269	184	330	235	a890	250	457	442	374	73	38	27
16	235	184	307	214	720	244	491	*511	331	69	38	27
17	220	176	356	206	600	222	491	648	300	67	38	27
18	269	161	356	184	520	210	484	576	280	64	36	*27
19	*323	152	336	171	450	208	427	476	266	62	36	28
20	316	179	380	161	390	217	367	438	250	61	34	28
21	291	408	600	159	350	232	321	457	*242	58	34	27
22	269	840	900	149	306	227	285	580	232	56	34	27
23	241	768	1,800	138	263	212	271	720	224	55	34	27
24	223	1,060	1,500	208	232	203	283	745	212	53	34	28
25	229	1,140	1,100	366	212	208	*280	695	203	52	34	47
26	212	1,100	900	696	194	224	306	544	192	52	34	40
27	278	1,080	700	518	178	229	340	472	183	*51	34	32
28	303	800	620	418	172	227	442	420	174	51	50	42
29	316	600	560	353	-	232	446	357	163	49	48	50
30	307	470	500	281	-	232	395	315	157	49	44	167
31	284	-	470	238	-	220	-	288	-	48	*38	-
Total	8,643	14,612	16,200	9,205	19,148	5,739	10,869	16,590	8,542	2,418	1,227	1,105
Mean	279	487	523	297	684	185	362	535	285	75.0	39.6	36.8
Cfsm	6.67	11.7	12.5	7.11	16.4	4.43	8.66	12.8	6.82	1.87	0.947	0.880
In.	7.69	13.00	14.41	8.19	17.04	5.11	9.67	14.76	7.60	2.15	1.09	0.98
Ac-ft	17,140	28,980	32,130	18,260	37,980	11,380	21,560	32,910	16,940	4,800	2,430	2,190

Calendar year 1950: Max 1,800 Min 48 Mean 365 Cfsm 8.73 In. 118.48 Ac-ft 264,100  
Water year 1950-51: Max 2,600 Min 27 Mean 313 Cfsm 7.43 In. 101.69 Ac-ft 226,700

Peak discharge (base, 1,000 cfs).--Oct. 10 (1 p.m.) 1,720 cfs (6.20 ft); probably Nov. 25 (time and discharge unknown); probably Dec. 23 (time and discharge unknown); sometime Feb. 9-11 (time and discharge unknown); May 11 (9:30 a.m.) 1,500 cfs (5.94 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for station below Bear Creek near Cedar Falls.

Note.--Backwater from Cedar Lake Nov. 25 to Dec. 4, Dec. 21 to Jan. 9, Feb. 16-21.

## LAKE WASHINGTON BASIN

Rex River near Cedar Falls, Wash.

Location.--Lat 47°21'10", long. 121°39'50", in NE¼NW¼ sec. 33, T. 22 N., R. 9 E., on right bank 2½ miles upstream from mouth and Cedar Lake and 7 miles southeast of Cedar Falls.

Drainage area.--13.0 sq mi.

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is about 1,600 ft (from topographic map).

Average discharge.--6 years, 110 cfs.

Extremes.--Maximum discharge during year, 1,480 cfs Feb. 11 (gage height, 6.27 ft), from rating curve extended above 680 cfs; minimum, 5.8 cfs Sept. 23, 24 (gage height, 2.48 ft).

1945-51: Maximum discharge recorded, that of Feb. 11, 1951; minimum discharge, that of Sept. 23, 24, 1951.

Remarks.--Records good except those above 1,000 cfs, which are fair, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 10, 11)

2.4	4.5	3.4	83	4.7	501
2.6	8.6	3.6	123	5.2	756
2.8	16.5	3.8	173	5.5	930
3.0	31	4.0	231	6.0	1,260
3.2	52	4.3	333		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	38	187	110	112	74	34	a80	110	94	26	8.3	7.1
2	33	207	89	173	91	31	a100	102	100	24	8.0	6.8
3	30	273	83	179	83	31	*130	106	108	22	8.0	6.6
4	35	222	102	121	73	32	140	147	102	22	7.8	6.6
5	83	216	106	94	65	30	130	187	92	21	7.5	6.4
6	102	201	198	80	60	28	128	187	112	19.5	7.3	6.4
7	106	187	219	68	121	28	130	181	125	18.5	7.1	8.0
8	152	145	165	59	*304	25	121	165	106	17	7.1	10
9	142	115	157	53	1,260	24	110	173	104	16.5	6.8	7.5
10	*695	94	163	50	756	25	102	241	104	15	*6.8	5.9
11	322	80	222	46	970	23	110	413	100	14	6.8	8.6
12	181	68	237	44	384	31	155	283	96	13	7.5	7.3
13	119	60	181	81	234	59	193	204	96	13	7.1	6.8
14	115	*55	*142	96	163	48	184	160	102	12.5	6.8	6.6
15	87	50	135	87	123	128	173	147	94	12.5	6.8	6.4
16	76	51	137	74	100	110	184	*173	85	12.5	6.6	6.4
17	71	46	190	66	83	81	198	198	76	12	6.6	6.2
18	119	42	168	58	74	71	181	168	69	11.5	6.4	6.2
19	145	38	160	50	66	a75	155	142	63	11	6.4	*6.2
20	*133	66	187	46	60	a80	128	135	59	11	6.2	6.2
21	108	213	213	48	53	a85	108	152	*56	11	6.0	6.0
22	89	492	344	41	51	a75	94	198	51	10.5	6.0	6.0
23	78	356	524	39	49	a70	89	253	49	10	6.0	6.0
24	69	478	372	129	45	a65	87	280	44	10	6.0	6.4
25	73	380	304	273	42	a68	*91	244	41	9.8	6.2	33
26	66	308	204	356	40	a72	98	187	38	9.8	6.2	11
27	96	322	173	602	40	a75	130	157	35	*9.5	6.4	8.9
28	121	241	179	142	38	a78	198	133	33	9.5	15	20
29	125	184	173	115	-	a80	165	115	30	8.9	9.2	29
30	119	140	155	102	-	a72	133	100	28	8.9	8.9	115
31	100	-	125	85	-	a68	-	94	-	8.6	7.5	-
Total	3,828	5,517	5,917	3,569	5,502	1,802	4,025	5,535	2,292	431.0	225.3	382.5
Mean	124	184	191	115	196	58.1	134	179	76.4	13.9	7.27	12.8
Cfsm	9.46	14.2	14.7	8.85	15.1	4.47	10.3	13.8	5.68	1.07	0.559	0.985
In.	10.95	15.78	16.93	10.21	15.74	5.16	11.51	15.83	6.56	1.23	0.64	1.09
Ac-ft	7,590	10,940	11,740	7,080	10,910	3,570	7,980	10,980	4,550	855	447	759
Calendar year 1950: Max	695	Min	11	Mean	131	Cfsm	10.1	In.	137.23	Ac-ft	95,140	
Water year 1950-51: Max	1,260	Min	6.0	Mean	107	Cfsm	8.23	In.	111.63	Ac-ft	77,400	

Peak discharge (base, 700 cfs).--Oct. 10 (8:30 a.m.) 990 cfs (5.43 ft); Dec. 23 (11:30 a.m.) 756 cfs (5.22 ft); Feb. 11 (7 a.m.) 1,480 cfs (6.27 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.



## Cedar River at Cedar Falls, Wash.

Location.--Lat 47°25'10", long. 121°47'20", in sec. 4, T. 22 N., R. 8 E., on right bank three-quarters of a mile downstream from Seattle municipal powerplant at Cedar Falls and 3 miles downstream from Cedar Lake.

Drainage area.--84.2 sq mi (revised).

Records available.--April 1914 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 910 ft (from topographic map).

Average discharge.--37 years, 299 cfs.

Extremes.--Maximum discharge during year, 3,860 cfs Feb. 11 (gage height, 10.86 ft); minimum, 28 cfs Aug. 18 (gage height, 5.06 ft).  
1914-51: Maximum discharge, 6,290 cfs Dec. 19, 1917; maximum gage height, 11.5 ft Dec. 22, 1933; no flow part of Nov. 25, 1917, Aug. 18, 1923; minimum daily, 2 cfs Sept. 20, 1922.

Remarks.--Records excellent except those for periods of no gage-height record, which are poor. All artificially diverted water returned to river above station. Some regulation by Cedar Lake Reservoir for power.

Cooperation.--Gage-height record collected in cooperation with city of Seattle.

Revisions (water years).--W 722: 1930.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 11 to Sept. 30

5.2	64	7.0	810	5.1	31	7.5	940
5.4	100	7.5	1,160	5.4	64	8.0	1,290
5.7	170	8.0	1,560	5.7	115	8.5	1,680
6.0	270	8.5	1,990	6.0	187	9.0	2,090
6.5	505	9.5	2,930	6.5	360	9.5	2,540
				7.0	620	10.5	3,500

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	67	219	790	692	461	599	505	306	*544	265	156	35
2	158	190	554	a900	320	578	544	393	361	495	195	35
3	158	150	422	a900	152	282	293	446	438	450	128	35
4	148	135	628	a800	96	445	480	518	440	186	110	38
5	180	296	572	763	288	648	451	194	484	315	107	37
6	182	369	485	568	282	677	a370	398	506	364	133	37
7	67	248	511	463	232	677	a230	492	446	181	144	36
8	77	249	552	586	202	672	a160	487	418	147	140	34
9	199	*180	546	506	1,190	730	a370	485	95	413	143	32
10	160	166	464	390	2,930	721	304	489	122	520	122	82
11	140	132	588	299	*3,430	533	268	501	394	433	101	82
12	116	186	498	335	3,080	637	140	286	275	358	102	63
13	118	354	*562	186	2,370	596	384	85	280	406	135	65
14	98	278	616	221	1,850	575	69	478	323	350	101	80
15	82	406	516	a400	1,520	*619	79	301	231	185	97	33
16	208	304	418	a380	1,260	643	267	335	202	422	100	33
17	128	274	389	*a350	902	618	407	63	181	317	130	80
18	134	159	596	365	716	557	447	132	a375	355	66	59
19	146	212	498	349	849	554	*423	79	a290	407	66	82
20	137	318	468	224	602	558	428	77	a330	459	123	70
21	94	218	506	134	512	561	65	305	a300	148	114	80
22	80	319	590	402	302	544	71	297	a290	144	151	35
23	160	144	962	396	457	556	368	216	a160	394	122	36
24	148	274	1,350	280	358	453	262	376	a160	254	106	70
25	145	438	1,440	277	304	443	305	294	a350	*250	35	72
26	154	966	1,500	313	519	552	278	96	a340	204	35	67
27	217	856	1,380	449	547	558	427	277	a230	134	94	64
28	*121	948	1,130	314	562	570	457	541	150	132	130	45
29	90	989	990	600	-	570	264	453	150	128	80	35
30	322	1,040	665	522	-	559	365	350	152	211	*62	46
31	200	-	748	510	-	511	-	551	-	206	59	-
Total	4,434	11,097	22,134	13,674	26,293	17,796	9,481	10,301	9,017	9,233	3,367	1,598
Mean	143	370	714	448	939	574	316	332	301	298	109	53.3
Ac-ft	8,790	22,010	43,900	27,520	52,150	35,300	18,810	20,430	17,880	18,310	6,680	3,170
Calendar year 1950: Max	1,660			Min	54	Mean	456	Ac-ft	329,900			
Water year 1950-51: Max	3,430			Min	32	Mean	380	Ac-ft	275,000			

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of 2 discharge measurements and records for nearby stations.

## Cedar River near Landsberg, Wash.

**Location.**--Lat 47°23'35", long. 121°56'50", in sec. 17, T. 22 N., R. 7 E., on left bank 1½ miles upstream from Landsberg and intake of Seattle water-supply system, 7 miles upstream from Maple Valley, and 12 miles downstream from Cedar Lake.

**Drainage area.**--125 sq mi, excludes that of Rock Creek (revised).

**Records available.**--July 1895 to April 1912 (monthly figures only October 1898 to Mar. 1901 in W.S.P. 492), April 1914 to September 1951. Published as "at Clifford Bridge, near Ravensdale" July 1895 to September 1898 and as "near Ravensdale" March 1901 to April 1912.

**Gage.**--Water-stage recorder. Altitude of gage is 580 ft (from topographic map). Prior to Oct. 1, 1898, staff gage at site 2 miles downstream at different datum. Mar. 24, 1901, to Apr. 30, 1912, staff gage at site 1½ miles downstream at different datum. Apr. 30, 1914, to Oct. 22, 1928, water-stage recorder a quarter of a mile downstream at different datum.

**Average discharge.**--53 years (1895-1911, 1914-51), 694 cfs (adjusted for Rock Creek diversion April to September 1932, October 1934 to September 1948).

**Extremes.**--Maximum discharge during year, 6,200 cfs Feb. 11 (gage height, 6.94 ft); minimum, 203 cfs Sept. 26, 27 (gage height, 0.88 ft).  
1895-98, 1901-12, 1914-51: Maximum discharge observed, 13,600 cfs Nov. 19, 1911 (gage height, 9.7 ft, site and datum then in use); minimum observed, 83 cfs Sept. 19, 1898.

**Remarks.**--Records excellent. All diversions except Rock Creek returned to river above station. Rock Creek which entered naturally just above gage has been diverted to a point downstream from Seattle municipal water-supply intake to lessen danger of pollution. Some regulation by Cedar Lake.

**Cooperation.**--Gage-height record collected in cooperation with city of Seattle.

**Revisions (water years).**--W 313: 1895-98, 1902-9.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.8	179	2.3	940
1.0	243	2.6	1,160
1.2	320	3.0	1,480
1.4	412	3.5	1,930
1.6	516	4.0	2,430
1.8	625	5.0	3,560
2.0	740	6.5	5,540

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	330	630	1,380	1,320	999	1,100	965	684	*986	554	415	252
2	458	650	1,100	1,810	902	1,080	980	746	735	736	450	242
3	408	636	991	1,780	716	842	832	781	738	736	383	240
4	404	568	1,190	1,630	628	854	886	842	790	549	360	240
5	473	750	1,140	1,450	807	1,090	918	638	808	598	352	238
6	466	790	1,200	1,210	802	1,150	810	684	834	669	385	238
7	344	682	1,110	1,050	864	1,140	721	834	790	494	392	236
8	376	646	1,180	1,190	978	1,130	606	860	774	424	390	232
9	508	*566	1,160	1,070	3,080	1,180	780	828	430	675	393	228
10	754	560	1,040	946	4,600	1,170	763	838	438	758	377	278
11	613	508	1,170	832	*5,450	984	717	368	730	774	348	278
12	486	546	1,060	866	4,750	1,120	600	694	612	652	352	250
13	436	707	*1,090	783	3,710	1,110	762	504	629	678	389	254
14	423	642	1,140	816	2,880	1,070	540	794	646	612	346	260
15	362	766	1,030	1,050	2,430	*1,250	492	690	554	516	327	218
16	493	686	938	1,040	2,100	1,220	660	688	528	686	344	211
17	408	656	932	*936	1,650	1,140	770	432	496	609	364	258
18	450	528	1,120	924	1,410	1,040	844	478	668	635	300	237
19	530	562	1,030	884	1,530	1,050	808	421	610	677	289	260
20	548	738	1,010	766	1,290	1,070	*836	402	638	742	350	238
21	450	802	1,030	690	1,160	1,080	487	634	576	452	339	254
22	406	986	1,130	920	914	1,060	438	624	596	411	357	210
23	476	800	1,650	913	1,040	1,050	718	574	450	636	342	208
24	453	1,190	2,050	953	934	946	650	691	436	*585	269	242
25	460	1,150	2,120	1,100	884	975	678	674	634	514	252	253
26	480	1,510	2,080	1,160	1,030	1,030	646	416	646	469	252	238
27	532	1,580	1,980	1,100	1,020	1,040	737	608	532	398	313	232
28	508	1,530	1,740	961	1,060	1,060	857	830	435	399	329	220
29	460	1,550	1,580	1,180	-	1,060	620	810	427	394	304	210
30	668	1,600	1,470	1,100	-	1,040	762	672	426	462	*305	286
31	575	-	1,330	1,050	-	991	-	818	-	468	278	-
Total	14,760	25,515	40,271	33,470	49,638	33,222	21,882	21,157	18,472	17,942	10,646	7,241
Mean	476	850	1,299	1,080	1,773	1,072	729	682	616	579	343	241
Ac-ft	29,280	50,610	79,880	66,390	98,460	65,890	43,400	41,960	36,640	35,590	21,120	14,560
Calendar year 1950:	Max	2,660	Min	317	Mean	906	Ac-ft	656,200				
Water year 1950-51:	Max	5,450	Min	208	Mean	806	Ac-ft	583,600				

\* Discharge measurement made on this day.

## Rock Creek near Maple Valley, Wash.

Location.--Lat 47°22'50", long. 122°01'00", in NE $\frac{1}{4}$  sec. 22, T. 22 N., R. 6 E., on right bank at mouth 2 miles southeast of Maple Valley.

Drainage area.--14.0 sq mi (revised).

Records available.--June 1945 to September 1951.

Gage.--Water-stage recorder and wood box culvert control. Altitude of gage is 425 ft (from topographic map).

Average discharge.--6 years, 24.8 cfs

Extremes.--Maximum discharge during year, 165 cfs Feb. 11 (gage height, 4.26 ft, from recorded range in stage); minimum, 4.8 cfs Sept. 16-20 (gage height, 0.22 ft).  
1945-51: Maximum discharge, that of Feb. 11, 1951; minimum, 3.1 cfs Oct. 11, 12, 13, 1947 (gage height, 0.29 ft).

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

0.2	5.0	2.2	83
.5	14.5	3.0	115
.9	31	4.2	163
1.5	55		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.5	10.5	41	55	52	55	35	16	12	8.1	6.3	5.2
2	*6.9	10.5	42	63	51	52	35	18	11.5	8.1	6.3	5.0
3	6.9	*11	43	72	60	51	34	17.5	11.5	8.1	6.0	5.0
4	7.2	11.5	45	77	58	52	35	17.5	11.5	8.1	6.0	5.0
5	8.1	11.5	45	77	56	48	32	16.5	11.5	8.1	6.0	5.0
6	6.9	11.5	47	73	55	47	31	16	11.5	7.8	6.3	5.0
7	6.9	11.5	51	70	70	45	31	16	11.5	7.5	6.6	5.2
8	7.5	12	53	87	105	44	31	15	11	7.5	6.3	5.0
9	7.5	11.5	52	63	150	42	29	15	11	7.5	6.3	5.0
10	9.8	11	51	60	140	41	28	15.5	11	7.5	6.3	5.2
11	7.5	11.5	49	57	160	40	28	16	10.5	7.2	6.0	5.2
12	7.5	11.5	*47	55	130	*42	28	15.5	10.5	7.2	6.3	5.2
13	7.5	11.5	45	53	110	43	27	14.5	10	7.2	6.0	5.2
14	7.2	11.5	44	51	100	46	26	14.5	9.8	7.2	6.0	5.0
15	6.9	12	42	51	95	51	26	14.5	9.4	7.2	6.0	5.0
16	6.6	12	41	51	90	55	24	14	9.4	7.2	6.0	5.0
17	6.6	12	41	51	88	56	24	14	9.1	7.2	5.8	4.8
18	6.9	12	39	51	86	54	24	14	8.8	7.2	5.8	4.8
19	7.5	12	39	51	83	53	23	14	8.8	6.9	5.5	4.8
20	6.9	12.5	37	51	80	51	*22	14	8.8	6.9	5.5	5.0
21	6.6	13.5	37	52	76	49	22	14	8.8	6.9	5.5	6.0
22	6.6	15	37	52	72	47	21	13.5	9.1	6.9	5.5	6.0
23	6.9	16.5	41	*53	69	45	20	13.5	9.1	*7.2	5.2	6.0
24	6.9	20	49	55	66	44	19.5	13.5	9.1	6.9	5.2	6.0
25	7.2	24	56	59	64	43	19	13	8.8	6.9	5.2	6.6
26	7.2	26	56	64	62	41	19	*13	8.4	6.9	5.2	6.3
27	8.1	31	55	66	59	40	19	13	8.4	6.6	5.8	6.0
28	8.8	35	53	64	57	39	18.5	13	8.1	6.6	6.6	6.0
29	8.8	38	51	61	-	38	18.5	12.5	8.1	6.6	*5.5	6.9
30	9.1	40	52	61	-	38	18.5	12	8.1	6.6	5.5	6.9
31	9.4	-	52	56	-	37	-	12	-	6.6	5.2	-
Total	231.9	490.0	1,433	1,840	2,344	1,429	766.0	453.0	295.1	224.4	181.7	163.3
Mean	7.48	16.3	46.2	59.4	83.7	46.1	25.5	14.6	9.84	7.24	5.86	5.44
Cfs/m	0.534	1.16	3.30	4.24	5.98	3.29	1.82	1.04	0.703	0.517	0.419	0.389
In.	0.62	1.30	3.81	4.89	6.23	3.80	2.03	1.20	0.78	0.60	0.48	0.43
Ac-ft	460	972	2,840	3,650	4,650	2,830	1,520	899	565	445	360	324

Calendar year 1950: Max 135 Min 6.6 Mean 32.7 Cfs/m 2.34 In. 31.66 Ac-ft 23,640  
Water year 1950-51: Max 160 Min 4.8 Mean 27.0 Cfs/m 1.93 In. 26.17 Ac-ft 19,540

\* Discharge measurement made on this day.

Note.--No gage-height record Feb. 1-18; discharge estimated on basis of recorded range in stage and records for stations on nearby streams. Shifting-control method used Oct. 1-10, Feb. 19, 20, Aug. 23 to Sept. 20.

## Cedar River at Renton, Wash.

Location.--Lat 47°28'50", long. 122°12'10", in NW 1/4 sec. 17, T. 23 N., R. 5 E., on left bank 125 ft downstream from bridge on U. S. Highway 10 at Renton and 2 miles upstream from mouth. Prior to Dec. 8, 1950, at site 700 ft upstream.

Drainage area.--193 sq mi (revised).

Records available.--March 1901 to July 1903 (fragmentary), September 1906 to December 1907 (monthly discharge only), August 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 15.20 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. Prior to Jan. 1, 1908, staff gages within 1 mile of present site, at datum 10.67 ft below mean sea level (unadjusted). Aug. 7, 1945, to Aug. 15, 1947, water-stage recorder at site 700 ft upstream at datum 20.13 ft above mean sea level and Aug. 6, 1947, to Dec. 7, 1950, at datum 19.13 ft above mean sea level, datum of 1929, supplementary adjustment of 1947.

Average discharge.--6 years (1945-51), 787 cfs.

Extremes.--Maximum discharge during year not determined, probably occurred Feb. 11 during period of no gage-height record (discharge measurement of 6,640 cfs, gage height, 9.48 ft, made Feb. 10); minimum, 78 cfs Sept. 5, 7.  
1901-3, 1906-7, 1945-51: Maximum discharge not determined, probably that of Feb. 11, 1951; minimum, that of Sept. 5, 7, 1951.

Remarks.--Records excellent except those for period of shifting control, which are fair, and those for period of no gage-height record, which are poor. Flow regulated by Cedar Lake for operation of powerplant. More than 250 cfs is diverted at Landsberg at times by city of Seattle for municipal use.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	190	632	1,700	1,500	920	1,070	890	565	750	322	209	133
2	201	804	1,350	2,200	985	1,030	885	605	604	387	214	112
3	241	720	1,280	2,200	780	790	735	635	503	552	186	96
4	256	649	1,390	1,900	840	935	785	720	607	438	157	*86
5	352	726	1,370	1,600	800	1,040	805	525	624	344	135	85
6	462	742	1,760	1,250	790	1,100	695	560	646	451	137	82
7	271	710	1,850	1,000	970	1,080	620	725	646	361	157	84
8	262	622	1,400	1,200	1,200	1,060	500	750	621	263	158	90
9	362	*545	1,300	1,020	3,500	1,110	655	705	442	314	159	85
10	767	514	1,270	895	*5,500	1,090	655	705	275	483	149	*98
11	816	477	1,260	775	6,500	920	595	920	418	555	137	154
12	462	417	1,100	805	*6,000	1,140	455	615	495	506	128	168
13	357	529	1,100	700	4,500	1,160	625	410	422	434	149	158
14	336	583	1,140	750	3,200	1,080	400	680	457	415	166	163
15	285	666	1,100	1,210	2,750	1,280	340	570	392	402	151	156
16	278	649	1,000	1,180	2,400	1,230	510	545	349	513	165	125
17	298	622	1,000	1,080	1,870	1,110	620	310	312	437	171	114
18	321	535	1,110	1,000	1,640	985	705	370	414	394	147	133
19	398	535	1,020	915	1,760	990	680	285	457	*418	120	135
20	462	627	995	765	1,520	1,010	710	285	412	461	138	127
21	388	901	1,030	850	1,580	995	345	475	408	429	159	122
22	309	1,160	1,110	1,080	1,080	1,030	285	440	401	238	*165	128
23	291	1,170	1,710	980	1,150	975	565	436	317	309	164	91
24	313	1,710	2,100	1,000	1,000	870	485	435	270	449	147	90
25	336	1,680	2,400	1,110	925	880	510	637	346	315	96	122
26	398	1,870	2,200	1,290	1,020	975	475	*367	438	300	87	124
27	422	2,100	2,100	1,180	1,000	960	600	401	376	232	109	114
28	508	1,920	1,800	960	1,040	965	775	507	277	201	168	116
29	477	1,870	1,600	1,130	-	960	545	701	246	189	164	109
30	535	1,900	1,600	1,040	-	975	660	545	243	223	146	170
31	605	-	1,450	970	-	915	-	590	-	254	123	-
Total	11,939	28,585	44,595	35,535	56,820	31,710	18,110	16,987	13,168	11,395	4,661	3,568
Mean	385	953	1,439	1,148	2,029	1,025	604	548	439	368	150	119
Ac-ft	23,680	56,700	88,450	70,480	112,700	62,900	35,920	33,690	26,120	22,600	9,240	7,080
Calendar year 1950:	Max	3,520			Min 130		Mean 922		Ac-ft	667,800		
Water year 1950-51:	Max	6,500			Min 82		Mean 759		Ac-ft	549,600		

\* Discharge measurement made on this day.

Note.--No gage-height record Dec. 8 to May 22; discharge estimated on basis of records for next station upstream, known daily diversion between, and records for nearby stations.

## Issaquah Creek near Issaquah, Wash.

Location.--Lat 47°28'55", long. 122°02'10", in W $\frac{1}{2}$  sec. 15, T. 23 N., R. 6 E., on right bank  $\frac{3}{4}$  miles south of Issaquah and 4 miles upstream from East Fork.

Drainage area.--26.0 sq mi (revised).

Records available.--June 1945 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 210 ft (from topographic map). Prior to Oct. 1, 1948, at datum 0.99 ft higher.

Average discharge.--6 years, 79.9 cfs.

Extremes.--Maximum discharge during year, 2,610 cfs Feb. 9 or 10 (gage height, 6.08 ft, from floodmark); minimum, 11 cfs Aug. 21, 24.

1945-51: Maximum discharge, that of Feb. 9 or 10, 1951; minimum, that of Aug. 21, 24, 1951.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. Many small diversions for irrigation and domestic use. No regulation.

Revisions (water years).--W 1092: 1946.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 11 to Sept. 30

1.0	15.5	2.3	255	1.5	11	2.6	160
1.1	21	2.6	360	1.7	22	3.0	274
1.3	41	3.0	520	2.0	51	3.5	462
1.5	70	3.5	750	2.3	97	4.0	710
1.7	104	4.0	1,030				
2.0	170	4.5	1,350				
		5.0	1,710				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	17	110	144	180	116	66	67	35	29	19.5	14	14.5
2	16.5	114	118	380	156	63	63	34	28	19.5	14	14.8
3	15.5	*104	139	328	170	66	59	33	28	19.5	14.5	13.5
4	17	90	160	249	151	70	56	37	29	19.5	14.5	12.5
5	38	122	151	192	137	65	52	39	29	20	14	12.5
6	31	100	249	160	135	*64	50	35	31	19.5	13.5	13
7	23	90	267	139	252	60	49	38	33	18	13.5	15
8	42	75	198	124	360	60	48	37	32	17.5	13.5	15.5
9	58	66	160	112	1,700	59	47	35	28	18	14	14.5
10	146	58	135	106	1,100	58	44	35	27	17.5	15	14.5
11	81	51	135	104	700	58	42	79	27	15.5	15	14.5
12	51	45	924	95	350	116	41	66	28	15.5	17	14
13	38	42	108	170	200	148	41	58	28	35.5	15	14
14	35	42	100	108	140	137	41	47	27	15.5	14.5	13
15	30	49	102	142	120	204	41	42	26	15.5	13.5	12.5
16	27	67	104	137	110	175	40	38	24	15.5	13	12.5
17	27	72	108	148	105	135	39	44	24	15.5	13	12.5
18	45	64	*97	131	100	116	*39	42	24	15.5	12.5	12.5
19	68	56	95	120	110	105	*38	38	25	*15.5	12.5	12.5
20	58	80	95	118	130	101	38	36	25	15	12.5	12
21	44	137	99	170	110	103	37	34	22	14.5	12	11.5
22	37	160	124	168	100	93	37	32	21	14.5	12	12
23	34	188	222	148	95	84	36	32	21	14.5	12.5	12
24	32	313	231	240	90	79	35	36	21	15	*12	13.5
25	44	237	201	*299	85	81	34	37	21	15	12	20
26	52	175	160	292	80	88	34	*33	21	15	12	16.5
27	60	270	148	216	75	83	37	32	20	14.5	14.5	14.5
28	78	198	135	172	70	76	46	32	19.5	14.5	28	17
29	81	156	120	148	-	73	38	34	19.5	14.5	19	20
30	73	148	144	133	-	81	37	32	19	14	17.5	37
31	70	-	131	120	-	73	-	30	-	13.5	15	-
Total	1,469	3,479	4,500	5,289	7,047	2,838	1,306	1,212	753.0	502.5	445.5	443.5
Mean	47.4	116	145	171	252	91.5	43.5	39.1	25.1	16.2	14.4	14.8
Cfsm	1.82	4.46	5.58	6.58	9.69	3.52	1.67	1.50	0.965	0.623	0.554	0.569
In.	2.10	4.98	6.44	7.57	10.08	4.06	1.87	1.73	1.08	0.72	0.64	0.63
Ac-ft	2,910	6,900	8,930	10,490	13,980	5,630	2,590	2,400	1,490	997	884	880
Calendar year 1950: Max	628			Min 14		Mean 93.3	Cfsm 3.59	In. 48.71	Ac-ft 67,550			
Water year 1950-51: Max	1,700			Min 11.5		Mean 80.2	Cfsm 3.08	In. 41.90	Ac-ft 58,080			

Peak discharge (base, 500 cfs).--Feb. 9 or 10 (time unknown) 2,610 cfs (6.08 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Feb. 9 to Mar. 5; discharge estimated on basis of floodmark on outside gage and records for stations on nearby streams. Shifting-control method used Jan. 2 to Feb. 8.

## Sammamish Lake near Redmond, Wash.

Location.--Lat 47°38'40", long. 122°06'10", in NE¼ sec. 24, T. 25 N., R. 5 E., on west shore, 0.6 mile upstream from outlet and 1.8 miles south of Redmond.

Drainage area.--93.6 sq mi (revised).

Records available.--January 1939 to September 1951.

Gage.--Staff gage read once daily. Datum of gage is 31.13 ft above near lower low water at Seattle (Corps of Engineers benchmark). Prior to June 21, 1942, staff gage 1,000 ft north at datum 1.00 ft higher. June 22, 1942, to Aug. 22, 1951, staff gage at present site at datum 1.00 ft higher.

Extremes.--Maximum gage height observed during year, 9.40 ft Feb. 12 (present datum); minimum observed, 1.09 ft Aug. 25-27.

1939-51: Maximum gage height observed, that of Feb. 12, 1951; minimum observed, that of Aug. 25-27, 1951.

A stage of 10.83 ft (present datum) was observed on Dec. 22, 1933, from information by Corps of Engineers.

Remarks.--Many small diversions from tributaries for irrigation and domestic use. Slight regulation on tributaries.

Gage height, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.65	1.78	4.40	5.50	5.28	5.57	3.63	1.90	1.28	0.72	0.30	1.18
2	.65	1.86	4.42	5.44	5.30	5.43	3.56	1.86	1.27	.71	.29	1.18
3	.65	1.95	4.48	5.80	5.32	5.27	3.49	1.82	1.25	.70	.28	1.18
4	.60	2.00	4.56	6.04	5.30	5.18	3.42	1.79	1.22	.68	.27	1.18
5	.70	2.06	4.62	6.00	5.24	5.04	3.36	1.76	1.20	.66	.26	1.18
6	.75	2.09	4.80	5.98	5.17	4.92	3.28	1.73	1.19	.63	.25	1.17
7	.80	2.10	5.02	5.92	5.20	4.79	3.21	1.71	1.17	.61	.24	1.23
8	.80	2.10	5.18	5.81	5.38	4.66	3.15	1.69	1.15	.60	.24	1.19
9	.85	2.10	5.26	5.70	6.12	4.55	3.08	1.66	1.13	.59	.23	1.19
10	1.05	2.10	5.28	5.60	7.73	4.46	3.00	1.63	1.11	.59	.22	1.19
11	1.15	2.08	5.27	5.52	8.24	4.37	2.94	1.68	1.09	.57	.21	1.19
12	1.15	2.05	5.28	5.38	8.40	4.30	2.85	1.69	1.08	.56	.21	1.19
13	1.15	2.03	5.20	5.30	8.32	4.35	2.79	1.69	1.07	.55	(a)	1.19
14	1.20	2.02	5.19	5.16	8.16	4.37	2.73	1.68	1.06	.54	(a)	1.19
15	1.20	2.00	5.14	5.24	7.95	4.40	2.67	1.65	1.05	.53	(a)	1.19
16	1.15	2.10	5.00	5.18	7.74	4.50	2.60	1.62	1.03	.52	(a)	1.19
17	1.10	2.18	5.02	5.20	7.50	4.52	2.53	1.61	1.01	.50	(a)	1.18
18	1.15	2.19	4.98	5.22	7.37	4.48	2.47	1.59	.99	.49	(a)	1.17
19	1.20	2.21	4.90	5.20	7.16	4.44	2.40	1.57	.97	.48	(a)	1.16
20	1.20	2.23	4.86	5.22	7.04	4.37	2.36	1.55	.95	.46	(a)	1.16
21	1.25	2.35	4.84	5.26	6.92	4.30	2.30	1.52	.93	.44	(a)	1.15
22	1.25	2.54	4.80	5.38	6.76	4.26	2.24	1.49	.91	.42	.16	1.15
23	1.25	2.68	4.88	5.42	6.58	4.19	2.18	1.49	.89	.41	(a)	1.14
24	1.25	2.96	5.06	5.46	6.40	4.13	2.12	1.47	.87	.39	(a)	1.14
25	1.50	3.34	5.22	5.62	6.26	4.04	2.07	1.44	.85	.38	1.09	1.21
26	1.50	3.52	5.26	5.76	6.10	3.99	2.04	1.41	.83	.37	1.09	1.20
27	1.55	3.83	5.28	5.78	5.90	3.92	2.02	1.38	.80	.35	1.09	1.20
28	1.40	4.10	5.26	5.75	5.72	3.87	2.00	1.36	.78	.33	1.15	1.21
29	1.55	4.16	5.22	5.64	-	3.78	1.98	1.34	.76	.33	1.17	1.22
30	1.60	4.24	5.26	5.54	-	3.80	1.94	1.32	.74	.32	1.18	1.32
31	1.65	-	5.28	5.42	-	3.72	-	1.50	-	.31	1.18	-

a No gage-height record.

## Sammanish River near Redmond, Wash.

Location.--Lat 47°40'10", long. 122°07'25", in NE $\frac{1}{4}$  sec. 11, T. 25 N., R. 5 E., on right bank 500 ft downstream from Bear Creek, half a mile west of Redmond, and  $\frac{1}{4}$  miles downstream from outlet of Sammanish Lake.

Drainage area.--140 sq mi.

Records available.--January 1939 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 30 ft (from topographic map). Prior to June 22, 1942, staff gage on west shore of lake half a mile uplake from outlet, at datum 32.13 ft above mean lower low-water (Corps of Engineers benchmark) during periods water-stage recorder was not operating. June 22, 1942, to Nov. 13, 1946, staff gage on west shore of lake 1,000 ft uplake from previous lake gage at previous lake gage datum.

Average discharge.--12 years, 289 cfs.

Extremes.--Maximum discharge during year, 1,520 cfs Feb. 11 (gage height, 9.17 ft); minimum, 43 cfs Aug. 20, 21, 24.

1939-51: Maximum discharge, that of Feb. 11, 1951; minimum, that of Aug. 20, 21, 24, 1951.

Remarks.--Records good except those for periods when lake gage readings were used and those for periods of shifting control, which are fair. Some small diversions from tributaries for irrigation and domestic use. Slight regulation on some tributaries.

Rating table, water year 1950-51, except periods of shifting control and periods when Sammanish Lake gage was used (gage height, in feet, and discharge, in cubic feet per second)

0.9	42	2.5	225	6.0	730
1.1	60	3.0	290	7.0	930
1.4	90	3.5	360	8.0	1,160
1.7	124	4.0	430	9.1	1,490
2.0	160	5.0	580		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	75	196	670	790	750	790	490	238	*152	93	53	55
2	75	208	655	850	810	750	475	232	148	92	54	55
3	75	221	670	930	810	730	460	225	146	91	55	55
4	71	228	670	930	790	715	445	218	143	89	55	53
5	80	234	670	930	770	700	445	218	143	87	54	53
6	85	*234	730	910	750	685	430	212	144	84	51	53
7	85	240	770	890	810	*655	416	218	153	82	50	56
8	90	240	770	850	870	640	402	212	144	81	50	58
9	95	240	770	830	1,110	625	402	206	138	80	51	56
10	115	240	770	810	*1,430	610	388	199	135	80	52	56
11	126	234	770	790	1,490	595	374	238	154	*74	52	56
12	126	234	750	750	1,490	610	360	225	156	72	51	55
13	126	228	715	750	1,430	625	346	218	152	75	49	56
14	131	228	700	715	1,370	625	346	212	129	72	48	55
15	131	236	700	770	1,310	640	339	199	128	69	48	54
16	126	332	715	770	1,250	640	325	199	120	67	47	53
17	120	318	715	790	1,220	640	318	199	118	67	47	54
18	126	297	*700	770	1,190	625	311	192	120	67	46	54
19	130	284	685	770	1,130	610	304	192	118	65	46	55
20	130	304	685	770	1,130	595	290	186	116	64	45	54
21	136	360	670	850	1,070	595	284	180	114	63	45	53
22	136	360	685	850	1,050	580	277	180	112	62	*45	55
23	136	402	715	850	1,010	565	270	173	110	61	46	56
24	136	490	770	850	970	550	264	173	108	62	45	57
25	144	535	770	*870	950	550	258	169	106	60	46	67
26	144	550	770	890	910	550	*251	165	104	59	46	63
27	149	625	770	890	870	535	244	164	101	57	47	62
28	154	640	750	850	830	520	234	172	99	57	61	66
29	172	625	730	830	-	520	258	165	97	57	57	68
30	178	640	790	790	-	520	244	161	95	55	57	86
31	184	-	790	770	-	505	-	156	-	54	55	-
Total	3,787	10,203	22,490	25,635	29,570	19,095	10,280	6,096	3,745	2,196	1,554	1,729
Mean	122	340	725	827	1,056	618	343	197	125	70.8	50.1	57.6
Cfs/m	0.871	2.43	5.18	5.91	7.54	4.40	2.45	1.41	0.893	0.506	0.358	0.411
In.	1.01	2.71	5.97	6.81	7.86	5.07	2.73	1.62	0.99	0.58	0.41	0.46
Ac-ft	7,510	20,240	44,610	50,850	58,650	37,870	20,390	12,090	7,420	4,360	3,080	3,430
Calendar year 1950:	Max 1,360	Min 62	Mean 437	Cfs/m 3.12	In. 42.39	Ac-ft 316,600						
Water year 1950-51:	Max 1,490	Min 45	Mean 374	Cfs/m 2.67	In. 36.22	Ac-ft 270,500						

\* Discharge measurement made on this day.

Note.--Discharge computed from once-daily readings of Sammanish Lake gage, Oct. 1 to Nov. 14, June 18 to July 10. Shifting-control method used Nov. 15 to Jan. 20.

## LAKE WASHINGTON BASIN

North Creek near Bothell, Wash.

Location.--Lat 47°47'30", long. 122°11'45" (revised), on line between secs. 29 and 32, T. 27 N., R. 5 E., on left bank 2 miles north of Bothell and 2½ miles upstream from mouth.

Drainage area.--24.1 sq mi (revised).

Records available.--July 1945 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 70 ft (from topographic map). Prior to Apr. 5, 1950, at datum 0.59 ft lower.

Average discharge.--6 years, 38.7 cfs.

Extremes.--Maximum discharge during year, 320 cfs Feb. 9 (gage height, 4.02 ft); minimum, 4.0 cfs July 12, 13 (gage height, 0.15 ft), but may have been less during period of no gage-height record in August.

1945-51: Maximum discharge, 455 cfs Feb. 17, 22, 1949, from rating curve extended above 240 cfs on basis of slope-area determination of peak flow; maximum gage height, 5.45 ft Feb. 22, 1949, datum then in use; minimum discharge, 1.0 cfs Aug. 10, 1946.

Remarks.--Records fair except those for periods of no gage-height record, which are poor. Many small diversions for irrigation and domestic use. Slight regulation for farm use.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Nov. 16 to Jan. 2, Feb. 9 to Mar. 15)

0.1	2.5	1.6	94
.3	10	2.0	126
.5	20	2.5	171
.7	31	3.0	216
1.0	50	4.0	310
1.3	71		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.1	40	114	106	50	45	37	18	11.5	6.2	5.8	8.7
2	7.1	32	85	177	122	39	33	17	10.5	6.6	5.8	8.7
3	7.1	37	81	176	92	41	30	16	11	6.6	6.2	8.7
4	14	27	68	135	78	54	29	15	12	9.2	6.2	7.9
5	32	23	60	100	68	51	29	20	12	8.3	5.8	7.5
6	15.5	21	96	81	66	46	28	18	13.5	7.9	5.7	8.3
7	14.5	*20	118	70	140	43	27	19	20	7.1	5.6	12
8	47	16.5	88	63	176	*43	26	21	14	6.6	5.6	13.5
9	30	15.5	97	62	280	42	27	19	12	7.1	5.6	10
10	30	15.5	100	55	280	41	27	20	11	6.6	5.8	10
11	15.5	15	80	61	198	41	26	65	11	*5.8	6.2	9.6
12	12.5	14	62	51	140	79	25	33	12	5.1	7	9.2
13	12	14.5	51	46	110	98	24	27	11.5	5.1	6.6	8.7
14	11.5	16	52	62	93	89	23	24	11	5.4	6.2	8.3
15	10	48	87	171	98	102	22	26	9.6	5.8	6.2	8.3
16	10	118	102	158	80	88	21	22	8.7	5.4	6.2	8.3
17	10.5	54	110	153	93	68	20	18	8.3	5.8	6	8.3
18	16	36	79	110	110	54	19	*16	7.9	*5.8	5.8	8.7
19	18	28	77	96	102	45	18	14.5	7.9	5.8	5.8	8.7
20	13.5	65	81	93	130	41	17	13.5	7.5	6.2	5.8	8.7
21	11.5	70	73	189	99	44	17	13	7.5	5.8	*5.4	8.3
22	11	80	78	162	81	62	18	12	7.5	5.8	5.8	8.7
23	11	63	104	114	70	47	17	12.5	7.1	5.8	6.2	9.2
24	15.5	81	96	*110	68	39	16.5	12	7.1	6.2	5.4	12
25	30	126	102	102	66	41	16	13.5	7.1	6.6	6.2	17
26	19	96	76	162	58	46	*15.5	12	7.1	6.6	7.1	11.5
27	28	126	65	106	52	41	18	12	6.6	5.8	6.3	11.5
28	45	89	80	76	46	36	32	19.5	6.6	5.4	16.5	15.5
29	42	68	57	64	48	39	29	18.5	8.2	5.8	12	8.7
30	33	101	148	58	-	58	20	14	6.2	6.2	10.5	17
31	24	-	118	53	-	43	-	*12	-	5.8	9.2	-
Total	603.8	1,536.0	2,662	3,222	3,056	1,646	707.0	593.0	291.9	194.2	212.5	301.5
Mean	19.5	51.2	85.9	104	109	53.1	23.6	19.1	9.73	6.26	6.85	10.0
Cfs/m	0.809	2.12	3.56	4.32	4.52	2.20	0.979	0.793	0.404	0.260	0.284	0.415
In.	0.93	2.37	4.11	4.97	4.72	2.54	1.09	0.92	0.45	0.30	0.33	0.47
Ac-ft	1,200	3,050	5,280	6,390	6,060	3,260	1,400	1,180	579	385	421	598

Calendar year 1950: Max 335 Min 5.8 Mean 49.2 Cfs/m 2.04 In. 27.65 Ac-ft 35,600

Water year 1950-51: Max 290 Min 5.1 Mean 41.2 Cfs/m 1.71 In. 23.20 Ac-ft 29,800

Peak discharge (base, 250 cfs).--Feb. 9 (10 p.m.) 320 cfs (4.02 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 29 to Feb. 1, Apr. 6-27, Apr. 30 to May 10, May 16, 17, Aug. 3-20; discharge estimated on basis of 1 discharge measurement and records for Issaquah Creek near Issaquah.



## Sammamish River at Bothell, Wash.

Location.--Lat 47°45'00", long. 122°11'30", in NW¼ sec. 8, T. 26 N., R. 5 E., on left bank in Bothell a quarter of a mile downstream from North Creek and 4½ miles upstream from mouth.

Drainage area.--199 sq mi.

Records available.--October 1939 to September 1951.

Gage.--Water-stage recorder. Datum of gage is mean lower low-water at Seattle (Corps of Engineers, U. S. Army, benchmark). Prior to Dec. 28, 1939, staff gage at same site and datum.

Average discharge.--12 years, 366 cfs.

Extremes.--Maximum discharge during year, about 1,900 cfs Feb. 12 and/or 13 (elevation, 32.05 ft± 0.1 ft); minimum, 62 cfs Aug. 22, 23 (elevation, 22.92 ft).  
1939-51: Maximum discharge, that of Feb. 12 and/or 13, 1951; minimum, that of Aug. 22, 23, 1951.

Remarks.--Records excellent except those for periods of no gage-height record, which are fair. Some small diversions from tributaries for irrigation and domestic use. Slight regulation on some tributaries.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1-6)

22.9	60	25.0	320	29.0	1,080
23.2	89	25.5	397	30.0	1,320
23.5	122	26.0	479	31.0	1,580
24.0	182	27.0	655	32.0	1,870
24.5	248	28.0	857		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	103	328	923	1,010	836	923	582	298	195	121	83	77
2	102	335	857	1,130	1,060	857	547	283	195	120	84	77
3	102	350	836	1,250	1,040	836	530	276	188	118	86	77
4	111	328	836	1,200	967	857	513	276	188	122	86	75
5	163	312	815	1,130	923	815	496	283	188	121	84	72
6	144	312	945	1,080	901	794	479	269	195	122	81	74
7	133	*305	1,010	1,010	1,080	753	479	276	214	117	78	81
8	189	298	967	990	1,180	733	462	269	195	114	78	90
9	234	290	945	945	1,500	713	445	262	182	113	80	84
10	248	283	990	923	*1,750	693	445	255	176	112	81	*81
11	208	283	923	901	1,840	693	429	365	176	*107	81	81
12	188	276	879	857	1,870	*794	405	312	182	101	79	79
13	182	276	836	815	1,870	836	397	290	176	99	76	78
14	176	283	815	815	1,840	794	389	276	169	99	75	78
15	169	324	879	1,100	1,780	836	373	269	163	97	74	76
16	169	564	923	1,080	1,690	815	365	255	157	96	73	75
17	169	462	945	1,100	1,600	773	358	255	155	95	72	76
18	188	397	857	1,010	1,580	733	350	255	151	95	71	77
19	208	365	*836	967	1,520	713	342	241	147	93	70	78
20	202	429	836	945	1,520	693	335	234	144	93	69	76
21	188	513	836	1,180	1,450	674	328	228	144	93	*68	75
22	182	496	836	1,180	1,380	713	320	221	140	92	66	76
23	182	547	945	1,080	1,280	655	320	228	139	92	65	77
24	182	674	967	*1,060	1,200	636	305	221	140	91	64	81
25	221	773	990	1,040	1,150	618	298	221	138	91	64	103
26	221	753	923	1,180	1,060	655	*290	214	134	90	66	93
27	241	857	901	1,130	*1,010	618	298	214	132	89	68	88
28	305	836	879	1,010	945	600	350	228	129	89	96	100
29	312	773	857	945	-	600	342	228	125	89	91	100
30	283	815	1,060	901	-	636	312	214	122	86	85	128
31	276	-	1,060	857	-	600	-	*208	-	84	80	
Total	5,981	13,837	28,107	31,821	37,822	22,659	11,884	7,924	4,879	3,141	2,374	2,483
Mean	193	461	907	1,026	1,351	731	396	256	163	101	76.6	82.8
Cfs/m	0.970	2.32	4.56	5.16	6.79	3.67	1.99	1.29	0.819	0.508	0.385	0.416
In.	1.12	2.59	5.25	5.95	7.07	4.23	2.22	1.48	0.91	0.59	0.44	0.46
Ac-ft	11,860	27,450	55,750	63,120	75,020	44,940	23,570	15,720	9,680	6,230	4,710	4,920

\* Discharge measurement made on this day.

Note.--No gage-height record Feb. 12, 13, July 29 to Aug. 20; discharge estimated on basis of records for stations on nearby streams.

## South Fork Skykomish River near Index, Wash.

Location.--Lat 47°48'20", long. 121°32'40", in NE $\frac{1}{4}$  sec. 29, T. 27 N., R. 10 E., on right bank 600 ft upstream from Sunset Falls, 2 miles upstream from confluence with North Fork, and 2 miles southeast of Index. Discharge measurements made about 2 miles upstream from gage.

Drainage area.--355 sq mi.

Records available.--October 1902 to September 1905, April 1911 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 574.80 ft (revised) above mean sea level, datum of 1929, supplementary adjustment of 1947. Oct. 1, 1902, to Sept. 30, 1905, staff gage at site 300 ft downstream at datum 0.39 ft higher. Apr. 26, 1911, to Sept. 30, 1913, staff gage at former site at datum 1 ft higher than present gage. Oct. 1, 1913, to Sept. 13, 1920, staff gage. Sept. 14, 1920, to Oct. 1, 1921, water-stage recorder, Jan. 23, 1922, to Mar. 14, 1934, staff gage, all at former site at present datum.

Average discharge.--43 years, 2,356 cfs.

Extremes.--Maximum discharge during year, 33,300 cfs Feb. 9 (gage height, 19.10 ft); minimum, 310 cfs Sept. 24 (gage height, 1.62 ft).  
1902-5, 1911-51: Maximum discharge observed, 57,000 cfs Dec. 18, 1917 (gage height, 22.6 ft, site then in use); minimum observed, 214 cfs Oct. 15-21, 23, 1925.

Remarks.--Records good except those for periods of no gage-height record, which are fair. No diversion or regulation.

Revisions (water years).--W 512: 1903-5, 1911-14. W 572: Drainage area. W 792: 1934.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

2.4	660	8.0	5,740	1.6	300	5.0	2,530
2.7	820	9.0	7,150	2.0	500	6.0	3,480
3.0	990	10.0	8,740	2.5	770	7.0	4,570
3.5	1,310	12.0	12,600	3.0	1,060	8.0	5,810
4.0	1,660	14.0	17,600	3.5	1,370	9.0	7,180
5.0	2,460	16.0	23,400	4.0	1,720	10.0	8,730
6.0	3,400	18.0	29,800	Note.--Same as preceding table above 10.0 ft.			
7.0	4,490						

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	710	3,000	3,000	2,910	1,560	*1,150	1,760	a2,200	2,980	2,620	698	490
2	685	3,400	2,550	3,600	1,590	1,120	2,030	a2,000	3,280	2,530	682	455
3	660	4,970	2,280	4,610	1,760	1,090	2,530	a2,000	3,680	2,440	666	440
4	685	5,220	2,120	3,200	1,560	1,090	3,180	a3,000	4,010	2,270	644	430
5	1,340	5,610	1,960	2,550	1,450	1,030	3,280	a3,900	3,790	1,870	627	415
6	2,120	4,040	2,550	2,200	1,340	1,000	3,080	4,010	3,680	1,720	611	405
7	3,000	3,500	2,910	1,920	2,200	940	3,380	a4,400	4,340	1,580	600	440
8	3,390	2,820	2,550	1,760	6,640	940	3,280	a3,700	3,790	1,450	588	676
9	3,710	2,370	2,370	1,620	26,100	910	2,890	a3,700	3,680	1,680	583	572
10	12,900	2,120	3,200	1,520	27,000	880	*2,710	a6,000	4,010	1,540	578	495
11	6,200	1,880	4,160	1,450	17,100	852	2,710	a11,000	4,120	1,510	566	465
12	*3,600	1,750	4,490	1,380	8,900	910	3,380	a7,000	4,010	1,450	550	435
13	2,640	1,620	3,400	1,800	5,810	1,030	4,340	a5,000	4,010	1,510	530	415
14	2,460	1,520	2,820	2,200	4,450	1,090	4,450	a2,230	4,340	1,440	520	415
15	2,120	1,450	2,640	1,960	3,680	1,910	4,120	3,790	4,830	1,340	515	405
16	1,760	1,560	2,820	1,760	2,980	2,110	4,120	4,340	4,450	1,270	510	405
17	1,620	1,520	4,040	1,660	2,710	1,620	4,340	*5,810	3,900	1,240	500	395
18	2,380	1,420	3,600	1,520	2,350	1,440	4,230	5,050	3,680	1,210	485	385
19	4,040	1,280	3,200	1,420	2,190	1,440	3,680	5,420	3,580	1,150	475	375
20	3,930	1,450	4,780	1,310	2,110	1,650	2,980	4,120	3,580	1,060	470	355
21	2,820	3,240	6,570	1,280	1,910	2,030	2,620	4,450	3,380	1,000	475	345
22	2,280	5,620	6,870	1,200	1,760	1,950	2,350	5,420	3,280	940	475	335
23	1,960	4,660	11,100	1,140	1,620	1,720	2,270	6,900	3,280	940	445	325
24	1,760	9,440	10,800	2,050	1,540	1,650	2,270	6,340	3,280	940	430	340
25	2,820	9,710	10,500	4,840	1,480	1,720	2,350	*6,070	3,180	910	415	770
26	3,000	9,970	6,150	6,040	1,370	1,790	2,530	4,810	3,080	880	400	825
27	3,400	8,570	4,970	3,500	1,270	1,870	2,620	4,340	*2,890	825	410	572
28	4,260	6,010	4,490	2,460	1,210	1,760	2,890	4,230	2,690	798	460	644
29	3,500	*4,490	3,820	2,040	-	1,790	2,890	3,680	2,600	770	*500	1,270
30	2,910	3,600	3,930	1,800	-	1,790	a2,500	3,280	2,710	770	616	3,370
31	2,640	-	3,300	1,620	-	1,720	-	2,980	-	715	578	-
Total	91,300	117,790	133,940	70,320	135,640	43,992	91,760	143,270	108,410	42,258	16,602	17,664
Mean	2,945	3,926	4,321	2,268	4,844	1,419	3,059	4,622	3,614	1,363	536	589
Cfs/m	8.30	11.1	12.2	6.39	13.6	4.00	8.62	13.0	10.2	3.84	1.61	1.66
In.	9.56	12.34	14.03	7.37	14.21	4.61	9.61	15.01	11.36	4.43	1.74	1.85
Ac-ft	181,100	233,600	265,700	139,500	269,000	87,260	182,000	284,200	215,000	83,820	32,930	35,040
Calendar year 1950: Max	15,200	Min	570	Mean	3,420	Cfs/m	9.63	In.	130.78	Ac-ft	2,476,000	
Water year 1950-51: Max	27,000	Min	325	Mean	2,775	Cfs/m	7.82	In.	106.12	Ac-ft	2,009,000	

Peak discharge (base, 10,000 cfs).--Oct. 10 (12 m.) 17,900 cfs (14.12 ft); Nov. 25 (6 p.m.) 14,800 cfs (12.86 ft); Dec. 23 (6:30 p.m.) 15,000 cfs (12.97 ft); Feb. 9 (11 p.m.) 33,300 cfs (19.10 ft); probably May 11 (time and discharge unknown).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of observed range in stage and records for stations on nearby streams.

Skykomish River near Gold Bar, Wash.

Location.--Lat 47°50'15", long. 121°40'00", in SW<sup>1</sup>/<sub>4</sub> sec. 9, T. 27 N., R. 9 E., on right bank 2 miles southeast of Gold Bar and 5 miles upstream from Wallace River and Startup.

Drainage area.--535 sq mi.

Records available.--September 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 209.26 ft (revised) above mean sea level, datum of 1929 (supplementary adjustment of 1947).

Average discharge.--23 years, 3,764 cfs.

Extremes.--Maximum discharge during year, 65,600 cfs Feb. 10 (gage height, 18.87 ft), from rating curve extended above 33,000 cfs; minimum, 467 cfs Sept. 23 (gage height, 3.06 ft).

1928-51: Maximum discharge, 79,000 cfs Dec. 21, 1933 (gage height, 21.3 ft), from rating curve extended above 33,000 cfs; minimum, 382 cfs Oct. 9, 1938 (gage height, 2.78 ft).

Remarks.--Records excellent except those for periods of doubtful or no gage-height record, which are fair. No diversion or regulation.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,160	4,900	4,430	4,520	2,360	1,970	2,710	3,320	4,700	4,070	1,120	757
2	1,070	5,390	3,730	5,500	2,500	1,850	3,080	3,000	5,090	3,980	1,100	710
3	971	8,050	3,460	6,990	2,710	1,850	3,900	3,160	5,610	3,900	1,060	688
4	1,020	8,330	3,240	4,900	2,360	1,850	4,700	4,160	6,050	3,480	1,030	672
5	2,430	8,610	2,930	3,900	2,230	1,730	4,900	6,050	5,830	2,860	1,010	650
6	4,070	6,270	3,980	3,320	2,040	1,670	4,610	6,270	5,610	2,640	962	636
7	5,190	5,290	4,520	5,000	3,740	1,610	5,090	6,750	6,750	2,430	953	688
8	5,830	4,250	3,980	2,710	10,700	1,560	4,800	5,830	5,830	2,300	926	1,380
9	*6,050	3,560	3,900	2,500	45,700	1,560	4,340	5,830	5,830	2,300	926	1,010
10	19,000	3,160	5,610	2,300	48,400	1,500	4,070	8,610	6,050	2,430	926	839
11	9,260	2,860	6,750	2,160	*28,300	1,440	*3,980	17,300	6,270	2,360	908	814
12	5,290	2,570	6,750	*2,100	14,600	1,670	5,090	10,700	6,050	2,360	856	725
13	3,980	2,360	5,090	2,640	9,500	1,850	6,750	7,510	6,050	2,300	830	680
14	3,640	2,230	4,250	3,320	17,000	1,910	6,750	6,050	6,510	2,230	814	636
15	3,160	2,100	4,160	3,000	16,000	3,360	6,270	5,500	7,510	2,100	805	650
16	2,640	2,360	4,610	2,710	a5,000	3,560	6,270	6,750	6,750	2,040	797	658
17	2,430	2,230	6,270	2,500	a4,200	2,710	6,750	6,900	6,050	1,970	773	636
18	3,980	2,100	5,610	2,300	a3,800	2,430	6,270	7,510	5,610	1,910	757	622
19	6,050	1,910	5,190	2,100	a3,400	2,300	5,290	6,270	5,500	1,790	741	601
20	5,290	2,230	8,330	1,970	a3,500	2,710	4,430	6,270	5,290	1,610	741	567
21	3,980	4,800	10,400	2,040	a3,000	3,240	3,900	*6,750	5,190	1,560	741	534
22	3,320	8,330	10,400	1,910	a2,700	3,160	3,640	8,610	5,090	1,500	733	509
23	2,860	6,750	16,800	1,790	a2,500	2,710	3,400	10,700	4,990	1,500	718	479
24	2,780	14,700	16,900	3,240	a2,400	2,570	3,400	10,100	5,190	1,500	695	528
25	5,190	15,300	16,900	8,330	a2,500	2,640	3,640	9,200	*4,990	1,440	672	1,500
26	4,800	15,400	9,500	10,100	a2,200	2,780	3,820	6,990	4,800	1,370	658	1,440
27	5,610	13,300	7,510	5,610	a2,100	2,860	3,980	6,510	4,520	1,290	650	971
28	6,510	9,200	6,750	3,980	*1,970	2,640	4,430	6,270	4,430	1,260	718	1,100
29	5,290	6,750	5,830	3,240	-	2,710	4,430	5,390	4,340	1,230	749	2,360
30	4,610	*5,290	6,050	2,860	-	2,710	3,820	4,900	4,250	1,210	882	6,420
31	4,160	-	5,090	2,570	-	2,640	-	4,520	-	1,180	*890	-
Total	141,621	180,580	208,940	110,110	227,010	71,770	138,510	215,880	166,730	66,100	26,141	30,460
Mean	4,568	6,019	6,740	3,552	8,108	2,315	4,617	6,964	5,558	2,132	843	1,015
Cfsm	8.54	11.3	12.6	6.64	15.2	4.33	6.63	13.0	10.4	3.99	1.58	1.90
In.	9.84	12.55	14.52	7.65	15.78	4.99	9.63	15.01	11.59	4.59	1.82	2.12
Ac-ft	280,900	358,200	414,400	218,400	450,300	142,400	274,700	428,200	330,700	131,100	51,850	60,420
Calendar year 1950:	Max 24,500			Min 830		Mean 5,357		Cfsm 10.0	In. 135.91	Ac-ft 3,879,000		
Water year 1950-51:	Max 48,400			Min 479		Mean 4,339		Cfsm 8.11	In. 110.09	Ac-ft 3,142,000		

Peak discharge (base, 19,000 cfs).--Oct. 10 (11:30 a.m.) 26,500 cfs (12.88 ft); Nov. 24 (5 to 6 a.m.) 19,300 cfs (11.23 ft); Nov. 25 (8 p.m.) 23,600 cfs (12.22 ft); Dec. 23 (7 p.m.) 23,600 cfs (12.19 ft); Feb. 10 (12:15 a.m.) 65,600 cfs (18.87 ft); May 11 (8:30 a.m.) 20,100 cfs (11.39 ft).

\* Discharge measurement made on this day.  
No gage-height record; discharge estimated on basis of recorded range in stage and records for South Fork Skykomish River near Index.

Note.--Gage-height record doubtful but used Sept. 9-29.

## Wallace River at Gold Bar, Wash.

Location.--Lat 47°51'50", long. 121°41'45", in NE<sup>1</sup> sec. 6, T. 27 N., R. 9 E., on left bank 30 ft downstream from highway bridge a quarter of a mile north of Gold Bar and 1 1/4 miles upstream from Olney Creek.

Drainage area.--19.8 sq mi.

Records available.--December 1928 to September 1933, July 1946 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 200 ft (from topographic map). Prior to Sept. 30, 1933, staff gage 40 ft upstream at different datum.

Average discharge.--9 years (1929-33, 1946-51), 163 cfs.

Extremes.--Maximum discharge during year, 1,780 cfs Feb. 9 (gage height, 8.75 ft); minimum, 11 cfs Aug. 19, 22, 24, 25, 26, Sept. 5, 6, 21.

1928-33, 1946-51: Maximum discharge observed, 2,590 cfs Feb. 26, 1932 (gage height, 8.00 ft, site and datum then in use); minimum observed, 9.6 cfs Aug. 27, Sept. 3-5, 1930 (gage height, 0.32 ft, site and datum then in use).

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of doubtful or no gage-height record, which are poor. No diversion or regulation.

Revisions.--W 1062: Drainage area.

Rating tables, water year 1950-51, except periods of shifting control or doubtful gage-height record (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Apr. 4

Apr. 4 to Sept. 30

4.1	26	5.6	308	4.1	10	5.3	148
4.3	41	6.0	456	4.3	18	5.6	227
4.5	60	6.5	675	4.5	28	6.0	373
4.7	85	7.0	925	4.7	46	6.5	617
5.0	134	7.5	1,180	5.0	88	7.0	890
5.3	210	8.0	1,440				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	37	298	146	170	465	*62	134	108	110	43	16.5	16.5
2	32	315	122	261	480	60	188	93	116	56	16	14.5
3	29	608	118	305	87	58	254	114	120	53	15.5	13
4	34	375	114	216	75	59	271	188	110	43	15	13
5	246	288	109	174	70	56	218	270	101	36	15	11.5
6	288	207	288	148	84	53	230	221	128	39	15	11.5
7	251	172	267	128	212	52	221	233	332	56	14.5	13.5
8	290	126	190	114	548	50	185	182	207	31	14.5	129
9	248	100	216	99	1,380	48	160	201	167	30	15	30
10	*608	89	398	90	1,380	48	155	273	148	29	14.5	22
11	226	81	340	*83	*962	46	172	681	133	27	14.5	22
12	148	73	232	79	468	57	*256	284	130	26	14.5	19
13	112	67	182	130	312	204	276	237	126	26	14	17.5
14	99	61	132	126	222	148	237	*193	122	24	13	16
15	86	58	185	130	193	292	224	182	120	22	13	15
16	73	87	267	120	157	271	237	221	101	22	13	14.5
17	68	89	312	111	139	172	240	253	86	21	12.5	14.5
18	165	60	182	99	124	139	207	195	80	21	12	13.5
19	248	56	204	91	111	139	182	182	65	20	12	14
20	134	70	329	86	116	202	133	156	61	19.5	12	13.5
21	100	143	274	99	102	229	120	182	61	19	12	13
22	84	264	305	90	94	182	116	215	58	19	11.5	13
23	73	290	644	83	87	148	112	227	53	18.5	12	13
24	73	761	869	284	83	134	128	273	52	18.5	11.5	14
25	294	624	531	562	79	143	139	207	52	18.5	11	220
26	185	394	274	520	75	177	144	141	58	18.5	11	80
27	222	526	264	229	68	167	153	128	51	17.5	a14	42
28	258	298	251	146	66	136	207	135	51	17	a22	80
29	180	222	235	d100	-	157	195	116	*48	17	a17	150
30	180	*177	288	484	-	155	139	114	45	17	a28	482
31	152	-	204	472	-	130	-	101	-	18.5	*21	-
Total	5,203	6,959	8,250	5,009	7,419	3,972	5,611	6,288	3,092	821.5	453.0	1,541.0
Mean	166	232	268	162	285	128	187	203	103	26.5	14.6	51.4
Cfsm	8.48	11.7	13.4	8.18	13.4	6.46	9.44	10.3	5.20	1.34	0.757	2.80
In.	9.77	13.07	15.50	9.41	13.93	7.46	10.54	11.81	5.81	1.54	0.85	2.89
Ac-ft	10,320	13,800	16,360	9,940	14,720	7,880	11,130	12,470	6,130	1,630	899	3,060

Calendar year 1950: Max 1,180 Min 11 Mean 199 Cfsm 10.1 In. 136.56 Ac-ft 144,200  
 Water year 1950-51: Max 1,380 Min 11 Mean 150 Cfsm 7.56 In. 102.58 Ac-ft 108,500

Peak discharge (base, 1,350 cfs).--Nov. 24 (2 to 3:30 a.m.) 1,360 cfs (7.82 ft); Dec. 24 (9 to 10 p.m.) 1,440 cfs (7.86 ft); Feb. 9 (2 p.m.) 1,780 cfs (8.75 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of recorded range in stage and records for stations on nearby streams.

d Doubtful gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Shifting-control method used Nov. 24 to Jan. 26, Feb. 10-16.

## Sultan River near Startup, Wash.

Location.--Lat 47°58'30", long. 121°46'30", in NE<sup>1</sup>/<sub>4</sub> sec. 28, T. 29 N., R. 8 E., on left bank 1½ miles upstream from intake of Everett water-supply system and 7½ miles north of Startup.

Drainage area.--74.5 sq mi (revised).

Records available.--May 1934 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 750 ft (from topographic map). Prior to July 2, 1934, staff gage at same site at datum 3.29 ft higher.

Average discharge.--17 years, 759 cfs.

Extremes.--Maximum discharge during year, 34,600 cfs Feb. 9 (gage height, 17.22 ft), from high-water mark in well), from rating curve extended above 2,900 cfs on basis of slope-area determination of peak flow; minimum, 60 cfs Sept. 24 (gage height, 3.39 ft). 1934-51: Maximum discharge, that of Feb. 9, 1951; minimum, 48 cfs Sept. 25, 27, 29, 30, 1942; minimum gage height, 3.32 ft Sept. 22, 23, 24, 1938.

Remarks.--Records good except those for periods of no gage-height record or shifting control, which are fair. No diversion or regulation.

Revisions (water years).--W 1182: 1935, 1936(M), 1937-39, 1940(M), 1941, 1942(P), 1943-49.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

3.4	74	5.5	560	10.0	5,000
3.7	107	6.0	770	11.0	7,100
4.0	149	6.5	1,030	12.0	9,800
4.3	202	7.0	1,360	14.0	17,000
4.6	270	8.0	2,200	16.0	27,000
5.0	380	9.0	3,400		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	262	1,220	640	820	4,400	234	540	520	540	359	119	105
2	230	1,460	540	1,580	600	221	700	445	600	350	117	93
3	206	2,500	520	1,360	600	208	970	480	640	347	115	86
4	250	2,000	500	770	480	215	1,090	700	620	312	112	83
5	1,660	2,020	480	600	414	210	970	1,000	580	260	110	81
6	2,350	1,150	1,400	480	374	204	895	920	620	270	106	78
7	1,950	970	1,180	414	2,050	196	970	1,090	1,060	250	102	120
8	2,100	720	870	380	5,280	187	845	870	795	221	100	560
9	1,360	600	1,170	335	23,400	181	745	845	680	208	99	234
10	5,400	500	2,350	308	16,600	176	680	1,150	680	223	97	162
11	1,620	434	1,740	*295	6,230	163	770	2,910	640	223	96	142
12	945	380	1,290	295	2,050	234	1,150	1,460	600	221	96	121
13	*680	341	895	745	1,260	640	1,320	1,000	620	223	93	108
14	580	318	700	660	895	480	1,150	820	660	215	*91	95
15	480	300	1,030	680	820	1,180	1,090	770	720	198	87	87
16	414	540	1,360	540	680	920	1,120	920	640	189	86	82
17	365	445	1,950	442	600	600	1,120	1,030	560	187	85	77
18	722	377	1,120	362	520	480	*1,000	845	520	185	85	72
19	1,430	320	1,220	315	480	462	795	700	480	174	84	70
20	945	500	2,300	290	520	*640	640	700	480	157	83	*67
21	680	1,320	2,100	298	462	770	560	*770	462	144	83	64
22	520	1,860	1,950	272	389	640	520	970	480	132	83	63
23	438	1,420	3,610	248	353	520	500	1,150	462	143	82	62
24	398	4,990	4,650	1,200	332	480	520	1,180	445	146	81	69
25	1,680	4,150	3,100	4,600	512	520	560	1,060	442	144	79	580
26	1,430	2,720	1,360	3,550	285	660	600	745	420	137	77	323
27	1,290	2,910	1,540	1,290	262	580	620	680	383	133	82	181
28	1,740	1,540	1,360	795	248	500	870	680	*386	150	115	272
29	1,260	1,030	1,150	a650	-	600	870	640	389	128	94	870
30	1,060	795	1,500	a520	-	800	640	580	377	123	121	3,120
31	1,030	-	1,000	a450	-	540	-	520	-	120	127	-
Total	35,455	39,850	46,575	25,544	66,896	14,247	24,820	28,150	16,981	6,260	2,987	8,127
Mean	1,144	1,328	1,502	824	2,589	460	827	908	566	202	96.4	271
Cfs/m	15.4	17.8	20.2	11.1	32.1	6.17	11.1	12.2	7.60	2.71	1.29	3.64
In.	17.70	19.88	25.25	12.75	33.39	7.11	12.39	14.05	8.48	3.12	1.49	4.06
Ac-ft	70,320	79,000	92,380	50,670	132,700	28,260	49,230	55,830	33,680	12,420	5,920	16,120

Calendar year 1950: Max 10,700 Min 127 Mean 1,068 Cfs/m 14.3 In. 194.68 Ac-ft 773,500  
 Water year 1950-51: Max 23,400 Min 62 Mean 865 Cfs/m 11.6 In. 157.67 Ac-ft 626,500

Peak discharge (base, 6,000 cfs).--Oct. 10 (6:30 a.m.) 11,000 cfs (12.42 ft); Nov. 24 (3 a.m.) 11,500 cfs (12.50 ft); Dec. 24 (8 a.m.) 8,600 cfs (11.56 ft); Jan. 26 (2 a.m.) 6,200 cfs (10.60 ft); Feb. 9 (1 p.m.) 34,600 cfs (17.22 ft); Sept. 30 (4 a.m.) 6,200 cfs (10.56 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Notes.--Shifting-control method used Jan. 10-23, Sept. 16-28.

## Woods Creek near Monroe, Wash.

Location.--Lat 47°52'20", long. 121°55'10", in W½ sec. 33, T. 28 N., R. 7 E., on left bank 200 ft downstream from West Fork and 2½ miles northeast of Monroe.

Drainage area.--53.4 sq mi (revised).

Records available.--July 1946 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 100 ft (from topographic map).

Average discharge.--5 years, 161 cfs.

Extremes.--Maximum discharge during year, 1,260 cfs Feb. 10 (gage height, 6.26 ft); minimum, 12 cfs Aug. 22 (gage height, 1.97 ft).  
1946-51: Maximum discharge, 1,710 cfs Feb. 26, 1950 (gage height, 7.18 ft); minimum, that of Aug. 22, 1951.

Remarks.--Records good except those for periods of shifting control, which are fair. Several small diversions above station for farm use. No regulation.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.9	11	2.8	86	4.5	475
2.1	20	3.1	131	5.0	660
2.3	33	3.5	207	5.5	860
2.5	50	4.0	327	6.1	1,160

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	22	205	*396	492	178	155	178	63	39	21	15	14
2	21	245	340	660	234	*141	161	58	37	*21	15.5	14
3	19.5	283	327	800	250	140	148	53	35	21	14.5	13.5
4	22	264	294	640	225	162	138	52	35	22	14	13
5	48	274	257	475	211	161	126	59	36	22	14	12.5
6	125	240	276	368	194	145	117	56	45	23	13.5	12.5
7	68	220	314	301	259	134	109	58	69	21	13.5	14.5
8	80	190	294	257	340	128	102	59	59	19	13.5	32
9	89	168	276	222	722	126	96	57	46	18.5	14	23
10	129	153	327	*199	1,120	120	90	54	41	18.5	14	19
11	110	143	314	186	*860	114	86	146	39	17.5	14	17.5
12	80	129	276	166	620	161	83	162	39	17.5	14	16.5
13	66	120	243	157	442	250	78	121	37	17	14	16
14	58	114	220	157	354	276	76	102	35	17	14	15.5
15	51	117	236	266	340	411	71	90	33	17	13.5	15.5
16	47	296	269	298	294	510	68	81	32	17	13.5	15
17	*45	327	291	340	266	396	66	78	30	17.5	15	15
18	49	301	262	301	327	314	65	74	29	17	12.5	15
19	57	269	245	284	301	286	62	68	27	16.5	12.5	15
20	54	286	243	269	354	266	59	63	27	16	13	15
21	48	327	240	396	314	266	57	59	26	15.5	12.5	15.5
22	46	340	238	426	276	327	54	54	25	15.5	12	15
23	43	340	271	354	243	314	52	51	25	15	12.5	15.5
24	44	458	294	327	222	284	51	*49	24	15	12.5	17
25	71	492	382	340	227	257	49	48	24	15.5	12.5	26
26	86	456	327	475	205	257	47	46	23	16	12.5	22
27	117	680	268	411	182	245	48	44	23	15	*13.5	18.5
28	188	640	294	314	166	218	63	47	22	15	17	*19
29	182	442	266	257	-	201	86	46	22	15	15	21
30	176	382	426	220	-	214	73	43	21	14.5	15.5	34
31	182	-	562	194	-	196	-	42	-	14	15	-
Total	2,423.5	8,901	9,290	10,552	9,728	7,175	2,559	2,083	1,005	543.0	426.0	527.5
Mean	78.2	207	300	340	347	231	85.3	67.2	33.5	17.5	13.7	17.6
Cfs/m	1.45	5.56	5.62	6.37	6.50	4.33	1.60	1.26	0.627	0.398	0.257	0.330
In.	1.69	6.20	6.47	7.35	6.77	5.00	1.78	1.45	0.70	0.38	0.30	0.37
Ac-ft	4,810	17,650	18,430	20,930	19,290	11,230	5,080	4,130	1,990	1,080	845	1,050

Calendar year 1950: Max 1,310 Min 16 Mean 195 Cfs/m 3.65 In. 49.67 Ac-ft 141,500  
Water year 1950-51: Max 1,120 Min 12 Mean 151 Cfs/m 2.83 In. 38.46 Ac-ft 109,500

Peak discharge (base, 800 cfs).--Jan. 3 (3 a.m.) 885 cfs (5.56 ft); Feb. 10 (4:37 a.m.) 1,260 cfs (6.26 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Aug. 10 to Sept. 6.

## Griffin Creek near Tolt, Wash.

Location.--Lat 47°37'00" long. 121°54'15", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 27, T. 25 N., R. 7 E., on left bank a quarter of a mile upstream from bridge on State Highway 15B, three-quarters of a mile upstream from mouth, and 2 miles south of Tolt. Prior to Sept. 21, 1951, at site 1,000 ft downstream.

Drainage area.--16.8 sq mi.

Records available.--June 1945 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 120 ft (from topographic map). Prior to Sept. 21, 1951, water-stage recorder at site 1,000 ft downstream at different datum.

Average discharge.--6 years, 47.2 cfs.

Extremes.--Maximum discharge during year, 738 cfs Feb. 10 (gage height, 5.03 ft, site and datum then in use); minimum, 2.6 cfs Aug. 7, 8, 16, 24.  
1945-51: Maximum discharge, that of Feb. 10, 1951; minimum, 2.4 cfs Sept. 13, 1949.

Remarks.--Records fair prior to Feb. 10, good thereafter. Some small diversions for irrigation and domestic use. No regulation.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1 to Feb. 9)

1.4	2.2	2.9	114
1.6	7.1	3.2	162
1.8	15	3.6	246
2.0	26	4.0	348
2.3	48	4.6	550
2.6	78		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.5	100	96	126	32	42	40	14	10.5	5.4	3.2	3.8
2	5.3	135	82	172	47	40	39	13	9.5	5.1	3.2	3.8
3	5.3	132	86	252	59	40	36	13	9.2	5.4	3.2	3.8
4	5.7	111	111	195	56	42	35	13.5	9.9	5.4	3.0	3.8
5	9.5	94	112	143	53	41	34	16.5	10.5	5.4	3.0	3.6
6	8.2	80	132	107	48	39	34	14	15.5	6.2	3.0	3.6
7	7.0	66	163	90	81	37	32	13.5	24	5.9	2.8	4.1
8	11.5	*54	141	76	126	36	30	13.5	21	5.1	2.8	4.6
9	14.5	46	112	61	407	37	27	12.5	19	4.6	2.8	4.1
10	30	39	94	51	*536	36	26	12.5	16.5	4.4	3.0	4.1
11	36	34	80	46	287	35	24	36	15	4.1	3.2	3.8
12	31	31	70	36	162	42	23	35	15	3.8	3.2	3.6
13	24	27	60	31	108	*51	22	30	15	3.6	3.2	3.6
14	21	28	*54	33	87	55	21	27	14	3.6	3.2	3.8
15	17	31	54	54	76	69	19.5	24	12.5	3.6	3.0	3.6
16	15	68	57	62	67	78	19	21	10.5	3.6	2.8	3.8
17	14.5	85	64	75	62	65	18.5	20	10.5	*3.8	2.8	3.8
18	16.5	81	61	74	60	53	18	19	10.5	3.8	2.8	4.1
19	19	71	56	*67	59	48	18	17	9.5	3.8	3.0	4.4
20	21	75	53	62	68	44	17	15.5	8.8	3.8	3.0	4.4
21	21	94	51	98	66	42	16	14.5	8.1	3.8	3.0	4.1
22	20	107	56	109	62	42	15.5	12.5	8.1	4.1	3.0	4.1
23	18.5	137	84	99	59	41	15	12.5	7.1	3.8	3.0	4.1
24	18	207	124	94	55	40	*14.5	13	6.8	3.8	2.8	4.8
25	27	198	158	92	52	40	14	14	6.5	3.6	2.8	6.8
26	34	145	115	95	50	47	13	12	6.2	3.6	3.0	5.6
27	38	165	96	86	46	49	14.5	12	5.9	3.6	3.4	4.8
28	59	157	81	72	44	47	20	20	5.6	3.6	5.4	5.1
29	67	121	68	55	-	46	16.5	*15.5	5.4	3.6	5.1	6.2
30	68	104	78	45	-	45	14.5	13	5.4	3.4	*5.4	9.9
31	68	-	115	35	-	43	-	12	-	5.4	4.6	-
Total	756.0	2,823	2,744	2,703	2,915	1,412	686.5	531.5	332.0	130.7	101.7	133.7
Mean	24.4	94.1	88.5	87.2	104	45.5	22.9	17.1	11.1	4.22	3.28	4.46
Cfs/m	1.45	5.60	5.27	5.19	6.19	2.71	1.36	1.02	0.661	0.251	0.195	0.265
In.	1.67	6.25	6.07	5.98	6.45	3.13	1.52	1.18	0.73	0.29	0.23	0.30
Ac-ft	1,500	5,600	5,440	5,360	5,780	2,800	1,360	1,050	659	259	202	265

Calendar year 1950: Max 355 Min 3.8 Mean 52.9 Cfs/m 3.15 In. 42.74 Ac-ft 38,300  
Water year 1950-51: Max 536 Min 2.8 Mean 41.8 Cfs/m 2.49 In. 33.80 Ac-ft 30,280

Peak discharge (base, 220 cfs).--Nov. 25 (3 a.m.) 224 cfs (3.13 ft); Jan. 3 (5:30 a.m.) 284 cfs (3.35 ft); Feb. 10 (2 a.m.) 738 cfs (5.03 ft).

\* Discharge measurement made on this day.

## Tolt River near Tolt, Wash.

Location.--Lat 47°41'45", long. 121°49'20", in S1NE1 sec. 31, T. 26 N., R. 8 E., on right bank 500 ft downstream from the Forks and 6 miles northeast of Tolt.

Drainage area.--79.7 sq mi (revised).

Records available.--August 1928 to January 1932, September 1937 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 348 ft above mean sea level (river-profile survey). Prior to Oct. 31, 1928, staff gage and Oct. 31, 1928, to Jan. 3, 1932, water-stage recorder at site 350 ft upstream at datum 7.1 ft lower (by river-profile survey). Sept. 1 to Oct. 6, 1937, staff gage at present site at datum 1.64 ft higher.

Average discharge.--17 years (1928-31, 1937-51), 577 cfs.

Extremes.--Maximum discharge during year, 16,800 cfs Feb. 9 (gage height, 12.54 ft), from rating curve extended above 3,800 cfs on basis of slope-area determination of peak flow; maximum gage height, 12.92 ft Feb. 9 (drift on control); minimum discharge, 53 cfs Sept. 22, 23 (gage height, 3.84 ft).

1928-32, 1937-51: Maximum discharge and gage height, those of Feb. 9, 1951; minimum discharge, that of Sept. 22, 23, 1951.

Remarks.--Records excellent except those for periods of shifting control, which are good. No diversion or regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-9				Oct. 10 to Sept. 30			
4.5	139			3.8	48	6.2	835
4.8	207			4.0	73	6.6	1,130
5.1	295			4.2	103	7.0	1,500
5.4	405			4.5	163	7.5	2,050
5.8	590			4.8	238	8.0	2,750
6.2	820			5.1	330	9.0	4,570
6.7	1,180			5.4	440	10.0	7,010
				5.8	615	11.4	11,700

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	167	1,390	685	877	556	390	529	379	390	204	92	80
2	152	1,400	810	1,660	757	379	585	344	396	191	90	72
3	139	2,240	655	1,600	751	372	745	372	400	188	89	68
4	158	1,300	739	1,090	645	368	842	393	393	184	87	64
5	656	1,180	757	877	585	354	733	705	368	172	86	60
6	682	940	1,710	763	547	334	655	625	456	174	84	61
7	682	891	1,350	680	1,470	320	727	640	1,010	168	83	68
8	950	*690	975	650	3,070	311	615	556	650	159	81	112
9	1,140	575	905	610	*11,400	301	558	547	516	154	81	101
10	2,730	516	1,010	575	6,870	289	508	705	472	148	80	63
11	1,030	464	*1,010	542	3,320	282	547	1,820	440	143	80	80
12	640	424	940	529	1,820	354	793	905	460	*141	79	74
13	508	396	721	842	1,260	640	898	635	448	141	79	70
14	444	379	640	856	1,010	565	757	534	436	137	77	65
15	396	376	727	863	940	975	705	500	416	131	76	61
16	358	556	940	*757	817	891	745	595	372	127	74	60
17	340	498	1,050	705	763	630	757	727	340	121	73	59
18	556	436	817	630	733	534	670	570	320	119	73	58
19	975	396	733	570	695	490	560	480	298	117	73	58
20	695	520	1,110	529	739	575	472	468	286	114	72	55
21	520	1,210	1,350	595	670	710	420	508	279	108	70	54
22	436	1,660	1,130	560	810	650	396	565	270	107	68	53
23	390	1,660	2,800	512	565	560	630	530	264	103	68	53
24	376	3,460	2,530	1,310	534	542	404	675	250	105	66	60
25	781	1,930	2,040	2,050	500	560	*440	705	241	105	65	246
26	849	1,450	1,130	2,280	468	733	456	492	235	103	65	198
27	884	1,710	1,130	1,130	432	695	480	460	222	101	69	119
28	1,090	1,180	1,180	805	416	600	630	520	219	100	*97	150
29	905	891	1,130	695	-	610	575	492	211	100	89	428
30	829	799	1,180	630	-	615	444	*436	206	97	119	1,290
31	805	-	975	575	-	547	-	396	-	93	103	-
Total	21,263	31,507	34,459	27,347	42,943	16,176	18,016	18,544	11,264	4,155	2,468	4,060
Mean	686	1,050	1,112	882	1,534	522	601	598	375	134	80.3	135
Cfsm	8.61	13.2	14.0	11.1	19.2	6.55	7.54	7.50	4.71	1.68	1.01	1.69
In.	9.92	14.70	16.08	12.76	20.04	7.55	8.41	8.65	5.26	1.94	1.16	1.89
Ac-ft	42,170	62,490	68,350	54,240	85,180	32,080	35,730	36,780	22,340	8,240	4,930	8,050
Calendar year 1950:	Max	5,790	Min	104	Mean	818	Cfsm	10.3	In.	139.28	Ac-ft	592,000
Water year 1950-51:	Max	11,400	Min	53	Mean	636	Cfsm	7.98	In.	108.36	Ac-ft	460,600

Peak discharge (base, 3,400 cfs).--Oct. 10 (7:30 a.m.) 4,260 cfs (8.87 ft); Nov. 24 (2:30 a.m.) 7,010 cfs (10.00 ft); Dec. 23 (4:30 p.m.) 5,220 cfs (9.28 ft); Jan. 26 (2:30 a.m.) 3,680 cfs (8.54 ft); Feb. 9 (10:50 a.m.) 16,800 cfs (12.54 ft).

\* Discharge measurement made on this day.

Note.---Shifting-control method used Feb. 9 to May 10.



## Snoqualmie River near Tolt, Wash.

Location.--Lat 47°39'55", long. 121°55'30", in sec. 9, T. 25 N., R. 7 E., on left bank 100 ft downstream from highway bridge, 1 mile northwest of Tolt, and 2 miles downstream from Tolt River.

Drainage area.--605 sq mi.

Records available.--October 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, unadjusted. Prior to Dec. 20, 1933, chain or wire-weight gage on bridge, 100 ft upstream at datum, 42.96 ft higher. Dec. 20, 1933, to Sept. 30, 1939, water-stage recorder at present site at datum 42.96 ft higher than present datum. Auxiliary water-stage recorder 1 1/2 miles upstream from base gage.

Average discharge.--23 years, 3,696 cfs.

Extremes.--Maximum discharge during year, 52,200 cfs Feb. 10 (elevation, 59.18 ft); minimum, 255 cfs Sept. 22; minimum daily, 416 cfs Sept. 22.

1929-51: Maximum discharge, that of Feb. 10, 1951; maximum elevation recorded, 59.9 ft Nov. 13, 1932; minimum discharge, 239 cfs Aug. 21, 1945, but may have been less during period of faulty intake action Sept. 13 or 14, 1949; minimum daily discharge, 396 cfs Sept. 24, 1938.

Remarks.--Records good except those for periods of shifting control or no gage-height record, which are fair. Low flow diverted for operation of powerplant at Snoqualmie Falls but returned to river above station. Some pondage at Snoqualmie Falls and some diurnal fluctuation caused by powerplant.

Rating tables, water year 1950-51, except periods of shifting control (elevation, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

44.6	945	49.0	8,360	44.8	400	48.0	4,560
45.0	1,330	50.0	11,000	45.2	640	49.0	6,910
45.5	1,880	51.0	13,900	45.6	960	50.0	9,660
46.0	2,520	52.0	16,900	46.0	1,360	51.0	12,600
46.5	3,280	53.0	19,900	46.4	1,970	52.0	15,600
47.0	4,130	54.5	24,600	47.0	2,710	54.0	22,600
48.0	6,080	56.0	31,100	47.5	3,570	56.0	31,100
						58.6	47,400

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Avg.	Sept.
1	1,210	5,260	5,460	a6,300	3,120	2,550	2,870	2,870	3,300	2,400	734	619
2	1,120	8,360	4,580	a7,880	3,520	2,400	3,040	2,550	3,390	2,320	682	552
3	1,020	9,630	4,310	a11,000	4,450	2,320	3,760	2,460	3,570	2,320	682	516
4	1,040	8,860	4,960	a8,400	4,040	2,320	4,660	2,870	3,760	2,250	682	504
5	1,820	8,120	5,260	a6,500	3,610	2,250	4,560	4,460	3,570	2,040	675	482
6	3,520	6,080	7,180	5,460	3,200	*2,110	4,250	4,560	3,950	1,900	696	460
7	3,610	6,080	9,370	4,490	4,910	2,110	4,350	4,560	5,440	1,840	640	477
8	4,680	*4,780	7,410	4,130	11,500	2,040	4,150	4,350	5,100	1,710	605	612
9	6,730	3,950	6,080	3,780	29,600	1,970	3,660	3,950	4,350	1,590	522	647
10	12,500	3,360	6,510	3,440	<del>47,400</del>	1,900	3,300	4,990	4,150	1,530	570	584
11	13,600	3,040	*6,730	3,360	34,500	1,840	3,300	10,800	4,050	1,530	552	528
12	5,660	2,740	7,880	3,120	22,900	1,900	3,950	9,950	3,950	1,450	564	570
13	3,950	2,450	6,080	3,520	14,400	2,790	5,210	6,280	3,950	*1,450	577	522
14	3,280	2,380	4,870	5,060	9,370	3,120	5,100	4,990	4,050	1,470	540	494
15	3,120	<del>2,320</del>	4,580	4,680	7,430	4,230	4,770	4,460	4,350	1,390	510	482
16	2,660	2,960	5,460	4,400	6,400	<del>5,790</del>	4,660	4,660	4,050	1,380	522	444
17	2,380	3,120	6,290	4,580	5,670	4,150	4,880	5,910	3,570	1,340	528	460
18	2,590	2,880	6,290	4,040	5,100	3,480	4,660	5,670	3,390	1,260	489	465
19	5,660	2,520	5,060	*3,520	4,770	3,040	4,150	4,560	5,210	1,200	504	494
20	6,080	2,740	6,080	3,280	4,880	3,120	3,480	4,150	3,120	1,060	504	455
21	4,220	5,660	8,610	3,780	4,460	3,760	3,040	4,350	3,040	906	482	455
22	3,280	8,120	7,410	3,860	4,050	3,860	2,870	5,100	2,960	854	488	416
23	2,810	6,630	13,600	3,440	3,760	3,300	2,710	6,150	2,870	969	494	438
24	2,450	16,900	16,900	4,320	3,480	2,960	2,710	6,280	2,870	933	494	438
25	3,120	15,100	<del>17,800</del>	8,610	3,210	2,960	*2,790	6,910	2,870	830	472	626
26	4,680	15,400	11,000	<del>11,800</del>	2,870	3,660	2,960	5,210	2,710	830	477	1,240
27	4,310	12,700	8,120	7,640	*2,790	4,050	3,040	4,560	2,630	806	570	782
28	6,290	10,200	7,410	5,460	<del>2,710</del>	3,570	3,760	4,460	2,550	774	*570	682
29	5,870	7,640	6,950	4,510	-	3,300	4,050	4,350	2,480	766	647	1,460
30	4,780	6,290	7,410	3,780	-	3,350	3,300	*3,760	2,480	822	661	4,660
31	4,680	-	a6,900	3,360	-	3,120	-	3,390	-	<del>750</del>	790	-
Total	132,720	199,270	232,550	161,300	256,140	93,360	113,990	153,590	105,730	42,670	17,933	21,565
Mean	4,281	6,442	7,502	5,203	8,229	3,012	3,800	4,955	3,524	1,376	578	719
Cfs/m	7.08	11.0	12.4	8.60	15.2	4.98	6.28	8.19	5.82	2.27	0.955	1.19
In.	8.16	12.25	14.30	9.92	15.87	5.74	7.01	9.44	6.50	2.62	1.10	1.33
Ac-ft	263,200	395,200	461,300	319,900	512,000	185,200	226,100	304,600	209,700	84,630	35,570	42,770
Calendar year 1950: Max	24,400	Min	650	Mean	5,197	Cfs/m	8.59	In.	116.60	Ac-ft	3,763,000	
Water year 1950-51: Max	47,400	Min	416	Mean	4,200	Cfs/m	8.94	In.	94.24	Ac-ft	3,040,000	

Peak discharge (base, 16,000 cfs).--Oct. 11 (1 to 2 a.m.) 19,300 cfs (52.77 ft); Nov. 24 (6 to 7 p.m.) 19,600 cfs (52.86 ft); Dec. 25 (12 m. to 1 p.m.) 19,000 cfs (52.70 ft); Feb. 10 (3 a.m.) 52,200 cfs (59.18 ft).

\* Discharge measurement made on this day.

No gage-height record; discharge estimated on basis of recorded range in stage and records for nearby streams.

Note.--Shifting-control method used Feb. 11 to May 10.

## Pilchuck River near Granite Falls, Wash.

Location.--Lat 48°03'15", long. 121°57'25", in SE $\frac{1}{4}$  sec. 30, T. 30 N., R. 7 E., on right bank 200 ft upstream from road bridge and 2 miles south of Granite Falls.

Drainage area.--52.5 sq mi (revised).

Records available.--May to October 1911, January 1943 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 340 ft (from topographic map). Prior to Oct. 13, 1911, staff gage at approximately same site, at different datum. Jan. 14, 1943, to July 9, 1946, several staff gages within 150 ft of present site at different datum.

Average discharge.--8 years, 346 cfs.

Extremes.--Maximum discharge during year, 6,760 cfs Feb. 9 (gage height, 8.56 ft), from rating curve extended above 2,400 cfs on basis of slope-area determination of peak flow; minimum, 28 cfs Aug. 21-27, Sept. 6, 7, 23.

1911, 1943-51: Maximum discharge observed, 7,930 cfs Oct. 25, 1945 (gage height, 10.28 ft), from rating curve extended above 4,100 cfs; minimum, that of Aug. 21-27, Sept. 6, 7, 23, 1951.

Remarks.--Records good. City of Snohomish diverts about 5 cfs above station for municipal use. Slight regulation at low flow; cause unknown.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.9	24	3.5	358
2.1	41	4.0	588
2.3	64	4.5	878
2.5	92	5.0	1,230
2.8	149	6.0	2,230
3.1	225	7.5	4,470

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	84	572	354	567	243	203	390	158	130	58	34	35
2	76	407	311	1,050	390	190	424	141	130	57	35	32
3	70	1,040	321	1,230	370	190	482	145	128	56	34	30
4	76	626	*321	722	307	203	473	187	122	56	34	30
5	707	583	318	512	281	190	398	281	115	54	33	30
6	864	398	616	415	258	172	343	217	194	56	*32	29
7	407	351	578	358	664	165	354	261	347	54	31	34
8	588	277	432	*325	1,310	160	304	225	255	53	32	216
9	394	234	478	294	4,380	158	271	194	184	*52	32	74
10	1,280	205	788	274	3,690	151	258	225	156	50	33	59
11	507	184	546	268	1,920	145	277	845	141	50	34	54
12	297	167	428	258	848	271	347	521	134	48	33	41
13	225	156	332	609	562	*848	343	311	138	45	32	39
14	184	151	290	512	432	578	294	246	132	45	31	39
15	160	154	340	716	428	878	284	225	122	45	31	38
16	143	469	428	552	386	746	284	225	111	44	30	33
17	128	407	552	497	351	478	265	237	102	44	32	32
18	184	332	402	370	370	386	234	205	95	44	35	32
19	*281	274	336	343	366	366	197	180	89	43	32	35
20	217	362	459	314	497	459	*174	172	86	42	30	35
21	172	572	487	497	432	492	158	180	83	40	30	35
22	145	704	437	473	354	502	154	187	78	40	28	35
23	130	507	848	382	311	420	151	194	76	39	28	30
24	124	1,150	1,010	934	287	390	160	*194	74	39	28	34
25	311	848	930	1,630	277	428	167	190	72	40	28	206
26	336	665	497	1,640	246	567	160	145	70	39	28	89
27	358	1,230	610	665	231	552	163	145	67	38	30	59
28	512	716	734	432	217	441	225	145	64	36	41	*64
29	390	487	643	336	-	502	258	163	60	36	36	172
30	428	402	848	294	-	526	197	145	59	36	40	712
31	478	-	648	261	-	450	-	136	-	34	44	-
Total	10,256	14,630	16,282	17,762	20,408	12,207	8,189	7,025	3,614	1,413	1,011	2,383
Mean	331	468	525	575	729	394	273	227	120	45.6	32.6	79.4
Ac-ft	20,340	29,020	32,290	35,230	40,480	24,210	16,240	13,950	7,170	2,800	2,010	4,730
Calendar year 1950:	Max	3,100	Min	41	Mean	398	Ac-ft	288,000				
Water year 1950-51:	Max	4,380	Min	28	Mean	316	Ac-ft	228,400				

Peak discharge (base, 2,500 cfs).--Jan. 26 (2 a.m.) 2,870 cfs (6.49 ft); Feb. 9 (4:30 p.m.) 6,760 cfs (8.56 ft).

\* Discharge measurement made on this day.

## Little Pilchuck Creek near Lake Stevens, Wash.

Location.--Lat 48°02'00", long. 122°03'00", in NW¼NW¼ sec. 4, T. 29 N., R. 6 E., on right bank 1½ miles northeast of Lake Stevens and 2 miles upstream from Stevens Creek.

Drainage area.--12.8 sq mi.

Records available.--June 1946 to September 1951.

Gage.--Water-stage recorder and wooden control. Altitude of gage is 200 ft (from topographic map).

Average discharge.--5 years, 33.0 cfs.

Extremes.--Maximum discharge during year, 225 cfs Jan. 2, 3 (gage height, 4.00 ft); minimum, 1.0 cfs Aug. 18, 24-26 (gage height, 0.70 ft).  
1946-51: Maximum discharge, 322 cfs Nov. 11, 1947; maximum gage height, 4.65 ft Feb. 26, 1950; minimum discharge, that of Aug. 18, 24-26, 1951.

Remarks.--Records good except those for periods of no gage-height record, which are fair. Several small diversions above station for farm use.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.69	1.0	2.0	46
.9	2.9	2.3	60
1.1	6.6	2.6	79
1.3	13	3.0	112
1.5	22	3.5	165
1.7	30	4.0	225

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.7	25	115	134	a30	34	38	7.9	4.0	1.4	1.3	1.5
2	1.7	34	93	193	a35	32	33	7.1	3.6	1.5	1.3	1.6
3	1.7	46	74	199	40	30	29	6.8	3.5	*1.8	1.3	1.4
4	1.9	42	58	160	38	39	26	6.4	3.5	1.8	1.3	1.3
5	5.9	43	47	108	36	42	24	7.1	3.5	1.7	1.3	1.3
6	5.0	37	44	75	34	36	22	6.6	3.8	1.7	*1.2	1.3
7	3.0	31	*56	58	51	32	20	6.8	5.2	1.6	1.1	1.7
8	12.5	25	53	48	52	30	18	7.1	5.2	1.5	1.2	3.3
9	8.5	20	52	*41	96	29	17	6.6	4.2	1.5	1.2	1.9
10	17.5	17	70	58	142	27	15	6.6	3.5	1.5	1.3	1.6
11	15	15	62	56	154	26	14	34	3.2	1.3	1.3	1.5
12	7.4	14	53	32	98	53	*13	38	3.0	1.3	1.2	1.5
13	5.7	12.5	44	29	69	105	12.5	26	2.9	1.3	1.2	1.5
14	4.7	11.5	39	29	54	123	12.5	*20	2.8	1.3	1.2	1.4
15	4.0	13.5	44	72	52	165	11.5	16.5	2.4	1.3	1.3	1.4
16	*3.8	60	52	105	47	176	11	14	2.3	1.3	1.3	1.3
17	4.0	72	65	117	46	132	10	12.5	2.2	1.3	1.1	1.3
18	4.7	68	58	113	73	96	9.5	11.5	2.2	1.4	1.1	1.4
19	5.7	52	53	95	63	79	9.5	9.9	2.1	1.3	1.1	1.4
20	6.1	52	48	80	61	71	8.8	8.2	1.9	1.3	1.1	*1.4
21	5.7	50	44	140	68	72	8.2	7.6	1.8	1.2	1.2	1.4
22	5.0	44	43	149	56	99	7.6	6.8	1.8	1.2	1.1	1.4
23	4.7	47	54	111	46	101	6.6	6.4	1.8	1.2	1.1	1.5
24	4.7	68	68	92	44	84	7.1	5.9	1.7	1.3	1.1	1.7
25	8.8	88	93	74	54	70	7.1	6.4	1.9	1.3	1.0	2.9
26	8.2	85	74	77	48	75	6.8	5.9	1.7	1.3	1.0	2.3
27	11	154	59	62	40	67	6.8	5.0	1.6	1.2	1.3	2.8
28	13.5	143	59	48	*56	54	9.2	5.0	1.5	1.2	2.3	2.5
29	16.5	98	50	a42	-	48	10	5.0	1.4	1.2	1.8	2.5
30	17	91	140	a38	-	48	8.8	4.7	1.4	1.3	1.9	2.9
31	17	-	154	a34	-	46	-	4.3	-	1.2	1.7	-
Total	232.6	1,558.5	2,018	2,628	1,663	2,121	432.5	322.4	81.6	42.7	39.9	52.9
Mean	7.50	52.0	65.1	84.8	59.4	68.4	14.4	10.4	2.72	1.38	1.29	1.76
Cfsm	0.586	4.06	5.09	6.62	4.64	5.34	1.12	0.812	0.212	0.108	0.101	0.138
In.	0.68	4.53	5.86	7.64	4.83	6.16	1.26	0.94	0.24	0.12	0.12	0.15
Ac-ft	461	3,090	4,000	5,210	3,300	4,210	858	639	162	85	79	105

Calendar year 1950: Max 277 Min 1.5 Mean 36.2 Cfsm 2.83 In. 38.34 Ac-ft 26,180  
Water year 1950-51: Max 199 Min 1.0 Mean 30.7 Cfsm 2.40 In. 32.53 Ac-ft 22,200

Peak discharge (base, 150 cfs).--Nov. 27 (5 p.m.) 170 cfs (3.56 ft); Dec. 30 (7:30 to 9 p.m.) 170 cfs (3.57 ft); (11 p.m. Jan. 2 to 1 a.m. Jan. 3) 225 cfs (4.00 ft); Jan. 22 (12:30 to 6 a.m.) 154 cfs (3.41 ft); Mar. 16 (12 to 2:30 a.m.) 187 cfs (3.70 ft).

\* Discharge measurement made on this day.

A No gage-height record; discharge estimated on basis of records for stations on nearby streams.

## Snohomish River at Snohomish, Wash.

Location.--Lat 47°54'32", long. 122°06'00" in SE $\frac{1}{4}$  sec. 13, T. 28 N., R. 5 E., on downstream end of drawrest of bridge No. 205 on State Highway 1A in Snohomish.

Drainage area.--1,720 sq mi, approximately (revised).

Records available.--February 1941 to September 1951 (high-water discharges only). High-water elevations prior to 1932 and high-water profiles on flood peaks since that time are available at the Seattle office of Corps of Engineers.

Gage.--Water-stage recorder. Datum of gage is 10 ft below mean sea level, datum of 1929. Auxiliary water-stage recorder  $2\frac{1}{2}$  miles downstream from base gage.

Extremes.--Maximum discharge during year, 153,000 cfs Feb. 10 (gage height, 30.12 ft, backwater from tide).

1941-51: Maximum discharge, that of Feb. 10, 1951.

Maximum stage known, 35 ft at base gage and 31 ft at auxiliary gage in 1906, from flood profile furnished by Corps of Engineers.

Remarks.--Records good except those for periods of no gage-height record, which are fair. Large diurnal fluctuation because of tides. No appreciable regulation or diversion at stages for which discharges are published.

Revisions (water years).--W 1152: 1948(M).

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-	12,300	16,100	17,000	-	-	-	-	-			
2	-	18,800	13,800	19,000	-	-	-	-	-			
3	-	20,600	12,100	22,000	10,800	-	10,900	-	10,500			
4	-	25,400	11,500	19,000	10,600	-	12,600	-	12,000			
5	-	25,000	11,800	16,000	-	-	13,300	11,600	11,000			
6	11,900	18,900	13,900	13,000	-	-	12,000	13,200	11,500			
7	11,400	18,300	18,700	11,000	10,300	-	12,400	13,500	13,000			
8	14,300	13,500	17,200	10,000	22,200	-	12,500	13,300	15,000			
9	16,600	11,100	14,500	-	48,500	-	11,200	11,800	13,000			
10	30,900	-	17,200	-	112,700	-	10,100	13,900	13,000			
11	33,800	-	17,000	-	119,700	-	-	25,800	13,000			
12	18,700	-	19,000	-	71,300	-	11,100	30,600	12,000			
13	11,900	-	16,200	-	48,700	-	14,300	20,100	12,000			
14	-	-	13,600	11,400	32,300	-	15,300	14,900	13,000			
15	-	-	12,800	12,200	23,600	10,900	14,500	12,500	14,000			
16	-	-	14,300	11,400	19,400	16,100	14,100	13,100	15,000			
17	-	-	16,300	11,700	16,200	12,400	14,700	16,000	13,000			
18	-	-	17,600	11,000	15,300	-	14,000	16,900	12,000			
19	12,700	-	14,200	-	13,700	-	12,900	14,100	11,000			
20	15,100	-	16,500	-	14,000	-	10,900	12,400	10,500			
21	11,600	12,200	23,500	-	13,200	10,500	-	12,400	10,200			
22	-	19,000	22,100	10,400	11,400	11,600	-	14,000	10,000			
23	-	21,400	28,100	-	10,100	10,500	-	17,600	-			
24	-	34,800	41,100	10,200	-	-	-	18,600	-			
25	-	35,300	45,500	23,200	-	-	-	18,000	-			
26	13,200	43,100	35,000	31,900	-	10,000	-	15,000	-			
27	12,600	37,900	27,000	25,800	-	10,500	-	14,000	-			
28	16,600	32,900	21,000	16,900	-	-	10,400	13,000	-			
29	15,900	23,400	19,000	12,300	-	-	11,600	12,000	-			
30	13,200	18,500	21,000	10,200	-	-	-	11,000	-			
31	12,700	-	19,000	-	-	-	-	10,000	-			12,500

Peak discharge (base, 40,000 cfs).--Oct. 10 (10 p.m.) 43,600 cfs (24.66 ft); Nov. 26 (8 a.m.) 45,500 cfs (25.93 ft); Dec. 25 (9 a.m.) 49,000 cfs (26.54 ft); Feb. 10 (7:30 p.m.) 153,000 cfs (30.12 ft).

Note.--No gage-height record at base gage Dec. 26 to Jan. 8, May 25-31, June 3-22; discharge estimated on basis of records for stations on nearby streams.

# SNOHOMISH RIVER BASIN

137

Quilceda Creek near Marysville, Wash.

Location.--Lat 46°06'20", long. 122°09'40", in NE 1/4 sec. 9, T. 30 N., R. 5 E., on right bank 300 ft downstream from Middle Fork and 3 1/2 miles north of Marysville.

Drainage area.--15.7 sq mi.

Records available.--June 1946 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 40 ft above mean sea level (from topographic map).

Average discharge.--5 years, 25.8 cfs.

Extremes.--Maximum discharge during year, 144 cfs Mar. 13 (gage height, 5.51 ft); minimum, 2.2 cfs July 16.

1946-51: Maximum discharge, 155 cfs Feb. 22, 1949; maximum gage height, 5.72 ft Feb. 26, 1950; minimum discharge, that of July 16, 1951.

Remarks.--Records good except those for periods of shifting control, which are fair. Several diversions above station for irrigation and domestic use. No regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Jan. 1

Jan. 2 to Sept. 30

1.6	4.4	3.0	38	1.6	2.2	3.0	42
1.8	7.8	3.5	53	1.8	5.8	3.5	60
2.0	12	4.0	72	2.0	10.5	4.0	80
2.3	19	4.5	92	2.3	19	5.2	130
2.6	26			2.6	28		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4.9	32	68	70	22	30	32	13	9.0	4.2	2.8	4.0
2	4.7	33	54	116	42	26	29	12	8.7	4.2	3.0	4.0
3	4.4	42	46	104	42	28	28	11.5	7.7	*4.4	3.3	3.8
4	4.9	33	40	84	41	47	25	11.5	9.4	5.2	3.2	3.7
5	13	28	34	66	38	45	23	11.5	9.0	4.8	3.0	3.7
6	8.2	24	36	52	37	*41	22	11	8.7	4.8	3.0	4.0
7	8.7	22	44	45	60	35	21	12	10.5	4.4	2.8	6.0
8	23	21	*42	51	52	34	19	12	9.4	4.4	2.8	7.4
9	14	19.5	42	37	80	33	*19.5	11.5	10	4.4	3.2	4.8
10	26	19	52	37	86	31	19	11.5	8.2	4.0	3.3	4.6
11	15	18.5	48	37	80	30	18	39	8.2	3.8	3.5	4.8
12	12	17.5	42	31	60	74	17.5	28	8.2	3.5	3.3	4.6
13	10.5	17.5	36	30	49	130	16.5	22	8.0	3.5	3.3	4.8
14	9.6	18.5	35	29	43	112	16.5	19	7.2	3.5	3.2	4.6
15	8.8	25	41	74	43	112	16	16.5	6.7	3.5	3.2	4.2
16	8.6	62	44	*98	38	104	15	15	6.7	3.2	3.2	4.0
17	8.4	52	60	104	41	80	14.5	14.5	6.5	3.3	3.0	3.8
18	11.5	46	50	82	56	66	14.5	13.5	6.5	3.3	3.0	4.0
19	13	38	46	72	51	58	14.5	13	6.0	3.2	3.0	4.2
20	*13.5	41	41	66	68	56	14	12	5.8	3.2	3.0	4.2
21	12	35	38	126	52	56	13.5	11.5	5.4	3.0	3.0	4.2
22	10.5	34	38	108	43	80	13.5	*10.5	5.2	3.0	3.0	4.0
23	9.8	38	46	78	36	74	13	10.5	5.0	2.8	3.0	3.8
24	10.5	48	53	70	37	60	12.5	10.5	5.0	2.8	3.0	*4.2
25	22	58	54	60	51	52	12.5	10.5	4.8	3.2	3.0	5.8
26	18.5	52	47	58	46	54	12.5	10	4.8	3.2	3.2	5.0
27	21	74	41	47	38	46	12.5	10	4.6	2.8	4.4	4.6
28	25	60	42	37	33	40	15.5	10	4.4	2.8	*6.3	5.2
29	22	48	37	31	-	36	14	9.7	4.2	3.0	4.6	5.6
30	21	54	86	26	-	36	13	9.2	4.2	3.0	4.8	6.0
31	19.5	-	72	22	-	36	-	8.7	-	3.0	4.2	-
Total	412.5	1,108.5	1,455	1,938	1,365	1,742	527.0	421.1	208.0	111.4	104.6	137.6
Mean	13.3	37.0	46.9	62.5	49.8	56.2	17.6	13.6	6.93	3.59	3.37	4.59
Ac-ft	818	2,200	2,890	3,840	2,710	3,460	1,050	835	413	221	207	273

Calendar year 1950: Max 128 Min 3.5 Mean 27.5 Ac-ft 19,930  
Water year 1950-51: Max 130 Min 2.8 Mean 26.1 Ac-ft 18,920

Peak discharge (base, 110 cfs).--Jan. 2 (1 p.m.) 125 cfs (5.21 ft); Jan. 16 (11 p.m.) 121 cfs (5.02 ft); Jan. 21 (4 p.m.) 134 cfs (5.27 ft); Mar. 13 (6:30 p.m.) 144 cfs (5.51 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Dec. 1-30, July 17 to Sept. 30.

## STILLAGUAMISH RIVER BASIN

South Fork Stillaguamish River near Granite Falls, Wash.

Location.--Lat 48°06'10", long. 121°56'40", in SW<sup>1</sup>/<sub>4</sub> NW<sup>1</sup>/<sub>4</sub> sec. 8, T. 30 N., R. 7 E., on right bank a quarter of a mile upstream from bridge, 1½ miles upstream from Canyon Creek and 2 miles northeast of Granite Falls.

Drainage area.--119 sq mi.

Records available.--July 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 350 ft (from topographic map). Prior to Aug. 31, 1928, staff gage at site 8 miles upstream at different datum. Aug. 31 to Sept. 30, 1928, staff gage at present site and datum.

Average discharge.--23 years, 1,030 cfs.

Extremes.--Maximum discharge during year, 36,800 cfs Feb. 9, 10 (gage height, 18.10 ft), from rating curve extended above 9,000 cfs; minimum, 99 cfs Sept. 24 (gage height, 3.33 ft).

1928-51: Maximum discharge, that of Feb. 9, 10, 1951; maximum gage height, 19.7 ft Feb. 26, 1932, from graph based on gage readings; minimum discharge, 55 cfs Sept. 23, 24, 1938; minimum gage height, 2.99 ft Aug. 19-21, 1941.

Remarks.--Records excellent except those for period of shifting control and those above 10,000 cfs, which are good. No diversion or regulation.

Revisions (water years).--W 902: 1939.

Rating tables, water year 1950-51, except period of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

3.7	219	5.5	1,240
4.0	320	6.0	1,700
4.3	455	7.0	2,820
4.6	620	8.0	4,250
5.0	860		

3.3	94	6.0	1,520
3.5	131	7.0	2,720
3.7	175	8.0	4,250
4.0	260	9.0	5,990
4.3	370	10.0	8,000
4.6	505	12.0	13,000
5.0	725	14.0	19,500
5.5	1,080	15.6	25,400

Note.--Same as following table above 8.0 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	315	1,910	888	1,200	614	414	777	683	643	455	159	144
2	277	2,010	752	2,220	1,040	390	930	643	695	437	157	127
3	247	5,020	722	2,280	1,040	382	1,200	621	784	437	154	120
4	294	2,500	*704	1,240	776	382	1,380	874	811	414	152	116
5	2,470	2,490	680	923	680	382	1,280	1,380	732	354	150	114
6	2,700	1,460	2,140	764	602	370	1,160	1,240	790	316	144	114
7	2,340	1,240	1,960	686	3,050	350	1,280	1,330	1,080	323	139	127
8	3,060	923	1,330	668	7,540	342	1,120	1,120	916	278	*135	1,000
9	1,850	758	1,760	*596	25,000	330	965	1,000	777	*260	135	346
10	8,100	656	3,780	572	25,400	320	895	1,330	797	278	137	245
11	2,220	566	2,400	544	8,080	309	930	3,890	777	292	137	207
12	1,200	490	1,750	516	2,930	496	1,330	2,070	725	288	135	175
13	867	440	1,200	1,460	1,730	*1,380	1,620	1,240	732	295	129	152
14	740	415	965	1,160	1,280	930	1,470	1,000	784	292	123	139
15	620	420	1,420	1,700	1,200	2,070	1,380	916	874	267	122	131
16	516	1,200	1,800	1,160	1,040	1,570	1,380	1,120	797	254	120	127
17	450	836	2,750	965	902	930	1,420	1,380	695	251	120	123
18	952	844	1,560	758	860	732	1,280	1,120	632	248	120	122
19	1,600	510	1,470	656	804	671	1,000	930	594	230	118	120
20	*1,080	1,060	3,480	584	930	860	*804	895	572	210	118	114
21	776	1,960	3,080	867	777	1,120	689	965	566	196	118	110
22	626	2,230	2,820	704	660	1,000	638	1,200	582	191	120	107
23	522	1,650	4,980	578	604	804	610	1,520	560	181	122	103
24	485	6,320	5,540	1,980	577	732	632	*1,520	550	191	118	108
25	2,420	5,220	3,970	7,170	550	784	701	1,520	545	191	112	858
26	1,960	3,800	1,750	5,680	495	860	732	965	530	185	110	424
27	2,180	4,320	2,120	1,900	455	832	784	867	500	175	112	264
28	2,640	2,120	1,900	1,160	432	725	1,200	874	485	173	196	*371
29	1,700	1,360	1,700	861	-	850	1,200	867	485	170	157	1,120
30	1,560	1,080	2,520	758	-	965	860	725	475	165	157	3,930
31	1,510	-	1,560	656	-	825	-	638	-	161	178	-
Total	48,275	53,628	65,461	42,986	90,048	23,117	31,647	36,443	20,485	8,169	4,204	11,258
Mean	1,557	1,788	2,112	1,387	3,216	746	1,055	1,176	683	264	136	375
Cfs/m	13.1	15.0	17.7	11.7	27.0	6.27	8.87	9.88	5.74	2.22	1.14	3.15
In.	15.09	16.76	20.46	13.43	28.14	7.22	9.89	11.39	6.40	2.55	1.31	3.52
Ac-ft	95,750	106,400	129,800	85,260	178,600	45,850	62,770	72,280	40,630	16,200	8,340	22,330

Calendar year 1950: Max 9,650 Min 148 Mean 1,472 Cfs/m 12.4 In. 167.53 Ac-ft 1,066,000  
 Water year 1950-51: Max 25,400 Min 103 Mean 1,194 Cfs/m 10.0 In. 136.16 Ac-ft 864,200

Peak discharge (base, 8,700 cfs).--Oct. 10 (6 a.m.) 14,200 cfs (12.39 ft); Nov. 24 (3 a.m.) 11,800 cfs (11.61 ft); Dec. 24 (9 p.m.) 9,100 cfs (10.48 ft); Jan. 26 (12 a.m.) 11,600 cfs (11.46 ft); Feb. 9 (11 p.m.) 36,800 cfs (18.10 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Feb. 11 to Mar. 16.

## STILLAGUAMISH RIVER BASIN

139

South Fork Stillaguamish River above Jim Creek, near Arlington, Wash.

Location.--Lat 48°09'55", long. 122°03'55", in SW $\frac{1}{4}$  sec. 17, T. 31 N., R. 6 E., on right bank  $\frac{1}{2}$  miles upstream from Jim Creek and 3 miles southeast of Arlington.

Drainage area.--199 sq mi.

Records available.--October 1936 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 80.00 ft above mean sea level, datum of 1929. Prior to Dec. 31, 1936, staff gage at same site and datum.

Average discharge.--15 years, 1,540 cfs.

Extremes.--Maximum discharge during year, 27,700 cfs Feb. 9 (gage height, 27.26 ft); minimum, 110 cfs Sept. 23, 24 (gage height, 10.77 ft).

1936-51: Maximum discharge, 29,900 cfs Oct. 25, 1946 (gage height, 26.07 ft), from rating curve extended above 16,000 cfs; maximum gage height, that of Feb. 9, 1951; minimum discharge, that of Sept. 23, 24, 1951.

Remarks.--Records good except those for periods of shifting control, which are fair. No diversion or regulation.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	458	2,790	1,700	2,260	1,450	780	1,410	1,110	990	683	207	190
2	401	3,070	1,460	3,680	2,100	702	1,650	955	1,070	658	201	159
3	358	4,450	1,410	4,000	2,080	695	2,020	983	1,190	664	198	144
4	375	3,520	1,320	2,390	1,700	708	2,320	1,320	1,190	629	195	134
5	2,740	3,850	1,280	1,860	1,550	671	2,080	2,140	1,110	518	190	128
6	3,920	2,080	3,140	1,600	1,410	623	1,860	1,910	1,190	467	181	124
7	3,070	1,800	3,070	1,460	4,800	*566	2,080	2,020	1,650	492	*175	138
8	4,260	1,320	*2,260	1,410	10,500	550	1,800	1,700	1,410	420	170	1,330
9	2,460	1,070	2,700	1,280	22,600	529	1,600	1,500	1,190	388	167	594
10	10,400	934	5,920	1,230	*23,600	503	1,500	1,960	1,230	*410	170	362
11	3,680	822	3,440	1,230	13,200	472	1,600	5,520	1,190	433	173	290
12	1,860	734	2,650	1,150	5,480	850	2,200	2,930	1,110	424	170	235
13	1,360	677	1,960	2,400	3,600	2,650	2,580	1,910	1,150	429	159	195
14	1,070	646	1,650	2,390	2,720	1,750	2,320	1,550	1,190	424	148	173
15	934	646	2,020	*2,930	2,580	3,040	2,200	1,410	1,320	401	144	156
16	794	1,800	2,650	2,320	2,200	2,720	2,260	1,650	1,230	370	141	148
17	702	1,230	3,840	1,910	1,810	1,700	2,260	2,020	1,070	366	141	144
18	*1,230	1,020	2,390	1,600	1,800	1,360	2,020	1,650	1,010	358	138	141
19	2,200	822	2,080	1,410	1,650	1,230	1,600	*1,360	941	333	138	136
20	1,600	1,320	4,380	1,280	1,860	1,500	1,280	1,280	906	302	136	128
21	1,110	3,000	4,460	1,800	1,650	1,960	*1,150	1,410	906	272	136	124
22	906	3,220	3,600	1,600	1,410	1,800	1,070	1,700	920	258	136	119
23	773	2,430	7,300	1,320	1,280	1,460	1,020	2,080	892	258	136	114
24	695	8,850	8,450	3,010	1,190	1,320	1,060	2,020	850	262	126	117
25	3,180	6,940	5,980	10,500	1,150	1,410	1,150	2,080	857	265	121	1,240
26	2,580	5,380	2,860	8,960	1,020	1,650	1,190	1,410	822	255	117	*734
27	2,790	6,860	3,300	3,370	920	1,600	1,230	1,230	740	241	121	353
28	3,520	3,300	3,220	2,520	850	1,360	1,860	1,280	740	229	287	375
29	2,460	2,320	2,790	2,200	-	1,550	1,860	1,280	727	226	229	1,550
30	2,140	1,960	4,260	1,900	-	1,750	1,410	1,110	708	222	204	4,890
31	2,260	-	2,790	1,700	-	1,500	-	969	-	216	276	-
Total	66,286	78,821	100,350	78,670	118,260	40,959	51,640	53,447	31,499	11,873	5,231	14,665
Mean	2,138	2,627	3,236	2,538	4,224	1,321	1,721	1,724	1,050	363	169	469
Cfs/m	10.7	13.2	16.3	12.8	21.2	6.64	8.65	8.66	5.28	1.92	0.849	2.46
In.	12.39	14.73	18.75	14.70	22.10	7.65	9.65	9.99	5.89	2.22	0.98	2.74
Ac-ft	131,500	156,300	199,000	156,000	234,600	81,240	102,400	106,000	62,480	23,550	10,380	29,090

Calendar year 1950: Max 12,000 Min 210 Mean 2,186 Cfs/m 11.0 In. 149.13 Ac-ft 1,583,000  
 Water year 1950-51: Max 23,600 Min 114 Mean 1,785 Cfs/m 8.97 In. 121.79 Ac-ft 1,293,000

Peak discharge (base, 12,600 cfs).--Oct. 10 (8 a.m.) 17,100 cfs (21.36 ft); Nov. 24 (4 a.m.) 15,100 cfs (20.35 ft); Dec. 24 (9:30 p.m.) 13,100 cfs (19.36 ft); Jan. 26 (12:30 a.m.) 16,100 cfs (20.92 ft); Feb. 9 (5:30 p.m.) 27,700 cfs (27.26 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1-5, 9, 12-25, 29-31, Nov. 6-20, Feb. 16 to Sept. 30.

## STILLAGUAMISH RIVER BASIN

Jim Creek near Arlington, Wash.

Location.--Lat 48°10'30", long. 122°03'55", in SE $\frac{1}{4}$  sec. 17, T. 31 N., R. 6 E., on right bank 1 mile upstream from mouth and 3 miles southeast of Arlington.

Drainage area.--48.9 sq mi.

Records available.--October 1937 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 110 ft (from topographic map).

Average discharge.--14 years, 200 cfs.

Extremes.--Maximum discharge during year, 2,820 cfs Feb. 10 (gage height, 7.41 ft); minimum, 7.2 cfs part of each day Aug. 19-27 (gage height, 0.65 ft).  
1937-51: Maximum discharge, 4,730 cfs Dec. 28, 1949 (gage height, 9.28 ft), from rating curve extended above 1,900 cfs; minimum, 5.9 cfs Sept. 16, 1949.

Remarks.--Records good except those for periods of no gage-height record, which are fair. No diversion or regulation.

Revisions (water years).--W 1042: 1938-44. W 1092: 1946.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Apr. 12-15)

Oct. 1-10

Oct. 10 to Sept. 30

1.5	25	0.6	5.9	1.8	97	4.0	720
1.7	45	.8	12.0	2.0	125	4.5	950
2.0	87	1.0	22	2.3	180	5.0	1,200
2.3	141	1.2	34	2.6	250	5.5	1,480
2.6	206	1.4	51	3.0	360	6.0	1,780
3.0	311	1.6	72	3.5	525	6.5	2,120
3.5	471						

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	35	455	288	455	170	128	245	103	72	16	9.0	13.5
2	31	455	250	832	220	122	235	92	71	16	9.0	11.5
3	25	600	242	925	240	120	252	97	71	16	9.0	10.5
4	28	420	225	560	202	128	278	138	71	16	9.0	9.3
5	214	438	210	405	188	124	255	190	65	17	8.7	9.0
6	181	312	455	315	178	111	225	145	82	18	8.7	8.7
7	139	275	508	275	664	*105	220	148	118	18	8.4	10.5
8	392	212	372	250	832	103	198	129	98	18	*8.7	24
9	288	186	387	215	1,780	103	178	123	82	17	8.7	18.5
10	983	167	560	198	2,120	103	163	154	73	*16.5	8.7	14
11	405	150	405	190	*1,360	97	157	542	68	15.5	9.3	12
12	232	134	306	180	620	152	198	288	64	15	9.0	11.5
13	178	128	248	275	420	560	202	186	65	14	9.0	10.5
14	147	124	220	306	327	472	172	156	63	14	8.7	9.3
15	126	151	265	*525	298	620	167	141	60	13.5	8.7	8.7
16	114	361	298	472	258	580	182	147	50	13.5	8.7	8.7
17	108	351	508	490	235	438	174	147	40	13.5	8.4	8.4
18	200	285	339	387	242	339	154	120	35	14	8.1	8.4
19	*215	275	282	318	238	292	*126	*104	32	12.5	7.8	8.4
20	*178	275	381	280	288	290	107	97	30	12.5	8.1	8.1
21	148	318	378	542	262	348	96	108	30	12	7.5	7.8
22	128	285	348	490	222	405	90	118	27	11	7.2	7.8
23	116	270	765	363	194	372	92	126	25	11	7.5	7.8
24	114	620	878	562	188	321	94	110	23	11	7.2	8.7
25	230	580	660	950	192	298	103	118	23	11.5	7.2	40
26	184	490	405	1,080	172	312	101	88	20	11	7.5	*30
27	200	878	455	472	157	342	105	94	19	10.5	9.3	19
28	324	*508	525	300	143	306	220	88	16	10	28	21
29	312	351	525	250	143	278	165	89	17	10.5	18.5	72
30	324	303	1,000	210	-	292	124	77	17	10	15.5	205
31	318	600	600	180	-	275	-	71	-	9.3	15.5	-
Total	6,667	10,357	13,288	13,252	12,410	8,536	5,079	4,326	1,527	424.3	304.6	642.6
Mean	215	345	429	427	443	275	169	140	50.9	13.7	9.83	21.4
Cfsm	4.40	7.06	8.77	8.73	9.06	5.62	3.46	2.86	1.04	0.280	0.201	0.438
In.	5.07	7.68	10.11	10.08	9.44	6.49	3.86	3.29	1.16	0.32	0.23	0.49
Ac-ft	13,220	20,540	26,360	26,280	24,610	16,930	10,070	8,580	3,030	842	604	1,270

Calendar year 1950: Max 1,910 Min 7.2 Mean 261 Cfsm 5.34 In. 72.58 Ac-ft 189,300  
Water year 1950-51: Max 2,120 Min 7.3 Mean 210 Cfsm 4.29 In. 58.42 Ac-ft 152,300

Peak discharge (base, 1,400 cfs).--Oct. 10 (7 a.m.) 1,660 cfs (5.80 ft); Jan. 26 (12:30 a.m.) 1,910 cfs (6.23 ft); Feb. 10 (10:50 p.m.) 2,820 cfs (7.41 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 28 to Feb. 2, June 16 to July 9; discharge estimated on basis of records for stations on nearby streams.



## STILLAGUAMISH RIVER BASIN

141

Squire Creek near Darrington, Wash.

Location.--Lat 48°16'15", long. 121°39'45", in SE $\frac{1}{4}$  sec. 8, T. 32 N., R. 9 E., on left bank at road crossing one third of a mile upstream from Ashton Creek and 3 miles west of Darrington.

Drainage area.--19.6 sq mi.

Records available.--June 1950 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 480 ft (from topographic map).

Extremes.--Maximum discharge during year, 6,440 cfs Feb. 10 (gage height, 10.52 ft), from rating curve extended above 700 cfs by logarithmic plotting; minimum, 12.5 cfs Sept. 23, 24 (gage height, 0.79 ft).  
1950-51: Maximum discharge, that of Feb. 10, 1951; minimum, that of Sept. 23, 24, 1951.

Remarks.--Records good except those for periods of no gage-height record, which are fair. No diversion or regulation.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to May 10

May 11 to Sept. 30

1.3	39	4.0	745	0.8	13
1.5	58	4.5	990	1.0	24
1.7	79	5.0	1,260	1.3	45
2.0	120	5.5	1,560	1.6	80
2.3	174	6.0	1,920	2.0	142
2.6	241	7.0	2,580	2.5	242
3.0	355	8.3	3,880	3.0	375
3.5	530			3.5	550
				4.0	755

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Avg.	Sept.
1	52	251	178	199	a115	78	116	116	170	149	42	25
2	44	241	154	270	a170	75	138	104	193	151	40	22
3	40	392	141	281	174	72	176	108	207	144	40	20
4	114	465	130	208	145	72	197	149	212	117	39	19
5	254	316	130	*172	126	68	182	199	203	94	36	18.5
6	251	219	592	150	346	64	172	202	207	102	35	17.5
7	462	184	355	140	834	61	182	224	220	87	34	62
8	468	147	246	131	1,440	*59	166	189	187	80	34	143
9	286	126	701	118	3,700	59	149	195	197	87	*34	44
10	1,530	112	900	114	3,860	55	145	271	199	93	34	39
11	324	102	490	108	1,310	53	156	610	195	91	33	34
12	191	94	301	99	541	68	215	295	189	*91	32	28
13	149	86	222	158	355	101	251	220	210	91	29	25
14	125	81	197	156	267	90	229	193	242	84	27	22
15	108	81	513	274	246	257	213	201	251	81	27	19
16	94	140	364	208	206	188	227	251	210	79	26	18.5
17	85	117	550	*162	184	128	*231	305	197	77	26	18.5
18	324	101	267	156	162	108	208	224	189	72	25	18.5
19	267	89	398	120	156	104	166	197	183	64	25	17.5
20	176	150	811	111	154	128	141	210	185	58	25	16.5
21	151	244	610	125	138	156	126	251	189	56	25	15.5
22	111	234	570	114	125	140	120	310	187	56	25	14.5
23	98	371	801	102	116	118	112	*375	177	56	25	13
24	190	1,170	1,320	336	108	110	117	384	191	56	23	16
25	585	1,490	640	990	102	117	130	278	177	53	22	148
26	310	840	346	694	94	116	134	222	168	50	21	*47
27	502	*890	325	295	87	111	141	207	164	48	29	34
28	413	364	287	a200	83	104	178	191	164	47	43	110
29	264	257	267	a160	-	118	166	170	162	45	26	367
30	229	213	370	a140	-	123	134	153	155	44	49	605
31	206	-	241	a120	-	114	-	153	-	43	29	-
Total	8,403	9,565	13,217	6,591	15,344	3,215	5,018	7,157	5,780	2,446	960	1,997.5
Mean	271	319	426	213	548	104	167	231	193	78.9	31.0	66.6
Cfs/m	13.8	16.3	21.7	10.9	28.0	5.31	8.52	11.8	9.85	4.03	1.58	3.40
In.	15.94	18.15	25.08	12.51	29.11	6.10	9.52	13.58	10.97	4.64	1.82	3.79
Ac-ft	16,670	18,970	26,220	13,070	30,430	6,380	9,950	14,200	11,460	4,850	1,900	3,960

Calendar year 1950: Max - Min - Mean - Cfs/m - In. - Ac-ft -  
Water year 1950-51: Max 3,860 Min 13 Mean 215 Cfs/m 11.1 In. 151.21 Ac-ft 158,100

Peak discharge (base, 2,200 cfs).--Oct. 10 (3:30 a.m.) 3,030 cfs (7.42 ft); Nov. 25 (3 p.m.) 2,680 cfs (7.04 ft); Dec. 24 (4 p.m.) 2,280 cfs (6.53 ft); Feb. 10 (1:30 a.m.) 6,440 cfs (10.52 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

## North Fork Stillaguamish River near Darrington, Wash.

Location.--Lat 48°16'30", long. 121°42'00", in NW¼ sec. 7, T. 32 N., R. 9 E., in pier at left bank at highway bridge 5 miles west of Darrington.

Drainage area.--39.1 sq mi.

Records available.--June 1950 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 410 ft (from topographic map).

Extremes.--Maximum discharge during year, 15,500 cfs Feb. 10 (gage height, 10.63 ft), from rating curve extended above 4,200 cfs by logarithmic plotting; minimum, 38 cfs Sept. 23, 24 (gage height, 0.96 ft).  
1950-51: Maximum discharge, that of Feb. 10, 1951; minimum, that of Sept. 23, 24, 1951.

Remarks.--Records good except those for periods of no gage-height record or shifting control, which are fair. No diversion or regulation.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	127	1,070	764	820	a475	345	594	576	470	298	63	58
2	113	1,120	654	998	a560	322	690	504	498	298	80	53
3	102	1,450	592	1,160	667	318	878	516	540	286	78	49
4	178	1,400	532	884	562	314	990	702	618	254	75	47
5	616	1,250	508	*715	490	298	955	815	558	215	73	44
6	771	940	1,710	616	448	282	899	856	606	218	70	42
7	998	820	1,400	556	1,930	270	955	955	630	200	67	74
8	1,200	680	1,080	520	4,170	258	871	822	534	188	64	375
9	792	586	1,770	472	10,300	250	787	801	534	188	*65	120
10	3,860	532	3,020	442	10,500	236	726	1,020	528	191	65	89
11	1,250	478	1,750	412	*5,070	228	738	1,910	516	185	64	78
12	792	436	1,200	382	2,300	274	1,020	1,220	492	*167	81	65
13	604	394	940	514	1,560	455	1,220	892	510	185	58	61
14	502	370	806	598	1,220	*425	1,100	768	552	176	57	55
15	424	352	1,060	785	1,100	791	990	738	576	167	55	52
16	364	550	1,200	757	955	801	1,060	829	498	164	54	49
17	316	514	1,810	635	857	606	*1,100	920	460	161	53	48
18	1,050	460	1,120	*544	762	516	1,020	738	455	150	52	47
19	1,050	406	1,290	478	714	492	822	648	410	140	52	46
20	778	538	2,530	436	720	594	690	642	405	132	50	43
21	604	989	2,300	460	642	732	600	720	410	125	50	*41
22	502	1,120	1,950	418	582	630	546	850	395	118	50	40
23	442	1,340	2,470	382	534	606	498	*955	380	115	48	39
24	519	3,360	3,430	718	504	564	504	899	405	112	47	40
25	1,570	3,710	2,290	2,210	470	588	558	808	375	108	44	269
26	1,200	2,690	1,300	2,370	425	618	600	636	350	105	43	118
27	1,570	*2,930	1,200	1,160	395	618	630	600	335	99	48	76
28	1,570	1,510	1,120	a800	375	582	920	582	330	95	122	158
29	1,200	1,120	1,030	a680	-	594	829	546	318	93	68	484
30	1,020	916	1,300	a560	-	624	678	486	310	89	87	1,260
31	948	-	980	a510	-	600	-	455	-	87	75	-
Total	27,012	34,031	45,086	22,992	49,269	14,829	24,468	24,589	13,978	5,109	1,957	4,020
Mean	871	1,134	1,454	742	1,760	478	816	787	468	165	63.1	134
Cfsm	22.3	29.0	37.2	19.0	45.0	12.2	20.9	20.1	11.9	4.22	1.61	3.43
In.	25.69	32.37	42.68	21.87	46.86	14.10	23.27	23.20	13.30	4.86	1.86	3.82
Ac-ft	53,580	67,500	89,438	45,600	97,720	29,410	46,530	46,370	27,720	10,130	3,880	7,970

Calendar year 1950: Max - Min - Mean - Cfsm - In. - Ac-ft -  
Water year 1950-51: Max 10,500 Min 39 Mean 732 Cfsm 18.7 In. 254.08 Ac-ft 529,800

Peak discharge (base, 4,400 cfs).--Oct. 10 (5:30 a.m.) 6,650 cfs (6.39 ft); Nov. 25 (5 p.m.) 6,170 cfs (6.23 ft); Dec. 10 (2 a.m.) 4,670 cfs (5.50 ft); Dec. 20 (6:30 p.m.) 4,470 cfs (5.38 ft); Dec. 24 (6:30 p.m.) 5,180 cfs (5.73 ft); Feb. 10 (5 a.m.) 15,500 cfs (10.63 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for station near Arlington.

Note.--Shifting-control method used Feb. 12 to Apr. 13, May 12 to July 7, July 15 to Sept. 7.

## North Fork Stillaguamish River near Arlington, Wash.

Location.--Lat 48°15'45", long. 122°02'45", in SE $\frac{1}{4}$  sec. 16, T. 32 N., R. 6 E., on right bank 6 miles northeast of Arlington, 7 miles upstream from mouth, and 8 miles downstream from Deer Creek.

Drainage area.--269 sq mi.

Records available.--July 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 89.34 ft above mean sea level, datum of 1929. Prior to Sept. 18, 1928, staff gage at same site at datum 0.34 ft lower.

Average discharge.--23 years, 1,740 cfs.

Extremes.--Maximum discharge during year, 30,600 cfs Feb. 9; maximum gage height, 13.46 ft Feb. 10, 11; minimum discharge, 168 cfs Sept. 24.

1928-51: Maximum discharge, that of Feb. 9, 1951; maximum gage height, that of Feb. 10, 11, 1951; minimum discharge, 88 cfs Sept. 23, 1938.

Remarks.--Records fair. No diversion or regulation.

Revisions.--W 832: Drainage area.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	540	2,930	2,520	2,820	1,470	915	1,580	1,350	1,180	690	334	258
2	485	3,150	2,170	3,720	1,720	831	1,780	<u>1,140</u>	1,180	679	326	237
3	<u>439</u>	3,970	2,030	3,970	2,170	824	2,220	1,180	1,260	690	318	222
4	482	3,600	1,850	2,720	1,720	858	2,650	1,630	1,440	674	314	210
5	1,850	3,720	<u>1,760</u>	2,170	1,550	810	2,400	2,220	1,350	618	308	204
6	2,520	2,720	*4,620	1,800	1,390	758	2,160	2,050	1,400	580	305	201
7	2,370	2,420	4,830	1,630	6,140	726	2,340	2,220	<u>1,580</u>	580	296	228
8	3,900	1,940	3,480	1,590	10,700	695	2,050	2,000	1,350	540	289	1,020
9	2,620	1,630	3,710	1,470	25,000	696	1,780	1,830	1,260	515	286	422
10	<u>10,900</u>	1,470	8,600	1,390	<u>28,600</u>	662	1,830	2,430	1,220	520	*286	306
11	4,240	1,310	4,990	1,350	17,600	<u>640</u>	1,630	<u>6,480</u>	1,220	520	275	282
12	2,520	1,200	3,720	1,240	6,900	1,100	2,460	3,940	1,180	*510	268	261
13	1,940	1,100	2,930	2,220	4,180	2,580	<u>3,190</u>	2,520	1,140	525	261	234
14	1,590	<u>1,060</u>	2,520	2,320	3,050	1,880	2,780	2,000	1,220	530	258	225
15	1,350	1,060	2,930	3,040	2,780	* <u>3,380</u>	2,460	1,830	1,260	505	254	213
16	1,200	1,980	3,280	2,620	2,340	3,050	2,650	2,100	1,180	485	240	201
17	1,100	1,720	4,830	2,320	2,050	1,940	2,780	2,340	1,060	478	234	198
18	*3,340	1,430	5,370	*1,850	1,880	1,830	2,460	*1,940	985	476	228	189
19	3,370	1,240	2,930	1,550	1,730	1,530	*1,940	1,630	950	462	225	192
20	2,520	1,470	6,000	1,390	2,000	1,940	1,580	1,580	915	430	228	189
21	1,900	2,520	7,320	1,900	1,730	2,460	1,350	1,680	880	412	222	180
22	1,550	2,620	5,150	1,720	1,480	2,280	1,220	2,050	880	399	222	175
23	1,350	2,500	8,040	1,430	1,350	1,830	<u>1,140</u>	2,400	859	390	219	172
24	1,240	9,740	<u>11,300</u>	2,440	1,260	1,630	1,180	2,280	852	386	216	175
25	3,040	8,640	7,560	6,280	1,260	1,730	1,260	2,340	831	386	213	742
26	2,820	7,560	3,840	<u>9,030</u>	1,100	2,000	1,350	1,630	798	378	207	471
27	3,480	9,120	4,100	3,600	1,020	1,940	1,440	1,480	750	366	213	303
28	3,840	4,990	3,840	2,420	<u>950</u>	1,680	2,580	1,440	738	366	<u>471</u>	322
29	3,260	3,480	3,260	1,980	-	1,780	2,280	1,480	732	358	310	780
30	2,820	2,930	4,680	1,760	-	1,940	1,630	1,350	<u>714</u>	354	278	<u>3,640</u>
31	2,720	-	3,260	1,550	-	1,630	-	1,180	-	<u>346</u>	303	-
Total	77,276	95,420	135,400	77,290	135,120	48,304	59,950	63,690	32,364	15,146	8,403	12,461
Mean	2,493	3,181	4,368	2,493	4,826	1,558	1,998	2,055	1,079	489	271	415
Cfs/m	9.27	11.8	16.2	9.27	17.9	5.79	7.43	7.64	4.01	1.82	1.01	1.54
In.	10.68	13.19	18.72	10.69	18.68	6.68	8.29	8.81	4.47	2.09	1.16	1.72
Ac-ft	153,300	189,300	268,600	153,200	268,000	95,810	118,900	126,300	64,190	30,040	16,670	24,720

Calendar year 1950: Max 11,900 Min 282 Mean 2,524 Cfs/m 9.38 In. 127.58 Ac-ft 1,827,000  
 Water year 1950-51: Max 28,800 Min 172 Mean 2,084 Cfs/m 7.75 In. 105.18 Ac-ft 1,509,000

Peak discharge (base, 11,500 cfs).--Oct. 10 (7:30 a.m.) 16,100 cfs (10.17 ft); Nov. 24 (6 a.m.) 15,200 cfs (9.71 ft); Dec. 10 (4 a.m.) 11,900 cfs (8.76 ft); Dec. 20 (10 p.m.) 14,500 cfs (9.45 ft); Dec. 24 (7:30 p.m.) 16,500 cfs (10.02 ft); Jan. 26 (2:30 a.m.) 16,100 cfs (10.30 ft); Feb. 9 (5 p.m.) 30,600 cfs (13.30 ft).

\* Discharge measurement made on this day.

## Armstrong Creek near Arlington, Wash.

Location.--Lat 48°13'15", long. 122°08'00", in NW $\frac{1}{4}$  sec. 35, T. 32 N., R. 5 E., on right bank at Northern Pacific Railroad culvert 1 mile north of Arlington.

Drainage area.--7.2 sq mi, approximately.

Records available.--June 1950 to September 1951.

Gage.--Water-stage recorder and wooden control. Altitude of gage is 60 ft (from topographic map).

Extremes.--Maximum discharge during year not determined, occurred sometime Feb. 9 or 10, when gage height was affected by backwater from Stillaguamish River; minimum, 1.2 cfs Sept. 14.  
1950-51: Maximum discharge, that of Feb. 9 or 10, 1951; minimum, that of Sept. 14, 1951.

Remarks.--Records good prior to Feb. 9, 1951, fair thereafter except those for periods of backwater, doubtful, or no gage-height record, which are poor. No diversion or regulation.

Rating tables, water year 1950-51, except periods of backwater or doubtful gage-height record (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used June 4-20, July 5 to Aug. 3, Sept. 11-30)

Oct. 1 to Nov. 27		Nov. 28 to Feb. 9		Feb. 10 to Sept. 30	
0.48	3.8	0.7	11.5	0.3	1.4
.5	4.9	.8	20	.35	2.6
.55	8.6	.9	32	.4	4.7
.6	14.5	1.0	48	.45	7.7
.7	36	1.1	70	.5	11.5
.75	53				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4.9	36	34	52	15	20	24	6.3	4.7	a4.7	4.2	3.8
2	4.3	30	28	55	21	15.5	23	5.2	4.2	a4.3	4.7	3.4
3	3.8	42	24	45	18.5	17	21	4.7	3.8	a3.8	6.9	3.4
4	4.9	25	20	*50	17.5	23	18.5	3.8	9.9	a3.9	4.2	3.4
5	12	23	17.5	43	16.5	21	15.5	4.7	9.1	*4.2	3.8	3.4
6	13	19	18.5	32	16	*18.5	15.5	3.4	9.1	4.2	4.2	3.4
7	9.6	17	19	27	14.5	17	4.7	15.5	4.7	3.4	3.4	3.4
8	25	14.5	18.5	22	26	13.5	15.5	4.2	11.5	4.7	4.0	3.8
9	17	14.5	17.5	19	*c55	14.5	13.5	2.4	7.7	5.2	3.8	3.8
10	33	13	18.5	17.5	c60	13.5	15.5	1.8	6.3	5.2	*3.8	3.4
11	17	12	17.5	18.5	c50	11.5	11.5	4.4	5.2	4.7	3.8	3.4
12	14.5	10.5	14	16	31	27	9.9	39	5.7	4.7	4.2	2.4
13	10.5	10.5	13	19	26	27	*9.9	21	5.2	5.2	4.2	2.4
14	6.8	10.5	12.5	21	23	26	9.9	13.5	5.7	4.2	4.2	1.6
15	7.6	13	14	40	23	39	9.1	11.5	5.7	4.7	4.2	1.6
16	6.8	36	14	*43	18.5	56	7.7	*10.5	10.5	4.7	3.8	1.8
17	6.8	23	16.5	48	17	60	7.0	8.4	9.1	5.2	3.8	1.8
18	9.6	19	14	40	31	63	7.0	8.4	7.7	5.2	3.8	1.8
19	12	17	14	34	31	56	4.7	8.4	6.3	5.2	4.2	1.8
20	14.5	19	14	27	31	56	3.4	7.7	5.2	5.7	4.2	1.8
21	14.5	17	18.5	43	32	66	d3.1	6.3	a4.5	4.7	4.2	1.6
22	12	15.5	19	48	29	75	d2.8	5.2	a4	4.7	4.2	1.6
23	10	15.5	30	43	21	69	d2.6	5.7	a3.5	4.2	4.2	1.8
24	10.5	30	48	34	21	66	2.4	5.7	a4.2	4.7	4.2	1.8
25	15.5	33	52	28	34	60	2.6	6.3	a4.7	5.2	4.2	*4.7
26	19	30	37	35	29	69	5.7	5.2	a4.2	4.7	4.7	3.0
27	19	49	32	27	23	56	8.4	5.2	a4	4.7	7.0	2.4
28	23	*19	32	21	20	42	11.5	7.0	a4	4.2	6.3	2.6
29	21	24	26	17.5	-	36	12.4	7.7	a4.2	4.7	4.7	3.0
30	21	26	48	16	-	34	9.1	5.2	a4.7	4.7	4.2	5.2
31	19	-	55	15	-	29	-	5.2	-	4.7	3.8	-
Total	420.4	663.5	756.5	996.5	763.0	1,194.5	319.7	278.3	190.1	145.6	135.1	83.3
Mean	13.6	22.1	24.4	32.1	27.2	38.5	10.7	8.98	6.34	4.70	4.36	2.78
Cfsm	1.89	3.07	3.39	4.46	3.78	5.35	1.49	1.25	0.891	0.653	0.606	0.386
In.	2.17	3.43	3.91	5.15	3.94	6.17	1.65	1.44	0.98	0.75	0.70	0.43
Ac-ft	834	1,320	1,500	1,980	1,510	2,370	634	552	377	289	268	165

Calendar year 1950: Max - Min - Mean - Cfsm - In. - Ac-ft -  
Water year 1950-51: Max 75 Min 1.6 Mean 16.3 Cfsm 2.26 In. 30.72 Ac-ft 11,800

\* Discharge measurement made on this day.  
a No gage-height record; discharge estimated on basis of records for stations or nearby streams.  
c Backwater from Stillaguamish River.  
d Doubtful gage-height record; discharge estimated on basis of records for stations on nearby streams.

## Cavanaugh Lake near Oso, Wash.

Location.--Lat 48°19'30", long. 122°19'15", in NW $\frac{1}{4}$ NW $\frac{1}{4}$  sec. 26, T. 33 N., R. 6 E., on north shore 5 miles northwest of Oso.

Drainage area.--6.7 sq mi, approximately

Records available.--June 1950 to September 1951 (discontinued).

Gage.--Staff gage read once daily. Altitude of gage is 1,010 ft (from topographic map).

Extremes.--1950-51: Maximum gage height observed, 5.12 ft Feb. 11, 1951; minimum observed, 0.84 ft Aug. 28, 29, 1951.

Remarks.--No diversion or regulation.

Gage height, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Avg.	Sept.
1	2.22	2.98	3.41	3.98	3.31	2.66	2.91	1.94	1.71	1.45	1.14	0.93
2	2.20	2.99	3.32	4.23	3.30	2.61	2.88	1.91	1.67	1.44	1.12	.93
3	2.18	3.09	3.21	4.34	3.30	2.56	2.86	1.89	1.65	1.43	1.11	.92
4	2.18	3.09	3.11	4.20	3.27	2.61	2.83	1.88	1.64	1.42	1.10	.92
5	2.34	3.16	3.02	4.00	3.19	2.66	2.80	1.90	1.60	1.41	1.08	.91
6	2.41	3.15	3.09	3.86	3.09	2.66	2.76	1.88	1.61	1.41	1.06	.90
7	2.48	3.10	3.24	3.63	3.37	2.58	2.72	1.87	1.61	1.41	1.05	.92
8	2.70	3.03	3.30	3.47	3.66	2.47	2.65	1.86	1.62	1.40	1.04	.96
9	2.78	2.94	3.30	3.34	4.50	2.45	2.60	1.84	1.59	1.39	1.03	.95
10	3.27	2.86	3.34	3.25	4.78	2.42	2.55	1.81	1.55	1.39	1.02	.94
11	3.50	2.78	3.32	3.13	5.12	2.36	2.49	2.23	1.54	1.38	1.01	.94
12	3.28	2.71	3.25	3.05	4.74	2.30	2.44	2.34	1.53	1.37	1.00	.94
13	3.17	2.66	3.16	3.17	4.43	2.65	2.41	2.34	1.54	1.37	.99	.93
14	3.09	2.60	3.11	3.35	4.16	2.69	2.38	2.32	1.54	1.36	.98	.93
15	2.96	2.60	3.06	3.42	3.94	2.92	2.32	2.30	1.54	1.35	.97	.93
16	2.86	2.74	3.02	3.54	3.71	2.94	2.29	2.25	1.54	1.34	.96	.92
17	2.79	2.78	3.08	3.58	3.56	2.92	2.24	2.21	1.54	1.33	.95	.91
18	2.90	2.82	3.04	3.53	3.42	2.88	2.21	2.18	1.54	1.32	.94	.90
19	2.96	2.76	2.98	3.44	3.36	2.82	2.18	2.13	1.53	1.30	.93	.90
20	3.00	2.75	3.10	3.36	3.35	2.81	2.12	2.07	1.53	1.29	.93	.89
21	2.96	2.75	3.32	3.48	3.30	2.86	2.08	2.04	1.52	1.28	.92	.87
22	2.88	2.78	3.41	3.55	3.19	2.96	2.04	2.00	1.52	1.26	.91	.86
23	2.82	2.77	3.68	3.46	3.09	2.94	2.00	1.95	1.51	1.25	.90	.86
24	2.77	3.09	3.94	3.50	3.04	2.93	1.97	1.97	1.50	1.24	.88	.86
25	2.77	3.26	4.00	3.61	3.03	2.88	1.94	1.92	1.50	1.22	.87	1.01
26	2.76	3.32	4.09	4.20	2.92	2.92	1.91	1.86	1.49	1.20	.86	1.01
27	2.78	3.62	4.16	4.18	2.83	2.94	1.90	1.82	1.48	1.19	.85	1.02
28	2.80	3.66	4.27	3.98	2.74	2.93	1.98	1.82	1.48	1.18	.84	1.04
29	2.82	3.58	4.21	3.77	-	2.95	1.98	1.80	1.47	1.17	.84	1.05
30	2.88	3.52	4.20	3.59	-	2.97	1.96	1.77	1.46	1.16	.87	1.20
31	2.90	-	4.11	3.44	-	2.96	-	1.74	-	1.15	.91	-

## Pilchuck Creek near Bryant, Wash.

Location.--Lat 48°16'00", long. 122°09'45", in NE $\frac{1}{4}$  sec. 16, T. 32 N., R. 5 E., on right bank 500 ft upstream from highway bridge 2 miles north of Bryant.

Drainage area.--50.8 sq mi (revised).

Records available.--March 1929 to September 1931, June 1950 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 140 ft (from topographic map). Prior to Sept. 30, 1931, staff gage 100 ft downstream at different datum.

Extremes.--Maximum discharge during year, 3,990 cfs Feb. 9 (gage height, 6.69 ft); minimum, 1.3 cfs Aug. 20, 21 (gage height, 1.40 ft).  
1929-31, 1950-51: Maximum discharge, that of Feb. 9, 1951; minimum, 0.5 cfs Aug. 29 to Sept. 1, 1931 (gage height, 0.90 ft, site and datum then in use).

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9

Feb. 9 to Sept. 30

1.9	29	1.4	1.3	3.5	700
2.1	61	1.6	6.2	4.0	1,090
2.4	141	1.8	19	4.5	1,500
2.7	264	2.1	66	5.0	1,980
3.1	487	2.4	148	5.5	2,520
3.5	760	2.7	248	6.0	3,100
4.0	1,180	3.1	440		
4.5	1,670				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	52	800	294	519	189	142	304	102	48	3.8	1.7	4.4
2	43	800	255	971	289	127	345	78	44	3.5	1.7	3.8
3	37	900	269	1,170	444	124	380	88	42	3.5	1.7	3.0
4	35	600	250	625	357	127	365	139	46	3.8	1.7	2.8
5	378	700	223	438	284	118	294	194	44	4.1	1.7	2.6
6	411	450	672	336	250	115	252	145	51	*4.4	1.7	2.4
7	264	350	923	279	1,130	104	261	154	99	4.4	1.7	2.6
8	595	250	598	246	1,360	*99	198	139	76	4.4	1.6	2.8
9	396	220	444	218	*2,740	94	181	121	55	4.1	1.6	4.4
10	1,420	190	632	218	2,020	96	175	145	40	3.8	*1.6	4.7
11	487	170	456	241	*1,580	84	191	1,090	33	3.5	1.6	3.8
12	274	150	352	210	700	240	269	446	30	3.3	1.7	3.3
13	198	140	255	265	464	749	*248	233	27	3.0	1.7	2.8
14	163	130	214	551	345	434	201	181	29	2.8	1.7	2.8
15	135	200	246	942	330	811	191	157	23	2.6	1.7	2.8
16	118	500	352	660	286	539	201	*163	17	2.6	1.7	2.4
17	105	450	598	545	248	317	191	149	13.5	2.6	1.6	2.4
18	499	400	374	391	256	265	157	121	11.5	2.6	1.6	2.1
19	450	350	274	*309	277	273	118	102	9.9	2.4	1.4	2.1
20	350	300	642	269	520	402	94	99	9.4	2.4	1.4	2.1
21	250	450	828	738	380	500	78	110	8.9	2.4	1.4	2.1
22	200	350	611	584	298	407	74	115	7.9	2.4	1.6	2.1
23	130	300	1,220	397	253	322	76	124	7.0	2.2	1.6	1.9
24	120	850	1,410	719	208	290	86	99	6.6	2.1	1.4	2.2
25	400	700	915	1,570	208	360	102	110	6.6	2.1	1.4	*115
26	350	*591	493	1,520	181	464	96	74	5.4	2.1	1.4	23
27	400	1,100	812	578	166	434	104	71	5.1	2.1	1.9	14.5
28	550	702	1,000	374	154	335	344	59	4.7	2.1	7.0	13
29	500	432	702	309	-	402	201	86	4.4	2.1	9.9	27
30	550	350	1,220	246	-	412	133	59	4.1	1.9	5.6	215
31	500	-	695	208	-	350	-	51	-	1.9	4.7	-
Total	10,356	13,655	18,229	16,644	15,865	9,516	5,910	4,983	809.0	91.0	70.9	475.9
Mean	334	455	588	537	567	307	197	161	27.0	2.94	2.29	15.9
Cfs/m	6.57	8.96	11.6	10.6	11.2	6.04	3.88	3.17	0.531	0.058	0.045	0.313
In.	7.58	10.00	13.35	12.18	11.61	6.97	4.33	3.65	0.59	0.07	0.05	0.35
Ac-ft	20,540	27,080	36,160	33,010	31,470	18,870	11,720	9,880	1,600	180	141	944

Calendar year 1950: Max - Min - Mean - Cfs/m - In. - Ac-ft -  
Water year 1950-51: Max 2,740 Min 1.4 Mean 265 Cfs/m 5.22 In. 70.73 Ac-ft 191,600

Peak discharge (base, 2,000 cfs).--Oct. 10 (5:30 a.m.) 2,350 cfs (5.08 ft); Dec. 24 (8 p.m.) 2,090 cfs (4.87 ft); Jan. 25 (12 p.m.) 3,120 cfs (5.62 ft); Feb. 9 (2:30 p.m.) 3,990 cfs (6.69 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Oct. 19 to Nov. 25; discharge estimated on basis of records for stations on nearby streams. Shifting-control method used Jan. 15 to Feb. 9, Mar. 16 to May 11.

## Fish Creek near Arlington, Wash.

Location.--Lat 48°10'30", long. 122°13'30", in NW $\frac{1}{4}$  sec. 18, T. 31 N., R. 5 E., on left bank three-quarters of a mile upstream from mouth and  $4\frac{1}{2}$  miles west of Arlington.

Drainage area.--7.6 sq mi, approximately.

Records available.--June 1950 to September 1951.

Gage.--Water-stage recorder and wooden control. Altitude of gage is about 50 ft (from topographic map).

Extremes.--Maximum discharge during year, 92 cfs Jan. 2 (gage height, 2.17 ft); minimum, 0.3 cfs part of each day Aug. 20-26, Sept. 4-7.

1950-51: Maximum discharge, that of Jan. 2, 1951; minimum, 0.3 cfs part of each day Aug. 20-26, Sept. 4-7, 1951.

Remarks.--Records good except those for periods of no gage-height record or shifting control, which are fair, and those below 1.0 cfs, which are poor. Some diversion and regulation.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

0.7	0.5	1.4	18
.8	1.2	1.6	30
1.0	3.9	1.8	47
1.2	9.3	2.1	82

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.0	12	32	34	a10	12.5	9.0	2.8	1.5	a0.7	0.5	0.4
2	*1.0	13	20	72	b18	10.5	8.1	2.8	1.4	a.7	.4	.4
3	1.0	19.5	15	50	15.5	10.5	7.2	2.5	1.4	a.8	.5	.4
4	1.0	12	12	*35	14.5	16	6.6	2.2	2.2	a.8	.5	.4
5	3.2	8.1	9.6	23	12.5	16.5	6.3	2.2	2.2	a.8	.5	.3
6	3.6	6.0	10.5	16.5	12	15	5.8	2.2	2.5	a.8	.4	.3
7	2.6	5.5	16.5	14	25	13	5.5	2.5	2.9	a.8	.4	.4
8	6.3	4.3	15	12	18	13	5.3	2.6	2.3	a.7	.4	.6
9	5.0	4.1	14	10.5	28	12	4.8	2.5	1.8	a.7	.4	.5
10	5.5	3.9	17.5	11.5	26	10.5	4.3	2.2	1.7	*7	.5	.6
11	4.3	3.9	16	13	21	10	4.1	17.5	1.6	*.6	.5	.6
12	3.1	3.8	13.5	10.5	15	*34	3.9	10.5	1.6	.5	.5	.6
13	2.8	3.6	10.5	10	12.5	67	*3.8	6.3	1.6	.5	.4	.5
14	2.5	3.9	10.5	9.6	11	56	3.6	4.8	1.5	.6	.4	.5
15	2.1	6.3	14.5	48	13	60	3.4	3.9	1.3	.5	.5	.4
16	2.1	39	16.5	*54	11.5	44	3.2	*3.4	1.2	.5	.4	.4
17	2.1	21	19	56	13	30	3.1	3.2	1.2	.5	.4	.4
18	2.8	14.5	14.5	37	19	22	3.1	3.1	1.2	.6	.4	.5
19	3.1	10	14	30	15	18.5	3.2	2.8	1.1	.6	.4	.5
20	5.0	14	12	23	27	16.5	2.9	2.5	1.0	.6	.3	.5
21	3.6	10	14	73	17.5	16	2.8	2.2	1.0	.6	.3	.4
22	2.9	9.0	14.5	55	13.5	31	2.6	2.1	.9	.5	.4	.5
23	2.8	10.5	19	35	11	25	2.6	1.8	.9	.5	.5	.5
24	2.8	12	24	28	12	18.5	2.5	1.8	.9	.5	*.4	.6
25	6.9	16.5	23	24	22	16	2.3	1.8	.8	.6	.3	1.1
26	6.3	13.5	16	22	21	16.5	2.3	1.8	a.8	.6	.4	.8
27	7.5	17.5	14	16	17	14	2.3	1.7	a.7	.6	.5	.7
28	10.5	*14	14	a12	14	12	4.1	2.0	a.7	.5	1.4	1.0
29	8.4	10.5	12	a11	-	11	4.3	1.8	a.7	.5	.6	1.1
30	6.6	19	57	a9.5	-	12	3.4	1.6	a.7	.6	.5	1.0
31	5.5	-	34	a9	-	10.5	-	1.6	-	.5	.5	-
Total	123.9	340.9	544.6	864.1	465.5	670.0	126.4	102.5	41.3	19.0	14.3	16.9
Mean	4.00	11.4	17.6	27.9	16.6	21.6	4.21	3.31	1.38	0.61	0.46	0.56
Cfs/m	0.526	1.50	2.32	3.67	2.18	2.84	0.554	0.436	0.182	0.080	0.061	0.074
In.	0.61	1.67	2.66	4.23	2.28	3.28	0.62	0.50	0.20	0.09	0.07	0.08
Ac-ft	246	676	1,080	1,710	923	1,330	251	203	82	38	28	34

Calendar year 1950: Max - Min - Mean - Cfs/m - In. - Ac-ft -  
 Water year 1950-51: Max 73 Min 0.3 Mean 9.12 Cfs/m 1.20 In. 16.29 Ac-ft 6,600

Peak discharge (base, 75 cfs).--Dec. 30 (8 a.m.) 78 cfs (2.07 ft); Jan. 21 (11:30 a.m.) 92 cfs (2.17 ft); Jan. 21 (2 p.m.) 82 cfs (2.10 ft); Mar. 13 (8:30 p.m.) 86 cfs (2.13 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of weather records and records for stations on nearby streams.

b Stage-discharge relation affected by ice.

Note.--Shifting-control method used May 23 to June 25, July 10 to Sept. 30.

## Skagit River near Hope, British Columbia

(International gaging station)

Location.--Lat 49°03', long. 121°05', on left bank just downstream from Galena Creek, 4 miles upstream from international boundary, and 40 miles southeast of Hope, British Columbia.

Drainage area.--357 sq mi, (revised).

Records available.--October 1934 to September 1951 in reports of Geological Survey. March 1915 to September 1922 in reports of Water Resources Division, Department of Resources and Development, Canada.

Gage.--Water-stage recorder. Altitude of gage is 1,670 ft (from topographic map). Prior to October 1934, water-stage recorder at about same site but different datum.

Average discharge.--17 years (1934-51), 926 cfs.

Extremes.--Maximum discharge during year, 5,560 cfs May 24 (gage height, 10.49 ft); minimum, 218 cfs Sept. 24 (gage height, 5.31 ft).

1915-22, 1934-51: Maximum discharge, 10,200 cfs June 21, 1950 (gage height, 12.20 ft); minimum recorded, 81 cfs Feb. 9, 1937.

Remarks.--No diversion or regulation.

Cooperation.--This station is maintained with the cooperation of the city of Seattle and is one of the international gaging stations maintained by Canada under agreement with the United States.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1-9)

5.3	215	7.5	1,610
5.6	320	8.0	2,130
6.0	505	9.0	3,330
6.5	820	10.4	5,410
7.0	1,180		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	303	764	1,740	1,390	572	632	544	1,400	2,130	2,670	750	352
2	286	708	1,520	1,330	578	596	608	1,330	*2,240	2,710	743	328
3	270	792	1,380	1,270	596	*578	785	1,330	2,560	2,610	736	310
4	255	1,110	1,250	1,160	596	572	995	1,470	2,740	2,430	715	299
5	255	a1,170	1,180	1,080	566	522	1,160	1,940	2,860	2,140	632	306
6	260	a1,220	1,160	1,020	532	a510	1,200	2,530	2,860	2,110	644	296
7	273	1,280	1,090	967	516	a497	1,280	3,030	2,900	1,880	602	285
8	384	1,140	1,030	939	558	485	1,330	3,460	2,900	1,700	596	316
9	496	1,020	1,030	904	764	465	1,290	3,280	2,980	1,610	566	313
10	764	995	1,490	862	2,250	460	1,240	3,740	3,150	1,610	532	306
11	946	981	1,800	820	a2,100	450	1,240	4,710	3,290	1,570	544	306
12	778	918	1,850	778	a1,940	445	1,430	5,060	3,370	1,540	516	292
13	729	848	1,710	757	a1,780	445	1,920	4,050	3,470	1,520	475	282
14	656	813	1,530	736	a1,630	435	2,160	3,380	3,740	1,500	440	299
15	614	771	1,410	736	a1,480	445	2,090	3,060	4,400	1,440	445	*257
16	566	750	1,320	708	1,320	440	2,110	3,280	4,280	1,380	440	254
17	522	708	*1,310	694	1,200	415	2,270	3,880	3,980	1,320	410	250
18	505	650	1,280	662	1,120	400	2,440	3,920	3,640	1,290	383	250
19	566	596	1,200	626	1,040	400	2,240	3,540	3,420	1,210	360	246
20	687	584	1,260	620	981	415	1,980	3,360	3,080	1,110	340	240
21	668	608	1,420	626	925	450	1,770	3,540	2,930	1,040	344	232
22	*614	638	1,540	802	876	465	1,610	4,170	2,910	995	352	229
23	590	602	1,610	578	820	460	1,480	5,350	2,970	967	344	222
24	572	827	2,170	578	785	445	1,440	*2,200	2,950	946	324	222
25	694	1,160	3,890	a575	750	450	1,450	4,380	2,880	925	310	243
26	862	2,250	3,230	a572	701	455	1,510	3,640	*2,910	883	302	250
27	897	3,560	2,500	a569	674	470	1,530	3,290	2,770	834	328	246
28	1,000	3,370	2,110	566	*644	480	1,560	2,970	2,640	799	405	250
29	935	*2,550	1,830	566	-	485	1,550	2,620	2,580	771	400	*302
30	883	2,060	1,680	566	-	505	1,480	2,360	2,610	771	396	332
31	827	-	1,500	*566	-	*516	-	2,170	-	750	396	-
Total	18,661	35,443	51,000	24,423	28,274	14,788	45,702	101,420	92,140	45,031	14,788	8,315
Mean	602	1,180	1,650	788	1,010	.477	1,520	3,270	3,070	1,450	.477	.277
Cfs/m	1.69	3.31	4.62	2.21	2.83	1.34	4.26	9.16	8.6	4.06	1.34	0.78
In.	1.95	3.69	5.33	2.55	2.95	1.54	4.75	10.56	9.60	4.68	1.54	0.87
Ac-ft	37,010	70,300	101,200	48,440	56,080	29,330	90,650	201,200	182,800	89,320	29,330	16,490

Calendar year 1950: Max 10,200 Min 255 Mean 1,620 Cfs/m 4.54 In. 61.57 Ac-ft 1,172,000  
Water year 1950-51: Max 5,330 Min 222 Mean 1,320 Cfs/m 3.70 In. 50.01 Ac-ft 952,200

\* Discharge measurement made on this day.

a No gage-height record; discharge interpolated.



Ruby Creek below Panther Creek, near Newhalem, Wash.

Location.--Lat 48°42', long. 120°58', in NW¼ sec. 10, T. 37 N., R. 14 E. (unsurveyed), on right bank 200 ft downstream from Panther Creek, 4 miles upstream from mouth, and 13 miles northeast of Newhalem.

Drainage area.--199 sq mi.

Records available.--September 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,640 ft (by barometer).

Extremes.--Maximum discharge during year, 4,170 cfs May 23 (gage height, 7.50 ft); minimum, 151 cfs Sept. 24; minimum gage height, 1.63 ft Oct. 3, 4.  
1948-51: Maximum discharge, 8,640 cfs Nov. 27, 1949 (gage height, 10.95 ft); minimum, 46 cfs Feb. 10, 1949 (gage height, 0.70 ft).

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 11				Feb. 12 to Sept. 30			
1.6	153	3.5	817	1.7	151	3.0	600
1.8	194	4.0	1,100	1.9	205	3.5	840
2.0	241	4.5	1,440	2.1	265	4.0	1,130
2.5	391	5.0	1,850	2.5	405	4.5	1,470
3.0	582	6.0	2,720				8.0 4,720

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	177	310	717	625	240	318	290	715	1,470	2,180	580	265
2	167	295	648	604	250	307	360	665	1,660	2,200	*580	250
3	161	347	604	562	245	300	460	*715	1,900	2,300	560	241
4	185	482	541	521	240	279	*580	920	2,020	2,000	540	235
5	190	582	521	501	239	286	640	1,400	2,100	1,700	520	232
6	199	501	501	459	234	276	620	1,660	2,100	1,300	480	229
7	249	452	482	444	235	272	665	2,270	2,100	1,100	460	279
8	482	402	*452	426	264	262	690	2,270	2,020	1,000	480	396
9	371	354	501	408	614	259	640	2,180	2,180	1,100	480	300
10	742	364	844	402	2,700	253	620	2,450	2,360	1,200	500	272
11	541	347	844	368	2,720	244	665	3,760	2,450	1,250	476	253
12	501	319	766	374	1,580	241	920	3,080	2,450	1,300	422	223
13	541	301	694	371	1,160	238	1,300	2,450	2,540	1,400	377	211
14	562	301	625	357	920	235	1,360	2,100	2,980	1,400	360	*202
15	482	289	582	351	790	250	1,300	1,980	3,360	1,300	360	199
16	402	289	562	355	690	238	1,330	2,180	2,980	1,300	363	205
17	357	275	562	316	620	229	1,470	2,720	2,360	1,450	342	217
18	347	264	521	*313	560	226	1,470	2,630	2,450	1,300	324	223
19	354	249	521	304	520	229	1,220	2,360	2,270	1,000	324	214
20	*377	262	582	295	480	259	1,040	2,360	2,100	750	338	191
21	347	287	648	287	456	286	890	2,630	2,020	800	346	177
22	319	292	694	278	426	265	815	3,170	2,100	850	342	167
23	301	307	766	273	405	253	765	*3,960	2,180	950	314	159
24	292	648	1,380	275	394	250	790	*3,170	2,180	950	279	156
25	412	1,210	1,910	313	*377	259	790	2,540	2,270	900	253	226
26	394	1,870	1,370	316	356	262	865	2,270	2,180	750	247	177
27	402	1,910	1,070	254	342	265	865	2,100	*2,100	600	279	159
28	398	1,400	925	239	328	262	865	1,940	2,020	650	335	177
29	364	1,040	817	239	-	265	815	1,740	2,020	620	293	272
30	347	870	742	240	-	265	765	1,540	2,100	580	346	436
31	319	-	670	240	-	265	-	1,440	-	580	300	-
Total	11,262	16,819	23,062	11,310	18,386	8,098	25,865	67,365	67,020	36,760	12,200	6,945
Mean	363	561	744	365	657	261	862	2,173	2,234	1,186	394	232
Cfs/m	1.82	2.82	3.74	1.83	3.30	1.31	4.33	10.9	11.2	5.96	1.98	1.17
In.	2.10	3.14	4.31	2.11	3.44	1.51	4.83	12.59	12.52	6.87	2.28	1.30
Ac-ft	22,340	33,360	45,740	22,430	36,470	16,060	51,300	133,600	132,900	72,910	24,200	13,780

Calendar year 1950: Max 5,650 Min 161 Mean 872 Cfs/m 4.38 In. 59.47 Ac-ft 631,200  
Water year 1950-51: Max 3,960 Min 156 Mean 836 Cfs/m 4.20 In. 57.00 Ac-ft 605,100

Peak discharge (base, 3,000 cfs).--Feb. 10 (6 p.m.) 3,760 cfs (7.03 ft); May 11 (1 p.m.) 4,060 cfs (7.44 ft); May 23 (8 a.m.) 4,170 cfs (7.50 ft); June 15 (1 a.m.) 3,560 cfs (6.87 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 30 to Feb. 4, July 2 to Aug. 1; discharge estimated on basis of recorded range in stage and records for Stettin Creek near Newhalem and Thunder Creek near Newhalem. Shifting-control method used Dec. 24 to Jan. 29, Feb. 5-11.

## SKAGIT RIVER BASIN

Ross Reservoir near Newhalem, Wash.

Location.--Lat 48°44', long. 121°04', in SE¼ sec. 35, T. 38 N., R. 13 E., at Ross Dam on Skagit River about 1 mile downstream from Ruby Creek and 9 miles northeast of Newhalem. Records available.--October 1946 to September 1951. Monthly elevations and contents March 1940 to September 1946.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (city of Seattle benchmark). Prior to Sept. 24, 1940, staff gage on west shore at site just uplake from Ross Dam at same datum. Sept. 24, 1940, to June 28, 1943, water-stage recorder at present site and datum; June 28, 1943, to Apr. 29, 1948, staff gage on west shore at site several hundred feet uplake from dam at same datum.

Extremes.--Maximum contents during year, 1,208,000 acre-ft July 27 (elevation, 1,582.37 ft); minimum, 533,600 acre-ft May 6 (elevation, 1,504.14 ft).

1940-51: Maximum contents, 1,214,000 acre-ft July 10, 1950 (elevation, 1,582.88 ft).

Remarks.--Reservoir is fringed by concrete dam completed to elevation 1,615 ft in 1949; storage began Mar. 11, 1940. Capacity, 1,202,920 acre-ft between elevations 1,250 ft (lowest outlet) and 1,582 ft (spillway crest). Dead storage negligible. Water used to supplement low flow of Skagit River through city of Seattle's Diablo and Newhalem powerplants. Figures given herein represent total contents.

Cooperation.--Gage-height record collected in cooperation with city of Seattle.

Capacity table (elevation, in feet, and contents, in acre-feet)  
(Prepared by Geological Survey on basis of 15 contour areas  
furnished by city of Seattle)

1,500	509,240	1,550	888,320
1,510	571,110	1,560	980,600
1,520	641,230	1,570	1,078,800
1,530	718,200	1,580	1,182,800
1,540	800,920	1,590	1,291,700

Elevation, at 12 p.m., in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	570.16	570.63	574.23	573.37	549.81	545.35	530.95	507.65	537.64	578.56	561.69	578.59
2	569.43	570.37	574.17	572.52	549.17	544.92	530.50	506.52	538.79	578.94	561.69	578.58
3	568.90	570.26	574.26	571.99	547.66	544.49	529.10	505.75	540.32	578.35	561.67	578.70
4	568.27	570.72	573.98	571.66	545.35	544.27	527.95	504.75	541.68	579.59	561.69	578.42
5	567.90	571.45	573.65	570.90	544.84	543.78	526.88	504.23	543.07	579.58	562.04	577.90
6	567.50	571.55	573.40	569.61	544.09	543.27	525.82	504.16	544.28	579.49	561.90	577.49
7	567.65	571.50	573.20	568.61	543.16	542.75	524.83	504.77	545.58	579.04	561.78	577.29
8	568.36	571.58	572.89	568.16	541.93	542.23	523.86	505.54	546.78	578.34	561.72	577.38
9	568.46	571.07	571.96	567.66	542.25	541.78	523.07	506.22	548.42	578.32	561.69	577.32
10	569.35	570.65	571.81	567.14	545.92	541.31	522.01	507.45	550.26	579.05	561.62	577.01
11	569.80	570.39	572.51	566.61	548.88	540.89	520.97	510.16	552.01	579.43	561.71	576.76
12	570.01	570.27	572.88	565.77	550.27	540.47	520.35	512.22	553.61	579.79	562.05	576.30
13	570.26	569.86	573.10	564.92	550.84	539.84	519.99	513.31	555.40	580.35	561.79	575.86
14	570.48	569.46	573.13	564.38	550.85	539.26	519.70	513.78	557.87	580.95	561.29	575.37
15	570.62	569.05	573.05	563.71	550.41	538.86	519.38	514.23	560.75	581.58	561.04	575.09
16	570.38	568.65	572.94	562.79	549.38	538.36	519.04	515.47	563.36	581.69	560.83	574.93
17	570.27	568.21	572.84	561.90	548.33	537.83	518.81	517.18	565.69	582.07	560.69	574.45
18	570.11	567.91	572.67	561.28	547.21	537.26	518.72	518.65	567.32	582.13	560.60	574.08
19	570.20	567.55	572.63	560.62	546.07	536.73	518.47	519.74	568.60	582.22	560.87	573.75
20	570.27	567.10	572.67	559.59	545.22	536.18	517.89	520.91	569.74	582.23	560.71	573.31
21	570.48	566.76	572.86	558.37	544.75	535.76	517.11	522.14	570.76	582.02	560.60	572.88
22	570.52	566.46	572.86	557.65	544.45	535.29	516.20	524.33	571.80	582.05	560.44	572.48
23	570.28	566.24	572.52	556.62	544.71	534.81	515.21	527.78	572.43	582.34	560.13	572.32
24	570.03	566.66	573.06	556.50	545.23	534.34	514.27	530.36	572.88	582.12	560.13	572.07
25	570.42	567.66	573.89	554.39	545.72	533.90	513.25	532.13	573.79	582.15	560.13	571.48
26	570.47	569.70	574.08	553.75	545.68	533.46	512.28	533.43	574.91	582.31	560.13	570.98
27	570.66	572.02	574.56	553.17	545.98	533.03	511.42	534.51	575.96	582.19	560.13	570.44
28	570.95	573.25	574.78	552.49	545.78	532.60	510.59	535.37	576.86	582.22	560.13	570.10
29	571.19	573.95	574.82	551.86	-	532.17	509.71	536.06	577.59	582.21	560.13	570.16
30	570.99	574.20	574.86	551.19	-	531.76	508.72	536.67	578.15	582.08	560.13	570.60
31	570.78	-	574.28	550.50	-	531.35	-	537.11	-	581.89	560.13	570.60

Note.--Add 1,000 ft to obtain elevation above mean sea level.

Monthly elevation and contents, water year October 1950 to September 1951

Date	Elevation (feet)†	Contents (acre-feet)†	Change in contents during month (acre-feet)
Sept. 30.....	1,570.4	1,082,900	-
Oct. 31.....	1,570.8	1,087,000	+4,100
Nov. 30.....	1,574.2	1,121,900	+34,900
Dec. 31.....	1,574.3	1,122,900	+1,000
Calendar year 1950....	-	-	+135,600
Jan. 31.....	1,550.5	892,800	-230,100
Feb. 28.....	1,545.8	851,120	-41,680
Mar. 31.....	1,531.4	729,470	-121,650
Apr. 30.....	1,508.7	562,600	-166,900
May 31.....	1,537.1	776,410	+213,800
June 30.....	1,578.2	1,163,700	+387,300
July 31.....	1,581.9	1,203,000	+39,300
Aug. 31.....	1,578.7	1,169,000	-34,000
Sept. 30.....	1,570.6	1,084,900	-84,100
Water year 1950-51....	-	-	+2,000

† Elevation and contents at 12 p.m.

## Thunder Creek near Newhalem, Wash.

Location.--Lat 48°40', long. 121°04', in SE 1/4 sec. 23, T. 37 N., R. 13 E., (unsurveyed), on right bank half a mile upstream from backwater from Diablo Reservoir, 8 miles east of Newhalem, and 20 miles northeast of Marblemount.

Drainage area.--98 sq mi, approximately.

Records available.--October 1930 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,220 ft (from river-profile map).

Average discharge.--21 years, 612 cfs.

Extremes.--Maximum discharge during year, 3,870 cfs Feb. 10 (gage height, 8.54 ft); minimum, 140 cfs Mar. 14 (gage height, 2.19 ft).  
1930-51: Maximum discharge, 8,900 cfs Nov. 27, 1949 (gage height, 12.14 ft), from rating curve extended above 2,900 cfs; minimum not determined, probably less than 50 cfs during period of ice effect or no gage-height record in February 1935.

Remarks.--Records good except those for periods of shifting control, which are fair. No diversion or regulation.

Revisions (water years).--W 1012: 1943.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

2.2	133	3.5	460	5.5	1,380
2.4	168	4.0	645	6.0	1,710
2.6	210	4.5	855	7.0	2,480
3.0	310	5.0	1,100	8.0	3,370

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	272	310	605	425	190	*184	212	410	685	1,680	*1,150	548
2	238	290	530	395	188	176	245	383	810	1,710	1,150	585
3	215	585	460	371	186	172	308	395	950	1,780	1,150	605
4	298	765	395	335	178	170	389	512	1,020	1,600	1,120	605
5	410	705	362	308	172	163	460	745	1,000	1,290	1,100	605
6	356	512	362	292	163	159	460	855	975	1,150	1,020	685
7	824	425	*332	258	190	154	478	1,000	950	975	1,020	1,010
8	1,350	362	308	268	190	150	495	975	950	1,000	1,100	1,200
9	765	312	470	242	1,000	150	460	1,000	1,020	1,150	1,180	788
10	1,440	300	1,640	230	3,290	147	442	1,260	1,120	1,320	1,230	725
11	832	282	1,000	218	2,480	145	460	2,240	1,180	1,350	1,150	585
12	900	262	765	206	1,320	142	565	1,570	1,200	1,440	950	495
13	810	245	625	208	900	143	765	1,570	1,320	1,800	832	*548
14	788	235	548	206	725	142	855	925	1,540	1,600	855	565
15	585	222	495	199	605	164	788	676	1,780	1,570	925	605
16	460	225	460	190	512	155	788	1,050	1,600	1,570	950	685
17	*410	210	495	*180	442	148	832	1,410	1,470	1,680	878	765
18	442	197	442	184	392	148	832	1,260	1,410	1,640	832	765
19	548	180	478	172	350	148	685	1,080	1,380	1,350	925	685
20	565	188	685	166	322	164	605	1,060	1,290	1,120	1,020	548
21	442	238	745	166	295	186	548	1,200	1,290	1,150	1,100	478
22	377	235	765	172	278	190	478	1,540	1,350	1,230	1,000	460
23	341	265	975	163	258	186	425	1,850	1,410	1,410	832	442
24	338	1,020	2,030	182	242	180	425	*1,500	1,440	1,440	745	460
25	832	1,920	1,640	305	230	184	442	1,180	1,500	1,380	705	685
26	548	2,320	1,050	410	210	188	478	975	1,500	1,260	685	365
27	495	1,850	832	295	199	190	478	900	1,470	1,200	725	310
28	460	1,200	685	250	190	192	495	810	*1,440	1,230	645	442
29	395	878	605	238	-	*201	*478	725	1,470	1,200	548	705
30	365	725	548	215	-	206	442	645	1,600	1,150	605	1,260
31	330	-	478	201	-	206	-	625	-	1,150	530	-
Total	17,431	17,463	21,710	7,640	15,785	5,233	15,813	32,098	38,120	42,375	23,657	19,209
Mean	562	582	700	246	564	169	572	1,035	1,271	1,367	924	640
Cfsm	5.73	5.94	7.14	2.51	5.76	1.72	5.38	10.6	13.0	13.9	9.43	6.53
In.	6.61	6.63	8.24	2.90	5.99	1.99	6.00	12.18	14.47	16.08	10.88	7.29
Ac-ft	34,570	34,640	43,060	15,150	31,310	10,380	31,360	63,670	75,610	84,050	53,840	38,100

Calendar year 1950: Max 2,920 Min 110 Mean 768 Cfsm 7.84 In. 106.34 Ac-ft 555,800  
Water year 1950-51: Max 3,290 Min 142 Mean 717 Cfsm 7.32 In. 99.26 Ac-ft 518,700

Peak discharge (base, 2,400 cfs).--Nov. 25 (8 p.m.) 3,470 cfs (8.13 ft); Dec. 24 (7:30 p.m.) 2,830 cfs (7.43 ft); Feb. 10 (1:30 p.m.) 3,870 cfs (8.54 ft); May 11 (1 p.m.) 2,560 cfs (7.08 ft).

\* Discharge measurement made on this day.

Note.--Shifting-control method used Mar. 28-31, Sept. 9-29.

## SKAGIT RIVER BASIN

Stettattle Creek near Newhalem, Wash.

Location.--Lat 48°43'40", long. 121°09'30", in NE $\frac{1}{4}$  sec. 6, T. 37 N., R. 13 E., on left bank three-quarters of a mile upstream from mouth,  $5\frac{1}{2}$  miles northeast of Newhalem, and 18 $\frac{1}{2}$  miles northeast of Marblemount.

Drainage area.--21.4 sq mi.

Records available.--December 1913 to April 1915 (fragmentary), September 1933 to September 1951. Published as "near Marblemount" 1913-15.

Gage.--Water-stage recorder. Altitude of gage is 927 ft (by altimeter). Prior to Apr. 30, 1915, staff gage at site half a mile downstream at different datum. Sept. 7 to Oct. 20, 1933, staff gage and Oct. 21, 1933, to Sept. 2, 1937, water-stage recorder at site 150 ft upstream at different datum.

Average discharge.--18 years (1933-51), 171 cfs.

Extremes.--Maximum discharge during year not determined, probably occurred Feb. 10 during period of indeterminate record; minimum, 25 cfs Jan. 24 (gage height, 1.24 ft, probably result of ice jam upstream).

1913-15, 1933-51: Maximum discharge, 8,580 cfs Nov. 26, 1949 (gage height, 9.70 ft), from rating curve extended above 780 cfs on basis of slope-area determination of peak flow; minimum, 9 cfs Nov. 9-11, 1936.

Remarks.--Records good except those for period of no gage-height record and those above 500 cfs, which are poor. No diversion or regulation.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Nov. 24

Nov. 25 to Sept. 30

1.5	40	3.2	362	1.4	36	2.6	235	4.5	1,210
1.8	64	3.6	518	1.6	51	2.9	335	5.0	1,620
2.0	85	4.0	706	1.8	72	3.2	450	5.5	2,090
2.3	128	4.5	1,000	2.0	100	3.6	640	6.0	2,620
2.6	188	5.0	1,370	2.3	155	4.0	870		
2.9	266								

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	53	122	140	118	110	48	90	151	210	410	*160	73
2	46	108	120	110	113	45	120	134	250	410	160	75
3	44	308	105	113	110	44	182	153	300	406	155	73
4	112	456	90	103	86	43	229	238	350	346	149	73
5	156	306	84	88	64	42	241	352	320	233	136	70
6	137	190	*92	77	58	42	217	370	320	238	130	72
7	502	150	100	72	84	41	226	378	340	200	127	136
8	480	117	98	68	310	40	208	338	290	185	136	120
9	272	98	*e380	63	e1,450	40	180	370	310	220	140	88
10	562	89	*e1,200	58	e2,900	40	172	536	350	232	138	82
11	306	83	e600	57	750	40	188	810	360	235	132	71
12	272	73	366	56	307	40	290	464	360	293	113	61
13	207	67	244	57	205	45	390	318	360	304	98	62
14	168	64	185	58	158	45	356	250	430	296	97	62
15	125	63	168	68	130	60	296	272	520	286	98	*64
16	99	69	178	*65	116	60	307	394	480	282	100	71
17	*88	65	262	61	105	50	342	454	430	286	98	78
18	154	60	214	58	97	50	328	360	400	262	98	77
19	335	53	250	51	88	50	232	318	360	205	100	70
20	306	67	472	48	84	70	182	338	370	170	103	59
21	190	133	540	48	81	75	151	422	360	172	108	53
22	142	139	508	54	74	70	134	575	380	198	100	51
23	120	154	555	50	67	65	130	*635	380	205	91	49
24	142	e1,100	e1,400	138	*61	60	144	495	380	211	80	59
25	432	e1,750	e700	482	58	65	178	*360	400	205	73	125
26	246	e1,200	300	360	55	65	192	328	380	178	75	81
27	246	e900	202	185	51	65	200	300	*352	170	100	62
28	246	360	160	134	49	*73	220	250	342	175	114	163
29	200	229	134	114	-	80	*202	220	363	170	82	450
30	170	178	155	111	-	84	178	200	386	160	97	379
31	142	-	138	111	-	84	-	190	-	170	81	-
Total	6,700	8,751	10,140	3,236	7,821	1,721	6,505	10,973	10,853	7,563	3,469	3,009
Mean	216	292	327	104	279	55.5	217	354	362	245	112	100
Cfs/m	10.1	13.6	15.3	4.86	13.0	2.59	10.1	16.5	16.9	11.4	5.23	4.67
In.	11.64	15.21	17.62	5.62	13.59	2.99	11.30	19.07	18.86	13.18	6.03	5.23
Ac-ft	13,290	17,360	20,110	6,420	15,510	3,410	12,900	21,760	21,630	15,040	6,880	5,970

Calendar year 1950: Max 1,750 Min 44 Mean 236 Cfs/m 11.0 In. 149.50 Ac-ft 170,600  
 Water year 1950-51: Max 2,900 Min 40 Mean 221 Cfs/m 10.3 In. 140.34 Ac-ft 160,200

Peak discharge (base, 1,100 cfs).--Nov. 25 (3 p.m.), discharge unknown; Dec. 10 (5 a.m.), discharge unknown; Dec. 24 (time and discharge unknown); Feb. 10 (1:30 a.m.), discharge unknown.

\* Discharge measurement made on this day.

e High stages indeterminate; discharge estimated on basis of records for stations on nearby streams.  
 Note.--No gage-height record Feb. 17, 22, 23, Mar. 9-27, May 27 to June 26; discharge estimated on basis of records for Cascade River near Marblemount.

## Skagit River at Newhalem, Wash.

Location.--Lat 48°40', long. 121°15', in SE $\frac{1}{4}$  sec. 21, T. 37 N., R. 12 E., on right bank at powerplant of city of Seattle at Newhalem, a quarter of a mile upstream from Newhalem Creek, 11 miles upstream from Bacon Creek, and 16 miles upstream from Marblemount.

Drainage area.--1,160 sq mi, approximately, of which 390 sq mi is in Canada.

Records available.--December 1908 to May 1914 and October 1920 to September 1951 in reports of Geological Survey. October 1908 to September 1933 (monthly discharge only), in State Water-Supply Bulletin 5.

Gage.--Water-stage recorder. Datum of gage is 400 ft above mean sea level, unadjusted.

Prior to May 24, 1914, staff gage at site a quarter of a mile upstream at different datum. Nov. 15, 1920, to June 4, 1923, staff gage at site 500 ft upstream at same datum.

Average discharge.--43 years, 4,344 cfs (adjusted for storage in Diablo Reservoir since October 1929 and Ross Reservoir since March 1940).

Extremes.--Maximum discharge during year, 18,300 cfs Dec. 24 (gage height, 88.33 ft); minimum, 834 cfs Nov. 12 (gage height, 80.32 ft); minimum daily, 1,240 cfs Sept. 3.

1908-14, 1920-51: Maximum discharge, 63,500 cfs Nov. 29, 1909 (gage height, 22.0 ft, from floodmark, site and datum then in use); minimum, 54 cfs Nov. 1, 1943 (gage height, 78.15 ft); minimum daily, 136 cfs Aug. 24, 1930.

Remarks.--Records excellent. Water is diverted 3 miles above station and is returned to river at Seattle powerplant just above station. Flow regulated by Diablo Reservoir (see p. 164) and by Ross Reservoir (see p. 150), having a combined capacity of 1,279,000 acre-ft.

Cooperation.--Gage-height record collected in cooperation with city of Seattle.

Revisions (water years).--W 512: 1909-14. W 1012: 1929.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

80.8	1,200	83.5	4,380
81.0	1,360	84.0	5,290
81.3	1,630	85.0	7,410
81.6	1,920	86.0	10,000
82.0	2,350	87.0	13,200
82.5	2,940	88.0	16,900
83.0	3,610		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,740	4,220	6,020	9,610	5,320	*4,170	4,030	8,540	4,720	9,080	4,390	2,780
2	3,960	4,090	6,030	9,050	5,700	4,120	4,110	8,470	3,280	9,110	4,180	2,500
3	4,070	4,090	4,910	7,470	8,320	4,110	3,500	7,160	3,460	9,140	4,300	1,240
4	4,630	3,750	5,050	6,240	8,620	3,740	3,880	8,400	4,520	9,610	3,680	5,620
5	4,250	3,170	5,580	6,950	8,550	4,060	3,620	9,020	4,210	8,570	2,400	4,050
6	4,060	4,240	5,800	9,430	5,720	4,060	3,490	9,220	3,920	8,730	4,050	3,850
7	2,910	4,260	5,390	9,450	6,370	4,040	4,120	9,400	4,130	9,380	4,300	3,920
8	3,060	4,340	5,000	4,920	9,370	4,020	9,640	9,560	4,240	9,910	4,160	3,580
9	3,820	4,940	9,250	5,650	9,960	3,970	9,590	9,490	3,250	7,100	4,210	2,970
10	3,960	4,940	*12,000	5,240	11,000	3,680	10,100	9,780	3,180	4,800	4,170	5,650
11	3,010	4,800	6,690	5,360	7,860	3,470	9,300	11,400	4,570	5,120	3,510	3,660
12	3,460	3,450	6,270	6,540	6,400	3,730	8,200	10,700	4,540	6,240	1,520	4,190
13	3,400	4,150	6,020	7,150	6,050	3,910	9,350	9,530	4,700	5,640	4,030	4,150
14	2,720	4,560	5,700	5,490	7,100	3,980	9,010	9,300	4,670	5,140	4,020	4,460
15	2,530	4,390	6,010	6,310	8,140	4,140	8,660	8,570	4,460	4,210	3,720	3,890
16	3,760	4,540	6,280	7,320	8,960	4,160	9,890	7,190	4,650	5,090	3,880	*2,850
17	3,310	4,510	8,530	7,240	9,080	4,080	9,890	8,210	4,570	6,550	4,010	5,980
18	*3,580	4,100	5,980	5,620	9,060	4,060	9,160	8,550	4,810	6,460	3,220	3,950
19	3,800	4,030	6,180	*5,600	8,990	4,040	8,990	8,110	5,540	6,820	1,440	4,070
20	3,640	4,390	6,320	6,170	8,400	4,060	8,220	7,830	5,480	5,900	3,680	4,060
21	2,960	4,700	6,930	8,750	6,390	4,080	5,180	8,020	5,510	5,130	3,610	4,120
22	2,550	4,840	8,580	5,330	5,670	4,060	10,600	*7,400	5,600	4,890	3,990	3,350
23	3,580	4,400	11,600	6,530	5,450	4,040	10,000	7,040	8,120	4,820	3,990	2,470
24	3,720	5,920	14,400	7,740	5,190	4,030	8,340	7,490	8,940	5,290	3,860	4,270
25	4,080	9,680	12,800	9,520	4,920	3,920	8,530	6,950	6,630	5,000	5,220	4,140
26	3,910	9,260	11,100	7,600	4,640	4,030	8,600	6,270	*5,540	4,990	1,520	4,070
27	3,870	6,770	6,630	5,900	4,430	*4,030	8,620	6,160	*5,500	5,040	3,810	4,050
28	3,540	5,780	6,100	5,020	4,200	4,030	8,730	5,840	5,690	4,580	3,710	4,180
29	3,140	5,810	6,420	5,680	-	4,040	8,570	5,920	6,380	4,000	3,740	4,320
30	4,090	6,270	6,290	5,280	-	4,060	8,490	5,200	9,180	4,690	3,790	3,440
31	4,100	-	6,080	5,300	-	4,030	-	5,140	-	*4,510	3,760	-
Total	110,210	148,390	225,940	209,460	199,860	123,970	231,960	249,860	154,190	195,340	112,090	109,970
Mean	3,555	4,946	7,288	6,757	7,138	3,999	7,732	8,060	5,140	6,301	3,616	3,666
Ac-ft†	218,600	294,300	448,100	415,500	396,400	245,900	460,100	495,600	305,800	387,500	222,500	218,100
(+)	+5,400	+35,220	-700	-28,900	-90,310	-123,500	-116,200	-212,400	-370,700	+52,960	-24,500	-82,610

Adjusted for change in reservoir contents

Mean	3,643	5,537	7,276	3,035	5,512	1,991	5,779	11,510	11,370	7,164	3,220	2,277
Cfs/m	3.14	4.77	6.27	2.62	4.75	1.72	4.99	9.92	9.80	6.18	2.78	1.96
In.	3.62	5.33	7.23	3.02	4.95	1.98	5.56	11.44	10.93	7.12	3.20	2.19
Ac-ft†	224,000	329,500	447,400	186,600	306,100	122,400	343,900	708,000	676,500	440,500	198,000	135,500

Observed

Calendar year 1950: Max	14,400	Min	1,420	Mean	5,917	Ac-ft	4,284,000
Water year 1950-51: Max	14,400	Min	1,240	Mean	5,675	Ac-ft	4,108,000

Adjusted

Calendar year 1950: Mean	6,106	Cfs/m	5.26	In.	71.45	Ac-ft	4,420,000
Water year 1950-51: Mean	5,689	Cfs/m	4.90	In.	66.57	Ac-ft	4,118,000

\* Discharge measurement made on this day.

† Change in contents in Ross and Diablo Reservoirs in acre-feet.

## SKAGIT RIVER BASIN

Skagit River above Alma Creek, near Marblemount, Wash.

Location.--Lat 48°36'25", long. 121°21'35", in NE $\frac{1}{4}$  sec. 15, T. 36 N., R. 11 E., on right bank three-quarters of a mile upstream from Alma Creek and 7 miles north of Marblemount.

Drainage area.--1,260 sq mi, approximately, of which 390 sq mi is in Canada.

Records available.--October 1950 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 365 ft (from river-profile map).

Extremes.--Maximum discharge during year, 28,000 cfs Feb. 10 (gage height, 14.40 ft), from rating curve extended above 18,000 cfs; minimum, 1,410 cfs Sept. 23 (gage height, 4.87 ft); minimum daily, 1,650 cfs Sept. 3.

Remarks.--Records good except those for periods of no gage-height record, which are fair. Flow regulated by power-plants on upper Skagit River, and by Ross Reservoir (see p. 150) and Diablo Reservoir (see p. 164).

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

5.0	1,550	7.0	4,610	11.0	15,100
5.5	2,180	8.0	6,770	12.0	18,600
6.0	2,900	9.0	9,290	13.0	22,400
6.5	3,700	10.0	12,100	14.0	26,400

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3,600	4,840	6,830	10,700	5,700	4,560	4,570	9,260	5,490	10,500	4,900	3,110
2	4,500	4,710	6,720	10,100	6,050	4,520	4,750	9,060	4,300	10,500	4,670	2,890
3	4,500	5,140	5,540	8,500	8,650	4,500	4,350	7,860	4,540	10,400	4,750	1,650
4	5,200	5,250	5,590	6,770	9,030	4,140	4,720	9,320	5,590	11,000	4,210	3,830
5	5,200	4,520	6,050	7,250	8,930	4,420	4,650	10,200	5,480	9,200	2,960	4,260
6	5,400	5,120	6,670	10,100	6,390	4,410	4,390	10,700	5,150	9,600	4,410	4,050
7	5,600	5,000	6,260	10,100	6,590	4,400	4,900	11,000	5,310	10,000	4,660	4,250
8	6,000	4,900	5,730	5,690	10,700	4,350	10,300	11,200	5,320	10,500	4,540	4,140
9	5,000	5,410	10,100	6,080	14,800	4,330	10,700	10,900	4,500	8,200	4,570	3,340
10	7,500	5,430	*16,300	5,660	24,800	4,030	11,100	11,900	4,530	5,800	4,570	4,110
11	5,400	5,290	9,020	5,720	19,000	3,840	10,300	14,600	5,720	5,800	3,940	3,960
12	4,800	4,000	7,760	6,610	10,000	4,050	9,340	12,900	5,670	7,200	2,170	4,670
13	4,500	4,520	7,030	7,480	7,760	4,260	11,000	11,200	6,070	6,800	4,140	4,430
14	4,000	4,940	6,520	6,030	8,080	4,330	10,400	10,600	6,060	6,300	4,300	4,780
15	3,700	4,860	6,720	6,540	9,510	*4,570	*9,860	9,810	6,200	5,500	4,050	4,200
16	4,400	4,920	7,010	7,770	10,200	4,600	11,500	8,520	6,000	6,100	4,190	3,200
17	4,400	4,920	7,650	7,670	10,200	4,500	11,000	9,900	6,100	7,200	4,280	4,310
18	5,000	4,480	6,870	5,960	10,000	4,460	10,700	9,930	5,900	7,000	3,550	4,190
19	5,400	4,440	7,020	5,960	9,900	4,450	10,200	9,240	6,300	*7,200	2,030	4,360
20	5,600	4,710	7,980	6,370	9,370	4,540	9,480	8,980	6,300	6,460	3,930	4,340
21	4,200	5,210	9,020	9,290	7,090	4,680	5,720	9,340	6,400	5,650	4,050	4,360
22	3,800	5,440	9,830	5,690	6,260	4,640	11,400	*9,280	7,000	5,400	4,420	3,720
23	4,300	5,120	14,200	6,680	5,920	4,570	11,000	9,290	9,000	5,460	4,310	2,740
24	4,600	8,240	19,300	8,240	5,660	4,480	9,140	9,450	9,800	5,840	4,160	4,450
25	6,200	13,400	17,200	11,500	5,320	4,470	9,340	8,240	8,300	5,460	*3,420	4,600
26	5,400	13,800	13,300	9,560	5,100	4,540	9,510	7,410	7,800	5,450	2,100	4,390
27	5,600	10,700	8,240	6,820	4,890	4,570	9,470	7,060	7,800	5,510	3,960	4,240
28	5,000	7,730	7,190	5,860	4,650	4,530	9,830	6,620	8,000	5,100	4,100	4,520
29	4,520	7,150	7,380	*6,310	-	4,580	9,640	6,610	8,500	4,560	4,030	5,220
30	4,740	7,250	7,390	5,760	-	4,620	9,360	5,770	10,500	5,120	4,090	4,660
31	4,830	-	8,500	5,710	-	4,570	-	5,800	-	4,960	4,110	-
Total	152,890	181,440	270,920	228,480	250,650	137,510	262,620	291,960	193,630	219,770	123,600	120,950
Mean	4,932	6,048	8,739	7,370	8,952	4,436	8,754	9,418	6,454	7,089	3,987	4,032
Ac-ft	303,300	359,900	537,400	453,200	497,200	272,700	520,900	579,100	384,100	435,900	245,200	239,900

Calendar year 1950: Max - Min - Mean - Ac-ft -  
 Water year 1950-51: Max 24,800 Min 1,650 Mean 6,670 Ac-ft 4,829,000

\* Discharge measurement made on this day.

Note.--No gage-height record Oct. 1-28, June 15 to July 19; discharge estimated on basis of 1 discharge measurement and records for station at Marblemount.

## Skagit River at Marblemount, Wash.

Location.--Lat 48°32'10", long. 121°25'50", in NW $\frac{1}{4}$  sec. 7, T. 35 N., R. 11 E., on right bank half a mile north of Marblemount and 1 mile upstream from Cascade River.

Drainage area.--1,360 sq mi, approximately, of which 390 sq mi is in Canada.

Records available.--September 1943 to July 1944, October 1946 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 305.1 ft above mean sea level (river-profile survey).

Average discharge.--5 years (1946-51), 6,580 cfs.

Extremes.--Maximum discharge during year, 42,400 cfs Feb. 10 (gage height, 9.65 ft), from rating curve extended above 20,000 cfs; minimum, 1,780 cfs Sept. 3 (gage height, 1.65 ft); minimum daily, 1,990 cfs Sept. 3.

1943-44, 1946-51: Maximum discharge, 59,300 cfs Nov. 27, 1949 (gage height, 11.37 ft), from rating curve extended above 20,000 cfs; minimum, 620 cfs Mar. 6, 1944 (gage height, 0.55 ft); minimum daily, 1,190 cfs Feb. 25, 1944.

Remarks.--Records good except those for periods of shifting control or no gage-height record, which are fair. Flow regulated by powerplants on upper Skagit River, and by Ross Reservoir (see p. 150) and by Diablo Reservoir (see p. 164).

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.7	1,990	4.5	10,000
2.0	2,530	5.0	12,200
2.5	3,810	6.0	17,100
3.0	4,840	7.0	25,000
3.5	6,300	8.0	29,800
4.0	8,020	9.1	38,100

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4,200	6,180	7,850	11,200	6,140	5,110	5,250	9,800	6,340	11,700	5,220	3,270
2	5,000	6,000	7,580	10,800	6,520	5,110	5,390	9,560	5,380	11,800	5,060	3,120
3	5,140	6,940	6,330	9,380	9,040	4,980	5,280	8,520	5,740	11,700	5,140	1,990
4	5,960	7,630	6,280	7,440	9,320	4,680	5,640	9,820	6,880	12,000	4,580	3,820
5	6,200	6,570	6,670	7,820	9,300	4,840	5,740	11,300	6,690	10,100	3,380	4,300
6	6,400	6,680	7,970	10,400	6,880	4,840	*5,290	11,800	6,260	10,300	4,610	4,180
7	6,900	6,400	7,380	10,500	7,350	4,840	5,740	12,300	6,330	10,600	4,890	4,430
8	7,910	6,250	6,680	6,250	12,500	4,840	10,800	12,300	6,220	11,200	4,760	4,430
9	6,740	6,810	*11,700	6,520	20,400	4,710	11,200	12,000	5,640	6,840	4,810	3,610
10	10,300	6,890	21,000	6,040	37,700	4,460	11,600	13,400	5,820	6,440	4,810	4,260
11	6,620	6,450	11,100	6,030	20,800	4,330	10,900	17,600	6,770	6,480	4,330	4,100
12	6,300	5,120	9,260	6,860	12,100	4,460	10,400	14,600	6,860	7,960	2,690	4,790
13	5,810	5,500	8,230	7,720	9,700	4,710	12,200	12,300	7,320	7,300	4,200	4,610
14	4,940	6,000	7,440	6,540	9,320	4,840	11,600	11,500	7,590	6,800	4,430	4,950
15	4,500	5,890	7,480	6,860	10,500	*5,250	10,900	10,800	7,850	5,840	4,260	3,380
16	5,180	6,030	7,950	8,100	10,900	5,250	12,400	9,680	7,380	6,500	4,360	3,560
17	5,050	5,960	8,960	8,120	10,800	5,110	12,200	11,400	7,410	7,920	4,380	4,330
18	5,740	5,560	7,760	6,360	10,600	4,980	11,800	11,200	7,700	*7,770	3,790	4,460
19	6,760	5,540	8,420	6,260	10,400	4,980	11,000	10,200	7,800	7,930	2,400	4,530
20	7,100	5,760	10,000	6,540	9,950	5,110	10,100	10,200	7,800	7,060	3,940	4,530
21	5,380	6,560	10,800	9,600	7,740	5,390	6,420	10,600	7,800	6,100	4,200	4,580
22	4,700	6,790	11,900	6,040	6,820	5,250	11,500	11,300	8,000	5,880	4,560	4,030
23	5,180	6,550	16,200	6,810	6,460	5,110	11,800	11,400	10,300	5,960	4,430	3,120
24	5,480	11,900	24,800	8,590	6,220	5,110	9,600	11,300	11,400	6,290	4,280	4,480
25	8,080	18,400	20,400	13,800	5,840	5,110	9,930	9,620	9,680	5,980	3,610	5,170
26	6,920	19,300	15,000	11,400	5,600	5,110	10,100	8,560	7,910	5,860	*2,450	4,710
27	7,020	15,100	9,630	7,870	5,390	5,250	10,200	8,160	7,830	5,830	3,910	4,560
28	6,670	10,000	8,360	6,610	5,250	5,110	10,700	7,670	8,040	5,480	4,230	4,710
29	5,920	8,680	8,260	6,910	-	5,250	10,500	7,540	8,440	5,030	4,160	5,810
30	6,300	8,370	8,560	6,320	-	5,250	9,840	6,640	11,500	5,510	4,180	5,920
31	6,360	-	9,380	6,280	-	5,250	-	6,620	-	5,330	4,260	-
Total	190,740	235,450	319,290	245,770	289,540	154,620	286,020	329,630	226,060	239,290	130,310	128,760
Mean	6,153	7,848	10,300	7,928	10,540	4,988	9,534	10,630	7,535	7,719	4,204	4,292
Ac-ft	378,300	467,000	633,300	487,500	574,300	306,700	567,300	653,800	448,400	474,600	258,500	255,400
Calendar year 1950:	Max	24,800	Min	2,750	Mean	8,404	Ac-ft	6,084,000				
Water year 1950-51:	Max	37,700	Min	1,990	Mean	7,604	Ac-ft	5,505,000				

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of 1 discharge measurement and records for stations at Concrete and above Alma Creek, near Marblemount.

Note.--Shifting-control method used Oct. 3 to Nov. 28, July 20 to Sept. 26.

## Cascade River at Marblemount, Wash.

Location.--Lat 48°31'45", long. 121°23'30", in SW $\frac{1}{4}$  sec. 9, T. 35 N., R. 11 E., on right bank 2 miles east of Marblemount and 2 $\frac{1}{2}$  miles upstream from mouth.

Drainage area.--180 sq mi, approximately.

Records available.--September 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 380.3 ft above mean sea level (river-profile survey). Prior to Oct. 10, 1928, staff gage at same site at datum 0.76 ft higher.

Average discharge.--23 years, 989 cfs.

Extremes.--Maximum discharge during year, 9,650 cfs Feb. 10 (gage height, 8.89 ft); minimum, 326 cfs Mar. 11, 12 (gage height, 2.03 ft).

1928-51: Maximum discharge, 17,800 cfs Nov. 27, 1949 (gage height, 11.47 ft), from rating curve extended above 5,000 cfs by logarithmic plotting; minimum, 149 cfs Nov. 15, 1929, but may have been less during January or February 1929, when stage-discharge relation was affected by ice; minimum gage height, 1.11 ft Feb. 8, 1937.

Remarks.--Records good except those above 5,000 cfs, which are fair. No diversion or regulation.

Revisions (water years).--W 832: 1936.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

2.0	315	5.0	2,290
2.3	420	5.5	2,910
2.6	540	6.0	3,610
3.0	750	7.0	5,300
3.5	1,020	8.0	7,400
4.0	1,360	9.0	9,920
4.5	1,780		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	416	812	1,220	1,020	524	472	580	785	1,120	2,180	990	460
2	374	785	1,050	1,050	540	448	680	705	1,320	2,180	960	440
3	343	1,220	930	1,050	516	440	870	730	1,600	2,180	960	452
4	444	1,560	840	930	480	432	1,020	990	1,870	1,870	900	472
5	*758	1,520	785	785	456	416	1,080	1,440	1,740	1,520	870	468
6	758	1,150	1,080	758	432	396	1,050	1,560	1,740	1,400	840	484
7	1,360	960	960	705	655	378	1,150	1,920	1,820	1,220	812	723
8	1,970	840	*940	655	1,220	364	1,080	1,690	1,560	1,120	812	1,220
9	1,320	730	1,200	626	4,420	364	990	1,690	1,640	1,220	840	705
10	3,040	680	3,110	603	5,870	346	930	2,290	1,870	1,480	900	630
11	1,790	630	2,120	572	5,880	332	990	4,230	1,920	1,520	870	540
12	1,520	590	1,690	544	3,250	360	1,290	2,780	1,920	1,690	730	460
13	1,260	544	1,320	567	2,240	399	1,640	1,870	1,970	1,740	630	464
14	1,180	520	1,150	576	1,740	385	1,640	1,520	2,410	1,690	616	484
15	950	500	1,080	608	1,440	*528	*1,520	1,400	2,840	1,600	630	504
16	785	524	1,120	590	1,260	524	1,560	1,690	2,530	1,560	680	520
17	680	496	1,360	562	1,080	460	1,640	2,410	2,240	1,640	655	536
18	870	472	1,150	524	990	432	1,560	2,070	2,120	*1,600	621	524
19	1,080	440	1,260	480	900	456	1,290	1,740	2,020	1,360	626	496
20	1,120	480	1,820	460	840	576	1,120	1,690	1,970	1,120	705	436
21	900	612	1,870	460	785	680	960	*2,020	1,970	1,080	758	396
22	758	655	1,870	432	705	626	900	2,650	2,070	1,150	705	382
23	680	705	2,180	416	655	576	812	3,180	2,070	1,280	621	368
24	655	2,470	3,760	484	626	549	812	2,470	2,070	1,260	544	374
25	1,740	3,960	3,610	930	594	562	870	1,970	2,120	1,220	512	840
26	1,290	4,400	2,240	1,220	549	572	900	1,600	2,120	1,120	*496	488
27	1,150	3,760	1,780	*900	524	562	900	1,520	2,070	1,080	520	388
28	1,150	2,350	1,520	705	496	536	990	1,360	2,070	1,050	612	396
29	990	1,740	1,290	655	-	558	960	1,180	2,070	1,050	488	785
30	900	1,440	1,290	598	-	572	840	1,080	2,180	1,020	608	*1,690
31	812	-	1,120	554	-	554	-	1,020	-	990	504	-
Total	33,013	37,545	48,615	21,019	42,667	14,855	32,624	55,250	59,030	44,170	22,015	17,128
Mean	1,065	1,252	1,568	678	1,524	479	1,087	1,782	1,968	1,425	710	571
Cfs/m	5.92	6.96	8.71	3.77	8.47	2.66	6.04	9.90	10.9	7.92	3.94	3.17
In.	6.82	7.76	10.04	4.34	8.82	3.07	6.74	11.42	12.20	9.13	4.55	3.54
Ac-ft	65,480	74,470	96,430	41,690	84,630	29,460	64,710	109,600	117,100	87,610	43,670	33,970

Peak discharge (base, 3,600 cfs).--Oct. 10 (6:30 a.m.), 3,910 cfs (6.22 ft); Nov. 25 (7:30 p.m.), 6,720 cfs (7.74 ft); Dec. 10 (5:30 a.m.), 3,610 cfs (6.00 ft); Dec. 24 (9 p.m.), 5,890 cfs (7.27 ft); Feb. 10 (10:30 a.m.), 9,650 cfs (8.89 ft); May 11 (1 p.m.), 5,110 cfs (6.90 ft).

\* Discharge measurement made on this day.



Sauk River above Whitechuck River, near Darrington, Wash.

Location.--Lat 48°10'00", long. 121°27'45", in NW $\frac{1}{4}$  sec. 24, T. 31 N., R. 10 E., on right bank half a mile upstream from Whitechuck River and 9 $\frac{1}{2}$  miles southeast of Darrington.

Drainage area.--152 sq mi.

Records available.--August to November 1910 (fragmentary gage heights only), October 1917 to September 1922, August 1928 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is about 930 ft (from river-profile survey). Prior to Nov. 18, 1910, staff gage three-eighths of a mile downstream at different datum.

Average discharge.--28 years (1917-22, 1928-51), 1,105 cfs.

Extremes.--Maximum discharge during year not determined, probably occurred Feb. 10 during period of no gage-height record; minimum, 210 cfs Sept. 23, 24 (gage height, 2.77 ft).

1917-22, 1928-51: Maximum discharge, 30,200 cfs Nov. 27, 1949 (gage height, 14.90 ft), from rating curve extended above 6,200 cfs, by logarithmic plotting; minimum, 115 cfs Nov. 15, 16, 30, Dec. 1, 1936.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. No diversion or regulation.

Revisions (water years).--W 752: 1932.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

2.8	220	4.1	1,070	6.5	5,280
3.0	300	4.5	1,540	7.0	6,420
3.2	395	5.0	2,290	8.0	8,820
3.5	570	5.5	3,190	9.0	11,400
3.8	790	6.0	4,200	10.5	15,500

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	324	1,280	1,340	1,240	600	584	654	1,030	1,260	1,580	577	322
2	292	*1,270	1,160	1,340	620	558	682	934	1,290	1,570	552	296
3	265	1,600	1,060	1,550	660	528	817	862	1,540	1,570	540	292
4	286	2,080	956	1,200	620	516	1,020	880	1,800	1,500	528	284
5	880	2,350	872	1,030	580	504	1,160	1,200	1,800	1,290	510	276
6	*1,230	1,660	1,160	914	550	486	1,180	1,480	1,800	*1,110	498	276
7	1,720	1,440	1,180	832	1,500	468	1,220	1,750	1,880	1,040	480	336
8	2,150	1,220	1,040	768	3,500	450	1,250	1,860	1,870	961	462	862
9	1,500	1,050	*1,210	712	10,000	439	1,190	1,800	1,750	826	*444	498
10	4,690	948	2,420	664	15,000	428	1,150	2,150	1,780	970	439	406
11	2,490	864	2,080	626	9,000	422	1,220	4,840	1,920	1,040	439	375
12	1,720	784	1,800	598	4,000	417	1,250	4,410	1,920	1,090	434	314
13	1,340	720	1,500	672	3,000	450	1,870	5,100	1,880	1,160	406	288
14	1,300	664	1,290	872	2,200	480	1,880	2,380	2,020	1,170	380	280
15	1,060	704	1,340	816	1,800	675	1,860	2,010	2,640	1,150	360	280
16	914	736	1,440	792	1,500	862	1,840	1,980	2,640	1,200	355	280
17	800	672	1,900	688	1,400	703	1,930	2,550	2,290	1,060	355	288
18	948	605	1,600	612	1,250	805	1,960	2,640	2,100	1,050	345	280
19	1,440	556	1,600	565	1,140	564	1,750	2,290	1,960	990	340	272
20	1,310	633	2,700	521	1,090	591	1,480	2,120	1,870	898	350	252
21	1,050	1,070	2,920	507	1,000	710	*1,240	2,100	1,800	808	375	*240
22	914	1,340	2,920	487	916	734	1,120	*2,550	1,780	774	370	228
23	816	1,170	3,800	448	853	696	1,030	3,580	1,770	742	336	220
24	784	3,310	4,780	619	799	647	970	3,580	1,770	734	322	220
25	2,150	4,510	5,070	1,780	758	640	934	3,100	1,800	734	300	640
26	1,720	4,690	3,310	2,420	718	647	925	2,460	1,770	710	292	492
27	1,900	3,880	2,350	1,780	*661	647	934	2,100	1,710	675	296	345
28	2,080	2,850	2,020	1,200	626	640	1,030	1,940	1,660	661	350	395
29	1,600	2,020	1,660	900	-	633	1,110	1,740	1,620	640	314	974
30	1,350	1,660	1,600	800	-	647	1,100	1,510	1,590	612	444	2,380
31	1,210	-	1,440	600	-	654	-	1,340	-	598	380	-
Total	42,233	48,336	61,618	28,551	66,541	18,025	37,556	68,266	55,280	30,913	12,573	12,851
Mean	1,362	1,611	1,988	921	2,169	581	1,252	2,202	1,843	997	406	428
Cfsm	8.96	10.6	13.1	8.06	15.6	3.82	8.24	14.5	12.1	6.56	2.67	2.82
In.	10.33	11.83	15.08	6.99	16.23	4.41	9.19	16.70	13.53	7.56	3.08	3.14
Ac-ft	83,770	95,870	122,200	56,630	131,600	35,750	74,490	135,400	109,600	61,320	24,940	25,490

Calendar year 1950: Max 5,070 Min 265 Mean 1,565 Cfsm 10.3 In. 139.79 Ac-ft 1,133,000  
 Water year 1950-51: Max 15,000 Min 265 Mean 1,322 Cfsm 8.70 In. 118.07 Ac-ft 957,100

Peak discharge (base, 4,000 cfs).--Oct. 10 (10 a.m.) 6,700 cfs (7.48 ft); Nov. 25 (7 p.m.) 7,360 cfs (7.67 ft); Dec. 25 (5 a.m.) 5,860 cfs (6.96 ft); probably Feb. 10 (time and discharge unknown); May 11 (5 p.m.) 5,730 cfs (6.79 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 28 to Feb. 18; discharge estimated on basis of records for station near Sauk. Shifting-control method used Oct. 1 to Jan. 27, Apr. 19 to May 11.

## Sauk River near Sauk, Wash.

Location.--Lat 48°25'15", long. 121°33'45", in NW<sup>1</sup>/<sub>4</sub> sec. 19, T. 34 N., R. 10 E., on left bank 5 miles upstream from mouth, 5 miles southeast of Sauk, and 8 miles downstream from Suittatte River.

Drainage area.--714 sq mi.

Records available.--August 1910 to August 1912, July 1928 to September 1951. Published as "near Suittatte Crossing, near Sauk" 1910-12.

Gage.--Water-stage recorder. Datum of gage is 266 ft (revised) above mean sea level (river-profile survey). Prior to Aug. 4, 1912, staff gages at various sites from 1 mile downstream to 5 miles upstream from present site and at various datums.

Average discharge.--23 years (1928-51), 4,177 cfs.

Extremes.--Maximum discharge during year, 62,700 cfs Feb. 10 (gage height, 14.97 ft); minimum, 1,200 cfs Sept. 23 (gage height, 3.03 ft).  
1910-12, 1928-51: Maximum discharge, 82,400 cfs Nov. 27, 1949 (gage height, 16.93 ft); minimum, 572 cfs Dec. 5, 1929, but may have been less during period of ice effect Jan. 10-27, 1930.

Remarks.--Records good except those for periods of no gage-height record, which are fair. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1 to Jan. 27, Feb. 6-9)

3.0	1,160	5.5	6,220	10.0	25,000
3.5	1,820	6.0	7,710	11.0	31,200
4.0	2,660	7.0	11,100	12.0	38,000
4.5	3,680	8.0	15,000	13.0	45,400
5.0	4,870	9.0	19,700	14.0	53,700

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1												
2	1,540	4,870	5,680	5,000	2,900	2,700	2,850	3,680	5,130	7,710	3,050	1,610
3	1,410	*5,390	4,870	5,800	3,000	2,600	3,150	3,360	5,520	7,560	2,950	1,560
4	1,330	6,510	4,500	6,680	3,200	2,500	3,790	3,360	6,510	7,710	2,850	1,520
5	1,260	7,400	4,130	5,260	3,000	2,400	4,370	3,900	7,100	7,100	2,780	1,530
6	2,850	8,340	3,790	4,500	2,900	2,300	4,620	5,260	7,100	5,660	2,660	1,530
7												
8	*4,130	6,360	5,800	4,020	2,760	2,200	4,500	5,800	7,250	5,000	2,570	1,520
9	4,870	5,520	5,660	3,790	5,260	2,150	4,870	7,250	7,710	4,500	2,480	1,700
10	6,360	4,620	4,740	3,460	12,400	2,100	4,740	6,950	6,950	4,250	2,480	3,250
11	5,260	4,130	*5,130	3,250	35,100	2,050	4,370	6,510	6,800	4,250	2,570	2,300
12	13,600	3,790	10,400	3,150	53,700	2,000	4,130	8,340	7,400	5,130	2,570	1,970
13												
14	8,340	3,460	8,340	2,950	33,800	2,200	4,130	16,400	7,710	5,130	2,570	1,820
15	5,660	3,150	7,250	2,850	15,900	2,700	5,000	12,200	7,560	5,390	2,300	1,560
16	4,870	2,950	5,800	3,250	11,100	2,660	6,360	8,990	7,710	5,660	2,080	1,500
17	4,620	2,760	5,130	3,680	8,680	2,570	*6,660	7,400	8,340	5,520	1,990	1,520
18	3,900	2,570	5,260	3,900	7,400	3,680	6,360	6,660	10,400	5,260	2,020	1,530
19												
20	3,360	3,050	5,660	3,790	6,220	*4,020	6,510	7,100	9,670	4,870	2,100	1,560
21	2,950	2,850	7,560	3,460	5,660	3,150	6,950	8,990	8,660	5,000	2,050	1,570
22	3,460	2,660	6,220	3,050	5,130	2,760	6,800	8,340	8,340	5,000	1,960	1,570
23	4,740	2,480	5,660	2,850	4,600	2,660	5,940	7,400	8,020	*4,500	1,940	1,540
24	4,620	2,950	8,990	2,760	4,300	3,050	5,130	7,100	7,710	3,790	2,070	1,450
25												
26	3,790	4,870	10,000	2,760	4,000	3,570	4,620	7,710	7,560	3,570	2,220	1,340
27	3,250	5,390	9,670	2,660	3,800	3,460	4,250	9,330	7,710	3,680	2,130	1,290
28	2,950	4,500	11,700	2,480	3,600	3,150	3,900	11,800	7,710	3,790	1,940	1,260
29	2,760	11,500	15,900	3,360	3,400	2,950	3,790	10,400	8,660	3,500	1,790	1,270
30	6,420	14,300	16,700	8,020	3,200	2,950	3,900	8,990	8,020	3,790	1,680	2,390
31												
1	6,220	17,600	10,400	*10,000	3,050	3,050	4,130	7,400	7,860	3,570	1,640	1,910
2	6,080	15,000	8,660	6,080	2,900	2,950	4,130	7,100	7,710	3,300	*1,670	1,460
3	7,400	10,400	7,560	4,500	2,800	2,660	4,620	6,660	7,560	3,250	1,910	1,450
4	6,080	8,020	6,510	3,900	-	2,950	4,620	5,940	7,560	3,300	1,680	2,760
5	5,130	6,660	3,500	-	-	3,050	4,130	5,390	7,710	3,150	2,130	6,560
6	4,740	-	5,660	3,100	-	2,850	-	5,000	-	3,050	1,860	-
Total	144,050	184,050	229,970	127,790	253,740	86,040	143,320	230,710	228,850	147,450	68,670	55,600
Mean	4,647	6,135	7,418	4,122	9,062	2,775	4,777	7,442	7,628	4,757	2,215	1,853
Cfsm	6.51	8.59	10.4	5.77	12.7	3.89	6.69	10.4	10.7	6.66	3.10	2.60
In.	7.50	9.59	11.98	6.66	13.22	4.48	7.47	12.02	11.92	7.68	3.58	2.90
Ac-ft	285,700	365,100	456,100	253,500	503,300	170,700	284,300	457,600	453,900	292,500	136,200	110,300
Calendar year 1950:	Max	18,700	Min	1,330	Mean	5,997	Cfsm	8.40	In.	114.01	Ac-ft	4,341,000
Water year 1950-51:	Max	53,700	Min	1,260	Mean	5,206	Cfsm	7.29	In.	99.00	Ac-ft	3,769,000

Peak discharge (base, 12,000 cfs).--Oct. 10 (1:30 p.m.) 18,700 cfs (8.96 ft); Nov. 25 (11 p.m.) 25,900 cfs (9.95 ft); Dec. 25 (1 a.m.) 21,700 cfs (9.49 ft); Jan. 26 (4 a.m.) 12,200 cfs (7.43 ft); Feb. 10 (6 a.m.) 62,700 cfs (14.97 ft); May 11 (12:30 to 2:30 p.m.) 19,700 cfs (8.99 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 28 to Feb. 5, Feb. 19 to Mar. 12; discharge estimated on basis of recorded range in stage, weather records, and records for nearby stations.

## Baker River at Concrete, Wash.

Location.--Lat 48°33', long. 121°45', in NW $\frac{1}{4}$  sec. 11, T. 35 N., R. 8 E., on left bank 800 ft downstream from Baker River powerplant, a quarter of a mile northeast of Concrete, and three-quarters of a mile upstream from mouth.

Drainage area.--270 sq mi.

Records available.--September 1910 to March 1915, September 1943 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 175 ft (from river-profile map). Prior to Mar. 5, 1915, staff gage half a mile downstream at different datum.

Average discharge.--12 years (1910-14, 1943-51), 2,544 cfs.

Extremes.--Maximum discharge during year, 29,700 cfs Feb. 10 (gage height, 16.20 ft), from rating curve extended above 12,000 cfs; minimum, 68 cfs Dec. 4, 5 (gage height, 1.14 ft); minimum daily, 505 cfs Sept. 1-3, 15, 16, 23.

1910-15, 1943-51: Maximum discharge observed, 35,200 cfs Nov. 27, 1945 (gage height, 20.32 ft), from rating curve extended above 12,000 cfs; minimum, 21 cfs Feb. 7, 1949 (gage height, 0.20 ft); minimum daily, 142 cfs Jan. 1, 1949.

Remarks.--Records good between 100 and 14,000 cfs, others fair except those for periods of no gage-height record, which are poor. Flow regulated by Baker River powerplant and Lake Shannon (see p. 164).

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1 to Dec. 24)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

4.5	1,500	8.0	5,610	3.0	505	5.5	2,420	9.0	8,730
5.0	1,910	9.0	7,960	3.5	710	6.0	3,040	10.0	11,400
5.5	2,370	10.0	11,400	4.0	990	6.5	3,780	12.0	17,400
6.0	2,880	12.0	18,600	4.5	1,360	7.0	4,600	14.0	24,000
7.0	4,080			5.0	1,850	8.0	6,470	16.0	29,200

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,760	2,430	2,600	2,950	1,960	1,940	1,600	2,130	2,160	4,060	1,830	505
2	1,910	2,130	2,280	3,290	1,900	1,750	1,770	2,180	2,360	4,220	1,810	505
3	1,540	3,120	2,250	3,380	1,890	985	1,800	1,920	2,350	3,990	1,820	505
4	1,740	4,450	2,090	2,390	2,040	1,700	1,810	1,890	3,550	3,480	1,810	1,130
5	2,000	4,350	1,450	a2,100	2,070	1,880	1,780	2,760	3,530	3,010	634	1,170
6	1,950	3,050	3,150	a2,200	1,970	1,960	1,770	3,120	4,210	2,300	1,630	1,100
7	2,630	2,490	*3,730	a2,000	2,600	2,040	1,700	3,680	3,020	2,360	1,520	1,040
8	6,360	2,350	2,440	a1,900	6,680	1,950	1,720	4,060	2,950	2,360	1,480	1,700
9	5,370	1,770	5,140	a1,700	18,000	1,910	1,780	2,900	2,940	2,360	1,480	874
10	8,760	1,670	13,400	a1,600	28,000	1,910	1,800	4,180	3,560	2,360	1,640	1,550
11	5,670	1,440	8,080	a1,650	19,700	1,770	1,790	8,380	3,660	2,360	1,420	1,670
12	3,770	1,120	5,350	a1,550	8,240	1,850	6,110	3,530	2,360	2,360	1,090	1,070
13	3,120	1,620	3,620	a2,000	5,300	1,970	1,740	3,950	4,000	2,810	1,380	1,020
14	1,990	1,580	2,840	a1,900	3,780	*1,880	1,640	2,820	3,870	2,890	1,540	979
15	1,880	1,510	3,250	a2,000	3,180	1,820	1,590	2,920	4,920	2,650	1,570	505
16	1,900	1,510	3,390	2,280	2,910	1,820	*1,750	3,530	5,100	2,510	1,670	505
17	1,910	1,490	4,540	2,080	2,480	1,880	1,670	4,220	3,980	2,560	1,680	1,260
18	3,460	1,340	3,580	2,210	2,420	1,850	1,820	4,240	3,610	2,720	530	1,450
19	4,820	827	4,420	a1,700	2,420	1,770	1,600	3,400	3,380	*2,360	512	1,350
20	4,610	1,540	7,770	a1,600	2,360	1,690	2,390	2,670	3,220	2,560	1,600	1,260
21	2,730	1,570	6,690	a1,750	2,420	1,770	2,390	4,100	3,540	2,360	1,570	1,350
22	2,650	1,790	7,250	a1,700	2,420	1,800	2,260	4,850	3,600	2,360	1,500	524
23	2,310	1,500	7,960	a1,500	1,880	1,770	2,050	*6,240	3,780	2,360	1,750	505
24	2,090	4,320	14,800	a2,550	1,860	1,710	1,870	6,670	3,690	1,820	*1,750	1,640
25	4,590	10,200	13,000	*a7,250	1,800	1,550	1,860	*5,040	3,820	1,890	954	1,860
26	3,880	14,200	5,870	5,900	1,940	1,800	1,790	2,590	3,750	1,960	601	1,750
27	4,060	13,100	5,020	a3,600	1,950	1,800	1,780	3,670	3,650	1,850	1,510	1,830
28	4,930	6,300	3,790	2,910	1,820	1,750	1,930	2,890	3,690	1,600	1,450	1,700
29	3,900	4,190	3,680	2,540	-	1,750	2,280	2,360	3,870	1,090	1,490	2,340
30	3,150	2,940	4,300	1,900	-	1,730	2,350	2,360	3,880	1,860	1,240	2,330
31	*2,660	-	3,110	1,890	-	1,670	-	2,360	-	1,870	1,250	-
Total	104,080	101,897	160,840	75,890	136,120	55,225	55,790	114,370	107,450	77,100	43,691	56,957
Mean	3,357	3,337	5,188	2,448	4,861	1,761	1,860	3,688	3,562	2,487	1,409	1,732
Ac-ft	206,400	202,100	319,000	150,500	270,000	109,500	110,700	226,800	213,100	152,900	86,660	73,300
(t)	+1,540	+180	-340	-500	-8,280	-29,460	+38,260	-2,680	+3,090	-2,460	-3,320	+44,110

Adjusted for change in lake contents

Mean	3,381	3,400	5,183	2,440	4,712	1,302	2,504	3,645	3,635	2,446	1,355	1,301
Cfsm	12.5	12.6	19.2	9.04	17.5	4.82	9.27	13.5	9.06	5.02	4.82	4.82
In.	14.44	14.05	22.13	10.42	18.17	5.66	10.35	15.56	15.01	10.44	5.79	5.38
Ac-ft	207,900	202,300	318,700	150,000	261,700	80,040	149,000	224,100	216,200	150,400	83,340	77,410

Observed

Calendar year 1950: Max	14,800	Min	382	Mean	3,364	Ac-ft	2,435,000
Water year 1950-51: Max	28,000	Min	505	Mean	2,930	Ac-ft	2,121,000

Adjusted

Calendar year 1950: Mean	3,367	Cfsm	12.5	In.	169.25	Ac-ft	2,437,000
Water year 1950-51: Mean	2,930	Cfsm	10.9	In.	147.30	Ac-ft	2,121,000

\* Discharge measurement made on this day.

+ Change in contents in Lake Shannon, in acre-feet, furnished by Puget Sound Power & Light Co.  
a No gage-height record; discharge estimated on basis of powerplant records and records for nearby stations.

## Skagit River near Concrete, Wash.

Location.--Lat 48°32', long. 121°46', in sec. 16, T. 35 N., R. 8 E., on right bank at dikes 2 miles downstream from Baker River and 2½ miles southwest of Concrete.

Drainage area.--2,700 sq mi, approximately, of which 390 sq mi is in Canada.

Records available.--September 1924 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 130.0 ft above mean sea level, datum of 1929. Prior to Dec. 10, 1924, staff gage at same site at different datum. Dec. 10, 1924, to Oct. 27, 1937, water-stage recorder at present site at datum 12.7 ft higher.

Average discharge.--27 years, 14,380 cfs.

Extremes.--Maximum discharge during year, 139,000 cfs Feb. 10 (gage height, 38.99 ft); minimum, 4,490 cfs Sept. 23 (gage height, 14.53 ft); minimum daily, 5,400 cfs Sept. 3. 1924-51: Maximum discharge, 154,000 cfs Nov. 27, 1949 (gage height, 40.8 ft); minimum, probably less than 2,160 cfs during period Oct. 1-24, 1925, when recorder was not operating and gates in Baker River Dam were first closed; minimum daily recorded, 2,610 cfs Nov. 14, 1936.

Maximum stage known, 69.3 ft, present datum, at site 200 ft upstream, from flood-marks (discharge, about 500,000 cfs); occurred about 1815. Records of other floods, at site 200 ft upstream, prior to establishment of station, are given in Water-Supply Paper 612.

Remarks.--Records excellent except those for periods of shifting control, which are good. Flow partly regulated by powerplants on Baker and upper Skagit Rivers, and by Ross Reservoir (see p. 150), and by Diablo and Lake Shannon Reservoirs (see p. 164).

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 11 to Sept. 30

15.7	8,110	19.0	17,500	29.0	68,500	15.0	5,400	19.0	16,200
16.0	8,810	20.0	21,200	31.0	81,500	15.5	6,420	20.0	19,900
16.5	10,000	21.0	25,300	33.0	95,200	16.0	7,510	21.0	24,000
17.0	11,300	23.0	34,500	35.0	109,000	16.5	8,670	23.0	33,400
17.5	12,700	25.0	44,100	37.6	128,000	17.0	9,890	25.0	44,000
18.0	14,200	27.0	55,700			17.5	11,300	27.0	55,700
						18.0	12,800		

Note.--Same as preceding table above 27.0 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8,110	14,800	19,700	22,800	13,300	11,000	11,600	18,300	15,400	25,800	11,300	6,630
2	8,570	14,800	17,900	23,200	13,600	10,700	12,200	17,600	15,400	26,300	11,000	6,000
3	8,570	17,500	15,800	24,500	16,500	9,890	13,400	16,800	16,500	26,300	11,000	5,400
4	9,050	21,600	15,100	18,900	16,500	10,400	14,800	17,600	20,300	25,400	10,400	6,420
5	11,900	23,200	14,200	17,500	16,500	10,400	15,100	22,300	19,900	21,500	8,200	7,740
6	14,200	17,900	19,700	19,700	13,900	10,100	14,800	24,000	20,700	20,300	9,390	7,740
7	15,500	16,100	20,500	19,300	16,600	10,100	15,100	26,800	19,900	19,100	9,890	7,970
8	25,300	14,800	16,800	15,500	33,800	9,890	19,100	27,200	18,700	19,500	9,890	11,000
9	20,800	13,900	21,800	14,500	73,700	9,890	20,700	24,500	17,900	17,900	9,890	8,200
10	36,200	13,500	49,100	13,300	128,000	9,390	20,700	29,400	19,500	16,200	10,100	8,430
11	28,600	12,400	33,800	13,000	94,400	9,150	20,300	47,300	20,700	15,800	9,640	8,430
12	18,200	10,800	27,100	13,300	49,700	9,390	20,300	39,600	21,100	17,900	7,970	8,200
13	16,500	10,500	22,000	15,100	35,400	10,400	24,500	29,400	21,900	17,900	7,740	7,740
14	13,600	11,100	18,900	14,500	29,000	10,100	24,500	25,400	22,700	17,600	8,910	7,970
15	11,900	10,800	19,300	14,800	27,200	11,900	22,700	24,000	27,200	16,200	8,910	7,290
16	11,100	11,300	20,500	16,800	25,000	12,800	24,500	24,000	26,300	15,400	8,910	6,420
17	11,100	11,300	25,800	16,100	23,600	11,600	25,000	28,600	24,000	17,200	8,910	7,510
18	13,900	10,500	22,000	14,200	22,300	11,000	24,500	27,600	21,500	17,900	7,740	8,200
19	17,500	9,780	21,600	13,000	21,500	10,700	22,300	24,500	22,300	16,800	6,420	7,970
20	16,600	10,500	31,100	12,400	21,100	11,300	21,500	23,200	21,500	15,100	7,740	7,970
21	13,900	13,500	33,400	16,100	17,900	12,200	15,800	25,800	21,900	13,400	8,910	7,740
22	11,900	14,800	32,900	13,300	16,200	12,500	19,900	29,400	22,700	13,400	9,150	6,420
23	11,300	13,600	39,100	12,700	14,800	11,900	21,500	34,900	24,000	13,700	8,910	5,600
24	11,300	30,600	60,000	14,800	31,700	11,600	17,900	32,900	25,400	13,700	8,910	7,290
25	20,600	40,600	59,400	30,100	13,100	11,600	18,300	28,600	25,000	13,400	7,510	9,890
26	20,100	61,000	37,200	32,900	12,500	11,900	18,700	22,300	22,700	12,600	6,210	9,150
27	19,300	50,500	29,300	22,000	12,200	12,200	18,700	21,900	21,900	12,800	7,070	8,430
28	22,000	34,300	24,500	16,800	11,600	11,600	19,900	19,900	21,900	11,900	8,670	8,200
29	18,200	26,200	22,400	15,800	-	11,600	20,300	18,700	22,300	11,000	8,200	11,300
30	16,100	22,400	23,700	14,200	-	12,200	19,500	16,800	25,400	11,600	8,430	17,200
31	15,500	-	20,800	13,600	-	11,600	-	15,800	-	11,600	8,430	-
Total	497,400	583,980	835,400	534,700	803,800	341,000	578,100	785,100	646,600	526,400	274,550	244,450
Mean	16,050	19,470	26,950	17,250	28,700	11,000	19,270	25,330	21,500	16,980	8,850	8,148
Ac-ft	986,600	1,158	1,657	1,061	1,594	676,400	1,147	1,557	1,283	1,044	544,200	484,900
Calendar year 1950: Max			61,000		Min	6,130	Mean	20,210	Ac-ft	14,630,000		
Water year 1950-51: Max			128,000		Min	5,400	Mean	18,220	Ac-ft	13,190,000		

Peak discharge (base, 50,000 cfs).--Nov. 26 (2:30 a.m.) 77,000 cfs (30.26 ft); Dec. 10 (10:30 to 11:30 a.m.) 54,500 cfs (26.79 ft); Dec. 25 (1:30 a.m.) 78,900 cfs (30.64 ft); Feb. 10 (2 p.m.) 139,000 cfs (38.99 ft); May 11 (6 p.m.) 56,300 cfs (27.14 ft).

\* Discharge measurement made on this day.

† Expressed in thousands.

Note.--Shifting-control method used Feb. 13 to Apr. 2.

## SKAGIT RIVER BASIN

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Alder Creek near Hamilton, Wash.

Location--Lat 48°32', long. 121°57', in N<sup>1</sup>/<sub>4</sub> sec. 18, T. 35 N., R. 7 E., on left bank at railroad trestle three-quarters of a mile upstream from mouth and 2 miles east of Hamilton.

Drainage area--8.8 sq mi, approximately.

Records available--August 1943 to September 1951.

Gage--Water-stage recorder. Altitude of gage is 123 ft (by altimeter). Prior to Nov. 15, 1945, water-stage recorder at site 80 ft upstream at datum 1.10 ft higher. Nov. 15, 1945, to Jan. 7, 1947, water-stage recorder at present site at datum 2.47 ft higher than present gage.

Average discharge--8 years, 35.3 cfs.

Extremes--Maximum discharge during year, 654 cfs Feb. 10 (gage height, 3.92 ft); minimum, 6.4 cfs Sept. 16-24 (gage height, 0.51 ft), 1943-51; Maximum discharge, that of Feb. 10, 1951; minimum, 6.3 cfs Sept. 4-12, 1944.

Remarks--Records good except those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 10 to Sept. 30

0.7	12	0.5	6.2	1.9	166
1.1	32	.7	13	2.1	202
1.4	59	.9	30	2.5	242
1.9	135	1.1	52	2.6	306
2.2	196	1.3	77	3.0	406
2.5	269	1.5	105	3.6	586
2.8	347	1.7	134		
3.1	430				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	17.5	37	57	75	56	42	63	26	18	13	9.9	7.2
2	17	35	49	115	66	38	63	25	18	12	9.6	7.2
3	15.5	38	45	150	65	35	64	23	18	11	9.6	7.2
4	16	40	40	107	60	36	64	23	19	12	9.6	7.2
5	21	44	38	84	59	37	*62	22	16	12	9.3	6.9
6	22	42	*46	70	56	35	59	22	16	12	9.3	7.2
7	24	40	59	63	88	34	57	23	19	12	9.0	7.2
8	28	37	53	56	160	33	53	23	18	11	9.0	7.2
9	26	34	50	52	419	32	51	22	16.5	11	9.0	6.9
10	79	32	56	50	577	31	49	22	16.5	11	9.0	6.9
11	54	30	50	47	421	30	46	46	16.5	11	9.0	6.9
12	45	38	48	44	222	*50	48	37	16.5	11	9.0	6.9
13	36	26	45	60	160	54	46	28	16.5	10	9.0	6.9
14	32	26	43	59	130	52	44	26	15.5	11	8.7	6.6
15	28	26	42	75	113	62	41	25	15.5	11	8.7	6.6
16	26	36	42	72	99	67	38	24	15	11	8.4	6.6
17	24	33	51	70	94	59	37	23	15	*11	8.4	6.4
18	34	31	50	61	84	56	36	22	15	10.5	8.4	6.4
19	45	30	49	54	78	56	34	22	15	10.5	8.4	6.4
20	49	30	69	51	78	64	33	22	14.5	10.5	8.2	6.4
21	41	37	91	63	72	70	32	21	14.5	10.5	8.1	6.4
22	36	59	84	58	69	73	31	21	14.5	10.5	8.0	6.4
23	34	56	101	52	65	70	30	20	14	10.5	8.0	6.4
24	31	79	174	77	60	68	29	22	14.5	10.5	7.8	6.9
25	32	95	178	*202	55	68	29	21	14	10.5	7.8	9.3
26	31	94	119	242	51	72	27	*21	14	10.5	7.7	7.2
27	37	104	124	141	48	74	27	20	13	10.5	7.6	7.2
28	41	95	112	89	45	70	28	20	13	10.5	9.0	7.2
29	39	78	90	81	-	70	27	20	13	9.9	7.5	7.2
30	*38	66	101	67	-	69	27	21	13	9.9	7.8	8.7
31	39	-	82	59	-	65	-	19	-	9.9	7.5	-
Total	1,038.0	1,436	2,238	2,558	3,550	1,672	1,275	732	471.5	338.2	266.3	210.1
Mean	33.5	47.9	72.2	82.5	127	53.9	42.5	23.6	15.7	10.9	8.59	7.00
Cfs/m	3.81	5.44	8.20	9.38	14.4	6.12	4.85	2.68	1.78	1.24	0.976	0.795
In.	4.39	6.08	9.46	10.61	15.00	7.07	5.39	3.09	1.99	1.43	1.13	0.89
Ac-ft	2,060	2,850	4,440	5,070	7,040	3,320	2,530	1,450	935	671	528	417

Calendar year 1950: Max 264 Min 10 Mean 46.1 Cfs/m 5.24 In. 71.06 Ac-ft 33,340  
 Water year 1950-51: Max 577 Min 6.4 Mean 45.3 Cfs/m 4.92 In. 66.73 Ac-ft 31,310

Peak discharge (base, 140 cfs)--Dec. 24 (10 p.m.) 249 cfs (2.42 ft); Jan. 3 (5:30 a.m.) 168 cfs (2.07 cfs); Jan. 25 (10:30 p.m.) 350 cfs (2.81 ft); Feb. 10 (9:30 a.m.) 654 cfs (3.92 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Feb. 23 to Mar. 11, June 25 to July 16, Aug. 20-28; discharge estimated on basis of weather records and records for stations on nearby streams.

## SKAGIT RIVER BASIN

Day Creek near Lyman, Wash.

Location.--Lat 48°30'05", long. 122°02'40", in NW $\frac{1}{4}$  sec. 28, T. 35 N., R. 6 E., on left bank at highway bridge, three-quarters of a mile upstream from mouth and 2 $\frac{1}{2}$  miles south-east of Lyman.

Drainage area.--38.1 sq mi.

Records available.--July 1943 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 90 ft (from topographic map).

Average discharge.--8 years, 267 cfs.

Extremes.--Maximum discharge during year, 4,510 cfs Feb. 9 (gage height, 7.72 ft), from rating curve extended above 1,300 cfs on basis of logarithmic plotting; minimum, 9.5 cfs part of each day Aug. 22-27, but may have been less during period of doubtful gage-height record in September.

1943-51: Maximum discharge, 5,570 cfs Dec. 28, 1949 (gage height, 8.35 ft), from rating curve extended above 3,000 cfs on basis of logarithmic plotting; minimum discharge, 5.9 cfs Feb. 1, 1945; minimum gage height, 0.64 ft Aug. 23, 24, 1945.

Remarks.--Records good except those for periods of shifting control or doubtful gage-height record, which are fair. No diversion or regulation.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 9

Feb. 10 to Sept. 30

5.0	1,560	0.9	8.0	1.9	57	3.5	345	5.5	1,640
6.0	2,450	1.1	14.5	2.2	84	4.0	530	6.0	2,210
7.2	3,850	1.3	22	2.5	123	4.5	810	6.5	2,840
		1.6	38	3.0	213	5.0	1,180	7.5	4,200

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	69	375	282	378	221	87	199	154	99	26	13	14.5
2	60	385	239	648	450	82	245	134	99	25	15	13.5
3	53	484	239	602	488	79	303	167	98	25	12.5	13
4	56	452	207	401	358	80	330	258	102	25	12	13
5	413	386	214	318	297	77	280	315	88	25	11.5	13
6	312	321	*772	265	254	73	265	268	92	25	11	12.5
7	318	274	1,050	236	1,630	71	280	265	107	25	10.5	12.5
8	590	214	540	244	2,020	67	228	205	86	24	10.5	21
9	398	183	561	219	3,850	66	207	226	79	27	10.5	15
10	1,420	162	620	226	3,920	63	199	255	75	22	10.5	13.5
11	500	143	625	231	1,850	59	242	1,090	70	22	10.5	12.5
12	303	126	440	212	744	320	398	426	66	20	10.5	12
13	221	116	315	500	494	*450	398	278	69	20	*10.5	11.5
14	174	113	271	397	384	265	*324	226	68	20	10.5	11
15	140	146	368	720	366	557	309	213	60	18.5	10.5	10.5
16	113	393	412	460	303	359	352	250	54	16.5	10	10.5
17	100	274	446	347	245	238	333	220	51	16.5	10	10.5
18	1,040	207	361	277	213	185	288	172	47	19.5	10	10
19	770	170	331	239	211	172	209	149	42	19	9.8	10
20	540	219	1,290	209	272	242	161	151	39	*18.5	9.8	10
21	309	390	1,050	372	209	327	137	180	38	17.5	9.8	10
22	225	350	820	282	170	258	122	207	36	17.5	9.8	10
23	189	485	1,440	234	148	197	120	211	35	17	9.8	10
24	170	1,080	1,600	567	137	176	139	224	33	16.5	9.8	10.5
25	372	1,140	880	1,660	128	217	165	170	31	16.5	9.5	60
26	424	940	540	*1,290	112	242	172	*136	30	16	9.5	28
27	666	1,500	910	625	100	222	247	120	29	15.5	11.5	22
28	770	820	745	416	94	185	684	104	28	14	28	30
29	648	500	670	325	-	260	306	102	27	14	17	202
30	*500	354	820	214	-	252	201	105	26	13.5	16.5	256
31	468	-	496	234	-	209	-	98	-	13	15.3	-
Total	12,335	12,702	19,956	13,408	19,628	6,137	7,943	7,079	1,804	613.5	365.8	888.5
Mean	398	423	644	433	701	198	261	228	60.1	19.8	11.7	29.6
Cfs/m	10.4	11.1	16.9	11.4	16.4	5.20	6.85	5.98	1.58	0.530	0.307	0.777
In.	12.04	12.40	19.48	13.09	19.16	5.99	7.66	6.91	1.76	0.60	0.36	0.87
Ac-ft	24,470	25,190	39,580	26,590	38,930	12,170	15,560	14,040	3,580	1,220	722	1,760

Calendar year 1950: Max 1,890 Min 20 Mean 351 Cfs/m 9.21 In. 125.20 Ac-ft 254,400  
 Water year 1950-51: Max 3,920 Min 9.5 Mean 282 Cfs/m 7.40 In. 100.32 Ac-ft 203,800

Peak discharge (base, 3,000 cfs).--Jan. 25 (9 p.m.) 3,570 cfs (7.10 ft); Feb. 9 (2 p.m.) 4,510 cfs (7.72 ft).

\* Discharge measurement made on this day.

Note.--Doubtful gage-height record Aug. 31 to Sept. 28; discharge computed on basis of trend of gage-height record and records for stations on nearby streams. Shifting-control method used Oct. 1 to Feb. 6, July 16-23.

## Skagit River near Mount Vernon, Wash.

Location.--Lat 48°25'40", long. 122°20'00", in SE $\frac{1}{4}$  sec. 7, T. 34 N., R. 4 E., on drawrest of, and 150 ft downstream from bridge on U. S. Highway 99 and 1 mile north of Mount Vernon.

Drainage area.--3,060 sq mi, approximately.

Records available.--November 1940 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, datum of 1929.

Average discharge.--10 years (1941-51), 16,070 cfs.

Extremes.--Maximum discharge during year, 144,000 cfs Feb. 11 (elevation, 36.85 ft); minimum, 5,160 cfs Sept. 24 (elevation, 9.62 ft).

1940-51: Maximum discharge, that of Feb. 11, 1951; minimum, 2,740 cfs Oct. 26, 1942 (elevation, 7.37 ft).

Maximum stage known, 37 ft in 1906, from Great Northern Railway high-water profile.

Remarks.--Records good except those for periods of doubtful gage-height record or shifting control, which are fair. Some regulation by powerplants on Baker and upper Skagit Rivers, and by Ross Reservoir (see p. 150), and by Diablo and Lake Shannon Reservoirs (see following page).

## Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9,160	15,500	23,000	25,000	14,500	11,600	12,500	19,000	16,300	26,200	11,800	8,000
2	8,360	16,000	20,200	25,900	15,000	11,100	12,800	18,200	16,500	26,200	11,600	6,740
3	8,560	17,400	18,200	29,100	17,100	10,700	13,700	17,600	16,500	26,500	11,400	6,380
4	8,560	21,800	16,800	23,500	18,200	10,400	15,000	17,400	18,800	25,900	11,400	5,650
5	11,300	25,500	15,800	20,700	18,200	10,800	16,000	21,000	21,000	23,500	17,000	7,640
6	15,000	20,200	19,000	20,400	16,500	10,700	15,500	24,400	20,700	20,400	8,760	8,000
7	15,000	17,600	24,100	21,000	17,300	10,500	15,200	25,300	20,700	19,900	10,300	7,820
8	22,200	15,800	21,000	19,000	33,000	10,400	17,400	27,700	19,900	19,600	10,300	9,820
9	25,800	14,200	19,600	16,000	58,800	10,400	20,700	25,600	19,000	19,900	10,300	10,000
10	30,800	13,700	45,500	15,000	102,000	10,000	20,200	27,400	18,800	16,800	10,300	8,180
11	38,000	12,800	44,900	14,500	138,000	49,800	20,200	40,800	20,700	16,300	10,300	8,950
12	21,600	12,000	34,100	14,200	81,800	49,800	20,700	50,000	20,700	17,400	9,580	8,760
13	17,600	10,500	26,200	15,500	45,300	11,800	23,500	35,700	21,800	18,200	7,280	8,180
14	15,000	11,100	22,100	17,100	32,600	11,400	25,000	28,000	22,400	18,200	8,960	8,180
15	13,000	10,900	21,000	16,800	28,400	12,300	23,800	25,600	25,300	17,100	9,160	8,000
16	11,400	11,800	22,100	19,000	25,900	14,700	23,800	25,000	27,100	15,800	9,160	7,100
17	11,600	12,000	25,600	18,200	24,100	12,800	25,000	27,100	25,300	16,800	9,580	7,100
18	13,300	11,400	26,200	16,500	23,000	11,800	25,000	29,800	22,700	17,900	8,960	8,180
19	19,000	10,500	22,400	14,700	21,800	11,400	23,500	27,100	22,100	17,400	7,640	8,180
20	21,800	10,300	30,500	13,700	21,800	11,800	22,100	24,400	22,400	16,300	6,740	8,180
21	16,800	13,000	41,300	15,800	19,600	13,200	18,800	25,900	22,100	14,500	8,960	8,000
22	13,500	15,800	40,900	16,500	17,100	13,700	17,900	28,400	22,400	14,000	9,380	7,460
23	11,800	15,000	39,700	14,000	15,500	13,000	21,000	33,300	23,000	14,000	9,380	6,560
24	11,800	27,300	55,600	15,500	14,500	12,500	19,300	35,700	25,000	13,700	9,160	6,200
25	15,100	38,100	71,400	27,600	14,000	12,300	18,500	32,600	25,900	14,000	8,760	9,160
26	23,200	63,000	51,800	43,700	13,200	12,500	18,800	25,000	23,200	13,500	7,460	10,700
27	19,600	58,600	38,500	29,100	12,800	13,000	19,000	23,000	22,400	13,000	6,380	8,360
28	24,400	47,800	30,800	21,300	11,800	12,500	21,000	21,600	22,400	12,800	8,760	8,360
29	22,100	34,100	26,200	17,900	-	12,500	21,300	20,200	22,100	12,000	8,760	10,000
30	18,200	26,500	27,700	16,600	-	13,000	20,200	18,500	23,800	11,400	8,560	16,000
31	17,100	-	25,300	15,200	-	12,500	-	17,100	-	12,000	8,960	-
Total	530,640	630,000	947,500	809,000	871,800	364,700	587,400	818,400	651,000	541,200	287,340	249,860
Mean	17,120	21,000	30,560	19,650	31,140	11,780	19,580	26,400	21,700	17,460	9,269	8,329
Ac-ft	1,053	1,250	1,879	1,208	1,729	723,400	1,165	1,623	1,291	1,073	569,900	495,600

Calendar year 1950: Max 71,400 Min 6,920 Mean 22,310 Ac-ft 16,150,000

Water year 1950-51: Max 138,000 Min 5,680 Mean 19,420 Ac-ft 14,060,000

Peak discharge (base, 55,000 cfs).--Nov. 26 (2 p.m.) 68,400 cfs (28.19 ft); Dec. 25 (11 a.m.) 74,000 cfs (29.08 ft); Feb. 11 (8:30 a.m.) 144,000 cfs (36.85 ft); May 12 (3 a.m.) 55,600 cfs (25.48 ft).

\* Discharge measurement made on this day.

† Expressed in thousands.

‡ Doubtful gage-height record; discharge estimated on basis of 1 discharge measurement and records for station at Concrete.

Note.--Shifting-control method used Oct. 11 to Nov. 24, Mar. 21 to Sept. 30.

## Reservoirs in Skagit River basin, Wash.

Ross Reservoir.--See page 150.

Diablo Reservoir.--Water-stage recorder, lat 48°43', long. 121°08', in SE¼ sec. 5, T. 37 N., R. 13 E. (unsurveyed), in Diablo Dam on Skagit River, 1 mile downstream from Thunder Creek and 6 miles northeast of Newhalem. Datum of gage is at mean sea level, subject to adjustment to datum of 1929. Records available, October 1929 to September 1951. October 1929 to September 1938, change in reservoir contents published with tables of monthly discharge for Skagit River at Newhalem. Maximum contents during year, 89,220 acre-ft Sept. 18, 28 (elevation, 1,205.0 ft); minimum observed, 28,350 acre-ft Mar. 13 (elevation, 1,100.1 ft), but may have been less sometime during period lake was lowered and well was out of water. Maximum contents during period 1929-51, 90,600 acre-ft July 14, 1933 (elevation, 1,206.5 ft).

Reservoir is formed by concrete dam, completed in 1930. Capacity, 76,220 acre-ft between elevations 1,040 ft (bottom of outlet pipes) and 1,205 ft (top of taintor gates). Dead storage, 13,000 acre-ft. Crest of spillway is at elevation 1,187 ft. Water is used by city of Seattle for power development at Diablo and Newhalem power-plants. Gage-height record collected in cooperation with city of Seattle. Figures given herewith represent total contents.

Lake Shannon.--Water-stage indicator, lat 48°33', long. 121°44', in sec. 2, T. 35 N., R. 8 E., on Baker River, half a mile north of Concrete and 1 mile upstream from mouth of Baker River. Datum of gage is at mean sea level, subject to adjustment to datum of 1929. Records available, November 1925 to September 1951.

Reservoir is formed by concrete dam, completed in June 1927. Capacity, 132,500 acre-ft between elevations 360 ft (lowest elevation for capacity operation) and 435 ft (spillway crest). Dead storage unknown. Water is used by Puget Sound Power & Light Co. for power development. Gage-height records furnished by Puget Sound Power & Light Co. Figures given herewith represent contents above elevation 340 ft (center line of outlet tunnel).

Monthly elevation and contents, water year October 1950 to September 1951

Date	Diablo Reservoir			Lake Shannon		
	Elevation (feet)†	Contents (acre-feet)†	Change in contents during month (acre-feet)	Elevation (feet)†	Contents (acre-feet)†	Change in contents during month (acre-feet)
Sept. 30.....	1,191.7	77,780	-	435.09	156,440	-
Oct. 31.....	1,193.3	79,080	+1,300	435.77	157,980	+1,540
Nov. 30.....	1,193.7	79,400	+320	435.85	158,160	+180
Dec. 31.....	1,191.6	77,700	-1,700	435.70	157,820	-340
Calendar year 1950..	-	-	+800	-	-	+2,230
Jan. 31.....	1,193.1	78,910	+1,210	435.48	157,320	-500
Feb. 28.....	1,105.7	30,280	-48,630	431.78	149,040	-8,280
Mar. 31.....	1,100.3	28,420	-1,860	417.88	119,580	-29,460
Apr. 30.....	1,193.4	79,160	+50,740	435.71	157,840	+38,260
May 31.....	1,191.7	77,780	-1,380	434.52	155,160	-2,680
June 30.....	1,188.6	61,140	-16,640	435.89	158,250	+3,090
July 31.....	1,187.9	74,800	+13,660	434.80	155,790	-2,460
Aug. 31.....	1,199.7	84,500	+9,700	433.32	152,470	-3,320
Sept. 30.....	1,201.4	85,990	+1,490	435.15	156,580	+4,110
Water year 1950-51..	-	-	+8,210	-	-	+140

† Elevation and contents at 12 p.m.



## Samish River near Burlington, Wash.

Location.--Lat 48°32'35", long. 122°20'25", in NE<sup>1</sup> sec. 7, T. 35 N., R. 4 E., on left bank 500 ft downstream from U. S. Highway 99 bridge, half a mile downstream from Friday Creek, and 5 miles north of Burlington.

Drainage area.--87.8 sq mi (revised).

Records available.--July 1943 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 45 ft (from topographic map). Prior to Dec. 1, 1948, water-stage recorder at site 500 ft upstream at different datum. Dec. 1, 1948, to Jan. 7, 1949, staff gage 200 ft upstream at datum 3.14 ft higher than present datum.

Average discharge.--8 years, 250 cfs.

Extremes.--Maximum discharge during year, 4,030 cfs Feb. 10 (gage height, 10.23 ft); minimum, 11 cfs July 10 (gage height, 2.01 ft).  
1943-51: Maximum discharge, 5,830 cfs Dec. 28, 1949 (gage height, 11.89 ft); minimum recorded, that of July 10, 1951.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of doubtful or no gage-height record, which are poor. There is evidence of slight regulation and there may be some pumping for irrigation.

Rating table, water year 1950-51, except periods of doubtful gage-height record or shifting control (gage height, in feet, and discharge, in cubic feet per second)

2.1	14.5	5.0	625
2.5	38	5.5	820
2.8	68	6.0	1,050
3.1	111	7.0	1,600
3.5	185	8.0	2,250
4.0	300	9.0	3,000
4.5	450	10.0	3,850

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	34	137	520	590	a370	237	268	121	78	31	22	21
2	32	126	435	1,020	420	*217	283	114	76	30	22	21
3	31	173	420	1,540	502	213	283	109	73	31	22	21
4	31	169	351	1,060	405	224	258	111	72	31	22	20
5	78	204	315	760	345	230	244	108	71	31	22	20
6	126	183	*405	590	292	217	230	106	*69	31	21	19.5
7	85	193	468	485	450	206	226	114	72	30	21	20
8	101	167	468	435	740	200	213	114	71	30	21	20
9	106	144	390	381	2,160	193	202	106	66	29	21	20
10	504	132	538	351	*3,760	189	191	106	64	28	22	19.5
11	d290	121	485	321	2,960	185	181	361	61	27	21	19.5
12	d180	113	450	285	1,560	472	191	405	60	27	21	19.5
13	154	108	378	485	1,050	780	*193	258	60	*26	21	19.5
14	123	128	333	555	840	608	183	196	60	27	21	19
15	103	150	318	555	720	870	173	167	58	27	21	18.5
16	91	224	363	555	625	880	169	154	55	27	20	18.5
17	85	244	420	590	572	825	167	142	53	27	19.5	18.5
18	165	303	405	485	555	502	159	132	51	26	21	18.5
19	348	258	351	435	502	450	148	121	49	26	19	18
20	356	237	405	372	555	435	139	114	47	26	19	18
21	224	265	590	405	485	450	132	109	44	25	19	18
22	165	590	538	*450	420	485	126	105	42	25	19	17.5
23	148	520	792	420	378	435	123	111	39	24	*19	18
24	130	720	1,330	625	351	390	121	121	37	24	19	19.5
25	114	680	1,390	1,120	339	384	120	114	35	25	19	34
26	100	700	840	1,540	306	405	114	105	34	24	19	26
27	108	841	1,030	780	278	366	116	98	33	24	22	*22
28	146	1,050	1,150	a600	258	333	177	92	32	23	22	25
29	*165	740	840	a500	-	324	159	88	32	23	24	25
30	159	572	840	a450	-	315	133	85	32	23	22	-
31	156	-	700	a400	-	285	-	81	-	23	22	-
Total	4,618	10,192	18,258	19,160	22,198	12,105	5,382	4,268	1,626	831	655.5	628.5
Mean	149	340	589	618	793	390	179	138	54.2	26.8	21.1	21.0
Cfs/m	1.70	3.87	6.71	7.04	9.03	4.44	2.04	1.57	0.617	0.305	0.240	0.239
In.	1.98	4.32	7.73	8.12	9.40	5.13	2.28	1.81	0.69	0.35	0.28	0.27
Ac-ft	9,160	20,220	36,210	38,000	44,030	24,010	10,680	8,470	3,230	1,650	1,300	1,250

Calendar year 1950: Max 1,480 Min 26 Mean 324 Cfs/m 3.69 In. 49.99 Ac-ft 234,400  
Water year 1950-51: Max 3,760 Min 17.5 Mean 274 Cfs/m 5.12 In. 42.34 Ac-ft 198,200

Peak discharge (base, 1,100 cfs).--Nov. 28 (9 a.m.) 1,220 cfs (6.28 ft); Dec. 24 (9:30 p.m.) 1,720 cfs (7.09 ft); Dec. 28 (2 to 4 a.m.) 1,250 cfs (6.23 ft); Jan. 3 (8 a.m.) 1,720 cfs (7.02 ft); Jan. 26 (1:30 to 4 a.m.) 1,720 cfs (6.96 ft); Feb. 10 (6 p.m.) 4,030 cfs (10.23 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of weather records and records for nearby streams.

d Doubtful gage-height record; discharge estimated on basis of trend of gage-height record.

Note.--Shifting-control method used Nov. 28 to Jan. 27, Feb. 1-5, Feb. 11 to Mar. 15, July 18 to Aug. 23.

Whatcom Creek below hatchery, near Bellingham, Wash.

Location.--Lat 48°45'10", long 122°25'40", in NW $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 28, T. 38 N., R. 3 E., on right bank in Whatcom Falls Park, seven-eighths of a mile downstream from Lake Whatcom and 2 miles east of Bellingham.

Drainage area.--56 sq mi, approximately.

Records available.--October 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 200.00 ft above mean sea level (city of Bellingham datum).

Average discharge.--6 years, 107 cfs.

Extremes.--Maximum discharge during year, 1,100 cfs Feb. 11 (gage height, 5.49 ft); minimum, 2.4 cfs Sept. 21, 24.  
1945-51: Maximum discharge, 1,350 cfs about Dec. 29, 1949 (gage height, about 6.0 ft, from recorded range in stage); minimum, that of Sept. 21, 24, 1951.

Remarks.--Records good except those for periods of shifting control or faulty intake action, which are fair. Flow completely regulated by Lake Whatcom (usable capacity, about 28,800 acre-ft under normal operating conditions). City of Bellingham diverts about 30 cfs from lake for municipal supply.

Cooperation.--Gage-height record collected in cooperation with city of Bellingham.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 11 to Sept. 30

1.5	2.4	1.6	3.0	2.7	124	4.5	655
1.6	4.9	1.8	10.5	3.0	185	5.0	965
1.8	15.5	2.0	26	3.3	263	5.5	1,100
2.0	27	2.2	47	3.6	350		
2.2	47	2.4	74	4.0	475		

Note.--Same as following table above 2.2 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4.1	6.2	163	410	365	7.2	7.2	6.4	8.7	5.2	5.6	4.4
2	4.1	6.2	213	425	365	6.8	7.2	6.4	9.2	5.2	5.2	4.0
3	4.1	6.2	*214	475	358	6.4	6.8	6.4	8.7	5.2	5.6	4.0
4	4.1	6.6	210	475	355	6.4	7.2	6.4	8.2	5.2	5.2	4.0
5	4.3	6.2	205	458	311	6.4	7.2	6.4	8.7	5.6	5.2	4.0
6	3.8	6.2	202	425	180	6.0	7.7	6.0	8.7	5.6	5.2	4.0
7	4.3	6.2	205	410	5.2	224	8.2	6.4	*8.7	5.6	5.2	3.6
8	4.6	6.2	205	380	4.6	528	8.7	6.4	7.7	5.6	5.6	4.0
9	4.6	6.2	205	353	119	458	*8.7	6.8	7.2	*6.4	5.2	3.6
10	4.9	6.2	208	352	580	395	8.7	6.8	6.4	6.4	5.2	3.6
11	4.6	6.2	226	297	1,080	347	8.7	8.7	5.6	6.0	5.6	3.6
12	4.6	6.2	258	192	1,080	329	8.7	8.2	5.0	6.0	5.6	3.6
13	4.6	6.2	255	285	*1,020	329	8.7	7.7	4.6	6.0	5.0	3.6
14	4.9	6.2	250	280	955	285	8.2	7.7	4.6	6.0	5.0	3.6
15	4.6	6.2	167	291	888	157	7.7	7.7	4.6	5.2	5.0	3.3
16	4.9	6.9	115	*303	775	10.5	7.7	7.7	4.6	5.0	5.0	3.3
17	4.6	6.6	115	152	695	9.7	6.8	8.2	4.6	5.2	5.0	3.3
18	4.6	7.3	115	326	598	9.7	6.8	8.2	4.6	5.2	5.0	3.6
19	4.9	6.9	153	320	510	9.2	6.8	8.2	5.0	5.6	5.0	3.6
20	4.6	6.9	241	311	369	9.2	6.8	8.2	5.0	5.6	*5.0	3.6
21	5.2	7.3	269	297	191	9.7	6.8	7.7	5.2	5.6	*5.0	3.3
22	4.9	7.3	266	297	9.7	9.2	6.8	7.7	5.2	5.6	5.0	3.6
23	*5.2	7.3	329	116	9.2	9.2	6.8	8.2	5.2	5.6	5.0	3.6
24	5.8	7.3	395	128	9.2	9.2	6.8	7.7	5.2	6.0	4.6	*4.0
25	6.2	7.7	458	440	8.7	9.2	6.8	7.7	5.2	5.6	5.0	4.0
26	6.2	6.9	440	545	8.2	9.2	6.8	8.2	5.2	5.6	4.6	4.0
27	6.2	7.3	458	545	8.2	8.7	6.8	8.2	5.2	5.6	4.6	4.0
28	6.8	7.3	458	510	*7.7	8.7	6.4	8.7	5.2	6.0	4.6	4.4
29	6.8	7.3	458	475	-	8.2	6.4	8.7	5.2	5.6	4.4	4.4
30	6.6	6.6	440	425	-	7.7	6.4	8.7	5.2	5.2	4.4	4.4
31	6.6	6.6	425	395	-	7.2	-	8.7	-	5.6	4.0	-
Total	155.9	258.7	8,321	11,073	10,842.7	3,235.7	221.3	234.6	182.4	173.8	155.6	114.6
Mean	5.03	8.62	268	357	367	104	7.38	7.57	6.08	5.61	5.02	3.82
Ac-ft	309	513	16,500	21,960	21,510	6,420	439	465	362	345	309	227
Calendar year 1950: Max			775	Min	2.6	Mean	134	Ac-ft	96,690			
Water year 1950-51: Max			1,080	Min	3.3	Mean	95.8	Ac-ft	69,360			

\* Discharge measurement made on this day.

Note.--Shifting-control method used Oct. 1 to Dec. 3, Aug. 24 to Sept. 24. Faulty intake action Feb. 21 to Mar. 7, Mar. 15 to Aug. 20; discharge computed using corrections based on outside gage readings.

Nooksack River above Cascade Creek, near Glacier, Wash.

Location--Lat 48°54'20", long. 121°50'50", in NW¼ sec. 1, T. 39 N., R. 7 E., on left bank a quarter of a mile upstream from Cascade Creek, half a mile downstream from Dead Horse Creek, 4½ miles east of Glacier, and 6 miles upstream from Glacier Creek.

Drainage area--105 sq mi.

Records available--October 1937 to September 1951.

Gage--Water-stage recorder. Altitude of gage is 1,245 ft (from river-profile map).

Average discharge--14 years, 735 cfs.

Extremes--Maximum discharge during year, 6,050 cfs Dec. 24 (gage height, 8.13 ft), from rating curve extended above 2,300 cfs on basis of contracted-opening determination of peak flow; minimum, 246 cfs Mar. 11 (gage height, 1.53 ft).  
1937-51: Maximum discharge, 10,300 cfs Nov. 26, 1949 (gage height, 10.50 ft), from rating curve extended above 2,700 cfs on basis of contracted-opening determination at gage height, 8.13 ft; minimum, 73 cfs Feb. 16, 1949.

Remarks--Records fair. No diversion. Some regulation at low flow by powerplant at Excelsior.

Revisions (water years)--W 1092: 1946.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	
1	715	820	765	660	376	316	366	484	792	1,590	792	400	
2	690	765	*665	650	382	303	416	452	875	1,630	792	420	
3	665	1,080	606	610	368	303	484	452	990	1,590	765	424	
4	902	1,510	556	552	351	303	566	520	1,080	1,390	740	424	
5	1,080	1,390	543	502	340	290	588	715	1,080	1,140	690	432	
6	1,020	1,020	820	476	334	280	584	792	1,110	1,020	635	448	
7	1,660	902	740	456	566	*270	610	960	1,020	960	635	579	
8	2,530	820	630	444	848	264	588	930	990	902	665	615	
9	1,550	65	1,050	424	1,880	255	561	930	1,080	1,020	690	464	
10	2,930	740	2,530	408	3,940	252	538	1,250	1,180	1,140	715	436	
11	1,750	715	1,790	400	2,730	249	*566	2,150	1,220	*1,220	665	376	
12	1,470	665	1,360	390	1,630	274	740	1,590	1,220	1,280	556	354	
13	1,220	655	1,020	396	1,140	303	960	1,220	1,360	1,360	502	368	
14	1,050	625	875	393	875	280	930	1,020	1,550	1,280	507	396	
15	930	620	875	460	740	337	848	990	1,630	1,220	538	408	
16	848	645	902	436	625	320	875	1,250	1,550	1,220	*556	432	
17	792	620	1,180	408	561	299	960	1,390	1,390	1,220	570	464	
18	930	606	902	*382	512	290	930	1,250	1,360	1,180	538	460	
19	1,280	588	1,020	368	480	296	740	1,080	1,280	990	570	400	
20	1,180	592	1,430	351	456	327	635	1,080	1,320	875	650	358	
21	902	635	1,470	351	424	358	570	1,220	1,360	875	665	323	
22	792	645	1,470	334	412	344	534	1,590	1,360	902	606	313	
23	740	665	1,550	327	393	334	502	2,020	1,390	930	507	306	
24	765	1,080	*3,980	379	386	327	498	1,670	1,430	960	452	323	
25	1,970	1,700	2,240	930	379	337	525	1,250	1,390	930	436	460	
26	*1,320	3,260	1,360	792	358	344	534	1,080	1,390	875	436	*316	
27	1,550	3,040	1,050	556	344	340	570	990	1,390	848	468	283	
28	1,430	1,550	902	476	334	340	751	902	1,430	848	456	690	
29	1,220	1,080	765	456	-	386	620	*820	1,470	848	386	1,140	
30	1,020	902	990	432	-	393	534	740	1,550	792	420	1,180	
31	902	-	740	408	-	379	-	715	-	792	396	-	
Total	37,803	30,700	36,776	14,607	22,164	9,693	19,107	33,502	58,237	33,827	17,999	13,992	
Mean	1,219	1,023	1,186	471	792	313	637	1,081	1,275	1,091	581	466	
Cfsm	11.18	9.74	11.3	4.49	7.54	2.98	6.07	10.3	12.1	10.4	5.53	4.44	
In.	13.39	10.87	13.03	5.17	7.85	3.43	6.77	11.87	13.54	11.98	6.38	4.96	
Ac-ft	74,980	60,890	72,940	28,970	45,960	19,230	37,900	66,450	75,840	67,090	35,700	27,750	
Calendar year 1950: Max	3,980			Min	270	Mean	1,059	Cfsm	10.1	In.	136.96	Ac-ft	767,000
Water year 1950-51: Max	3,980			Min	249	Mean	845	Cfsm	8.05	In.	109.24	Ac-ft	611,700

Peak discharge (base, 3,600 cfs).--Oct. 8 (9:30 a.m.) 4,060 cfs (8.53 ft); Nov. 26 (10 p.m.) 4,180 cfs (8.97 ft); Dec. 24 (5 p.m.) 5,970 cfs (8.13 ft); Feb. 10 (12:30 p.m.) 4,550 cfs (7.13 ft).

\* Discharge measurement made on this day.

## Canyon Creek at Kulshan, Wash.

Location.--Lat 48°50'05", long. 122°08'05", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 27, T. 39 N., R. 5 E., on left bank at Kulshan a quarter of a mile upstream from mouth.

Drainage area.--8.55 sq mi (revised).

Records available.--July 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 350 ft (from topographic map).

Extremes.--Maximum discharge during year not determined, occurred Feb. 11 (gage height, 8.44 ft); minimum, 1.0 cfs Sept. 15-24.

1948-51: Maximum discharge not determined, occurred Feb. 11, 1951; minimum, that of Sept. 15-24, 1951; minimum gage height, 0.59 ft Sept. 12-14, 1949.

Remarks.--Records good except those for periods of shifting control or no gage height record, which are fair, and those above 200 cfs, which are poor. No diversion or regulation.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	16	34	61	60	a30	20	23	34	29	19.5	3.4	2.0
2	14	31	*46	89	43	19.5	24	30	34	18	3.2	2.0
3	12.5	68	41	84	38	19.5	31	29	36	16.5	3.2	1.6
4	12.5	67	35	55	31	19	42	36	47	17	3.1	1.6
5	31	64	33	43	28	a18	42	51	42	15.5	2.6	1.4
6	55	45	71	35	26	a18	40	61	44	a14	2.8	1.4
7	68	40	100	33	138	a17	45	72	48	a13	2.5	1.6
8	106	52	76	31	404	*16.5	45	56	39	a12	2.5	2.0
9	68	28	75	29	1,030	15.5	47	53	37	a11	2.5	2.0
10	246	24	400	29	1,400	14	40	72	38	a10	2.4	2.0
11	85	23	255	28	a1,200	14	37	213	40	a9	2.6	1.8
12	53	30	175	27	a300	28	*52	143	38	*7.6	2.5	1.6
13	40	18.5	93	41	a150	52	72	86	42	7.0	2.0	1.4
14	31	18.5	68	44	a100	37	58	64	47	6.5	2.0	1.2
15	26	17.5	73	55	a70	54	47	56	45	6.5	*2.0	1.2
16	22	21	120	48	60	49	75	69	40	6.2	2.0	1.0
17	20	21	232	39	53	37	73	77	34	5.8	1.8	1.0
18	131	18.5	145	*31	47	30	66	60	31	5.4	1.8	1.0
19	228	17	108	26	43	27	52	48	29	5.2	1.8	1.0
20	127	18.5	224	23	41	30	45	43	28	5.0	1.6	1.0
21	65	30	255	25	37	36	39	49	28	4.6	1.6	1.0
22	44	42	175	22	34	33	35	72	28	4.6	1.4	1.0
23	39	44	279	20	32	29	32	104	27	4.4	1.4	1.0
24	31	139	526	98	29	27	31	123	27	4.2	1.4	1.2
25	*29	621	295	750	27	27	32	69	26	4.4	1.4	3.4
26	30	586	122	328	25	29	33	60	24	4.0	1.4	3.6
27	41	502	104	122	24	28	35	50	23	3.7	1.8	4.8
28	64	255	134	67	22	26	46	42	22	3.7	3.1	*4.8
29	55	139	91	a50	-	27	49	34	21	3.4	2.8	9.5
30	45	87	117	a40	-	26	40	28	20	3.6	2.8	39
31	40	-	78	a35	-	24	-	*27	-	3.8	2.4	-
Total	1,875.0	3,081.5	4,607	2,407	5,462	847.0	1,328	2,031	1,016	254.7	70.0	99.1
Mean	60.5	103	149	77.6	195	27.3	44.3	65.5	33.9	8.22	2.26	3.30
Cfsm	7.08	12.0	17.4	9.08	22.8	3.19	5.18	7.66	3.96	0.961	0.264	0.386
In.	8.16	13.40	20.04	10.47	23.76	3.68	5.78	8.83	4.42	1.11	0.30	0.43
Ac-ft	5,720	6,110	9,140	4,770	10,830	1,680	2,630	4,030	2,020	505	139	197

Calendar year 1950: Max 621 Min 6 Mean 68.1 Cfsm 7.96 In. 108.18 Ac-ft 49,340  
 Water year 1950-51: Max 1,400 Min 1.0 Mean 63.2 Cfsm 7.39 In. 100.38 Ac-ft 45,770

Peak discharge (base, 850 cfs (revised)).--Nov. 25 (7:30 p.m.) 2,350 cfs (4.61 ft); Dec. 24 (8:30 p.m.) 973 cfs (3.58 ft); Jan. 25 (8:30 p.m.) 973 cfs (3.60 ft); Feb. 11 (time and discharge unknown) (8.44 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Shifting-control method used Nov. 25 to Jan. 28, Feb. 2-8, 10, Feb. 16 to Mar. 4, Mar. 8 to May 22, July 12-16.

South Fork Nooksack River near Wickersham, Wash.

Location.--Lat 48°39'50", long. 122°07'50", in lot 2, sec. 26, T. 37 N., R. 5 E., on left bank three-quarters of a mile upstream from Skookum Creek and 4 miles east of Wickersham.

Drainage area.--103 sq mi.

Records available.--October 1933 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 385 ft (from river-profile map). Prior to July 9, 1934, staff gage at datum 2.6 ft higher.

Average discharge.--18 years, 722 cfs.

Extremes.--Maximum discharge during year, 15,600 cfs Feb. 10 (gage height, 11.89 ft); minimum, 79 cfs Sept. 24 (gage height, 1.95 ft).  
1933-51: Maximum discharge, 15,800 cfs Nov. 27, 1949 (gage height, 12.01 ft); minimum, 66 cfs Oct. 9, 1940, Sept. 11-13, 1944.

Remarks.--Records good. No diversion or regulation.

Revisions (water years).--W 832: 1935-36.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.9	72	3.2	455	6.0	3,390
2.0	86	3.6	700	7.0	4,990
2.2	123	4.0	1,000	8.0	6,830
2.4	169	4.5	1,480	9.0	8,880
2.6	223	5.0	2,050	10.0	11,100
2.9	320	5.5	2,680	11.0	13,400

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	272	770	783	1,010	570	324	570	694	570	360	123	107
2	241	728	642	1,600	904	306	721	602	642	352	121	103
3	226	1,330	576	1,480	872	306	904	648	714	344	119	101
4	253	1,370	*482	1,020	684	306	1,010	904	798	320	117	98
5	954	1,210	499	826	602	296	928	1,070	728	269	115	94
6	968	880	1,280	694	528	285	826	1,090	791	250	111	93
7	1,030	749	1,280	635	2,360	279	928	1,260	721	232	109	96
8	1,100	602	992	616	4,400	263	791	1,000	590	217	107	130
9	888	528	1,540	570	8,680	259	694	992	602	209	107	103
10	3,640	482	2,990	583	12,700	250	668	1,280	642	238	107	98
11	1,430	435	2,110	552	6,140	241	728	2,980	602	232	107	98
12	880	596	1,480	510	2,360	521	*1,220	1,700	576	226	107	94
13	700	369	1,000	798	1,540	*826	1,380	1,170	654	*223	103	91
14	570	364	848	756	1,200	576	1,230	984	714	212	*101	88
15	472	356	1,140	872	1,050	1,300	1,140	952	728	198	100	86
16	410	540	1,330	798	872	864	1,230	1,210	687	192	98	85
17	382	482	1,930	714	770	584	1,270	1,180	590	190	98	85
18	1,860	430	1,280	570	674	477	1,110	952	546	190	96	85
19	2,180	378	1,860	516	642	455	826	833	494	172	94	85
20	1,590	420	3,750	482	654	596	674	826	472	164	94	83
21	912	661	2,750	482	570	728	609	960	482	155	94	80
22	680	826	2,420	482	510	654	583	1,170	477	152	94	80
23	596	888	3,040	*435	466	534	546	1,430	455	150	94	80
24	516	2,220	5,740	2,180	450	499	609	1,480	466	150	94	83
25	616	3,120	2,960	7,430	425	570	694	1,110	440	147	93	352
26	735	3,030	1,590	3,140	378	654	728	826	415	143	91	162
27	*1,640	3,100	1,640	1,430	360	622	791	791	400	138	105	119
28	1,590	1,930	1,640	968	340	540	1,640	*661	392	136	112	206
29	1,330	1,330	1,380	826	-	635	1,040	570	378	134	138	310
30	1,030	936	1,760	749	-	642	819	522	374	127	123	*1,100
31	920	-	1,220	655	-	570	-	494	-	123	117	-
Total	30,611	30,860	53,912	34,359	51,711	15,942	26,907	32,321	17,140	6,345	3,489	4,475
Water year 1950-51: Max	987	1,029	1,739	1,108	1,847	514	897	1,043	571	205	113	149
Cfsm	9.58	9.99	16.9	10.8	17.9	4.99	8.71	10.1	5.54	1.99	1.10	1.45
In.	11.05	11.14	19.47	12.41	18.67	5.76	9.72	11.67	6.19	2.29	1.26	1.62
Ac-ft	60,720	61,210	106,900	68,150	102,600	31,620	53,370	64,110	34,000	12,590	6,920	8,880

Calendar year 1950: Max 5,740 Min 132 Mean 974 Cfsm 9.46 In. 128.35 Ac-ft: 705,100

Water year 1950-51: Max 12,700 Min 80 Mean 844 Cfsm 8.19 In. 111.25 Ac-ft: 611,100

Peak discharge (base, 4,800 cfs).--Nov. 25 (8:30 p.m.) 5,160 cfs (7.06 ft); Dec. 2 (4:30 p.m.) 5,700 cfs (7.37 ft); Dec. 24 (6 p.m.) 8,040 cfs (8.64 ft); Jan. 25 (6 a.m.) 7,830 cfs (8.53 ft); Feb. 10 (8:30 a.m.) 15,600 cfs (11.89 ft).

\* Discharge measurement made on this day.

## NOOKSACK RIVER BASIN

Skookum Creek near Wickersham, Wash.

Location.--Lat 48°40'20", long. 122°08'30", in NE $\frac{1}{4}$  sec. 27, T. 37 N., R. 5 E., on right bank 500 ft upstream from mouth and  $3\frac{1}{2}$  miles east of Wickersham.

Drainage area.--22.8 sq mi.

Records available.--July 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 400 ft (from topographic map).

Extremes.--Maximum discharge during year, 2,100 cfs Feb. 10 (gage height, 7.42 ft), from rating curve extended above 400 cfs by logarithmic plotting; minimum, 17 cfs Sept. 23, 24 (gage height, 1.73 ft).  
1948-51: Maximum discharge, that of Feb. 10, 1951; minimum, that of Sept. 23, 24, 1951.

Remarks.--Records fair except those for periods of no gage-height record, shifting control, and those above 500 cfs, which are poor. No diversion or regulation.

Revisions (water years).--W 1182: 1949.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.7	15.5	2.8	144
1.9	27	3.1	207
2.1	44	3.5	310
2.3	65	4.0	460
2.5	91	4.5	635

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	41	120	133	181	a110	61	84	99	81	70	30	23
2	37	112	109	251	a230	56	105	84	101	67	29	22
3	33	225	101	258	a180	55	154	88	102	66	29	21
4	48	225	*90	189	116	55	179	134	107	62	29	20
5	239	183	103	160	107	52	158	158	102	56	29	20
6	164	127	240	136	96	50	148	162	112	52	27	20
7	184	111	228	125	417	49	164	172	121	48	26	22
8	258	93	162	123	579	46	158	148	95	46	26	24
9	168	78	352	114	1,280	45	114	148	90	43	26	22
10	558	72	474	107	1,690	44	105	187	94	45	26	24
11	212	66	322	107	862	42	142	508	94	45	26	22
12	140	61	223	99	400	80	235	258	87	44	26	20
13	109	55	168	121	288	*112	*238	185	96	*47	25	19.5
14	88	53	162	133	218	83	192	152	104	46	*24	19
15	75	52	218	204	196	184	185	146	104	43	23	19
16	67	88	263	172	166	166	192	177	96	41	22	19
17	63	76	346	134	144	109	205	181	90	41	22	19
18	274	64	221	109	127	88	179	144	87	42	22	19
19	296	55	279	99	118	78	131	121	84	41	22	18.5
20	192	60	460	87	114	99	102	118	78	38	22	18
21	123	84	385	90	101	120	90	144	81	35	22	17.5
22	99	112	370	85	93	112	84	179	80	34	22	17.5
23	91	154	445	*78	85	94	78	223	80	34	22	17
24	80	343	730	300	81	88	67	214	81	34	21	20
25	116	514	460	890	77	96	105	160	73	35	20	77
26	125	600	288	444	72	109	105	123	73	34	20	26
27	*284	530	260	218	67	104	139	111	70	33	53	22
28	282	313	266	a180	54	91	277	*99	72	32	64	39
29	228	212	230	a160	-	94	172	88	70	31	26	64
30	164	164	290	a140	-	105	123	84	71	31	35	*152
31	146	-	216	a120	-	91	-	80	-	31	26	-
Total	4,964	5,002	8,594	5,614	8,078	2,658	4,410	4,875	2,687	1,347	842	863.0
Mean	160	167	277	181	288	85.7	147	157	89.6	43.5	27.2	28.8
Cfs/m	7.02	7.32	12.1	7.94	12.6	3.76	6.45	6.89	3.93	1.91	1.19	1.26
In.	8.10	8.16	14.02	9.16	13.18	4.34	7.19	7.95	4.38	2.20	1.37	1.41
Ac-ft	9,850	9,920	17,050	11,140	16,020	5,270	8,750	9,670	5,350	2,670	1,670	1,710
Calendar year 1950: Max	900	Min	17.5	Mean	165	Cfs/m	7.24	In.	98.17	Ac-ft	119,400	
Water year 1950-51: Max	1,690	Min	17	Mean	137	Cfs/m	6.01	In.	81.46	Ac-ft	99,050	

Peak discharge (base, 700 cfs).--Oct. 10 (9 a.m.) 1,090 cfs (5.60 ft); Nov. 26 (6 p.m.) 955 cfs (5.24 ft); Dec. 10 (12:30 a.m.) 890 cfs (5.10 ft); Dec. 20 (5:30 p.m.) 750 cfs (4.67 ft); Dec. 24 (6:30 to 7 p.m.) 1,110 cfs (5.36 ft); Jan. 25 (8 a.m.) 978 cfs (5.27 ft); Feb. 10 (10:30 a.m.) 2,100 cfs (7.42 ft); May 11 (10 a.m.) 710 cfs (4.70 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on nearby streams.

Note.--Shifting-control method used Nov. 24 to Jan. 27, Feb. 4 to May 10.

Nooksack River at Deming, Wash.

Location.--Lat 48°48'35", long. 122°12'15", in lot 12, sec. 6, T. 38 N., R. 5 E., on left bank 800 ft downstream from South Fork and 1 mile southeast of Deming.

Drainage area.--580 sq mi.

Records available.--September 1910 to March 1911 (gage heights only), July 1935 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 203.6 ft above mean sea level, datum of 1929. Prior to Dec. 5, 1910, staff gage at site 1 1/8 miles downstream at different datum. Dec. 5, 1910, to Mar. 31, 1911, staff gage 4 miles downstream from Ioming at different datum. July 20 to Sept. 19, 1935, staff gage at same site at datum 0.67 ft higher.

Average discharge.--16 years (1935-51), 3,131 cfs.

Extremes.--Maximum discharge during year, 38,500 cfs Feb. 10 (gage height, 15.69 ft), from rating curve extended above 25,000 cfs; minimum, 754 cfs Sept. 23 (gage height, 4.58 ft). 1935-51: Maximum discharge, that of Feb. 10, 1951; minimum, 560 cfs Nov. 9, 10, 1936, but may have been less during periods of ice effect.

Remarks.--Records fair except those for periods of no gage-height record, which are poor. No diversion. Slight regulation by powerplant at Excelsior.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,510	3,000	*3,990	4,570	3,100	1,840	2,350	2,600	2,600	3,500	1,780	1,000
2	1,340	2,700	3,550	5,560	3,550	1,730	2,520	2,350	2,860	3,500	1,780	1,040
3	1,250	3,800	3,340	6,200	3,770	1,720	2,950	2,350	3,320	3,500	1,780	1,070
4	1,460	4,500	2,950	4,610	3,130	1,720	3,410	2,860	3,700	3,130	1,690	1,070
5	3,030	5,500	2,850	3,990	2,930	1,650	3,320	3,600	3,600	2,600	1,580	1,080
6	3,770	3,900	4,810	3,550	2,640	1,580	3,130	3,900	3,800	2,270	1,520	1,120
7	4,340	3,300	4,950	3,240	5,640	*1,530	3,320	4,530	3,600	2,110	1,520	1,330
8	6,350	2,700	4,100	3,130	9,890	1,480	3,040	4,100	3,130	1,960	1,560	1,600
9	4,450	2,400	4,630	2,930	25,500	1,450	2,860	3,900	3,220	2,030	1,620	1,220
10	11,500	2,200	10,900	2,850	34,900	1,380	2,690	4,860	3,500	2,440	1,670	1,110
11	6,070	2,100	7,810	2,730	26,800	1,330	*2,780	8,290	3,500	2,520	1,630	960
12	4,220	1,900	6,460	2,540	*12,800	1,740	3,700	5,980	3,410	*2,600	1,450	900
13	3,440	1,800	4,810	3,240	8,870	2,950	4,420	4,420	3,700	2,780	1,320	950
14	2,850	1,800	4,100	3,440	6,680	2,520	4,320	3,800	4,100	2,780	1,320	993
15	2,440	1,700	4,340	4,100	5,580	3,410	3,900	3,600	4,320	2,600	1,370	1,000
16	2,170	2,000	4,810	3,880	4,530	3,600	4,100	4,320	4,000	2,520	*1,350	1,080
17	2,020	2,100	6,200	3,440	4,100	2,780	4,420	4,750	3,600	2,600	1,360	1,180
18	4,340	2,000	4,950	3,030	3,700	2,520	4,210	4,210	3,500	2,440	1,350	1,180
19	6,590	1,800	4,810	*2,730	3,520	2,440	3,410	3,700	3,410	2,190	1,400	1,050
20	5,560	1,850	8,090	2,440	3,320	2,690	2,950	3,600	3,320	1,860	1,530	910
21	3,660	2,400	8,090	2,640	2,860	3,040	2,690	4,000	3,410	1,860	1,600	833
22	2,850	3,800	6,990	2,440	2,600	2,860	2,520	4,860	3,410	1,960	1,520	824
23	2,540	3,200	7,810	2,260	2,440	2,600	2,350	6,250	3,410	2,030	1,310	787
24	2,260	7,500	15,800	4,650	2,350	2,440	2,350	5,980	3,410	2,110	1,170	806
25	*3,880	8,500	13,000	14,400	2,270	2,520	2,520	4,750	3,410	2,110	1,110	1,600
26	3,660	14,000	7,810	11,000	2,110	2,690	2,600	3,800	3,320	1,960	1,070	1,030
27	4,690	12,000	6,990	6,200	2,030	2,600	2,780	3,600	3,220	1,880	1,180	824
28	5,300	9,000	6,990	4,600	1,880	2,350	4,100	3,220	3,220	1,960	1,620	*1,420
29	4,570	7,000	5,810	4,100	-	2,520	3,500	*2,860	3,320	1,880	1,090	2,270
30	3,990	5,000	6,590	3,600	-	2,690	2,950	2,600	3,410	1,840	1,110	4,320
31	3,500	-	5,300	3,400	-	2,440	-	2,440	-	1,840	1,030	-
Total	119,540	125,250	193,550	131,670	191,090	70,790	96,160	126,080	103,730	73,560	44,390	36,547
Mean	3,856	4,175	6,244	4,247	6,825	2,284	3,205	4,067	3,458	2,366	1,432	1,218
Cfsm	6.65	7.20	10.8	7.32	11.8	3.94	5.53	7.01	5.98	4.08	2.47	2.10
In.	7.66	8.03	12.41	8.44	12.25	4.54	6.17	8.08	6.65	4.70	2.85	2.34
Ac-ft	237,100	248,400	383,900	261,200	579,000	140,400	190,700	250,100	205,700	145,500	88,050	72,490

Calendar year 1950: Max 18,000 Min 1,240 Mean 4,252 Cfsm 7.33 In. 99.50 Ac-ft 3,079,000  
 Water year 1950-51: Max 34,900 Min 797 Mean 3,595 Cfsm 6.20 In. 84.12 Ac-ft 2,603,000

Peak discharge (base, 13,000 cfs).--Oct. 10 (10 a.m.) 15,500 cfs (11.30 ft); probably Nov. 26 (time unknown) 16,300 cfs (11.52 ft); Dec. 24 (8:30 p.m.) 23,300 cfs (12.95 ft); Jan. 25 (9 p.m.) 15,900 cfs (11.00 ft); Feb. 10 (12:30 p.m.) 38,500 cfs (15.69 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Oct. 31 to Nov. 30, Jan. 28 to Feb. 1; discharge estimated on basis of recorded range in stage and records for nearby stations.

## NOOKSACK RIVER BASIN

Nooksack River near Lynden, Wash.

Location.--Lat 48°55'10", long. 122°29'10", in NE 1/4 sec. 36, T. 40 N., R. 2 E., on right bank 150 ft downstream from bridge on State Highway 1B, 1 1/2 miles upstream from Fishtrap Creek, 2 miles southwest of Lynden, and 12 miles upstream from mouth.

Drainage area.--636 sq mi.

Records available.--December 1944 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 24.4 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).

Average discharge.--6 years, 3,838 cfs.

Extremes.--Maximum discharge during year, 40,200 cfs Feb. 10 (gage height, 21.76 ft); minimum, 925 cfs Sept. 23, 24 (gage height, 5.58 ft).

1944-51: Maximum discharge, 44,500 cfs Oct. 26, 1945 (gage height, 21.58 ft); maximum gage height, that of Feb. 10, 1951; minimum discharge, probably less than 850 cfs during period of no gage-height record in February 1949.

Remarks.--Records good except those for periods of shifting control or no gage-height record, which are fair. No diversion. Slight regulation by powerplant at Excelsior.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,560	3,150	4,860	4,860	3,300	1,880	2,500	2,760	*2,700	3,640	1,900	1,130
2	1,370	2,760	4,030	5,300	3,700	*1,800	2,600	2,450	2,860	3,640	1,900	1,130
3	1,280	3,750	3,640	7,000	3,770	1,760	3,030	2,350	3,270	3,640	1,900	1,160
4	1,500	4,720	3,150	5,150	3,300	1,760	3,510	2,700	3,640	3,390	1,800	1,160
5	2,140	5,780	2,920	4,300	3,100	1,680	3,510	3,390	3,640	2,860	1,700	1,160
6	3,900	4,030	4,710	3,640	2,900	1,650	3,270	3,900	3,770	2,500	1,700	1,200
7	3,900	3,390	5,150	3,390	6,640	1,600	3,510	4,300	3,900	2,350	1,600	1,260
8	6,040	2,860	4,580	3,150	11,200	1,550	3,390	4,300	3,390	2,100	1,600	1,520
9	5,060	2,500	3,900	3,000	27,700	1,500	3,030	3,900	3,390	2,300	1,640	1,370
10	12,500	2,300	13,700	2,900	39,000	1,450	*2,860	4,720	3,510	*2,500	1,680	1,230
11	6,400	2,160	10,100	2,800	*34,600	1,400	2,810	9,440	3,640	2,550	1,650	1,130
12	4,720	1,980	8,900	2,600	*18,800	2,000	3,510	9,710	3,510	2,600	1,500	1,040
13	3,770	1,880	5,950	3,300	*9,920	3,150	4,860	5,950	3,770	2,760	1,370	1,040
14	2,920	1,840	4,720	3,640	7,180	2,860	4,720	4,720	4,300	2,810	1,410	1,070
15	2,500	1,760	4,720	4,030	5,780	3,900	4,300	4,030	4,720	2,650	1,410	1,100
16	2,200	2,110	5,300	*4,300	4,900	5,000	4,440	4,440	4,580	2,500	1,410	1,130
17	2,020	2,250	6,640	3,900	4,400	3,510	4,720	5,300	4,030	2,550	1,410	1,200
18	3,210	2,110	6,120	3,270	3,900	3,030	4,440	4,720	3,770	2,550	1,400	1,230
19	7,000	1,880	5,150	2,800	3,500	2,760	3,770	4,160	3,640	2,300	1,450	1,160
20	7,360	1,930	8,410	2,500	3,500	2,920	3,270	3,900	3,510	2,160	1,480	1,100
21	4,440	2,550	12,000	2,700	3,000	3,390	2,860	4,030	3,390	2,100	1,560	980
22	3,270	4,030	8,900	2,500	2,700	3,390	2,650	5,000	3,510	2,150	*1,520	952
23	2,810	3,390	9,300	2,430	2,600	2,920	2,500	6,640	3,510	2,200	1,370	952
24	*2,500	7,860	17,800	5,000	2,500	2,700	2,450	6,820	3,510	2,250	1,260	925
25	3,380	8,550	23,900	17,600	2,400	2,760	2,600	5,780	3,510	2,250	1,230	*1,300
26	3,900	18,800	10,100	17,800	2,200	2,920	2,650	4,300	3,390	2,150	1,160	1,260
27	4,160	18,800	8,120	7,360	2,100	2,810	2,760	3,900	3,270	2,100	1,200	980
28	6,120	12,200	8,310	4,800	2,000	2,600	3,900	3,390	3,390	2,150	1,520	1,100
29	5,150	*8,120	6,460	4,300	-	2,650	3,900	3,150	3,390	2,100	1,300	1,800
30	4,160	5,950	7,000	3,700	-	2,860	3,150	2,810	3,510	2,000	1,200	3,980
31	3,640	-	5,780	3,500	-	2,600	-	2,600	-	2,000	1,200	-
Total	126,660	145,390	234,320	147,490	220,590	78,760	101,470	139,560	107,920	77,800	46,430	37,749
Mean	4,086	4,846	7,559	4,758	7,078	2,541	3,382	4,502	3,597	2,510	1,498	1,258
Cfs/m	6.42	7.62	11.9	7.48	12.4	4.00	5.32	7.08	5.66	3.95	2.36	1.98
In.	7.41	8.50	13.70	8.62	12.90	4.61	5.93	8.16	6.31	4.55	2.71	2.21
Ac-ft	251,200	288,400	464,800	292,500	437,500	156,200	201,300	276,600	214,100	154,300	92,090	74,870

Calendar year 1950: Max 23,900 Min 1,260 Mean 4,636 Cfs/m 7.29 In. 98.95 Ac-ft 3,356,000  
 Water year 1950-51: Max 39,000 Min 925 Mean 4,011 Cfs/m 6.31 In. 85.61 Ac-ft 2,904,000

Peak discharge (base, 15,000 cfs).--Oct. 10 (6 p.m.) 19,700 cfs (16.19 ft); Nov. 26 (5 a.m.) 23,400 cfs (17.36 ft); Dec. 10 (11:30 a.m.) 17,000 cfs (15.30 ft); Dec. 21 (4 a.m.) 15,300 cfs (14.70 ft); Dec. 25 (6 a.m.) 31,400 cfs (19.63 ft); Jan. 26 (5 a.m.) 24,000 cfs (17.63 ft); Feb. 10 (3 p.m.) 40,200 cfs (21.76 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 9-13, 19-23, Jan. 28 to Feb. 2, Feb. 4-6, 16-28, Mar. 6-12, July 8, 9, July 21 to Aug. 6, Aug. 11, 12, 18, 19; discharge estimated on basis of records for station at Deming. Shifting-control method used Feb. 13-15, Mar. 1-5, 13-15, Apr. 13 to July 7, July 10-20, Aug. 7-10, 13-17, Aug. 20 to Sept. 30.



Fishtrap Creek at Lynden, Wash.

Location.--Lat 48°57'50", long. 122°26'00", on north line sec. 16, T. 40 N., R. 3 E., at right bank on downstream side of bridge on State Highway 1A, 1 mile north of Lynden.

Drainage area.--24.1 sq mi, of which 18.5 sq mi is in British Columbia.

Records available.--July 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 110 ft (from topographic map).

Extremes.--Maximum discharge during year, 550 cfs Feb. 11 (gage height, 6.59 ft); minimum, 3.4 cfs Sept. 23.

1948-51: Maximum discharge, that of Feb. 11, 1951; minimum, 0.4 cfs Sept. 10, 1949 (gage height, 1.00 ft).

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of no gage-height record, which are poor. No regulation. Probably some small diversions for domestic use. Large high-water diversion through sloughs.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Nov. 26

Nov. 27 to Sept. 30

1.0	2.2	2.0	40	1.3	2.6	3.0	90
1.2	7.1	2.5	64	1.4	4.3	4.0	179
1.4	13.0	3.0	90	1.6	9.6	5.0	295
1.7	26	3.4	115	2.0	28	6.5	533
				2.5	55		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.4	21	47	84	80	*65	55	35	18.5	8.7	6.9	5.1
2	7.2	18	38	154	67	60	52	17	8.4	6.9	4.9	5.1
3	7.4	23	36	200	94	61	50	30	17	8.4	6.9	4.9
4	7.9	28	32	126	100	66	48	28	16.5	8.4	6.6	4.7
5	12	25	28	90	88	a68	45	28	16	8.4	6.9	4.5
6	14.5	22	37	72	76	a64	44	27	17	8.4	7.2	4.5
7	14.5	19	47	62	114	a62	42	30	22	8.1	6.9	4.9
8	16.5	17.5	54	51	179	a60	41	30	19.5	8.1	6.9	4.9
9	16.5	15	47	62	417	a58	40	28	16.5	*8.1	7.2	4.7
10	29	14.5	77	64	533	a56	*39	26	15	7.5	7.2	4.5
11	25	13.5	118	66	*499	a55	38	56	14.5	7.2	6.9	4.5
12	15	13	118	64	302	a125	40	80	14.5	6.9	6.9	4.3
13	13	13	80	106	211	a180	36	55	15	6.9	6.9	4.1
14	12.5	13	59	126	169	154	34	41	15.5	6.9	6.9	4.1
15	12.5	13.5	55	140	144	206	32	36	14	6.9	6.6	4.1
16	9.9	21	66	136	126	216	32	34	13.5	7.2	6.6	4.1
17	9.6	38	85	*101	126	159	32	32	12.5	6.6	6.6	4.1
18	19.5	43	75	79	126	131	31	30	12	7.5	6.6	3.7
19	39	34	65	68	126	126	32	28	12	6.9	6.4	3.7
20	34	32	90	64	194	131	30	26	11.5	7.2	6.4	3.9
21	25	52	114	77	159	174	30	25	11	7.2	6.1	3.7
22	19	67	97	84	126	169	30	24	10.5	7.2	*6.1	3.7
23	17	59	118	76	106	126	31	22	10	7.2	5.8	3.4
24	*16.5	72	241	134	94	104	28	24	9.9	7.2	5.6	3.9
25	16	82	257	390	86	92	28	a27	9.6	7.2	5.6	*4.4
26	15	115	149	348	80	85	28	a25	9.6	7.5	5.1	4.1
27	15.5	114	131	158	72	76	28	a23	9.3	7.5	5.6	3.9
28	15.5	96	179	116	68	70	54	a22	9.0	7.2	5.1	5.1
29	17	84	149	87	-	69	48	a21	9.0	7.2	5.6	5.1
30	21	*63	126	74	-	64	40	a20	8.7	6.9	5.4	3.9
31	23	-	104	64	-	59	-	*19	-	6.6	5.4	-
Total	523.4	1,241.0	2,919	3,533	4,541	3,189	1,138	964	406.6	231.6	198.8	136.2
Mean	16.9	41.4	94.2	114	162	103	37.9	31.1	13.6	7.47	6.41	4.54
Ac-Ft	1,040	2,460	5,790	7,010	9,010	6,330	2,260	1,910	806	459	394	270

Calendar year 1950: Max 282 Min 5.5 Mean 50.4 Ac-ft 36,500  
Water year 1950-51: Max 533 Min 3.4 Mean 52.1 Ac-ft 37,740

Peak discharge (base, 220 cfs).--Dec. 24 (12 p.m.) 323 cfs (5.20 ft); Jan. 3 (4 a.m.) 222 cfs (4.40 ft); Jan. 25 (8 p.m.) 449 cfs (6.05 ft); Feb. 11 (1 to 2 a.m.) 550 cfs (6.59 ft); Mar. 15 (10 p.m.) 245 cfs (4.77 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of weather records and records for nearby streams.

Note.--Shifting-control method used Feb. 14 to Mar. 16.

## DAKOTA CREEK BASIN

Dakota Creek near Blaine, Wash.

Location.--Lat 48°57'25", long. 122°39'30", in NW 1/4 sec. 14, T. 40 N., R. 1 E., on right bank 3 1/2 miles upstream from mouth and 4 1/2 miles southeast of Blaine.

Drainage area.--15.2 sq mi.

Records available.--July 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 20 ft (from topographic map).

Extremes.--Maximum discharge during year, 753 cfs Feb. 10 (gage height, 9.92 ft); minimum, 0.7 cfs Aug. 23, Sept. 8; minimum daily, 1.0 cfs Sept. 5, 11-24.  
1948-51: Maximum discharge, 826 cfs Dec. 27, 1949; maximum gage height, that of Feb. 10, 1951; minimum discharge, 0.1 cfs Aug. 11, 1950; minimum daily, 0.7 cfs Aug. 1, 1949.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of doubtful or no gage-height record, which are poor. Probably some small diversions for domestic use. Some diurnal fluctuation at low flow from unknown cause.

Rating table, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Jan. 23

Jan. 24 to Sept. 30

1.3	1.6	3.0	83	1.2	0.6	3.0	86	7.0	430
1.5	5.6	3.5	120	1.4	3.3	3.5	121	8.0	535
1.7	13	4.0	160	1.7	13	4.0	157	9.0	645
2.0	28	4.5	205	2.0	28	4.5	197	10.0	765
2.3	43	5.0	255	2.3	43	5.0	239		
2.6	59	6.2	391	2.6	61	6.0	330		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.9	4.2	24	59	40	*23	22	11.5	*5.0	2.0		1.5
2	2.1	3.7	23	218	45	22	21	9.6	5.2	2.0		1.8
3	1.8	5.9	30	262	55	22	19.5	8.4	4.6	2.0		1.5
4	1.9	5.9	24	100	57	30	18.5	7.8	4.6	2.0		1.3
5	3.9	5.4	20	61	51	30	17	8.4	4.6	2.0		1.0
6	3.9	5.2	41	46	41	28	16	8.1	5.4	1.9		1.2
7	3.7	4.9	40	38	118	25	15	7.8	2.2	1.9		1.6
8	4.4	4.4	44	42	230	23	14	7.8	6.8	1.9		1.2
9	4.6	4.2	34	63	587	22	13.5	7.4	7.2	1.9		1.3
10	8.1	3.9	127	65	717	21	*12.5	6.8	7.2	*1.8	1.5	1.2
11	5.2	3.9	116	65	*521	20	12	62	7.2	1.7		1.0
12	3.9	3.7	94	50	117	60	12	84	8.4	1.6		1.0
13	3.7	3.7	53	50	104	173	11.5	38	7.8			1.0
14	3.3	4.4	40	52	78	230	11	25	8.8			1.0
15	2.9	4.4	48	218	66	474	10.5	20	6.8			1.0
16	2.7	9.6	83	169	52	344	10	17.5	6.2			1.0
17	2.7	12.5	124	*112	57	165	10	16.5	5.4			1.0
18	3.9	13.5	73	75	63	118	9.6	13.5	5.4			1.0
19	6.5	12	58	64	53	104	8.8	11.5	4.4			1.0
20	5.6	15	83	64	121	100	8.4	10	3.7		1.4	1.0
21	4.4	45	97	120	73	110	8.4	9.2	3.3		1.4	1.0
22	3.9	73	83	108	50	93	8.4	8.1	3.0	1.5	1.3	1.0
23	3.5	48	146	80	38	63	8.1	7.4	2.6		*1.3	1.0
24	3.3	97	388	187	34	49	8.1	8.8	2.5		1.2	1.0
25	3.3	77	345	601	31	42	7.2	8.4	2.4		1.4	1.6
26	*3.4	112	116	386	28	38	6.5	7.4	2.3		1.5	*1.6
27	4.4	84	116	107	26	32	7.2	6.8	2.2		1.6	1.5
28	4.2	44	187	80	24	28	22	6.2	2.1		2.2	*3.1
29	4.6	37	124	65	-	28	20	5.9	2.0		1.8	2.4
30	4.9	*28	124	55	-	26	14	5.6	2.0		1.8	4.6
31	4.4	-	83	45	-	24	-	5.2	-		1.6	-
Total	121.0	755.4	2,988	3,707	3,477	2,567	382.7	460.6	148.3	51.2	47.0	42.4
Mean	3.90	25.2	96.4	120	124	82.8	12.8	14.9	4.94	1.65	1.52	1.41
Cfsm	0.257	1.66	6.34	7.69	8.16	5.45	0.842	0.980	0.325	0.109	0.100	0.093
In.	0.30	1.85	7.31	9.07	8.51	6.28	0.94	1.13	0.36	0.13	0.11	0.10
Ac-ft	240	1,500	5,930	7,350	6,900	5,090	759	914	294	102	93	84

Calendar year 1950: Max 519 Min 1.6 Mean 47.5 Cfsm 3.12 In. 42.39 Ac-ft 34,350  
Water year 1950-51: Max 717 Min 1.0 Mean 40.4 Cfsm 2.66 In. 36.09 Ac-ft 29,260

Peak discharge (base, 490 cfs).--Dec. 24 (11:30 p.m.) 568 cfs (7.51 ft); Jan. 25 (9 a.m.) 634 cfs (8.93 ft); Feb. 10 (5:30 a.m.) 753 cfs (9.92 ft); Mar. 15 (8 p.m.) 645 cfs (8.95 ft).  
\* Discharge measurement made on this day.

Note.--Doubtful or no gage-height record Jan. 28 to Feb. 3, Mar. 5-12, June 22 to Aug. 22; discharge estimated on basis of weather records and records for stations on nearby streams. Shifting-control method used Oct. 11 to Nov. 21, Mar. 15 to June 21, Aug. 23 to Sept. 30.

## KOOTENAI RIVER BASIN

Kootenay River at Newgate, British Columbia

(International gaging station)

Location.--Lat 49°01', long. 115°10', on left bank at old highway bridge site, 0.7 mile northwest of Newgate and 0.9 mile north of international boundary.

Drainage area.--7,660 sq mi, approximately.

Records available.--October 1930 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,310.23 ft above mean sea level (datum of Geodetic Survey of Canada, adjustment of 1945). Prior to Oct. 1, 1940, staff gage at same site at datum 1.00 ft higher. Oct. 1, 1940, to Apr. 30, 1947, staff gage at present site and datum.

Average discharge.--21 years, 9,833 cfs.

Extremes.--Maximum discharge during year, 66,500 cfs June 17 (gage height, 12.24 ft); minimum, 2,370 cfs during period Jan. 27 to Feb. 2.  
1930-51: Maximum discharge, 98,200 cfs May 28, 1948 (gage height, 15.02 ft); minimum observed, 994 cfs Feb. 7, 1936; minimum gage height observed, 0.21 ft Jan. 11, 1944.

Remarks.--Records excellent except those for periods of no gage-height record, which are fair. Records give total flow of main channel and slough.

Cooperation.--This station is one of the international gaging stations maintained by Canada under agreement with the United States.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.4	2,530	4.0	7,600	9.0	34,500
2.0	3,370	5.0	11,000	11.0	53,500
3.0	5,250	7.0	21,000	12.2	66,100

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a4,450	9,010	5,050	5,490	a2,530	3,790	4,180	20,000	27,800	32,700	19,000	12,500
2	a4,500	8,050	4,510	4,970	2,750	3,710	4,530	20,600	26,200	33,100	*8,000	13,100
3	a4,500	7,380	4,370	4,450	3,020	3,560	5,140	19,600	25,800	34,900	17,200	13,500
4	a4,150	6,970	4,350	4,280	3,400	3,480	5,870	18,900	*25,700	38,600	16,600	13,000
5	a4,130	7,230	3,560	3,910	3,550	2,990	8,800	20,600	25,900	43,100	16,200	11,600
6	a4,350	7,690	3,420	3,670	3,640	2,920	7,420	26,300	25,700	44,600	15,700	11,100
7	a4,500	7,500	3,580	3,580	3,480	2,810	7,900	33,900	24,700	44,400	14,800	10,700
8	a4,800	7,160	3,880	3,390	3,420	2,850	8,350	39,000	23,400	42,400	13,700	10,500
9	a5,700	6,630	4,280	3,550	3,640	2,860	8,560	40,100	22,400	39,700	12,700	10,300
10	*a6,200	6,150	4,550	3,810	5,030	3,090	8,260	42,700	24,500	38,100	12,000	10,100
11	6,390	5,970	5,320	4,000	9,040	3,150	7,870	47,400	29,300	36,000	11,800	9,960
12	6,540	5,850	5,650	4,130	8,870	3,180	7,930	54,400	35,800	33,900	11,400	9,680
13	6,130	5,540	5,580	4,130	7,350	3,320	9,080	57,000	38,200	33,800	11,600	9,320
14	6,170	5,470	5,180	4,130	6,510	3,370	11,600	50,200	46,900	36,000	11,800	8,740
15	6,390	5,320	4,950	4,130	6,100	3,450	12,400	42,100	*54,300	37,900	11,400	8,290
16	6,850	5,340	4,820	4,080	5,690	3,470	12,300	39,100	64,300	38,500	10,700	7,840
17	7,060	5,470	4,780	3,980	5,510	3,430	12,400	42,000	65,300	38,300	10,300	7,600
18	7,130	5,400	4,840	3,830	5,270	3,260	12,900	49,300	58,400	37,200	*9,960	7,350
19	7,690	4,920	4,690	*3,690	4,970	3,260	12,900	51,400	49,800	36,100	9,570	7,210
20	8,710	*4,530	4,570	3,610	4,820	3,290	11,900	47,000	44,600	35,300	9,150	7,060
21	9,500	4,900	4,740	3,430	4,650	3,350	10,600	42,400	40,400	33,100	8,800	6,940
22	8,710	4,970	5,070	3,480	*4,470	3,470	9,780	41,600	36,500	30,200	8,560	6,820
23	7,900	4,610	5,740	3,480	4,280	3,500	9,150	46,900	34,300	27,100	8,440	6,870
24	7,300	4,060	6,340	3,450	4,060	3,480	8,710	*57,100	36,200	25,000	8,740	6,890
25	6,920	4,870	9,570	3,510	4,020	3,530	8,710	60,200	38,200	24,600	9,320	7,160
26	7,040	4,950	8,740	4,080	4,040	3,720	*9,400	51,100	36,500	24,600	9,040	8,290
27	7,690	5,540	7,500	3,060	3,930	3,900	11,000	42,600	36,500	24,200	8,590	8,500
28	8,140	5,740	6,770	a3,340	3,840	3,830	13,200	38,600	36,900	23,200	8,290	8,050
29	8,200	5,600	6,200	a3,420	-	3,790	15,400	35,900	34,500	22,000	8,590	7,600
30	8,770	5,430	5,850	a3,080	-	3,830	17,400	33,000	32,600	20,900	9,400	7,810
31	10,000	-	5,800	a2,630	-	3,930	-	30,100	-	20,200	11,000	-
Total	206,110	178,050	164,240	117,780	131,860	105,570	291,640	*1241.1	*1201.6	*1029.7	332,350	274,580
Mean	6,650	5,940	5,300	3,800	4,710	3,410	9,720	40,000	36,700	33,200	11,700	9,150
Cfsm	0.87	0.78	0.69	0.50	0.61	0.45	1.27	5.22	4.79	4.33	1.53	1.19
In.	1.00	0.87	0.80	0.58	0.64	0.52	1.42	6.02	5.34	4.99	1.76	1.33
Ac-ft	408,800	353,200	325,800	233,600	261,500	209,400	578,500	*2,462	*2,185	*2,042	718,700	544,600

Calendar year 1950: Max 70,400 Min 1,770 Mean 11,890 Cfsm 1.55 In. 21.08 Ac-ft 8,609,000  
Water year 1950-51: Max 65,300 Min 2,530 Mean 14,300 Cfsm 1.87 In. 25.27 Ac-ft 10,320,000

\* Discharge measurement made on this day.

\* Expressed in thousands.

a No gage-height record; discharge estimated on basis of records for station at Wardner and Elk River near Elko, British Columbia.

## Fortine Creek near Trego, Mont.

Location.--Lat 48°38'40", long. 114°54'40" in NE1/4 sec. 11, T. 33 N., R. 26 W. on downstream side of private bridge a quarter of a mile upstream from Edna Creek, 1 mile downstream from Stewart Creek, and 5 miles (revised) southwest of Trego.

Drainage area.--112 sq mi (revised).

Records available.--December 1946 to September 1951.

Gage.--Wire-weight gage read once daily.

Extremes.--Maximum discharge during year, 875 cfs May 7 (gage height, 9.95 ft, from graph based on gage readings); minimum observed, 8.8 cfs Oct. 1; minimum gage height observed, 1.22 ft Aug. 22.

1946-51: Maximum discharge, 1,810 cfs May 16, 1950 (gage height, 11.8 ft, from floodmark); minimum daily, 5 cfs Dec. 5, 1946, to Jan. 7, 1947, Jan. 13-15, 1947, Feb. 11-13, 1948, Sept. 7, 1949.

Remarks.--Records fair April, May, August, and September, others poor.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1 to Nov. 9, June 1 to July 26)

1.1	8.5	5.0	270
1.3	16	9.0	700
2.0	56	9.7	810

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.8	37	19	38	12	45	70	756	146	89	20	64
2	9.2	28	18	34	15	40	90	603	138	78	20	62
3	9.2	27	17	30	20	35	120	458	127	74	*18	34
4	9.6	25	15	26	24	32	187	442	125	88	20	28
5	11	23	12	22	26	30	202	581	127	109	18	26
6	11	22	15	21	26	24	241	690	135	99	16	18
7	11	19	17	20	28	20	276	806	*130	90	18	18
8	11	17	19	23	30	20	305	746	132	81	16	18
9	13	13	20	27	80	24	*300	682	124	*70	18	18
10	16	12	22	32	140	28	268	683	117	80	16	18
11	18	12	23	34	200	32	258	641	116	73	18	20
12	14	11	26	35	190	34	260	750	118	66	18	22
13	14	14	28	35	180	35	324	676	116	62	16	23
14	14	*18	26	35	170	36	440	*649	108	51	20	21
15	18	20	24	35	155	37	402	585	104	55	18	19
16	18	21	23	35	140	37	334	511	98	52	16	20
17	15	21	23	34	130	36	334	436	106	50	14	20
18	*16	21	23	*32	115	36	375	448	100	46	13	20
19	20	18	24	31	105	35	382	410	102	46	13	19
20	22	22	26	30	*98	35	319	321	106	48	13	19
21	25	30	*31	28	90	35	278	286	97	43	13	20
22	24	22	43	27	80	35	230	287	90	39	12	22
23	22	14	60	30	70	35	202	288	85	36	12	24
24	19	21	140	29	65	35	190	282	106	34	13	30
25	20	27	120	35	60	36	189	250	108	33	13	34
26	20	32	90	30	55	38	250	228	92	31	15	35
27	22	22	80	24	50	40	274	199	84	29	20	*28
28	24	21	70	20	48	40	335	186	78	27	27	26
29	33	20	60	14	-	40	408	178	78	24	51	24
30	46	20	55	10	-	40	615	168	74	23	56	24
31	41	-	45	11	-	50	-	167	-	20	*67	-
Total	574.8	630	1,214	867	2,400	1,075	8,456	14,393	3,265	1,746	634	774
Mean	18.5	21.0	39.2	28.0	85.7	3.47	282	464	109	56.3	20.5	25.8
Cfsm	0.165	0.188	0.350	0.250	0.765	0.310	2.52	4.14	0.973	0.503	0.183	0.230
In.	0.19	0.21	0.40	0.29	0.80	0.36	2.81	4.77	1.09	0.58	0.21	0.26
Ac-ft	1,140	1,250	2,410	1,720	4,760	2,130	16,770	28,550	6,480	3,460	1,260	1,540

Calendar year 1950: Max 1,530 Min 8.8 Mean 104 Cfsm 0.929 In. 12.62 Ac-ft 75,450

Water year 1950-51: Max 806 Min 8.8 Mean 98.7 Cfsm 0.881 In. 11.97 Ac-ft 71,470

Peak discharge (base, 200 cfs).--Feb. 11 (time and discharge unknown); Apr. 14 (7 p.m.) 468 cfs (7.04 ft); May 1 (6 a.m.) 782 cfs (9.55 ft); May 7 (8 a.m.) 875 cfs (9.95 ft).

\* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice Nov. 10 to Apr. 3.

## Fisher River near Jennings, Mont.

Location.--Lat 48°14'40", long. 115°17'10", in NW 1/4 sec. 27, T. 29 N., R. 29 W., on right bank 80 ft below bridge, 1 mile downstream from Wolf Creek, 9 miles upstream from mouth and 9 miles southeast of Jennings.

Drainage area.--780 sq mi.

Records available.--December 1950 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,443.23 ft above mean sea level, datum of 1929 (Corps of Engineers benchmark).

Extremes.--Maximum discharge during period, 3,520 cfs May 7 (gage height, 5.90 ft); minimum, 138 cfs Sept. 21 (gage height, 1.60 ft).  
Maximum discharge known, 6,560 cfs about May 22, 1948, from slope-area determination at site  $7\frac{1}{2}$  miles downstream.

Remarks.--Records good except those for periods of ice effect, which are poor.

Rating table, Dec. 15, 1950, to Sept. 30, 1951, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.6	138	3.5	1,040
2.0	254	4.0	1,470
2.5	445	5.0	2,450
3.0	700	5.9	3,520

Discharge, in cubic feet per second, December 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1			-	560	b260	481	618	2,550	958	490	198	228
2			-	505	b280	441	718	2,400	888	472	192	216
3			-	500	b320	445	944	2,220	860	*463	189	204
4			-	468	b360	432	1,290	2,250	839	525	186	189
5			-	432	b400	402	1,630	2,600	902	560	184	178
6			-	415	441	378	1,900	3,040	923	520	178	170
7			-	b400	419	370	2,070	3,460	860	486	172	164
8			-	b380	530	382	2,200	*3,470	832	450	170	159
9			-	b360	730	386	2,180	3,220	818	441	167	156
10			-	b350	2,660	382	2,040	3,070	839	441	*170	154
11			-	b340	3,160	362	1,910	3,080	*888	419	170	156
12			-	b330	2,660	390	1,860	3,270	930	394	175	156
13			-	320	1,910	374	2,010	3,030	930	378	172	154
14			-	324	1,520	366	2,330	2,960	923	366	167	151
15			*271	320	*1,340	378	2,290	2,940	1,000	354	161	148
16			278	*320	1,210	*406	2,120	2,740	972	339	156	148
17			295	324	1,090	374	2,030	2,690	839	328	154	146
18			320	310	980	358	2,050	2,800	766	310	148	146
19			328	295	888	358	2,070	2,570	724	299	146	143
20			358	306	818	362	1,900	2,320	678	281	143	141
21			505	302	766	362	1,720	2,170	634	271	143	*138
22			634	306	700	366	1,570	2,110	606	261	141	141
23			980	295	645	366	1,450	2,170	596	254	141	146
24			1,880	278	590	366	1,350	2,150	754	248	141	146
25			1,820	320	575	386	*1,310	1,940	700	241	146	164
26			1,460	454	540	424	1,350	1,720	640	235	141	192
27			1,130	406	481	454	1,470	1,590	612	232	146	178
28			923	b290	461	468	1,640	1,520	565	225	167	164
29			760	b260	-	500	1,890	1,340	550	222	222	161
30			678	b240	-	535	2,240	1,190	505	213	271	164
31			628	b250	-	570	-	1,080	-	207	278	-
Total			-	10,960	26,754	12,604	52,150	75,640	23,511	10,925	5,335	4,901
Mean			-	354	956	407	1,738	2,440	784	352	172	163
Cfsm			-	0.454	1.23	0.522	2.23	3.13	0.01	0.451	0.221	0.209
In.			-	0.52	1.28	0.60	2.49	3.61	1.13	0.52	0.25	0.23
Ac-ft			-	21,740	53,070	25,000	103,400	150,000	46,630	21,670	10,580	9,720
Calendar year	: Max			Min	Mean			Cfsm	In.	Ac-ft		
Water year	: Max			Min	Mean			Cfsm	In.	Ac-ft		

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

## Kootenai River at Libby, Mont.

Location.--Lat 48°24'00", long. 115°33'10", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 34, T. 31 N., R. 31 W., on right bank 1,800 ft downstream from highway bridge at Libby and 1 mile downstream from Libby Creek.

Drainage area.--10,240 sq mi, approximately.

Records available.--October 1910 to September 1951.

Gage.--Water-stage recorder. Prior to Apr. 28, 1931, chain gage at highway bridge at different datum. Since 1931 chain gage read about once daily has been used as supplementary gage.

Average discharge.--25 years (1912-15, 1917-18, 1928-32, 1934-51), 11,160 cfs.

Extremes.--Maximum discharge during year, 69,400 cfs June 17 (gage height, 14.97 ft); minimum daily, 2,400 cfs Jan. 30.

1910-51: Maximum discharge, 130,000 cfs June 21, 1916 (gage height, 20.7 ft, present datum); minimum observed, 895 cfs Jan. 11, 1930 (discharge measurement).

Remarks.--Records excellent except those for periods of ice effect, which are fair. Diversion for irrigation of about 4,200 acres above station.

Revisions (water years).--W 1042: 1933.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.7	3,700	7.0	21,400
2.0	4,440	9.0	30,700
3.0	7,160	11.0	41,600
4.0	10,000	13.0	54,800
5.0	13,200	15.0	69,600
6.0	17,200		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5,200	11,800	6,570	7,610	6,700	5,500	6,150	25,500	31,500	34,400	20,000	14,100
2	4,990	10,500	5,960	7,100	6,000	5,290	6,740	26,900	29,300	34,600	18,200	14,800
3	4,960	9,430	5,550	6,540	5,500	5,120	7,720	25,100	28,400	*35,900	18,400	15,000
4	4,880	8,920	5,390	6,040	4,090	5,010	9,010	24,100	28,800	39,200	17,800	14,600
5	4,910	8,900	4,440	5,360	4,320	4,670	10,500	25,600	30,000	44,500	17,400	15,400
6	5,040	9,260	3,770	4,340	4,470	5,500	12,000	31,400	29,400	47,100	16,800	12,700
7	5,310	9,200	4,040	4,020	4,360	5,300	12,700	40,000	27,800	47,100	16,100	12,200
8	5,260	8,840	4,420	4,180	4,320	5,300	13,600	47,200	26,500	46,300	15,100	11,900
9	5,450	8,280	4,860	4,260	4,990	5,500	13,800	49,400	25,300	42,400	*14,000	11,800
10	5,990	7,660	5,200	4,600	9,420	4,190	13,400	53,300	25,700	39,600	13,200	11,600
11	7,220	7,220	5,530	5,040	16,800	4,600	12,600	58,600	29,100	37,700	12,900	11,500
12	7,300	6,910	6,320	5,260	17,100	4,670	12,500	64,600	*35,700	35,300	12,600	11,300
13	7,020	6,660	6,460	5,280	12,900	4,860	13,400	68,100	43,300	35,000	12,600	11,000
14	6,820	*6,430	6,260	5,310	10,800	5,120	16,400	65,000	48,600	37,400	12,900	10,400
15	6,910	6,550	*5,990	*5,280	*9,610	4,930	18,400	*55,100	55,400	39,700	12,600	9,880
16	7,160	6,100	5,740	5,280	9,700	*5,120	18,000	47,200	64,400	40,500	12,100	9,400
17	*7,610	6,180	5,720	5,150	8,980	4,990	17,700	48,200	68,800	40,200	11,600	9,060
18	7,920	6,260	5,740	5,040	8,530	4,880	18,200	56,400	65,400	38,600	11,500	8,780
19	8,640	6,010	5,770	4,960	8,030	4,700	18,400	60,800	56,300	37,300	11,000	8,560
20	11,000	5,550	5,600	4,650	7,580	4,700	17,200	57,000	48,700	36,600	10,600	*8,540
21	11,700	5,530	5,900	4,570	7,300	4,620	15,700	51,200	44,000	34,200	10,300	8,250
22	11,000	5,690	6,600	4,160	6,910	4,730	14,300	47,700	39,500	51,100	9,970	8,170
23	9,880	5,720	8,060	4,420	6,460	4,800	13,300	52,100	36,700	27,800	9,760	8,080
24	8,980	5,180	10,800	4,290	6,100	4,800	*12,500	61,400	38,000	25,800	9,910	8,220
25	8,310	5,120	12,200	4,730	6,010	4,880	12,200	67,000	40,800	25,300	10,500	8,450
26	8,280	5,930	14,000	5,450	6,100	5,120	12,700	61,600	39,300	25,400	10,600	9,790
27	9,620	6,380	11,700	4,990	5,950	5,500	14,100	51,400	38,200	25,000	10,200	10,300
28	9,260	6,800	10,200	5,580	5,580	5,580	16,500	44,500	39,100	24,100	9,850	9,910
29	9,850	6,880	9,120	b2,600	-	5,580	19,200	40,900	37,100	23,100	10,100	9,320
30	11,000	6,740	8,560	b2,400	-	5,640	22,500	37,600	34,500	22,000	11,500	9,340
31	12,100	-	8,000	b2,500	-	5,800	-	34,400	-	21,200	12,600	-
Total	259,570	216,430	214,310	148,420	205,510	148,990	421,020	41,479.2	41,165.6	41,074.4	403,090	319,950
Mean	7,696	7,214	6,913	4,788	7,340	4,806	14,030	47,720	39,520	34,660	13,000	10,660
Cfsm	0.752	0.704	0.675	0.468	0.717	0.469	1.37	4.66	3.86	3.38	1.27	1.04
In.	0.87	0.79	0.78	0.54	0.75	0.54	1.53	5.37	4.31	3.90	1.46	1.16
Ac-ft	473,200	429,300	425,100	294,400	407,600	295,500	855,100	42,934	42,352	42,131	799,500	634,600
Calendar year 1950:	Max 78,900	Min 1,100	Mean 14,360	Cfsm 1.40	In. 19.09	Ac-ft 10,410,000						
Water year 1950-51:	Max 68,800	Min 2,400	Mean 16,590	Cfsm 1.62	In. 22.00	Ac-ft 12,010,000						

Peak discharge (base, 37,000 cfs).--May 13 (2 to 5 p.m.) 68,600 cfs (14.87 ft); May 25 (2 p.m.) 67,600 cfs (14.74 ft); June 17 (3 p.m.) 69,400 cfs (14.97 ft); July 8 (1 a.m.) 47,300 cfs (11.91 ft).

\* Discharge measurement made on this day.

b Expressed in thousands.

b Stage-discharge relation affected by ice.

## Lake Creek at Troy, Mont.

Location.--Lat 48°26'40", long. 115°52'30", in SW¼ sec. 18, T. 31 N., R. 33 W., on right bank a quarter of a mile downstream from powerplant, half a mile upstream from mouth, and 1½ miles southeast of Troy.

Drainage area.--210 sq mi (revised).

Records available.--January 1945 to September 1951.

Gage.--Water-stage recorder.

Average discharge.--6 years, 537 cfs.

Extremes.--Maximum discharge during year, 2,770 cfs Feb. 11 (gage height, 7.49 ft); minimum daily, 114 cfs Sept. 23.

1945-51: Maximum discharge, 3,250 cfs May 30, 1948 (gage height, 8.28 ft); minimum, 2.0 cfs Sept. 1, 1947, Sept. 15, 1948 (gates closed at power dam upstream, leakage only).

Remarks.--Records good except those for periods of shifting-control, which are poor. Large diurnal fluctuation at low flows and some at high flows caused by small dam at powerplant diversion. Water diverted returns to stream at powerplant above station. Natural regulation by Bull and Spar Lakes.

Rating tables, water year 1950-51, except periods of shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 11 to May 10

May 11 to Sept. 30

4.6	120	4.9	365	2.7	107
5.0	255	5.3	580	3.5	240
5.5	525	6.0	1,120	4.0	350
6.0	890	7.0	2,080	4.5	525
6.5	1,560			5.0	780
				6.2	1,620

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	132	625	432	698	448	526	415	960	957	708	270	224
2	180	564	416	668	454	509	445	896	957	*655	246	182
3	171	513	399	668	477	498	460	856	970	692	264	184
4	168	501	399	618	416	482	514	848	932	708	268	227
5	168	525	366	584	372	498	562	952	964	692	238	222
6	204	519	360	544	350	470	629	1,110	944	660	280	189
7	215	489	360	519	345	465	622	1,390	931	615	244	185
8	174	460	355	513	345	460	636	1,430	912	585	244	170
9	208	438	340	489	558	465	650	1,400	898	548	*244	172
10	243	421	330	483	1,310	440	629	1,450	924	585	256	206
11	231	404	355	471	2,070	425	622	1,580	1,000	534	235	185
12	255	394	360	460	1,790	440	622	1,490	*1,140	516	187	178
13	247	*388	355	448	1,380	425	658	1,330	1,120	494	242	178
14	235	372	*355	454	*1,220	395	755	1,310	1,150	480	246	173
15	190	355	350	*454	1,090	420	762	*1,280	1,240	440	224	168
16	247	366	345	443	1,020	*425	770	1,220	1,230	456	218	170
17	*243	366	355	443	944	405	778	1,170	1,130	430	217	162
18	251	345	388	416	880	385	816	1,200	1,070	402	218	167
19	330	330	382	394	808	395	816	1,180	1,010	390	171	168
20	604	340	399	388	770	390	778	1,150	957	375	224	*167
21	604	345	513	382	740	380	732	1,140	924	370	217	*176
22	507	360	597	388	688	385	688	1,180	892	330	211	170
23	448	310	850	377	650	380	680	1,280	872	370	204	114
24	421	340	1,070	372	622	385	*650	1,310	984	322	196	178
25	399	355	1,170	382	601	370	636	1,200	905	325	187	178
26	448	388	1,080	495	594	405	650	1,140	846	318	175	208
27	454	416	970	448	544	400	710	1,140	828	308	209	194
28	513	426	890	416	526	395	800	1,170	780	300	213	192
29	558	421	810	426	-	400	864	1,120	742	270	202	173
30	758	426	772	416	-	400	936	1,050	720	312	218	140
31	735	-	735	426	-	405	-	984	-	292	224	-
Total	10,541	12,502	16,858	14,683	22,012	13,223	20,285	36,916	28,929	14,482	6,992	5,400
Mean	340	417	544	474	706	427	676	1,191	964	467	226	180
Cfs/m	1.62	1.99	2.59	2.26	3.74	2.03	3.22	5.67	4.59	2.22	1.08	0.857
In.	1.87	2.22	2.99	2.61	3.90	2.34	3.59	6.54	5.12	2.56	1.24	0.96
Ac-ft	20,910	24,800	33,440	29,120	43,660	26,230	40,230	73,220	57,380	28,720	13,870	10,710

\* Discharge measurement made on this day.

Note.--Shifting-control method used Dec. 21 to Feb. 27, Apr. 27 to May 10, May 19 to June 27.

## Kootenai River at Leonia, Idaho

Location.--Lat 48°37', long. 116°03', in NW¼ sec. 20, T. 33 N., R. 34 W., on right bank at Leonia, 450 ft east of Montana-Idaho State line and half a mile upstream from Boulder Creek.

Drainage area.--11,740 sq mi, approximately.

Records available.--March 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,700.25 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. Prior to Nov. 13, 1928, chain gage on bridge 250 ft upstream at datum 0.41 ft lower.

Average discharge.--23 years, 13,070 cfs.

Extremes.--Maximum discharge during year, 76,300 cfs May 13 (gage height, 117.04 ft); minimum daily, 4,500 cfs Jan. 30, 31.

1928-51: Maximum discharge, 123,000 cfs May 28, 1948 (gage height, 123.40 ft); minimum, 996 cfs Dec. 9, 1936; minimum gage height, 97.56 ft Dec. 10, 1929.

Floods of June 1894 and 1916 reached stages of 124.6 and 121.6 ft, respectively, from information by Great Northern Railway Co.

Remarks.--Records excellent except those for periods of ice effect, which are fair. No diversion or regulation above station.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 1-27, Aug. 20-25)

1.2	4,280	7.0	22,300
2.0	6,240	9.0	29,800
3.0	9,220	13.0	49,800
5.0	16,100	17.0	76,000

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5,500	15,400	8,020	10,600	b4,800	7,140	7,220	32,000	*36,000	36,600	20,600	14,500
2	5,560	13,400	7,540	9,830	b5,100	6,940	7,960	33,300	33,400	36,800	19,800	15,100
3	5,280	11,700	6,880	9,150	b5,400	6,770	9,360	31,400	32,300	37,700	19,100	15,300
4	*5,280	10,800	6,610	8,340	b5,400	6,660	11,800	30,300	32,300	41,400	18,500	15,200
5	5,500	11,100	b6,100	7,540	b6,200	6,160	14,300	32,700	33,400	46,600	18,000	14,200
6	5,500	11,000	b5,600	6,770	b6,300	5,530	16,300	39,600	32,900	49,400	17,600	13,400
7	5,580	*11,100	b5,500	b6,000	b6,200	b4,800	17,600	50,400	31,400	49,400	16,900	12,800
8	5,630	10,500	5,730	b6,000	b6,100	b4,600	18,600	*58,900	29,800	49,000	16,100	12,400
9	5,760	9,660	6,110	*6,190	b7,000	b5,000	18,900	60,800	28,600	45,600	15,200	12,200
10	6,030	8,860	6,340	6,530	b14,000	b5,400	18,400	63,000	28,800	42,600	14,400	11,900
11	6,940	8,270	6,640	6,610	b26,000	b5,700	17,600	68,400	32,100	40,200	13,900	11,700
12	7,430	7,930	7,110	6,660	b25,000	6,060	17,200	74,100	39,700	37,200	13,600	11,500
13	7,170	7,570	7,510	6,770	*20,800	6,110	18,600	75,900	47,900	36,200	13,300	11,200
14	6,940	7,280	7,430	6,770	17,100	6,290	22,000	73,200	53,800	38,600	13,600	10,600
15	6,880	7,140	7,140	6,740	14,800	6,340	23,800	64,500	59,200	41,200	13,500	9,970
16	6,990	7,020	6,940	6,640	14,300	6,370	23,100	57,700	66,600	42,300	13,000	9,560
17	7,370	6,940	6,940	6,530	13,100	6,190	22,700	58,100	70,600	42,000	12,300	9,060
18	7,930	6,990	7,050	b8,100	12,300	6,080	23,300	64,200	*68,100	40,500	11,800	8,820
19	8,760	6,850	7,140	b6,000	11,300	5,980	23,500	*67,700	60,500	38,800	11,400	8,530
20	12,600	6,530	7,170	b5,900	10,400	5,960	22,300	64,800	53,900	37,900	11,000	8,270
21	14,300	6,340	7,900	b5,700	9,800	5,880	20,500	59,600	49,100	35,600	*10,500	8,180
22	13,200	6,550	8,980	b5,600	9,190	5,980	18,900	56,900	44,300	32,100	10,100	8,080
23	11,400	6,530	12,100	b5,500	8,460	*5,980	17,700	59,900	40,800	28,900	9,870	7,990
24	10,000	6,370	17,200	b5,600	7,990	6,010	16,800	67,100	42,700	26,700	9,800	7,990
25	9,150	6,270	19,400	5,900	7,990	6,030	16,400	72,200	45,000	25,800	10,300	8,400
26	9,390	7,020	20,500	6,830	7,840	6,210	*16,900	*68,100	43,600	*25,800	10,700	9,530
27	9,730	7,600	17,800	6,880	7,510	6,550	18,700	58,800	41,800	25,400	10,300	10,600
28	10,800	8,180	15,300	b5,000	7,250	6,690	21,300	52,300	*42,400	24,600	10,100	10,100
29	12,000	8,370	13,600	b4,600	-	6,720	24,400	47,600	40,500	23,300	10,200	9,530
30	15,200	8,180	12,200	b4,500	-	6,740	28,500	43,700	37,300	22,400	11,400	9,420
31	16,200	-	11,400	b4,500	-	6,880	-	39,600	-	21,600	13,200	-
Total	265,600	257,450	291,990	202,280	297,630	189,750	554,640	*1,726.8	*1,298.8	*1,122.2	420,070	326,030
Mean	8,568	8,582	9,416	6,525	10,630	6,121	18,450	55,700	43,290	36,200	13,550	10,870
Cfs	0.730	0.751	0.802	0.556	0.905	0.521	1.57	4.74	3.69	3.08	1.15	0.926
In.	0.84	0.82	0.92	0.64	0.94	0.60	1.76	5.47	4.11	3.55	1.33	1.03
Ac-ft	526,800	510,600	579,000	401,200	590,300	376,400	*1,100	*3,425	*2,576	*2,226	833,200	646,700

\* Discharge measurement made on this day.

† Expressed in thousands.

b Stage-discharge relation affected by ice.



## Boulder Creek near Leonia, Idaho

Location.--Lat 48°36', long. 116°06', in NE $\frac{1}{4}$  sec. 32, T. 61 N., R. 3 E., on right bank three-quarters of a mile downstream from McGinty Creek, three-quarters of a mile upstream from buildings of the Idamont Lead-Zinc Mines Co.,  $2\frac{1}{2}$  miles upstream from mouth, and  $2\frac{1}{2}$  miles southwest of Leonia.

Drainage area.--53 sq mi.

Records available.--April 1928 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 2,600 ft (from topographic map). Prior to Nov. 20, 1928, staff gage at site 1 mile downstream at different datum. Nov. 20, 1928, to Nov. 29, 1933, Oct. 13, 1934, to Sept. 27, 1946, water-stage recorder and Dec. 30, 1933, to Oct. 12, 1934, staff gage at site a quarter of a mile upstream at different datum.

Average discharge.--22 years (1929-51), 111 cfs.

Extremes.--Maximum discharge during year, 1,050 cfs Feb. 11 (gage height, 5.33 ft); maximum gage height, 6.46 ft or higher sometime during period Jan. 31 to Feb. 10 (ice jam); minimum, 14 cfs Aug. 18-23, Sept. 19-22.  
1928-51: Maximum discharge, 2,700 cfs Oct. 19, 1947 (gage height, 7.85 ft), from rating curve extended above 970 cfs on basis of contracted-opening determination of peak flow; minimum, 2 cfs Aug. 25, Sept. 5, 1931.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor. No diversion or regulation.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

2.6	14	3.6	172
2.8	25	4.0	309
3.0	44	4.5	535
3.3	92	5.1	880

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	16	258	151	211	90	99	90	356	283	104	21	26
2	16	211	142	198	100	92	95	325	294	97	20	26
3	16	194	137	185	100	87	110	313	290	92	20	21
4	*20	309	123	172	100	85	140	369	276	108	19	19
5	44	317	b100	166	90	72	150	510	258	101	18	18
6	55	237	b110	157	90	b65	170	689	224	97	18	17
7	32	*207	b120	148	90	b60	180	772	211	85	18	16
8	31	178	110	142	120	b60	180	*742	211	78	18	17
9	61	157	104	137	200	b65	170	742	244	74	18	16
10	68	148	126	131	350	b66	170	760	294	72	18	16
11	68	139	131	126	750	b66	200	826	332	66	19	18
12	45	126	134	115	500	b66	250	760	356	63	20	16
13	38	123	123	115	344	b66	321	618	332	57	18	16
14	35	113	120	110	251	b65	344	623	344	54	18	16
15	35	110	115	108	214	64	313	557	348	50	17	16
16	33	104	123	101	182	72	309	606	268	47	16	16
17	52	99	151	97	178	64	336	706	224	44	15	16
18	120	94	151	99	151	b60	344	650	*211	42	15	16
19	172	b90	148	92	139	57	298	546	194	38	14	15
20	336	92	185	88	134	58	258	520	178	35	14	14
21	194	88	317	88	126	58	227	*546	163	33	*14	14
22	131	83	344	83	126	58	214	618	160	31	14	15
23	108	79	568	79	120	55	214	684	166	31	15	16
24	97	120	667	85	120	55	230	568	227	29	16	17
25	134	148	584	137	110	55	272	495	169	28	16	44
26	182	194	412	145	101	60	*313	465	154	*26	16	33
27	248	204	336	92	99	70	344	465	142	24	17	23
28	230	211	279	b60	110	70	399	408	126	23	27	21
29	369	182	248	b65	-	70	408	336	115	23	27	21
30	684	166	251	b70	-	75	382	305	108	22	35	65
31	356	-	227	b80	-	80	-	279	-	21	34	-
Total	4,026	4,781	6,837	3,682	5,085	2,095	7,431	17,159	6,902	1,695	585	620
Mean	150	159	221	119	162	67.6	248	554	230	54.7	18.9	20.7
Cfsm	2.45	3.00	4.17	2.25	3.43	1.28	4.68	10.5	4.34	1.03	0.357	0.391
In.	2.82	3.35	4.80	2.58	3.57	1.47	5.21	12.04	4.84	1.19	0.41	0.44
Ac-ft	7,990	9,480	13,560	7,300	10,090	4,160	14,740	34,030	13,690	3,360	1,160	1,230

Calendar year 1950: Max 1,040 Min 12 Mean 184 Cfsm 3.47 In. 47.05 Ac-ft 133,000  
Water year 1950-51: Max 826 Min 14 Mean 167 Cfsm 3.15 In. 42.72 Ac-ft 120,800

Peak discharge (base, 490 cfs).--Oct. 30 (4:30 a.m.) 910 cfs (5.16 ft); Dec. 25 (2:30 a.m.) 736 cfs (4.86 ft); Feb. 11 (time unknown) 1,050 cfs (5.38 ft); May 11 (8:30 p.m.) 964 cfs (5.20 ft); May 17 (8:30 p.m.) 820 cfs (4.96 ft); May 22 (7 to 8 p.m.) 784 cfs (4.90 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Feb. 1-12, Mar. 25 to Apr. 12; discharge estimated on basis of weather records and records for other Kootenai River tributaries.

## Moyie River at Eastport, Idaho

(International gaging station)

Location.--Lat 49°00', long. 116°11', in SE $\frac{1}{4}$  sec. 10, T. 65 N., R. 2 E., or left bank at Eastport, 1,000 ft downstream from international boundary.

Drainage area.--570 sq mi.

Records available.--August 1929 to September 1951 in reports of Geological Survey. January 1915 to December 1916, and discharge measurements during 1914 and 1917, in reports of Department of Resources and Development, Canada.

Gage.--Water-stage recorder. Datum of gage is 2,620.06 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. January 1915 to December 1916, staff gage at site 0.2 mile upstream at different datum.

Average discharge.--22 years, 672 cfs.

Extremes.--Maximum discharge during year, 6,450 cfs May 12 (gage height, 9.11 ft); minimum, 96 cfs Oct. 3 (gage height, 3.61 ft).  
1929-51: Maximum discharge, 8,030 cfs May 24, 1948 (gage height, 10.25 ft); minimum, 23 cfs Nov. 7, 1936 (gage height, 3.20 ft).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair. No regulation or diversion above station.

Cooperation.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

3.6	94	6.0	1,790
3.9	184	7.0	3,080
4.2	319	8.0	4,560
4.5	481	9.0	6,250
5.0	810		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	99	850	510	907	b390	557	672	3,250	2,140	1,250	*238	252
2	99	742	487	842	b420	545	882	2,950	2,020	1,160	230	243
3	99	686	475	818	b430	522	*1,150	2,760	*1,980	1,110	221	250
4	102	707	a450	742	b420	516	1,440	*2,930	2,030	1,170	209	217
5	112	850	a420	665	b410	470	1,650	3,680	2,040	1,120	192	204
6	*155	834	a420	608	398	484	1,620	4,340	1,920	1,150	184	196
7	131	795	a430	b568	a400	475	1,720	4,980	1,840	1,080	177	188
8	128	735	a430	b570	464	464	1,790	5,250	1,720	1,020	173	184
9	162	*665	a420	b551	a500	459	1,660	5,610	*1,700	1,000	162	177
10	155	639	a420	533	a1,200	447	1,580	5,840	1,800	984	166	170
11	170	613	a450	522	3,190	431	1,580	5,930	2,020	860	170	170
12	162	557	a450	510	2,280	414	1,800	6,180	2,250	826	170	162
13	162	522	a440	493	1,760	409	2,460	5,510	2,340	772	159	159
14	166	522	*425	481	1,530	398	2,700	5,280	2,410	771	162	155
15	173	498	442	487	1,370	398	2,460	4,770	2,620	672	155	152
16	170	487	431	475	1,240	398	2,410	4,610	2,580	672	142	148
17	184	470	459	464	1,110	382	2,620	4,680	2,450	584	139	142
18	248	453	464	442	1,030	371	2,710	*5,010	2,280	563	134	134
19	309	409	459	431	932	361	2,360	4,580	2,090	522	131	131
20	420	409	470	420	898	361	2,090	4,260	1,950	487	125	128
21	431	414	606	425	850	361	1,850	*4,070	1,770	459	122	128
22	403	398	788	*409	*788	361	1,690	4,130	1,640	471	*119	131
23	393	376	1,250	393	735	355	1,590	4,380	1,620	409	125	134
24	376	398	1,760	387	700	350	1,590	4,380	2,420	387	125	139
25	387	425	2,340	453	679	376	1,740	4,160	1,920	341	125	170
26	533	539	1,760	557	646	420	2,010	3,820	1,760	375	122	173
27	588	533	1,470	459	606	447	2,320	3,350	*1,640	358	125	155
28	652	527	1,280	b400	588	459	2,550	3,330	1,520	279	162	152
29	707	522	1,130	b370	-	481	2,840	2,950	1,390	285	184	155
30	1,120	516	1,070	b340	-	510	3,050	2,660	1,310	276	217	204
31	1,010	-	1,010	b360	-	545	-	2,360	-	252	319	-
Total	10,006	17,091	23,416	16,100	25,920	13,507	58,584	132,370	59,170	21,546	5,184	5,083
Mean	323	570	755	519	926	436	1,953	4,270	1,972	665	167	169
Cfs/m	0.567	1.00	1.32	0.911	1.62	0.765	3.43	7.49	3.46	1.22	0.293	0.296
In.	0.65	1.12	1.53	1.05	1.69	0.88	3.82	8.64	3.85	1.41	0.34	0.33
Ac-ft	19,850	33,900	46,440	31,930	51,410	26,790	116,200	262,600	117,400	42,740	10,280	10,080
Calendar year 1950:	Max 6,320	Min 88	Mean 1,049	Cfs/m 1.84	In. 24.98	Ac-ft 759,200						
Water year 1950-51:	Max 6,180	Min 99	Mean 1,063	Cfs/m 1.86	In. 25.32	Ac-ft 769,600						

Peak discharge (base, 2,900 cfs).--Feb. 11 (about 12 m.) 3,470 cfs (7.28 ft); Apr. 14 (12:30 a.m.) 2,900 cfs (6.87 ft); May 12 (6 a.m.) 6,450 cfs (9.11 ft).

\* Discharge measurement made on this day.

a No gage-height record Dec. 4-13, Feb. 7-10; discharge estimated on basis of weather records and records for station at Eileen and nearby streams.

b Stage-discharge relation affected by ice.

## Moyie River at Eileen, Idaho

Location.--Lat 48°46', long. 116°10', in NE $\frac{1}{4}$  sec. 35, T. 63 N., R. 2 E., on right bank an eighth of a mile downstream from Skin Creek, a quarter of a mile southeast of Eileen, and 4 miles upstream from mouth.

Drainage area.--755 sq mi.

Records available.--October 1925 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,124.5 ft (river-profile survey). Prior to June 1, 1928, staff gage and June 1, 1928, to Sept. 30, 1944, water-stage recorder at same site and 1.0 ft higher datum.

Average discharge.--26 years, 831 cfs.

Extremes.--Maximum discharge during year, 7,150 cfs May 12 (gage height, 6.20 ft); minimum, 128 cfs Oct. 3 (gage height, 2.10 ft).  
1925-51: Maximum discharge, 9,650 cfs May 26, 1948 (gage height, 6.51 ft); minimum, 40 cfs Nov. 27, 1936; minimum gage height, 0.50 ft, present datum, Feb. 22, 1944.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair. No diversion or regulation above station.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

2.1	128	4.0	1,680
2.3	198	4.5	2,420
2.6	345	5.0	3,390
3.0	610	5.5	4,700
3.5	1,070	6.2	7,150

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	134	1,160	690	1,250	b570	717	861	3,550	2,540	1,480	307	375
2	134	1,020	680	1,160	b600	699	1,160	3,320	2,420	1,380	296	340
3	131	970	650	1,150	b610	666	1,500	3,090	2,360	1,310	286	318
4	138	980	600	1,050	b600	b650	1,860	3,240	2,360	1,380	276	291
5	164	1,150	580	920	b580	b600	2,140	3,870	2,360	1,360	257	276
6	*211	1,150	580	861	561	b600	2,120	4,470	2,260	1,360	247	262
7	194	1,110	580	798	561	b620	2,220	5,650	2,170	1,280	242	257
8	175	1,020	*589	807	568	b610	2,320	5,960	2,060	1,220	238	257
9	211	920	580	798	708	b590	2,170	6,390	2,020	1,180	224	242
10	229	890	580	753	1,600	b570	2,060	6,670	2,110	1,170	224	233
11	229	860	600	735	3,700	b565	2,020	6,830	2,320	1,060	233	224
12	229	800	620	708	2,750	554	2,200	7,030	2,590	990	233	220
13	220	720	600	690	2,220	533	*2,790	6,510	2,680	920	238	216
14	229	720	580	674	1,930	526	3,130	6,350	2,700	870	233	211
15	233	700	600	674	1,760	540	2,860	5,680	2,920	807	220	202
16	233	670	590	674	1,600	533	2,770	5,440	*2,880	762	211	194
17	247	650	620	674	1,450	505	2,960	5,620	2,720	708	198	190
18	313	620	620	603	1,350	491	3,060	*5,900	2,560	674	190	179
19	375	580	620	596	1,200	484	2,730	5,370	2,370	618	183	175
20	519	580	640	582	1,150	484	2,470	5,030	2,230	582	175	171
21	561	580	840	603	1,100	484	2,230	4,760	2,080	554	*171	164
22	505	550	1,100	589	1,000	491	2,080	4,880	1,900	526	168	171
23	484	520	1,700	554	*950	484	1,960	5,090	1,880	491	175	175
24	457	560	2,500	547	910	477	1,930	5,030	2,730	470	179	187
25	484	600	3,000	634	890	512	2,040	4,760	2,280	438	179	220
26	650	750	2,500	825	834	575	2,290	4,350	2,050	418	175	252
27	699	730	2,000	658	780	603	2,570	4,080	1,920	399	179	216
28	843	720	1,750	b570	762	618	2,810	3,820	1,760	375	220	211
29	890	710	1,550	b530	-	650	3,110	*3,390	1,630	363	262	211
30	1,500	700	1,450	b490	-	682	3,320	3,060	1,550	345	351	262
31	1,430	-	1,400	b520	-	717	-	2,730	-	318	464	-
Total	13,051	23,690	31,989	22,677	33,294	17,830	69,741	151,920	68,410	25,808	7,234	6,902
Mean	421	790	1,032	732	1,189	575	2,252	4,901	2,280	833	233	230
Cfsm	0.568	1.05	1.37	0.968	1.57	0.762	3.08	6.48	3.02	1.10	0.309	0.305
In.	0.64	1.17	1.58	1.12	1.64	0.88	3.44	7.48	3.37	1.27	0.36	0.34
Ac-ft	25,890	46,990	63,450	44,980	66,040	35,370	138,300	301,300	135,700	51,190	14,350	13,690

Calendar year 1950: Max 7,600 Min 117 Mean 1,314 Cfsm 1.74 In. 23.63 Ac-ft 951,200  
Water year 1950-51: Max 7,030 Min 131 Mean 1,295 Cfsm 1.72 In. 23.29 Ac-ft 937,200

Peak discharge (base, 1,840 cfs).--Dec. 25 (time unknown) 3,090 cfs (4.86 ft); Feb. 11 (12 m.) 4,030 cfs (5.26 ft); Apr. 14 (3:30 a.m.) 3,300 cfs (4.96 ft); May 12 (7 a.m.) 7,150 cfs (6.20 ft); June 15 (5 to 6 a.m.) 3,020 cfs (4.83 ft); June 24 (12 m.) 3,040 cfs (4.84 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Nov. 2 to Dec. 7, Dec. 9 to Jan. 1, Feb. 19-22; discharge estimated on basis of records for station at Eastport and weather records.

## KOOTENAI RIVER BASIN

Kootenai River at Boom Camp, near Bonners Ferry, Idaho

Location.--Lat 48°42'05", long. 116°14'30", in NW¼ sec. 29, T. 62 N., R. 2 E., on left bank 600 ft east of Boom Camp, 3½ miles upstream from Bonners Ferry, and 4 miles downstream from Moyie River.

Drainage area.--12,950 sq mi, approximately.

Records available.--October 1927 to September 1951 in reports of Geological Survey. April 1925 to September 1927 in reports of Department of Resources and Development, Canada.

Gage.--Water-stage recorder. Datum of gage is 1,700.00 ft above mean sea level, levels by Topographic Branch in 1928. Datum of 1929, Pacific Northwest supplementary adjustment of 1947 is 0.04 ft higher. Prior to Aug. 23, 1934, staff gage at same site. Datum of gage was 54.08 ft higher prior to Oct. 8, 1934.

Extremes.--Maximum elevation during year, 1,776.56 ft May 14; minimum, 1,757.67 ft Jan. 29, 1927-51: Maximum elevation recorded, 1,779.87 ft May 28, 1948; minimum, 1,755.53 ft Dec. 9, 1936.

Remarks.--Elevations affected by backwater from Kootenay Lake May 6 to July 24. Dike of drainage district number 14 in United States broke May 11 affecting elevations at high stages.

Mean elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	58.33	61.47	59.51	60.35	58.13	59.12	59.21	65.01	66.84	66.19	62.52	61.13
2	58.24	60.97	59.33	60.15	58.16	59.02	59.54	65.27	66.12	66.17	62.31	61.29
3	58.16	60.54	59.07	59.96	58.37	58.93	60.01	65.00	65.69	66.25	62.13	61.31
4	58.19	60.34	58.96	59.71	58.43	58.88	60.66	64.82	65.59	66.82	61.97	61.29
5	58.23	60.47	59.04	59.37	58.75	58.73	61.29	65.31	65.75	67.86	61.85	61.03
6	58.37	60.46	58.81	59.00	58.85	58.52	61.76	66.45	65.66	68.67	61.74	60.83
7	58.41	60.43	58.59	58.93	58.73	58.14	62.06	68.48	65.29	68.85	61.60	60.68
8	58.43	60.28	58.50	59.00	58.67	58.34	62.32	70.51	64.89	68.84	61.40	60.56
9	58.52	60.07	58.70	58.78	59.16	58.20	62.37	71.76	64.56	68.31	61.18	60.52
10	58.68	59.82	58.76	58.94	61.74	58.38	62.24	72.69	64.58	67.57	60.99	60.47
11	59.10	59.66	58.91	58.95	67.38	58.55	62.02	73.98	65.21	67.03	60.86	60.41
12	59.25	58.51	59.13	58.95	68.90	58.55	61.99	75.44	66.49	66.34	60.77	60.37
13	59.15	59.38	59.29	59.00	66.58	58.58	62.38	76.34	68.11	65.96	60.73	60.28
14	59.06	59.28	59.24	58.99	64.82	58.67	63.17	76.50	69.45	66.23	60.81	60.15
15	59.04	59.21	59.12	58.97	63.50	58.70	63.51	75.30	70.84	66.70	60.78	59.98
16	59.08	59.16	59.04	58.93	62.36	58.71	63.38	73.35	72.52	66.97	60.65	59.83
17	59.23	59.12	59.05	58.87	61.16	58.58	63.33	72.82	73.85	67.01	60.49	59.67
18	59.44	59.14	59.13	58.73	60.82	59.52	63.47	73.62	74.10	66.73	60.38	59.59
19	59.73	59.04	59.15	58.73	60.55	58.47	63.46	74.57	73.09	66.40	60.28	59.50
20	60.62	58.90	59.15	58.73	60.34	58.45	63.45	74.52	71.45	66.19	60.20	59.42
21	61.08	58.80	59.50	58.57	60.16	58.41	62.79	73.54	69.94	65.82	60.06	59.38
22	60.81	58.90	59.89	58.46	59.96	58.45	62.40	72.68	68.38	65.13	59.99	59.35
23	60.40	58.87	60.77	58.42	59.72	58.47	62.11	72.91	67.51	64.40	59.89	59.33
24	60.08	58.81	61.98	58.45	59.55	58.47	61.87	74.15	67.71	63.86	59.89	59.36
25	59.83	58.77	62.69	58.60	59.53	59.50	61.80	75.36	68.19	63.62	60.06	59.49
26	60.00	59.16	62.85	59.10	59.45	58.64	61.97	75.39	68.01	63.59	60.17	59.85
27	60.09	59.37	62.20	59.06	59.33	58.81	62.40	73.91	67.51	63.53	60.05	60.12
28	60.37	59.60	61.59	58.60	59.20	58.87	62.99	72.11	67.46	63.36	60.01	59.99
29	60.64	59.63	61.11	58.04	-	58.90	63.64	70.58	67.17	63.13	60.06	59.83
30	61.46	59.57	60.77	58.21	-	58.93	64.06	69.18	66.50	62.91	60.37	59.81
31	61.72	-	60.58	58.13	-	59.01	-	67.93	-	62.72	60.81	-

Note.--Add 1,700 ft to obtain elevation above mean sea level.

## Kootenai River at Bonners Ferry, Idaho

Location.--Lat 48°42'00", long. 116°18'45", in NE¼ sec. 27, T. 62 N., R. 1 E., near right bank on upstream side of highway bridge at Bonners Ferry.

Drainage area.--13,000 sq mi, approximately.

Records available.--May to October 1904, October 1927 to September 1951 (gage heights only prior to 1928). Gage-height records collected in this vicinity since 1904 are contained in reports of United States Weather Bureau.

Gage.--Wire-weight gage. Water-stage recorder 800 ft across channel from wire-weight gage at same datum used as supplemental gage during high stages. Datum of gage is 1,743.00 ft above mean sea level with respect to Geological Survey benchmark V-3-1929, at elevation 1,777.08 ft. Datum of 1929, supplementary adjustment of 1947, is 0.02 ft higher. Gage readings have been reduced to elevations above mean sea level. May 1 to Oct. 15, 1904, staff gage on railroad bridge three-quarters of a mile downstream at different datum. Oct. 1, 1927, to Nov. 30, 1929, staff gage near left bank. Dec. 1, 1929, to June 12, 1933, chain or wire-weight gages on old highway bridge 40 ft downstream. Datum of gages Oct. 1, 1927, to Jan. 2, 1931, was about 0.23 ft lower.

Average discharge.--23 years (1928-51), 14,140 cfs.

Extremes.--Maximum daily discharge during year, 83,800 cfs May 13; maximum elevation, 1,774.86 ft May 14; minimum daily discharge, 4,380 cfs Jan. 29; minimum elevation, 1,743.99 ft Mar. 23.

1927-51: Maximum discharge, 139,000 cfs May 27, 1948 (affected by dike breakage downstream); maximum elevation, 1,778.32 ft May 28, 1948; minimum daily discharge, 1,300 cfs Feb. 8, 1936; minimum elevation, 1,741.14 ft, datum then in use, Dec. 5, 1929, Dec. 29, 1930.

Flood of June 1894 reached a stage of 1,777.2 ft at present datum.

Remarks.--Records excellent except those for periods of ice effect, which are good.

Backwater from Kootenay Lake usually present at Bonners Ferry. Discharge for periods of backwater at Boom Camp from Kootenay Lake, May 6 to July 24, computed on basis of fall between gages at Boom Camp and near Bonners Ferry; that for remainder of year on basis of stage-discharge relation for station at Boom Camp. Discharge measurements made at station near Bonners Ferry. Dike of drainage district number 14 in Kootenai Valley in United States broke May 11, affecting discharge and elevations at high stages. No diversion or regulation above station.

Daily mean elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	48.74	52.52	49.89	50.89	48.99	46.15	44.98	57.65	64.13	62.75	54.60	51.61
2	48.69	51.73	49.69	50.61	49.16	46.06	45.48	58.56	62.95	62.63	54.04	51.92
3	48.62	51.03	49.45	50.37	49.77	45.73	46.23	58.39	62.21	62.65	53.53	51.93
4	48.66	50.67	49.47	50.04	49.82	45.68	47.21	57.95	61.87	63.28	53.04	51.90
5	48.68	50.84	49.35	49.57	49.93	46.46	48.44	58.57	61.90	64.58	52.65	51.56
6	48.75	50.81	49.64	49.29	49.78	47.23	49.53	60.65	61.66	65.67	52.38	51.24
7	48.77	50.86	49.92	49.16	49.77	47.31	50.43	63.95	60.98	66.03	52.00	51.03
8	48.85	50.62	49.90	49.58	49.76	47.63	51.03	67.04	60.18	66.08	51.52	50.93
9	48.93	50.32	49.75	49.44	49.99	47.72	51.40	68.74	59.52	65.54	50.94	50.83
10	48.99	50.06	49.60	49.27	53.83	47.11	51.26	70.15	59.30	64.67	50.43	50.78
11	49.15	49.90	49.46	49.11	61.81	46.68	50.88	71.62	60.06	63.95	50.10	50.69
12	49.36	49.76	49.45	49.16	62.55	46.76	50.67	73.34	61.95	63.08	49.88	50.62
13	49.56	49.63	49.60	49.08	59.65	46.35	51.31	74.48	64.19	62.40	49.82	50.54
14	49.33	49.53	49.58	48.91	57.43	46.00	52.90	74.76	66.14	62.51	49.85	50.38
15	49.30	49.42	49.45	48.81	56.20	45.77	54.02	73.56	67.90	63.10	49.91	50.15
16	49.29	49.41	49.36	48.66	55.69	45.52	54.10	71.68	69.94	63.50	49.88	50.00
17	49.35	49.38	49.38	48.64	54.17	45.08	54.04	70.81	71.58	63.60	49.81	49.87
18	49.61	49.38	49.36	48.65	52.42	44.75	54.31	71.65	72.05	63.31	49.78	49.79
19	49.85	49.30	49.46	48.61	50.83	44.49	54.54	72.63	71.15	62.84	49.79	49.70
20	50.90	49.22	49.49	48.55	49.76	44.20	54.10	72.72	69.37	62.49	49.81	49.64
21	51.68	49.16	49.81	48.62	49.13	44.08	53.26	71.79	67.67	61.98	49.76	49.54
22	51.68	49.38	50.34	48.62	48.63	44.02	52.53	70.76	66.19	60.93	49.77	49.50
23	50.83	49.35	51.30	48.44	48.04	44.01	51.72	70.86	64.76	59.66	49.82	49.48
24	50.33	49.36	53.27	48.39	47.51	44.02	51.18	72.17	64.79	58.53	49.84	49.49
25	50.05	49.39	54.79	48.40	47.25	44.03	50.88	73.30	65.31	57.72	50.05	49.60
26	50.24	49.49	55.25	48.60	46.97	44.20	51.05	73.77	65.20	57.42	50.31	49.98
27	50.39	49.65	54.31	48.62	46.64	44.44	51.74	72.32	64.61	57.16	50.17	50.27
28	50.72	49.89	53.07	48.61	46.31	44.56	52.94	70.37	64.44	56.74	50.33	50.21
29	51.07	49.96	52.11	48.59	-	44.54	54.41	68.60	64.13	56.19	50.43	50.03
30	52.31	49.93	51.47	48.64	-	44.55	56.07	67.05	63.30	55.62	50.74	50.03
31	52.92	-	51.23	48.81	-	44.70	-	65.55	-	55.09	51.13	-

Note.--Add 1,700 ft to obtain elevation above mean sea level.

## KOOTENAI RIVER BASIN

Discharge, in cubic feet per second, of Kootenai River at Bonners Ferry, Idaho, water year  
October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5,530	16,400	9,250	12,200	5,410	*8,230	8,650	36,200	39,200	38,100	21,600	14,800
2	5,320	14,500	8,680	11,400	5,480	7,930	9,700	37,800	37,000	*38,400	20,500	15,400
3	5,180	*12,700	7,900	10,800	6,000	7,670	11,500	36,100	35,600	38,000	19,700	15,500
4	5,200	11,900	7,580	9,930	6,160	7,530	13,800	35,000	35,600	42,000	18,900	15,400
5	5,290	12,400	b6,900	8,840	b6,950	7,100	16,500	38,000	36,900	47,000	18,300	14,400
6	5,630	12,400	b6,400	7,730	b7,050	b6,500	18,500	46,200	36,700	50,300	17,800	13,600
7	*5,730	12,500	b6,300	b7,300	6,960	5,580	19,700	*55,100	35,100	50,400	17,200	15,000
8	5,780	11,700	6,340	b7,100	6,800	b5,350	20,900	64,300	33,600	50,000	16,300	12,600
9	6,000	11,000	6,880	7,100	b8,000	5,730	21,200	68,400	32,400	46,800	15,400	12,400
10	6,450	10,200	7,050	7,560	b16,500	b6,100	20,600	71,500	32,900	43,300	14,600	12,200
11	7,610	9,640	7,470	7,580	b32,000	b6,400	19,600	76,500	36,300	41,400	14,000	12,000
12	8,080	9,150	8,110	7,580	b30,000	6,660	19,500	81,400	42,500	38,400	13,700	11,900
13	7,790	8,740	*8,590	7,730	b25,000	6,740	21,500	83,800	50,300	37,200	13,500	11,600
14	7,530	8,440	8,440	7,700	b20,500	6,990	25,300	81,100	56,500	39,000	13,600	11,100
15	7,500	8,230	8,080	7,640	b18,800	7,080	27,100	75,800	*62,800	41,200	13,600	10,500
16	7,610	8,110	7,650	7,530	b17,500	7,130	26,500	64,500	70,900	42,400	13,100	10,000
17	8,080	7,990	7,880	*7,360	b15,000	6,770	26,200	66,000	75,100	42,400	12,500	9,470
18	8,710	8,050	8,110	6,960	14,100	6,610	27,000	*70,700	74,100	40,900	12,100	9,220
19	9,640	7,760	8,170	b6,700	13,100	6,460	26,900	74,600	66,100	39,500	11,700	8,950
20	12,800	7,360	8,170	b6,600	12,300	6,420	25,500	72,500	*59,500	38,700	11,300	8,680
21	14,600	7,080	9,250	b6,400	11,700	6,340	23,400	66,900	52,700	37,000	10,800	8,560
22	13,600	7,360	10,500	6,240	10,900	6,450	21,500	63,600	44,500	33,800	10,500	8,470
23	12,000	7,500	13,800	6,130	10,100	6,500	20,100	66,500	42,500	30,700	*10,200	8,410
24	10,900	7,130	18,800	6,210	9,570	6,500	*19,000	72,700	44,400	*28,600	10,200	8,500
25	10,100	7,020	22,200	6,610	9,510	6,560	18,700	76,700	46,900	27,600	10,800	8,900
26	10,600	8,140	23,000	8,020	9,250	6,990	19,500	73,900	45,600	27,400	11,200	10,100
27	11,000	8,780	19,800	7,900	8,870	7,470	21,500	66,200	43,200	27,000	10,700	11,000
28	12,000	9,510	17,100	6,610	8,470	7,640	24,400	58,700	43,600	26,000	10,600	10,500
29	13,000	9,600	15,100	5,200	-	*7,730	28,000	*53,800	42,100	24,800	10,800	10,000
30	16,300	9,440	13,800	b5,100	-	7,820	30,400	46,000	38,900	23,600	11,900	9,930
31	17,400	-	13,000	b5,200	-	8,050	-	43,200	-	22,600	13,500	-
Total	262,960	290,130	330,500	232,960	351,980	212,870	631,850	*1,925.5	*1,393.4	*1,155.3	430,800	337,070
Mean	9,128	9,671	10,660	7,515	12,570	6,867	21,080	62,110	46,450	37,270	13,900	11,240
Cfsm	0.702	0.744	0.820	0.578	0.967	0.528	1.62	4.78	3.57	2.67	1.07	0.865
In.	0.81	0.83	0.95	0.67	1.01	0.61	1.81	5.51	3.99	3.31	1.23	0.96
Ac-ft	561,200	575,500	655,500	462,100	698,100	422,200	*1,253	*3,619	*2,764	*2,292	854,500	668,600
Calendar year 1950: Max	90,100	Min	2,400	Mean	18,920	Cfsm	1.46	In.	19.77	Ac-ft	13,700,000	
Water year 1950-51: Max	83,800	Min	5,100	Mean	20,750	Cfsm	1.60	In.	21.63	Ac-ft	15,030,000	

\* Discharge measurement made on this day.

† Expressed in thousands.

b Stage-discharge relation affected by ice.

## Kootenai River near Bonners Ferry, Idaho

Location.--Lat 48°41'55", long. 116°20'40", in NW 1/4 sec. 28, T. 62 N., R. 1 E., on left bank 1.6 miles downstream from highway bridge at Bonners Ferry.

Drainage area.--13,000 sq mi, approximately.

Records available.--May 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,700.00 ft above mean sea level, levels by Topographic Branch in 1928. Datum of 1929, supplementary adjustment of 1947, is 0.02 ft higher at Bonners Ferry. May 17 to July 20, 1928, water-stage recorder at same site at datum 43.42 ft higher. July 21 to Oct. 22, 1928, and for elevations below 1,742 ft prior to Jan. 2, 1931, staff gage at same site and datum.

Extremes.--Maximum elevation during year, 1,774.22 ft May 14; minimum, 1,742.9 ft Mar. 25.

1928-51: Maximum elevation, 1,776.84 ft May 28, 1948; minimum, 1,740.16 ft Mar. 29, 1944.

Remarks.--Elevations affected by backwater from Kootenay Lake. Dike of drainage district number 14 in United States broke May 11, affecting elevations at high stages.

Daily mean elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	48.71	52.42	49.70	50.69	46.76	45.77	43.76	56.92	63.70	62.36	54.29	51.27
2	48.66	51.54	49.54	50.40	46.95	45.61	44.21	57.83	62.57	62.22	53.66	51.58
3	48.59	50.83	49.28	50.18	47.12	45.26	44.97	57.72	61.85	62.22	53.13	51.62
4	48.60	50.44	49.26	49.92	47.22	45.17	46.29	57.33	61.50	62.80	52.65	51.60
5	48.64	50.60	48.95	49.53	47.40	45.26	47.69	57.99	61.50	64.08	52.25	51.26
6	48.69	50.59	48.85	49.19	47.46	44.93	48.79	59.92	61.27	65.20	51.97	50.94
7	48.73	50.63	48.97	48.98	47.38	44.54	49.64	63.19	60.62	65.58	51.60	50.75
8	48.74	50.46	49.01	49.07	47.20	44.40	50.29	66.40	59.85	65.64	51.11	50.59
9	48.78	50.19	49.12	49.05	47.54	44.48	50.74	68.37	59.16	65.15	50.56	50.56
10	48.81	49.92	49.21	49.07	49.95	44.52	50.60	69.58	58.92	64.31	50.03	50.53
11	49.00	49.75	49.32	49.05	57.03	44.48	50.23	71.06	59.62	63.51	49.69	50.50
12	49.22	49.66	49.35	48.96	59.60	44.60	50.02	72.78	61.48	62.66	49.48	50.41
13	49.25	49.50	49.52	48.80	57.28	44.65	50.65	73.83	63.72	61.98	49.35	50.31
14	49.23	49.39	49.49	48.70	54.88	44.68	52.23	74.14	65.62	62.09	49.43	50.14
15	49.19	49.32	49.35	48.61	53.31	44.63	53.36	73.01	67.44	62.66	49.54	49.94
16	49.19	49.28	49.25	48.52	52.62	44.54	53.48	71.16	69.36	63.04	49.52	49.81
17	49.22	49.22	49.27	48.48	51.93	44.14	53.43	70.30	71.00	63.16	49.45	49.66
18	49.39	49.26	49.35	48.44	51.16	43.74	53.74	71.06	71.48	62.85	49.45	49.58
19	49.65	49.20	49.37	48.41	50.23	43.46	53.96	72.07	70.67	62.40	49.52	49.55
20	50.49	49.08	49.36	48.27	49.42	43.30	53.53	72.18	68.89	62.05	49.55	49.50
21	51.33	49.00	49.62	48.19	48.85	43.14	52.77	71.24	67.24	61.57	49.60	49.40
22	51.16	49.28	49.98	48.12	48.34	43.03	51.90	70.30	65.70	60.56	49.59	49.36
23	50.68	49.20	50.97	47.96	47.80	43.03	51.20	70.39	64.38	59.32	49.66	49.32
24	50.25	49.11	52.73	47.96	47.34	43.02	50.64	71.64	64.38	58.23	49.68	49.33
25	49.91	49.09	54.35	48.00	47.02	43.00	50.32	72.99	64.86	57.43	49.64	49.42
26	50.02	49.56	54.93	48.44	46.69	43.07	50.49	73.21	64.77	57.11	50.05	49.80
27	50.15	49.49	54.09	48.35	46.36	43.35	51.20	71.80	64.21	56.85	49.98	50.09
28	50.50	49.71	52.91	47.45	46.04	43.48	52.56	69.92	64.01	56.42	50.02	50.02
29	50.84	49.81	51.97	46.95	-	43.44	53.76	68.14	63.70	55.90	50.01	49.84
30	51.98	49.80	51.23	46.90	-	43.40	55.39	66.60	62.92	55.33	50.29	49.86
31	52.72	-	51.02	46.81	-	43.54	-	65.10	-	54.80	50.80	-

Note.--Add 1,700 ft to obtain elevation above mean sea level.

## KOOTENAI RIVER BASIN

## Deep Creek at Moravia, Idaho

Location.--Lat 48°38', long. 116°24', in sec. 18, T. 61 N., R. 1 E., on downstream side of right abutment of highway bridge, 1 mile downstream from Ruby Creek and 1 mile southwest of Moravia.

Drainage area.--133 sq mi.

Records available.--May 1928 to September 1951 (no winter records prior to 1933).

Gage.--Staff gage read once daily. Altitude of gage is 1,800 ft (from topographic map). Prior to Aug. 2, 1949, at datum 2.00 ft higher.

Average discharge.--19 years (1932-51), 142 cfs.

Extremes.--Maximum daily discharge during year, 1,200 cfs Feb. 11; maximum gage height observed, 6.80 ft Feb. 11 (ice jam); minimum observed, 14 cfs Aug. 21; minimum gage height observed, 3.42 ft Oct. 1, 2.  
1928-51: Maximum discharge observed, 1,500 cfs May 15, 1950 (gage height, 6.42 ft); maximum gage height observed, that of Feb. 11, 1951; minimum discharge observed, 5 cfs Aug. 14, 22, 1940.

Remarks.--Records fair except those for periods of ice effect, doubtful or no gage-height record, or shifting control which are poor. Small diversions above station for irrigation. Occasional regulation above station at migratory waterfowl refuge near Elmira.

Rating tables, water year 1950-51, except periods of ice effect or shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Nov. 14

Nov. 15 to Sept. 30

3.4	23	4.3	140	3.7	11	4.8	163
3.6	35	4.6	218	3.9	24	5.1	262
3.8	55	5.0	356	4.2	54	5.5	437
4.0	85			4.5	96	6.2	855

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Jul	Aug.	Sept.
1	24	*210	187	412	b180	184	219	540	219	93	a24	41
2	24	201	181	384	b190	210	285	485	226	93	23	33
3	26	185	147	374	b190	200	356	512	226	96	21	31
4	34	185	133	343	b190	147	479	464	226	100	21	29
5	a45	145	b120	309	b180	128	501	642	193	111	20	29
6	a50	132	b135	240	178	b125	518	654	181	107	20	26
7	*44	115	b150	200	172	b130	545	785	169	96	20	24
8	a40	111	b150	b210	301	b135	589	752	163	90	18	24
9	55	111	147	b230	469	b150	594	630	163	93	18	24
10	55	104	147	244	b1,000	b150	600	746	163	96	20	24
11	46	104	153	237	b1,200	b150	612	766	193	77	20	23
12	46	100	*166	230	b800	b145	606	806	226	69	20	21
13	44	97	158	219	*529	b140	648	812	219	61	20	21
14	42	92	147	230	437	135	696	606	175	56	20	21
15	39	100	147	219	408	150	666	*589	*216	54	16	21
16	a38	119	187	226	361	178	624	578	193	52	15	21
17	53	111	213	219	326	178	660	589	163	47	15	20
18	65	107	230	196	301	140	572	612	153	43	15	20
19	74	93	318	187	278	135	556	589	137	41	15	18
20	100	80	374	178	270	130	556	490	128	39	15	18
21	127	109	427	166	255	137	506	490	124	39	*14	16
22	88	119	453	163	145	137	379	512	119	38	15	19
23	74	104	726	153	b140	133	379	572	158	*36	16	20
24	a70	137	800	150	b180	133	374	479	200	33	16	22
25	a90	169	746	230	244	142	388	398	158	33	16	44
26	111	169	678	437	203	181	422	343	128	31	20	40
27	164	200	550	248	150	213	479	343	124	29	24	34
28	169	219	506	b140	160	213	506	*314	111	a28	29	29
29	218	213	464	b150	-	*200	523	262	93	a27	38	30
30	356	193	448	b160	-	213	534	240	74	a26	37	76
31	248	-	458	b170	-	216	-	233	-	a25	39	-
Total	2,659	4,134	9,946	7,254	9,436	4,958	15,372	16,633	5,021	1,859	640	821
Mean	85.8	138	321	234	337	160	512	537	167	60.0	20.6	27.4
Cfs/m	0.645	1.04	2.41	1.76	2.53	1.20	3.85	4.04	1.26	0.451	0.155	0.206
In.	0.74	1.16	2.78	2.03	2.64	1.39	4.30	4.65	1.40	0.52	0.18	0.23
Ac-ft	5,270	8,200	19,730	14,390	18,720	9,630	30,490	32,990	9,960	3,690	1,270	1,630

\* Discharge measurement made on this day.

a Doubtful or no gage-height record; discharge estimated on basis of weather records and records for nearby streams.

b Stage-discharge relation affected by ice.

Note.--Shifting-control method used Nov. 15 to Apr. 30.



## Kootenai River at Klockmann Ranch, near Bonners Ferry, Idaho

Location.--Lat 48°47'40", long. 116°22'50", in SE $\frac{1}{4}$  sec. 19, T. 63 N., R. 1 E., on right bank 0.3 mile downstream from drainage district number 5 dike and 8 miles north of Bonners Ferry.

Drainage area.--13,300 sq mi, approximately.

Records available.--May 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,700.00 ft above mean sea level, levels by Topographic Branch in 1928. Datum of 1929, supplementary adjustment of 1947, is about 0.03 ft higher.

Extremes.--Maximum elevation during year, 1,771.35 ft May 14; minimum, 1,742.0? ft Mar. 25.

1928-51: Maximum elevation, 1,773.82 ft May 28, 1948; minimum, 1,738.76 ft Apr. 1, 1944.

Remarks.--Elevations affected by backwater from Kootenay Lake. Dike of drainage district number 14 in Kootenai Valley in United States broke May 11 affecting elevations at high stages.

Daily mean elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	48.43	51.28	49.22	49.99	46.66	44.91	42.59	54.92	62.36	60.86	53.02	
2	48.40	50.65	49.09	49.76	46.61	44.78	43.00	55.93	61.31	60.70	52.49	
3	48.34	50.05	48.90	-	46.70	44.46	43.71	55.86	60.56	60.69	52.03	
4	48.36	49.75	48.87	-	46.77	44.31	44.69	55.47	60.16	61.21	51.54	
5	48.39	49.85	48.58	-	46.84	44.07	45.92	56.03	60.06	62.30	51.15	
6	48.46	49.84	48.51	-	46.87	43.85	46.99	57.85	59.84	63.32	50.81	
7	48.49	49.89	48.58	-	46.80	43.52	47.82	60.88	59.22	63.74	50.44	
8	48.48	49.75	48.64	-	46.84	43.42	48.48	63.84	58.45	63.80	49.99	
9	48.52	49.53	48.71	-	46.86	43.44	48.90	65.79	57.82	63.41	49.47	
10	48.52	49.31	48.78	-	46.62	43.46	48.82	66.97	57.54	62.63	49.98	
11	48.68	49.20	48.88	-	54.52	43.44	48.50	68.31	58.14	61.93	49.64	
12	48.84	49.14	48.95	-	57.34	43.52	48.31	69.84	59.74	61.13	49.45	
13	48.86	49.02	49.08	-	55.34	43.54	48.82	70.93	61.78	60.49	48.33	
14	48.84	48.95	49.04	-	53.04	43.55	50.26	71.30	63.60	60.49	49.41	
15	48.83	48.90	48.92	-	51.55	43.48	51.43	70.53	65.23	61.00	49.53	
16	48.79	48.84	48.84	-	50.88	43.41	51.62	69.04	66.94	61.38	49.56	
17	48.84	48.82	48.85	-	50.36	43.16	51.59	68.17	68.37	61.46	49.59	
18	49.01	48.83	48.92	-	49.69	42.85	51.85	68.71	69.06	61.24	49.65	
19	49.22	48.78	48.93	-	49.08	42.59	52.09	69.62	68.48	60.79	49.77	
20	49.84	48.71	48.94	-	48.52	42.44	51.71	69.84	67.08	60.43	49.81	
21	50.52	48.66	49.14	-	48.00	42.27	51.05	69.12	65.52	59.97	49.82	
22	50.34	48.94	49.44	-	47.48	42.16	50.27	68.30	64.12	59.06	49.89	
23	49.94	48.82	50.22	-	46.96	42.13	49.63	68.30	62.89	57.89	49.02	
24	49.56	48.74	51.64	-	46.46	42.09	49.12	69.27	62.80	56.87	49.10	
25	49.32	48.73	52.99	-	46.12	42.05	48.80	70.44	63.17	56.12	49.22	
26	49.49	48.92	53.50	-	45.79	42.10	48.89	70.77	63.09	55.74	49.40	
27	49.56	49.04	52.86	-	45.47	42.32	49.51	69.68	62.61	55.46	49.32	
28	49.82	49.23	51.80	-	45.17	42.38	50.56	68.10	62.36	55.06	49.36	
29	50.04	49.30	50.98	46.68	-	42.34	51.08	66.56	62.11	54.56	49.35	
30	50.94	49.29	50.42	46.87	-	42.31	52.42	65.05	61.39	53.99	49.44	
31	51.58	-	50.24	46.66	-	42.41	-	63.64	-	53.48	-	

Note.--Add 1,700 ft to obtain elevation above mean sea level.

## KOOTENAI RIVER BASIN

Kootenai River near Copeland, Idaho

(International gaging station)

Location.--Lat 48°54'45", long. 116°25'00", in NW<sup>1</sup>/<sub>4</sub> NW<sup>1</sup>/<sub>4</sub> SW<sup>1</sup>/<sub>4</sub> sec. 12, T. 64 N., R. 1 W., on right bank at Andrews Ranch, three-quarters of a mile downstream from Mission Creek and 1½ miles northwest of Copeland.

Drainage area.--13,400 sq mi, approximately.

Records available.--October 1927 to September 1951 (gage-height record only prior to May 1929) in reports of Geological Survey. April 1925 to September 1927 (gage heights only) in reports of Department of Resources and Development, Canada.

Gage.--Water-stage recorder. Datum of gage is 1,700.00 ft above mean sea level referred to benchmark T-10-1914, elevation, 1,791.49 ft (datum of 1929, supplementary adjustment of 1947, is about 0.04 ft higher). Prior to Nov. 20, 1929, staff or recording gage at site three-quarters of a mile upstream at same datum.

Average discharge.--22 years, 14,730 cfs.

Extremes.--Maximum daily discharge during year, 86,900 cfs May 14; maximum elevation, 1,767.17 ft May 26; minimum daily discharge, 5,400 cfs Jan. 30; minimum elevation, 1,741.15 ft Mar. 26.

1929-51: Maximum daily discharge, 124,000 cfs May 30, 1948; maximum elevation, 1,770.10 ft May 31, 1948; minimum daily discharge, 1,350 cfs Feb. 8, 1936; minimum elevation, 1,738.52 ft Apr. 2, 3, 1944.

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are good. Dikes of drainage District No. 14 in Kootenai Valley in United States broke May 11, affecting elevations and discharge at high stages. Discharge computed from fall-mean stage-discharge relations determined on basis of fall in reach between stations at Klockmann Ranch and at Porthill and discharge measurements made at station near Copeland. Stage-discharge relation affected by backwater from Kootenay Lake.

Cooperation.--This is one of the international gaging stations maintained by the United States under agreement with Canada.

Daily mean elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	48.24	50.09	48.73	49.18	46.28	44.19	41.44	51.78	60.14	58.59	51.40	49.33
2	48.21	49.62	48.65	49.03	46.35	44.02	41.66	52.68	59.19	58.44	50.95	49.51
3	48.19	49.18	48.54	48.93	46.39	43.74	42.15	52.78	58.51	58.38	50.50	49.53
4	48.21	48.97	48.52	48.77	46.40	43.58	42.87	52.53	58.10	58.71	50.07	49.51
5	48.22	49.08	48.29	48.57	46.40	43.33	43.74	53.03	57.87	59.49	49.67	49.31
6	48.30	49.07	48.22	48.39	46.36	43.13	44.67	54.59	57.59	60.31	49.37	49.15
7	48.30	49.10	48.27	48.19	46.31	42.90	45.36	57.16	57.03	60.71	49.04	49.06
8	48.31	49.02	48.32	48.18	46.18	42.80	45.93	59.63	56.41	60.82	48.61	49.03
9	48.34	48.87	48.36	48.19	46.25	42.73	46.36	61.63	55.82	60.56	48.17	49.02
10	48.31	48.73	48.43	48.19	47.39	42.70	46.34	62.78	55.54	59.97	47.72	49.05
11	48.39	48.67	48.49	48.14	51.51	42.67	46.12	63.96	55.96	59.41	47.40	49.03
12	48.51	48.66	48.53	48.06	54.11	42.67	45.98	65.39	57.11	58.79	47.24	48.97
13	48.54	48.60	48.63	47.95	52.74	42.67	46.39	66.51	58.71	58.23	47.17	48.91
14	48.55	48.56	48.63	47.92	50.86	42.65	47.53	66.93	60.31	58.11	47.22	48.83
15	48.53	48.53	48.56	47.87	49.72	42.56	46.54	66.47	61.79	58.45	47.36	46.73
16	48.51	48.51	48.50	47.82	49.13	42.53	46.82	65.39	63.26	58.70	47.48	48.67
17	48.52	48.45	48.52	47.77	48.70	42.34	46.85	64.73	64.53	58.80	47.62	48.61
18	48.63	48.47	48.56	47.68	48.19	42.08	49.10	65.12	65.19	58.65	47.75	48.57
19	48.75	48.43	48.56	47.54	47.72	41.88	49.34	65.81	64.99	58.32	47.95	48.61
20	49.13	48.41	48.56	47.41	47.28	41.71	49.08	66.10	63.86	58.01	48.06	48.59
21	49.56	48.41	48.67	47.32	46.93	41.55	48.60	65.65	62.66	57.62	48.14	48.52
22	49.43	48.59	48.65	47.27	46.53	41.39	48.01	65.03	61.47	56.86	48.26	48.47
23	49.19	48.50	49.36	47.18	46.12	41.32	47.52	65.01	60.47	55.96	48.40	48.44
24	48.95	48.44	50.29	47.14	45.66	41.25	47.11	65.76	60.31	55.05	48.53	48.47
25	48.77	48.44	51.31	47.13	45.33	41.19	46.85	66.65	60.51	54.35	48.63	48.51
26	48.90	48.55	51.70	47.56	45.01	41.20	46.91	67.13	60.45	53.94	48.73	48.70
27	48.94	48.62	51.28	47.29	44.69	41.34	47.35	66.45	60.09	53.65	48.70	48.60
28	49.10	48.73	50.52	46.76	44.41	41.32	48.15	65.15	59.82	53.25	48.73	48.77
29	49.25	48.80	49.68	46.49	-	41.30	49.24	63.73	59.59	52.79	48.74	48.70
30	49.86	48.79	49.48	46.42	-	41.26	50.54	62.49	59.05	52.32	48.86	48.79
31	50.30	-	49.38	46.33	-	41.35	-	61.29	-	51.82	49.13	-

Note.--Add 1,700 ft to obtain elevation above mean sea level.

Discharge, in cubic feet per second, of Kootenai River near Copeland, Idaho,  
water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5,930	18,000	9,800	15,500	5,800	8,710	8,660	37,200	42,300	40,600	22,600	14,700
2	5,790	16,000	9,200	12,600	5,750	8,670	9,640	40,100	39,200	40,300	21,400	15,300
3	5,500	14,000	8,500	11,700	6,300	8,250	11,200	*39,100	37,300	*40,800	20,600	15,600
4	5,610	12,700	8,000	10,900	6,550	7,900	13,300	37,300	36,700	43,300	19,600	15,500
5	*5,790	13,000	7,200	9,900	7,300	7,400	16,000	38,300	37,700	48,200	19,000	14,800
6	5,930	13,000	7,000	8,500	7,450	6,800	18,400	43,600	37,800	52,300	18,300	14,000
7	6,020	13,100	8,700	8,000	7,450	6,100	20,200	53,300	36,200	53,500	17,600	13,200
8	5,930	*12,500	6,700	7,600	7,550	5,800	21,600	63,000	34,000	53,500	16,800	12,800
9	6,110	11,800	7,200	7,650	8,700	6,100	22,400	69,300	32,400	51,300	15,600	12,500
10	6,550	10,800	7,400	8,100	15,000	6,450	22,000	72,500	32,000	47,900	14,900	12,300
11	7,520	10,200	7,800	8,100	33,500	6,750	21,100	77,300	34,400	45,300	14,300	12,100
12	8,120	9,720	8,500	8,100	32,500	6,930	20,500	82,500	40,600	42,100	13,800	12,000
13	7,990	9,170	8,900	8,300	28,500	7,040	21,600	86,300	48,400	39,900	13,400	11,800
14	7,820	8,710	8,900	8,300	24,000	7,300	25,300	86,800	55,000	40,600	13,700	11,300
15	7,850	8,440	8,620	8,200	21,500	7,500	28,600	*81,900	60,300	43,200	13,700	10,700
16	7,730	8,130	8,130	8,100	19,000	7,550	28,500	74,000	66,900	44,900	13,200	10,200
17	8,060	8,270	8,170	7,900	16,500	7,400	28,100	69,300	72,500	45,100	12,500	9,600
18	8,890	8,220	6,480	7,500	15,500	7,200	28,800	71,700	74,900	44,300	12,100	9,400
19	9,820	7,800	8,710	7,200	14,500	6,970	29,300	76,100	*70,800	*42,500	11,700	9,000
20	12,500	7,650	8,710	7,100	13,500	6,840	28,000	76,600	64,100	41,200	11,500	8,600
21	15,300	7,240	9,630	6,850	13,000	*6,670	25,900	72,200	57,100	39,900	10,900	8,700
22	14,600	7,500	11,000	6,700	12,000	6,680	23,500	68,000	51,300	36,800	10,700	8,600
23	12,900	7,500	14,200	6,600	11,000	6,850	21,800	67,700	46,400	32,900	*10,500	8,500
24	11,400	7,430	19,600	6,600	10,500	6,980	20,400	72,200	46,600	30,000	10,300	8,600
25	10,600	7,430	23,900	7,100	10,200	7,030	19,500	77,800	49,100	28,300	10,500	9,000
26	10,900	8,460	25,600	8,500	9,790	7,240	19,800	78,600	48,700	28,000	11,200	9,800
27	11,300	9,120	23,300	8,400	9,310	7,740	21,600	72,400	46,600	27,700	10,800	10,900
28	12,300	9,830	19,800	7,600	8,940	8,030	24,600	*64,700	46,100	27,000	10,900	10,600
29	13,200	10,100	17,100	5,600	-	8,040	28,200	58,300	45,200	25,800	10,900	10,200
30	16,400	10,100	15,300	5,400	-	8,060	32,900	52,200	42,300	24,500	11,000	10,200
31	18,900	-	14,500	5,550	-	8,260	-	47,100	-	23,500	13,400	-
Total	233,210	305,940	356,550	252,150	381,590	225,240	661,400	*2,007.7	*1,452.9	*1,225.2	437,400	340,700
Mean	9,458	10,200	11,500	8,134	13,630	7,266	22,050	64,760	47,760	39,520	14,110	11,360
Cfs	0.706	0.761	0.858	0.607	1.02	0.542	1.65	4.83	3.56	2.95	1.05	0.848
In.	0.81	0.85	0.99	0.70	1.06	0.65	1.84	5.57	3.98	3.40	1.21	0.95
Ac-ft	581,600	606,800	707,200	500,100	756,900	446,800	*1,312	*3,982	*2,852	*2,430	667,600	675,800
Calendar year 1950: Max	90,800	Min	2,600	Mean	19,800	Cfs	1.48	In.	20.05	Ac-ft	14,330,000	
Water year 1950-51: Max	86,900	Min	5,400	Mean	21,700	Cfs	1.62	In.	21.99	Ac-ft	15,710,000	

\* Discharge measurement made on this day.

\* Expressed in thousands.

Note.--Channel conveyance affected by ice Nov. 19, 22, 23, Dec. 1-4, 6-14, Feb. 1-24, Mar. 4-13.  
No gage-height record at Klockmann Ranch Jan. 3-28, Aug. 31 to Sept. 30; discharge computed on basis of records for station at Bonners Ferry with allowance for inflow and channel storage.

## Long Canyon Creek near Porthill, Idaho

Location.--Lat 48°57', long. 116°32', in NW $\frac{1}{4}$  sec. 36, T. 65 N., R. 2 W., on left bank 200 ft below United States Forest Service bridge at mouth of canyon, 4 miles southwest of Porthill.

Drainage area.--29 sq mi, approximately.

Records available.--May 1928 to September 1951 (no winter records prior to 1935).

Gage.--Water-stage recorder at present site since Nov. 17, 1948. Altitude of gage is 1,830 ft (by barometer). Prior to Mar. 20, 1930, staff gages, and thereafter, water-stage recorder at several nearby sites and at various datums.

Average discharge.--17 years (1934-51), 59.8 cfs.

Extremes.--Maximum discharge during year, 586 cfs June 24 (gage height, 2.35 ft); minimum, 9 cfs Sept. 20-22.

1928-51: Maximum discharge, 1,300 cfs May 27, 1948 (gage height, 2.75 ft, site and datum then in use) by slope-area determination of peak flow; maximum gage height, 8.55 ft (datum used Sept. 4, 1941, to Aug. 23, 1948) June 14, 15, 1933 (drift jam); minimum discharge, 3 cfs Nov. 1-3, 28, Dec. 4-10, 1936, Jan. 6-8, 1937, Dec. 13, 1940.

Remarks.--Records fair. No regulation or diversion above station.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	13	114	49	62	a20	33	26	110	190	190	23	32
2	13	*99	47	60	a22	32	30	105	*190	183	21	37
3	*13	92	45	57	a28	32	36	103	197	183	20	25
4	14	105	40	51	a26	29	42	112	193	202	19	20
5	21	108	42	46	a24	29	46	117	190	172	18	18
6	32	94	53	44	b21	b25	44	158	183	140	17	17
7	18	85	47	41	21	b23	45	183	183	127	16	17
8	22	76	40	48	21	a22	50	221	179	115	16	19
9	47	68	37	42	22	a23	50	257	193	121	16	17
10	35	66	45	40	81	a24	47	293	235	112	15	15
11	38	64	41	38	a180	a24	47	333	287	98	18	15
12	33	61	a40	36	a120	a24	50	347	326	95	18	14
13	36	55	a39	35	a90	a24	64	281	333	92	16	12
14	34	55	a36	33	a75	a23	72	257	375	84	15	12
15	34	51	a38	a32	a70	a23	70	245	428	74	14	12
16	30	49	a37	a31	*62	a22	*71	263	*368	68	13	11
17	32	46	a38	a30	58	21	78	*319	319	62	12	10
18	49	43	*39	a29	56	a21	85	340	305	60	12	10
19	72	40	39	*29	52	a21	78	293	281	55	11	10
20	105	44	40	28	49	a21	74	275	251	52	11	9
21	85	40	50	27	46	a20	70	281	231	49	11	9
22	68	38	55	26	42	*20	66	326	231	47	*11	10
23	60	36	71	26	40	20	62	390	269	47	11	10
24	53	42	95	26	41	19	61	368	420	45	12	10
25	107	52	116	30	38	20	61	319	287	*40	12	25
26	135	65	90	29	36	21	66	293	269	37	11	19
27	133	60	82	23	33	21	74	287	240	34	11	13
28	110	53	76	b17	34	21	87	275	226	32	52	12
29	118	48	72	a16	-	21	97	231	202	30	35	13
30	209	50	72	a16	-	21	105	211	197	26	40	55
31	146	-	68	a18	-	22	-	193	-	23	45	-
Total	1,915	1,899	1,679	1,066	1,406	722	1,854	7,766	7,778	2,695	572	508
Mean	61.8	63.3	54.2	34.4	50.2	23.3	61.8	251	259	86.9	18.5	16.9
Cfsm	2.13	2.18	1.87	1.19	1.73	0.803	2.13	8.66	8.93	3.00	0.638	0.583
In.	2.46	2.44	2.15	1.37	1.80	0.93	2.38	9.96	9.97	3.46	0.73	0.65
Ac-ft	3,800	3,770	3,330	2,110	2,790	1,430	3,680	15,400	15,430	5,350	1,130	1,010

Calendar year 1950: Max 598 Min - Mean 88.3 Cfsm 3.04 In. 41.33 Ac-ft 63,930

Water year 1950-51: Max 428 Min 9 Mean 81.8 Cfsm 2.82 In. 36.3C Ac-ft 59,230

Peak discharge (base, 380 cfs).--May 23 (8:30 to 10:30 p.m.) 442 cfs (2.29 ft); June 14 (9 p.m.) 466 cfs (2.21 ft); June 24 (4:30 a.m.) 586 cfs (2.35 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of weather records and records for Smith and Boundary Creeks near Porthill.

b Stage-discharge relation affected by ice.

## Smith Creek near Porthill, Idaho

Location.--Lat 48°57'40", long. 116°33'20", in NE $\frac{1}{4}$  sec. 26, T. 65 N., R. 2 W., on right bank at United States Forest Service bridge, 1 mile south of Smith Creek ranger station and 4 miles southwest of Porthill.

Drainage area.--70 sq mi, approximately.

Records available.--May 1928 to September 1951 (no winter records 1928-30, 1932-34).

Gage.--Water-stage recorder. Altitude of gage is 1,770 ft (from topographic map). Prior to Apr. 20, 1929, staff gage 40 ft downstream at 2.67 ft lower datum.

Average discharge.--19 years (1930-32, 1934-51), 177 cfs.

Extremes.--Maximum discharge during year, 1,730 cfs June 24 (gage height, 5.98 ft); minimum, 21 cfs Aug. 22 (gage height, 1.15 ft).

1928-51: Maximum discharge, 3,150 cfs May 17, 1941, from rating curve extended above 1,600 cfs; maximum gage height, 7.37 ft May 27, 1948; minimum discharge, 4 cfs Dec. 4-10, 1936; minimum gage height, 0.78 ft Sept. 4, 1931.

Remarks.--Records good except those for periods of no gage-height record, which are poor. No diversion or regulation above station.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.1	19	3.0	245
1.2	23	3.5	405
1.4	34	4.0	615
1.7	56	4.5	865
2.0	82	5.0	1,140
2.5	142	5.5	1,440

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	32	416	162	195	75	116	81	405	516	412	45	101
2	32	*346	151	183	80	116	82	349	*575	384	42	99
3	*30	320	150	181	105	112	104	329	640	374	40	69
4	42	422	135	166	105	108	123	598	605	452	38	58
5	90	484	115	149	99	102	135	735	580	360	35	51
6	143	370	136	142	94	88	136	871	480	346	33	46
7	80	317	138	138	102	80	146	1,040	456	293	32	44
8	114	275	132	145	120	75	156	1,110	480	251	30	54
9	170	235	131	145	156	80	148	1,140	570	260	29	47
10	152	228	150	135	500	82	144	1,240	745	245	29	41
11	208	208	151	128	770	82	148	1,340	914	200	47	40
12	161	189	145	124	412	82	175	1,270	1,000	185	75	37
13	156	173	135	119	270	82	266	936	926	170	47	34
14	132	171	131	116	230	80	296	850	992	157	40	32
15	124	161	127	111	210	80	269	876	1,130	145	35	31
16	107	157	124	109	*191	78	*278	1,050	887	135	32	30
17	122	151	142	107	180	72	326	*1,240	775	124	29	29
18	320	142	*139	103	170	72	349	1,170	730	115	27	28
19	538	128	132	*100	160	72	296	936	650	107	25	26
20	590	138	139	99	150	72	260	909	560	96	23	23
21	391	132	202	97	140	70	245	1,000	516	90	22	24
22	275	124	230	96	130	*69	240	1,220	516	84	*22	25
23	228	119	352	94	125	68	230	1,400	705	76	26	26
24	198	144	508	93	125	68	240	1,200	1,250	73	27	27
25	484	185	595	108	130	70	260	975	760	*70	30	85
26	630	260	368	116	120	72	299	887	675	65	23	75
27	615	228	317	80	110	71	349	936	570	61	24	51
28	492	210	275	65	115	71	416	865	492	58	79	45
29	556	181	245	69	-	71	448	650	436	54	77	52
30	926	171	248	60	-	71	433	844	426	50	111	135
31	560	-	220	66	-	72	-	500	-	47	132	-
Total	8,698	6,785	6,345	3,629	5,174	2,504	7,088	28,371	20,537	5,539	1,306	1,525
Mean	281	226	205	117	185	80.8	236	915	685	179	42.1	50.8
Cfs/m	4.01	3.23	2.93	1.67	2.64	1.15	3.37	13.1	9.79	2.56	0.601	0.726
In.	4.62	3.60	3.37	1.93	2.75	1.33	3.77	15.07	10.91	2.94	0.69	0.81
Ac-ft	17,250	13,460	12,590	7,200	10,260	4,970	14,060	56,270	40,730	10,990	2,590	3,020
Calendar year 1950: Max	1,600	Min	13	Mean	272	Cfs/m	3.89	In.	52.79	Ac-ft	197,100	
Water year 1950-51: Max	1,400	Min	22	Mean	267	Cfs/m	3.81	In.	51.79	Ac-ft	193,400	

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 8-13, 20-24, Jan. 27 to Feb. 8, Feb. 13-15, Feb. 17 to Mar. 21, Apr. 21-25; discharge estimated on basis of weather records and records for Boundary Creek and other nearby streams.

## KOOTENAI RIVER BASIN

Boundary Creek near Porthill, Idaho

(International gaging station)

Location.--Lat 48°59'50", long. 116°34'05", in SW<sup>1</sup>/<sub>4</sub> sec. 11, T. 65 N., R. 2 W., on left bank near mouth of canyon, 0.2 mile south of international boundary and 3 miles west of Porthill.

Drainage area.--97 sq mi, approximately.

Records available.--May 1928 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,770 ft (from topographic map). Prior to Apr. 24, 1929, staff gage 140 ft upstream at different datum.

Average discharge.--21 years (1930-51), 181 cfs.

Extremes.--Maximum discharge during year, 1,620 cfs May 12 (gage height, 4.44 ft); maximum gage height, 4.65 ft Feb. 11 (ice jam); minimum discharge, 26 cfs Oct. 3 (gage height, 0.70 ft).

1928-51: Maximum discharge, 2,530 cfs May 28, 1948 (gage height, 5.34 ft), from rating curve extended above 1,500 cfs; minimum, 5 cfs sometime between Nov. 10 and Dec. 3, 1936 (gage height, 0.27 ft).

Remarks.--Records good except those for periods of ice effect, which are poor. No regulation or diversion above station.

Cooperation.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

0.7	26	2.1	258
.9	42	2.5	417
1.2	72	3.0	630
1.5	115	3.5	910
1.8	172	4.2	1,430

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	31	317	162	202	b85	132	95	465	549	373	51	95
2	32	*268	147	189	b95	132	107	417	*572	353	49	93
3	*30	244	153	191	b115	125	125	405	598	357	47	72
4	41	313	132	179	b117	127	153	477	594	338	5	64
5	64	377	113	157	b110	120	182	780	580	379	*3	58
6	132	309	159	157	b110	b109	186	952	506	379	42	54
7	75	270	166	151	b120	b97	202	1,130	485	239	41	52
8	77	227	142	b155	b150	b92	218	1,180	497	248	41	66
9	109	196	134	157	b200	b100	202	1,230	567	244	40	56
10	107	210	147	149	540	b100	196	1,320	662	227	39	52
11	136	199	153	143	b657	b99	202	1,330	786	136	73	50
12	108	174	147	139	445	99	244	1,390	903	184	89	47
13	99	162	140	134	321	98	353	1,070	840	170	58	44
14	88	170	129	130	274	96	365	959	910	157	52	42
15	82	159	138	127	251	95	357	959	1,010	145	47	41
16	73	157	134	125	224	92	361	1,090	786	134	42	40
17	82	155	140	125	215	86	405	*1,310	695	124	40	40
18	216	147	*143	118	b205	86	417	1,240	662	115	37	40
19	369	127	140	115	b195	86	361	1,020	603	*177	36	38
20	345	147	143	112	186	86	317	966	544	99	35	37
21	227	140	177	110	168	85	281	1,020	497	93	34	36
22	172	132	196	*107	151	*84	262	1,190	477	89	*33	39
23	153	124	278	105	149	81	251	1,410	536	84	39	45
24	140	132	401	102	b144	81	262	1,200	903	78	49	42
25	309	157	469	113	b140	82	297	987	594	73	44	70
26	425	224	361	124	140	85	361	896	549	70	38	62
27	441	207	309	91	127	85	401	896	477	66	37	48
28	381	199	278	70	b130	81	441	840	417	63	101	45
29	369	182	248	b65	-	88	481	680	585	61	91	54
30	558	174	244	b65	-	86	481	603	377	57	120	142
31	401	-	218	b75	-	86	-	554	-	56	124	-
Total	5,993	5,997	6,041	3,981	5,762	2,981	8,586	29,966	18,561	5,339	1,667	1,664
Mean	190	200	195	128	206	96.2	286	967	619	172	53.8	55.5
Cfs/m	1.96	2.06	2.01	1.32	2.12	0.992	2.95	9.97	6.38	1.77	0.555	0.572
In.	2.26	2.30	2.32	1.53	2.21	1.14	3.29	11.49	7.12	2.05	0.64	0.64
Ac-ft	11,690	11,690	11,980	7,900	11,430	5,910	17,030	59,440	36,820	10,530	3,310	3,300
Calendar year 1950: Max	1,630	Min	24	Mean	258	Cfs/m	2.66	In.	36.11	Ac-ft	186,800	
Water year 1950-51: Max	1,410	Min	30	Mean	264	Cfs/m	2.72	In.	36.99	Ac-ft	191,300	

Peak discharge (base, 750 cfs).--Feb. 11 (about 1 a.m.) about 850 cfs; May 12 (1 a.m.) 1,620 cfs (4.44 ft); May 17 (9 p.m.) 1,490 cfs (4.27 ft); May 23 (8:30 p.m.) 1,550 cfs (4.35 ft); June 14 (9:30 p.m.) 1,190 cfs (3.90 ft); June 24 (4:30 a.m.) 1,320 cfs (4.06 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

## Kootenai River at Porthill, Idaho

(International gaging station)

Location.--Lat 49°00'00", long. 116°30'10", in SW $\frac{1}{4}$  sec. 8, T. 65 N., R. 1 W., on right bank 300 ft south of international boundary at Porthill.

Drainage area.--13,700 sq mi, approximately.

Records available.--May to July 1904 and October 1927 to March 1928 (gage heights only). April 1928 to September 1951 in reports of Geological Survey. October 1924 to September 1927 (gage heights only) in reports of Department of Resources and Development, Canada.

Gage.--Water-stage recorder. Datum of gage is 1,700.00 ft above mean sea level referred to benchmark 10-M-1928, at elevation 1,767.68 ft (datum of 1929, supplementary adjustment of 1947, and datum of Geodetic Survey of Canada, Pub. 24, 1951 Edition, are 0.03 ft higher). Prior to May 17, 1928, staff gages at approximately same site. Datum of gage prior to July 28, 1928, was 38.34 ft higher, except in 1904 when different datum was used.

Average discharge.--23 years, 15,000 cfs.

Extremes.--Maximum daily discharge during year, 88,600 cfs May 14; maximum elevation, 1,763.11 ft May 26; minimum daily discharge, 5,590 cfs Oct. 3, Jan. 30; minimum elevation 1,740.68 ft Mar. 30.

1928-51: Maximum daily discharge, 125,000 cfs June 1, 1948; maximum elevation, 1,768.16 ft May 31, 1948; minimum daily discharge, 1,380 cfs, Feb. 8, 1936; minimum elevation, 1,738.21 ft Apr. 3, 1944.

Maximum elevation known, 1,772.7 ft in June 1894, present datum.

Remarks.--Records excellent except those for periods of ice effect near Copeland or no gage-height record at Klockmann Ranch, which are good. Daily discharge represents entire flow passing international boundary, computed by adding tributary inflow, including that of Boundary Creek, to flow at station near Copeland and correcting for storage change in channel and flooded areas between stations near Copeland and at Porthill. Boundary dike of Reclamation Farm and United States Forest Service roadway dike (south side of Boundary Creek) remained intact and flow of river was confined throughout year to main channel on which gage and cableway are located. Elevations affected by backwater from Kootenai Lake. Dike of drainage district number 14 in Kootenai Valley in United States broke May 11, affecting elevations and discharge at high stages.

Cooperation.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	48.02	49.22	48.33	48.60	46.04	43.70	40.84	49.24	58.21	56.70	50.24	48.68
2	48.00	48.88	48.28	48.48	46.08	43.56	41.02	50.00	57.40	56.54	49.83	48.79
3	47.97	48.56	48.21	48.40	46.09	43.29	41.37	50.20	56.80	56.45	49.43	48.78
4	47.98	48.42	48.20	48.31	46.07	43.15	41.88	50.07	56.40	56.63	49.02	48.75
5	47.99	48.52	48.03	48.16	46.03	42.89	42.58	50.59	56.08	57.13	49.69	48.62
6	48.06	48.51	47.96	48.04	46.00	42.73	43.22	51.80	55.78	57.72	48.40	48.52
7	48.07	48.56	48.01	47.90	45.92	42.54	43.77	53.93	55.28	58.07	47.09	48.48
8	48.07	48.50	48.05	47.86	45.79	42.43	44.23	56.05	54.70	58.17	47.70	48.48
9	48.09	48.38	48.08	47.86	45.82	42.34	44.62	57.56	54.21	58.05	47.35	48.48
10	48.04	48.30	48.14	47.83	46.44	42.32	44.64	58.65	53.94	57.63	47.91	48.52
11	48.08	48.27	48.18	47.78	49.32	42.28	44.50	59.64	54.20	57.21	47.64	48.52
12	48.17	48.28	48.20	47.70	51.36	42.23	44.42	60.82	55.05	56.76	47.53	48.44
13	48.21	48.23	48.26	47.61	50.56	42.22	44.77	61.69	56.21	56.33	47.48	48.41
14	48.21	48.22	48.26	47.57	49.26	42.16	45.64	62.12	57.36	56.19	47.52	48.34
15	48.20	48.20	48.20	47.49	48.41	42.07	46.43	61.96	58.62	56.35	47.67	48.30
16	48.17	48.18	48.18	47.44	47.91	42.03	46.73	61.40	59.74	56.52	47.83	48.26
17	48.18	48.14	48.19	47.40	47.57	41.86	46.81	61.07	60.73	56.59	47.03	48.22
18	48.24	48.16	48.22	47.50	47.15	41.63	47.07	61.56	61.28	56.47	47.21	48.20
19	48.33	48.11	48.20	47.18	46.73	41.44	47.25	61.80	61.28	56.21	47.43	48.24
20	48.57	48.11	48.21	47.05	46.36	41.29	47.12	62.07	60.60	55.98	47.53	48.22
21	48.84	48.11	48.29	46.97	46.03	41.14	46.77	61.88	59.75	55.64	47.66	48.18
22	48.78	48.29	48.41	46.93	45.68	41.00	46.35	61.54	58.94	55.06	47.78	48.14
23	48.63	48.19	48.73	46.84	45.33	40.91	45.98	61.58	58.22	54.33	47.97	48.10
24	48.46	48.17	49.32	46.78	44.99	40.83	45.70	62.10	58.08	53.60	47.09	48.12
25	48.33	48.16	50.09	46.77	44.74	40.76	45.52	62.72	58.10	52.99	47.19	48.16
26	48.46	48.22	50.38	46.93	44.46	40.74	45.56	63.08	58.07	52.58	47.27	48.29
27	48.49	48.26	50.06	46.82	44.19	40.83	45.83	62.70	57.83	52.27	47.25	48.32
28	48.60	48.39	49.50	46.47	43.94	40.80	46.43	61.68	57.60	51.90	47.28	48.32
29	48.70	48.40	49.04	46.23	-	40.76	47.28	60.90	57.44	51.50	47.28	48.29
30	49.12	48.39	48.75	46.16	-	40.71	48.21	59.97	57.04	51.06	47.35	48.36
31	49.39	-	48.70	46.09	-	40.78	-	59.03	-	50.64	47.53	-

Note.--Add 1,700 ft to obtain elevation above mean sea level.

## KOOTENAI RIVER BASIN

Discharge, in cubic feet per second, of Kootenai River at Porthill, Idaho,  
water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5,990	19,000	10,200	14,100	6,020	9,140	8,840	37,600	44,700	42,000	23,000	14,800
2	5,890	17,000	9,610	13,100	5,930	9,050	9,790	40,600	41,500	41,400	21,800	15,500
3	5,590	14,900	8,920	12,200	6,560	8,680	11,300	39,900	39,500	41,800	21,000	15,800
4	5,700	13,700	8,340	11,400	6,820	8,270	13,300	38,500	38,600	44,100	19,900	14,700
5	6,000	14,000	7,600	10,400	7,560	7,800	16,000	39,700	39,400	48,400	19,500	15,000
6	6,210	13,800	7,410	8,950	7,710	7,130	18,400	44,900	39,500	52,400	18,600	14,200
7	6,200	13,800	7,050	8,450	7,750	6,420	20,300	53,700	37,900	53,800	17,900	13,400
8	6,150	13,200	7,020	7,990	7,940	6,060	21,800	63,200	35,700	54,000	17,100	13,000
9	6,440	12,400	7,500	8,020	9,090	6,360	22,600	70,200	34,500	52,200	15,900	12,600
10	6,860	11,400	7,730	8,460	15,800	6,890	22,400	74,200	34,000	49,100	15,200	12,400
11	7,890	10,700	8,140	8,460	33,300	6,990	21,600	79,200	36,200	46,500	14,600	12,200
12	8,330	10,200	8,850	8,470	32,000	7,170	21,100	84,100	42,000	43,100	14,100	12,100
13	8,280	9,610	9,200	8,670	29,900	7,270	22,100	87,400	49,200	40,900	13,800	11,900
14	8,090	9,150	9,220	8,630	25,500	7,540	25,600	88,600	55,900	41,100	13,800	11,400
15	8,120	8,850	8,980	8,530	22,600	7,760	28,900	84,600	61,400	43,300	13,700	10,800
16	7,960	8,530	8,470	8,420	19,800	7,780	29,100	77,600	67,500	45,000	13,200	10,300
17	8,300	8,670	8,510	8,210	17,200	7,690	29,000	73,000	73,000	45,300	12,500	9,710
18	9,460	8,560	8,810	7,820	16,200	7,520	29,600	74,200	75,300	44,700	12,100	9,500
19	10,600	8,140	9,060	7,540	15,200	7,270	30,000	77,600	72,500	43,100	11,700	9,060
20	13,400	8,000	9,070	7,430	14,100	7,120	28,800	78,500	66,600	41,700	11,500	8,680
21	15,900	7,570	10,000	7,150	13,600	6,940	26,800	75,000	59,600	40,500	10,900	8,800
22	15,200	7,720	11,400	6,970	12,500	6,940	24,400	71,500	53,800	37,600	10,700	8,710
23	13,500	7,850	14,700	6,890	11,500	7,080	22,600	71,100	48,900	33,800	10,500	8,600
24	11,900	7,790	20,300	6,870	11,000	7,200	21,200	74,500	49,500	30,900	10,300	8,670
25	11,600	7,850	24,700	7,580	10,700	7,250	20,300	79,200	50,700	29,000	10,500	9,170
26	12,100	9,020	26,300	8,700	10,300	7,440	20,600	80,200	50,700	28,500	11,200	9,880
27	12,500	9,620	24,500	8,660	9,760	7,880	22,300	75,300	48,500	28,100	10,900	11,000
28	13,300	10,300	20,800	8,000	9,380	8,230	25,200	68,100	47,600	27,400	11,100	10,700
29	14,200	10,500	18,000	5,900	-	8,250	28,800	61,400	46,500	26,200	11,100	10,300
30	17,900	10,500	16,100	5,590	-	8,280	33,400	54,900	43,800	24,900	11,200	10,600
31	19,900	-	15,100	5,770	-	8,420	-	49,700	-	23,900	13,600	-
Total	509,720	322,330	371,390	263,130	595,720	233,620	676,130	2,068,110	1,484,500	1,244,500	442,500	344,680
Mean	9,991	10,740	11,980	8,498	14,130	7,536	22,540	66,710	49,480	40,150	14,270	11,490
Cfsm	0.729	0.784	0.874	0.520	1.03	0.550	1.65	4.87	3.61	2.93	1.04	0.839
In.	0.84	0.87	1.01	0.71	1.07	0.63	1.84	5.61	4.03	3.38	1.20	0.94
Ac-ft	614,300	639,300	756,600	521,900	784,900	463,400	1,341,000	4,102,000	2,944,000	2,468,000	877,700	685,700
Calendar year 1950: Max	91,600	Min	2,720	Mean	20,450	Cfsm	1.49	In.	20.25	Ac-ft	14,810,000	
Water year 1950-51: Max	88,600	Min	5,590	Mean	22,350	Cfsm	1.63	In.	22.13	Ac-ft	16,180,000	

\* Expressed in thousands.



## Kootenay Lake at Kuskonook, British Columbia

(International gaging station)

Location.--Lat 49°18', long. 116°40', on east shore of lake at Kuskonook.Records available.--April 1936 to September 1951.Gage.--Water-stage recorder. Datum of gage is 1,735.17 ft above mean sea level, Geodetic Survey of Canada, datum of Pub. 24, 1951 edition, which is the same at Porthill as datum of 1929, supplementary adjustment of 1947, and 0.03 ft higher than datum in use at station Kootenai River at Porthill. Gage heights have been reduced to latter datum. Prior to Apr. 25, 1938, staff gage at same site at datum 3.00 ft higher.Extremes.--Maximum elevation during year, 1,755.97 ft May 27; minimum, 1,739.70 ft Mar. 30.

1936-51: Maximum elevation, 1,761.25 ft June 11, 1948; minimum daily, 1,737.83 ft Apr. 5, 6, 1944.

Remarks.--Elevation is subject to partial regulation by Corra Linn Dam below outlet. Practically no diversion or regulation above Kootenay Lake.Cooperation.--This station is one of the international gaging stations maintained by Canada under agreement with the United States.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	47.74	47.66	47.74	47.62	445.74	42.86	39.78	43.62	54.42	55.11	48.32	47.68
2	47.71	47.55	47.73	47.60	445.73	42.70	39.79	43.93	53.95	55.00	48.01	47.65
3	47.70	47.50	47.73	47.57	445.68	42.55	39.85	44.24	53.49	52.93	47.69	47.63
4	47.72	47.52	47.72	47.54	445.61	42.43	39.95	44.50	53.08	52.92	47.38	47.59
5	47.74	47.57	47.67	47.52	445.53	42.25	40.08	44.80	52.62	52.98	47.09	47.54
6	47.76	47.58	47.64	47.49	445.44	42.07	40.21	45.16	52.17	53.12	46.80	47.56
7	47.78	47.58	47.64	47.42	445.37	41.95	40.37	45.73	51.73	53.28	46.53	47.60
8	47.77	47.58	47.67	47.38	445.27	41.84	40.53	46.50	51.32	53.36	46.21	47.65
9	47.77	47.59	47.69	47.38	445.20	41.72	40.73	47.45	50.94	53.37	45.88	47.67
10	47.68	47.61	47.73	47.34	45.18	41.67	40.86	48.36	50.70	53.33	45.57	47.72
11	47.63	47.65	47.73	47.27	45.38	41.62	41.00	49.33	50.68	53.20	45.37	47.73
12	47.71	47.68	47.72	47.18	45.58	41.53	41.11	50.43	50.87	53.04	45.35	47.70
13	47.76	47.71	47.75	47.11	45.79	41.48	41.24	51.47	51.17	52.91	45.41	47.68
14	47.77	47.73	47.71	47.04	45.87	41.39	41.40	52.18	51.57	52.78	45.49	47.67
15	47.75	47.73	47.69	46.96	45.83	41.31	41.64	52.81	52.16	52.70	45.66	47.69
16	47.73	47.71	47.68	46.88	45.67	41.25	41.89	53.28	52.75	52.66	45.92	47.69
17	47.74	47.67	47.72	46.80	45.45	41.10	42.15	53.65	53.25	52.66	46.20	47.68
18	47.74	47.63	47.71	46.71	45.23	40.92	42.43	53.98	53.69	52.62	46.47	47.68
19	47.76	47.62	47.70	46.61	45.00	40.75	42.59	54.23	54.08	52.50	46.73	47.72
20	47.75	47.64	47.71	46.51	44.77	40.58	42.76	54.47	54.28	52.35	46.88	47.72
21	47.76	47.70	47.72	46.48	44.52	40.43	42.87	54.65	54.27	52.09	47.04	47.70
22	47.75	47.76	47.74	46.44	44.26	40.32	42.95	54.81	54.13	51.77	47.21	47.68
23	47.75	47.72	47.77	46.38	44.02	40.19	42.96	55.04	53.92	51.41	47.40	47.68
24	47.71	47.70	47.83	46.32	43.78	40.10	42.95	55.33	53.72	51.03	47.53	47.70
25	47.66	47.70	47.92	46.28	43.54	40.00	42.90	55.59	53.56	50.63	47.59	47.69
26	47.71	47.69	47.88	46.28	43.36	39.96	42.88	55.76	53.56	50.26	47.62	47.68
27	47.69	47.71	47.83	46.14	43.18	39.90	42.88	55.86	53.55	49.91	47.63	47.68
28	47.71	47.75	47.72	46.06	42.99	39.83	42.96	55.81	53.46	49.62	47.64	47.69
29	47.72	47.78	47.57	45.94	-	39.80	43.10	55.62	53.33	49.32	47.63	47.72
30	47.75	47.76	47.57	45.84	-	39.78	43.31	55.29	53.24	48.97	47.64	47.77
31	47.75	-	47.61	445.78	-	39.78	-	54.87	-	46.65	47.65	-

a Mean daily elevations estimated on basis of records for stations at Queens Bay and East Branch.

Note.--Add 1,700 ft to obtain elevation above mean sea level.

## Columbia River at Birchbank, British Columbia

(International gaging station)

Location.--Lat 49°10', long. 117°43', on right bank at Birchbank, British Columbia, 7 miles upstream from Trail, 11 miles downstream from Kootenai River, and 17 miles upstream from international boundary.

Drainage area.--34,000 sq mi, approximately.

Records available.--April 1913 to September 1951. Published as "at Trail, British Columbia" 1913-37.

Gage.--Water-stage recorder. Datum of gage is 1,329.90 ft above mean sea level (levels by Geodetic Survey of Canada, 1947 international joint adjustment). Prior to Oct. 1, 1937, chain or cable gage on highway bridge at site 7 miles downstream at datum 16.27 ft lower.

Average discharge.--38 years, 69,520 cfs.

Extremes.--Maximum discharge during year, 229,000 cfs May 27 (gage height, 37.22 ft); minimum, 20,100 cfs Feb. 1 (gage height, 6.28 ft).  
1913-51: Maximum discharge, 370,000 cfs June 11, 1948 (gage height, 50.62 ft); minimum observed, 8,940 cfs Feb. 3, 1937 (gage height, 6.27 ft, site and datum then in use).

Remarks.--Records excellent. Small diversions above station for irrigation. Fluctuation at low flow caused by powerplant on Kootenai River. Flow affected by partial regulation of Kootenai River in Kootenay Lake.

Cooperation.--This station is one of the international gaging stations maintained by Canada under agreement with the United States.

Revisions (water years).--W 982: 1942. Corrected figures of monthly discharges for the water year 1949, superseding those published in Water-Supply Paper 1152, are given in the following table.

Revised monthly discharge, in cubic feet per second, 1948-49

Month	Cfs-days	Discharge in cubic feet per second				Runoff	
		Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October .....	1,254,300	47,000	33,700	40,500	1.19	1.37	2,488,000
November .....	873,000	33,700	25,800	29,100	.8 <sup>1</sup>	.96	1,732,000
December .....	691,100	25,800	18,700	22,300	.6 <sup>1</sup>	.76	1,371,000
Calendar year 1948 .....	28,649,800	369,000	16,900	78,300	2.3 <sup>1</sup>	31.35	56,830,000
January .....	556,000	20,100	16,100	17,900	.5 <sup>1</sup>	.61	1,103,000
February .....	444,400	17,700	14,000	15,900	.4 <sup>1</sup>	.49	881,500
March .....	525,600	18,600	16,200	17,000	.5 <sup>1</sup>	.58	1,043,000
April .....	1,062,700	66,600	17,200	35,400	1.0 <sup>1</sup>	1.16	2,108,000
May .....	4,594,100	210,000	68,200	148,000	4.3 <sup>1</sup>	5.02	9,112,000
June .....	5,005,000	203,000	118,000	167,000	4.9 <sup>1</sup>	5.48	9,927,000
July .....	3,093,400	112,000	92,000	99,800	2.9 <sup>1</sup>	3.39	6,136,000
August .....	2,342,700	92,500	58,300	75,600	2.2 <sup>1</sup>	2.56	4,647,000
September .....	1,454,500	57,800	36,600	46,500	1.4 <sup>1</sup>	1.60	2,885,000
Water year 1948-49 .....	21,896,800	210,000	14,000	60,000	1.7 <sup>1</sup>	23.98	43,430,000

## Columbia River at Birchbank, British Columbia--Continued

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Jan. 8

Jan. 9 to Sept. 30

7.4	24,700	6.4	20,600	20.0	89,000
9.0	32,300	8.0	27,500	26.0	129,000
12.0	47,500	10.0	36,700	32.0	178,000
14.0	58,000	14.0	56,200	38.0	237,000

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	45,600	58,000	32,900	36,200	20,700	32,300	22,700	57,600	200,000	194,000	159,000	71,700
2	45,300	54,200	30,700	37,600	22,200	31,300	23,800	59,200	194,000	193,000	154,000	71,500
3	41,800	47,700	31,300	37,800	22,900	29,800	22,200	61,500	187,000	193,000	150,000	70,000
4	41,200	43,400	29,100	35,300	26,100	29,000	26,800	63,800	184,000	197,000	146,000	69,000
5	39,800	42,900	27,900	31,700	25,300	30,300	27,300	67,200	182,000	201,000	142,000	65,100
6	38,800	43,700	28,300	30,400	26,300	29,100	28,700	71,500	177,000	206,000	137,000	59,300
7	38,400	42,700	25,600	30,400	27,800	27,200	31,600	76,900	172,000	213,000	133,000	58,500
8	39,200	41,000	25,000	28,100	27,500	27,000	33,000	83,500	166,000	216,000	129,000	57,800
9	42,500	39,700	25,200	28,300	29,800	22,300	33,800	91,500	160,000	218,000	123,000	56,800
10	47,700	37,300	25,600	31,200	33,600	22,600	34,400	101,000	154,000	219,000	116,000	58,300
11	42,200	36,600	29,400	*31,500	37,400	22,400	35,500	111,000	152,000	218,000	110,000	58,500
12	38,400	33,900	27,600	31,400	39,100	23,900	36,800	128,000	154,000	216,000	102,000	56,800
13	38,500	33,400	27,900	31,200	40,100	23,900	38,000	143,000	159,000	214,000	95,400	55,900
14	44,800	33,200	*30,100	30,800	41,800	24,400	39,700	155,000	168,000	213,000	90,700	54,000
15	43,400	35,400	30,200	32,100	43,500	25,100	41,200	167,000	181,000	213,000	85,000	52,300
16	41,800	40,000	28,700	31,400	38,900	25,600	42,700	*176,000	195,000	213,000	79,700	51,600
17	41,200	38,800	28,600	31,600	44,700	27,800	44,700	184,000	206,000	214,000	78,400	50,400
18	43,100	33,400	28,500	31,100	45,200	28,200	46,400	191,000	216,000	216,000	77,500	48,800
19	*45,400	30,800	29,000	30,500	44,200	28,400	47,700	195,000	221,000	218,000	76,500	47,500
20	48,900	30,400	28,000	27,400	42,800	27,100	*48,500	199,000	223,000	216,000	75,300	46,500
21	48,200	28,000	29,500	27,000	43,100	27,100	49,200	*202,000	222,000	214,000	74,700	45,600
22	47,700	29,600	29,900	25,700	41,800	26,600	49,400	205,000	219,000	209,000	73,300	46,700
23	47,000	33,800	33,000	26,600	40,900	25,800	49,900	211,000	216,000	202,000	71,600	43,900
24	46,500	32,100	38,400	27,500	39,500	24,500	49,800	218,000	214,000	197,000	71,700	44,000
25	44,800	31,900	46,400	27,400	37,400	23,300	50,900	223,000	209,000	191,000	73,900	47,400
26	46,400	32,700	50,100	28,000	36,000	22,300	51,500	228,000	206,000	185,000	73,600	47,500
27	49,200	32,100	52,200	*31,200	34,500	23,200	52,200	229,000	204,000	181,000	72,200	45,900
28	49,100	31,700	51,700	29,500	33,300	23,200	53,500	227,000	202,000	176,000	72,700	42,900
29	49,000	32,000	47,900	25,300	-	23,200	54,600	223,000	199,000	172,000	73,100	43,100
30	51,300	35,200	41,600	23,700	-	22,700	56,000	216,000	197,000	168,000	71,700	45,700
31	55,300	-	37,000	21,600	-	22,500	-	208,000	-	163,000	70,200	-
Total	1,381.5	*1,115.6	*1,027.3	930,500	986,200	901,100	*1,222.3	*4,772.3	5,738	6,259	*3,058.2	*1,610.9
Mean	44,600	37,200	33,100	30,000	35,200	25,800	40,700	154,000	191,000	202,000	98,700	53,700
Cfs/m	1.31	1.09	0.97	0.89	1.04	0.76	1.20	4.53	5.62	5.94	2.90	1.58
In.	1.51	1.22	1.12	1.02	1.08	0.88	1.34	5.22	6.27	6.85	3.34	1.76
Ac-ft	2,740	2,213	2,038	1,846	1,956	1,589	2,424	9,466	11,380	12,410	6,066	3,195

Calendar year 1950: Max 325,000 Min 17,000 Mean 78,600 Cfs/m 2.31 In. 31.38 Ac-ft 56,870,000  
 Water year 1950-51: Max 229,000 Min 20,700 Mean 79,200 Cfs/m 2.33 In. 31.61 Ac-ft 57,320,000

\* Discharge measurement made on this day.

\* Expressed in thousands.

Note.--No gage-height record Feb. 13 to Mar. 29; discharge estimated on basis of records at Trail, B.C.

## PEND OREILLE RIVER BASIN

Flint Creek near Southern Cross, Mont.

Location.--Lat 46°14', long. 113°18', in NW¼ sec. 36, T. 6 N., R. 14 W., on left wing wall of weir half a mile downstream from powerplant, 2 miles downstream from Georgetown Lake, 3 miles northwest of Southern Cross, and 6 miles south of Phillipsburg.

Drainage area.--52.5 sq mi.

Records available.--October 1940 to September 1951.

Gage.--Staff gage and Cippolletti weir; gage read once daily.

Average discharge.--11 years, 35.0 cfs.

Extremes.--Maximum discharge observed during year, 168 cfs July 11 (gage height, 1.65 ft); minimum observed, 16 cfs Mar. 21 to Apr. 13, Apr. 25 to May 5.

1940-51: Maximum discharge observed, 174 cfs (revised) June 13, 1942 (gage height, 1.86 ft); probably no flow Aug. 20, 1943, when generator was shut down.

Revision.--The maximum discharge for the water year 1942 has been revised to 174 cfs June 13 (gage height, 1.86 ft), superseding figure published in Water-Supply Paper 962.

Remarks.--Records good except those above 50 cfs, which are fair. Flow regulated by Georgetown Lake (see p. 249).

Cooperation.--Gage-height record furnished by The Montana Power Co., under general supervision of Geological Survey, in connection with a Federal Power Commission project.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second (Shifting-control method used Mar. 21 to May 5)

0.5	15
.7	24
1.0	41
1.2	60
1.7	181

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	31	31	31	31	31	31	16	16	31	84	37	31
2	31	31	31	31	31	31	16	16	31	84	37	31
3	31	31	31	31	31	31	16	16	31	84	37	31
4	31	31	31	31	31	31	16	16	31	84	46	31
5	31	31	31	31	31	31	16	16	31	106	46	28
6	31	31	31	31	31	31	16	24	31	84	46	28
7	31	31	31	31	31	31	16	24	31	47	37	23
8	31	31	31	31	31	31	16	24	31	47	33	28
9	31	31	31	31	31	31	16	27	47	47	33	30
10	31	31	31	31	31	31	16	27	47	96	31	30
11	31	31	31	31	31	31	16	25	47	*165	31	30
12	31	31	31	31	31	31	16	24	47	52	31	30
13	31	31	31	31	31	31	16	24	*130	48	30	29
14	31	31	31	31	31	31	17	22	130	48	*28	29
15	31	31	31	31	31	31	17	*22	135	60	28	29
16	31	31	31	31	31	31	17	22	125	47	28	29
17	31	31	31	31	31	31	17	22	89	39	28	29
18	31	31	31	31	31	31	17	21	87	39	28	*29
19	31	31	31	31	31	31	17	21	87	47	28	29
20	31	31	31	31	*31	*31	17	21	46	46	28	29
21	31	31	31	31	31	16	17	21	46	48	28	29
22	31	31	31	31	31	16	17	21	39	40	28	29
23	31	31	31	31	31	16	17	21	46	39	28	29
24	31	31	31	*31	31	16	17	18	130	39	28	43
25	31	31	31	31	31	16	16	18	130	39	33	47
26	*31	31	31	31	31	16	*16	18	87	47	33	47
27	31	31	31	31	31	16	16	31	56	47	33	47
28	31	31	*31	31	31	16	16	31	56	47	33	47
29	31	*31	31	31	-	16	16	31	56	48	33	47
30	31	31	31	31	-	16	16	31	84	47	33	47
31	31	-	31	31	-	16	-	31	-	39	31	-
Total	961	930	961	961	868	796	491	702	1,995	1,856	1,012	995
Mean	31.0	31.0	31.0	31.0	31.0	25.7	16.4	22.6	66.5	59.2	32.6	33.2
Ac-ft	1,910	1,840	1,910	1,910	1,720	1,580	1,274	1,390	3,960	3,640	2,010	1,970
Calendar year 1950: Max	30				Min 15	Mean	27.3		Ac-ft	19,750		
Water year 1950-51: Max	165				Min 16	Mean	34.3		Ac-ft	24,810		

\* Discharge measurement made on this day.

## Trout Creek near Southern Cross, Mont.

Location.--Lat 46°16'40", long. 113°20'50", in W $\frac{1}{2}$ NW $\frac{1}{4}$  sec. 15, T. 6 N., R. 14 W., on right bank a quarter of a mile upstream from mouth, 4 $\frac{1}{2}$  miles southwest of Phillipsburg, and 6 $\frac{1}{2}$  miles northwest of Southern Cross.

Drainage area.--34.8 sq mi.

Records available.--December 1945 to September 1951 (discontinued).

Gage.--Water-stage recorder.

Average discharge.--6 years, 36.6 cfs.

Extremes.--Maximum discharge during year, 196 cfs Feb. 10 (gage height, 4.58 ft), from rating curve extended above 100 cfs; minimum, 7.6 cfs Mar. 5 (gage height, 2.56 ft).  
1945-51: Maximum discharge, 331 cfs Apr. 16, 1948 (gage height, 5.67 ft), from rating curve extended above 80 cfs by logarithmic plotting; minimum, 7.1 cfs Mar. 14, 1949 (gage height, 2.54 ft).

Remarks.--Records good except those for period of no gage-height record, which are poor. Diversions for irrigation of about 2,500 acres above station; bypass diversions irrigate an additional 1,500 acres. During irrigation season flow is supplemented by water from East Fork Rock Creek which is diverted in sec. 5, T. 4 N., R. 14 W., 500 ft below Rock Creek Dam, through a canal into Trout Creek.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

2.6	8.8	3.4	56
2.7	12	3.8	99
2.9	20	4.3	159
3.1	32		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	45	29	22	16	a12	14	33	22	43	65	138	80
2	45	29	20	16	a13	14	45	23	43	66	138	80
3	43	28	19	16	14	14	50	24	42	67	139	78
4	41	28	21	16	15	14	42	37	44	77	147	73
5	42	27	17	15	16	13	40	42	54	77	147	53
6	41	27	20	14	15	14	34	34	53	73	144	45
7	39	27	21	14	16	15	31	33	50	69	138	41
8	38	27	20	15	18	15	31	35	48	74	132	36
9	38	24	20	15	47	15	29	47	45	81	130	35
10	37	26	20	14	118	14	26	40	47	98	130	35
11	36	27	20	14	54	15	24	38	50	*97	129	36
12	35	26	20	15	26	15	25	46	52	100	110	35
13	35	26	19	14	19	16	29	47	55	77	101	35
14	34	26	18	15	18	15	27	44	67	76	*97	31
15	35	24	19	14	18	16	23	40	*54	75	89	22
16	33	26	19	14	17	16	23	38	57	75	84	29
17	33	25	19	14	16	16	23	36	56	70	80	*29
18	32	25	18	14	16	15	23	36	58	67	72	31
19	31	23	18	14	16	16	21	35	54	70	69	30
20	31	24	18	14	*16	*16	21	35	52	66	82	32
21	31	24	18	13	16	23	22	35	52	70	74	33
22	31	23	18	13	14	24	21	33	52	74	69	36
23	31	23	20	14	15	18	21	33	51	76	75	42
24	30	24	21	*14	16	22	21	43	59	97	84	45
25	29	28	21	14	16	43	20	41	60	104	90	55
26	*29	26	19	15	15	38	*21	48	58	122	92	58
27	30	24	18	13	14	30	20	44	59	118	94	64
28	30	23	*18	a12	15	24	21	38	62	122	95	42
29	29	*22	17	a11	-	23	22	31	62	129	96	40
30	29	22	17	a11	-	28	23	34	65	138	98	41
31	29	-	17	a11	-	27	-	41	-	141	82	-
Total	1,072	763	592	434	621	598	812	1,203	1,604	2,711	3,245	1,327
Mean	34.6	25.4	19.1	14.0	22.2	19.3	27.1	38.8	53.5	87.5	105	44.2
As-ft	2,130	1,510	1,170	861	1,230	1,190	1,610	2,390	3,160	5,380	6,440	2,630
Calendar year 1950: Max	133			Min 16		Mean 36.1		As-ft 26,150				
Water year 1950-51: Max	147			Min 11		Mean 41.0		As-ft 29,720				

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records and records for stations on nearby streams.

## PEND OREILLE RIVER BASIN

## Flint Creek at Maxville, Mont.

Location.--Lat 46°28'00", long. 113°14'30", in NW<sup>1</sup> sec. 9, T. 8 N., R. 13 W., on right bank 0.4 mile west of Maxville and 1 mile upstream from Boulder Creek.

Drainage area.--208 sq mi (revised).

Records available.--August 1941 to September 1951. April 1939 to September 1941 at site half a mile upstream; records not equivalent owing to diversions.

Gage.--Water-stage recorder. Datum of gage is 4,828.44 ft above mean sea level, datum of 1929.

Average discharge.--10 years, 105 cfs.

Extremes.--Maximum discharge during year, 480 cfs Feb. 10 (gage height, 4.19 ft); minimum, 27 cfs Jan. 27 (gage height, 1.40 ft).  
1941-51: Maximum discharge, 1,680 cfs Mar. 28, 1943 (gage height, 6.79 ft), from rating curve extended above 600 cfs; minimum, 27 cfs Mar. 4, 1945, Jan. 26, 1946, Jan. 27, 1951; minimum gage height, 1.31 ft Mar. 4, 1945.

Remarks.--Records excellent except those for periods of ice effect, which are poor. Diversions for irrigation of about 8,200 acres above station. During irrigation season flow is supplemented by water from East Fork Rock Creek which is diverted in sec. 5, T. 4 N., R. 14 W., 500 ft below Rock Creek Dam, through a canal into Trout Creek, thence into Flint Creek. Some regulation by Georgetown Lake (capacity, 31,000 acre-ft), see p. 249).

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Mar. 25

Mar. 26 to Sept. 30

1.6	41	1.8	56
1.8	56	2.1	81
2.0	73	2.5	124
2.5	128	3.0	189
3.0	198	3.5	275
3.7	331	3.9	367

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	90	83	82	67	b42	b59	127	96	169	175	164	114
2	91	86	76	68	b46	b58	134	100	142	204	165	113
3	91	83	77	66	50	b57	155	100	129	194	162	113
4	87	83	78	64	50	b56	152	124	126	206	168	112
5	86	83	62	b60	59	b50	140	150	158	231	174	94
6	92	82	66	56	62	b55	136	158	174	212	169	83
7	84	83	87	56	68	b56	126	181	161	183	161	76
8	82	84	80	b58	78	b60	125	299	164	167	153	70
9	79	76	78	b60	91	b56	118	271	153	167	152	68
10	78	70	77	b55	248	b55	110	214	151	*231	157	67
11	76	90	77	b60	309	b62	105	218	162	245	160	70
12	75	87	77	b60	136	70	101	267	183	233	151	68
13	74	91	76	b60	92	75	109	243	206	172	132	66
14	73	90	69	b60	84	73	123	209	272	156	126	60
15	76	91	75	b62	85	76	113	*183	*315	154	*122	58
16	74	85	73	b57	81	78	109	174	351	144	111	56
17	76	85	75	b56	74	70	106	185	349	135	110	*56
18	77	87	71	b55	77	74	106	194	287	125	105	58
19	75	85	72	b55	75	75	96	189	249	123	92	57
20	73	b86	74	b58	*73	*81	88	178	224	115	102	65
21	76	87	74	b65	70	98	86	164	196	106	101	69
22	80	84	73	b61	67	116	86	169	182	108	91	73
23	77	85	95	59	b64	76	85	192	169	105	102	112
24	75	86	103	*69	b63	104	76	238	188	108	110	116
25	*74	102	100	68	b65	174	72	186	254	120	115	114
26	76	105	84	67	b60	185	72	181	218	137	117	117
27	79	94	76	42	b58	116	*76	172	194	141	120	121
28	82	91	*75	b38	b60	83	82	238	183	152	121	105
29	78	*82	71	b36	-	85	99	217	171	158	123	95
30	78	84	72	b57	-	109	108	182	168	164	136	93
31	83	-	70	b59	-	104	-	178	-	185	124	-
Total	2,467	2,590	2,393	1,774	2,387	2,546	3,221	5,850	6,048	5,033	4,096	2,539
Mean	79.6	86.3	77.2	57.2	85.2	82.1	107	189	202	162	132	84.6
Ac-ft	4,890	5,140	4,750	3,520	4,730	5,050	6,390	11,600	12,000	9,980	8,120	5,040
Calendar year 1950: Max	397			Min 40		Mean 97.1		Ac-ft 70,320				
Water year 1950-51: Max	351			Min 36		Mean 112		Ac-ft 81,210				

\* Discharge measurement made on this day.  
b stage-discharge relation affected by ice.

## Boulder Creek at Maxville, Mont.

Location.--Lat 46°28'30", long. 113°14'00", in SE $\frac{1}{4}$  sec. 4, T. 8 N., R. 13 W., on right bank an eighth of a mile upstream from mouth and three-quarters of a mile north of Maxville.

Drainage area.--71.3 sq mi.

Records available.--April 1939 to September 1951.

Gage.--Water-stage recorder. Prior to July 7, 1941, wire-weight gage at private bridge 75 ft upstream at different datum; July 8-20, 1941, temporary staff gage at site 100 ft upstream from private bridge at datum 1.03 ft higher. July 21 to Aug. 11, 1941, staff gage at same site and datum.

Average discharge.--12 years, 48.5 cfs.

Extremes.--Maximum discharge during year, 410 cfs June 16 (gage height, 3.27 ft); minimum daily, 8 cfs Jan. 30.

1939-51: Maximum discharge, 763 cfs June 3, 1948 (gage height, 4.24 ft); minimum, 4.6 cfs Dec. 26, 1942.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor. Bypass diversions for irrigation of about 350 acres below station.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.1	13	2.5	175
1.3	22	3.0	305
1.6	46	3.2	374
2.0	93		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Ave.	Sept.
1	23	32	28	24	b14	a17	17	42	169	141	35	17
2	26	32	28	24	b17	a16	18	42	151	150	35	16
3	26	31	b26	24	b20	b15	20	42	141	141	34	16
4	28	32	28	24	a22	b15	21	47	155	151	34	16
5	34	33	b22	a20	a27	a15	23	59	146	159	31	16
6												
7	40	32	b25	b19	a25	b16	24	86	153	135	28	15
8	37	33	b30	b18	a30	b17	25	101	151	126	27	16
9	35	29	b28	b19	a35	b18	26	159	144	118	28	15
10	37	25	a28	b20	a45	b17	26	167	134	114	28	15
11	35	b22	a28	b20	a75	b15	23	161	146	141	28	15
12												
13	34	b34	a28	b20	a150	b17	22	182	171	*139	28	16
14	32	b32	a28	b21	a50	b18	23	221	204	118	28	16
15	31	b32	a28	b21	a35	a18	28	182	250	109	*28	16
16	30	b30	27	b21	a30	a16	31	150	*281	102	26	16
17	31	b28	26	22	a30	a17	28	*131	338	98	26	15
18												
19	31	29	a27	22	a25	a18	27	137	370	94	25	21
20	32	29	a28	22	a21	a17	29	163	318	89	25	*26
21	31	30	a27	21	a20	a16	34	193	275	84	23	27
22	31	b28	a25	b18	a19	a17	31	188	247	60	20	26
23	29	b28	a25	b17	*20	*18	30	182	229	74	20	28
24												
25	31	30	a25	b19	19	18	28	182	199	65	20	30
26	33	29	a25	22	b17	18	28	221	186	62	21	29
27	32	29	26	b21	b18	17	27	299	173	57	23	34
28	31	30	27	*21	a20	17	26	345	207	55	23	36
29	29	31	28	21	a19	18	27	258	219	53	19	39
30												
31	*30	32	26	21	a18	18	29	221	177	49	17	41
32	32	32	26	13	b15	18	*32	239	171	49	15	35
33	31	31	*26	b11	a18	17	38	342	161	46	16	31
34	32	*29	24	b9	-	17	47	261	150	42	17	30
35	35	29	25	b2	-	16	42	211	141	40	21	28
36	35	-	24	b10	-	16	-	190	-	37	19	-
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Total	984	903	822	593	654	523	830	5,404	5,937	2,912	768	697
Mean	31.7	30.1	26.5	19.1	30.5	16.9	27.7	174	198	93.9	24.8	23.2
Ac-ft	1,950	1,790	1,630	1,180	1,690	1,040	1,650	10,720	11,780	5,780	1,520	1,380

Calendar year 1950: Max 429 Min 5.2 Mean 51.1 Ac-ft 37,010

Water year 1950-51: Max 370 Min 8 Mean 58.2 Ac-ft 42,110

Peak discharge (base, 150 cfs).--Feb. 11 (time and discharge unknown); May 12 (1 to 2 a.m.) 242 cfs (2.78 ft); May 24 (2 a.m.) 406 cfs (3.28 ft); May 28 (8 a.m.) 378 cfs (3.20 ft); June 16 (2:30 a.m.) 410 cfs (3.27 ft); June 25 (3 a.m.) 244 cfs (2.75 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records and records for Flint Creek at Maxville and Trout Creek near Southern Cross.

b Stage-discharge relation affected by ice.

## Middle Fork Rock Creek near Philipsburg, Mont.

Location.--Lat 46°11', long. 113°30', in NE $\frac{1}{4}$  sec. 17, T. 5 N., R. 15 W., on downstream side of bridge half a mile upstream from East Fork,  $2\frac{1}{2}$  miles upstream from confluence with West Fork, and 15 miles southwest of Philipsburg.

Drainage area.--123 sq mi.

Records available.--September 1937 to September 1951.

Gage.--Wire-weight gage read twice daily: Sept. 21, 1937, to May 10, 1942, wire-weight gage at site one-fourth of a mile upstream at different datum. May 11, 1942, to Nov. 9, 1950, staff gage at same site and datum.

Average discharge.--14 years, 122 cfs.

Extremes.--Maximum discharge during year, 1,180 cfs May 28 (gage height, 3.60 ft from graph based on gage readings), from rating curve extended above 500 cfs; minimum daily, 15 cfs Jan. 29.

1937-51: Maximum discharge, 1,360 cfs May 29, 1948 (gage height, 3.80 ft), from rating curve extended above 550 cfs on basis of slope-area determination of peak flow; minimum observed, 4.5 cfs Dec. 9, 10, 23, 24, 1944 (gage height, 0.0? ft).

Remarks.--Records fair except those for period of ice effect, which are poor. A few small diversions for irrigation above station.

Rating tables, water year 1950-51, except for period of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Nov. 9

Nov. 10 to Sept. 30

0.7	32	0.5	18	1.2	98	2.5	455
.8	42	.7	32	1.5	158	3.0	725
1.0	73	.9	53	2.0	284	3.5	1,100

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	53	66	60	37	b22	29	37	174	522	281	115	98
2	61	66	62	37	b26	30	38	154	405	278	109	90
3	61	63	63	33	b30	26	46	152	373	290	109	72
4	63	66	58	26	34	28	54	137	373	330	109	68
5	61	66	53	30	37	27	58	167	394	330	106	65
6	63	66	52	16	36	26	63	220	402	302	104	65
7	61	66	57	19	39	31	65	293	409	284	100	65
8	59	63	62	26	41	27	70	447	402	278	100	62
9	63	39	62	34	43	35	61	489	402	276	98	60
10	63	51	46	26	50	24	70	512	420	290	98	58
11	64	76	54	34	51	28	69	578	402	*302	91	58
12	61	76	56	34	48	36	72	624	394	290	91	58
13	63	76	56	34	40	36	78	606	*508	276	91	58
14	64	66	50	34	42	36	68	481	541	270	*95	57
15	64	74	53	36	43	36	69	*436	810	270	96	57
16	59	74	53	34	40	34	78	436	855	256	91	56
17	61	62	39	34	41	34	81	464	945	251	86	57
18	63	62	40	36	42	17	93	508	930	220	83	*58
19	66	70	40	24	45	22	78	541	855	208	81	57
20	68	68	42	36	*41	*34	88	546	832	200	80	57
21	66	65	46	37	41	36	88	536	532	198	78	56
22	66	65	45	38	26	35	91	606	485	174	83	56
23	66	65	44	34	19	37	88	788	489	165	86	60
24	66	65	42	*42	23	41	86	1,010	508	160	96	56
25	61	66	44	40	30	41	86	892	494	154	100	54
26	*66	69	39	36	25	33	*96	802	420	141	104	53
27	63	70	40	18	22	36	95	825	377	129	104	50
28	66	70	*38	b16	30	38	115	1,070	360	127	104	51
29	66	*56	36	b15	-	38	191	915	330	121	102	52
30	66	57	37	b16	-	38	170	692	299	119	106	51
31	64	-	37	b19	-	37	-	584	-	115	100	-
Total	1,957	1,964	1,506	931	1,007	1,006	2,442	16,685	15,468	7,085	2,996	1,815
Mean	63.1	65.5	48.6	30.0	36.0	32.5	81.4	538	516	229	96.6	60.5
Cfs/m	0.513	0.533	0.395	0.244	0.293	0.264	0.662	4.37	4.20	1.86	0.785	0.492
In.	0.59	0.59	0.46	0.28	0.31	0.30	0.74	5.04	4.69	2.14	0.90	0.55
Ac-ft	3,880	3,900	2,990	1,850	2,000	2,000	4,840	33,090	30,680	14,050	5,940	3,600
Calendar year 1950	Max 1,290	Min 10	Mean 162	Cfs/m 1.32	In. 17.90	Ac-ft 117,500						
Water year 1950-51	Max 1,070	Min 15	Mean 150	Cfs/m 1.22	In. 16.59	Ac-ft 108,800						

Peak discharge (base, 450 cfs).--May 12 (2 p.m.) 660 cfs (2.90 ft); May 24 (2 p.m.) 1,080 cfs (3.47 ft); May 28 (1 p.m.) 1,180 cfs (3.60 ft); June 17 (3 p.m.) 1,020 cfs (3.40 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.



## Blackfoot River near Helmsville, Mont.

Location.--Lat 46°56'10", long. 112°56'30", in NW 1/4 sec. 25, T. 14 N., R. 11 W., on right bank 50 ft downstream from county highway bridge, 2 miles downstream from Arrastre Creek, and 5 miles northeast of Helmsville.

Drainage area.--481 sq mi.

Records available.--September 1940 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 4,301.29 ft above mean sea level, datum of 1929 (Corps of Engineers benchmark).

Average discharge.--11 years, 340 cfs.

Extremes.--Maximum discharge recorded during year, 2,540 cfs May 25 (gage height, 6.75 ft); minimum daily, 110 cfs Jan. 29.

1940-51: Maximum discharge, 3,180 cfs June 6, 1948 (gage height, 7.55 ft); minimum daily, 50 cfs Jan. 3, 1950.

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are poor. Flow includes natural overflow channel on left bank, but does not include unnamed diversions past station. Diversions for irrigation of about 1,500 acres above station. Bypass diversions may irrigate an additional 500 acres below station.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Apr. 7

Apr. 8 to Sept. 30

1.3	131	1.8	212	3.0	586	5.0	1,540
1.7	208	2.2	313	3.5	790	6.0	2,090
2.0	284	2.5	408	4.0	1,030	6.7	2,510

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	206	204	176	178	b130	150	199	950	1,570	980	439	277
2	201	208	174	172	b135	b150	215	890	1,410	950	435	267
3	199	206	168	172	b140	b150	230	822	1,310	935	425	262
4	197	206	b165	166	b145	b150	247	880	1,260	955	415	254
5	199	204	b160	166	b150	b140	257	955	1,320	1,020	411	252
6	208	206	a175	b160	b150	b130	254	1,150	1,300	1,020	392	245
7	204	213	a190	b155	b150	b135	270	1,550	1,280	995	375	240
8	199	215	b186	b158	b160	b138	307	1,730	1,290	940	362	235
9	197	b210	184	b165	b175	b140	334	1,810	1,300	910	356	233
10	195	b195	180	170	190	a142	334	a1,900	1,340	990	349	230
11	199	b188	180	168	213	a145	325	a2,100	1,490	935	349	245
12	195	a185	178	*166	210	a147	322	a2,400	*1,660	858	349	259
13	195	a183	176	164	204	b148	343	a2,400	1,800	*826	334	245
14	195	a183	172	166	b195	b149	382	a2,400	1,880	822	322	235
15	195	a184	172	166	b185	150	411	a2,100	1,990	844	313	228
16	195	186	170	166	176	152	415	*1,950	2,180	812	*307	226
17	197	184	172	166	172	148	425	1,930	2,260	776	299	221
18	206	186	170	164	170	146	460	2,130	2,100	745	291	221
19	206	178	170	160	168	145	460	2,320	1,900	711	285	217
20	199	176	174	b150	164	143	456	2,260	1,720	679	277	*219
21	199	180	180	b153	*162	*148	428	2,130	1,620	647	272	219
22	197	178	180	b155	161	153	422	2,060	1,480	616	267	224
23	*197	199	188	b150	b159	152	*415	2,170	1,330	586	265	224
24	195	186	199	b153	b157	148	395	2,410	1,300	560	313	221
25	193	188	210	*b156	155	153	388	2,510	1,280	545	296	219
26	193	190	210	159	155	168	395	2,300	1,220	538	277	237
27	195	*186	195	b140	153	174	422	2,070	1,190	520	272	240
28	199	182	190	b125	152	166	481	2,000	1,150	499	272	230
29	201	178	*184	b110	-	162	616	1,970	1,100	464	276	224
30	201	178	182	b115	-	166	862	1,850	1,020	466	276	217
31	206	-	180	b125	-	176	-	1,730	-	452	299	-
Total	6,161	5,743	5,590	4,837	4,636	4,664	11,468	57,827	45,050	23,616	10,218	7,066
Mean	199	191	180	156	166	150	382	1,865	1,502	762	330	236
Cfsm	0.414	0.397	0.374	0.324	0.345	0.312	0.794	3.88	3.12	1.58	0.686	0.491
In.	0.48	0.44	0.43	0.37	0.36	0.36	0.89	4.47	3.48	1.82	0.79	0.55
Ac-ft	12,220	11,390	11,090	9,590	9,200	9,250	22,750	114,700	89,360	46,840	20,270	14,020
Calendar year 1950: Max	2,420	Min	50	Mean	412	Cfsm	0.857	In.	11.63	Ac-ft	298,400	
Water year 1950-51: Max	2,510	Min	110	Mean	512	Cfsm	1.06	In.	14.44	Ac-ft	370,700	

Peak discharge (base, 650 cfs).--May 12 (time and discharge unknown); May 25 (2 to 6 a.m.) 2,540 cfs (6.75 ft); June 17 (2 to 6 a.m.) 2,290 cfs (6.33 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records and records for station near Ovando.

b Stage-discharge relation affected by ice.

## PEND OREILLE RIVER BASIN

Nevada Creek above reservoir, near Finn, Mont.

Location (revised).--Lat 46°47', long. 112°46', in NE $\frac{1}{4}$  sec. 19, T. 12 N., R. 9 W., on right bank 1 mile upstream from Buffalo Creek and 4 miles west of Finn.

Drainage area.--128 sq mi.

Records available.--April 1939 to September 1951.

Gage.--Water-stage recorder. Prior to Apr. 30, 1942, wire-weight gage at site an eighth of a mile upstream at different datum.

Average discharge.--12 years, 35.2 cfs.

Extremes.--Maximum daily discharge during year, 800 cfs Apr. 2; maximum gage height, 5.47 ft Apr. 2 (backwater from ice); minimum daily discharge, 4 cfs Jan. 29.  
1939-51: Maximum discharge, 1,440 cfs Apr. 16, 1948, from rating curve extended above 350 cfs; maximum gage height, 6.09 ft Mar. 18, 1947 (ice jam); minimum discharge probably less than 2 cfs at times in January and February 1944.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor. Diversions for irrigation of about 2,500 acres above station.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to June 15

June 16 to Sept. 30

0.8	6.8	2.0	91	0.8	13
1.0	13	2.5	155	1.0	21
1.2	23	3.0	233	1.2	32
1.5	44	3.8	430	1.5	53
				2.0	99
				2.7	184

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.5	18	17	14	a8	9	400	112	154	49	25	24
2	9.4	19	17	15	a11	9	800	102	131	51	23	24
3	9.7	19	16	15	a14	9	650	117	110	47	18	24
4	11	19	15	15	a15	8	402	176	110	56	17	21
5	13	19	10	14	a14	8	290	170	159	59	17	20
6	17	19	14	13	a13	9	202	186	154	47	15	19
7	14	20	16	12	16	10	170	224	140	42	14	16
8	15	18	17	12	20	10	148	241	135	39	14	17
9	15	a17	17	13	25	9	102	245	130	43	17	17
10	17	a12	16	12	50	8	81	243	131	*72	19	16
11	18	a18	16	12	150	8	75	257	148	62	21	22
12	20	a18	16	12	75	8	82	328	175	50	22	22
13	22	a20	16	12	50	9	109	353	181	*44	20	18
14	20	a21	12	12	40	10	103	*306	*180	42	19	16
15	19	a20	17	13	a35	12	73	228	176	42	18	16
16	19	a16	17	12	a28	10	66	205	177	42	17	15
17	20	a17	16	12	a23	10	72	235	167	39	*16	15
18	20	a16	17	12	a20	10	76	297	154	38	15	15
19	19	a15	18	a12	a18	12	61	304	139	35	16	14
20	18	a17	18	a12	a15	13	60	273	124	33	16	18
21	20	a18	16	a13	*14	*13	63	241	111	32	15	*18
22	20	a18	15	a12	13	16	52	224	102	24	16	20
23	21	a17	20	a12	12	14	51	243	95	24	27	22
24	*19	a17	25	a12	11	15	46	293	96	27	26	21
25	19	a18	23	*14	10	75	44	282	85	28	22	20
26	20	a18	22	13	10	180	46	220	73	29	21	24
27	20	*17	18	8	10	200	*49	193	71	28	21	21
28	20	17	16	5	10	100	62	198	64	28	24	20
29	20	17	*15	4	-	75	84	194	60	26	27	19
30	19	17	15	a5	-	75	112	181	54	28	37	19
31	19	-	14	a6	-	150	-	170	-	26	28	-
Total	541.6	532	517	360	730	1,104	4,630	7,041	3,786	1,232	623	575
Mean	17.5	17.7	16.7	11.6	26.1	35.6	154	227	126	39.7	20.1	19.2
Ac-ft	1,070	1,080	1,030	714	1,450	2,190	9,180	13,970	7,510	2,440	1,240	1,140

Calendar year 1950: Max 532 Min 7 Mean 41.3 Ac-ft 29,870  
Water year 1950-51: Max 800 Min 4 Mean 59.4 Ac-ft 42,990

Peak discharge (base, 160 cfs).--Feb. 11 or 12 (time and discharge unknown); Mar. 26 or 27 (time and discharge unknown); Apr. 2 or 3 (time and discharge unknown); May 4 (7 p.m.) 286 cfs (3.25 ft); May 13 (2:30 p.m.) 378 cfs (3.62 ft); May 19 (9:30 a.m.) 313 cfs (3.37 ft); May 25 (8:30 a.m.) 306 cfs (3.34 ft); June 5 (8 p.m.) 198 cfs (2.79 ft); June 13 (12:30 p.m.) 186 cfs (2.71 ft).

\* Discharge measurement made on this day.

a No gage-height record (stage-discharge relation probably affected by ice during most of periods); discharge estimated on basis of temperature records.

Note.--Stage-discharge relation affected by ice Nov. 27 to Jan. 18, Jan. 25-29, Feb. 7-14, Feb. 21 to Apr. 3.

## Blackfoot River near Ovando, Mont.

Location.--Lat 47°01'10", long. 113°13'40", (revised), in SE 1/4 sec. 34, T. 15 N., R. 13 W., on left bank a quarter of a mile upstream from Monture Creek and 5 miles west of Ovando.

Drainage area.--1,274 sq mi (revised).

Records available.--September 1940 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 3,917.27 ft above mean sea level, datum of 1929 (Corps of Engineers benchmark).

Average discharge.--11 years, 829 cfs.

Extremes.--Maximum discharge during year, 6,080 cfs May 24 (gage height, 5.81 ft); minimum, 165 cfs Jan. 28 (gage height, 1.50 ft).

1940-51: Maximum discharge, 8,200 cfs May 22, 1948 (gage height, 6.84 ft); minimum daily, 130 cfs Jan. 3, 1950.

Floodmarks indicate stage of 10 ft reached in recent years.

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are poor. Diversions for irrigation of about 25,000 acres above station.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.7	196	3.5	1,510
2.0	270	4.0	2,250
2.4	453	5.0	4,200
2.8	730	5.8	6,060
3.2	1,130		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	448	546	471	426	b280	b330	840	2,250	3,590	2,390	980	623
2	448	553	459	420	b300	b320	1,120	2,140	3,230	2,390	970	608
3	436	555	453	442	b330	b320	1,320	1,980	2,950	2,390	950	601
4	436	553	426	404	b360	b320	1,300	2,020	2,820	2,490	920	594
5	442	560	368	409	b370	294	1,230	2,150	2,890	2,560	910	594
6	448	567	448	365	b370	250	1,110	2,640	2,910	2,640	890	587
7	459	580	520	b350	b380	b260	990	3,250	2,840	2,530	850	573
8	453	573	483	b380	b400	b300	990	3,650	2,780	2,370	811	567
9	442	501	453	b380	b460	b320	990	3,880	2,730	2,250	793	560
10	448	b490	442	b420	580	b330	920	4,220	2,800	2,350	784	553
11	448	b480	448	b420	622	b340	890	4,860	3,050	2,250	775	573
12	448	b480	465	b410	b590	b340	880	5,680	*3,490	*2,090	775	601
13	448	483	453	b410	b560	335	920	5,680	3,950	2,000	748	594
14	442	b485	442	b410	520	339	1,020	*5,750	4,310	1,980	722	573
15	442	b490	442	404	483	348	1,040	5,360	4,950	2,000	*706	560
16	442	b490	431	393	442	353	1,050	4,760	5,410	1,940	690	553
17	448	495	436	393	426	353	1,200	4,600	5,270	1,850	666	553
18	471	501	431	393	393	335	1,200	4,900	4,950	1,760	643	553
19	483	501	436	363	*393	*335	1,240	5,040	4,470	1,690	629	*553
20	483	489	436	b320	368	339	1,210	5,110	4,050	1,590	622	573
21	477	501	442	b340	383	348	1,170	4,970	3,760	1,510	608	573
22	471	483	448	b360	378	378	1,170	5,020	3,490	1,430	601	580
23	471	453	453	b340	368	373	*1,140	5,440	3,210	1,350	608	587
24	*471	477	483	b370	368	378	1,130	5,960	3,190	1,290	650	580
25	465	520	507	383	383	442	1,130	5,770	3,130	1,260	650	601
26	471	526	513	393	368	553	1,150	5,440	3,010	1,210	601	629
27	465	520	*477	275	b340	682	1,210	5,060	2,910	1,180	594	629
28	489	*495	485	217	b350	808	1,340	4,970	2,780	1,120	601	615
29	489	489	459	b200	-	540	1,590	4,670	2,620	1,090	615	608
30	546	477	448	b210	-	507	2,030	4,330	2,470	1,050	668	594
31	546	-	442	b240	-	601	-	3,970	-	1,010	668	-
Total	14,394	15,311	14,080	11,220	11,565	11,871	34,440	135,520	104,010	56,990	22,694	17,555
Mean	464	510	454	362	413	383	1,148	4,372	3,467	1,838	732	585
Cfsm	0.364	0.400	0.356	0.284	0.324	0.301	0.901	3.43	2.72	1.44	0.575	0.459
In.	0.42	0.45	0.41	0.33	0.34	0.35	1.01	3.95	3.04	1.68	0.66	0.51
Ac-ft	28,550	30,370	27,930	22,550	22,940	23,550	68,510	268,800	206,300	113,000	45,010	34,820
Calendar year 1950: Max	5,720			Min 130		Mean 1,026		Cfsm 0.805	In. 10.93	Ac-ft 742,400		
Water year 1950-51: Max	5,960			Min 200		Mean 1,232		Cfsm 0.967	In. 13.13	Ac-ft 891,800		

Peak discharge (base, 1,600 cfs).--May 24 (9 to 11 a.m.) 6,080 cfs (5.81 ft); June 16 (10 a.m.) 5,580 cfs (5.60 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

## PEND OREILLE RIVER BASIN

Blackfoot River near Bonner, Mont.

Location.--Lat 46°53'40", long. 113°46'50", in SW1/4 sec. 8, T. 13 N., R. 17 W., on right bank 4 miles northeast of Bonner, 6 miles downstream from Union Creek and 6 miles upstream from mouth.

Drainage area.--2,294 sq mi (revised).

Records available.--July 1898 to June 1901, May 1903 to October 1905, October 1939 to September 1951. Published as Blackfoot River at Bonner 1898-99 and as B'g Blackfoot River near Bonner 1903-5.

Gage.--Staff gage read once daily. Datum of gage is 3,322.94 ft above mean sea level, datum of 1929, Pacific Northwest supplementary adjustment of 1947. July 1898 to June 1901, May 1903 to October 1905, chain gage at site 6 miles downstream at different datum.

Average discharge.--12 years (1939-51), 1,470 cfs.

Extremes.--Maximum discharge during year, 11,000 cfs May 13 (gage height, 9.10 ft, from graph based on gage readings); minimum daily, 400 cfs Jan. 25, 1898-1901, 1903-5, 1939-51: Maximum discharge observed, 17,200 cfs June 19-21, 1899 (gage height, 8.7 ft, site and datum then in use); minimum daily, 200 cfs Jan. 4, 5, 1950.

Remarks.--Records fair except those for periods of ice effect, which are poor. Diversions for irrigation of about 35,000 acres above station.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.5	680	6.0	5,420
2.0	975	8.0	8,780
3.0	1,740	9.1	11,000
4.0	2,740		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	
1	708	915	945	927	550	730	1,170	5,120	6,310	3,140	1,510	969	
2	713	921	945	933	630	720	1,190	4,670	5,760	2,660	1,460	982	
3	718	933	850	921	700	710	1,270	4,460	5,270	2,760	1,400	975	
4	718	921	870	921	750	700	2,020	4,690	5,000	3,460	1,360	988	
5	724	927	800	837	800	700	2,280	4,970	5,120	4,190	1,330	994	
6	*730	957	750	730	820	600	2,390	4,850	5,200	4,110	1,290	982	
7	718	*1,000	850	718	830	650	2,410	6,340	4,970	4,050	*1,270	975	
8	708	1,030	969	735	870	700	2,580	*7,640	4,850	3,760	1,230	975	
9	696	988	945	771	920	750	2,720	8,060	4,750	3,590	1,230	951	
10	708	969	873	837	1,050	771	2,780	8,360	4,750	3,590	1,220	963	
11	730	957	849	831	1,250	807	3,020	9,260	5,030	3,470	1,210	975	
12	735	963	800	825	1,700	807	3,110	10,400	5,500	3,260	1,200	963	
13	724	975	*790	825	1,500	759	3,320	10,800	6,020	3,120	1,200	951	
14	724	982	790	801	1,350	747	3,380	10,300	*6,500	3,090	1,190	939	
15	724	994	790	783	1,200	759	3,600	9,650	7,180	3,040	1,180	921	
16	730	994	795	783	1,050	753	3,520	8,880	7,950	2,920	1,160	903	
17	730	1,010	789	777	950	741	3,630	8,420	8,150	*2,810	1,150	879	
18	753	1,010	777	730	900	747	3,520	8,680	7,590	2,660	1,120	867	
19	765	1,020	783	*670	880	735	3,440	8,840	6,740	2,540	1,080	*873	
20	759	1,040	783	850	870	735	3,340	8,800	6,290	2,420	1,040	873	
21	765	1,060	795	700	860	730	3,280	8,650	6,100	2,280	982	879	
22	753	1,070	813	750	820	741	3,160	8,460	5,720	2,180	957	885	
23	771	1,050	837	700	750	783	3,030	9,030	5,340	2,060	963	891	
24	777	1,040	861	789	750	819	2,940	9,810	5,160	1,990	975	891	
25	783	1,010	909	801	800	891	2,790	9,870	5,150	2,020	988	915	
26	789	994	963	813	760	933	2,880	9,120	4,910	1,890	1,010	957	
27	807	994	957	700	750	988	2,920	8,590	4,740	1,820	1,010	988	
28	825	988	945	550	*730	*1,070	3,230	8,400	4,570	1,760	1,000	1,000	
29	873	982	933	400	-	1,070	*3,690	8,000	4,360	1,690	988	994	
30	885	982	921	450	-	1,100	4,810	7,420	4,040	1,620	988	1,000	
31	897	-	915	500	-	1,190	-	6,870	-	1,570	975	-	
Total	23,440	29,676	26,592	23,158	25,790	24,936	87,220	247,410	169,020	85,520	35,666	28,298	
Mean	756	969	858	747	921	804	2,907	7,981	5,634	2,759	1,151	943	
Cfsm	0.330	0.431	0.374	0.326	0.401	0.350	1.27	3.48	2.46	1.20	0.502	0.411	
In.	0.38	0.48	0.43	0.38	0.42	0.40	1.42	4.01	2.74	1.38	0.58	0.46	
Ac-ft	46,490	58,860	52,740	45,930	51,150	49,460	173,000	490,700	335,200	168,600	70,740	56,130	
Calendar year 1950: Max			9,190	Min	200	Mean	1,910	Cfsm	0.833	In.	11.31	Ac-ft	1,383,000
Water year 1950-51: Max			10,800	Min	400	Mean	2,210	Cfsm	0.963	In.	13.08	Ac-ft	1,600,000

Peak discharge (base, 2,500 cfs).--Apr. 17 (7 a.m.) 3,680 cfs (4.77 ft); May 13 (2 a.m.) 11,000 cfs (9.10 ft); June 17 (5 a.m.) 8,360 cfs (7.76 ft); July 5 (8 a.m.) 4,230 cfs (5.18 ft).

\* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice Dec. 3-7, 12-15, Jan. 16-23, Jan. 27 to Mar. 9.

Clark Fork above Missoula, Mont.

Location.--Lat 46°52'40", long 113°55'40", in NW¼ sec. 19, T. 13 N., R. 18 W., on right bank 3 miles downstream from Blackfoot River and 3 miles east of Missoula.

Drainage area.--5,740 sq mi, approximately.

Records available.--March 1929 to September 1951.

Gage.--Water-stage recorder.

Average discharge.--22 years, 2,659 cfs.

Extremes.--Maximum discharge during year, 20,400 cfs May 15 (gage height, 10.04 ft); minimum recorded, 534 cfs Aug. 9 (gage height, 1.69 ft).  
1929-51: Maximum discharge, 31,500 cfs May 23, 1948 (gage height, 13.07 ft); minimum, 86 cfs Jan. 8, 1930 (gage height, 0.52 ft, ice jam above station); minimum daily, 224 cfs Jan. 8, 1930 (ice jam above station).

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are fair. Diurnal fluctuation caused by powerplant at Bonner. Diversions for irrigation of about 120,000 acres above station.

Revisions (water years).--W 1042: 1936. W 1152: 1942.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 12

Feb. 13 to Sept. 30

2.4	1,090	2.4	1,190	6.0	7,850
3.0	1,820	3.0	1,920	7.0	10,500
4.0	3,400	4.0	5,510	8.0	13,500
5.0	5,470	5.0	5,500	9.5	18,500

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,890	2,220	2,030	2,000	a1,100	1,830	3,160	8,150	11,800	6,740	2,870	2,190
2	1,890	2,240	2,000	1,890	a1,200	1,750	3,590	7,800	10,800	6,810	2,790	2,090
3	1,960	2,220	1,820	1,890	a1,350	a1,700	4,350	7,500	9,760	6,860	2,650	2,070
4	1,790	2,190	1,860	1,880	a1,450	a1,650	4,930	7,500	9,140	6,830	2,610	2,060
5	1,960	2,190	1,700	1,820	a1,500	a1,600	5,130	8,180	9,360	7,140	2,660	2,020
6	1,970	2,240	b1,500	1,690	a1,500	a1,200	5,280	9,570	10,000	7,190	2,630	2,000
7	2,000	2,260	1,620	1,380	a1,600	a1,350	5,210	11,700	9,990	6,810	*2,480	1,960
8	1,970	2,340	2,090	b1,300	b1,700	a1,500	5,240	13,000	10,100	6,330	2,290	1,950
9	1,950	2,180	2,040	b1,500	b2,000	a1,650	5,540	14,700	9,790	6,030	2,210	1,930
10	1,820	1,760	1,930	1,850	2,770	a1,700	5,190	*14,900	9,410	6,400	2,300	1,860
11	1,920	1,880	1,930	1,570	4,310	a1,700	5,060	15,700	9,650	6,780	2,320	1,890
12	1,890	2,120	2,000	1,680	4,990	a1,650	4,810	17,800	10,400	6,350	2,320	2,030
13	1,890	2,040	*1,990	*1,790	4,060	a1,750	4,830	18,500	11,400	5,830	2,340	2,070
14	1,890	1,960	1,880	1,850	a3,300	a1,750	5,500	18,300	*12,100	5,640	2,300	2,050
15	1,900	2,310	1,780	1,890	a2,700	a1,700	5,810	17,000	13,000	5,210	2,240	1,990
16	1,890	1,720	1,860	1,850	a2,500	a1,900	5,650	15,300	14,400	5,150	2,160	1,960
17	1,960	2,030	1,860	1,790	a2,350	a2,000	5,610	14,800	14,700	*4,850	2,090	1,960
18	1,970	2,130	1,830	1,760	a2,250	a1,950	5,810	15,200	14,100	4,590	2,000	*1,960
19	1,990	2,190	1,790	1,660	a2,150	a1,900	6,080	15,700	13,000	4,350	1,880	1,950
20	1,990	2,100	1,810	b1,400	*2,160	a2,050	5,940	15,500	11,800	4,170	1,880	2,000
21	1,960	2,060	1,810	b1,500	2,170	a2,300	5,680	15,100	10,900	4,020	1,830	2,070
22	1,950	2,140	1,790	b1,800	2,090	a2,700	5,460	15,000	10,100	3,800	1,740	2,090
23	1,990	2,040	1,860	b1,600	1,950	a2,650	5,240	15,600	9,460	3,510	1,780	2,200
24	1,970	1,960	2,020	b1,650	1,870	a2,400	5,060	17,100	8,740	3,470	1,860	2,300
25	1,930	2,060	2,190	b1,750	2,020	a2,700	4,810	17,700	9,220	3,350	1,960	2,340
26	1,920	2,180	2,320	1,900	2,000	a3,000	4,750	16,600	8,820	3,280	1,980	2,380
27	1,920	2,250	2,220	a1,600	1,820	a3,200	4,890	15,300	8,320	3,160	1,910	2,340
28	1,990	2,180	2,120	a1,200	1,830	*2,990	5,280	15,000	7,920	3,190	1,950	2,280
29	2,090	2,090	2,070	a800	-	2,640	*6,120	15,200	7,530	3,340	1,950	2,200
30	*2,190	2,060	2,030	a850	-	2,630	7,380	14,000	7,140	3,060	2,060	2,160
31	2,240	-	2,030	a1,000	-	2,770	-	12,800	-	2,990	2,230	-
Total	60,640	63,340	59,780	50,090	62,690	64,260	157,490	436,000	312,850	157,130	6*,350	62,350
Mean	1,956	2,111	1,928	1,616	2,239	2,073	5,250	14,060	10,430	5,069	2,205	2,078
Ac-ft	120,300	125,600	118,600	99,350	124,300	127,500	312,400	864,800	620,500	311,700	133,600	123,700
Calendar year 1950: Max	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100
Water year 1950-51: Max	18,500	18,500	18,500	18,500	18,500	18,500	18,500	18,500	18,500	18,500	18,500	18,500

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records and records for powerplant at Bonner as furnished by Montana Power Co.

b Stage-discharge relation affected by ice.

## PEND OREILLE RIVER BASIN

West Fork Bitterroot River near Conner, Mont.

Location.--Lat 45°44', long. 114°17', in NE<sup>1</sup>/<sub>4</sub> sec. 26, T. 1 S., R. 22 W., on right bank half a mile downstream from West Fork Dam, 6 miles upstream from Nez Perce Creek, and 16 miles southwest of Conner.

Drainage area.--322 sq mi.

Records available.--April 1941 to September 1951.

Gage.--Water-stage recorder.

Average discharge.--10 years, 299 cfs.

Extremes.--Maximum discharge during year, 2,020 cfs May 25 (gage height, 4.45 ft); minimum, 1.2 cfs Sept. 8-15 (gage height, 0.33 ft).

1941-51: Maximum discharge, 4,060 cfs May 9, 1947 (gage height, 6.18 ft); minimum, 0.2 cfs Nov. 25, 1942.

Remarks.--Records good except those for period of Sept. 8-15, which are poor. Flow regulated by West Fork Bitterroot River Reservoir (see p. 249). Diversions for irrigation of about 200 acres above station.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)  
(Shifting-control method used May 30 to June 14)

0.3	1.0	0.8	18	2.5	502
.4	1.5	1.0	40	3.0	765
.5	3.0	1.3	88	3.5	1,090
.6	6.0	1.6	155	4.0	1,510
.7	11	2.0	288	4.5	1,980

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	170	225	90	88	a83	84	88	a498	1,180	497	139	92
2	214	221	98	88	a83	86	88	a501	1,030	502	134	88
3	*252	221	116	88	a83	86	88	a503	929	469	134	86
4	252	274	116	88	83	86	90	a508	864	480	139	84
5	252	311	116	88	83	86	90	a508	864	455	150	234
6	252	311	116	88	83	86	92	512	864	419	145	430
7	252	311	116	88	83	86	92	516	851	388	137	206
8	252	*311	116	a88	83	86	198	526	838	376	129	1.2
9	249	311	116	a88	88	86	331	536	813	351	122	1.2
10	249	311	116	a88	88	88	359	1,300	807	338	118	1.2
11	249	311	116	a88	88	88	359	1,710	832	334	122	1.2
12	249	307	114	a86	88	88	359	1,980	*896	315	129	1.2
13	249	307	114	a86	88	88	363	1,840	942	299	118	1.2
14	245	307	*114	a86	86	88	367	1,540	994	284	111	1.2
15	245	303	114	*86	86	88	367	1,290	1,080	270	105	4.8
18	245	303	114	86	86	88	367	1,280	1,220	259	101	33
17	245	299	111	86	88	88	371	*1,220	1,220	*245	99	53
18	242	248	111	86	88	90	376	1,390	1,140	232	96	62
19	242	124	96	86	88	90	380	1,520	1,050	225	90	67
20	238	66	57	84	88	90	380	1,540	968	211	88	68
21	238	88	57	84	88	90	380	1,500	896	202	86	68
22	238	90	57	84	86	90	384	1,540	832	192	92	68
23	235	90	68	84	86	90	384	1,710	771	188	*118	68
24	235	90	86	84	86	90	384	1,980	738	182	122	121
25	232	90	88	84	84	88	384	1,970	721	176	114	204
26	232	90	86	84	*84	88	*380	1,780	666	173	101	249
27	228	90	88	84	84	88	380	1,690	611	167	96	249
28	228	90	88	84	84	88	427	1,800	580	164	96	245
29	225	90	88	a84	-	88	a493	1,740	550	158	96	277
30	225	90	88	a84	-	88	a496	1,560	516	152	98	359
31	225	-	88	a84	-	*88	-	1,380	-	145	96	-
Total	7,394	6,280	3,061	2,664	2,396	2,722	9,297	39,846	26,263	8,828	3,521	3,424.2
Mean	238	209	98.7	86.0	85.6	87.8	316	1,285	875	285	114	114
Ac-ft	14,650	12,460	6,070	5,280	4,750	5,400	18,440	79,030	52,090	17,510	6,980	6,790

Calendar year 1950: Max 1,820 Min 23 Mean 291 Ac-ft 210,500  
Water year 1950-51: Max 1,980 Min 1.2 Mean 317 Ac-ft 229,400

\* Discharge measurement made on this day.

a No gage-height record; discharge interpolated or estimated on basis of recorded range in stage and on basis of records for Bitterroot River near Darby.

## East Fork Bitterroot River at Conner, Mont.

Location.--Lat 45°56'00", long. 114°07'30", in SE<sup>1</sup>/<sub>4</sub> sec. 7, T. 2 N., R. 20 W., on left bank 125 ft downstream from highway bridge at Conner and half a mile upstream from confluence with West Fork.

Drainage area.--405 sq mi (revised).

Records available.--September 1910 to September 1916 (1916, gage heights only) published as "near Darby", April 1937 to September 1951.

Gage.--Wire-weight gage read twice daily. Sept. 20, 1910, to Sept. 17, 1916, staff gage at site 2½ miles upstream at different datum. Apr. 4, 1937, to Aug. 14, 1941, wire-weight gage on highway bridge 125 ft upstream at present datum.

Average discharge.--14 years (1937-51), 253 cfs.

Extremes.--Maximum discharge during year, 2,530 cfs May 24 (gage height, 4.65 ft from graph based on gage readings); minimum observed, 28 cfs Jan. 28 (gage height, 1.03 ft).

1910-15, 1937-51: Maximum discharge, 3,760 cfs May 29, 1948; maximum gage height, 5.78 ft May 9, 1947; minimum discharge observed, 1.4 cfs Aug. 17, 1937.

Remarks.--Records poor. Diversions for irrigation of about 3,000 acres above station.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	108	120	95	b85	b95	b95	135	570	1,340	600	214	113
2	105	129	90	b85	b100	98	154	537	1,140	680	207	111
3	*105	129	90	b90	b100	b92	185	476	1,000	580	204	111
4	110	123	110	b80	b110	b90	220	493	940	625	197	111
5	118	120	80	b75	b110	88	274	570	1,000	580	191	109
6	120	126	80	52	b110	86	300	672	1,010	535	185	107
7	115	132	105	36	b110	b85	340	944	1,000	502	179	107
8	105	*123	90	b60	b120	b85	375	1,400	954	479	170	105
9	112	102	80	b85	b130	b85	350	*1,540	904	452	162	105
10	112	b100	77	b90	210	88	315	1,660	975	515	159	103
11	112	b130	77	b90	249	b90	305	1,770	968	484	154	101
12	110	129	77	b90	232	b90	320	2,030	*1,020	452	154	101
13	110	123	80	93	135	b90	395	1,660	1,100	389	145	101
14	105	132	*77	105	147	b90	449	1,310	1,240	376	138	101
15	110	123	86	*112	132	b92	427	1,120	1,340	384	140	103
16	112	129	84	102	129	95	380	1,060	1,500	364	132	101
17	110	135	77	98	120	95	416	1,150	1,480	*352	128	99
18	115	135	80	93	b120	95	498	1,250	1,340	348	125	99
19	120	123	86	75	b115	b98	515	1,420	1,180	320	125	99
20	110	105	86	b70	b110	b100	482	1,420	1,180	293	118	105
21	118	115	84	b65	108	105	410	1,460	1,040	282	113	103
22	126	120	75	69	b109	110	449	1,470	961	296	113	103
23	120	120	91	71	110	105	405	1,730	880	293	*120	99
24	118	110	91	b72	115	108	345	2,250	904	282	118	101
25	115	115	88	73	b110	118	350	2,130	862	279	113	105
26	120	115	84	b70	*b102	141	*375	2,000	776	268	109	105
27	115	115	84	48	b95	144	390	2,040	745	265	109	101
28	120	105	88	39	93	128	482	2,230	705	258	115	99
29	120	95	87	b35	-	132	564	1,960	650	248	113	101
30	123	100	87	b50	-	138	559	1,680	615	234	113	101
31	120	-	86	b70	-	*132	-	1,560	-	227	113	-
Total	5,539	3,578	2,652	2,328	3,525	3,186	11,164	43,562	30,729	12,222	4,476	3,110
Mean	114	119	85.5	75.1	126	103	372	1,405	1,024	394	144	104
Cfs/m	0.281	0.294	0.211	0.185	0.311	0.254	0.919	3.47	2.53	0.975	0.356	0.257
In.	0.32	0.33	0.24	0.21	0.32	0.29	1.03	4.00	2.82	1.12	0.41	0.29
Ac-ft	7,020	7,100	5,260	4,620	6,990	6,320	22,140	86,400	60,950	24,240	8,880	6,170

Calendar year 1950: Max ' 2,280 Min 58 Mean 327 Cfs/m 0.807 In. 10.97 Ac-ft 236,800  
 Water year 1950-51: Max 2,250 Min 35 Mean 340 Cfs/m 0.840 In. 11.38 Ac-ft 246,100

Peak discharge (base, 700 cfs).--May 12 (11 a.m.) 2,170 cfs (4.43 ft); May 24 (2 p.m.) 2,530 cfs (4.65 ft); May 28 (11 a.m.) 2,490 cfs (4.61 ft); June 16 (12 m.) 1,660 cfs (3.72 ft).

\* Discharge measurement made on this day.  
 b Stage-discharge relation affected by ice.

Note.--Stage-discharge relation indefinite Nov. 20 to Dec. 9; discharge estimated on basis of records for Bitterroot River near Darby.

## Bitterroot River near Darby, Mont.

Location.--Lat 45°58'20", long. 114°08'20", in E $\frac{1}{2}$  (revised) sec. 36, T. 3 N., R. 21 W., on left bank 25 ft downstream from bridge on U. S. Highway 93, a quarter of a mile downstream from Chaffin Creek, and 4 miles southeast of Darby.

Drainage area.--1,050 sq mi, approximately.

Records available.--April 1937 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 3,943.14 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. Prior to Aug. 2, 1939, wire-weight gage at highway bridge 25 ft upstream at same datum.

Average discharge.--14 years, 877 cfs.

Extremes.--Maximum discharge during year, 7,080 cfs May 24 (gage height, 6.47 ft); minimum, 138 cfs Jan. 29 (gage height, 1.39 ft).

1937-51: Maximum discharge, 11,500 cfs May 9, 1947 (gage height, 8.18 ft); minimum observed, about 71 cfs Feb. 9, 1939; minimum gage height observed, 1.06 ft-Dec. 9, 1937.

Remarks.--Records excellent except those for periods of ice effect or no gage height record, which are poor. Some regulation by West Fork Bitterroot River Reservoir (see p. 249). Diversions for irrigation of about 5,000 acres above station. Ditch bypassing station irrigates about 500 acres below.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Apr. 18				Apr. 19 to Sept. 30			
1.5	165	2.8	940	1.7	190	4.0	2,300
1.7	230	3.2	1,340	2.0	320	4.5	3,070
2.0	365	3.8	2,020	2.5	640	5.5	4,950
2.4	605			3.0	1,080	6.3	6,690
				3.5	1,620		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	382	570	370	310	288	288	414	2,100	3,660	2,070	577	345
2	398	570	335	310	306	279	470	2,000	3,170	2,170	563	335
3	*464	558	340	320	306	279	591	2,800	2,860	2,070	549	330
4	481	591	404	306	315	288	768	2,950	2,700	2,170	556	325
5	542	698	320	297	315	288	959	2,150	2,630	2,070	570	350
6	584	696	320	250	315	274	1,100	2,400	2,910	1,970	535	570
7	542	696	398	220	306	284	1,250	2,700	2,810	1,720	514	591
8	529	*696	376	262	335	270	1,330	3,500	2,720	1,650	486	266
9	577	594	360	288	387	279	1,480	3,850	2,620	1,540	472	238
10	563	556	350	284	529	262	1,470	4,590	2,690	1,670	451	222
11	620	665	350	297	688	266	1,360	5,560	2,960	1,540	444	218
12	665	635	360	306	712	270	1,370	6,180	*3,220	1,370	451	218
13	658	584	355	310	570	274	1,570	5,480	3,480	1,310	430	214
14	620	605	*325	310	511	270	1,900	4,570	3,900	1,310	418	210
15	620	549	355	*306	481	284	1,850	3,880	4,510	1,340	400	206
16	650	577	355	297	453	292	1,780	3,620	4,990	1,230	388	206
17	612	577	340	292	442	270	1,840	*3,900	4,570	*1,190	376	222
18	642	584	330	284	420	260	2,010	4,470	4,170	1,120	360	238
19	658	431	340	270	409	270	2,020	4,750	3,700	1,070	350	246
20	605	320	310	262	392	270	1,820	4,690	3,550	970	340	262
21	591	355	288	284	392	288	1,620	4,610	3,240	899	335	270
22	650	360	270	288	355	306	1,480	4,930	2,990	818	335	266
23	620	365	320	284	340	292	1,390	5,670	2,750	776	*406	270
24	591	355	365	288	355	302	1,320	6,670	2,910	759	424	280
25	570	387	382	288	330	335	1,320	6,140	2,750	776	394	345
26	570	398	382	288	*302	392	*1,440	5,430	2,520	748	365	430
27	563	392	345	242	284	414	2,150	5,350	2,450	774	355	430
28	570	387	360	177	288	376	2,170	6,530	2,360	696	355	424
29	584	350	355	b160	-	382	2,050	5,560	2,190	644	360	418
30	598	382	345	b190	-	404	2,050	4,830	2,080	626	365	514
31	591	-	330	b240	-	*392	-	4,260	-	598	360	-
Total	17,910	15,461	10,735	8,510	11,126	9,390	43,272	134,200	94,240	39,663	13,284	9,459
Mean	578	515	346	275	397	303	1,442	4,329	3,141	1,279	429	315
As-ft	35,520	30,670	21,290	16,880	22,070	18,620	85,830	266,200	186,900	78,670	26,350	18,760

Calendar year 1950: Max 6,640 Min 190 Mean 1,059 As-ft 766,300  
 Water year 1950-51: Max 6,670 Min 160 Mean 1,116 As-ft 807,800

Peak discharge (base, 2,500 cfs).--May 12 (9:30 a.m.) 6,460 cfs (6.20 ft); May 24 (9:30 a.m.) 7,080 cfs (6.47 ft); May 28 (10 a.m.) 7,010 cfs (6.44 ft); June 16 (5:30 a.m.) 5,370 cfs (5.71 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations on East Fork and West Fork Bitterroot River.

b Stage-discharge relation affected by ice.



## Rock Creek near Darby, Mont.

Location.--Lat 46°04'10", long. 114°13'20", in SE $\frac{1}{4}$  sec. 29, T. 4 N., R. 21 W., on left bank 0.6 mile downstream from Como Lake, 0.7 mile upstream from Rock Creek Canal, and 4 miles northwest of Darby.

Drainage area.--55.5 sq mi.

Records available.--April 1946 to September 1948 (fragmentary), December 1948 to September 1951. Records for earlier years collected by Bitterroot Irrigation District.

Gage.--Water-stage recorder. Prior to Dec. 2, 1948, staff gage 0.6 mile downstream at different datum.

Extremes.--Maximum discharge during year, 764 cfs June 18 (gage height, 4.09 ft); minimum, 3.0 cfs Oct. 15 to Nov. 11 (gage height, 1.05 ft).  
1948, 1948-50: Maximum discharge, 1,580 cfs June 17, 1950 (gage height, 5.19 ft), from rating curve extended above 380 cfs, but may have been higher in May 1947; no flow Apr. 6, 18, 19, May 27-30, 1946.

Remarks.--Records fair except those for periods of no gage-height record and those below 10 cfs, which are poor. Flow regulated to limit of capacity of Como Lake (see p. 249). Small diversion above station for irrigation. Greater part of flow diverted by Rock Creek Canal, 0.7 mile below station.

Rating tables, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)

Oct. 1-15			Oct. 15 to Sept. 30		
2.0	80	1.0	2.0	2.3	89
2.2	111	1.2	6.0	2.7	166
2.5	163	1.4	11.5	3.0	245
		1.7	24	3.5	435
		2.0	49	4.1	770

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	154	3.0	4.8	110	*107	107	91	*109	430	426	346	322
2	152	3.0	5.0	110	107	105	91	132	386	453	180	314
3	150	3.0	5.0	109	107	105	91	168	358	462	180	292
4	*150	3.0	5.0	109	107	105	89	205	350	495	176	269
5	149	3.0	5.2	109	107	105	88	236	346	510	173	269
6	147	3.0	5.2	109	107	103	86	263	346	520	183	266
7	145	3.0	5.2	109	107	103	86	275	346	495	192	263
8	143	3.0	5.4	109	107	103	84	278	346	462	190	260
9	142	*3.0	5.4	109	107	103	82	*282	330	444	212	263
10	116	3.0	5.6	107	107	103	80	286	300	435	215	260
11	98	3.0	5.6	107	107	102	46	289	245	394	258	254
12	94	3.2	5.6	107	107	102	28	292	236	318	257	257
13	92	3.4	5.6	107	107	102	27	296	*239	254	210	263
14	92	3.4	5.6	107	107	102	27	300	242	251	205	263
15	40	3.4	*5.6	107	107	102	27	300	248	275	205	260
16	3.0	3.6	5.6	107	107	100	27	300	460	310	208	260
17	3.0	3.6	5.8	107	107	100	27	303	686	330	215	257
18	3.0	3.8	5.8	107	107	100	26	303	734	*326	227	257
19	3.0	4.0	6.0	107	107	99	25	303	650	318	215	257
20	3.0	4.0	6.0	107	107	99	a25	306	544	303	215	254
21	3.0	4.2	6.2	107	107	99	a25	310	448	296	*212	254
22	3.0	4.2	46	107	107	99	a25	314	458	303	262	251
23	3.0	4.4	94	107	107	99	a25	318	369	306	303	199
24	3.0	4.4	110	107	107	99	a25	322	310	314	358	180
25	3.0	4.4	110	107	107	99	a25	326	354	314	358	173
26	3.0	4.4	110	107	*107	97	a25	330	390	314	342	155
27	3.0	4.4	110	107	107	97	a25	338	426	318	342	142
28	3.0	4.4	110	107	107	97	a25	426	444	330	334	146
29	3.0	4.6	110	107	-	*97	a25	542	440	334	330	148
30	3.0	4.6	110	107	-	95	a50	530	430	334	330	142
31	3.0	-	110	107	-	24	-	480	-	358	326	-
Total	1,912.0	109.4	1,135.2	3,337	2,996	3,122	1,428	9,462	11,891	11,302	7,719	7,150
Mean	61.7	3.65	36.6	108	107	101	47.6	305	396	365	249	238
Ac-ft	3,790	217	2,250	6,620	5,940	6,190	2,830	18,770	23,590	22,420	15,310	14,180
Calendar year 1950: Max				1,340	Min 0.8	Mean 166	Ac-ft 120,500					
Water year 1950-51: Max				734	Min 3.0	Mean 169	Ac-ft 122,100					

\* Discharge measurement made on this day.  
a No gage-height record; discharge estimated.

## PEND OREILLE RIVER BASIN

## Rock Creek Canal near Darby, Mont.

Location.--Lat 46°04'40", long. 114°12'40", in SE $\frac{1}{4}$  NW $\frac{1}{4}$  (revised) sec. 28, T. 4 N., R. 21 W., on downstream side of footbridge a quarter of a mile downstream from diversion dam,  $\frac{1}{2}$  miles downstream from Como Lake, and 4 miles northwest of Darby.

Records available.--April to September 1946, May 1948 to September 1951 (irrigation seasons only).

Gage.--Water-stage recorder. Apr. 8 to May 13, 1946, staff gage a quarter of a mile upstream at different datum, May 14, 1946, to May 27, 1950, staff gage at present site approximately at present datum, and May 28, 1950, to Sept. 30, 1950, staff gage 80 ft downstream at present datum.

Extremes.--1946, 1948-51: Maximum daily discharge, 349 cfs July 27, 1949; no flow except during irrigation seasons.

Remarks.--Records excellent. Canal diverts from Rock Creek for irrigation of land in vicinity of Hamilton. During irrigation seasons water may be diverted from Lost Horse Creek into canal below station near southwest corner of sec. 22.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.9	0	1.5	11	3.0	109
1.0	.5	1.7	19	3.5	156
1.1	1.1	1.9	29	4.0	211
1.2	2.5	2.2	47	5.0	334
1.3	5.0	2.5	68		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-						0	*66	245	252	330	320
2	-						0	104	245	254	174	313
3	-						0	145	243	253	172	288
4	†111						0	188	241	254	168	267
5	-						0	225	242	253	168	266
6	-						0	242	243	253	175	253
7	-						0	252	225	252	188	252
8	-						0	252	192	251	186	252
9	-						0	*251	190	249	203	259
10	-						0	248	190	243	203	258
11	-						0	248	186	239	241	248
12	-						0	248	187	237	241	255
13	-						0	249	*189	231	201	257
14	†87						0	248	189	231	192	257
15	-						0	251	190	251	195	257
16	-						0	*249	197	261	198	257
17	-						0	251	198	265	205	253
18	-						0	251	200	*265	211	254
19	-						0	251	206	279	205	254
20	-						0	251	213	291	205	251
21	-						0	249	217	289	*204	249
22	-						0	251	183	293	248	247
23	-						0	252	21	302	293	196
24	-						*1.1	254	39	304	326	178
25	-						2.3	255	220	304	330	173
26	-						3.8	254	239	305	331	151
27	-						5.3	254	234	309	331	136
28	-						20	254	239	325	328	142
29	-						15	248	233	328	325	146
30	-						32	246	251	328	328	141
31	-						-	245	-	331	322	-
Total	-						79.5	7,232	6,087	8,498	7,427	7,030
Mean	-						26.5	233	203	274	240	234
Ac-ft	-						158	14,340	12,070	16,860	14,730	13,940

Calendar year : Max - Min - Mean - Ac-ft -  
The period : Max - Min - Mean - Ac-ft 72,100

\* Discharge measurement made on this day.

† Result of discharge measurement.

## Skalkaho Creek near Hamilton, Mont.

Location.--Lat 46°09'50", long. 113°56'20", in SW 1/4 sec. 26, T. 5 N., R. 19 W., on right bank 2 miles downstream from Daly Creek and 12 miles southeast of Hamilton.

Drainage area.--87.8 sq mi.

Records available.--April 1920 to September 1924, December 1948 to September 1951.

Gage.--Water-stage recorder. Apr. 20, 1920, to Sept. 30, 1924, staff gage at site 3 miles downstream at different datum.

Extremes.--Maximum discharge during year, 665 cfs May 28 (gage height, 4.11 ft); maximum recorded gage height, 4.95 ft Feb. 1 (backwater from ice); minimum recorded discharge, 17 cfs Feb. 27 (gage height, 1.36 ft).

1920-24, 1948-51: Maximum discharge observed, 1,110 cfs June 15 (corrected), 1922 (gage height, 3.80 ft, site and datum then in use); minimum recorded, 12 cfs Mar. 11, 1950 (gage height, 1.27 ft).

Flood of May 1948 reached a discharge of 1,130 cfs (by slope-area method at a point 5 miles downstream).

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor. During irrigation season flow is supplemented by releases from Kent Lake and Dam Creek Lake (combined capacity, 200 acre-ft).

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-29

Oct. 30 to Sept. 30

1.8 36  
2.0 54  
2.1 66

1.5 22  
1.7 33  
2.0 55

2.5 115  
3.0 224  
4.0 610

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	42	50	39	32	b26	26	29	131	435	367	109	82
2	*42	49	36	34	28	26	32	119	391	399	106	61
3	42	48	40	35	30	26	36	115	359	375	102	60
4	45	49	34	34	30	26	41	124	351	419	102	54
5	52	50	36	32	29	26	48	149	367	379	99	57
6	54	49	b34	b30	28	b26	53	211	355	355	95	56
7	46	*49	b36	b28	28	26	59	275	341	333	92	54
8	46	45	b37	b29	30	b26	60	326	319	302	91	55
9	47	40	36	b29	32	26	58	*350	319	285	87	54
10	44	b38	36	b50	34	26	53	355	341	305	86	53
11	46	b39	36	b31	34	27	51	419	375	263	85	53
12	46	b40	36	b31	33	26	54	451	407	244	83	53
13	44	b40	35	b31	33	26	67	403	*431	233	81	51
14	42	b40	35	b31	32	25	80	348	475	230	79	50
15	45	42	*35	*b32	31	26	80	323	534	224	75	49
16	43	42	34	32	30	26	81	326	578	*214	73	49
17	44	41	34	32	29	24	87	375	542	203	72	48
18	47	42	34	31	29	24	97	427	511	191	71	50
19	45	41	34	30	28	24	103	431	480	180	69	49
20	42	b41	34	29	27	24	97	435	471	171	68	49
21	43	41	34	33	27	25	92	443	463	162	*68	49
22	46	41	34	31	26	26	86	475	451	153	68	49
23	44	40	36	29	*b26	24	83	547	435	147	77	51
24	42	41	36	32	b26	25	81	588	447	141	72	49
25	42	42	36	31	26	26	82	552	439	137	68	49
26	42	41	33	31	26	27	88	529	427	133	66	53
27	44	41	35	26	b26	26	99	556	423	128	65	49
28	47	40	34	b24	b26	26	*119	601	407	122	66	46
29	62	39	34	b21	-	*26	137	558	383	119	66	46
30	62	40	34	b20	-	27	137	498	363	114	69	45
31	55	-	32	b22	-	28	-	471	-	103	64	-
Total	1,433	1,281	1,094	921	810	798	2,270	11,871	12,620	7,137	2,474	1,557
Mean	46.2	42.7	35.3	29.7	26.9	25.7	75.7	383	421	230	79.8	51.9
Cfs/m	0.526	0.486	0.402	0.338	0.329	0.293	0.862	4.36	4.79	2.62	0.909	0.591
In.	0.61	0.54	0.46	0.39	0.34	0.34	0.96	5.03	5.34	3.02	1.05	0.66
Ac-ft	2,840	2,540	2,170	1,830	1,610	1,580	4,500	25,550	25,030	14,160	4,910	3,090

Calendar year 1950: Max 757 Min 15 Mean 108 Cfs/m 1.23 In. 16.73 Ac-ft 78,380  
 Water year 1950-51: Max 601 Min 20 Mean 121 Cfs/m 1.38 In. 18.74 Ac-ft 87,810

Peak discharge (base, 400 cfs).--May 12 (12:30 a.m.) 463 cfs (3.67 ft); May 28 (3 a.m.) 665 cfs (4.11 ft); June 16 (1 a.m.) 630 cfs (4.04 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Feb. 2-22; discharge estimated on basis of temperature records.

## Blodgett Creek near Corvallis, Mont.

Location.--Lat 46°16'10", long. 114°14'10" (revised), in NW¼ sec. 21, T. 6 N., R. 21 W., on right bank 4½ miles upstream from mouth and 7 miles southwest of Corvallis.

Drainage area.--26.4 sq mi (revised).

Records available.--December 1946 to September 1951.

Gage.--Water-stage recorder.

Extremes.--Maximum discharge during year, 518 cfs June 16 (gage height, 5.11 ft); minimum, 6.8 cfs Sept. 25 (gage height, 2.19 ft).  
1946-51: Maximum discharge, 836 cfs May 16, 1949 (gage height, 6.42 ft); minimum, 1.6 cfs Feb. 19, 1949 (gage height, 1.96 ft).

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are poor. Flow slightly regulated at low stages by storage for irrigation in High Lake and Blodgett Lake (combined capacity, 900 acre-ft).

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-29

Oct. 30 to Sept. 30

2.3 9.5  
2.5 19  
2.7 32  
3.0 62  
3.3 108

2.2 7.0 3.3 106  
2.4 16 3.5 142  
2.6 27 4.0 246  
2.8 43 4.5 365  
3.0 65 5.0 490

Note.--Same  
as following  
table above  
3.3 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	10	117	45	31	b15	18	18	140	160	202	45	26
2	11	98	41	30	b18	18	22	119	137	246	42	27
3	10	91	41	29	b19	18	29	108	125	220	40	28
4	*14	100	39	30	b19	18	40	115	129	258	38	28
5	48	128	31	28	20	17	52	152	168	211	34	24
6	55	106	b35	27	18	b16	69	235	172	203	30	23
7	34	96	36	23	17	b15	87	297	164	190	28	23
8	41	84	33	b24	20	b14	97	304	154	170	26	25
9	66	*72	32	26	24	b14	92	283	154	154	24	26
10	52	b68	32	25	46	b14	85	316	190	190	23	23
11	94	65	33	25	60	b14	76	355	246	144	22	26
12	77	59	34	24	45	14	81	350	278	135	20	25
13	69	53	33	23	38	14	112	255	*271	153	19	23
14	56	51	32	22	35	14	150	202	328	173	18	21
15	56	46	32	21	33	14	128	176	402	172	16	20
16	54	44	*30	*20	30	16	122	*178	420	156	a15	20
17	56	41	30	20	29	15	133	224	330	*150	a14	18
18	99	42	29	20	28	14	152	276	302	138	a13	19
19	90	38	28	20	26	14	144	262	258	128	a12	18
20	70	38	28	20	25	14	117	258	258	106	a12	14
21	68	37	28	18	25	15	97	264	235	88	a17	12
22	79	35	28	18	23	16	85	304	217	77	*24	9.4
23	69	33	30	18	*22	15	77	398	213	71	24	9.0
24	60	34	36	18	22	16	77	452	269	73	14	7.8
25	52	43	43	18	21	16	83	352	235	78	11	9.5
26	52	50	43	18	20	18	106	292	220	73	9.8	28
27	51	51	39	16	20	18	133	309	235	66	9.0	16
28	58	50	37	b15	20	18	*170	360	220	65	9.8	14
29	198	49	35	b13	-	18	211	262	188	63	10	12
30	215	48	34	b10	-	*18	174	217	180	55	24	11
31	152	-	33	b11	-	18	-	184	-	48	25	-
Total	2,114	1,867	1,060	661	738	491	3,017	7,997	6,859	4,257	668.6	580.7
Mean	68.2	62.2	34.2	21.3	26.4	15.8	101	258	229	137	21.6	19.4
Cfs/m	2.58	2.36	1.30	0.807	1.00	0.598	3.83	9.77	8.67	5.19	0.818	0.735
In.	2.97	2.63	1.50	0.93	1.04	0.69	4.27	11.26	9.87	5.98	0.94	0.82
Ac-ft	4,190	3,700	2,100	1,310	1,460	974	5,980	15,860	13,600	8,440	1,330	1,150
Calendar year 1950: Max	636			Min 5.5	Mean 88.9	Cfs/m 3.37	In. 45.73	Ac-ft 64,330				
Water year 1950-51: Max	452			Min 7.8	Mean 83.0	Cfs/m 3.14	In. 42.70	Ac-ft 60,090				

Peak discharge (base, 450 cfs).--May 24 (6 to 8 a.m.) 492 cfs (5.01 ft); June 16 (3:30 a.m.) 518 cfs (5.11 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for nearby streams.

b Stage-discharge relation affected by ice.

## Fred Burr Creek near Victor, Mont.

Location.--Lat 46°21'20", long. 114°15'10", in NE¼NW¼ sec. 20, T. 7 N., R. 21 W., on right bank 5 miles upstream from mouth and 7 miles southwest of Victor.

Drainage area.--18.6 sq mi.

Records available.--December 1946 to September 1951 (discontinued).

Gage.--Water-stage recorder. Prior to Apr. 4, 1948, water-stage recorder at same site at datum 1.74 ft higher. July 30 to Sept. 30, 1948, staff gage at same site at datum 0.22 ft lower.

Extremes.--Maximum discharge during year, 424 cfs June 16 (gage height, 4.58 ft); minimum daily, 5 cfs Jan. 30, 31.  
1946-51: Maximum discharge, 23,100 cfs May 28, 1948 (failure of dam above station) by slope-area determination of peak flow at site 3 miles upstream from station; minimum observed, 2.7 cfs Sept. 20-22, 1948.

Remarks.--Records fair. Flow slightly regulated by Fred Burr Lake (capacity, 200 acre-ft), and prior to May 28, 1948, by Fred Burr Reservoir (capacity, 515 acre-ft).

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Apr. 4

Apr. 5 to Sept. 30

2.5	7.0	2.4	6.0	3.0	47
2.6	10	2.5	9.0	3.2	75
2.8	19	2.6	13	3.5	135
3.0	34	2.7	18	4.0	253
3.3	64	2.8	25	4.3	340
3.7	123				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.8	51	11	18	b*6	b11	12	89	153	119	28	14
2	8.8	42	37	18	a9	b11	13	72	135	153	27	14
3	8.8	43	41	18	a11	b11	19	84	119	146	26	14
4	9.8	55	27	16	a12	b11	29	64	107	175	24	13
5	22	60	23	16	a12	b10	43	84	105	153	22	13
6	*30	53	b22	b15	a10	b10	59	123	109	144	20	12
7	22	47	20	b14	a10	b10	68	148	107	137	18	12
8	25	43	18	b15	b11	b10	70	202	105	131	17	12
9	34	*41	18	b16	b16	b9	64	240	105	109	16	12
10	30	40	18	b15	b28	b9	55	*216	105	107	14	11
11	48	32	18	b14	32	b9	50	229	107	105	14	11
12	46	28	20	13	25	b8.5	54	224	128	89	13	11
13	40	26	20	12	22	b8.5	72	206	*191	89	12	11
14	32	25	19	12	20	8.5	97	173	240	113	11	10
15	32	23	*18	12	18	8.5	80	140	314	127	11	10
16	27	22	17	12	18	8.5	72	131	328	111	10	9.8
17	26	21	16	12	17	8.5	79	146	250	103	11	9.4
18	43	20	16	11	16	7.9	93	164	218	*99	16	9.4
19	40	22	15	11	15	7.9	88	170	184	93	16	9.0
20	32	21	15	10	14	8.2	69	175	184	82	15	8.7
21	35	18	15	10	14	8.5	57	175	162	68	14	8.7
22	38	18	15	10	13	8.8	51	182	151	56	*16	8.4
23	38	17	18	10	13	8.5	46	226	144	51	16	8.1
24	34	18	23	10	13	8.8	47	308	170	48	16	7.2
25	29	26	31	10	*12	9.4	55	221	166	54	16	6.9
26	28	32	29	10	b12	10	70	190	144	55	16	14
27	28	32	26	b9	b12	10	86	204	159	47	15	16
28	30	32	24	b8	b12	10	*111	253	153	41	16	11
29	89	24	22	b6	-	10	135	199	127	40	16	8.7
30	110	9.1	21	b5	-	*10	117	182	119	35	15	8.4
31	75	-	19	b5	-	10	-	166	-	30	14	-
Total	1,099.2	941.1	652	371	424	290.0	1,961	5,366	4,787	2,910	511	323.7
Mean	35.5	31.4	21.0	12.0	15.1	9.35	65.4	173	160	93.9	16.5	10.8
Ac-ft	2,180	1,870	1,290	736	841	575	3,890	10,640	9,490	5,770	1,010	642
Calendar year 1950: Max	560				Min 6.6		Mean 57.5		Ac-ft 41,610			
Water year 1950-51: Max	326				Min 5		Mean 53.8		Ac-ft 38,930			

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records and records for Bear Creek near Victor.

b Stage-discharge relation affected by ice.

## Bear Creek near Victor, Mont.

Location.--Lat 46°23', long. 114°13', in NE<sup>1</sup> sec. 9, T. 7 N., R. 21 W., on left bank 4 miles upstream from mouth and 5 miles southwest of Victor.

Drainage area.--26.8 sq mi (revised).

Records available.--April 1938 to September 1951.

Gage.--Water-stage recorder and timber control. Prior to Aug. 27, 1941, staff gage at same site and datum.

Average discharge.--13 years, 65.2 cfs.

Extremes.--Maximum discharge during year, 654 cfs June 15 (gage height, 2.99 ft); minimum, 6.5 cfs Sept. 20 (gage height, 0.01 ft).  
1938-51: Maximum discharge, 1,340 cfs June 16, 1950 (gage height, 4.04 ft), from rating curve extended above 530 cfs; minimum recorded, 1.0 cfs Sept. 13, Nov. 15, 1944.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair.

Revisions (water years).--W 982: 1942.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

-0.1	5.1	1.0	77
.1	10	1.5	145
.3	18	2.0	242
.5	30	2.5	410
.7	47	2.7	500

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	12	108	45	37	b13	b18	18	127	140	204	42	9.3
2	13	92	42	36	b16	b18	20	108	124	248	40	9.0
3	13	87	42	34	b17	b18	26	98	115	229	36	9.6
4	20	112	40	32	b18	18	36	108	122	274	34	9.0
5	*60	123	b55	30	b18	b17	54	150	154	222	30	8.4
6	60	102	b36	b29	14	b16	73	253	150	203	28	8.1
7	43	92	b36	b25	14	b16	87	304	144	197	26	7.5
8	48	81	b32	b26	18	b15	94	307	138	167	24	7.8
9	64	b70	31	b27	20	b15	89	287	140	148	22	8.7
10	54	b65	31	b25	54	b14	78	*342	184	203	22	7.8
11	79	b62	32	b24	65	14	74	398	236	148	22	11
12	77	56	35	b23	52	14	78	364	271	140	20	10
13	69	54	33	b22	41	14	106	245	311	159	18	9.3
14	57	50	32	b21	40	13	133	190	*385	175	16	8.7
15	62	b45	31	b20	34	14	117	164	491	168	15	8.1
16	54	43	*29	*b20	31	15	115	169	458	154	14	7.8
17	56	42	29	a19	29	14	127	224	372	144	13	7.3
18	87	41	29	a19	27	14	142	268	314	*156	13	7.3
19	83	b37	29	b19	26	13	134	240	285	124	12	7.0
20	66	b37	29	b19	25	13	110	237	268	105	11	6.8
21	80	36	29	b18	23	14	94	245	242	87	11	7.5
22	81	34	28	18	22	14	82	330	230	76	*11	7.5
23	85	33	42	b17	b21	13	75	469	229	72	12	8.4
24	72	34	54	16	b21	13	75	444	294	72	13	7.8
25	63	46	65	16	*20	14	87	314	258	83	12	11
26	61	53	59	b16	b20	16	113	274	230	74	10	27
27	59	53	54	b15	b19	16	*133	316	235	63	9.9	18
28	62	52	50	b13	b19	16	162	372	211	59	10	15
29	202	50	46	b11	-	16	203	247	190	57	10	13
30	201	48	43	b10	-	*17	159	209	190	52	10	13
31	*140	-	40	b11	-	17	-	171	-	46	9.9	-
Total	2,183	1,838	1,186	668	737	469	2,894	7,974	7,091	4,289	576.8	296.7
Mean	70.4	61.3	38.3	21.5	26.3	15.1	96.5	257	236	138	18.6	9.89
Cfsm	2.83	2.29	1.43	0.802	0.981	0.563	3.60	9.59	8.81	5.15	0.694	0.369
In.	3.03	2.56	1.65	0.92	1.02	0.65	4.02	11.06	9.83	5.94	0.80	0.41
Ac-ft	4,330	3,650	2,350	1,320	1,460	930	5,740	15,820	14,060	8,510	1,140	588
Calendar year 1950: Max	837			Min 8.4	Mean 91.1	Cfsm 3.40	In. 46.19	Ac-ft 65,940				
Water year 1950-51: Max	491			Min 6.8	Mean 82.7	Cfsm 3.09	In. 41.89	Ac-ft 59,900				

Peak discharge (base, 400 cfs).--May 11 (11:30 p.m.) 464 cfs (2.62 ft); May 24 (1 a.m.) 568 cfs (2.83 ft); May 28 (2 a.m.) 455 cfs (2.60 ft); June 15 (11 p.m.) 654 cfs (2.99 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge interpolated.

b Stage-discharge relation affected by ice.

## Kootenai Creek near Stevensville, Mont.

Location.--Lat 46°32'30", long. 114°10'00", in SW $\frac{1}{4}$ NW $\frac{1}{4}$  sec. 18, T. 9 N., R. 20 W., on left bank 3 miles upstream from mouth and 4 miles northwest of Stevensville.

Drainage area.--28.9 sq mi (revised).

Records available.--December 1948 to September 1951.

Gage.--Water-stage recorder.

Extremes.--Maximum discharge during year, 654 cfs June 15 (gage height, 4.36 ft); minimum daily, 12 cfs Jan. 30.

1948-51: Maximum discharge, 1,300 cfs June 17, 1950 (gage height, 5.85 ft), from rating curve extended above 500 cfs; minimum daily, 6 cfs Feb. 19, 20, 1949.  
Flood of May-June 1948 reached a discharge of 1,250 cfs, by slope-area determination, at a point a quarter of a mile downstream.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to June 15

June 16 to Sept. 30

1.7	11	2.8	117	1.6	14	2.7	112
2.0	16	3.1	197	1.8	18	3.0	190
2.2	25	3.5	325	2.0	25	3.4	310
2.3	33	3.9	470	2.2	39	3.8	450
2.5	59			2.4	60		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	19	*82	43	31	17	21	21	150	166	256	66	19
2	19	69	43	31	19	20	23	120	130	298	83	18
3	19	66	43	31	20	20	33	104	113	286	60	18
4	25	82	41	31	21	20	46	115	120	317	56	17
5	*69	110	b30	29	20	20	62	161	156	277	49	17
6	75	87	b32	b28	20	19	82	264	158	265	45	16
7	46	76	b34	b24	20	16	95	322	150	259	42	16
8	56	68	33	25	22	17	106	*322	134	220	37	17
9	82	b63	31	26	30	16	95	304	150	202	35	17
10	82	60	31	26	55	16	82	360	212	250	36	16
11	130	53	31	25	70	16	78	378	264	162	36	19
12	106	49	32	24	60	16	84	367	318	182	33	18
13	89	46	31	23	46	16	120	280	350	232	30	18
14	68	42	30	b22	40	16	150	221	*374	268	29	17
15	71	40	31	21	36	17	137	186	469	262	27	16
16	59	38	*30	21	34	18	134	189	426	*250	26	16
17	49	35	27	22	32	17	145	236	348	241	25	16
18	71	34	27	*b21	31	17	161	294	331	235	24	16
19	76	32	27	b21	30	17	161	264	310	208	23	16
20	62	31	28	b21	28	17	134	274	307	159	*22	16
21	69	29	30	21	28	17	106	297	280	114	22	15
22	68	29	31	20	26	17	87	346	271	102	23	15
23	71	30	43	20	25	17	80	384	271	104	26	16
24	62	31	53	20	*b24	18	82	360	295	110	25	15
25	52	52	61	20	22	19	102	353	256	140	22	25
26	51	66	49	20	b22	20	147	318	256	110	20	44
27	46	64	41	b18	b22	20	*166	346	280	95	20	34
28	49	56	38	b16	b22	21	189	367	259	95	20	31
29	146	49	40	14	-	21	215	290	241	93	20	26
30	164	45	38	12	-	21	183	255	244	74	21	25
31	117	-	34	14	-	*21	-	209	-	66	20	-
Total	2,172	1,614	1,113	698	842	566	3,306	8,436	7,639	5,932	1,003	585
Mean	70.1	53.8	35.9	22.5	30.1	18.3	110	272	255	191	32.4	19.5
Cfs/m	2.43	1.86	1.24	0.779	1.04	0.633	3.81	9.41	8.82	6.61	1.12	0.675
In.	2.80	2.08	1.43	0.90	1.08	0.73	4.25	10.85	9.84	7.82	1.29	0.75
Ac-ft	4,310	3,200	2,210	1,380	1,670	1,120	6,560	16,730	15,150	11,770	1,990	1,160
Calendar year 1950: Max		755		Min 10	Mean 97.9	Cfs/m 3.39	In. 46.02	Ac-ft 70,900				
Water year 1950-51: Max		469		Min 12	Mean 92.9	Cfs/m 3.21	In. 43.62	Ac-ft 67,250				

Peak discharge (base, 500 cfs).--June 15 (9 p.m.) 654 cfs (4.36 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Nov. 10-16, Jan. 8-13, Jan. 29 to Feb. 23, Mar. 1-13; discharge estimated on basis of temperature records and records for Blodgett Creek near Corvallis.

## Burnt Fork Creek near Stevensville, Mont.

Location.--Lat 46°27'50", long. 113°56'40", in NW<sup>1</sup>SW<sup>1</sup> sec. 11, T. 8 N., R. 19 W., on downstream side of county road bridge, 8 miles southeast of Stevensville.

Drainage area.--74 sq mi, approximately.

Records available.--May 1920 to August 1924, April 1938 to September 1951.

Gage.--Staff gage read once daily except Sundays and holidays. May 8, 1920, to Aug. 23, 1924, staff gage at same site at different datum.

Average discharge.--13 years (1938-51), 49.3 cfs.

Extremes.--Maximum discharge observed during year, 361 cfs May 24 (gage height, 2.16 ft); maximum gage height observed, 3.17 ft Jan 31 (backwater from ice); minimum daily discharge, 15 cfs Jan. 30, 31.  
1920-24, 1938-51: Maximum discharge observed, 641 cfs May 28, 1938 (gage height, 2.92 ft); maximum gage height observed, 3.40 ft Jan. 6, 9, 1947 (backwater from ice); minimum daily discharge, 2 cfs Mar. 11, 1948.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor. Bypass diversion supplies water for irrigation of about 2,000 acres below station. During irrigation season natural flow of stream is augmented by release from Burnt Fork Lake (capacity, 510 acre-ft).

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

0.6	18	1.5	147
.7	23	1.9	260
.9	42	2.2	377
1.2	87		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a20	34	35	a31	b16	b27	a28	102	196	a150	51	35
2	20	34	38	32	b20	b26	31	95	175	154	51	a35
3	20	32	a38	32	b24	b26	36	84	a170	145	51	a34
4	20	36	39	b32	a26	a25	50	98	168	a160	51	34
5	*23	a40	b30	b31	b26	b24	52	126	178	154	a45	25
6	26	42	b26	b28	b25	b23	61	a175	178	154	38	25
7	23	33	b27	a22	b24	b22	66	260	168	145	38	25
8	a22	33	b29	b22	b24	b22	a67	275	168	a140	38	25
9	22	b28	28	b23	b27	b22	67	260	163	132	38	a26
10	20	b20	a28	b23	b30	b22	61	260	a165	145	38	27
11	20	a22	28	b24	a30	a22	55	290	168	136	38	25
12	20	a23	29	b25	29	b22	56	321	168	124	a37	25
13	20	b24	29	b25	b28	22	64	a260	193	124	36	25
14	20	b24	b29	a26	b28	22	70	228	*240	116	36	25
15	a20	b25	29	29	b28	22	a71	202	223	a110	36	25
16	21	26	29	34	29	b22	73	*199	337	*106	32	a25
17	26	36	*29	*27	b29	22	77	226	a310	104	32	25
18	27	36	29	b26	a30	a22	84	246	297	96	32	25
19	29	a35	29	b25	31	22	84	246	267	93	a31	25
20	25	b34	29	b25	29	22	84	a246	193	84	29	25
21	25	36	29	a26	29	22	84	246	226	84	33	25
22	a25	34	29	b26	a29	22	a75	267	226	a75	35	25
23	25	a33	30	b27	b29	22	67	321	208	67	35	a25
24	25	32	a30	b28	*b28	22	64	361	a205	64	*36	25
25	25	36	a31	b28	a28	a24	64	321	202	64	35	24
26	25	a36	32	b28	b27	26	67	297	196	61	a35	25
27	25	36	34	b24	b26	22	*70	a305	191	52	35	25
28	25	36	32	a20	b26	22	84	313	191	51	35	23
29	a38	36	30	b17	-	22	a100	282	180	a47	35	21
30	*38	36	30	b15	-	22	106	a250	170	43	35	a21
31	36	-	a30	b15	-	*26	-	226	-	43	35	-
Total	756	966	943	796	755	711	2,022	7,386	6,120	3,223	1,162	780
Mean	24.4	32.2	30.4	25.7	27.0	22.9	67.4	238	204	104	37.5	26.0
Ac-ft	1,500	1,920	1,870	1,580	1,500	1,410	4,010	14,650	12,140	6,390	2,300	1,550
Calendar year 1950: Max	379			Min	10	Mean	54.2	Ac-ft	39,250			
Water year 1950-51: Max	361			Min	15	Mean	70.2	Ac-ft	50,820			

\* Discharge measurement made on this day.

a No gage-height record; discharge interpolated or estimated on basis of temperature records and records for Skalkaho Creek near Hamilton.

b Stage-discharge relation affected by ice.



# PEND OREILLE RIVER BASIN

221

Lolo Creek near Lolo, Mont.

Location.--Lat 46°45', long. 114°09', in NW¼ sec. 5, T. 11 N., R. 20 W., on left bank 4 miles upstream from mouth and 3 miles southwest of Lolo.

Records available.--November 1950 to September 1951.

Gage.--Water-stage recorder.

Extremes.--Maximum discharge during period, 1,500 cfs May 12 (gage height, 4.98 ft); maximum gage height, 5.71 ft Feb. 11 (backwater from ice); minimum, 46 cfs Sept. 19, 20 (gage height, 1.52 ft).

Remarks.--Records poor. Numerous small diversions mainly for irrigation of hay meadows above station.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.5	45	3.5	615
1.7	68	4.0	880
2.0	118	4.5	1,180
2.5	233	5.0	1,510
3.0	400		

Discharge, in cubic feet per second, November 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		*242	137	185	b100	b135	192	748	808	432	133	56
2		216	126	178	b125	b132	213	*660	695	440	122	54
3		192	116	169	b140	b130	263	597	620	432	111	80
4		198	b105	165	b145	b127	336	592	597	472	98	62
5		213	97	158	b145	b125	400	855	695	464	86	63
6		205	104	128	b142	b123	464	842	685	516	82	60
7		195	b115	122	b140	b121	534	1,040	650	498	80	55
8		190	b118	b125	b150	a120	584	*1,130	602	432	78	55
9		154	b120	b128	b200	a120	584	1,100	584	400	77	58
10		*b138	122	b130	b400	b122	534	1,140	610	444	72	59
11		b135	126	b132	b500	b125	489	1,290	*680	388	71	59
12		b135	128	b135	b450	b125	488	1,420	737	340	71	56
13		b135	*126	b137	a420	b125	525	1,260	764	326	70	54
14		b130	114	b144	a390	126	680	1,110	820	326	70	53
15		b125	126	150	a360	126	675	970	946	309	68	51
16		b130	120	141	319	139	645	*898	1,020	*292	65	51
17		b128	116	137	282	129	825	952	940	276	63	50
18		b127	114	*131	266	116	655	1,010	898	260	59	49
19		b125	113	129	245	120	685	982	798	248	58	48
20		b125	116	143	227	128	640	970	757	242	52	51
21		b127	122	158	213	137	579	970	690	227	55	51
22		b130	122	139	*195	133	525	1,050	645	205	55	51
23		131	158	139	182	129	480	1,220	606	190	64	54
24		133	211	145	b175	131	452	1,270	645	182	*87	51
25		158	251	137	b160	148	444	1,200	625	173	76	53
26		162	260	143	b150	165	456	1,110	552	169	80	111
27		154	248	111	143	162	494	1,080	538	167	77	76
28		145	233	b65	b140	*158	579	1,140	498	162	70	63
29		135	216	b80	-	167	814	982	460	156	65	58
30		145	208	a80	-	171	842	928	444	148	63	54
31		-	198	b65	-	173	-	904	-	139	62	-
Total		4,656	4,586	4,085	6,504	4,188	15,836	31,220	20,569	9,453	2,320	1,726
Mean		155	148	132	232	135	528	1,007	686	305	74.8	57.5
Ac-ft		9,240	9,100	8,100	12,900	8,310	31,410	61,920	40,800	18,750	4,600	3,420

Calendar year : Max Min Mean Ac-ft  
Water year : Max Min Mean Ac-ft

Peak discharge (base, 1,000 cfs)--May 12 (10:30 a.m.) 1,500 cfs (4.98 ft); May 24 (8 a.m.) 1,320 cfs (4.73 ft); June 16 (6 a.m.) 1,100 cfs (4.32 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records.

b Stage-discharge relation affected by ice.

## PEND OREILLE RIVER BASIN

Clark Fork below Missoula, Mont.

Location.--Lat 46°52'10", long. 114°07'30", in NE $\frac{1}{4}$  sec. 21, T. 13 N., R. 20 W., on right bank 2 miles downstream from Bitterroot River and 5 miles (revifed) west of Missoula.

Drainage area.--8,690 sq mi, approximately.

Records available.--October 1929 to September 1951.

Gage.--Water-stage recorder.

Average discharge.--22 years, 4,897 cfs.

Extremes.--Maximum discharge during year, 32,500 cfs May 25 (gage height, 9.09 ft); minimum recorded, 1,110 cfs Jan. 29 (gage height, 0.68 ft).  
1929-51: Maximum discharge, 52,800 cfs May 23, 1948 (gage height, 12.08 ft); minimum, 388 cfs Jan. 18, 1933; minimum gage height, 0.37 ft Sept. 13, 1937.

Remarks.--Records excellent except those for period Jan. 29 to Feb. 2, which are poor. Some diurnal fluctuation at low flows caused by powerplant at Bonner. Diversions for irrigation of about 235,000 acres above station.

Revisions (water years).--W 1042: 1931.

Rating tables, water year 1950-51, except period of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to May 25

May 26 to Sept. 30

0.7	1,150	4.0	8,260
1.0	1,460	5.0	11,800
1.5	2,180	6.0	15,800
2.0	3,050	8.0	26,000
2.5	4,070	10.0	38,000
3.0	5,270		

1.6	2,600
2.0	3,280
3.0	5,480
4.0	8,500
5.0	12,000
6.0	15,800

Note.--Same as preceding table above 6.0 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3,280	5,140	4,000	3,830	al 500	3,200	4,760	14,300	21,700	12,800	4,320	3,500
2	3,240	4,940	3,920	3,680	*bl 700	3,110	3,300	13,400	19,400	13,100	4,280	3,440
3	3,320	4,740	3,740	3,680	2,380	3,030	6,120	12,600	17,300	13,600	4,210	3,440
4	3,300	4,640	3,680	3,620	2,660	2,960	7,020	12,200	16,000	13,500	4,040	3,460
5	3,480	4,810	3,400	3,480	2,840	2,680	7,780	13,000	16,200	14,300	4,000	3,350
6	3,720	5,040	2,920	3,220	2,840	2,080	8,420	15,100	17,300	14,000	3,890	3,300
7	3,920	5,010	3,070	2,540	2,860	2,270	8,850	19,000	17,300	13,200	*3,710	3,260
8	3,830	5,060	3,720	2,460	2,970	2,510	9,230	21,900	17,000	12,500	3,500	3,330
9	3,810	4,760	3,700	2,750	3,620	2,880	9,840	24,300	16,500	11,700	3,440	3,240
10	3,850	*4,090	3,560	3,010	5,730	2,970	9,600	24,700	16,100	12,100	3,280	3,050
11	*3,960	4,140	*3,520	2,880	7,680	2,940	9,290	26,300	16,800	12,800	3,420	3,050
12	4,180	4,400	3,580	3,010	8,750	2,960	8,850	29,700	18,400	11,700	3,480	3,100
13	4,220	4,200	3,820	*3,200	7,080	3,010	8,890	31,400	19,800	10,900	3,500	3,100
14	4,140	4,140	3,500	3,320	5,680	3,090	10,100	30,200	*21,000	10,600	3,440	3,050
15	4,000	4,340	3,360	3,380	5,060	3,140	11,100	27,100	23,200	9,960	3,330	2,980
16	4,000	3,660	3,420	3,400	4,810	3,440	10,900	*24,100	26,000	9,760	3,240	2,930
17	4,030	4,030	3,420	3,340	4,520	3,560	10,700	23,000	27,300	*9,180	3,140	2,910
18	4,070	4,250	3,400	3,240	4,290	3,280	11,100	24,400	25,800	8,570	3,020	*2,910
19	4,310	4,050	3,340	2,860	4,180	3,140	11,700	25,700	23,600	8,030	2,930	2,880
20	4,290	3,700	3,340	2,580	4,000	3,340	11,600	25,600	21,400	7,610	2,830	2,910
21	4,070	3,870	3,340	2,610	3,960	3,680	10,800	25,100	19,800	7,420	2,760	2,980
22	4,070	4,050	3,340	2,990	*3,830	4,520	10,200	25,100	18,400	6,510	2,710	3,070
23	4,180	4,030	3,460	2,900	3,560	4,520	9,570	26,700	17,200	5,970	2,730	3,230
24	4,110	3,890	3,830	2,790	3,440	4,180	9,060	30,000	16,500	5,700	2,860	3,410
25	3,960	3,960	4,200	3,050	3,600	4,400	8,610	32,100	17,600	5,480	3,070	3,460
26	3,850	4,220	4,520	3,200	3,560	*5,060	8,820	30,100	16,300	5,350	3,120	3,570
27	3,870	4,340	4,430	2,790	3,280	5,380	9,850	27,200	15,400	5,140	3,050	3,670
28	3,980	4,250	4,200	1,700	3,240	4,860	9,780	27,100	15,000	4,970	3,100	3,670
29	4,470	4,140	4,090	al 300	-	4,380	11,500	28,500	14,200	5,000	3,150	3,610
30	5,490	4,030	3,980	al 200	-	4,310	*13,800	26,000	13,300	4,710	3,280	3,540
31	5,590	-	3,940	al 300	-	4,430	-	23,700	-	4,620	3,480	-
Total	124,590	129,920	113,520	89,290	113,620	109,310	281,900	739,600	581,800	290,780	104,310	97,400
Mean	4,019	4,331	3,662	2,880	4,058	3,526	9,397	23,860	18,730	9,380	3,365	3,247
Ac-ft	247,100	257,700	225,200	177,100	225,400	216,800	559,100	*1,467	*1,114	576,600	206,900	193,000
Calendar year 1950: Max	38,500				Min	1,250	Mean	6,957	Ac-ft	5,037,000		
Water year 1950-51: Max	32,100				Min	1,200	Mean	7,551	Ac-ft	5,466,000		

Peak discharge (base, 12,000 cfs).--May 13 (7:30 p.m.) 31,800 cfs (8.96 ft); May 25 (11 a.m.) 32,500 cfs (9.09 ft); June 17 (8 a.m.) 27,700 cfs (8.28 ft).

\* Discharge measurement made on this day.

† Expressed in thousands.

a No gage-height record; discharge estimated on basis of weather records.

b Stage-discharge relation affected by ice.

## Clark Fork at St. Regis, Mont.

Location.--Lat 47°18'10", long. 115°05'10". in center of SW $\frac{1}{4}$  sec. 19, T. 18 N., R. 27 W., on left bank 0.5 mile downstream from St. Regis River and 0.8 mile east of St. Regis.

Drainage area.--10,500 sq mi, approximately.

Records available.--October 1910 to September 1923, February 1929 to September 1951.

Gage.--Water-stage recorder. Prior to Nov. 29, 1933, staff gage at same site and datum.

Average discharge.--35 years, 7,341 cfs.

Extremes.--Maximum discharge during year, 41,700 cfs May 26 (gage height, 15.76 ft); minimum, 1,600 cfs Jan. 30 (gage height, 3.77 ft, from recorded range in stage).  
1910-23, 1929-51: Maximum discharge observed, 68,900 cfs May 24, 1948 (gage height, 19.96 ft); minimum discharge, 1,000 cfs Dec. 17, 1940 (gage height, 3.36 ft), but may have been less during period of ice effect Feb. 19-22, 1929.

Remarks.--Records excellent except those for periods of no gage-height record, which are poor. Some diurnal fluctuation at low flows caused by powerplant at Bonner. Diversions for irrigation of about 244,000 acres above station.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

4.4	2,180	8.0	9,500
4.7	2,580	10.0	15,900
5.0	3,010	12.0	23,900
6.0	4,800	14.0	32,900
7.0	6,950	15.6	40,800

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4,130	7,500	5,630	5,850	a2,600	4,840	5,310	20,400	29,400	17,000	5,850	4,440
2	4,170	7,000	5,460	5,650	a3,000	4,720	6,900	19,500	26,900	16,400	5,650	4,420
3	4,130	6,670	5,360	6,480	a3,600	4,600	7,920	18,200	24,500	17,200	5,550	4,380
4	4,240	6,510	5,140	5,380	4,200	4,500	9,310	17,500	22,500	17,400	5,400	4,350
5	4,260	6,670	5,040	5,220	4,110	4,460	10,800	18,000	22,000	17,600	5,240	4,310
6		*6,880	4,560	4,940	4,260	3,930	12,000	20,400	22,600	18,100	5,140	4,180
7	4,740	6,980	4,560	4,360	4,200	3,310	13,000	25,000	23,100	17,200	5,000	4,110
8	4,840	6,930	4,460	3,930	4,680	3,400	13,800	29,200	22,600	16,100	*4,780	4,090
9	4,780	6,770	4,960	4,080	5,080	3,990	14,500	*31,200	22,400	15,300	4,600	4,170
10	*4,820	6,270	4,940	4,130	8,090	4,270	14,100	33,500	21,800	14,700	4,500	4,040
11	4,900	5,740	4,780	4,260	12,100	4,260	13,700	34,900	22,300	15,400	4,480	3,900
12	4,890	5,810	*4,780	4,220	14,600	4,180	13,400	38,400	23,800	15,100	4,480	3,880
13	5,120	5,870	4,820	4,350	13,000	4,200	13,500	40,600	*25,500	13,900	4,500	3,900
14	5,120	5,650	4,800	4,500	10,600	4,240	14,800	40,000	26,900	13,300	4,480	3,880
15	5,060	5,680	4,640	4,580	9,130	4,310	16,400	37,000	28,900	12,400	4,400	3,810
16	4,940	5,530	4,500	4,600	8,350	4,480	16,500	33,600	31,500	*12,100	4,290	3,720
17	5,080	5,180	4,600	4,640	7,780	4,720	16,200	31,600	33,300	11,700	4,170	3,660
18	5,000	5,590	4,580	*4,500	7,220	4,680	16,400	32,200	32,900	11,000	4,040	3,640
19	5,260	5,530	4,520	4,270	6,860	4,440	17,000	33,600	30,900	10,500	3,910	*3,640
20	5,440	5,260	4,500	3,990	6,560	4,400	17,000	34,100	28,400	9,700	3,820	3,630
21	5,360	5,100	4,560	3,720	*6,290	4,660	16,100	33,800	26,800	9,180	3,720	3,660
22	5,160	5,300	4,680	3,810	6,090	5,000	15,000	33,700	24,700	8,660	3,630	3,730
23	5,200	5,400	5,080	4,040	5,830	5,870	*14,100	35,200	23,300	8,080	3,550	3,900
24	5,260	5,340	5,920	3,930	5,480	5,700	13,400	38,000	22,800	7,550	3,640	4,020
25	5,200	5,460	6,530	3,990	5,340	5,480	12,800	40,700	21,700	7,250	3,790	4,220
26	5,120	5,680	7,020	4,360	5,380	6,050	12,700	40,500	22,000	7,120	3,990	4,480
27	5,040	5,870	7,020	4,400	5,160	*6,670	13,000	37,800	20,700	6,900	4,000	4,480
28	5,180	5,920	6,700	a3,800	4,960	6,740	14,100	35,700	20,000	6,540	4,000	4,500
29	6,070	5,790	6,360	a2,800	-	6,310	16,200	36,600	19,200	6,420	4,090	4,460
30	7,220	5,680	6,160	a2,200	-	6,030	18,900	35,100	17,900	6,340	4,180	4,420
31	7,800	-	6,010	a2,300	-	6,050	-	32,000	-	6,090	4,290	-
Total	158,070	179,560	162,570	132,260	184,550	150,490	409,640	986,800	741,100	372,030	137,160	122,020
Mean	5,099	5,985	5,244	4,266	6,591	4,855	13,650	31,830	24,700	12,000	4,425	4,067
Ac-ft	313,500	356,200	322,500	262,300	366,000	298,500	812,500	*1,957	*1,470	737,900	372,100	242,000

Calendar year 1950: Max 50,900 Min 1,900 Mean 9,779 Ac-ft 7,080,000  
Water year 1950-51: Max 40,700 Min 2,200 Mean 10,240 Ac-ft 7,410,000

\* Discharge measurement made on this day.

\* Expressed in thousands.

No gage-height record; discharge estimated on basis of temperature records and records for station below Missoula.

## Flathead River at Flathead, British Columbia

(International gaging station)

**Location.**--Lat 49°00', Long. 114°29', on left bank at highway bridge, 0.2 mile north of international boundary, 0.2 mile northwest of Flathead, British Columbia, and 7 miles northwest of Trail Creek, Mont.

**Drainage area.**--450 sq mi.

**Records available.**--March 1929 to September 1951 (no winter records).

**Gage.**--Water-stage recorder. Altitude of gage is 3,980 ft (from topographic map). Prior to Sept. 1, 1949, staff gage at same site and datum.

**Extremes.**--Maximum discharge during year, 8,100 cfs May 12 (gage height, 6.12 ft); minimum recorded, 204 cfs Oct. 3 (gage height, 0.81 ft), but was probably less during period of no record in winter.

1929-51: Maximum discharge, 14,600 cfs May 23, 1948 (gage height, 9.1 ft, from floodmark), from rating curve extended above 8,000 cfs; minimum observed, 65 cfs Apr. 9, 1929, but may have been less during periods of no record in winter.

**Remarks.**--Records good. No regulation or diversion above station.

**Cooperation.**--This station is one of the international gaging stations maintained by Canada under agreement with the United States.

**Revisions (water years).**--W 1092: 1933 (maximum gage height only).

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-31		Nov. 1 to Sept. 30	
0.8	200	1.3	440
1.0	285	1.6	640
1.5	578	2.0	980
2.0	987	2.5	1,500
2.3	1,280	3.0	2,130
		4.0	3,830
		5.0	5,820
		6.0	7,850

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	218	1,060					-	3,360	2,590	2,500	845	1,150
2	218	917					-	2,610	2,700	2,550	818	1,210
3	218	827					-	2,230	2,950	2,590	809	1,100
4	215	784					-	2,180	3,130	2,870	776	962
5	234	890					-	3,230	*2,960	2,900	736	872
6	298	971					-	4,290	2,640	*2,900	696	800
7	308	899					-	45,330	2,370	2,700	664	736
8	290	760					-	6,380	2,200	2,450	648	720
9	*381	570					-	6,560	2,300	*2,450	626	696
10	456	612					-	7,080	2,950	2,350	619	640
11	438	633					-	7,450	3,940	2,160	619	680
12	498	605					-	7,810	4,720	2,000	626	666
13	480	482					-	6,520	4,740	2,130	598	618
14	480	535					-	5,280	5,260	2,000	584	584
15	530	528					-	4,420	6,320	2,000	548	549
16	510	-					-	*4,580	6,420	1,900	521	521
17	498	*483					-	5,820	5,220	1,800	494	488
18	514	-					-	6,800	4,420	1,700	482	482
19	777	-					-	5,980	4,040	1,800	458	458
20	1,130	-					-	5,260	3,640	1,500	*458	458
21	1,180	-					-	5,180	3,160	1,410	452	458
22	940	-					-	5,820	2,930	1,310	440	458
23	818	-					-	6,860	2,910	1,200	452	476
24	728	-					-	7,180	4,180	1,180	476	521
25	673	-					-	6,060	4,140	1,140	464	854
26	894	-					-	4,720	3,510	1,100	452	1,440
27	1,010	-					-	4,420	3,290	1,000	458	1,180
28	931	-					2,540	4,320	2,930	1,000	458	1,030
29	913	-					3,000	3,810	2,590	1,000	*482	1,080
30	1,090	-					3,180	3,270	2,540	905	704	1,680
31	1,230	-						2,860	-	801	1,000	-
Total	19,189	-					-	157,420	107,690	57,866	18,464	23,558
Mean	619	-					-	5,060	3,590	1,870	596	785
Cfs	1.38	-					-	11.29	7.98	4.16	1.32	1.74
In.	1.58	-					-	15.02	8.90	4.80	1.52	1.94
Ac-ft	38,060	-					-	312,200	215,500	114,800	38,820	46,750

Calendar year 1950: Max - Min - Mean - Cfs - In. - Ac-ft -  
 Water year 1950-51: Max 7,810 Min - Mean - Cfs - In. - Ac-ft -

\* Discharge measurement made on this day.

+ Result of discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for Flathead River near Columbia Falls, Mont.

## Flathead River near Columbia Falls, Mont.

Location (revised).--Lat 48°28'20", long. 114°05'20", in NE $\frac{1}{4}$ NE $\frac{1}{4}$  sec. 12, T. 31 N., R. 20 W., on right bank 1 mile upstream from Middle Fork and 8 miles northeast of Columbia Falls.

Drainage area.--1,553 sq mi (revised).

Records available.--September 1910 to September 1917, April 1929 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 3,109.70 ft above mean sea level, datum of 1929 (levels by Bureau of Reclamation). September 1910 to September 1917, staff gage at site 1,000 ft downstream at different datum.

Average discharge.--23 years (1910-17, 1935-51), 2,855 cfs.

Extremes.--Maximum discharge during year, 20,800 cfs May 12 (gage height, 10.30 ft); minimum daily, 600 cfs Jan. 30.

1910-17, 1929-51: Maximum discharge, 29,500 cfs June 20, 1916 (gage height, 9.8 ft, site and datum then in use); minimum, 296 cfs Mar. 5, 1945.

Remarks.--Records excellent except those for periods of no gage-height record, which are fair.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.5	600	6.0	6,300
2.0	830	7.0	8,850
2.5	1,130	8.0	12,000
3.0	1,580	9.0	15,500
4.0	2,720	10.2	20,400
5.0	4,300		

Discharge, in cubic feet per second, water year October 1950 to September, 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	958	3,320	1,590	2,220	2,700	1,370	1,160	11,200	7,900	8,000	3,150	2,900
2	940	3,010	1,430	1,950	2,750	1,290	1,280	9,810	7,480	8,150	3,020	3,370
3	928	2,760	1,350	1,970	1,190	1,230	1,500	8,200	7,550	8,250	2,940	3,230
4	922	2,590	1,440	1,710	1,230	1,270	1,860	7,900	7,820	9,150	2,860	2,970
5	952	2,540	894	*1,540	1,230	1,020	2,540	9,690	7,800	10,200	2,750	2,750
6	1,020	2,620	1,010	1,380	1,160	922	2,620	13,500	7,280	10,300	2,660	2,550
7	1,060	2,550	1,300	1,350	1,100	910	3,160	16,500	6,650	9,810	2,540	2,390
8	1,050	2,380	1,540	1,430	1,140	994	3,520	17,200	6,200	8,730	2,420	2,270
9	1,070	2,020	1,500	1,640	1,390	1,000	3,530	17,200	6,040	8,400	2,330	2,210
10	1,210	1,960	1,450	1,610	2,060	1,070	3,280	18,100	6,700	8,050	2,260	2,110
11	1,350	1,990	1,450	1,580	3,050	1,120	3,110	19,100	8,550	7,300	2,220	2,140
12	*1,380	1,890	1,510	1,550	3,050	1,150	3,230	20,400	10,900	6,820	2,260	2,090
13	1,440	1,770	1,500	1,510	2,810	1,240	3,940	19,600	12,000	6,880	2,140	1,990
14	1,510	1,760	1,410	1,460	2,780	1,210	4,720	16,800	13,000	7,080	*2,090	1,880
15	1,620	1,710	1,380	1,430	2,760	1,210	4,740	14,300	15,400	7,120	1,980	1,790
16	1,710	*1,690	1,350	1,390	2,750	1,230	4,640	13,000	17,600	*6,920	1,900	1,710
17	1,720	1,650	1,380	1,350	2,500	1,160	*4,940	13,800	15,900	6,700	1,820	1,650
18	1,860	1,600	1,400	1,280	2,290	1,110	5,340	16,600	13,700	6,460	1,760	1,580
19	2,140	1,430	1,360	1,230	2,140	1,100	4,620	17,200	12,300	6,300	1,710	1,530
20	2,980	1,430	1,380	1,240	1,980	1,100	4,500	15,100	*11,300	5,920	1,660	1,510
21	3,940	1,520	1,550	1,200	*1,870	1,100	3,990	14,200	10,200	5,460	1,610	1,490
22	3,530	1,440	1,680	1,210	1,680	1,090	3,710	14,700	9,150	4,980	1,570	1,480
23	3,090	1,190	2,030	1,210	1,580	1,080	3,470	17,000	8,760	4,800	1,560	1,500
24	2,780	1,340	2,470	1,170	1,540	1,050	3,390	18,900	11,500	4,520	1,640	1,680
25	2,540	1,520	3,190	1,230	1,610	1,060	3,580	18,300	13,100	4,200	1,650	2,000
26	2,520	1,710	3,630	1,290	1,560	1,110	4,240	15,100	11,000	4,100	1,580	*3,230
27	2,690	1,820	3,250	820	1,420	1,110	5,460	15,400	10,300	3,900	1,610	3,560
28	2,680	1,790	2,940	712	1,420	1,070	6,550	12,500	9,420	3,710	1,670	2,990
29	2,810	1,740	2,660	850	-	1,070	6,120	11,600	8,400	3,640	1,690	2,810
30	3,150	1,700	2,490	a500	-	1,080	5,860	10,200	7,680	3,500	2,020	3,080
31	3,500	-	2,400	a550	-	1,100	-	8,970	-	3,510	2,670	-
Total	61,060	58,440	56,174	41,562	50,760	34,626	120,600	450,070	301,780	202,260	65,740	68,240
Mean	1,970	1,948	1,812	1,341	1,613	1,117	4,020	14,520	10,060	6,525	2,121	2,275
Cfs/m	1.27	1.25	1.17	0.863	1.17	0.719	2.59	9.35	6.48	4.20	1.37	1.46
In.	1.46	1.40	1.35	0.99	1.22	0.83	2.88	10.78	7.23	4.84	1.58	1.63
Ac-ft	121,100	115,900	111,400	82,440	100,700	68,680	239,200	892,700	598,600	401,200	130,400	135,400
Calendar year 1950: Max	20,500	Min	600	Mean	3,836	Cfs/m	2.47	In.	33.53	Ac-ft	2,777,000	
Water year 1950-51: Max	20,400	Min	600	Mean	4,141	Cfs/m	2.67	In.	36.20	Ac-ft	2,998,000	

Peak discharge (base, 11,000 cfs).--May 1 (11 a.m.) 11,400 cfs (7.85 ft); May 12 (8 to 9 p.m.) 20,800 cfs (10.30 ft); May 25 (3 a.m.) 19,300 cfs (9.96 ft); June 16 (9 a.m.) 17,700 cfs (9.56 ft); June 25 (2:30 a.m.) 14,100 cfs (8.62 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for other Flathead River stations.

## Skyland Creek near Essex, Mont.

Location.--Lat 48°17'30", long. 113°23'10", (revised), in SE1/4 sec. 9, T. 29 N., R. 14 W., on left bank 150 ft upstream from mouth and 10 miles northeast of Essex.

Drainage area.--8.09 sq mi.

Records available.--January 1946 to September 1951.

Gage.--Water-stage recorder and concrete control. Datum of gage is 4,835.83 ft above mean sea level, datum of 1929 (Corps of Engineers benchmark).

Average discharge.--5 years, 19.8 cfs.

Extremes.--Maximum discharge during year, 179 cfs June 15 (gage height, 2.05 ft); maximum gage height recorded, 3.27 ft Dec. 5 (backwater from ice); minimum daily discharge, 4 cfs Mar. 7, 8.

1946-51: Maximum discharge, 284 cfs May 22, 1948 (gage height, 2.15 ft); maximum gage height recorded, that of Dec. 5, 1950; minimum discharge, 0.1 cfs Nov. 15, 1946 (gage height, 0.12 ft), caused by ice jam upstream.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

0.4	3.1	1.2	40
.5	5.1	1.4	63
.6	8.0	1.7	113
.8	16	2.0	169
1.0	26		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	6.6	12	b8	b8.5	a5.5	5.4	4.4	23	56	63	18	12
2	7.0	12	b7.5	b8	b5.5	a5.3	4.4	20	a52	a66	18	13
3	6.8	10	b7	b7.5	a6	a5.2	4.9	19	a47	a70	*17	12
4	6.8	10	b6.5	b7.5	a6	a5.0	5.6	19	a48	a70	16	12
5	7.4	12	b6	b7	b6	b4.8	6.8	24	a47	a76	16	11
6	8.0	11	b6.5	b7	b6	a4.5	6.8	37	a44	a80	16	11
7	7.0	10	b6.5	b7	b6	b4	6.8	46	*42	a64	15	11
8	6.8	8.7	b6.5	b7	5.9	a4	7.4	53	43	53	16	10
9	7.4	b8.5	6.8	b7.5	b6.5	a4.5	7.4	*62	51	56	15	10
10	9.4	b8.5	7.7	7.4	b8	a5	6.8	82	65	63	15	10
11	10	b8.5	7.7	7.4	a10	a5	6.8	103	86	55	15	12
12	7.7	b8.5	*7.4	7.4	b8.5	a5	7.0	122	101	*50	15	11
13	*7.0	b8.5	7.4	7.4	b7.5	b4.5	8.7	99	115	48	14	11
14	7.0	b8.5	7.7	7.4	b7	4.7	9.0	77	139	45	14	10
15	7.7	b8.5	7.4	7.0	b6.5	4.7	9.0	65	165	42	14	10
16	7.4	b8	7.7	7.0	b6.5	4.7	9.7	64	152	38	13	9.7
17	7.4	b8	7.7	7.0	6.2	4.7	12	84	126	35	13	9.7
18	8.7	b7.5	7.7	6.8	6.2	a4.7	12	104	108	33	12	9.7
19	9.4	b7.5	7.4	b6.8	6.2	4.7	b11	98	99	31	12	9.7
20	10	b7.5	7.4	6.8	5.9	4.7	11	93	93	29	12	9.7
21	9.0	b6.5	8.0	6.5	5.9	4.7	10	96	88	27	12	9.7
22	8.3	b6	8.3	6.5	5.9	4.7	a9.4	118	81	26	12	10
23	8.0	b6	11	6.5	5.9	4.7	8.7	146	77	25	12	10
24	7.7	b7	14	6.2	5.9	4.7	8.7	152	108	23	12	11
25	8.0	b7.5	14	6.2	5.9	4.7	9.7	127	99	22	12	21
26	8.7	8.0	13	b6	5.6	4.7	*13	110	96	22	12	*18
27	8.7	8.3	12	b6	b5.5	4.7	17	108	86	21	a12	14
28	8.7	8.0	11	a5.5	*b6.5	*4.4	21	111	74	20	a12	13
29	12	8.0	10	b5.5	-	4.2	24	94	65	20	a12	13
30	16	8.0	b9.5	b5	-	4.4	26	79	60	19	a12	13
31	14	-	b9	b5	-	4.4	-	66	-	18	*12	-
Total	264.6	255.5	264.3	210.3	179.0	145.4	305.0	2,501	2,513	1,314	428	347.2
Mean	8.54	8.52	8.53	6.78	6.39	4.69	10.2	80.7	83.8	42.4	13.8	11.6
Cfs/m	1.06	1.05	1.05	0.838	0.790	0.580	1.26	9.98	10.4	5.24	1.71	1.43
In.	1.22	1.17	1.21	0.97	0.82	0.67	1.41	11.51	11.60	6.04	1.97	1.60
Ac-ft	525	507	524	417	355	288	605	4,960	4,980	2,670	848	688
Calendar year 1950: Max			237	Min 2	Mean	26.0	Cfs/m	3.21	In.	43.64	Ac-ft	18,790
Water year 1950-51: Max			165	Min 4	Mean	23.9	Cfs/m	2.95	In.	40.19	Ac-ft	17,310

Peak discharge (base, 65 cfs).--May 12 (5:30 a.m.) 127 cfs (1.78 ft); May 24 (1 a.m.) 163 cfs (1.97 ft); June 15 (7 to 10 p.m.) 179 cfs (2.05 ft); June 24 (2 a.m.) 120 cfs (1.74 ft); July 6 (time unknown) 84 cfs (1.53 ft); July 10 (2 to 4 a.m.) 71 cfs (1.45 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records or on basis of records for Bear Creek near Essex and Middle Fork Flathead River at Essex.

b Stage-discharge relation affected by ice.

## Bear Creek near Essex, Mont.

Location (revised).--Lat 48°16'50", long. 113°25'30", in SE $\frac{1}{4}$  NW $\frac{1}{4}$  sec. 18, T. 29 N., R. 14 W., on right bank 1 mile downstream from Autumn Creek and 8 $\frac{1}{2}$  miles east of Essex.

Drainage area.--20.7 sq mi.

Records available.--January 1946 to September 1951.

Gage.--Water-stage recorder.

Average discharge.--5 years, 47.6 cfs.

Extremes.--Maximum discharge during year, 352 cfs May 11 (gage height, 2.19 ft); minimum daily, 9 cfs Mar. 7-9

1946-51: Maximum discharge, 696 cfs May 22, 1948 (gage height, 3.01 ft); minimum daily, 5.5 cfs Jan. 21 to Mar. 4, Mar. 8-16, 1949.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Apr. 5

Apr. 6 to Sept. 30

0.1	9.0	0.8	53	0.2	15	1.3	124
.2	12	1.0	73	.4	26	1.6	187
.3	16	1.2	98	.6	40	1.9	265
.4	22	1.3	114	.8	58	2.1	324
.6	36			1.0	80		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	14	48	a24	a39	a10	14	12	128	121	a100	30	21
2	14	41	a23	36	a11	a13	a16	105	116	a100	*29	24
3	14	38	a21	a32	a11	a12	20	98	111	a105	*28	22
4	14	47	*b20	b29	a12	a11	a30	114	114	a115	27	20
5	16	51	a19	a27	b12	a10	a45	180	113	a125	27	19
6	18	44	a20	a26	a12	a10	54	243	110	a140	26	18
7	16	40	a21	a25	a12	a9	54	249	*108	a110	26	18
8	15	35	a23	a25	12	a9	58	243	105	a100	26	18
9	18	b30	a26	a25	a15	a9	50	*256	119	a105	26	18
10	23	b28	a30	a24	a30	a10	43	288	139	a110	24	18
11	32	b28	33	a24	a50	a10	40	306	160	a100	25	20
12	23	25	32	23	a40	a10	50	309	176	*89	25	19
13	*20	b24	29	21	a30	10	74	249	187	86	24	18
14	19	b23	27	a21	b25	a10	64	197	212	81	23	17
15	19	23	26	21	22	a10	62	178	238	77	22	16
16	18	22	25	a20	a20	a10	68	192	220	71	22	16
17	18	22	25	a18	a18	b10	84	235	132	67	21	16
18	24	b22	25	b17	a17	a10	a80	252	160	62	21	16
19	30	b21	24	a16	16	10	a70	220	151	56	20	15
20	41	b21	26	a15	a16	11	a60	212	137	52	20	15
21	35	b21	36	a15	a16	a11	a56	215	128	50	20	15
22	31	a20	36	a14	16	10	a54	256	119	45	20	16
23	30	a19	77	a14	a15	a10	a52	297	116	43	20	17
24	26	a20	103	a14	a15	a10	52	285	190	42	20	18
25	25	a22	95	a14	a15	a11	64	235	173	39	20	45
26	28	a24	73	a13	15	a11	*90	202	166	38	20	*46
27	28	a25	62	a12	b15	a11	126	202	151	36	20	32
28	28	a25	55	a11	*b17	*10	143	200	134	34	24	31
29	52	a25	48	a10	-	a11	158	169	119	33	23	31
30	75	a24	46	a10	-	11	164	151	a110	32	25	30
31	58	-	42	a10	-	a11	-	132	-	31	*22	-
Total	822	858	1,172	621	515	325	1,993	6,594	4,385	2,274	726	645
Mean	26.5	28.6	37.8	20.0	18.4	10.5	66.4	213	146	73.4	23.4	21.5
Cfsm	1.28	1.38	1.83	0.966	0.889	0.507	3.21	10.3	7.05	3.55	1.13	1.04
In.	1.48	1.54	2.11	1.11	0.93	0.58	3.58	11.87	7.87	4.09	1.30	1.16
Ac-ft	1,630	1,700	2,320	1,230	1,020	645	3,950	13,080	8,700	4,510	1,440	1,280

Calendar year 1950: Max 519 Min 6.5 Mean 58.9 Cfsm 2.85 In. 38.59 Ac-ft: 42,610  
 Water year 1950-51: Max 309 Min 9 Mean 57.3 Cfsm 2.77 In. 37.62 Ac-ft: 41,500

Peak discharge (base, 150 cfs).--Apr. 29 (7:30 to 10:30 p.m.) 178 cfs (1.56 ft); May 11 (9 to 10 p.m.) 352 cfs (2.19 ft); May 17 (10 to 12 p.m.) 277 cfs (1.94 ft); May 23 (9 to 12 p.m.) 321 cfs (2.09 ft); June 15 (7 to 11 p.m.) 252 cfs (1.85 ft); June 24 (7 to 9 p.m.) 194 cfs (1.63 ft); July 6 (time unknown) 158 cfs (1.46 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records and records for Sky-land Creek near Essex and Middle York Flathead River at Essex.

b Stage-discharge relation affected by ice.

## Middle Fork Flathead River at Essex, Mont.

Location.--Lat 48°16'30", long. 113°36'10", in SW<sup>1</sup>/<sub>4</sub> sec. 14, T. 29 N., R. 16 W., on right bank 0.6 mile upstream from Ole Creek, 0.7 mile southeast of Essex, and 4 miles downstream from Bear Creek.

Drainage area.--510 sq mi (revised).

Records available.--October 1939 to September 1951.

Gage.--Water-stage recorder.

Average discharge.--12 years, 1,012 cfs.

Extremes.--Maximum discharge during year, 9,180 cfs May 12 (gage height, 8.99 ft); minimum daily, 175 cfs Jan. 30.

1939-50: Maximum discharge, 14,500 cfs May 22, 1948 (gage height, 10.95 ft, from partly estimated gage-height record); minimum, 17 cfs Jan. 11, 1941 (gage height, 1.30 ft, caused by ice jam upstream).

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are poor.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

2.1	168	5.0	2,050
2.4	257	6.0	3,330
2.7	369	7.0	5,000
3.0	504	8.0	6,960
3.5	768	8.8	8,750
4.0	1,120		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	228	1,390	682	895	a225	*448	386	3,210	2,810	2,850	787	444
2	225	1,200	682	830	250	444	471	2,610	2,560	2,860	755	457
3	225	1,060	634	793	300	430	634	2,250	2,520	2,950	*727	452
4	225	1,050	586	735	350	350	830	2,280	2,670	3,220	704	421
5	244	1,220	514	650	375	250	1,120	3,030	2,690	3,200	677	399
6	310	1,240	608	600	375	225	1,280	4,860	2,500	3,610	639	382
7	314	1,180	650	550	375	225	1,280	5,940	*2,370	3,280	619	369
8	303	1,040	645	525	375	225	1,410	6,140	2,250	2,860	603	373
9	337	876	578	600	500	a250	1,340	*6,480	2,410	2,900	588	369
10	430	836	578	550	900	a350	1,170	7,130	3,220	2,970	583	357
11	805	843	629	525	1,420	375	1,070	7,730	4,350	2,810	573	390
12	768	799	*639	500	1,250	400	1,140	6,660	4,980	*2,640	598	395
13	*682	710	624	500	1,060	350	1,490	7,000	5,240	2,600	553	378
14	629	716	593	475	944	300	1,640	5,460	6,020	2,600	533	365
15	639	655	588	475	876	300	1,620	4,420	7,320	2,510	509	353
16	629	660	583	450	811	300	1,630	4,160	7,300	2,530	490	345
17	598	639	565	425	727	300	1,890	4,950	5,980	2,180	471	337
18	677	613	578	400	a675	300	2,100	6,220	4,950	2,040	457	329
19	869	573	568	*380	629	300	1,860	5,790	4,420	1,890	444	318
20	1,100	543	603	400	588	300	1,640	5,450	3,940	1,700	430	318
21	1,210	568	733	400	558	300	1,410	5,450	3,540	1,540	421	318
22	1,140	528	811	400	524	300	1,260	6,360	3,280	1,410	408	325
23	1,040	444	1,230	400	485	296	1,180	7,890	3,110	1,300	412	337
24	930	588	1,980	400	495	288	1,110	8,130	3,630	1,230	439	353
25	856	624	2,260	400	490	299	1,200	6,520	3,750	1,170	421	543
26	850	704	1,960	350	457	325	*1,540	5,310	3,660	1,100	399	*843
27	823	745	1,600	275	412	322	2,130	5,090	3,640	1,020	399	710
28	818	756	1,390	250	444	*299	2,770	5,460	3,330	972	421	629
29	1,100	745	1,200	a200	-	307	3,170	4,710	3,040	930	430	603
30	1,590	722	1,100	a175	-	337	3,720	3,910	2,890	876	498	608
31	1,620	-	918	a200	-	365	-	3,280	-	823	*485	-
Total	22,214	24,267	27,399	14,706	16,850	9,860	45,491	165,880	114,530	66,351	16,466	12,820
Mean	717	809	884	474	602	318	1,516	5,351	3,618	2,140	531	427
Cfs/m	1.41	1.59	1.75	0.929	1.18	0.624	2.97	10.5	7.49	4.20	1.04	0.837
In.	1.63	1.77	1.99	1.07	1.23	0.72	3.31	12.11	8.36	4.84	1.20	0.93
Ac-ft	44,060	48,130	54,350	29,170	35,420	19,560	90,230	329,000	227,200	131,600	32,660	25,430

Calendar year 1950: Max 10,100 Min 150 Mean 1,641 Cfs/m 3.22 In. 43.65 Ac-ft 1,188,000  
 Water year 1950-51: Max 8,660 Min 175 Mean 1,471 Cfs/m 2.98 In. 39.16 Ac-ft 1,065,000

Peak discharge (base, 4,400 cfs).--May 12 (9:30 a.m.) 9,180 cfs (8.99 ft); May 24 (6 a.m.) 8,620 cfs (8.75 ft); June 16 (4:30 a.m.) 7,930 cfs (8.45 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records and records for station near West Glacier.

Note.--Stage-discharge relation affected by ice Jan. 5-28, Feb. 2-10, Mar. 4-8, 11-22.



## Middle Fork Flathead River near West Glacier, Mont.

Location.--Lat 48°29'50", long. 114°00'30", in SW 1/4 sec. 34, T. 32 N., R. 19 W., on left bank three-quarters of a mile downstream from McDonald Creek, 1 1/2 miles west of West Glacier, and 3 1/2 miles upstream from mouth.

Drainage area.--1,128 sq mi (revised).

Records available.--October 1939 to September 1951. Published as "near Belton" 1939-47.

Gage.--Water-stage recorder. Prior to Nov. 22, 1950, staff gage read once-daily, at same site and datum.

Average discharge.--12 years, 2,707 cfs.

Extremes.--Maximum discharge during year, 20,100 cfs May 12 (gage height, 8.71 ft); minimum daily discharge, 500 cfs Jan. 30.

1939-51: Maximum discharge, 32,600 cfs May 23, 1948 (gage height, 12.40 ft, from floodmark); minimum observed, 232 cfs Jan. 21, 1940 (gage height, 1.08 ft).

Remarks.--Records excellent except those below 2,500 cfs, which are good and those for periods of ice effect and doubtful or no gage-height record, which are poor.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.4	535	4.0	4,510
2.0	1,020	5.0	7,300
2.5	1,580	6.0	10,500
3.0	2,330	7.0	13,900
3.5	3,320	8.5	19,300

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	600	4,300	1,680	2,640	600	*1,040	1,040	8,580	7,270	7,620	2,880	1,700
2	600	3,700	1,620	2,480	650	1,010	1,140	7,400	6,630	8,130	2,700	1,960
3	550	3,250	1,580	2,370	800	1,010	1,380	6,430	6,490	8,200	2,600	1,910
4	550	3,000	1,450	2,110	950	990	1,860	6,290	6,630	9,030	2,530	1,750
5	600	3,100	1,200	1,980	950	700	2,570	7,620	6,740	9,220	2,380	1,630
6	750	3,200	1,200	1,810	950	600	3,060	11,000	6,400	10,000	2,260	1,540
7	800	3,150	1,330	1,610	900	550	3,210	13,800	5,950	9,540	2,110	1,480
8	900	2,950	1,400	1,530	900	550	3,430	14,300	5,590	8,420	2,020	1,440
9	900	2,700	1,340	1,640	1,200	700	3,450	14,700	5,560	8,200	1,910	1,490
10	1,000	2,300	1,300	1,550	3,200	1,100	*3,120	15,800	*6,770	7,940	1,840	1,430
11	1,500	2,300	1,340	1,460	3,800	1,100	2,940	17,200	8,840	7,400	1,870	1,490
12	2,200	2,200	1,370	1,390	3,600	bl, 150	2,960	19,300	10,300	7,090	1,870	1,490
13	2,200	2,050	*1,350	1,340	3,200	bl, 100	3,500	17,200	10,800	7,300	1,670	1,440
14	2,150	1,950	1,320	1,320	2,700	990	4,080	14,000	12,400	7,520	1,610	1,390
15	2,200	1,900	1,300	1,280	2,600	980	4,050	11,600	15,200	7,620	1,550	1,340
16	2,300	1,800	1,300	1,240	2,300	970	3,950	10,600	16,200	7,400	*1,500	1,310
17	2,250	1,750	1,310	*1,220	2,300	970	4,250	11,600	14,200	*7,150	1,450	1,280
18	2,150	1,700	1,320	1,200	2,000	960	4,720	14,000	12,200	6,860	1,430	1,240
19	2,300	1,600	1,310	1,150	1,850	950	4,430	13,700	11,100	6,570	1,400	1,230
20	4,000	1,500	1,340	1,140	1,700	950	4,020	12,600	*10,100	5,930	1,380	1,210
21	5,200	1,500	1,670	1,130	1,450	960	3,590	12,400	9,090	5,340	1,370	1,200
22	4,500	1,400	1,980	1,050	1,350	950	3,280	13,800	8,420	4,800	1,340	1,200
23	*3,790	1,200	2,980	1,000	1,300	940	3,040	16,600	8,150	4,460	1,350	1,200
24	3,400	1,260	4,590	1,050	1,220	930	2,900	17,900	9,860	4,300	1,380	1,210
25	3,100	1,410	5,790	1,000	1,220	940	2,980	15,600	10,200	4,120	1,350	1,740
26	3,000	1,570	5,390	1,100	1,170	980	3,560	12,800	9,480	3,930	1,330	*3,340
27	3,000	1,710	4,510	750	1,090	990	4,720	11,900	9,320	3,680	1,310	2,960
28	2,950	1,770	3,910	600	1,050	970	6,090	12,000	8,640	3,500	1,350	2,580
29	2,950	1,770	3,470	550	-	960	6,940	11,000	7,940	3,360	1,370	2,440
30	4,000	1,750	3,140	b500	-	970	8,520	9,600	7,620	3,250	1,410	2,470
31	4,610	-	2,920	550	-	1,000	-	8,320	-	3,020	1,660	-
Total	70,900	65,740	67,710	41,720	47,000	28,960	108,780	389,440	274,050	200,900	54,180	50,090
Mean	2,287	2,191	2,184	1,346	1,679	934	3,626	12,560	9,135	6,481	1,748	1,670
Cfsm	2.03	1.94	1.94	1.19	1.49	0.828	3.21	11.1	8.10	5.75	1.55	1.48
In.	2.34	2.16	2.24	1.37	1.55	0.95	3.58	12.80	9.04	6.63	1.79	1.65
Ac-ft	140,600	130,400	134,500	82,750	93,220	57,440	215,800	772,400	543,600	398,500	107,500	99,350

Calendar year 1950: Max 23,600 Min 400 Mean 3,994 Cfsm 3.54 In. 48.04 Ac-ft: 2,891,000  
 Water year 1950-51: Max 19,300 Min 500 Mean 3,834 Cfsm 3.40 In. 46.10 Ac-ft: 2,776,000

Peak discharge (base, 8.700 cfs).--Apr. 30 (8 p.m.) 9,440 cfs (5.67 ft); May 12 (2 p.m.) 20,100 cfs (8.71 ft); May 24 (11:30 a.m.) 18,400 cfs (8.25 ft); June 16 (9 a.m.) 17,000 cfs (7.85 ft); July 6 (1 p.m.) 10,400 cfs (5.38 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--Doubtful or no gage-height record Oct. 1-22, 24-30, Nov. 1-21, Jan. 22-29, Jan. 31 to Feb. 20, Feb. 22, 23, Mar. 5-11; discharge estimated on basis of temperature records and records for other Flathead River stations.

South Fork Flathead River at Spotted Bear ranger station, near Hungry Horse, Mont.

Location.--Lat 47°55'20", long. 113°31'25", in SE1SW1 sec. 17, T. 25 N., R. 15 W., on left bank 600 ft south of Spotted Bear ranger station, 1,000 ft upstream from Spotted Bear River, and 40 miles southeast of Hungry Horse.

Drainage area.--958 sq mi (revised).

Records available.--August 1948 to September 1951.

Gage.--Water-stage recorder.

Extremes.--Maximum discharge during year, 14,200 cfs May 12 (gage height, 9.93 ft); minimum recorded discharge, 217 cfs Jan. 28 (gage height, 0.52 ft).

1948-51: Maximum discharge, 15,600 cfs June 21, 1950 (gage height, 10.54 ft); minimum daily, 160 cfs Feb. 5-8, 1949.

Flood of May-June 1948 reached a stage of 14.00 ft about May 22 (discharge, 22,000 cfs, by slope-area determination of peak flow).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used May 13, 14)

Oct. 1 to May 12

May 13 to Sept. 30

0.7	262	2.5	1,160	6.0	6,100	1.4	506	5.0	3,700
.9	320	3.0	1,540	8.0	10,100	2.0	800	6.0	5,270
1.2	425	3.5	2,040	9.7	13,700	3.0	1,440	7.0	7,190
1.5	553	4.0	2,730			4.0	2,440	7.7	13,300
2.0	830	5.0	4,300						

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	427	1,900	1,100	1,170	325	*614	614	4,950	4,540	4,710	1,580	780
2	412	1,690	1,050	1,100	350	600	782	4,280	4,060	4,960	1,500	775
3	404	*1,540	980	1,080	375	525	*1,050	3,780	3,840	5,320	1,430	750
4	401	1,500	908	1,040	400	475	1,350	3,890	3,850	6,030	1,380	710
5	416	1,600	995	986	450	425	1,750	5,150	3,880	5,950	1,340	670
6	497	1,630	718	806	450	400	2,050	7,610	3,670	6,290	1,260	*630
7	525	1,580	914	619	*b450	400	2,130	8,970	5,920	5,930	1,200	600
8	515	1,480	928	718	b475	400	2,340	9,270	3,330	5,300	1,150	586
9	563	1,300	836	862	b700	425	2,330	10,000	3,410	4,840	1,100	576
10	640	1,220	800	782	1,460	450	2,080	10,500	4,130	4,880	1,060	567
11	836	1,270	812	718	2,370	475	1,900	11,800	5,340	4,300	1,030	655
12	928	1,210	824	735	2,050	500	1,960	11,700	6,570	3,980	1,010	695
13	940	1,080	806	729	1,590	525	2,450	11,400	7,590	4,060	970	680
14	940	1,090	758	724	1,360	550	3,120	8,640	8,970	4,300	928	645
15	980	1,010	747	701	1,310	550	3,000	6,950	11,700	4,410	894	620
16	1,030	986	770	678	1,200	575	2,850	6,330	13,100	4,190	850	600
17	1,020	973	747	667	1,020	525	3,030	6,910	11,200	3,950	811	581
18	1,130	960	729	635	973	475	3,360	*8,140	9,500	3,760	780	562
19	1,350	843	*712	563	908	500	3,270	7,760	8,120	3,590	750	544
20	1,360	756	747	558	856	475	2,960	7,370	*7,390	3,240	725	544
21	1,370	862	806	553	830	472	2,580	7,190	6,590	2,890	705	534
22	1,310	836	824	588	764	463	2,380	8,260	5,840	2,610	685	544
23	1,250	770	1,010	563	712	447	2,200	10,600	5,480	2,400	700	553
24	1,170	782	1,470	544	690	447	2,040	11,900	6,370	2,250	750	572
25	1,100	914	1,770	593	712	459	2,080	10,500	6,250	2,160	755	690
26	1,070	1,050	1,790	603	684	484	2,400	8,390	5,860	*2,150	705	1,080
27	1,040	1,100	1,630	359	630	497	2,860	7,610	6,150	2,000	670	994
28	1,050	1,120	1,520	302	619	476	3,520	7,840	5,950	1,900	685	922
29	1,440	1,100	1,400	290	-	472	*4,370	6,970	5,370	1,840	725	904
30	2,040	1,100	1,310	280	-	497	5,370	6,010	4,980	1,750	822	904
31	2,130	-	1,240	300	-	544	-	5,220	-	1,650	850	-
Total	30,284	35,254	31,351	20,846	24,713	15,122	74,176	247,890	186,310	117,590	29,780	20,467
Mean	977	1,175	1,011	672	883	488	2,473	7,996	6,210	3,793	961	682
Cfs/m	1.02	1.23	1.06	0.701	0.922	0.509	2.58	8.35	6.48	3.96	1.00	0.712
In.	1.18	1.37	1.22	0.81	0.96	0.59	2.88	9.63	7.23	4.56	1.15	0.79
Ac-ft	60,070	69,930	62,180	41,350	49,020	29,990	147,100	491,700	369,500	233,200	59,070	40,600

Calendar year 1950: Max 15,300 Min 230 Mean 2,502 Cfs/m 2.61 In. 35.43 Ac-ft 1,811,000  
Water year 1950-51: Max 13,700 Min 280 Mean 2,284 Cfs/m 2.38 In. 32.37 Ac-ft 1,654,000

Peak discharge (base, 7,500 cfs).--May 12 (10 a.m.) 14,200 cfs (9.93 ft); May 24 (10 a.m.) 12,300 cfs (9.28 ft); June 16 (7 a.m.) 15,700 cfs (9.89 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Jan. 29 to Feb. 6, Mar. 2-20; discharge estimated on basis of temperature records and records for South Fork Flathead River near Columbia Falls, Mont.

## Spotted Bear River near Hungry Horse, Mont.

Location.--Lat 47°55'40", long. 113°31'10", near center of sec. 17, T. 25 N., R. 15 W., on left bank a third of a mile upstream from mouth, and 40 miles southeast of Hungry Horse.

Drainage area.--184 sq mi (revised).

Records available.--October 1948 to September 1951:

Gage.--Water-stage recorder.

Extremes.--Maximum discharge during year, 3,280 cfs May 12 (gage height, 5.77 ft); minimum daily, 50 cfs Jan. 29-31.  
1948-51: Maximum discharge, 3,860 cfs June 6, 1950 (gage height, 6.42 ft); minimum daily, 26 cfs Feb. 5-7, 1949.  
Flood of May-June 1948 reached a stage of 7.24 ft about May 22 (discharge, 4,010 cfs, by slope-area determination of peak flow).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.0	56	3.0	795
1.2	91	4.0	1,560
1.6	181	5.0	2,490
2.0	300	5.6	3,100
2.5	510		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	66	304	159	202	55	*b110	110	1,020	881	821	207	114
2	64	282	152	189	80	105	150	828	814	867	202	125
3	85	*238	141	189	65	90	*218	729	828	923	189	123
4	64	235	141	176	70	80	265	755	861	1,040	184	112
5	72	290	134	164	80	75	368	1,140	867	979	176	106
6	95	276	b130	146	90	70	416	1,830	789	1,040	167	*99
7	95	259	b145	132	*b90	70	400	2,130	735	951	162	93
8	91	229	b150	b140	110	70	434	2,140	705	840	157	91
9	116	191	b140	b145	160	75	412	2,290	783	854	155	91
10	119	189	b130	b130	300	80	368	2,400	1,090	771	152	87
11	197	199	134	b125	400	85	336	2,750	1,400	669	150	106
12	159	186	134	b125	360	90	364	3,090	1,550	657	148	106
13	150	174	130	b125	250	95	492	2,380	1,640	675	139	102
14	139	174	123	b125	235	100	576	1,780	1,920	693	134	97
15	146	150	125	b120	220	105	550	1,480	2,420	669	130	91
16	152	159	123	b115	200	105	540	1,420	2,460	621	127	89
17	150	150	123	b110	175	90	615	1,620	2,080	588	121	85
18	189	148	119	b105	165	85	723	*1,900	1,690	545	116	83
19	241	134	*119	b95	155	90	627	1,720	1,510	501	112	80
20	229	130	123	b95	150	90	530	1,620	*1,360	447	110	80
21	241	136	136	b95	140	85	470	1,600	1,210	396	108	80
22	218	127	139	b100	130	80	416	1,950	1,140	364	106	82
23	202	110	171	b95	125	80	384	2,570	1,080	336	110	85
24	184	127	265	b95	120	80	364	2,630	1,340	320	116	95
25	176	141	332	b100	125	85	388	2,150	1,200	304	112	194
26	176	159	324	b105	120	90	492	1,700	1,140	*279	104	352
27	171	164	290	85	110	90	657	1,580	1,140	265	102	229
28	179	162	265	60	b110	85	840	1,680	1,040	253	106	199
29	262	162	241	50	-	85	*1,000	1,400	950	241	112	202
30	368	159	229	50	-	90	1,190	1,190	860	227	136	199
31	364	-	213	50	-	100	-	1,020	-	215	130	-
Total	5,161	5,524	5,280	3,638	4,370	2,710	14,695	54,482	37,483	18,531	4,280	3,677
Mean	166	184	170	117	156	87.4	480	1,757	1,249	591	138	123
Cfs/m	0.902	1.00	0.924	0.636	0.848	0.475	2.66	9.55	6.79	3.21	0.750	0.668
In.	1.04	1.12	1.07	0.73	0.88	0.55	2.97	11.01	7.58	3.70	0.86	0.75
Ac-ft	10,240	10,960	10,470	7,220	8,670	5,380	29,150	108,100	74,350	36,360	8,490	7,290
Calendar year 1950: Max	3,390	Min	40	Mean	470	Cfs/m	2.55	In.	34.67	Ac-ft	340,100	
Water year 1950-51: Max	3,090	Min	50	Mean	437	Cfs/m	2.38	In.	32.26	Ac-ft	316,700	

Peak discharge (base, 1,500 cfs).--May 12 (3 a.m.) 3,280 cfs (5.77 ft); Mar. 24 (3:30 a.m.) 2,820 cfs (5.33 ft); June 16 (1:30 a.m.) 2,740 cfs (5.25 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Jan. 27 to Feb. 6, Feb. 8-27, Mar. 2 to Apr. 2; discharge: estimated on basis of 2 discharge measurements, temperature records, and records for South Fork Flathead River at Spotted Bear ranger station near Hungry Horse, Mont.

## Twin Creek near Hungry Horse, Mont.

Location.--Lat 47°59'10", long. 113°33'30", in E½ sec. 25, T. 26 N., R. 16 W., on left bank 0.1 mile (revised) upstream from mouth, 300 ft upstream from road bridge, and 36 miles southeast of Hungry Horse.

Drainage area.--47.0 sq mi (revised).

Records available.--August 1948 to September 1951.

Gage.--Water-stage recorder.

Extremes.--Maximum discharge during year, 1,270 cfs May 12 (gage height, 7.19 ft); minimum recorded, 13 cfs Oct. 1 (gage height, 2.07 ft).

1948-51: Maximum discharge, 1,550 cfs May 14, 1950 (gage height, 7.51 ft); minimum daily, 5 cfs Jan. 11, Jan. 20 to Feb. 6, Feb. 13, 14, 1949.

Flood of May-June 1948 reached a stage of 8.1 ft about May 22 (discharge, 2,410 cfs, by slope-area determination of peak flow).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

2.0	11	4.0	210
2.2	18	4.5	294
2.4	30	5.0	400
2.7	52	6.0	690
3.0	80	7.0	1,140
3.5	140		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	13	125	54	90	22	46	78	414	234	166	37	22
2	14	101	52	80	22	46	115	319	228	166	36	24
3	14	*68	50	72	24	46	*165	285	245	170	35	23
4	14	103	50	68	26	46	221	339	269	176	34	22
5	16	144	48	64	28	40	268	516	266	170	31	20
6	20	136	48	60	*b30	36	264	748	236	198	29	*18
7	18	128	46	56	49	34	268	785	212	169	29	18
8	19	120	44	54	73	b32	281	733	202	145	28	19
9	23	110	42	52	161	32	242	773	242	148	29	18
10	33	100	44	50	215	32	198	804	327	141	28	17
11	79	90	46	48	261	34	188	872	393	127	28	23
12	64	80	48	46	192	34	234	1,090	398	121	29	21
13	56	72	48	44	148	34	331	708	414	116	27	19
14	49	68	46	44	121	34	325	508	464	113	26	18
15	52	64	46	42	98	34	298	414	548	105	25	17
16	50	58	46	40	87	34	302	419	488	97	24	17
17	49	54	46	40	77	32	361	*505	568	90	23	17
18	67	52	48	38	71	32	383	572	327	84	22	16
19	101	50	*52	38	66	32	292	519	298	76	21	16
20	110	48	64	36	63	32	234	502	*269	69	21	15
21	115	46	140	36	59	32	192	536	264	64	20	15
22	101	44	180	36	56	32	167	653	247	58	20	16
23	90	40	280	36	56	31	156	781	240	55	21	16
24	78	44	400	34	56	31	172	715	283	51	20	16
25	72	50	390	34	50	34	221	527	256	*50	21	22
26	71	52	280	34	48	38	296	431	244	48	20	43
27	69	54	250	28	*46	38	386	441	234	45	20	38
28	72	54	190	22	46	37	441	456	212	43	22	34
29	135	54	160	20	-	38	477	365	194	42	21	32
30	179	54	130	19	-	46	516	309	180	40	25	28
31	157	-	110	20	-	59	-	266	-	38	24	-
Total	2,000	2,283	3,478	1,381	2,251	1,138	8,072	17,305	8,802	3,181	798	640
Mean	64.5	76.1	112	44.5	80.4	36.7	269	558	293	103	25.7	21.3
Cfs	1.37	1.62	2.38	0.947	1.71	0.781	5.72	11.9	6.23	2.19	0.547	0.453
In.	1.58	1.81	2.74	1.09	1.78	0.90	6.58	13.72	6.95	2.52	0.63	0.51
Ac-ft	3,970	4,530	6,900	2,740	4,460	2,260	16,010	34,320	17,460	6,310	1,580	1,270
Calendar year 1950: Max	1,240	Min	13	Mean	156	Cfs	3.32	In.	44.96	Ac-ft	112,700	
Water year 1950-51: Max	1,090	Min	13	Mean	141	Cfs	3.00	In.	40.61	Ac-ft	101,800	

Peak discharge (base, 480 cfs).--Apr. 30 (5:30 a.m.) 542 cfs (5.54 ft); May 12 (4:30 a.m.) 1,270 cfs (7.19 ft); May 22 (11:30 p.m.) 636 cfs (6.39 ft); June 15 (9:30 p.m.) 622 cfs (5.80 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Nov. 7 to Dec. 18, Dec. 21 to Feb. 5, Mar. 3-7, 9-22, Sept. 2-5; discharge estimated on basis of temperature records and records for stations on nearby streams.

## Lower Twin Creek near Hungry Horse, Mont.

Location.--Lat 47°59'40", long. 113°33'20" in SE $\frac{1}{4}$  sec. 24, T. 26 N., R. 16 W., on left bank half a mile upstream from mouth and 35 miles southeast of Hungry Horse.

Drainage area.--22.4 sq mi (revised).

Records available.--August 1948 to September 1951.

Gage.--Water-stage recorder.

Extremes.--Maximum discharge during year, 457 cfs May 12 (gage height, 3.50 ft); minimum, 9.6 cfs Oct. 3, 4 (gage height, 1.14 ft).

1948-51: Maximum discharge, 565 cfs June 5, 1950 (gage height, 3.86 ft); minimum daily, 2 cfs Jan. 18 to Feb. 10, 1949.

Flood of May-June 1948 reached a stage of 5.25 ft about May 22 (discharge, 1,200 cfs, by slope-area determination of peak flow).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 11

Feb. 12 to Sept. 30

1.1	8
1.3	17
1.5	30
1.8	59
2.2	116
2.7	218

1.1	12	2.1	114
1.3	21	2.5	198
1.5	34	3.0	322
1.8	67	3.4	429

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	10	78	36	56	b13	24	33	205	124	94	28	16
2	10	69	35	51	a13	b23	42	160	122	97	27	16
3	9.6	*64	34	48	a14	b23	*58	141	131	104	25	16
4	9.6	66	32	44	a16	23	81	153	141	112	25	16
5	10	72	b51	40	a17	b20	107	229	139	109	25	*16
6	11	79	b50	37	*17	b18	118	299	124	133	24	16
7	10	75	29	b55	18	b16	122	348	112	107	23	15
8	11	66	28	32	21	b15	124	343	107	91	22	15
9	11	57	26	33	38	b16	118	367	122	89	22	15
10	13	57	27	31	88	b17	106	370	164	86	20	15
11	23	54	29	29	126	b16	99	383	203	78	20	18
12	37	48	30	28	107	b17	102	407	210	78	20	15
13	35	45	30	27	80	b18	129	501	215	81	20	15
14	32	42	29	26	66	b19	153	241	241	81	20	15
15	36	38	29	26	57	20	143	203	276	78	19	15
16	35	36	29	25	50	19	139	200	248	74	18	15
17	34	36	30	24	44	18	149	*229	205	67	18	15
18	42	33	31	23	41	b18	162	258	175	64	18	15
19	48	31	*32	b22	38	18	141	246	155	59	17	15
20	57	30	38	21	36	18	118	241	*139	53	16	15
21	69	29	52	b21	33	18	102	248	135	47	16	14
22	66	27	61	21	b30	18	91	284	129	43	16	14
23	63	24	113	20	b29	18	83	325	129	41	16	14
24	57	26	213	19	b28	18	84	312	149	39	16	14
25	54	30	206	20	27	18	97	251	135	*38	16	15
26	54	35	150	22	26	20	122	229	133	37	15	16
27	51	36	118	b16	*b25	20	157	232	133	34	16	15
28	49	36	96	b12	b25	20	*193	234	118	33	15	16
29	71	38	79	b12	-	20	227	193	107	33	15	17
30	85	37	71	b12	-	22	241	160	102	30	16	18
31	84	-	63	b12	-	27	-	141	-	28	16	-
Total	1,187.2	1,399	1,837	845	1,123	595	3,641	7,933	4,623	2,138	600	460
Mean	38.3	46.6	59.3	27.3	40.1	19.2	121	256	154	69.0	19.4	15.3
Cfs/m	1.71	2.08	2.65	1.22	1.79	0.857	5.40	11.4	6.87	3.08	0.866	0.683
In.	1.97	2.32	3.06	1.41	1.86	0.99	6.02	13.14	7.66	3.55	1.00	0.76
Ac-ft	2,350	2,770	3,640	1,680	2,230	1,180	7,220	15,730	9,170	4,240	1,190	912

Calendar year 1950: Max 525 Min 9.6 Mean 87.2 Cfs/m 3.89 In. 52.92 Ac-ft 63,140

Water year 1950-51: Max 407 Min 9.6 Mean 72.3 Cfs/m 3.23 In. 43.74 Ac-ft 52,310

Peak discharge (base, 300 cfs).--May 12 (5 a.m.) 457 cfs (3.50 ft); May 24 (3 a.m.) 345 cfs (3.09 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records.

b Stage-discharge relation affected by ice.

## Sullivan Creek near Hungry Horse, Mont.

Location.--Lat 48°01'45", long. 113°42'10", in W $\frac{1}{2}$  sec. 12, T. 26 N., R. 17 W., on left bank a quarter of a mile downstream from Quintonkon Creek, 3 miles upstream from mouth, and 30 miles southeast of Hungry Horse.

Drainage area.--71.3 sq mi (revised).

Records available.--September 1948 to September 1951.

Gage.--Water-stage recorder.

Extremes.--Maximum discharge during year, 1,400 cfs May 12 (gage height, 4.34 ft); minimum, 30 cfs Oct. 3 (gage height, 1.24 ft).  
1948-51: Maximum discharge, 1,700 cfs May 12, 1949 (gage height, 4.73 ft); minimum daily, 17 cfs Feb. 14, 1949.

Flood of May-June 1948 reached a discharge of 2,280 cfs on about May 22, by slope-area determination of peak flow.

Remarks.--Records good except those for periods of ice effect, which are poor.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used June 15-30)

1.2	26	3.0	525
1.4	45	3.5	810
1.7	87	4.0	1,150
2.0	147	4.3	1,380
2.5	288		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	31	328	145	202	b45	b75	92	580	415	313	78	58
2	31	*262	138	189	b55	b70	129	475	395	322	73	63
3	30	236	132	180	b60	b70	170	420	430	330	68	53
4	31	236	117	168	b70	b70	215	450	460	382	87	50
5	45	262	b90	154	b75	b65	262	668	450	357	65	*47
6	78	251	b75	143	b80	b60	281	982	400	335	61	45
7	55	239	b75	b120	b85	b55	292	1,120	570	350	60	43
8	51	215	b85	b105	*b90	b50	322	1,090	344	284	60	44
9	55	194	b95	b105	b200	b50	288	1,140	368	270	58	44
10	68	197	100	110	515	b50	251	1,180	490	255	57	42
11	105	177	107	115	470	b55	236	1,250	635	226	60	92
12	92	161	121	109	344	b60	258	1,320	679	212	60	73
13	85	152	119	105	268	b60	344	1,060	732	207	58	81
14	79	143	113	101	220	b60	425	810	630	199	56	56
15	96	134	109	100	194	63	390	674	354	192	52	52
16	89	127	109	96	172	63	362	640	901	180	50	50
17	87	123	129	94	156	63	390	726	738	170	49	47
18	138	119	129	87	143	61	430	*862	635	161	48	44
19	177	111	134	84	132	53	370	792	586	149	45	42
20	199	109	*175	85	125	52	313	738	515	138	43	41
21	242	101	236	84	115	52	266	738	*475	129	42	39
22	215	100	248	82	109	51	239	882	455	121	42	40
23	194	94	580	77	105	50	220	1,090	445	115	43	40
24	172	105	940	76	109	50	220	1,090	574	109	45	44
25	156	140	850	85	100	52	242	914	505	103	46	57
26	163	163	608	92	89	57	313	792	480	100	43	92
27	154	163	455	b50	b80	57	415	792	465	*82	48	70
28	158	158	352	b40	*b75	55	495	804	410	89	52	61
29	420	154	288	b35	-	55	624	668	362	85	47	57
30	505	149	251	b55	-	61	679	564	330	82	82	67
31	415	-	223	b40	-	70	-	475	-	77	71	-
Total	4,414	5,101	7,308	3,148	4,279	1,815	9,533	25,766	15,826	6,154	1,721	1,612
Mean	142	170	236	102	153	58.5	318	831	528	199	55.5	53.7
Cfsm	1.99	2.38	3.31	1.43	2.15	0.820	4.46	11.7	7.41	2.79	0.778	0.753
In.	2.29	2.66	3.82	1.65	2.24	0.95	4.98	13.49	8.27	3.22	0.90	0.84
Ac-ft	8,760	10,120	14,500	6,240	8,490	3,600	18,910	51,110	31,390	12,210	3,410	3,200

Peak discharge (base, 700 cfs).--Dec. 24 (2 a.m.) 1,020 cfs (3.82 ft); May 12 (3:30 a.m.) 1,400 cfs (4.34 ft); May 24 (1 a.m.) 1,180 cfs (4.01 ft); June 15 (10 p.m.) 1,040 cfs (3.95 ft).

\* Discharge measurement made on this day.  
b Stage-discharge relation affected by ice.

## Graves Creek near Hungry Horse, Mont.

Location.--Lat 48°07'50", long. 113°46'10", in W $\frac{1}{2}$  sec. 4, T. 27 N., R. 17 W., on left bank 2 miles upstream from mouth and 22 miles southeast of Hungry Horse.

Drainage area.--33.0 sq mi.

Records available.--August 1948 to September 1951.

Gage.--Water-stage recorder.

Extremes.--Maximum discharge during year, 907 cfs June 16 (gage height, 4.33 ft); minimum daily, 20 cfs Jan. 30.

1948-51: Maximum discharge, 1,520 cfs June 22, 1950 (gage height, 5.70 ft); minimum daily, 10 cfs during several periods in January and February 1949.

Flood of May-June 1948 reached a stage of 5.33 ft about May 22 (discharge, 1,440 cfs, by slope-area determination of peak flow).

Remarks.--Records good except those for periods of ice effect no gage-height record, or those for period Sept. 18-30, which are fair.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used June 12 to July 6)

1.0	22	3.0	343
1.4	52	3.5	504
1.7	84	4.0	708
2.0	123	4.3	839
2.5	218		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	26	218	81	116	a55	42	40	306	278	306	65	64
2	28	*182	76	108	a40	b40	48	285	268	303	62	70
3	26	157	73	100	a45	38	60	227	290	324	58	62
4	27	148	b65	99	a50	b35	*80	214	319	375	56	57
5	34	146	b60	88	a60	b35	100	272	327	418	52	*52
6	59	146	63	81	b70	a30	115	399	300	431	49	48
7	49	139	66	b75	82	a30	126	515	275	381	48	46
8	45	125	65	70	83	a30	141	538	248	350	47	47
9	47	109	57	68	205	a30	141	578	253	313	47	45
10	55	108	55	63	324	a30	129	623	335	290	44	41
11	81	105	56	59	282	a30	122	661	461	260	49	76
12	82	96	57	56	207	a35	123	751	527	241	52	74
13	80	86	57	56	157	39	144	598	582	236	45	68
14	74	83	54	55	128	37	176	448	695	239	45	63
15	77	76	55	55	105	40	178	358	835	234	41	59
16	71	74	57	51	90	43	170	327	830	225	38	55
17	68	72	68	50	80	40	172	*363	686	211	36	51
18	84	71	72	48	73	37	178	497	582	194	34	49
19	110	64	75	b47	65	36	176	479	523	178	33	48
20	168	61	*89	46	61	34	155	441	441	155	32	44
21	253	61	133	44	a60	32	139	428	*399	139	31	43
22	230	59	152	45	a55	32	123	497	381	123	30	43
23	190	53	303	44	a55	31	113	657	378	110	30	42
24	157	82	527	42	a50	31	109	695	512	102	32	42
25	136	76	451	48	a50	31	115	570	461	96	32	47
26	136	80	338	59	a45	32	133	479	415	89	30	48
27	122	82	255	b40	a45	33	168	482	405	*85	33	46
28	117	83	207	b30	*43	32	205	497	384	80	37	43
29	163	82	166	a25	-	31	270	424	345	77	34	42
30	243	83	148	a20	-	33	327	566	324	73	67	54
31	255	-	129	a30	-	35	-	316	-	58	76	-
Total	3,291	2,987	4,110	1,815	2,645	1,064	4,276	14,271	13,066	6,886	1,365	1,567
Mean	106	99.6	133	58.5	94.5	34.3	143	460	436	216	44.0	52.2
Cfs/m	3.21	3.02	4.03	1.77	2.86	1.04	4.33	13.9	13.2	6.55	1.33	1.58
In.	3.70	3.37	4.65	2.04	2.98	1.20	4.83	16.03	14.73	7.55	1.53	1.76
Ac-ft	6,530	5,920	8,150	3,600	5,250	2,110	8,480	28,310	25,920	13,260	2,710	3,110

Calendar year 1950: Max 1,480 Min 20 Mean 179 Cfs/m 5.42 In. 73.43 Ac-ft 129,200

Water year 1950-51: Max 835 Min 20 Mean 157 Cfs/m 4.76 In. 64.37 Ac-ft 113,400

Peak discharge (base, 500 cfs).--Dec. 24 (7 to 8 a.m.) 562 cfs (3.65 ft); May 12 (8 to 10 a.m.) 782 cfs (4.17 ft); May 24 (3 a.m.) 738 cfs (4.08 ft); June 16 (12:30 to 3:30 a.m.) 907 cfs (4.33 ft); June 24 (11 a.m. to 2 p.m.) 534 cfs (3.44 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of temperature records and records for Sullivan Creek near Hungry Horse.

b Stage-discharge relation affected by ice.

## South Fork Flathead River near Columbia Falls, Mont.

Location.--Lat 48°22'10", long. 114°02'40", in NE<sup>1</sup>/<sub>4</sub> sec. 17, T. 30 N., R. 19 W., on right bank 2 miles upstream from mouth, 3 miles downstream from Hungry Horse Dam, and 9 miles east of Columbia Falls.

Drainage area.--1,667 sq mi (revised).

Records available.--September 1910 to September 1916, April 1923 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 3,030.3 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). September 1910 to September 1916, chain gage and Apr. 23, 1923, to Sept. 30, 1928, water-stage recorder at site 1½ miles downstream at different datum. Oct. 1, 1928, to Sept. 30, 1929, at present site at datum 2.00 ft higher and Oct. 1, 1929, to Sept. 30, 1948, at present site at datum 1.00 ft higher than present datum.

Average discharge.--22 years (1928-32, 1933-51), 3,237 cfs.

Extremes.--Maximum discharge during year, 25,500 cfs May 12 (gage height, 15.73 ft); minimum observed, 7.3 cfs Sept. 24 (gage height, 0.52 ft) result of storage in Hungry Horse Reservoir.

1950-16, 1923-51: Maximum discharge observed, 46,200 cfs June 19, 1916 (gage height, 16.6 ft, site and datum then in use), from rating curve extended above 20,000 cfs; minimum observed, that of Sept. 24, 1951.

Remarks.--Records excellent except those for periods of ice effect and those for period Sept. 21-30, which are fair. Flow regulated by Hungry Horse Dam beginning Sept. 21, 1951, when diversion tunnel was closed.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

0.5	6	2.5	575	8.0	6,880
.6	12	3.0	840	10.0	10,300
.8	30	3.5	1,180	13.0	17,300
1.0	65	4.0	1,590	15.4	24,500
1.5	190	5.0	2,640		
2.0	365	6.0	3,880		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	780	4,320	2,010	3,000	b800	1,420	1,410	10,500	8,700	8,060	2,520	1,410
2	769	3,840	1,980	2,760	b900	1,350	1,740	8,860	7,880	7,980	2,430	1,420
3	747	3,420	1,890	2,650	b1,000	1,240	2,350	7,740	7,620	8,560	2,290	1,350
4	742	3,280	1,780	2,490	b1,100	1,200	3,110	7,790	7,720	9,400	2,200	1,250
5	769	3,310	1,610	2,190	*b1,200	g936	4,140	10,000	7,840	9,780	2,100	1,170
6	g942	3,460	b1,550	2,070	b1,300	g816	4,870	14,100	7,570	10,000	1,980	1,100
7	g995	3,330	b1,400	1,930	b1,300	b750	5,150	17,400	7,110	9,760	1,880	1,060
8	g954	3,500	b1,850	b1,900	b1,300	b600	5,510	*17,800	6,740	8,840	1,800	1,030
9	g988	2,700	b1,750	b1,950	b1,800	g1,020	5,480	18,700	6,680	8,130	1,730	1,010
10	1,060	2,490	b1,600	1,970	b3,500	1,160	5,020	19,600	7,700	7,930	1,680	981
11	1,410	2,490	1,580	1,750	5,570	g1,180	4,640	21,200	9,900	7,380	1,640	1,210
12	*1,560	2,400	1,600	1,670	5,220	*g1,180	4,670	24,300	11,900	6,780	1,660	1,230
13	1,550	2,210	1,570	1,630	4,240	1,220	5,470	25,200	13,300	6,740	1,540	1,190
14	1,530	2,070	1,510	1,610	3,590	1,200	6,560	17,700	15,200	6,860	1,490	1,140
15	1,620	*1,990	1,450	1,560	3,270	1,230	6,600	14,100	19,000	6,980	*1,430	1,090
16	1,640	1,880	1,470	1,530	3,030	1,270	6,310	12,600	21,700	6,780	1,370	1,040
17	1,630	1,850	1,560	*1,470	2,670	1,160	*6,470	13,100	19,800	6,420	1,310	1,000
18	1,830	1,820	*1,610	1,460	2,450	1,110	6,960	15,200	16,400	*6,110	1,270	974
19	2,360	1,710	1,580	1,440	2,310	1,120	6,820	15,400	14,300	5,820	1,220	942
20	3,000	1,540	1,800	1,430	2,140	1,120	6,210	14,300	12,800	5,400	1,180	824
21	3,410	1,570	2,490	1,370	2,000	1,090	5,580	13,800	11,400	4,900	1,140	396
22	3,130	1,570	2,710	1,400	1,840	1,090	5,080	15,200	10,400	4,410	1,120	*g25
23	2,850	1,440	4,180	1,380	1,680	1,060	4,700	18,800	9,760	4,040	1,110	g8.0
24	2,580	1,490	6,720	1,380	1,650	1,010	4,450	21,500	11,100	3,780	1,160	g7.3
25	2,380	1,680	6,890	1,430	1,640	1,010	4,500	19,900	*11,200	3,590	1,200	*g11
26	2,310	1,920	6,240	1,410	1,570	1,060	5,090	16,100	10,200	3,490	1,140	g13
27	2,210	2,050	5,260	967	1,430	1,100	6,100	14,500	10,200	3,300	1,120	g9.9
28	2,180	2,080	4,560	b750	1,390	1,060	7,170	14,500	10,000	3,090	1,140	g9.2
29	3,000	2,060	3,960	b700	-	1,030	8,740	13,400	9,220	2,970	1,150	g8.6
30	4,550	2,040	3,580	b650	-	1,090	10,700	11,600	8,580	2,830	1,390	g11
31	4,810	-	3,260	b750	-	1,230	-	10,000	-	2,680	1,590	-
Total	80,286	71,010	82,800	50,647	61,890	34,312	161,600	472,890	331,920	192,770	47,980	22,920.0
Mean	1,945	2,367	2,671	1,634	2,210	1,107	5,387	15,250	11,060	6,218	1,548	764
Ac-ft	19,600	140,800	164,200	100,500	122,800	68,060	320,500	938,000	658,400	382,400	95,170	45,460
(t)	0	0	0	0	0	0	0	0	0	0	0	+21,650

Adjusted for change in reservoir contents

Mean	1,945	2,367	2,671	1,634	2,210	1,107	5,387	15,250	11,060	6,218	1,548	1,128
Cfs	1.17	1.42	1.60	0.980	1.33	0.664	3.23	9.15	6.63	3.73	0.929	0.677
In.	1.35	1.58	1.84	1.13	1.38	0.77	3.80	10.55	7.40	4.30	1.07	0.76
Ac-ft	19,600	140,800	164,200	100,500	122,800	68,060	320,500	938,000	658,400	382,400	95,170	67,110

Observed

Calendar year 1950: Max	29,000	Min	650	Mean	4,905	Ac-ft	3,552,000
Water year 1950-51: Max	24,300	Min	7.3	Mean	4,359	Ac-ft	3,156,000

Adjusted

Calendar year 1950: Mean	4,905	Cfs	2.94	In.	39.98	Ac-ft	3,552,000
Water year 1950-51: Mean	4,359	Cfs	2.63	In.	35.73	Ac-ft	3,178,000

\* Discharge measurement made on this day.

† Change in contents, in acre-feet, in Hungry Horse Reservoir; furnished by Bureau of Reclamation.

b Stage-discharge relation affected by ice.

g Computed from staff-gage readings.



## Flathead River at Columbia Falls, Mont.

Location.--Lat 48°21'50", long. 114°11'10", in NW 1/4 (revised) sec. 17, T. 30 N., R. 20 W., on right bank 200 ft downstream from highway bridge at Columbia Falls and 5 miles downstream from South Fork.

Drainage area.--4,464 sq mi (revised).

Records available.--May 1922 to September 1923 (fragmentary), June 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,978.00 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).

Prior to Nov. 14, 1928, wire-weight gage on bridge 200 ft upstream at datum 0.19 ft higher.

Average discharge.--23 years (1928-51), 9,112 cfs.

Extremes.--Maximum discharge during year, 69,000 cfs May 12 (gage height, 15.50 ft); minimum daily, 1,900 cfs Jan. 30.

1922-23, 1928-51: Maximum discharge, 102,000 cfs May 23, 1948 (gage height, 19.08 ft); minimum, 798 cfs Dec. 8, 1929 (gage height, -0.08 ft).

Maximum stage known, 22.7 ft in June 1894, from floodmarks (discharge, 135,000 cfs, from rating curve extended above 85,000 cfs by logarithmic plotting).

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are fair. South Fork Flathead River which contributes about one-third of flow completely regulated beginning Sept. 21, 1951, when diversion tunnel at Hungry Horse Dam was closed.

Revisions (water years).--W 1092: 1923.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.5	2,070	8.0	20,000
2.0	2,820	10.0	30,200
3.0	4,510	12.0	42,700
4.0	6,580	14.0	57,200
5.0	9,090	15.2	66,600
6.0	12,200		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,470	12,200	5,590	8,180	a2,200	4,230	3,730	31,700	24,800	24,400	9,080	6,490
2	2,410	10,800	5,280	7,500	a2,400	4,070	4,300	27,400	22,800	25,100	8,750	7,160
3	2,360	9,710	5,280	7,230	b3,100	3,850	5,380	23,400	22,200	25,800	8,410	7,040
4	2,340	9,040	4,870	6,700	b3,400	3,650	6,890	22,700	22,700	28,200	8,180	6,560
5	2,420	9,200	4,110	6,580	b3,500	2,760	8,910	27,300	23,100	30,100	7,880	6,100
6	2,850	9,570	3,850	5,990	*b3,500	2,420	10,600	38,400	22,000	31,300	7,480	5,720
7	3,040	9,310	4,430	5,200	3,430	b2,300	11,700	49,200	20,500	30,200	7,160	5,400
8	2,980	8,700	5,080	5,060	3,480	b2,400	12,800	*51,400	19,100	27,200	6,800	5,180
9	3,110	7,680	4,890	5,480	4,510	b2,800	13,000	52,300	18,600	25,600	6,540	5,240
10	3,440	7,010	4,660	5,420	8,910	a3,500	11,800	55,000	21,300	24,800	6,320	5,040
11	4,450	7,010	4,700	5,120	12,700	a3,500	10,900	59,100	27,700	22,900	6,120	5,320
12	5,340	6,750	4,800	4,950	12,100	b3,600	11,000	68,500	33,600	21,300	6,230	5,360
13	5,360	6,320	4,740	4,830	10,400	b3,600	13,100	83,500	36,800	21,400	5,940	5,140
14	5,380	6,050	4,590	4,720	9,260	b3,600	15,700	51,600	41,400	21,900	5,720	4,910
15	5,630	*5,850	4,430	4,660	8,700	b3,900	16,000	42,000	50,300	22,300	*5,480	4,660
16	5,830	5,590	4,420	4,550	8,340	b3,800	15,400	37,200	57,200	*21,800	5,260	4,450
17	5,720	5,480	4,570	4,400	7,620	b3,400	16,000	39,100	51,600	20,800	5,060	4,280
18	5,960	5,340	4,680	4,270	6,960	b3,300	17,400	47,200	43,800	20,000	4,890	4,120
19	7,010	5,020	4,570	4,020	6,580	b3,300	16,600	48,400	38,900	19,200	4,740	4,000
20	10,100	4,700	4,800	3,900	6,180	b3,300	15,200	43,500	35,400	17,800	4,620	3,800
21	12,900	4,830	5,830	3,850	5,830	b3,100	13,600	41,400	31,900	16,100	4,470	3,420
22	11,500	4,740	6,510	3,850	5,400	b3,200	12,400	44,400	29,100	14,800	4,360	2,850
23	*10,100	4,190	6,880	3,800	5,060	*b3,100	*11,400	53,800	27,700	13,500	4,320	2,850
24	8,990	4,360	13,800	3,900	4,890	b3,000	10,900	60,800	32,700	12,800	4,510	*3,040
25	8,180	4,910	16,000	*3,780	4,910	3,030	11,200	57,000	*35,900	12,400	4,530	3,700
26	7,980	5,460	15,700	4,110	4,780	3,200	12,800	46,200	32,200	12,000	4,300	6,630
27	8,000	5,920	13,600	2,660	4,380	3,300	15,900	40,900	31,200	11,300	4,250	6,840
28	7,920	5,890	*11,800	2,210	4,210	3,140	19,800	40,200	29,300	10,700	4,000	6,050
29	8,880	5,920	10,300	b2,000	-	3,090	24,000	37,200	26,700	10,400	4,450	5,630
30	11,800	5,810	9,450	b1,900	-	3,140	23,400	32,400	25,000	10,100	5,000	5,810
31	13,200	-	6,880	a2,000	-	3,380	-	28,300	-	9,510	6,270	-
Total	197,850	203,440	215,070	142,620	166,730	101,560	397,810	4,358,330	935,500	615,510	181,510	152,790
Mean	6,376	6,781	6,938	4,601	5,955	3,276	13,260	43,850	31,180	19,860	5,855	5,095
Ac-ft	392,000	403,500	426,600	282,900	330,700	201,400	789,000	*2,696	1,856	*1,221	360,000	303,100
(t)	0	0	0	0	0	0	0	0	0	0	0	+21,650

Adjusted for change in reservoir contents

Mean	6,376	6,781	6,938	4,601	5,955	3,276	13,260	43,850	31,180	19,860	5,855	5,458
Cfsm	1.43	1.52	1.55	1.03	1.33	0.734	2.97	9.82	6.98	4.45	1.31	1.22
In.	1.65	1.70	1.79	1.19	1.38	0.85	3.31	11.32	7.79	5.13	1.51	1.36
Ac-ft	392,000	403,500	426,600	282,900	330,700	201,400	789,000	2,696	1,856	1,221	360,000	324,750

observed

Calendar year 1950: Max	73,600	Min	1,900	Mean	13,060	Ac-ft	9,453,000
Water year 1950-51: Max	66,300	Min	1,900	Mean	12,790	Ac-ft	9,262,000

Adjusted

Calendar year 1950: Mean	13,060	Cfsm	2.93	In.	39.74	Ac-ft	9,453,000
Water year 1950-51: Mean	12,820	Cfsm	2.87	In.	38.98	Ac-ft	9,284,000

Discharge measurement made on this day.

\* Change in contents, in acre-feet, in Hungry Horse Reservoir; furnished by Bureau of Reclamation.

† Expressed in thousands.

a No gage-height record; discharge estimated on basis of records for other Flathead River stations.

b Stage-discharge relation affected by ice.

## PEND OREILLE RIVER BASIN

Swan River near Bigfork, Mont.

Location (revised).--Lat 48°01'30", long. 113°58'40", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 11, T. 26 N., R. 19 W., on left bank at outlet of Swan Lake, about 1,000 ft downstream from Johnson Creek and 5 miles southeast of Bigfork.

Drainage area.--671 sq mi (revised).

Records available.--October 1910 to May 1911 (gage heights only), April 1922 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 3,062.6 ft above mean sea level (river-profile survey). Oct. 10, 1910, to May 22, 1911, staff gage at site 10 miles upstream at different datum. Apr. 28, 1922, to Oct. 14, 1930, staff gage at site 800 ft upstream at datum 1.9 ft higher.

Average discharge.--25 years (1922-24, 1928-51), 1,035 cfs.

Extremes.--Maximum discharge during year, 4,750 cfs May 14 (gage height, 5.45 ft); minimum observed, 428 cfs Feb. 2 (gage height, 2.34 ft).  
1922-51: Maximum discharge, 8,400 cfs May 24, 1948 (gage height, 7.12 ft, from graph based on gage readings); minimum, 85 cfs Jan. 26-29, 1930 (gage height, 0.04 ft, site and datum then in use).

Remarks.--Records excellent except those computed from staff-gage readings, which are fair. Natural storage in Swan Lake. Diversions for irrigation of about 360 acres above station.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to May 14

May 15 to Sept. 30

2.5	400	2.5	580	4.5	2,980
2.6	620	3.0	1,020	5.0	3,860
3.0	980	3.5	1,550	5.5	4,850
3.5	1,550	4.0	2,220		

Note.--Same as following table above 5.5 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	560	1,170	800	1,230	442	718	700	2,370	2,780	2,550	1,220	732
2	545	1,200	800	1,180	428	700	763	2,640	2,580	2,480	1,200	718
3	538	1,180	800	1,120	506	876	850	2,700	2,370	2,430	1,150	708
4	530	1,120	790	1,080	545	860	980	2,760	2,200	2,430	1,110	700
5	545	1,080	772	1,030	575	836	1,130	2,840	2,100	2,490	1,090	676
6	568	1,090	754	980	590	605	1,310	3,080	2,030	2,600	1,050	660
7	590	1,070	718	840	605	575	1,490	3,380	2,030	2,640	1,020	644
8	590	1,050	718	800	620	560	1,820	3,690	2,000	2,560	992	628
9	560	1,020	718	763	676	805	*1,740	3,840	1,930	2,600	963	520
10	568	950	727	772	790	805	1,770	*3,890	1,890	2,520	944	520
11	575	900	727	772	970	605	1,760	3,960	1,860	2,430	925	660
12	582	880	727	754	1,160	605	1,740	4,110	2,000	2,340	898	700
13	590	860	727	754	1,310	605	1,710	4,470	2,260	2,220	878	708
14	598	810	709	736	1,350	805	1,720	4,730	2,480	2,130	849	700
15	612	810	718	727	1,330	605	1,800	4,330	2,740	2,080	840	692
16	620	*772	718	709	1,320	605	1,830	4,110	3,120	2,080	812	668
17	644	745	736	676	1,280	598	1,830	3,750	3,820	2,080	794	660
18	684	745	736	676	1,200	598	1,830	3,490	3,640	2,030	767	652
19	718	745	718	652	1,130	582	1,860	3,400	3,840	1,970	749	*644
20	763	709	727	*644	1,080	582	1,900	3,330	3,690	1,930	724	636
21	780	709	781	644	1,020	582	1,850	3,190	3,470	1,860	716	628
22	800	709	*820	644	*960	575	1,800	3,110	3,260	1,800	700	620
23	790	870	644	910	568	575	1,710	3,090	3,040	1,720	692	620
24	800	718	970	636	860	560	1,620	3,240	2,950	1,630	684	620
25	772	727	1,180	628	830	568	1,550	3,530	2,980	1,950	700	644
26	781	745	1,330	660	810	575	1,490	3,730	*3,000	1,470	684	668
27	772	763	1,450	676	763	598	1,450	3,670	2,930	1,430	684	700
28	772	781	1,440	605	727	612	1,500	3,490	2,850	1,580	700	700
29	870	787	1,390	515	-	620	1,620	3,350	2,780	1,330	676	692
30	1,030	793	1,390	485	-	612	1,920	3,190	2,670	1,310	724	-
31	1,130	-	1,280	456	-	644	-	2,980	-	*1,260	740	-
Total	21,287	26,338	27,741	23,468	24,781	18,844	46,853	107,630	81,260	63,410	26,673	20,016
Mean	687	878	895	757	885	606	1,582	3,472	2,709	2,045	860	667
Cfm	1.02	1.31	1.33	1.13	1.32	0.906	2.33	5.17	4.04	3.05	1.28	0.994
In.	1.18	1.48	1.53	1.30	1.38	1.04	2.80	5.98	4.51	3.52	1.48	1.11
Ac-ft	42,220	52,240	55,020	46,550	49,150	37,580	92,930	213,500	161,200	125,800	52,910	39,700
Calendar year 1950: Max	5,900	Min	345	Mean	1,439	Cfm	2.14	In.	27.11	Ac-ft	1,042,000	
Water year 1950-51: Max	4,730	Min	428	Mean	1,336	Cfm	1.99	In.	27.07	Ac-ft	968,600	

\* Discharge measurement made on this day.

Note.--Computed from once-daily staff-gage readings Nov. 2, 3, Nov. 29 to Dec. 21, Dec. 24 to Jan. 19, Jan. 29 to Feb. 4, Mar. 5-9.

# PEND OREILLE RIVER BASIN

239

Flathead Lake at Somers, Mont.

Location.--Lat 48°04'30", long. 114°13'30", in SE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> sec. 26, T. 27 N., R. 21 W., at steamboat dock at Somers.

Records available.--April 1922 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (Somers datum). July 1 to Dec. 12, 1923, temporary staff gage at same site and datum.

Extremes.--Maximum elevation during year, 2,893.21 ft July 28; minimum, 2,883.65 ft Mar. 31.

1922-51: Maximum elevation, 2,896.26 ft June 19, 1933; minimum, 2,881.07 ft Dec. 5, 1936.

Remarks.--Since April 1938 lake elevation has been subject to regulation by Kerr Dam, 4 miles below outlet and since Sept. 21, 1951, by Hungry Horse Reservoir.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	92.74	92.90	92.80	91.48	87.44	85.64	83.70	86.85	91.96	92.70	92.88	92.87
2	92.73	92.85	92.75	91.33	87.40	85.52	83.70	87.07	92.03	92.78	92.88	92.90
3	92.73	92.84	92.74	91.28	87.32	85.41	83.70	87.20	92.11	92.84	92.90	92.97
4	92.72	92.89	92.70	91.12	87.29	85.22	83.70	87.30	92.12	92.96	92.95	92.98
5	92.81	92.91	92.65	90.86	87.22	85.10	83.78	87.42	92.22	92.93	92.93	92.95
6	92.76	92.94	92.60	90.67	87.13	85.00	83.88	87.70	92.22	92.85	92.93	92.88
7	92.73	92.88	92.55	90.47	87.11	84.90	84.00	88.17	92.20	92.79	92.90	92.78
8	92.85	92.85	92.50	90.17	87.05	84.74	84.20	88.63	92.13	92.74	92.90	92.75
9	92.74	92.85	92.52	89.92	87.06	84.70	84.35	89.05	92.07	92.76	92.87	92.78
10	92.74	92.85	92.48	89.65	86.97	84.60	84.48	89.50	92.05	92.79	92.85	92.77
11	92.73	92.85	92.43	89.36	87.10	84.51	84.57	90.00	92.12	92.82	92.83	92.80
12	92.77	92.90	92.34	89.18	87.20	84.47	84.66	90.55	92.27	92.89	92.83	92.82
13	92.79	92.90	92.20	89.00	87.24	84.58	84.67	91.13	92.45	93.01	92.85	92.78
14	92.85	92.85	92.12	88.85	87.28	84.31	84.80	91.50	92.65	93.00	92.78	92.75
15	92.87	92.83	91.98	88.85	87.30	84.30	84.96	91.64	92.80	92.94	92.75	92.76
16	92.89	92.83	91.87	88.80	87.23	84.22	85.10	91.68	92.92	92.89	92.73	92.80
17	92.91	92.84	91.82	88.71	87.16	84.15	85.25	91.72	92.99	92.89	92.70	92.78
18	92.91	92.80	91.69	88.55	87.20	84.08	85.32	91.78	92.98	92.93	92.77	92.78
19	92.94	92.80	91.61	88.51	87.10	84.01	85.45	91.92	92.93	92.96	92.77	92.68
20	92.99	92.81	91.49	88.45	86.93	83.99	85.55	92.00	92.80	92.97	92.85	92.70
21	92.88	92.80	91.39	88.35	86.77	83.95	85.63	92.03	92.77	92.92	92.82	92.67
22	92.75	92.68	91.36	88.32	86.65	83.94	85.65	92.06	92.86	92.83	92.78	92.65
23	92.77	92.71	91.28	88.20	86.58	83.88	85.67	92.25	92.90	92.80	92.71	92.67
24	92.83	92.70	91.42	88.15	86.35	83.84	85.67	92.43	92.84	92.87	92.66	92.66
25	92.91	92.73	91.45	88.12	86.24	83.85	85.67	92.68	92.85	92.97	92.70	92.65
26	92.85	92.76	91.60	87.90	86.10	83.83	85.70	92.75	92.73	93.03	92.68	92.65
27	92.95	92.80	91.69	87.91	85.97	83.83	85.75	92.72	92.68	93.03	92.67	92.69
28	92.95	92.75	91.72	87.80	85.83	83.77	85.87	92.63	92.67	93.07	92.70	92.71
29	92.91	92.75	91.73	87.68	-	83.74	86.10	92.52	92.76	92.87	92.71	92.76
30	92.92	92.80	91.71	87.60	-	83.71	86.50	92.33	92.74	92.79	92.79	92.86
31	92.95	-	91.61	87.50	-	83.67	-	92.14	-	92.82	92.80	-

Note.--Add 2,800 ft to obtain elevation above mean sea level.

Monthly elevation and contents, water year October 1950 to September 1951

Date	Elevation (feet)†	Contents (acre-feet)‡	Change in contents during month (acre-feet)
Sept. 30.....	2,892.73	1,757,000	-
Oct. 31.....	2,892.95	1,785,000	+28,000
Nov. 30.....	2,892.80	1,766,000	-19,000
Dec. 31.....	2,891.61	1,617,000	-149,000
Calendar year 1950.....	-	-	+290,000
Jan. 31.....	2,887.50	1,112,000	-505,000
Feb. 28.....	2,885.83	909,900	-202,100
Mar. 31.....	2,883.67	651,600	-258,300
Apr. 30.....	2,886.50	990,600	+339,000
May 31.....	2,892.14	1,685,000	+692,400
June 30.....	2,892.74	1,758,000	+75,000
July 31.....	2,892.62	1,768,000	+10,000
Aug. 31.....	2,892.80	1,768,000	-2,000
Sept. 30.....	2,892.86	1,773,000	+7,000
Water year 1950-51.....	-	-	+16,000

† Elevations at 12 p.m.

‡ Contents above elevation 2,878 ft.

## PEND OREILLE RIVER BASIN

## Flathead River near Polson, Mont.

Location.--Lat 47°40'50", long. 114°15'10", in NW 1/4 sec. 11, T. 22 N., R. 21 W., on left bank half a mile downstream from Kerr Dam, 4 miles west of Polson, and 5 miles downstream from Flathead Lake.

Drainage area.--7,096 sq mi (revised).

Records available.--July 1907 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,693.70 ft above mean sea level (levels by The Montana Power Co.). Prior to Oct. 1, 1941, staff, chain gage, or recorder at several sites near highway bridge at old site of Michell's Ferry 6 miles downstream from present site, all at datum 2,629.00 ft above mean sea level (river-profile survey).

Average discharge.--44 years, 11,330 cfs.

Extremes.--Maximum discharge during year, 66,800 cfs June 16 (gage height, 17.99 ft); minimum, about 250 cfs Sept. 3; minimum daily, 1,410 cfs Aug. 19.

1907-51: Maximum discharge, 82,100 cfs May 29, 30, 1928 (gage height, 17.1 ft, site and datum then in use; minimum probably less than 5 cfs Apr. 13, 1938, caused by power regulation; minimum daily, 32 cfs Apr. 12, 1938, caused by power regulation. Remarks.--Records excellent. Diversions above station for irrigation of about 10,000 acres. Flathead project pumps can divert up to 12,000 acre-ft per month when required for irrigation of lands downstream from station. Flow regulated by Kerr Dam since April 1938 (see preceding page). Storage began in Hungry Horse Reservoir Sept. 21, 1951, 21,500 acre-ft stored through Sept. 30.

Revisions (water years).--W 652: 1926. W 752: 1932. W 1182: 1948.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.6	1,390	7.0	11,300
2.0	1,780	10.0	22,000
3.0	3,020	14.0	42,200
5.0	6,320	16.4	56,600

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,070	18,300	7,140	20,400	9,450	15,000	3,470	20,100	45,100	33,000	8,850	3,040
2	3,700	17,900	7,350	20,800	9,590	14,600	6,660	21,800	26,300	26,500	8,950	2,980
3	3,650	11,900	6,340	14,900	8,480	13,700	6,940	23,100	23,200	26,100	8,620	5,110
4	3,910	11,500	7,830	19,200	6,190	13,300	6,800	23,500	25,300	29,000	8,850	7,990
5	3,790	5,800	8,880	21,700	8,430	13,100	6,840	24,100	26,200	39,100	9,030	8,480
6	4,040	11,700	9,400	21,800	8,850	12,200	7,080	25,500	29,100	43,200	*7,920	11,800
7	3,800	11,700	8,650	21,400	8,650	10,300	6,840	27,400	29,800	42,600	8,980	12,600
8	3,610	12,100	7,420	24,100	9,510	9,260	4,380	29,800	29,300	34,400	8,700	10,600
9	4,190	10,700	6,900	25,100	9,590	9,320	7,460	32,400	29,000	28,700	8,400	3,360
10	3,600	8,380	6,300	24,700	8,520	9,180	8,210	35,000	26,800	31,600	8,800	6,920
11	*3,290	6,920	11,300	24,500	6,550	9,290	9,510	37,200	26,600	27,600	8,620	6,470
12	3,600	6,120	13,600	23,500	8,380	9,080	10,300	40,000	29,400	21,600	8,090	5,280
13	4,790	8,750	14,500	17,600	9,450	*9,050	10,200	42,800	29,800	20,200	7,720	6,380
14	4,620	8,520	15,000	14,500	9,620	9,260	11,100	46,000	33,000	26,800	8,720	6,800
15	4,580	8,110	14,800	11,500	11,900	8,680	11,600	47,600	42,600	30,500	8,520	5,960
16	6,050	7,760	13,000	9,820	14,200	8,550	12,000	48,100	52,900	29,600	7,990	4,520
17	6,450	7,740	11,000	9,820	14,100	8,550	12,600	46,600	55,600	26,600	7,270	6,280
18	6,160	6,960	13,900	9,700	9,430	6,300	*13,600	48,700	56,500	21,900	1,430	6,470
19	6,270	4,770	14,100	*9,960	14,700	8,450	14,200	49,500	55,800	21,600	1,410	6,740
20	9,430	6,960	13,700	10,000	17,400	8,310	14,600	49,800	52,800	22,100	3,060	5,690
21	21,200	7,350	14,100	9,730	17,300	7,790	14,700	50,600	42,000	23,900	7,310	6,600
22	21,400	7,180	13,500	10,100	17,400	7,460	14,900	50,500	31,200	23,700	7,920	5,150
23	10,600	5,670	10,800	10,400	17,200	6,920	15,100	50,400	37,000	20,000	7,670	2,820
24	7,160	6,700	11,300	9,540	17,000	5,850	15,000	51,300	40,900	12,400	8,210	5,270
25	7,370	5,300	13,400	9,050	15,700	4,600	15,100	*52,800	43,500	9,000	3,980	5,620
26	7,120	3,400	12,700	9,400	15,900	6,880	15,000	54,000	43,800	9,760	2,870	4,240
27	8,550	*6,530	11,000	9,110	16,900	6,660	15,200	54,300	42,100	14,300	5,030	*5,470
28	10,700	7,200	11,600	9,560	15,800	6,740	15,600	53,100	35,800	18,000	6,120	5,730
29	10,800	7,230	12,900	9,590	-	6,780	16,200	53,400	*29,800	20,900	4,600	4,670
30	12,400	7,540	15,200	9,210	-	6,280	17,900	53,200	30,200	16,100	5,130	3,030
31	12,200	-	16,400	9,510	-	6,570	-	51,600	-	8,600	4,150	-
Total	221,100	256,670	356,010	460,000	336,190	277,810	339,090	1,236,400	1,101,400	759,660	212,720	182,270
Mean	7,132	8,556	11,480	14,840	12,030	8,932	11,300	41,820	36,710	24,510	6,862	5,076
Ac-ft	438,500	509,100	706,100	912,400	666,800	551,000	672,600	*2,571	*2,185	*1,507	421,900	361,500
(+)	+28,000	-19,000	-149,000	-505,000	-202,100	-258,300	*339,000	*692,400	+75,000	+10,000	-2,000	+28,650

Adjusted for change in reservoir contents

Mean	7,587	8,236	9,060	6,626	8,367	4,760	17,000	53,070	37,980	24,670	6,829	6,557
Cfsm	-	-	-	-	-	-	-	-	-	-	-	-
In.	-	-	-	-	-	-	-	-	-	-	-	-
Ac-ft	466,500	490,100	557,100	407,400	464,700	292,700	*1,012	*3,263	*2,260	*1,517	419,900	390,150

Observed

Calendar year 1950: Max	65,500	Min	1,730	Mean	15,560	Ac-ft	11,260,000
Water year 1950-51: Max	56,500	Min	1,410	Mean	15,890	Ac-ft	11,500,000

Adjusted

Calendar year 1950: Mean	15,960	Cfsm	-	In.	-	Ac-ft	11,550,000
Water year 1950-51: Mean	15,940	Cfsm	-	In.	-	Ac-ft	11,540,000

\* Discharge measurement made on this day.

† Change in contents in Flathead Lake, in acre-feet, furnished by The Montana Power Co. and change in Hungry Horse Reservoir furnished by U. S. Bureau of Reclamation.

\* Expressed in thousands.

## Clark Fork near Plains, Mont.

Location.--Lat 47°25'50", long. 114°51'20", SW<sup>1</sup> sec. 1, T. 19 N., R. 26 W., or right bank 2 miles southeast of Plains and 6 miles downstream from Flathead River.

Drainage area.--19,900 sq mi, approximately.

Records available.--October 1910 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,449.34 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).

Average discharge.--35 years (1912-15, 1917-19, 1920-24, 1925-51), 18,690 cfs.

Extremes.--Maximum discharge during year, 96,100 cfs May 26 (gage height, 15.60 ft); minimum, 6,700 cfs Aug. 20 (gage height, 3.90 ft).  
1910-51: Maximum discharge, 134,000 cfs June 5, 1948 (gage height, 19.17 ft); minimum, 3,200 cfs Feb. 8, 1936, Dec. 10, 1940; minimum gage height, 2.85 ft Dec. 10, 1940.

Remarks.--Records excellent. Some regulation by Flathead Lake (see p. 239). Diversions for irrigation of about 335,000 acres above station.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

3.9	6,700	9.0	33,250
4.5	8,960	11.0	48,700
5.0	11,000	13.0	68,000
6.0	15,500	15.6	96,100
7.0	20,650		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8,480	20,500	14,000	24,200	11,500	20,300	13,800	38,800	81,600	47,600	15,600	9,880
2	7,950	26,400	13,400	24,900	12,300	19,700	11,700	41,100	85,000	47,400	15,300	9,040
3	8,560	25,200	13,400	24,200	12,800	19,100	15,000	40,900	48,600	40,000	15,100	8,760
4	8,980	18,700	12,800	24,800	13,300	18,300	16,700	40,600	45,700	42,900	14,800	10,500
5	9,320	18,300	13,300	24,700	12,500	18,100	18,100	41,200	48,700	46,900	14,700	12,300
6	9,360	*13,800	14,200	26,100	13,900	16,800	19,400	43,800	48,600	57,300	14,600	13,300
7	9,840	18,500	14,300	25,500	14,400	15,600	20,700	49,900	50,900	57,900	13,900	16,400
8	9,720	18,700	13,700	24,900	14,900	14,700	21,500	56,600	50,900	56,300	*14,400	16,700
9	*9,640	19,100	12,900	28,200	16,700	13,700	20,000	*62,100	50,500	44,700	14,100	14,900
10	9,960	17,200	12,700	28,400	18,700	14,700	22,500	67,500	49,700	42,400	14,100	10,200
11	9,680	15,100	*12,000	28,000	22,000	15,000	23,100	71,200	46,700	44,800	13,900	10,700
12	9,360	13,700	16,500	28,200	22,800	14,600	24,100	77,400	50,300	40,500	13,800	11,300
13	9,680	12,900	18,600	25,600	23,700	13,800	24,300	82,700	*53,500	33,300	13,300	10,700
14	10,600	15,200	19,000	20,600	21,900	14,100	25,600	86,900	55,600	34,600	13,500	10,900
15	10,600	14,800	18,900	17,900	19,900	14,400	27,800	87,300	62,800	39,800	13,800	11,200
16	10,400	14,700	18,600	15,700	21,400	14,400	28,600	84,000	76,300	40,600	13,500	10,800
17	11,800	15,900	17,400	15,300	22,200	14,500	28,800	81,600	87,300	39,100	13,200	10,000
18	12,400	14,200	15,800	*15,100	21,500	14,400	29,500	81,900	89,200	34,900	12,500	10,000
19	12,400	13,500	18,000	14,700	16,600	12,200	31,200	83,700	87,300	31,600	7,720	*10,500
20	12,500	11,200	18,300	14,700	*22,300	13,800	31,400	85,200	84,100	30,600	6,880	11,100
21	16,200	12,600	18,300	14,400	23,400	13,800	31,100	85,400	77,500	31,000	7,280	10,300
22	27,300	13,300	18,800	14,300	23,000	13,600	30,200	85,300	59,900	31,600	11,000	10,800
23	23,700	13,400	18,600	14,500	22,800	13,800	*29,500	86,400	57,200	30,500	12,300	9,680
24	15,900	12,100	17,500	14,800	22,300	13,700	28,700	89,100	58,600	25,800	12,000	8,220
25	13,300	12,800	18,200	14,200	21,900	12,700	28,200	93,000	63,100	18,900	12,700	9,760
26	13,500	11,800	19,100	13,900	20,800	*12,000	27,900	95,400	64,700	17,100	9,920	10,600
27	13,100	10,800	19,100	14,400	21,200	13,800	28,000	93,900	63,200	17,600	8,370	9,560
28	14,500	12,900	18,300	13,700	21,500	14,500	29,000	91,200	58,300	21,500	9,160	10,300
29	17,000	13,600	18,600	11,700	-	14,200	31,500	89,700	50,700	24,900	11,500	10,800
30	18,500	13,600	19,500	10,600	-	13,800	34,900	89,900	47,300	26,100	17,200	9,920
31	19,900	-	21,900	10,500	-	13,300	-	85,800	-	20,300	13,300	-
Total	394,110	480,300	515,500	593,700	532,200	461,200	752,800	2,289,500	*1,833	1,118,500	583,030	329,420
Mean	12,710	15,340	16,630	19,150	19,010	14,880	25,090	73,850	61,100	36,080	12,360	10,980
Ac-ft	781,700	915,000	1,022	*1,178	*1,056	914,800	*1,493	*4,541	*5,636	*2,219	759,700	653,400
Calendar year 1950:	Max	110,000	Min	7,130	Mean	25,960	Ac-ft	18,800,000				
Water year 1950-51:	Max	95,400	Min	6,880	Mean	26,470	Ac-ft	19,170,000				

\* Discharge measurement made on this day.

\* Expressed in thousands.

## PEND OREILLE RIVER BASIN

Clark Fork near Heron, Mont.

Location.--Lat 48°04', long. 115°59', in sec. 28, T. 27 N., R. 34 W., on left bank 600 ft upstream from Dead Horse Creek and 1½ miles northwest of Heron.

Drainage area.--21,800 sq mi, approximately.

Records available.--September 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,078.00 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. Prior to Oct. 30, 1928, staff gage at same site. Datum lowered 10.00 ft Jan. 2, 1931.

Average discharge.--23 years, 20,400 cfs.

Extremes.--Maximum discharge during year, 106,000 cfs May 26 (gage height, 40.53 ft); minimum, 2,800 cfs Aug. 21 (gage height, 9.00 ft); minimum daily, 3,260 cfs Aug. 21.

1928-51: Maximum discharge, 153,000 cfs May 29 to June 1, 1948; maximum gage height, 50.97 ft May 31, 1948; minimum discharge, 1,190 cfs Dec. 23, 1935 (gage height, 7.59 ft), during period of extreme regulation, from rating curve extended below 4,000 cfs; minimum daily, 1,400 cfs Feb. 12, 1936.

Maximum discharge known, 195,000 cfs June 1894 (gage height, 59.1 ft, present datum, from floodmark an eighth of a mile downstream).

Remarks.--Records excellent. Some regulation by Flathead Lake (see p. 239); diurnal fluctuation at low flow caused by powerplant at Thompson Falls. Diversion above station for irrigation of about 354,000 acres.

Revisions (water years).--W 1182: 1936.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8,850	21,800	15,700	25,800	11,300	24,300	16,300	44,800	91,100	53,300	20,700	11,900
2	9,210	25,100	15,800	27,700	12,800	23,200	16,900	47,400	84,600	53,500	18,500	11,000
3	8,580	28,800	15,500	26,600	13,200	22,700	15,700	47,900	64,400	50,800	15,900	10,600
4	9,130	24,100	15,400	26,300	15,000	21,800	19,400	47,700	54,500	46,600	16,500	11,200
5	9,480	21,100	14,700	24,000	15,400	21,000	22,000	46,300	55,400	49,300	16,300	11,600
6		9,960	19,900	14,500	27,600	14,500	20,700	24,800	51,000	54,000	16,100	13,500
7	10,100	16,700	16,000	26,600	15,400	18,500	25,300	57,200	56,500	63,400	15,800	14,600
8	10,400	20,900	15,900	27,900	*16,300	18,900	29,900	65,200	57,400	62,100	15,600	16,900
9	10,300	20,500	15,100	27,900	18,500	16,100	26,800	71,400	57,100	59,200	15,700	17,100
10	10,400	21,200	14,500	30,600	25,400	16,600	28,000	76,400	56,900	48,700	15,400	14,800
11	11,000	18,500	14,300	30,700	32,500	17,300	28,700	81,800	55,800	48,800	15,500	11,200
12	10,700	17,000	14,100	30,400	36,000	17,500	30,400	87,700	*54,900	48,400	15,300	12,200
13	10,200	15,600	18,000	30,400	34,800	18,800	31,400	92,700	59,800	43,600	15,000	11,900
14	10,300	14,300	20,000	27,500	32,200	16,900	32,400	96,700	62,300	37,200	14,600	11,400
15	11,300	16,400	20,500	22,800	28,600	16,800	34,500	95,600	66,400	40,600	14,900	12,300
16	11,000	16,300	20,400	19,800	26,200	16,900	35,400	96,300	76,300	44,400	15,100	12,100
17	11,300	16,100	20,100	18,300	27,700	16,700	35,900	93,400	89,600	44,700	14,800	11,700
18	12,700	15,400	19,100	17,400	27,000	16,600	36,500	93,000	96,800	42,300	17,500	11,000
19	13,500	15,600	*18,200	17,300	25,600	16,200	37,500	*94,000	96,500	37,600	14,200	11,500
20	13,900	14,600	20,100	16,900	21,800	14,600	38,600	95,000	94,200	35,200	9,480	12,000
21	14,400	12,800	20,900	16,800	27,100	15,800	37,900	95,300	89,300	33,600	3,260	11,800
22	21,500	14,100	21,900	16,500	27,300	16,000	36,800	95,500	80,800	34,700	7,820	*11,400
23	28,600	14,800	23,000	16,300	26,800	16,100	35,400	96,600	63,800	34,600	11,800	11,700
24	22,200	17,900	25,500	16,400	26,500	16,100	34,600	99,100	66,000	32,600	12,800	11,200
25	16,400	14,100	26,000	16,600	25,800	15,800	34,200	102,000	68,200	28,000	*13,100	9,670
26	14,200	14,400	26,100	16,400	25,000	14,700	33,700	106,000	70,600	21,500	13,500	11,000
27	14,800	14,000	25,700	16,800	24,000	14,400	35,900	106,500	70,900	19,700	11,200	11,700
28	15,100	12,700	24,800	15,700	24,600	16,100	34,700	102,000	66,600	20,700	9,910	10,800
29	16,700	15,100	23,500	14,000	-	16,800	37,100	99,200	*63,900	23,600	9,950	11,600
30	*19,700	16,200	23,700	11,900	-	*16,400	*40,300	*98,500	55,200	*27,100	12,600	12,000
31	22,700	-	25,800	11,200	-	16,600	-	95,600	-	27,100	11,400	-
Total	418,610	523,000	602,600	674,900	659,000	542,900	925,900	*2,581.3	*2,079	*1,270.3	427,920	363,370
Mean	13,500	17,430	19,440	21,770	23,540	17,510	30,860	85,270	69,300	40,600	13,800	12,110
Ac-ft	630,300	*1,037	*1,195	*1,339	*1,307	*1,077	*1,636	*5,120	*4,124	*2,520	848,800	720,700

Calendar year 1950: Max 120,000 Min 7,430 Mean 29,750 Ac-ft 21,520,000  
 Water year 1950-51: Max 106,000 Min 3,260 Mean 30,330 Ac-ft 21,950,000

\* Discharge measurement made on this day.

\* Expressed in thousands.

## Pend Oreille Lake at Hope, Idaho

Location.--Lat 48°15', long. 116°18', in lot 2, sec. 35, T. 57 N., R. 1 E., at floating dock near Northern Pacific Railway station at Hope.

Drainage area.--22,900 sq mi, approximately.

Records available.--March 1914 to September 1922 (published as "at Sandpoint"), September 1921 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,000.00 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. Mar. 18, 1914, to Sept. 30, 1922, staff gage at Sandpoint at datum 42.18 ft higher. Sept. 17, 1921, to Oct. 7, 1929, staff gage at present site at datum 45.47 ft higher than present datum. Oct. 8, 1929, to Sept. 30, 1950, water-stage recorder at present site at datum 0.20 ft lower than present datum.

Extremes.--Maximum contents during year, 1,723,000 acre-ft May 29 (elevation, 2,064.19 ft); minimum, 240,400 acre-ft Oct. 3, 4, (elevation, 2,047.75 ft).

1921-51: Maximum contents, 2,462,000 acre-ft June 9, 1948 (elevation, 2,071.62 ft, present datum); minimum, 117,700 acre-ft Feb. 17, 1936 (elevation, 2,046.27 ft, present datum).

Maximum contents known, 2,905,000 acre-ft in June 1894 (elevation, 2,075.88 ft, present datum).

Remarks.--Divisions from tributaries of Clark Fork for irrigation. Pend Oreille Lake is a natural lake and there is no regulating structure at the outlet. Contents shown is that above elevation 2,044.8 ft.

Revisions (water years).--W 1122: 1946.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	47.82	50.25	49.92	52.07	50.25	52.17	50.20	54.55	63.97	59.05	52.40	48.74
2	47.79	50.41	49.93	52.22	50.19	52.09	50.22	54.78	63.73	58.76	52.11	48.67
3	47.75	50.65	49.93	52.32	50.12	52.02	50.23	55.00	63.16	58.42	51.85	48.62
4	47.81	50.81	49.91	52.34	50.10	51.93	50.32	55.21	62.43	58.17	51.63	48.59
5	47.85	50.84	49.84	52.32	50.06	51.83	50.49	55.40	61.81	57.88	51.42	48.57
6	47.89	50.84	49.85	52.33	50.02	51.77	50.69	55.64	61.26	57.80	51.22	48.59
7	47.90	50.75	49.87	52.37	50.04	51.66	50.90	56.01	60.82	57.82	51.05	48.67
8	47.93	50.74	49.87	52.40	50.07	51.54	51.16	56.49	60.44	57.83	50.89	48.77
9	47.98	50.75	49.84	52.41	50.23	51.39	51.38	57.02	60.11	57.78	50.73	48.85
10	48.01	50.77	49.80	52.49	50.66	51.24	51.57	57.58	59.81	57.53	50.59	48.94
11	48.03	50.74	49.75	52.55	51.27	51.12	51.74	58.21	59.55	57.33	50.45	48.84
12	48.06	50.65	49.72	52.62	51.81	51.05	51.91	58.88	59.32	57.12	50.36	48.79
13	48.07	50.59	49.77	52.70	52.17	50.96	52.17	59.58	59.20	56.84	50.24	48.78
14	48.10	50.45	49.85	52.64	52.41	50.85	52.36	60.27	59.12	56.49	50.15	48.69
15	48.12	50.37	49.95	52.56	52.53	50.86	52.60	60.82	59.14	56.24	50.05	48.69
16	48.14	50.34	50.04	52.40	52.57	50.78	52.82	61.26	59.32	56.10	49.98	48.66
17	48.20	50.32	50.13	52.23	52.80	50.70	53.03	61.63	59.69	55.97	49.90	48.63
18	48.28	50.27	50.17	52.02	52.62	50.62	53.22	61.92	60.17	55.81	49.90	48.61
19	48.41	50.19	50.24	51.85	52.60	50.54	53.39	62.19	60.56	55.56	49.81	48.58
20	48.55	50.12	50.34	51.68	52.50	50.47	53.59	62.43	60.85	55.30	49.60	48.58
21	48.66	50.08	50.45	51.56	52.49	50.41	53.74	62.85	61.00	53.02	49.34	48.57
22	48.90	50.00	50.64	51.41	52.48	50.38	53.83	62.84	60.99	54.81	49.18	48.51
23	49.25	49.92	50.92	51.26	52.47	50.33	53.89	63.09	60.72	54.63	49.09	48.52
24	49.42	49.92	51.22	51.15	52.45	50.29	53.92	63.32	60.47	54.42	49.04	48.52
25	49.50	49.90	51.44	51.12	52.42	50.26	53.94	63.56	60.29	54.16	49.03	48.51
26	49.48	49.86	51.63	51.08	52.37	50.23	53.96	63.79	60.21	53.75	48.99	48.43
27	49.54	49.84	51.79	50.92	52.29	50.18	53.99	64.01	60.09	53.58	48.91	48.39
28	49.59	49.80	51.88	50.89	52.23	50.18	54.04	64.14	59.95	53.06	48.80	48.39
29	49.70	49.80	51.92	50.73	-	50.19	54.14	64.17	59.74	52.85	48.79	48.39
30	49.91	49.87	51.99	50.56	-	50.20	54.32	64.17	59.40	52.74	48.80	48.48
31	50.10	-	52.01	50.39	-	50.20	-	64.11	-	52.64	48.73	-

Note.--Add 2,000 ft to obtain elevation above mean sea level.

Monthly elevation and contents, water year October 1950 to September 1951

Date	Elevation (feet)†	Contents (acre-feet)	Change in contents during month (acre-feet)
Sept. 30.....	2,048.04	248,000	-
Oct. 31.....	2,050.10	440,600	+192,600
Nov. 30.....	2,049.87	420,800	-19,800
Dec. 31.....	2,052.01	606,700	+185,900
Calendar year 1950.....	-	-	+248,600
Jan. 31.....	2,050.39	465,500	-141,200
Feb. 28.....	2,052.23	626,000	+160,500
Mar. 31.....	2,050.20	449,200	-176,800
Apr. 30.....	2,054.32	811,000	+361,800
May 31.....	2,064.11	1,715,000	+904,000
June 30.....	2,059.40	1,272,000	-443,000
July 31.....	2,052.64	682,100	-609,900
Aug. 31.....	2,048.73	323,200	-358,900
Sept. 30.....	2,048.48	302,000	-21,200
Water year 1950-51.....	-	-	+54,000

† Elevation at 12 p.m.

## Priest Lake at outlet, near Coolin, Idaho

Location.--Lat 48°29'30", long. 116°53'00", in SE $\frac{1}{4}$  sec. 5, T. 59 N., R. 4 W., half a mile east of outlet and  $1\frac{1}{2}$  miles northwest of Coolin.

Drainage area.--572 sq mi.

Records available.--June 1911 to September 1913 (fragmentary gage-height records at Coolin), published as part of records for Priest River at outlet of Priest Lake, at Coolin, April 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,434.64 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. June 1911 to September 1913, staff gages at Coolin at different datums. Apr. 21, 1928, to Oct. 18, 1939, staff gage 400 ft from lake outlet at present datum.

Extremes.--Maximum gage height during year, 4.63 ft May 18; minimum, 0.73 ft Apr. 2. 1928-51: Maximum gage height, 6.46 ft May 29, 30, 1948; minimum observed, -0.16 ft Nov. 23-25, Dec. 4-6, 1936.

Remarks.--Flow from Priest Lake is regulated to hold lake at heights desirable for recreation interests during summer months and storage is released for power use downstream during winter months. Storage began Aug. 9, 1950. Prior to Aug. 9, 1950, some regulation resulted from logging operations in the outlet channel.

Gage height, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.30	3.22	2.71	3.71	2.69	1.52	0.74	2.58	3.81	2.96	3.01	3.25
2	1.29	3.26	2.60	3.71	2.70	1.46	.75	2.64	3.69	2.91	3.04	3.24
3	1.30	3.28	2.51	3.71	2.67	1.42	.74	2.67	3.59	2.88	3.05	3.20
4	1.33	3.29	2.41	3.67	2.65	1.41	.76	2.71	3.50	2.91	3.06	3.18
5	1.40	3.31	2.31	3.61	2.62	1.37	.80	2.82	3.43	2.94	3.07	3.19
6	1.44	3.32	2.24	3.55	2.52	1.33	.87	2.98	3.33	2.92	3.08	3.20
7	1.49	3.32	2.18	3.48	2.44	1.28	.93	3.20	3.22	2.90	3.10	3.20
8	1.55	3.31	2.11	3.43	2.35	1.25	1.00	3.43	3.13	2.86	3.11	3.17
9	1.61	3.29	2.10	3.39	2.33	1.23	1.09	3.63	3.04	2.84	3.11	3.14
10	1.69	3.26	2.16	3.34	2.29	1.19	1.15	3.83	2.98	2.81	3.15	3.10
11	1.75	3.25	2.22	3.31	2.36	1.16	1.23	4.03	2.98	2.78	3.15	3.11
12	1.80	3.22	2.28	3.26	2.38	1.14	1.30	4.29	3.01	2.77	3.16	3.11
13	1.84	3.19	2.35	3.24	2.35	1.13	1.38	4.46	3.05	2.76	3.16	3.10
14	1.87	3.16	2.41	3.22	2.30	1.10	1.49	4.53	3.10	2.74	3.18	3.08
15	1.90	3.17	2.48	3.18	2.26	1.08	1.60	4.53	3.17	2.74	3.19	3.06
16	1.91	3.20	2.57	3.16	2.22	1.08	1.70	4.53	3.25	2.73	3.21	3.05
17	1.94	3.20	2.68	3.15	2.17	1.05	1.82	4.55	3.28	2.72	3.21	3.03
18	1.98	3.18	2.76	3.12	2.11	1.01	1.93	4.61	3.30	2.71	3.21	3.01
19	2.07	3.14	2.85	3.08	2.05	.97	2.03	4.62	3.30	2.70	3.22	3.01
20	2.20	3.12	2.96	3.04	2.03	.94	2.08	4.58	3.28	2.71	3.23	2.98
21	2.31	3.08	3.06	3.03	1.97	.91	2.12	4.53	3.24	2.74	3.21	2.96
22	2.36	3.06	3.17	3.01	1.91	.90	2.14	4.50	3.20	2.76	3.20	2.96
23	2.39	3.03	3.30	2.97	1.84	.87	2.15	4.50	3.18	2.79	3.22	2.94
24	2.42	3.03	3.45	2.95	1.78	.85	2.16	4.55	3.24	2.84	3.22	2.94
25	2.47	3.04	3.61	2.94	1.72	.82	2.17	4.54	3.24	2.85	3.20	2.96
26	2.55	3.14	3.72	2.96	1.67	.80	2.19	4.46	3.22	2.88	3.19	2.98
27	2.63	3.05	3.76	2.94	1.62	.78	2.24	4.37	3.17	2.91	3.19	2.98
28	2.74	3.01	3.78	2.86	1.57	.77	2.31	4.29	3.13	2.94	3.20	2.99
29	2.86	2.89	3.77	2.81	-	.76	2.40	4.21	3.06	2.96	3.19	3.01
30	3.04	2.79	3.77	2.77	-	.75	2.48	4.09	3.00	2.97	3.20	3.09
31	3.16	-	3.76	2.73	-	.74	-	3.94	-	2.97	3.24	-



## Priest River near Coolin, Idaho

Location.--Lat 48°26'50", long. 116°53'00", in SE¼ sec. 19, T. 59 N., R. 4 W., on left bank 190 ft downstream from Dickensheet Bridge, 2½ miles downstream from Binarch Creek, 3 miles southwest of Coolin, and 5 miles downstream from outlet of Priest Lake.

Drainage area.--611 sq mi.

Records available.--October 1948 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,338.24 ft above mean sea level, datum of 1929, supplementary adjustment of 1947.

Extremes.--Maximum discharge during year, 5,550 cfs May 19 (gage height, 6.80 ft); minimum, 36 cfs Aug. 1 (gage height, 1.32 ft).  
1948-51: Maximum discharge, 6,840 cfs May 16, 1949 (gage height, 7.48 ft); minimum, that of Aug. 1, 1951.

Remarks.--Records good. No diversion above station. Flow regulated by Priest Lake (see preceding page).

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to May 18

May 19 to Sept. 30

1.6	75	4.0	1,350	1.3	34	3.0	540
2.0	150	4.5	1,920	1.6	67	3.5	880
2.5	300	5.0	2,590	2.0	135	4.0	1,360
3.0	530	6.0	4,120	2.5	300	4.5	1,930
3.5	870	6.8	5,550				

Note.--Same as preceding table above 4.6 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	146	1,240	2,440	2,090	1,090	1,550	879	2,770	*4,290	2,180	38	645
2	*144	1,260	2,230	2,080	1,100	1,500	879	2,840	4,140	1,830	38	832
3	142	1,280	2,090	2,080	1,080	1,450	897	2,870	3,980	1,610	41	808
4	150	1,300	2,020	2,040	1,060	1,450	942	2,920	3,850	1,640	42	364
5	168	1,310	1,930	1,970	1,680	1,420	1,000	3,050	3,740	1,660	41	111
6	175	1,320	1,870	1,910	2,380	1,360	1,070	3,260	3,610	1,640	44	109
7	182	1,320	1,900	1,850	2,380	1,350	1,140	3,550	3,460	1,620	44	282
8	192	1,300	1,550	1,790	2,350	1,300	1,220	3,850	3,320	1,590	46	779
9	218	1,280	669	1,730	2,320	1,280	1,280	4,120	3,200	1,570	48	765
10	236	*1,260	116	*1,660	2,280	1,250	1,350	4,380	3,100	1,260	50	345
11	254	1,300	96	1,620	2,350	1,220	1,380	4,680	3,080	1,080	50	107
12	268	1,300	92	1,590	*2,380	1,200	*1,450	5,070	3,020	1,080	51	282
13	280	1,280	94	1,570	2,350	1,190	1,550	5,290	2,800	1,050	52	435
14	292	1,250	94	1,540	2,310	1,160	1,670	5,440	2,450	916	53	425
15	300	1,250	92	1,520	2,270	1,160	1,780	5,420	2,440	840	54	420
16	304	1,280	89	1,500	2,220	1,150	1,880	*5,420	2,510	832	61	415
17	312	1,280	94	1,480	2,150	1,120	1,980	5,440	2,550	730	77	405
18	328	1,250	94	1,460	2,120	1,090	2,100	5,510	2,560	600	79	400
19	362	1,220	94	1,420	2,060	1,060	2,180	5,510	2,560	540	90	386
20	412	1,200	101	1,380	2,020	1,040	2,230	5,490	2,550	586	104	376
21	460	1,160	158	1,380	1,980	1,000	2,240	5,380	2,510	211	135	368
22	480	1,130	317	1,360	1,920	996	2,270	5,320	2,450	106	197	368
23	490	1,110	644	1,330	1,860	978	2,270	5,360	2,420	91	185	358
24	505	1,110	762	1,310	1,810	951	2,270	5,420	2,490	85	*166	225
25	520	1,120	897	1,310	1,750	933	2,280	5,380	2,460	75	251	169
26	572	1,120	1,500	1,330	1,690	906	2,300	5,290	2,440	52	345	172
27	658	1,090	1,900	1,340	1,640	906	2,370	5,140	2,410	40	270	172
28	798	2,520	2,010	1,230	1,580	897	2,450	5,000	2,350	38	425	172
29	870	2,560	2,150	1,190	-	888	2,560	4,870	2,280	39	368	175
30	1,050	2,520	2,150	1,180	-	888	2,660	4,680	2,230	38	471	194
31	1,180	-	2,140	1,110	-	879	-	4,480	-	*38	802	-
Total	12,428	40,920	32,363	48,350	54,180	35,502	52,507	143,200	87,250	25,447	4,518	11,064
Mean	401	1,364	1,044	1,560	1,825	1,145	1,750	4,619	2,800	821	146	369
Ac-ft	24,650	81,160	64,190	95,900	107,500	70,420	104,100	284,000	175,100	50,470	8,960	21,950
Calendar year 1950: Max	5,570			Min 89		Mean 1,494	Ac-ft 1,082,000					
Water year 1950-51: Max	5,510			Min 38		Mean 1,501	Ac-ft 1,086,000					

\* Discharge measurement made on this day.

Note.--No gage-height record Oct. 10-25; Dec. 5, 6, Jan. 28 to Feb. 11; discharge computed on basis of recorded range in stage, weather records, and records for Priest Lake and nearby streams.

## PEND OREILLE RIVER BASIN

## Priest River near Priest River, Idaho

Location.--Lat 48°13', long. 116°55', in NE $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 11, T. 56 N., R. 5 W., on right bank 500 ft downstream from Saddler Creek, a quarter of a mile downstream from Lower West Branch, 2 $\frac{1}{2}$  miles north of Priest River, and 3 $\frac{1}{2}$  miles upstream from mouth.

Drainage area.--902 sq mi.

Records available.--June 1903 to April 1905, November 1910 to April 1911, May to December 1923, February 1929 to September 1951. Prior to October 1930 published as "at Priest River."

Gage.--Water-stage recorder. Altitude of gage is 2,090 ft (from river-profile map). Prior to May 15, 1929, and Sept. 18, 1929, to Apr. 28, 1930, staff gages at site 3 miles downstream at altitude about 40 ft lower. June 4 to Sept. 17, 1929, Apr. 29 to Sept. 11, 1930, staff gages at or near present site and at present datum.

Average discharge.--21 years (1930-51), 1,584 cfs.

Extremes.--Maximum discharge during year, 6,880 cfs May 14 (gage height, 6.80 ft); minimum, 203 cfs Aug. 6-9, 11-13 (gage height, 0.56 ft). 1903-5, 1910-11, 1923, 1929-51: Maximum discharge, 10,500 cfs May 29, 30, 1948; maximum gage height, 8.97 ft May 29, 1948; minimum discharge recorded, 184 cfs Jan. 7, 1937 (gage height, 0.54 ft).

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are fair. No diversion above station. Some regulation on tributary and, since Aug. 9, 1950, by low buttress and stoplog dam on Priest River three-quarters of a mile downstream from lake outlet

Revisions (water years).--W 572: 1903-5.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

0.5	185	2.5	1,460
.8	290	3.0	1,940
1.1	440	4.0	2,950
1.5	700	5.0	4,220
2.0	1,050	6.8	6,880

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	286	1,860	2,900	2,920	a1,600	2,120	1,820	4,040	*4,930	2,510	212	784
2	*282	1,770	2,710	2,830	a1,600	2,070	1,960	4,090	4,750	2,480	209	854
3	278	1,730	2,530	2,820	a1,600	2,000	2,100	4,040	4,580	2,020	209	994
4	304	1,740	2,420	2,760	a1,600	1,990	2,320	4,050	4,450	2,040	209	917
5	396	1,730	2,320	2,660	a1,600	1,940	2,560	4,300	4,350	2,080	206	312
6	476	1,710	a2,300	2,550	a3,000	1,880	2,710	4,510	4,180	2,080	203	254
7	396	1,700	a2,300	2,450	a3,000	1,820	2,850	4,380	4,060	2,020	203	246
8	385	1,670	a2,200	2,420	a3,000	1,800	2,990	5,170	3,930	1,570	203	683
9	452	1,620	a1,300	2,350	a3,200	1,770	2,960	5,400	3,790	1,540	203	924
10	476	*1,590	a600	2,280	a3,900	1,690	2,930	5,620	3,650	1,640	206	875
11	458	1,610	a550	*2,220	a4,200	1,650	2,900	5,920	3,620	1,410	203	324
12	452	1,630	513	2,170	*4,020	1,640	*2,930	6,530	3,660	1,380	203	246
13	434	1,590	513	2,140	3,800	1,640	3,080	6,780	3,580	1,350	206	454
14	446	1,580	482	2,110	3,610	1,620	3,360	6,850	3,160	1,340	206	532
15	452	1,570	476	2,090	3,450	1,740	3,470	a6,700	2,990	1,150	209	526
16	446	1,630	494	2,050	3,300	1,740	3,490	*6,610	3,050	1,130	206	520
17	476	1,670	637	2,030	3,160	1,640	3,570	6,610	3,070	1,110	209	513
18	532	1,630	749	1,970	3,030	1,580	3,700	6,680	3,080	917	222	500
19	584	1,540	721	1,920	2,900	1,540	3,750	6,660	3,070	611	222	488
20	686	1,540	840	1,870	2,820	1,540	3,670	6,560	3,030	742	232	482
21	735	1,530	994	1,870	2,730	1,540	3,560	6,430	2,990	552	243	470
22	756	1,510	1,070	1,830	2,660	1,540	3,450	6,340	2,930	390	270	470
23	742	1,460	1,630	1,780	2,550	1,500	3,360	6,320	2,880	308	322	470
24	728	1,560	2,290	1,760	2,480	1,500	3,310	6,370	3,000	290	282	470
25	770	1,670	2,370	1,660	2,430	1,530	3,280	6,350	2,980	278	*326	360
26	889	1,670	2,420	2,160	2,350	1,650	3,300	6,190	2,900	262	360	322
27	931	1,620	3,000	2,040	2,270	1,710	3,360	6,000	2,840	240	434	312
28	1,210	2,520	2,960	a1,800	2,180	1,690	3,570	5,820	2,780	226	385	304
29	1,430	2,980	3,040	a1,650	-	1,680	3,820	5,650	2,720	218	637	330
30	1,870	2,980	3,070	a1,550	-	1,760	3,910	5,440	2,660	215	604	375
31	2,070	-	3,120	a1,550	-	1,740	-	5,190	-	*209	686	-
Total	20,828	52,610	53,519	66,460	78,240	53,250	94,040	178,030	103,670	35,638	8,730	15,291
Mean	672	1,754	1,726	2,144	2,794	1,718	3,135	5,743	3,456	1,150	282	510
Ac-ft	41,310	104,400	106,200	131,800	155,200	105,600	186,500	353,100	205,600	70,690	17,320	30,330
Calendar year 1950: Max	6,720			Min	274		Mean	2,080	Ac-ft	1,506,000		
Water year 1950-51: Max	6,850			Min	203		Mean	2,083	Ac-ft	1,508,000		

\* Discharge measurement made on this day.

a No gage-height record; discharge computed on basis of weather records and records for station near Coolin and nearby streams.

b Stage-discharge relation affected by ice.

PEND OREILLE RIVER BASIN

247

Calispell Creek near Dalkena, Wash.

Location.--Lat 48°14'40", long. 117°20'30", in SW¼ sec. 26, T. 32 N., R. 43 E., on left bank 2 miles upstream from Calispell Lake, 4.8 miles west of Dalkena, and 9 miles upstream from mouth.

Drainage area.--67.8 sq mi.

Records available.--August 1950 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 2,070 ft (from topographic map).

Extremes.--Maximum discharge during period August 1950 to September 1951, 515 cfs Apr. 14, 15 (gage height, 5.90 ft); minimum, 6.0 cfs Oct. 3 (gage height, 3.12 ft).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor. Some diversion above station for irrigation. Some regulation by Power Lake.

Rating tables, Aug. 1, 1950, to Sept. 30, 1951, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Aug. 1, 1950, to Apr. 28, 1951				Apr. 29 to Sept. 30, 1951			
3.1	5.0	4.5	163	3.2	17	5.0	285
3.3	16	5.0	263	3.6	52	5.7	460
3.6	40	5.9	515	4.0	102		
4.0	86						

Discharge, in cubic feet per second, 1950-51

1950

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1	a17	15.5	9	16.5	15.5	17	16	13.5	25	17.5	13
2	a17	15.5	10	17.5	15.5	18	16	13.5	26	16.5	14
3	a17	16	11	16.5	15.5	19	16	13.5	27	16.5	14
4	a17	16	12	16.5	15	20	16	13	28	16	15
5	a17	16	13	16	13.5	21	16	13	29	15.5	14
6	17.5	16	14	16	13.5	22	16	13	30	16	14
7	16.5	15.5	15	16	13.5	23	16	13	31	16	-
8	16	15.5	16	16	13.5	24	17.5	13			
Total.....										511.5	431.0
Mean.....										16.5	14.4
Ac-ft.....										1,010	855

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for Mill Creek near Colville.

1950-51

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	14	48	48	100	a40	b70	127	388	98	38	20	19.5
2	15	37	43	93	a40	b68	160	350	92	36	22	18.5
3	15.5	32	40	97	a40	b65	212	325	88	35	20	19.5
4	6.5	33	36	85	a40	b63	292	*314	*87	34	19.5	18.5
5	9.0	35	33	69	b43	b62	365	362	88	*35	21	18.5
6	8.5	32	33	66	*b46	b60	408	388	88	36	19.5	18.5
7	8.0	29	36	51	b47	b59	*422	445	84	34	19.5	18.5
8	8.5	25	36	68	48	b58	*452	*445	84	31	19.5	19.5
9	9.0	23	33	66	80	b57	437	400	78	30	19.5	19.5
10	10	22	34	60	212	b56	393	388	73	29	18.5	18
11	9.5	22	38	60	338	b56	379	400	69	27	18.5	17
12	9.0	21	*40	56	250	*54	379	415	*71	28	19.5	17
13	9.0	*20	37	57	220	54	437	375	70	27	19.5	17
14	9.5	21	36	53	204	54	499	*338	65	*26	19.5	18
15	10	22	37	53	181	63	483	303	*62	26	19.5	18
16	12	26	42	52	161	80	*452	*273	59	*23	18.5	18
17	22	36	80	51	146	62	437	263	56	23	18.5	18
18	25	29	86	46	136	56	468	259	56	22	18.5	17
19	25	23	78	47	124	56	437	245	53	22	19.5	17
20	27	23	94	43	118	58	393	226	50	22	18.5	18
21	28	25	127	45	108	61	341	209	50	22	18.5	17
22	25	27	124	43	100	65	297	*194	52	23	19.5	17
23	22	25	198	42	b93	62	261	182	49	23	*19.5	19.5
24	22	33	254	41	b90	63	243	175	56	22	18.5	18
25	23	48	224	51	b85	69	235	154	51	22	18.5	18.5
26	25	54	177	74	b80	82	233	148	45	23	18.5	18
27	29	54	151	b68	b76	92	*248	138	43	23	18.5	18
28	47	73	132	b58	b73	93	338	*127	39	23	21	18
29	68	57	112	b50	-	100	437	119	38	23	20	18
30	108	50	122	45	-	115	450	112	38	23	20	23
31	77	-	124	42	-	114	-	*104	-	21	19.5	-
Total	736.0	1,005	2,685	1,828	3,219	2,127	10,695	8,564	1,932	832	601.0	548.5
Mean	23.7	33.5	86.6	59.0	115	68.6	352	276	64.4	28.8	19.4	18.3
Ac-ft	1,460	1,990	5,350	3,630	6,390	4,220	21,210	16,990	3,830	1,650	1,190	1,090
Calendar year 1950: Max - Min - Mean - Ac-ft -												
Water year 1950-51: Max 499 Min 6.5 Mean 95.3 Ac-ft 68,970												

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for Mill Creek near Colville.

b Stage-discharge relation affected by ice.

## PEND OREILLE RIVER BASIN

Pend Oreille River below Z Canyon, near Metaline Falls, Wash.

(International gaging station)

**Location.**--Lat 48°59', long. 117°21', in lot 2, sec. 11, T. 40 N., R. 43 E., on right bank three-quarters of a mile downstream from Z Canyon, 1 1/2 miles south of international boundary, 5 miles downstream from Slate Creek, and 10 miles downstream from town of Metaline Falls.

**Drainage area.**--25,200 sq mi, approximately.

**Records available.**--November 1908 to September 1910 (gage heights only), October 1912 to September 1951. Published as Clark Fork at Metaline Falls prior to October 1928 and as Clark Fork below Z Canyon, near Metaline Falls October 1928 to September 1937.

**Gage.**--Water-stage recorder. Datum of gage is 1,721.80 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to Dec. 19, 1928, staff gages at Metaline Falls about 10 miles upstream at datum approximately 262.2 ft higher.

**Average discharge.**--39 years (1912-51), 26,190 cfs

**Extremes.**--Maximum discharge during year, 109,400 cfs May 31, June 1 (gage height, 44.27 ft); minimum, 10,500 cfs Oct. 2 (gage height, 12.40 ft).

1912-51: Maximum discharge, 171,300 cfs June 13, 1948 (gage height, 60.25 ft); minimum, 2,500 cfs Dec. 12, 1919 (gage height, -2.4 ft, site and datum then in use).

**Remarks.**--Records good. Water diverted above station for many uses, but principally for irrigation. In 1946 there were diversions for irrigation of about 339,300 acres, and there probably has not been any appreciable change since that time. Flow affected by natural storage in Pend Oreille Lake (see p. 243), some regulation by Flathead Lake (see p. 239), and by smaller reservoirs in Pend Oreille River basin in Montana (see following page).

**Cooperation.**--This is one of the international gaging stations maintained by the United States under agreement with Canada.

**Revisions (water years).**--W 442: 1913.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

12.5	10,800	18.0	29,300	35.0	81,200
13.0	12,200	20.0	35,400	40.0	96,400
14.0	15,300	23.0	44,600	45.0	111,600
15.0	18,800	27.0	56,800		
16.0	22,600	31.0	69,000		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	11,000	21,200	21,700	32,000	21,900	33,400	24,700	45,600	109,200	78,770	34,200	15,000
2	10,900	22,100	21,400	32,400	23,500	33,200	25,000	46,500	108,800	77,270	33,500	14,700
3	10,800	22,900	21,400	31,800	23,300	33,100	25,300	47,700	107,800	75,000	32,400	15,000
4	10,800	23,600	21,500	31,700	23,700	32,900	25,900	49,200	105,700	73,270	31,000	14,900
5	11,000	24,700	21,500	31,200	23,400	32,800	26,400	51,000	102,700	71,170	29,700	14,600
6	11,200	25,000	21,600	31,300	23,000	32,000	27,200	52,400	99,000	*69,270	28,500	14,400
7	11,000	25,300	21,600	31,200	23,600	30,700	28,200	54,400	94,600	67,370	27,500	*14,200
8	11,000	25,000	21,300	31,000	24,400	29,500	29,500	55,900	90,600	66,970	26,700	14,000
9	11,300	25,300	21,000	31,000	25,200	28,300	29,900	58,300	87,600	66,570	25,900	14,000
10	11,300	25,300	21,100	30,900	25,600	29,000	30,900	61,300	85,100	66,570	25,200	14,700
11	11,600	25,100	20,800	30,600	26,500	29,200	32,000	65,100	82,900	65,870	24,600	15,000
12	11,700	25,400	20,500	30,500	27,900	28,800	33,000	69,000	81,200	64,470	24,000	15,100
13	11,900	25,400	*20,100	30,300	30,300	*28,500	34,000	72,900	*79,600	63,070	23,000	15,000
14	11,900	*24,900	19,800	30,000	32,400	27,900	34,800	77,300	78,000	61,470	22,300	15,000
15	12,200	24,400	20,500	29,800	34,200	27,400	36,200	81,500	76,900	59,370	21,800	15,000
16	12,100	24,300	20,700	30,600	35,000	26,500	37,300	85,700	76,000	57,270	21,300	15,000
17	12,500	23,900	21,300	31,000	35,200	25,600	38,300	89,200	78,000	55,500	20,900	14,800
18	13,000	23,400	21,800	31,700	35,700	26,000	39,400	92,000	77,300	54,570	20,400	14,700
19	13,000	22,900	22,400	32,000	35,800	26,000	40,200	93,900	79,600	53,270	20,100	14,400
20	13,300	22,900	22,900	32,000	35,600	25,600	41,700	*95,900	82,200	51,670	20,000	14,100
21	13,800	22,700	23,200	31,400	35,300	25,300	42,400	97,900	84,700	50,000	19,700	14,200
22	14,400	21,600	23,900	30,500	35,200	24,800	42,700	99,500	86,300	48,800	18,600	14,100
23	*14,900	21,100	24,600	*29,600	35,200	24,500	*43,000	101,100	*87,200	47,470	17,600	14,200
24	15,600	21,900	26,100	29,000	34,900	24,300	43,500	*102,000	86,700	46,200	*16,800	14,100
25	17,000	21,700	27,700	*28,600	34,900	24,400	43,800	103,000	85,700	44,970	16,400	14,000
26	18,100	21,800	28,700	28,100	34,400	24,500	43,900	104,100	83,700	43,470	16,100	13,700
27	18,700	21,700	29,800	27,500	34,200	24,100	44,000	105,600	82,400	41,970	15,900	13,500
28	18,600	21,400	30,600	28,200	34,000	24,000	44,200	106,800	82,100	39,700	16,000	13,800
29	18,900	21,100	31,000	25,400	-	24,200	44,900	107,600	81,400	37,700	16,300	13,600
30	19,900	21,200	31,600	21,600	-	24,500	45,000	108,500	80,200	*36,200	15,900	13,600
31	20,700	-	31,600	20,700	-	24,400	-	109,200	-	35,070	15,300	-
Total	424,100	699,200	733,900	923,600	844,100	855,400	\$1,077.1	\$2,490.1	\$2,621.2	\$1,766.6	697,800	432,200
Mean	13,680	23,310	23,670	29,790	30,150	27,580	35,900	80,530	87,370	57,050	22,510	14,410
Cfs/m	0.543	0.925	0.939	1.18	1.20	1.09	1.42	3.19	3.47	2.26	0.893	0.572
In.	0.83	1.03	1.08	1.36	1.25	1.26	1.59	3.87	3.87	2.61	1.03	0.64
Ac-ft	841,200	*1,387	*1,456	*1,832	*1,674	*1,697	*2,136	*4,839	*5,199	*3,508	*1,384	857,300
Calendar year 1950: Max	127,800	Min	10,800	Mean	37,270	Cfs/m	1.48	In.	20.09	Ac-ft	26,980	000
Water year 1950-51: Max	109,200	Min	10,800	Mean	37,170	Cfs/m	1.48	In.	20.02	Ac-ft	26,910	000

\* Discharge measurement made on this day.

\* Expressed in thousands.

## Smaller Reservoirs in Pend Oreille River basin, Mont.

Georgetown Lake on Flint Creek, 2 miles west of Southern Cross. Storage began about 1905 for pumpage into Warm Springs Creek for use of reduction works of Anaconda Copper Mining Co. at Anaconda, or for release through Flint Creek for power development. Usable capacity, 31,000 acre-ft. Records furnished by The Montana Power Co.

East Fork Rock Creek Reservoir on East Fork Rock Creek, 14 miles southwest of Phillipsburg. Storage began in 1938 for irrigation in Flint Creek Valley; usable capacity, 16,000 acre-ft. Records furnished by Montana State Water Conservation Board.

Nevada Creek Reservoir on Nevada Creek, 7 miles west of Pinn. Storage began in 1939 for irrigation; usable capacity, 12,600 acre-ft. Records furnished by Montana State Water Conservation Board.

West Fork Bitterroot River Reservoir on West Fork Bitterroot River, 7 miles upstream from Nez Perce Creek and 23 miles south of Darby. Storage began in 1940 for irrigation; usable capacity, 31,700 acre-ft. Records furnished by Montana State Water Conservation Board.

Como Lake on Rock Creek, 4 miles northwest of Darby. Storage began in 1909 for irrigation; usable capacity, 34,800 acre-ft. Records furnished by Bitterroot Irrigation District.

Camas Reservoirs comprise a group of four reservoirs in Little Bitterroot River basin, which are operated for irrigation. Records furnished by Office of Indian Affairs. Little Bitterroot Lake on Little Bitterroot River, 2 miles southwest of Marion, storage began in 1918; usable capacity, 24,000 acre-ft. Hubbard Reservoir on Little Bitterroot River, 9 miles northwest of Marada; storage began in 1924; usable capacity, 12,100 acre-ft. Upper Dry Fork Reservoir on Dry Fork Creek, 4 miles northwest of Lonepine; storage began in 1940; usable capacity, 2,700 acre-ft. Dry Fork Reservoir on Dry Fork Creek, 1 mile west of Lonepine; storage began in 1921; usable capacity, 4,000 acre-ft.

Mission Valley Reservoirs comprise a group of eight reservoirs in the area east of and tributary to Flathead River between Flathead Lake and Jocko River, which are operated for irrigation. Records furnished by Office of Indian Affairs. Twin Reservoir, fed entirely by canals, 4 miles southeast of Polson; storage began in 1932; usable capacity, 1,210 acre-ft. Pablo Reservoir, fed entirely by canals, 3 miles south of Polson; storage began in 1914; usable capacity, 25,000 acre-ft. Lower Crow Reservoir or Crow Creek, 6 miles west of Ronan; storage began in 1933; usable capacity, 10,350 acre-ft. Kicking Horse Reservoir, fed entirely by canals, 5 miles south of Ronan; storage began in 1930; usable capacity, 8,350 acre-ft. Nine-pipe Reservoir, fed entirely by canals, 2 miles northeast of Charlo; storage began in 1911; usable capacity, 14,870 acre-ft. McDonald Reservoir on Post Creek, 9 miles east of Charlo; storage began in 1919; usable capacity, 8,220 acre-ft. Mission Reservoir on Mission Creek, 4 miles east of St. Ignatius; storage began in 1935; usable capacity, 7,250 acre-ft. Tabor Reservoir on Dry Creek, 8 miles southeast of St. Ignatius; storage began in 1919; usable capacity, 23,000 acre-ft.

Lower Jocko Lake on Middle Fork Jocko River, 15 miles east of Arlee. Storage began in 1937; usable capacity, 7,600 acre-ft. Records furnished by Office of Indian Affairs. Thompson Falls Reservoir on Clark Fork, at Thompson Falls. For power development, usable capacity, 15,000 acre-ft. Records furnished by The Montana Power Co.

Other reservoirs of small capacity, principally on tributaries of Bitterroot River, are operated for irrigation.

Monthly change in contents, in acre-feet, water year October 1950 to September 1951

Month	Georgetown Lake	East Fork Rock Creek Reservoir	Nevada Creek Reservoir	West Fork Bitterroot River Reservoir	Como Lake
(Contents Sept. 30).	(25,910)	(10,480)	(8,040)	(26,710)	(8,900)
October.....	-1,050	-	-	a-9,070	+320
November.....	+440	-	-	a-7,640	+9,800
December.....	+30	-	-	a0	+2,610
Calendar year 1950	+3,670	-	-	+9,350	+10,970
January.....	-170	-	-	a0	+870
February.....	-2,190	-	-	a0	-2,610
March.....	-3,050	-	-	a+360	0
April.....	+1,490	-	-	a+10,740	+3,320
May.....	+4,950	d+5,520	d+4,860	a+10,900	+12,870
June.....	+2,270	0	-900	a0	+2,650
July.....	+420	-200	-100	a0	+110
August.....	-30	-4,050	-750	a0	-12,310
September.....	-210	-2,850	-4,400	a-940	-12,290
(Contents Sept. 30).	(28,810)	(8,900)	b(6,750)	(31,060)	(7,600)
Water year 1950-51	+2,900	-1,580	-1,290	+4,350	-1,300

Month	Camas Reservoirs	Mission Valley Reservoirs	Lower Jocko Lake	Thompson Falls Reservoir
(Contents Sept. 30).	(35,020)	(23,710)	(2,150)	(11,650)
October.....	+510	+4,950	-480	+2,740
November.....	+770	+5,060	-230	+1,360
December.....	+790	+7,460	-	-2,230
Calendar year 1950	+7,290	+20,110	-	-1,920
January.....	+370	+2,910	-	-1,870
February.....	-1,860	+5,690	-	+2,160
March.....	+1,590	+2,710	-	+150
April.....	+1,140	+6,350	-	-9,370
May.....	+370	+33,840	c+3,460	+3,370
June.....	+320	-350	+470	-3,460
July.....	-1,680	-22,420	-1,370	+4,630
August.....	-3,310	-40,750	-1,810	+5,720
September.....	-1,350	-5,910	-200	+140
(Contents Sept. 30).	(36,300)	(22,250)	(1,990)	(14,390)
Water year 1950-51	+1,280	-460	-160	+2,740

a Interpolated on basis of readings made weekly or less frequently.

b From figure of contents for first day of following month.

c 6-month period.

d 8-month period.

## Columbia River at international boundary

(International gaging station)

Location.--Lat 49°00'03", long. 117°37'40", in SE $\frac{1}{4}$  sec. 4, T. 40 N., R. 41 E., on left bank at international boundary, half a mile downstream from Pend Oreille River.

Drainage area.--59,700 sq mi, approximately.

Records available.--March 1938 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (Bureau of Reclamation 1937 datum). Prior to Apr. 27, 1939, staff gage at same site and datum. Since May 31, 1942, auxiliary water-stage recorder 2.2 miles downstream from base gage. Auxiliary staff gage Jan. 1 to May 30, 1942, at same site.

Average discharge.--13 years, 93,410 cfs.

Extremes.--Maximum discharge during year, 332,800 cfs May 27 (elevation, 1,324.28 ft); minimum, 41,200 cfs Feb. 1 (elevation, 1,294.73 ft).

1938-51: Maximum discharge, 550,100 cfs June 12, 1948 (elevation, 1,338.13 ft); minimum, 20,700 cfs Mar. 9, 1944 (elevation, 1,289.91 ft).

Flow of about 12,900 cfs occurred Jan. 30 or 31, 1937, based on information from other gaging stations (elevation, 1,287.9 ft), from rating curve extended below 1,291.6 ft; may have been as low sometime in January 1930.

Remarks.--Records excellent except those for periods of no gage-height record, which are fair. Many diversions above station for irrigation. It was estimated that 346,700 acres were under irrigation in the United States in 1946. Water is diverted for the irrigation of an additional 25,000 acres in Canada. The flow is affected by internationally controlled storage in Kootenay Lake as well as by natural and controlled regulation in lakes and reservoirs in Pend Oreille River basin.

Cooperation.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

Revisions (water years).--W 932: 1937(m), 1938(M), 1939(m).

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	54,900	77,700	55,000	67,200	42,100	65,800	46,400	106,400	305,000	269,900	197,200	88,300
2	*55,100	75,300	52,200	70,900	44,700	65,100	47,800	108,700	297,900	267,000	191,800	87,800
3	51,500	69,900	52,300	70,300	45,200	63,300	47,000	111,900	290,100	265,400	167,500	86,500
4	50,900	65,200	51,200	67,800	48,700	62,500	52,400	116,400	286,800	267,100	181,900	85,200
5	49,800	66,200	48,800	64,800	48,000	62,400	54,200	123,900	280,900	269,500	176,600	81,700
6	49,100	67,300	50,300	63,000	48,400	60,800	56,000	130,800	272,500	271,900	170,800	74,400
7	48,500	66,900	47,200	63,400	50,300	57,000	59,800	132,500	263,400	273,800	165,800	73,100
8	49,300	65,200	46,300	61,600	50,900	55,200	62,600	147,100	253,200	276,200	159,800	72,200
9	52,100	63,800	46,400	61,300	53,700	51,800	63,900	157,200	246,500	277,400	153,300	71,400
10	57,900	61,500	45,300	64,200	58,200	51,000	65,600	170,200	239,200	278,700	145,900	73,100
11	53,700	60,800	50,100	*65,200	64,800	51,800	67,800	187,000	234,900	278,600	139,500	74,000
12	47,600	58,700	48,200	65,300	67,300	52,100	70,300	207,300	236,300	274,300	130,200	72,200
13	50,400	57,500	47,800	65,100	71,200	51,600	74,100	222,200	239,200	271,600	122,900	70,900
14	55,800	57,200	49,400	65,200	75,300	*51,900	77,200	235,800	245,900	269,700	116,400	69,100
15	55,400	*57,900	*50,100	67,000	80,000	52,500	79,600	249,700	258,300	267,900	109,800	67,300
16	53,000	61,800	48,800	65,000	82,100	52,400	82,300	262,600	269,400	266,100	102,500	66,300
17	52,600	61,600	49,000	65,300	81,800	52,600	86,000	274,800	280,000	263,900	100,300	65,200
18	55,200	58,400	49,500	63,700	82,300	54,000	89,100	284,000	289,400	266,200	98,800	63,200
19	57,200	52,000	50,600	62,900	81,200	53,400	*90,400	288,900	296,000	266,300	97,400	61,800
20	*61,700	52,100	50,100	59,400	80,700	52,500	92,600	294,500	299,600	264,200	96,000	60,400
21	61,200	49,700	51,600	58,200	79,300	51,300	93,400	299,300	301,500	260,300	95,400	59,300
22	61,000	49,500	52,900	55,700	78,000	50,200	94,200	304,200	300,600	255,400	93,600	61,000
23	60,500	53,500	56,400	55,300	76,000	49,000	95,100	312,100	298,100	249,300	90,600	57,900
24	60,900	53,000	63,100	*56,100	75,800	48,200	95,200	318,800	296,500	242,300	89,700	58,000
25	60,600	52,600	73,200	55,700	73,200	47,500	96,300	321,900	292,100	235,800	*91,600	60,400
26	63,900	53,700	77,900	56,100	70,900	46,900	97,900	326,100	286,600	229,600	91,300	62,100
27	67,000	53,600	81,300	57,300	69,500	48,300	99,100	329,400	284,600	223,700	89,900	57,800
28	67,200	52,800	81,700	56,900	67,800	46,200	100,100	327,000	282,400	217,800	89,900	56,900
29	67,100	52,800	79,000	50,700	-	46,400	102,300	323,600	277,200	212,800	91,300	56,400
30	70,000	55,600	73,700	45,400	-	46,200	103,900	320,100	273,700	207,100	90,000	59,200
31	74,200	-	69,000	42,100	-	45,900	-	312,200	-	202,300	87,500	-
Total	*1,775.3	*1,781.6	*1,748.4	*1,888.1	*1,847.4	1,643.6	*2,342.6	*7,313.6	8,277.8	*7,942.1	*3,845.2	2,053.1
Mean	57,270	59,390	56,400	60,910	65,980	53,020	79,090	255,900	275,900	258,200	124,000	68,440
Cfs/m	0.959	0.995	0.945	1.02	1.11	0.888	1.31	3.95	4.62	4.29	2.08	1.15
In.	1.11	1.11	1.09	1.18	1.15	1.02	1.46	4.56	5.16	4.95	2.40	1.28
Ac-ft	*3,521	*3,534	*3,488	*3,745	*3,664	*3,260	*4,646	*14,510	*16,420	*15,750	*7,627	*4,072
Calendar year 1950: Max	459,000	Min	31,400	Mean	115,200	Cfs/m	1.93	In.	26.20	Ac-ft	83,400,000	
Water year 1950-51: Max	329,400	Min	42,100	Mean	116,300	Cfs/m	1.95	In.	26.47	Ac-ft	84,220,000	

\* Discharge measurement made on this day.

\* Expressed in thousands.

a No gage-height record at either base or auxiliary gage; fall interpolated.

## Kettle River near Ferry, Wash.

(International gaging station)

Location.--Lat 48°58'40", long. 118°46'10", in lot 7, sec. 10, T. 40 N., R. 32 E., on right bank  $\frac{1}{2}$  miles south of international boundary and Ferry and 3 miles upstream from Toroda Creek.

Drainage area.--2,220 sq mi, approximately.

Records available.--August 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,836.8 ft above mean sea level, International joint adjustment of 1947. Prior to Sept. 27, 1928, staff gage at same site and datum.

Average discharge.--23 years, 1,404 cfs.

Extremes.--Maximum discharge during year, 15,000 cfs May 13 (gage height, 18.79 ft); minimum not determined, probably occurred sometime during period of ice effect.

1928-51: Maximum discharge, 21,200 cfs May 29, 1948 (gage height, 21.15 ft); minimum, 14 cfs (discharge measurement) Jan. 23, 1930, but may have been less during period of ice effect Jan. 18-23, 1930.

Remarks.--Records excellent except those for periods of ice effect, which are fair. Several small diversions above station for irrigation. No regulation.

Cooperation.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

9.7	180	12.0	1,790
10.0	288	14.0	4,360
10.5	534	16.0	8,360
11.0	880	18.5	14,200

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	183	468	452	558	160	450	730	5,410	4,200	2,220	377	540
2	190	442	345	512	160	450	832	4,860	4,200	2,220	*359	576
3	190	426	280	420	160	440	1,020	*4,690	4,200	2,110	331	489
4	187	416	230	340	160	411	1,390	5,220	*4,690	2,110	318	431
5	187	442	200	250	250	402	1,940	6,850	5,040	2,510	301	392
6	196	478	200	*245	200	370	2,160	8,810	4,690	2,330	288	354
7	206	478	220	240	190	340	2,330	9,730	4,360	2,510	272	356
8	261	447	368	240	180	340	2,570	10,900	4,050	2,220	276	327
9	284	397	436	240	300	340	2,630	11,800	4,520	2,000	265	301
10	416	354	462	250	387	340	2,570	12,300	4,860	1,840	245	305
11	*436	327	473	260	436	340	2,510	12,800	5,040	1,690	261	*292
12	416	331	489	270	380	359	2,940	13,500	5,410	1,480	268	280
13	392	301	517	290	370	382	3,900	14,000	5,600	1,390	292	272
14	416	340	489	320	370	392	4,690	11,300	5,220	1,300	354	265
15	452	340	462	350	380	416	4,690	10,200	5,600	1,200	363	253
18	473	368	436	360	450	406	*4,860	9,960	5,600	1,100	340	242
17	452	377	457	370	534	402	5,600	11,100	4,520	1,020	297	227
16	421	387	447	390	528	397	6,200	11,600	4,050	944	260	220
19	402	327	442	382	523	431	5,410	*10,200	3,750	880	253	213
20	406	322	436	397	506	447	4,860	8,580	3,540	832	227	203
21	478	340	416	402	506	484	4,360	8,140	3,330	772	220	193
22	523	345	426	*421	500	512	4,050	*9,040	*3,140	730	203	200
23	484	345	426	411	500	523	3,750	10,900	3,000	674	203	196
24	*436	322	436	411	490	489	3,540	12,500	3,200	627	196	190
25	426	327	468	416	473	512	3,750	10,400	3,140	594	187	190
26	411	336	540	489	478	540	4,050	7,920	2,880	552	183	187
27	473	368	588	421	*470	570	4,520	7,040	2,690	517	187	224
28	528	436	588	193	460	588	5,040	6,620	2,510	489	235	284
29	528	500	594	170	-	588	6,000	6,000	2,280	457	301	268
30	523	*523	601	160	-	640	5,800	5,040	2,160	426	462	*276
31	478	-	588	160	-	581	-	4,520	-	402	495	-
Total	11,854	11,610	13,512	10,328	10,501	13,982	108,692	281,910	121,470	40,156	8,839	8,726
Mean	382	367	436	333	375	451	3,623	9,094	4,049	1,295	285	291
Ac-ft	23,510	23,030	26,800	20,490	20,830	27,730	215,600	559,200	240,900	79,650	17,530	17,310
Calendar year 1950: Max	11,800			Min	117		Mean	1,473	Ac-ft	1,066,000		
Water year 1950-51: Max	14,000			Min	160		Mean	1,758	Ac-ft	1,273,000		

Peak discharge (base, 8,000 cfs).--May 13 (2 a.m.) 15,000 cfs (18.79 ft); May 24 (4 p.m.) 12,800 cfs (17.93 ft).

\* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice Dec. 3-7, Jan. 3-18, Jan. 29 to Feb. 9, Feb. 12-16, 22-24, Feb. 27 to Mar. 3, Mar. 6-11.

## KETTLE RIVER BASIN

Curlew Creek near Malo, Wash.

Location.--Lat 48°46'00", long. 118°39'10", in NW¼ sec. 28, T. 38 N., R. 33 E., on left bank a quarter of a mile downstream from Curlew Lake, and 3 miles southwest of Malo.

Drainage area.--69.3 sq mi.

Records available.--April to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 2,330 ft (from topographic map).

Extremes.--Maximum discharge observed during period, 169 cfs Apr. 16 (gage height, 4.35 ft), result of discharge measurement; minimum, 2.7 cfs Sept. 18 (gage height, 2.01 ft).

Remarks.--Records good except those for period of no gage-height record, which are poor. No regulation or diversion. At high stage and during irrigation season water from Sanpoil River is sometimes diverted into this basin above Curlew Lake.

Rating table, Apr. 26 to Sept. 30, 1951 (gage height, in feet, and discharge, in cubic feet per second)

2.0	3.0
2.1	6.5
2.5	24
3.0	49
4.0	131

Discharge, in cubic feet per second, April to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1							-	123	65	33	14.5	9.0
2							-	121	63	33	*14.5	9.4
3							-	120	61	33	14	9.6
4							-	119	*60	33	14	9.4
5							-	121	60	33	13.5	9.0
6							-	123	60	32	12.5	8.6
7							-	127	56	31	12	9.0
8							-	131	52	31	12	8.2
9							-	132	52	31	12	7.3
10							-	130	52	30	11.5	6.9
11							-	132	50	30	11.5	5.5
12							-	132	50	29	12	4.8
13							-	130	50	29	12	4.0
14							-	127	50	28	11.5	3.4
15							-	122	50	28	11	4.2
16							+169	117	48	27	10.5	4.0
17							-	113	48	27	10	5.7
18							-	107	46	25	9.5	3.4
19							-	102	44	25	9.1	3.4
20							-	*98	42	24	8.8	3.7
21							-	95	*42	23	8.4	4.4
22							-	92	42	22	7.9	4.8
23							-	91	41	21	7.6	4.4
24							-	86	40	19.5	7.2	4.8
25							-	83	39	18.5	7.0	5.1
26							122	80	38	17	6.9	6.5
27							122	78	36	16.5	6.8	7.8
28							123	75	35	16.5	7.0	9.4
29							125	72	35	16	7.3	10.5
30							124	69	33	16	7.8	12.5
31							-	66	-	15	8.4	-
Total							-	3,314	1,440	793.0	318.7	196.7
Mean							-	107	48.0	25.6	10.3	6.56
Ac-ft							-	6,570	2,860	1,570	632	390
Calendar year	: Max			Min			Mean		Ac-ft			
Water year	: Max			Min			Mean		Ac-ft			

\* Discharge measurement made on this day.

† Result of discharge measurement.

Note.--No gage-height record Aug. 9 to Sept. 4; discharge estimated on basis of records for nearby stations, recorded range in stage, and weather records.



Kettle River near Laurier, Wash.

(International gaging station)

Location.--Lat 48°59'10", long. 118°13'00", in NW $\frac{1}{4}$  sec. 11, T. 40 N., R. 36 E., on right bank 500 ft downstream from Deep Creek,  $1\frac{1}{2}$  miles southeast of Laurier, and 12 miles upstream from Boulder Creek.

Drainage area.--3,800 sq mi, approximately.

Records available.--September 1929 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,425.5 ft above mean sea level, international joint adjustment of 1947. Prior to Jan. 3, 1930, staff gage at same site at datum 2.14 ft higher.

Average discharge.--22 years, 2,734 cfs.

Extremes.--Maximum discharge during year, 26,700 cfs May 13 (gage height, 14.90 ft); minimum, 320 cfs Oct. 1 (gage height, 2.85 ft).

1929-51: Maximum discharge, 35,000 cfs May 29, 1948 (gage height, 17.25 ft); minimum not determined, probably occurred during winter of 1929-30.

Maximum stage known, about 22 ft in May or June 1894, from information by local residents.

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are poor. North Fork regulated by reservoir at Grand Forks, British Columbia. Numerous diversions for irrigation of about 720 acres in the United States (for 1946 from United States reports), and 2,090 acres in Canada from the Canada Year Book for 1940. Some diversion for domestic use.

Cooperation.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

Revisions (water years).--W 737: 1930-31. W 862: 1937. W 882: 1938.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

2.8	297	7.0	4,740
3.7	805	10.0	11,100
5.0	1,910	14.6	25,600

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	325	1,100	1,220	1,750	500	1,300	1,910	11,100	8,070	4,400	840	910
2	354	1,060	1,010	1,700	500	1,260	2,190	10,100	7,850	4,400	*779	352
3	344	1,060	900	1,600	500	1,220	2,760	9,650	*8,070	4,240	746	351
4	354	1,020	800	1,500	500	1,280	3,700	*9,890	8,290	4,080	708	840
5	354	1,020	700	1,300	650	1,260	4,910	11,400	9,190	4,570	663	766
6	354	1,100	700	1,100	550	1,140	5,640	15,600	8,730	4,570	626	714
7	379	1,100	700	1,000	550	1,180	5,640	17,500	8,070	4,740	597	675
8	404	1,100	938	931	550	1,140	6,210	19,100	7,640	4,400	573	638
9	441	1,060	1,060	900	600	1,050	6,410	20,700	8,070	3,840	568	626
10	511	960	1,140	900	1,060	1,000	6,020	21,700	8,730	3,540	545	602
11	614	938	1,180	900	1,050	1,000	6,020	22,400	9,420	3,320	556	585
12	*682	924	1,220	950	1,050	1,000	6,410	24,900	10,100	2,970	539	573
13	663	854	1,220	1,000	1,050	1,100	8,070	25,600	10,600	2,760	579	550
14	669	833	1,220	1,050	1,000	1,140	9,890	21,000	10,400	2,500	614	539
15	688	882	1,180	1,100	1,100	*1,220	10,400	17,800	10,600	2,370	675	517
16	753	*896	*1,180	1,100	1,660	1,220	10,400	17,500	11,100	2,190	657	506
17	772	831	1,180	1,100	1,660	1,140	*10,900	18,700	9,190	2,020	614	484
18	772	896	1,180	1,100	1,660	1,140	11,900	*20,700	8,070	1,910	556	468
19	734	868	1,180	1,100	1,560	1,140	11,900	*19,100	7,640	1,810	517	446
20	734	826	1,180	1,100	1,560	1,180	10,100	15,900	7,220	1,610	484	425
21	826	819	1,180	1,100	1,560	1,220	9,190	14,400	6,810	1,520	462	420
22	889	833	1,180	1,100	1,520	1,260	8,510	*15,300	*6,210	1,480	436	410
23	910	826	1,220	*1,140	1,480	1,300	7,850	17,800	6,020	1,380	420	404
24	861	819	1,340	1,140	1,430	1,260	7,640	21,000	6,210	1,300	415	399
25	833	819	1,610	1,140	1,430	1,260	7,640	19,200	6,210	1,260	410	399
26	861	833	1,910	1,180	1,380	1,340	8,290	14,700	5,830	1,180	*399	399
27	1,020	882	1,910	1,000	1,340	1,430	9,190	13,000	5,450	1,100	399	420
28	1,140	1,020	1,910	700	1,300	1,480	10,100	12,200	5,090	1,020	451	436
29	1,180	1,180	1,860	550	-	1,560	11,600	11,400	4,740	998	562	*489
30	1,180	1,220	1,810	550	-	1,610	11,900	9,890	4,400	931	746	500
31	1,180	-	1,810	500	-	1,760	-	8,730	-	882	861	-
Total	21,781	28,679	38,828	33,281	30,750	38,570	233,290	507,960	234,020	79,298	17,997	17,023
Mean	703	956	1,253	1,074	1,098	1,244	7,776	16,390	7,801	2,558	581	567
Ac-ft	43,200	56,880	77,010	66,010	60,990	76,500	462,700	*1,008	464,200	157,300	35,700	33,760
Calendar year 1950: Max		20,000		Min	257		Mean	2,862		Ac-ft	2,072,000	
Water year 1950-51: Max		25,600		Min	325		Mean	3,511		Ac-ft	2,542,000	

Peak discharge (base, 13,000 cfs).--May 13 (5 a.m.) 26,700 cfs (14.90 ft); May 24 (9 p.m.) 22,100 cfs (13.58 ft).

\* Discharge measurement made on this day.

\* Expressed in thousands.

a No gage-height record; discharge estimated on basis of records for station near Ferry.

Note.--Stage-discharge relation affected by ice Dec. 3-7, Jan. 9-16, Jan. 27 to Feb. 9, Feb. 11-15, Mar. 9-12.

## COLVILLE RIVER BASIN

## Loon Lake near Loon Lake, Wash.

Location.--Lat 48°01'45", long. 117°36'15", in NW¼ sec. 11, T. 29 N., R. 41 E., at south end of Loon Lake, 2.7 miles southeast of town of Loon Lake. Prior to Sept. 29, 1951, at site 0.2 mile north on east shore.

Drainage area.--33.4 sq mi.

Records available.--April 1950 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, unadjusted. Prior to Sept. 29, 1951, water-stage recorder at site 0.2 mile north at present datum.

Extremes.--Maximum elevation during year, 2,381.78 ft Apr. 18; minimum recorded, 2,380.11 ft Sept. 28, 29.

1950-51: Maximum elevation, 2,382.71 ft (revised) May 3, 1950; minimum recorded, that of Sept. 28, 29, 1951.

Revisions.--The maximum elevation for the water year 1950 has been revised to 2,382.71 ft May 3, 1950, superseding figure published in Water-Supply Paper 1182.

Remarks.--Elevation controlled by dam at lake outlet. Some small diversions for irrigation of lawns and gardens.

Revisions.--Elevations for the period April to September 1950 as published in Water-Supply Paper 1182, are 0.08 ft too high.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.
1	80.86	81.10	81.28	-	-	-	81.20	-	81.45	81.30	80.85	80.43
2	80.85	81.11	81.27	-	-	-	81.22	-	81.45	81.29	80.84	-
3	80.84	81.11	81.29	-	-	-	81.27	-	81.44	81.29	80.83	-
4	80.85	81.11	81.30	-	-	-	81.32	-	81.46	81.28	80.81	-
5	80.92	81.11	81.29	-	-	-	81.38	-	81.48	81.27	80.77	80.38
6	80.92	81.10	81.31	-	-	-	81.45	-	81.49	81.26	80.77	-
7	80.91	81.10	81.33	-	-	-	81.50	-	81.50	81.25	80.74	-
8	80.92	81.10	81.33	-	-	-	81.55	-	81.50	81.24	80.72	-
9	80.92	81.09	81.33	-	-	-	81.58	-	81.50	81.23	80.70	-
10	80.93	81.09	81.34	-	-	-	81.62	-	81.50	81.21	80.68	-
11	80.93	81.08	81.34	-	-	-	81.65	-	81.49	81.19	80.66	-
12	80.94	81.08	81.34	-	-	-	81.68	-	81.50	81.18	80.64	-
13	80.94	81.08	81.34	-	-	-	81.70	-	81.50	81.17	80.63	-
14	80.94	81.08	81.35	-	-	-	81.73	-	81.50	81.16	80.63	-
15	80.94	81.08	81.36	-	-	-	81.74	-	81.50	81.14	80.62	-
16	80.93	81.12	81.39	-	-	-	81.76	-	81.49	81.12	80.61	-
17	80.94	81.13	-	-	-	-	81.77	-	81.47	81.11	80.60	-
18	80.94	81.12	-	-	-	-	81.78	-	81.47	81.10	80.59	-
19	80.94	81.12	-	-	-	-	81.77	-	81.45	81.07	80.58	-
20	80.96	81.14	-	-	-	-	81.75	-	81.44	81.05	80.55	-
21	80.96	81.15	-	-	-	-	81.74	-	81.42	81.03	80.53	-
22	80.96	81.14	-	-	-	81.36	81.72	-	81.41	81.01	80.52	-
23	80.94	81.13	-	-	-	81.34	81.70	-	81.40	81.00	80.50	-
24	80.94	81.16	-	-	-	81.31	81.68	-	81.39	80.99	80.48	-
25	80.94	81.16	-	-	-	81.27	-	-	81.38	80.98	80.45	-
26	80.96	81.18	-	-	-	81.25	-	-	81.36	80.95	80.43	-
27	80.96	81.19	-	-	-	81.22	81.63	-	81.35	80.94	80.42	-
28	80.98	81.19	-	-	-	81.20	-	-	81.34	80.93	-	80.11
29	81.01	81.19	-	-	-	81.19	81.71	-	81.33	80.90	80.44	80.11
30	81.08	81.23	-	-	-	81.18	-	-	81.32	80.88	80.44	80.15
31	81.11	-	-	-	-	81.18	-	81.45	-	80.87	80.44	-

Note.--Add 2,300 ft to obtain elevation above mean sea level.

## Mill Creek near Colville, Wash.

Location.--Lat 48°34'55", long. 117°51'00", in lot 3, in NW¼ sec. 35, T. 36 N., R. 39 E., on right bank 3 miles northeast of Colville and 5 miles downstream from North Fork.

Drainage area.--82 sq mi, approximately.

Records available.--February 1940 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,959.0 ft above mean sea level, datum of 1929.

Average discharge.--11 years, 49.8 cfs.

Extremes.--Maximum discharge during year, 413 cfs Apr. 14 (gage height, 4.56 ft); minimum, 9.0 cfs Sept. 20 (gage height, 1.16 ft), but may have been less sometime during period of shifting control Sept. 22-25.

1940-51: Maximum discharge, 538 cfs May 4, 1948 (gage height, 5.25 ft); minimum recorded, 3.6 cfs Aug. 28, 31, Sept. 1, 1940, but may have been less during period of no gage-height record Feb. 1-4, 1940.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for period of ice effect, which are poor. Diversion for irrigation of about 50 acres above station. No regulation.

Revisions (water years).--W 1042: 1940, 1942.

Rating table, water year 1950-51, except periods of ice effect or shifting control (gage height, in feet, and discharge, in cubic feet per second)

1.1	7.1	2.5	105
1.3	14	3.0	186
1.5	23	3.5	237
1.7	34	4.0	316
2.0	56	4.5	404

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	
1	9.7	30	26	69	b31	62	128	252	86	38	14	15.5	
2	10.5	26	24	69	b32	62	154	230	81	37	13.5	15	
3	*10.5	24	22	67	b33	60	193	222	*78	34	13	14.5	
4	12	23	20	60	b35	61	260	214	76	33	12.5	12.5	
5	15	22	18.5	51	b37	58	308	230	75	34	12	13	
6	18	22	23	44	b36	58	316	230	75	35	12.5	12	
7	15.5	21	24	45	b37	57	333	230	74	33	13	12	
8	16.5	19.5	23	54	40	57	350	230	72	31	13	12.5	
9	24	18.5	22	51	60	59	316	222	70	31	13	12.5	
10	19.5	18	24	50	92	54	300	214	68	30	12.5	12.5	
11	17.5	18	26	50	133	53	300	214	64	29	12.5	11.5	
12	15.5	17.5	28	47	107	54	316	244	66	27	12.5	11.5	
13	14.5	16.5	26	47	90	54	368	222	62	26	12.5	11	
14	14	17	26	47	89	54	395	200	59	26	12.5	10.5	
15	13.5	17	26	48	85	*63	368	186	55	24	12	10	
16	13	25	*26	47	79	67	350	172	53	24	12	10	
17	13.5	*26	33	45	76	58	*359	166	51	*23	12.5	9.7	
18	17	23	36	43	74	55	368	163	50	22	11.5	10	
19	17.5	19	37	42	72	56	324	154	47	22	11.5	9.7	
20	17.5	20	43	40	72	60	292	144	47	20	11	9.3	
21	17	20	50	42	71	66	268	139	47	20	10.5	9.3	
22	15.5	21	54	41	70	68	244	130	45	19.5	10.5	9.3	
23	14.5	20	72	*40	70	65	230	126	44	19	11	9.3	
24	14	20	100	41	69	65	222	121	58	18	11.5	9.3	
25	15	24	106	44	69	71	214	*116	48	17.5	11	11	
26	21	26	87	59	67	82	214	114	44	17	*10.5	13.5	
27	20	27	77	38	59	87	222	110	41	17	10.5	13	
28	24	31	73	30	63	87	252	106	40	16	12	13	
29	30	28	70	b30	-	96	284	103	38	15	14.5	13.5	
30	44	26	73	b30	-	109	260	98	36	15	15.5	13.5	
31	41	-	73	b30	-	111	-	92	-	14.5	15.5	-	
Total	560.7	666.0	1,368.5	1,441	1,848	2,069	8,506	5,394	1,750	767.5	382.5	349.9	
Mean	18.1	22.2	44.1	45.5	66.0	66.7	284	174	58.3	24.8	12.3	11.7	
Cfs/m	0.221	0.271	0.538	0.567	0.805	0.813	3.46	2.12	0.711	0.302	0.150	0.143	
In.	0.25	0.30	0.62	0.65	0.84	0.94	3.86	2.45	0.79	0.35	0.17	0.16	
Ac-ft	1,110	1,320	2,710	2,860	3,670	4,100	16,870	10,700	3,470	1,520	759	694	
Calendar year 1950: Max	330			Min	7.5	Mean	52.9	Cfs/m	0.845	In.	8.75	Ac-ft	38,300
Water year 1950-51: Max	395			Min	9.3	Mean	68.8	Cfs/m	0.839	In.	11.38	Ac-ft	49,780

Peak discharge (base, 200 cfs).--Apr. 8 (2 a.m.) 377 cfs (4.33 ft); Apr. 14 (4 a.m.) 413 cfs (4.56 ft); Apr. 29 (5 a.m.) 292 cfs (3.87 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--Shifting-control method used Nov. 22 to Dec. 2, Dec. 4 to Jan. 15, Sept. 10-17, 22-25, 27-30.

## Colville River at Kettle Falls, Wash.

Location.--Lat 48°35'40", long. 118°03'30" (revised), in sec. 29, T. 36 N., R. 38 E., on right bank 600 ft downstream from Stevens County Light & Power Co.'s plant at foot of Meyers Falls, half a mile south of town of Kettle Falls, and 2 miles upstream from Franklin D. Roosevelt Lake.

Drainage area.--1,050 sq mi, approximately.

Records available.--October 1922 to September 1951. Published as "at Meyers Falls" 1922-38.

Gage.--Water-stage recorder. Altitude of gage is 1,500 ft (from topographic map). Prior to Oct. 21, 1932, staff gage at site 500 ft upstream, at different datum. Oct. 21, 1932, to Sept. 19, 1938, staff gages at site 200 ft upstream at different datum. Sept. 20, 1938, to Mar. 20, 1949, staff gage at same site and datum.

Average discharge.--29 years, 272 cfs.

Extremes.--Maximum discharge during year, 2,240 cfs Apr. 14, 15; maximum gage height, 9.30 ft Apr. 14; minimum discharge, 29 cfs Oct. 4; minimum gage height, 4.59 ft Oct. 4, Aug. 3.

1922-51: Maximum discharge observed, 2,720 cfs Apr. 20, 1938; minimum observed, 0.5 cfs Aug. 15, 1930.

Remarks.--Records good except those for periods of ice effect, which are fair. Several ditches above station divert water for irrigation. Slight regulation for power by small reservoir above falls.

Cooperation.--Gage-height record and one discharge measurement furnished by Washington Water Power Co.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

5.1	77
5.5	144
6.0	295
7.0	808
9.3	2,240

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	*85	225	276	640	b280	676	1,280	1,550	546	235	129	151
2	109	269	232	614	b280	676	1,310	1,520	520	242	125	149
3	89	245	b220	b600	b310	650	1,400	1,490	499	242	112	142
4	94	232	b170	b570	b350	650	1,490	1,460	478	235	112	136
5	121	222	b140	b520	b410	650	1,640	1,460	484	228	107	129
6	149	216	b140	b470	b440	629	1,730	1,460	499	228	123	127
7	166	207	b180	b420	b450	619	1,800	1,460	515	228	110	123
8	163	*213	b230	b420	468	603	1,940	1,430	515	222	116	129
9	158	195	248	b440	525	603	2,080	1,400	499	216	118	138
10	175	182	245	b440	640	598	2,080	1,340	478	210	114	127
11	168	184	248	b440	808	562	2,080	1,310	463	204	109	138
12	161	184	265	447	972	603	2,080	1,340	437	198	114	136
13	151	179	276	463	1,020	598	2,160	1,370	426	192	107	134
14	142	182	276	463	1,050	*598	2,160	1,310	411	187	110	123
15	142	190	273	463	1,080	629	2,240	1,250	395	179	114	129
16	140	*219	*276	473	1,160	755	2,160	1,160	370	176	116	123
17	131	258	295	484	1,140	808	2,160	1,140	350	*176	112	116
18	134	265	340	468	1,050	861	*2,080	1,080	331	173	105	121
19	156	251	380	468	970	888	2,080	998	313	166	105	119
20	163	235	416	468	888	888	1,940	915	300	136	96	118
21	163	225	452	463	867	888	1,870	861	288	154	104	110
22	163	232	484	463	808	970	*1,760	834	291	161	100	114
23	158	228	525	463	782	1,020	1,730	782	273	154	100	125
24	142	225	588	468	755	1,020	1,610	728	304	158	100	121
25	154	238	666	473	755	1,050	1,550	*702	295	158	105	125
26	158	269	702	515	728	1,110	1,490	650	291	149	*105	131
27	179	284	702	504	702	1,160	1,460	640	304	146	105	134
28	195	295	702	b250	676	1,160	1,460	624	269	142	118	131
29	213	291	676	*b240	-	1,160	1,580	614	255	129	119	134
30	251	284	650	b240	-	1,190	1,640	598	251	134	144	138
31	300	-	650	b240	-	1,250	-	572	-	131	151	-
Total	4,871	6,994	11,923	14,090	20,344	25,522	54,040	34,048	11,650	5,669	3,505	3,871
Mean	157	233	385	455	727	823	1,801	1,098	388	164	113	129
Ac-ft	9,660	13,870	23,650	27,950	40,350	50,620	107,200	67,530	23,110	11,280	6,950	7,680

Calendar year 1950: Max 1,370 Min 74 Mean 390 Ac-ft 282,100  
 Water year 1950-51: Max 2,240 Min 85 Mean 538 Ac-ft 389,800

\* Discharge measurement made on this day.  
 b Stage-discharge relation affected by ice.

Coeur d'Alene River above Shoshone Creek, near Prichard, Idaho

Location.--Lat 47°42', long. 115°59', in NE¼SW¼ sec. 5, T. 50 N., R. 4 E., on left bank at Shoshone Creek ranger station 0.2 mile downstream from Uranus Creek, 0.4 mile upstream from Shoshone Creek, and 3½ miles north of Prichard.

Drainage area.--335 sq mi.

Records available.--December 1950 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 2,485 ft (from river-profile map).

Extremes.--Maximum discharge during period, 9,610 cfs Feb. 11 (gage height, 7.17 ft), from rating curve extended above 3,300 cfs by logarithmic plotting; minimum, 65 cfs probably Sept. 20 (gage height, 0.91 ft).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair. No regulation or diversion above station.

Rating table, period Dec. 1, 1950, to Sept. 30, 1951, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

0.9	62	3.0	1,380
1.2	164	4.0	2,800
1.5	286	5.0	4,280
2.0	540	6.0	6,450
2.5	895	6.8	8,530

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1			1,000	1,150	b480	598	976	2,290	648	264	121	110
2			880	1,080	b520	524	1,420	1,930	610	256	121	110
3			800	1,030	b560	512	1,930	1,670	592	243	118	105
4			720	895	b540	524	2,470	1,640	561	264	118	105
5			610	794	b480	496	2,690	2,320	569	269	114	100
6			600	716	b470	458	3,050	3,030	563	260	111	100
7			620	674	474	474	3,190	3,590	*552	243	108	100
8			540	b640	598	437	3,360	3,110	524	231	108	95
9			520	b620	1,490	469	2,920	2,600	490	227	118	90
10			500	598	5,520	453	2,470	2,570	469	218	114	95
11			520	575	8,310	396	2,330	2,740	469	206	111	100
12			580	552	8,650	417	2,380	*2,740	485	202	118	100
13			620	540	3,640	391	2,800	2,450	480	194	114	90
14			640	518	2,520	396	3,570	2,710	453	187	114	90
15			660	507	1,990	427	3,240	2,760	427	179	111	85
16			680	512	1,640	524	2,780	2,540	412	175	*104	80
17			700	512	1,360	437	2,670	2,490	366	168	104	75
18			800	490	1,220	412	2,860	2,370	371	160	100	75
19			1,080	b475	1,060	417	*2,760	2,050	361	157	95	75
20			1,200	b460	967	432	2,340	1,760	347	*153	95	70
21			2,000	458	870	453	1,970	1,600	347	153	95	75
22			2,370	458	778	458	1,700	1,530	327	150	90	80
23			4,200	b410	723	443	1,510	1,530	318	146	90	85
24			7,830	406	695	432	1,410	1,460	381	146	90	90
25			5,600	490	688	474	1,440	1,260	347	139	95	100
26			3,800	810	623	569	1,580	1,100	304	135	95	110
27			3,000	844	575	*629	1,850	1,000	291	132	95	100
28			2,300	635	629	681	2,190	940	277	132	95	90
29			1,800	b550	-	818	2,490	861	273	128	100	85
30			*1,510	b460	-	678	2,490	786	264	125	110	110
31			1,340	b470	-	844	-	716	-	121	120	-
Total			50,000	19,329	46,090	15,873	71,036	62,143	12,916	5,763	3,292	2,775
Mean			1,613	624	1,646	512	2,368	2,005	431	186	106	92.5
Cfsm			4.81	1.86	4.91	1.53	7.07	5.99	1.29	0.555	0.316	0.276
In.			5.55	2.15	5.12	1.76	7.89	6.90	1.43	0.64	0.37	0.31
Ac-ft			99,170	38,340	91,420	31,480	140,900	123,300	25,620	11,430	6,530	5,500

Calendar year	: Max	Min	Mean	Cfsm	In.	Ac-ft
Water year	: Max	Min	Mean	Cfsm	In.	Ac-ft

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Dec. 1-21, 25-29, Aug. 18 to Sept. 30; discharge estimated on basis of recorded range in stage, weather records, and records for other Coeur d'Alene River stations.

## Coeur d'Alene River near Prichard, Idaho

Location.--Lat 47°38', long. 115°59', in lot 7, sec. 32, T. 50 N., R. 4 E., on right bank 0.2 mile downstream from Beaver Creek and 1½ miles southwest of Prichard.

Drainage area.--583 sq mi.

Records available.--August 1944 to September 1951.

Gage.--Staff gage read once daily. Altitude of gage is 2,365 ft (from river-profile map).

Average discharge.--7 years, 1,458 cfs.

Extremes.--Maximum discharge during year, 16,400 cfs Feb. 11 (gage height, 10.95 ft, from graph based on gage readings); minimum observed, 146 cfs Sept. 20 (gage height, 1.73 ft).

1944-51: Maximum discharge determined, that of Feb. 11, 1951, but may have been higher Dec. 15, 1946; minimum observed, 90 cfs Sept. 13, 1944 (gage height, 1.00 ft).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair. No diversion or regulation above station.

Revisions.--W 1182: Drainage area.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(shifting-control method used Aug. 7 to Sept. 30)

1.6	137	5.0	2,700
2.0	273	6.0	4,060
2.5	482	7.0	5,790
3.0	765	8.0	8,030
3.5	1,160	9.0	10,600
4.0	1,590	10.3	14,400

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a220	2,020	1,590	2,000	b920	1,000	1,630	3,770	1,400	496	243	208
2	215	1,540	1,360	1,780	b980	944	2,100	3,170	1,300	482	240	201
3	a210	1,240	1,240	1,830	b1,050	896	2,840	2,710	1,270	450	229	198
4	a225	1,220	1,100	1,590	1,000	888	3,600	2,640	1,210	496	226	191
5	a250	1,220	920	1,450	912	896	4,260	3,590	1,180	506	222	191
6	a320	1,220	920	1,310	872	880	4,650	4,730	1,160	468	222	188
7	a300	1,150	976	1,180	304	848	4,890	5,730	*1,190	442	218	181
8	a270	1,080	856	1,190	1,060	a730	5,160	4,920	1,110	424	218	178
9	296	856	795	1,180	2,260	765	4,570	4,210	1,030	420	215	171
10	312	856	765	1,100	10,900	730	4,020	4,220	1,000	411	215	175
11	328	795	818	1,030	14,400	659	3,670	4,630	992	394	218	188
12	289	723	904	1,000	11,800	653	3,690	*4,580	1,020	373	226	181
13	266	683	968	952	6,780	883	4,180	4,090	1,080	360	222	171
14	258	671	984	936	4,300	689	5,160	4,630	1,080	352	222	168
15	258	624	1,030	904	3,260	751	4,940	4,540	1,020	348	191	156
16	258	*613	1,030	888	2,710	896	4,270	4,200	992	336	*191	152
17	277	618	1,090	920	2,400	765	4,120	4,150	936	320	184	149
18	336	586	1,210	880	2,110	702	4,470	4,220	880	312	184	149
19	464	525	1,620	818	1,870	689	*4,390	3,780	840	308	178	149
20	751	520	1,970	758	*1,710	744	3,730	3,260	780	*312	178	146
21	960	608	2,990	751	1,570	758	3,120	2,960	751	300	178	149
22	723	695	3,800	780	1,430	795	2,590	2,880	723	296	171	159
23	555	695	6,220	723	1,330	772	2,330	3,040	659	292	165	171
24	480	840	12,100	*689	1,290	772	2,180	2,960	723	285	185	184
25	428	1,260	8,580	825	1,270	864	2,220	2,590	683	273	171	201
26	570	1,640	5,850	1,490	1,180	904	2,480	2,320	641	273	171	218
27	641	1,770	4,420	1,690	1,060	1,020	2,900	2,130	618	266	171	204
28	730	1,730	3,500	1,300	1,050	1,220	3,390	1,980	565	258	168	188
29	1,330	1,710	*2,870	b1,050	-	1,370	3,940	1,680	530	254	178	171
30	2,530	1,680	2,600	b880	-	1,450	4,120	1,630	506	258	204	212
31	2,640	-	2,350	b900	-	1,460	-	1,510	-	251	218	-
Total	17,665	31,468	77,426	34,774	82,478	27,193	109,610	107,450	27,869	11,016	6,202	5,348
Mean	570	1,049	2,498	1,122	2,946	877	3,654	3,466	929	355	200	178
Cfsm	0.978	1.80	4.28	1.92	5.05	1.50	6.27	5.95	1.59	0.609	0.343	0.305
In.	1.13	2.01	4.94	2.22	5.26	1.73	6.99	6.85	1.78	0.70	0.40	0.34
Ac-ft	35,040	62,420	153,600	68,970	163,600	53,940	217,400	213,100	55,280	21,850	12,300	10,610
Calendar year 1950: Max	14,000	Min	181	Mean	1,993	Cfsm	3.42	In.	46.41	Ac-ft	1,443,000	
Water year 1950-51: Max	14,400	Min	146	Mean	1,475	Cfsm	2.53	In.	34.35	Ac-ft	1,068,000	

\* Discharge measurement made on this day.

a No gage-height record; discharge computed on basis of weather records and records for station at Enaville and nearby streams.

b Stage-discharge relation affected by ice.

## Coeur d'Alene River at Enaville, Idaho

Location.--Lat 47°34', long. 116°15', in NW<sup>1</sup> sec. 30, T. 49 N., R. 2 E., on right bank 800 ft upstream from highway bridge, a quarter of a mile northwest of Enaville Post Office, 1.1 miles upstream from South Fork, and 3.5 miles downstream from North Fork.

Drainage area.--895 sq mi.

Records available.--March 1911 to April 1913 (fragmentary), October 1939 to September 1951. Published as North Fork of Coeur d'Alene River at Enaville 1911-13.

Gage.--Water-stage recorder. Datum of gage is 2,100.00 ft above mean sea level, referenced to benchmark near mouth of North Fork, elevation, 2,204.880 ft (U. S. Geol. Survey Bull. 567, p. 82). Mar. 3, 1911, to Apr. 12, 1913, staff gage at site a quarter of a mile downstream at different datum. Oct. 18 to Dec. 22, 1939, staff gage at present site and datum.

Average discharge.--12 years (1939-51), 1,853 cfs.

Extremes.--Maximum discharge during year, 27,400 cfs Feb. 11 (gage height, 74.93 ft), from rating curve extended above 18,000 cfs by logarithmic plotting; minimum, 243 cfs Sept. 20-22 (gage height, 60.54 ft).

1911-13, 1939-51: Maximum discharge, 28,100 cfs Dec. 15, 1946, from rating curve extended above 13,000 cfs by logarithmic plotting; minimum daily discharge, 145 cfs Dec. 24, 1944; maximum gage height, 74.93 ft Feb. 11, 1951; minimum gage height, 60.16 ft Nov. 19, 1944.

From local information concerning high-water marks, flood in December 1933 reached a stage of 79.47 ft and that in April 1938 a stage of 78.16 ft.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair. No appreciable diversion or regulation above station.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	320	2,890	2,430	3,140	bl,500	1,540	2,770	5,450	1,870	719	344	308
2	317	2,280	2,010	2,950	bl,550	1,410	3,630	4,640	1,740	702	341	302
3	314	1,840	1,810	3,010	bl,600	1,340	4,930	4,000	1,680	673	334	295
4	320	1,710	1,650	2,590	bl,600	1,340	6,310	3,810	1,650	755	331	283
5	366	1,710	1,440	2,270	bl,500	1,320	7,440	4,900	1,650	774	324	275
6	462	1,730	1,320	2,010	bl,400	bl,500	7,960	6,310	1,650	719	317	269
7	450	1,650	1,360	1,780	bl,500	bl,200	8,190	7,640	1,680	673	311	266
8	396	1,490	1,290	1,710	bl,700	bl,100	8,300	6,990	*1,610	629	308	261
9	432	1,320	1,180	1,720	b5,500	bl,500	7,600	5,850	1,480	602	305	264
10	458	1,180	1,130	1,610	bl8,000	bl,100	6,360	5,530	1,390	582	311	264
11	467	1,120	1,160	1,530	22,500	949	a5,800	*6,010	1,400	561	302	272
12	432	1,050	1,350	1,450	22,400	928	a5,700	6,240	1,490	542	305	272
13	396	960	1,500	1,390	11,500	949	a6,400	5,700	1,510	527	298	266
14	381	910	1,590	1,370	*7,680	949	a8,000	6,380	1,430	512	295	258
15	373	856	1,630	1,340	5,930	1,050	a7,900	6,500	1,380	499	289	253
16	373	850	1,690	1,340	4,920	1,500	a6,800	6,040	1,340	485	*286	250
17	377	897	1,990	1,380	3,980	1,290	a6,400	5,860	1,270	476	280	250
18	454	850	2,520	1,300	3,700	1,150	a6,700	5,800	1,180	462	275	250
19	582	762	2,820	1,230	3,220	1,140	6,550	5,160	1,120	454	272	248
20	992	737	3,160	1,160	2,870	1,210	*5,720	4,500	1,070	*445	269	243
21	1,420	*843	4,340	1,180	2,590	1,300	4,880	4,090	1,030	437	266	243
22	1,100	1,050	5,590	1,190	2,300	1,370	4,240	3,920	982	428	264	243
23	837	1,120	7,630	1,070	2,100	1,310	3,810	4,040	924	420	264	248
24	690	1,230	15,900	1,050	1,990	1,280	3,500	4,000	1,060	412	261	246
25	613	1,890	a13,000	1,250	1,960	1,380	3,420	3,600	1,030	400	269	269
26	780	2,290	a9,000	2,790	1,790	1,680	3,630	3,120	897	392	266	311
27	856	2,470	a7,200	3,300	1,580	1,990	4,140	2,840	845	381	261	320
28	924	2,630	a5,800	2,370	1,540	*2,070	4,880	2,690	798	373	266	305
29	1,710	2,650	*4,400	bl,800	-	2,340	5,640	2,490	762	366	302	298
30	3,490	2,510	3,940	bl,350	-	2,590	5,810	2,240	731	358	327	355
31	3,790	-	3,600	bl,400	-	2,550	-	2,020	-	348	324	-
Total	24,862	45,475	115,410	55,010	140,400	43,775	173,410	148,340	38,647	16,106	9,167	8,187
Mean	802	1,516	3,723	1,775	5,014	1,412	5,780	4,785	1,288	520	296	273
Cfsm	0.896	1.69	4.16	1.98	5.60	1.58	6.46	5.35	1.44	0.581	0.331	0.305
In.	1.03	1.89	4.80	2.29	5.83	1.82	7.21	6.16	1.61	0.67	0.38	0.34
Ac-ft	49,310	90,200	228,900	109,100	278,500	86,830	344,000	294,200	76,660	31,950	18,180	16,240

Calendar year 1950: Max 22,100 Min 298 Mean 3,064 Cfsm 3.42 In. 46.47 Ac-ft 2,218,000  
 Water year 1950-51: Max 22,500 Min 243 Mean 2,243 Cfsm 2.51 In. 34.03 Ac-ft 1,624,000

Peak discharge (base, 6,000 cfs).--Dec. 24 (7 p.m.) 18,400 cfs (71.90 ft); Feb. 11 (12 p.m.) 27,400 cfs (74.93 ft); Apr. 8 (5 p.m.) 8,380 cfs (67.77 ft); Apr. 14 (time unknown) 8,480 cfs (67.82 ft); May 7 (5 to 6 p.m.) 7,900 cfs (67.52 ft).

\* Discharge measurement made on this day.

No gage-height record; discharge computed on basis of weather records and records for stations near Cataldo and near Prichard.

b Stage-discharge relation affected by ice.

## SPOKANE RIVER BASIN

Coeur d'Alene River near Cataldo, Idaho

Location.--Lat 47°34', long. 116°18', in sec. 26, T. 49 N., R. 1 E., on left bank 1½ miles upstream from Cataldo and 3 miles downstream from South Fork.

Drainage area.--1,220 sq mi, approximately.

Records available.--April 1911 to December 1912, July 1920 to September 1951.

Average discharge.--32 years, 2,441 cfs.

Gage.--Water-stage recorder. Datum of gage is 2,100 ft above mean sea level, referenced to benchmark "2143 S" (U. S. Geol. Survey Bull. 567, p. 82). Datum of 1929, supplementary adjustment of 1947 is 2.84 ft higher. Apr. 25, 1911, to Dec. 31, 1912, staff gage 300 ft downstream at different datum. July 29, 1950, to Oct. 10, 1925, staff gage at present site and datum.

Extremes.--Maximum discharge during year, 34,800 cfs Feb. 11 (gage height, 51.45 ft); minimum, 312 cfs Sept. 22 (gage height, 38.29 ft).  
1911-12, 1920-51: Maximum discharge, 55,300 cfs Dec. 22 or 23, 1933 (gage height, 56.9 ft, from floodmark), from rating curve extended above 24,000 cfs by logarithmic plotting; minimum, 122 cfs Dec. 4, 1929; minimum gage height, 37.03 ft Sept. 6, 1931.

Remarks.--Records good except those for period of ice effect, which are fair. No appreciable diversion or regulation above station.

Cooperation.--Water-stage recorder graph and four discharge measurements furnished by Washington Water Power Co.

Rating table, water year 1950-51, except period of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Nov. 2 to Dec. 23, Feb. 12 to Apr. 15)

58.3	298	41.0	2,750	46.0	13,800
58.5	390	42.0	4,170	48.0	20,500
59.0	700	43.0	6,010	50.1	29,100
40.0	1,620	44.0	8,270		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	446	3,580	3,020	3,980	b2,050	2,390	3,710	6,800	3,040	1,290	536	482
2	440	2,930	2,710	3,860	b2,150	2,260	4,490	5,850	2,850	1,270	536	484
3	435	2,530	2,560	3,950	b2,200	2,200	5,990	5,160	2,760	1,210	524	440
4	440	2,380	2,380	3,490	b2,200	2,180	7,810	4,990	2,690	1,380	518	420
5	530	2,450	2,080	3,130	b2,100	2,160	9,300	6,170	2,700	1,380	500	405
6	672	2,490	1,950	2,830	b2,000	2,050	10,100	8,130	2,700	1,280	494	390
7	637	2,340	2,070	2,580	b2,100	1,940	10,300	10,200	2,700	1,180	488	385
8	560	2,140	1,960	2,510	b2,500	1,800	10,400	9,320	*2,560	1,100	482	381
9	609	1,900	1,810	2,510	7,180	1,900	9,430	7,840	2,460	1,080	476	381
10	658	1,700	1,750	2,350	24,800	1,800	7,960	7,690	2,290	1,000	476	381
11	658	1,630	1,860	2,270	29,000	1,700	7,220	*8,410	2,340	985	476	405
12	609	1,540	2,130	2,100	27,800	1,670	7,090	8,650	2,490	940	478	395
13	560	1,400	2,370	2,100	15,200	1,710	8,030	7,810	2,510	908	470	*381
14	536	1,340	2,470	2,100	10,200	1,730	10,100	8,490	2,440	892	464	366
15	536	1,240	2,470	2,080	*7,620	1,970	9,870	8,510	2,410	852	*446	357
16	518	1,250	2,550	2,120	6,150	2,630	8,490	7,980	2,380	828	446	352
17	536	1,280	2,930	2,190	5,190	2,280	8,010	7,910	2,250	804	440	348
18	530	1,250	3,530	2,060	4,670	2,100	8,370	7,660	2,120	772	430	343
19	804	1,090	3,860	1,940	4,170	2,080	8,250	7,060	2,030	*748	420	330
20	*1,180	1,080	4,250	1,830	3,800	2,190	*7,220	6,210	1,910	732	410	325
21	1,740	1,300	5,330	1,870	3,500	2,330	6,170	5,750	1,850	708	405	320
22	1,450	*1,600	6,670	1,880	3,250	2,350	5,390	5,670	1,780	686	400	316
23	1,170	1,670	9,090	1,730	3,080	2,250	4,920	5,890	1,680	672	400	325
24	985	1,830	17,000	1,700	2,940	2,220	4,670	5,790	1,660	658	390	330
25	900	2,650	15,300	2,060	2,850	2,350	4,630	5,350	1,790	623	400	390
26	1,130	3,100	10,900	4,350	2,700	2,740	4,870	4,780	1,620	616	405	452
27	1,240	3,210	8,490	4,560	2,470	3,000	5,430	4,440	1,540	602	395	415
28	1,370	3,290	6,690	3,460	2,380	3,080	6,230	4,250	1,470	602	415	385
29	2,380	3,270	*5,450	b2,500	-	3,360	7,180	3,920	1,400	581	500	371
30	4,000	3,140	4,900	b1,900	-	3,550	7,290	3,530	1,340	554	524	430
31	4,460	-	4,470	b1,950	-	3,520	-	3,250	-	548	506	-
Total	32,719	62,600	145,000	80,030	186,250	71,490	218,920	203,650	65,880	27,481	14,248	11,465
Mean	1,055	2,087	4,677	2,582	6,552	2,306	7,287	6,569	2,196	886	460	362
Cfs/m	0.665	1.71	5.83	2.12	5.45	1.89	5.98	5.38	1.80	0.726	0.377	0.313
In.	1.00	1.91	4.42	2.44	5.68	2.18	6.67	6.21	2.01	0.84	0.43	0.35
Ac-ft	64,900	124,200	287,600	158,700	369,400	141,800	434,200	403,900	130,700	54,510	28,260	22,740
Calendar year 1950: Max	25,600	Min	430	Mean	4,097	Cfs/m	3.36	In.	45.60	Ac-ft	2,966,000	
Water year 1950-51: Max	29,000	Min	316	Mean	3,068	Cfs/m	2.51	In.	34.14	Ac-ft	2,221,000	

Peak discharge (base, 11,000 cfs).--Dec. 24 (s. p. m.) 19,400 cfs (47.76 ft); Feb. 11 (12 p. m.) 34,800 cfs (51.45 ft).

\* Discharge measurement made on this day.  
b Stage-discharge relation affected by ice.



## St. Joe River at Calder, Idaho

Location.--Lat 47°16', long. 116°11', in sec. 3, T. 45 N., R. 2 E., on right bank 150 ft southwest of Chicago, Milwaukee, St. Paul & Pacific Railway station at Calder.

Drainage area.--1,030 sq mi, approximately.

Records available.--April 1911 to September 1912 (published as "near Calder"), July 1920 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,096.76 ft above mean sea level, datum of 1929, supplementary adjustment of 1947, or 2,100 ft above mean sea level, datum of Geological Survey as given in Bulletin 567: Apr. 14, 1911, to Sept. 30, 1912, staff gage at site  $2\frac{1}{2}$  miles downstream at different datum. July 13 to Dec. 21, 1920, staff gage at present site and datum.

Average discharge.--31 years (1920-51), 2,281 cfs.

Extremes.--Maximum discharge during year, 17,200 cfs Feb. 11 (gage height, 88.07 ft); maximum gage height, 88.16 ft Feb. 10 (ice jam); minimum discharge, 371 cfs Sept. 17 (gage height, 79.49 ft).

1911-12, 1920-51: Maximum discharge, 53,000 cfs Dec. 23, 1933, computed on basis of slope between gages downstream; maximum gage height, 93.1 ft Apr. 18, 1938, from floodmark; minimum discharge, 96 cfs Dec. 5, 1928 (gage height, 78.43 ft).

Remarks.--Records good except those for period of ice effect or no gage-height record, which are fair. No diversion above gage.

Cooperation.--Water-stage recorder graph and two discharge measurements furnished by Washington Water Power Co.

Revisions.--W 1182: Drainage area.

Rating table, water year 1950-51, except period of ice effect (gage height, in feet, and discharge, in cubic feet per second)

79.5	358	83.0	3,640
80.0	610	84.0	5,330
80.5	950	86.0	9,750
81.0	1,360	88.0	16,900
82.0	2,360		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	464	2,260	2,270	2,750	a1,200	1,880	2,770	6,380	4,520	2,120	749	521
2	454	2,220	2,020	2,660	b1,250	1,820	3,680	5,520	4,260	2,060	a735	489
3	454	1,870	1,920	2,600	b1,350	1,770	4,620	4,960	4,160	1,990	a720	474
4	479	1,840	1,870	2,400	b1,300	1,740	5,800	5,000	4,020	a2,200	709	459
5	604	2,080	1,600	2,220	b1,300	1,690	6,690	5,880	4,070	2,180	a684	444
6	868	2,180	1,690	1,970	b1,250	1,600	7,310	7,880	4,020	2,120	658	430
7	722	2,040	1,680	1,840	b1,300	1,560	7,700	10,400	4,020	a1,940	640	421
8	604	1,890	1,700	1,960	b1,800	1,520	7,780	5,330	3,820	1,750	646	444
9	690	1,620	1,590	1,940	b5,000	1,570	6,880	8,510	*3,660	1,670	628	459
10	676	1,520	1,640	1,820	b13,000	1,400	6,200	*9,180	3,700	1,610	628	430
11	777	1,540	1,700	1,770	14,800	1,360	6,060	10,200	3,900	1,540	622	459
12	646	1,430	1,670	1,680	11,800	1,380	6,380	10,300	4,230	1,460	616	440
13	576	1,320	1,900	1,650	7,420	1,400	7,550	9,100	4,310	1,420	587	411
14	537	1,270	1,670	1,640	5,560	1,410	8,990	8,490	4,310	1,350	582	402
15	548	*1,210	1,880	1,620	4,640	1,580	8,270	7,700	4,500	a1,310	*564	393
16	548	1,220	1,900	1,610	3,990	1,930	7,660	7,570	4,520	1,270	559	384
17	526	1,250	2,080	1,590	3,540	1,590	7,750	8,000	4,150	1,220	537	380
18	690	1,210	2,240	1,510	3,260	1,500	*8,160	8,270	3,900	1,180	521	389
19	875	a1,100	2,330	1,430	2,950	1,550	8,000	7,880	3,660	*1,130	510	393
20	742	a1,000	2,640	1,440	2,750	1,680	6,920	7,590	3,420	1,090	499	384
21	812	1,270	3,000	1,410	2,590	1,820	5,940	7,420	3,250	1,070	494	*380
22	683	1,290	3,260	1,400	2,400	1,800	5,350	7,750	3,050	1,040	489	389
23	652	1,330	5,620	1,320	2,320	1,660	4,960	8,760	2,900	998	504	398
24	640	1,470	7,440	1,340	2,240	1,610	4,940	8,780	3,010	966	489	393
25	604	2,780	6,060	*1,670	2,210	1,860	5,090	8,200	2,840	928	504	504
26	920	2,780	5,310	2,330	2,030	2,180	5,500	7,610	2,650	898	484	777
27	882	2,570	4,570	2,180	1,920	2,180	6,080	7,220	2,530	875	469	510
28	1,150	2,520	3,920	a1,600	1,960	2,200	6,750	6,940	2,460	866	439	426
29	2,640	2,420	3,440	b1,000	-	2,510	7,680	6,120	2,260	a860	640	407
30	3,260	2,330	3,280	a1,000	-	*2,550	7,280	5,480	2,200	812	646	459
31	2,840	-	3,020	b1,100	-	2,480	-	4,910	-	777	610	-
Total	27,563	52,830	87,490	54,430	107,130	54,760	194,740	237,330	108,300	42,682	18,212	13,249
Mean	889	1,761	2,822	1,756	3,826	1,766	6,491	7,656	3,610	1,377	587	442
Cfs/m	0.863	1.71	2.74	1.70	3.71	1.71	6.30	7.43	3.50	1.34	0.570	0.429
In.	1.00	1.91	3.16	1.97	3.87	1.98	7.03	8.57	3.91	1.54	0.66	0.48
Ac-ft	54,670	104,800	175,500	108,000	212,500	108,600	386,300	470,700	214,800	84,660	36,120	26,280
Calendar year 1950:	Max	17,600	Min	444	Mean	3,603	Cfs/m	3.50	In.	47.49	Ac-ft	2,608,000
Water year 1950-51:	Max	14,800	Min	380	Mean	2,736	Cfs/m	2.66	In.	36.08	Ac-ft	1,981,000

Peak discharge (base, 8,500 cfs).--Feb. 11 (5 p.m.) 17,200 cfs (88.07 ft); Apr. 14 (7 a.m.) 9,280 cfs (85.81 ft); May 12 (2 to 4 a.m.) 11,000 cfs (86.42 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of weather records and record for nearby streams.

b Stage-discharge relation affected by ice.

## St. Maries River at Lotus, Idaho

Location.--Lat 47°14'40", long 116°37'30", in sec. 17, T. 45 N., R. 2 W., on left bank 1 mile northwest of Lotus, 1 mile downstream from Carlton Creek, and 5½ miles south-west of St. Maries.

Drainage area.--437 sq mi.

Records available.--July 1911 to October 1912, July 1920 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,140.19 ft above mean sea level, referenced to benchmark "U.S.G.S. 2155 1911 35" (U.S. Geol. Survey Bull. 567, p. 45). Datum of 1929, supplemental adjustment of 1947, is 3.17 ft higher. Prior to Oct. 1, 1945, staff gages at sites 0.8 to 1.3 miles upstream at different datums. Oct. 1, 1945, to Feb. 21, 1949, staff gage at present site and datum.

Average discharge.--31 years (1920-51), 504 cfs.

Extremes.--Maximum discharge during year, about 10,300 cfs Feb. 11, estimated on basis of records for nearby streams; maximum gage height, 13.4 ft probably Feb. 9, from floodmark (ice jam); minimum discharge, 47 cfs Sept. 21, 22 (gage height, 1.26 ft). 1911-12, 1920-51: Maximum discharge observed, 23,800 cfs Dec. 22, 23, 1933, from rating curve extended above 4,000 cfs by logarithmic plotting; maximum gage height, that of Feb. 9, 1951; minimum discharge, 16 cfs (estimated) Nov. 21, 1929.

Remarks.--Records good except those for period of ice effect or no gage-height record, which are poor. No diversion or appreciable regulation above station.

Cooperation.--Water-stage recorder graph and two discharge measurements furnished by Washington Water Power Co.

Revisions.--W 1062: Drainage area.

Rating tables, water year 1950-51, except period of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Mar. 15 to Apr. 7)

Oct. 1 to Feb. 11

Feb. 12 to Sept. 30

1.2	53	3.0	1,030	1.2	40	2.0	316
1.4	102	4.0	2,130	1.4	80	2.5	624
1.7	201	5.0	3,650	1.7	176	3.0	1,030
2.0	335	6.0	6,050	Note.--Same as preceding table above 3.0 ft.			
2.5	625	6.9	8,730				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	
1													
2	74	316	483	709	340	320	1,310	1,060	354	154	69	78	
3	71	639	398	680	370	310	1,640	904	338	154	67	69	
4	71	414	361	754	360	300	1,880	810	316	146	67	65	
5	79	306	361	666	330	290	2,270	777	316	165	67	60	
6	108	260	264	567	320	280	2,490	859	349	227	65	56	
7													
8	183	230	256	448	300	270	2,590	842	400	176	67	54	
9	134	213	653	335	290	250	2,520	877	455	161	62	54	
10	108	217	653	404	600	230	2,470	895	*590	146	62	54	
11	111	197	500	442	1,700	250	2,140	842	418	139	62	65	
12	128	164	459	361	5,500	220	1,820	*785	354	133	60	62	
13													
14	114	179	471	392	8,500	190	1,560	762	327	126	60	60	
15	102	168	549	356	7,000	170	1,450	826	332	120	60	60	
16	97	161	567	351	3,000	200	1,530	842	332	117	60	58	
17	92	157	518	382	2,000	260	1,760	1,160	301	113	58	56	
18	92	*154	512	436	1,600	436	1,670	1,110	280	107	*58	53	
19													
20	94	157	567	512	1,200	1,070	1,520	976	260	104	60	53	
21	94	186	666	500	900	900	1,420	904	246	102	58	53	
22	108	201	716	488	850	600	*1,410	859	237	99	56	53	
23	164	168	680	431	750	700	1,350	785	232	*94	54	53	
24	141	186	859	398	650	*793	1,160	732	223	91	54	51	
25													
26	138	287	834	382	580	886	1,000	673	214	91	53	*47	
27	125	387	926	398	520	810	886	631	210	78	53	47	
28	108	387	1,780	345	460	673	810	604	205	88	53	49	
29	111	471	1,850	371	430	702	746	590	210	91	54	49	
30	108	1,060	1,330	*543	510	940	724	564	214	85	56	58	
31													
26	175	724	1,030	1,640	400	1,160	716	518	193	83	56	80	
27	201	555	859	1,420	310	1,190	732	486	184	80	56	80	
28	222	488	769	587	280	1,140	842	455	172	76	58	65	
29	606	414	709	450	-	1,200	1,190	430	165	76	69	62	
30	666	387	769	400	-	1,270	1,510	400	161	75	85	65	
31	436	-	859	350	-	1,130	-	377	-	71	85	-	
Total	5,061	9,833	22,108	16,498	40,050	19,140	44,916	23,355	8,588	3,566	1,904	1,769	
Mean	163	328	713	532	1,430	617	1,497	753	286	115	61.4	59.0	
Cfs/m	0.373	0.751	1.63	1.22	3.27	1.41	3.43	1.72	0.654	0.263	0.141	0.135	
In.	0.43	0.84	1.88	1.40	3.41	1.63	3.82	1.99	0.73	0.30	0.16	0.15	
Ac-ft	10,040	19,500	43,850	32,720	79,440	37,960	89,090	46,280	17,030	7,070	3,780	3,510	
Calendar year 1950: Max			7,020	Min	62	Mean	864	Cfs/m	1.98	In.	26.84	Ac-ft	625,500
Water year 1950-51: Max			8,500	Min	47	Mean	539	Cfs/m	1.23	In.	16.74	Ac-ft	390,300

Peak discharge (base, 2,200 cfs).--Dec. 23 (9 p.m.) 2,200 cfs (3.99 ft); Feb. 11 (time unknown) about 10,300 cfs (gage height unknown); Apr. 6 (11 a.m.) 2,650 cfs (4.49 ft).

\* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice about Jan. 28 to Feb. 11. No gage-height record Jan. 29 to Mar. 14, Mar. 17-19; discharge computed on basis of weather records and records for Potlatch Creek, Coeur d'Alene River stations and Coeur d'Alene Lake.

## Coeur d'Alene Lake at Coeur d'Alene, Idaho

Location.--Lat 47°40', long. 116°46', in sec. 24, T. 50 N., R. 4 W., 500 ft southwest of south end of Eleventh Street, Coeur d'Alene.

Drainage area.--3,700 sq mi, approximately.

Records available.--April 1903 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,100.00 ft above mean sea level, referred to originally accepted elevation (2,157.40 ft) of Geological Survey benchmark in southeast corner of Merriam Building (see Water-Supply Paper 882). Datum of 1929, supplementary adjustment of 1947, is 3.00 ft higher. Apr. 25, 1903, to Feb. 14, 1905, staff gage at mouth of St. Joe River at datum about 18.7 ft higher. Feb. 15, 1905, to Mar. 23, 1921, staff gage and Mar. 24, 1921, to Dec. 22, 1930, water-stage recorder at Johnson Wharf 800 ft southeast of railroad station and 1 mile northwest of present site at datum 19.75 ft higher. Dec. 23, 1930, to Feb. 9, 1931, staff gage at present site at datum.

Extremes.--Maximum contents during year, 472,000 acre-ft Feb. 14 (elevation, 2,132.48 ft), minimum, 115,000 acre-ft Mar. 15 (elevation, 2,124.26 ft).

1903-51: Maximum contents, 834,900 acre-ft Dec. 25, 1933 (elevation, 2,139.05 ft); minimum, 2,700 acre-ft below zero of contents table Oct. 10-12, 1904, Sept. 24, 25, 1905, Oct. 14 to Nov. 3, 1906 (elevation, 2,119.9 ft).

Maximum contents known prior to 1903, 753,300 acre-ft May 31, 1894 (elevation, 2,137.6 ft, from high-water marks).

Remarks.--The Washington Water Power Co. stores water in Coeur d'Alene Lake by regulation at Post Falls Dam for power generation at Post Falls and other plants on Spokane River. Storage is within natural range of lake stage. Contents given herein are those above elevation 2,120.0 ft. Capacity of lake between elevations 2,120 and 2,140 ft, 889,000 acre-ft.

Cooperation.--Water-stage recorder graph furnished by Washington Water Power Co.

Revisions.--W 1182: Drainage area.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	28.00	27.81	28.01	28.33	26.88	26.77	25.26	28.55	27.91	27.91	27.97	27.93
2	28.00	27.82	27.88	28.14	26.99	26.48	25.43	28.54	27.62	27.94	27.96	27.93
3	27.99	27.82	27.78	27.95	26.90	26.23	25.71	28.45	27.34	27.92	27.96	27.93
4	27.99	27.78	27.76	27.75	26.80	25.99	26.12	28.33	27.11	27.97	27.96	27.96
5	28.01	27.81	27.83	27.50	26.64	25.72	26.62	28.22	26.91	27.95	27.98	27.97
6	27.99	27.88	27.91	27.26	26.42	25.55	27.10	28.20	26.73	27.91	27.96	27.99
7	27.95	27.94	28.00	27.15	26.22	25.40	27.59	28.32	26.60	27.90	27.95	27.99
8	27.94	27.98	28.00	27.23	26.12	25.17	28.01	28.55	26.47	27.90	27.95	27.99
9	27.95	27.99	27.93	27.34	26.30	25.00	28.40	28.77	26.40	27.88	27.96	27.98
10	27.96	27.99	27.89	27.43	27.20	24.83	28.68	28.90	26.41	27.87	27.96	27.98
11	27.94	27.97	27.84	27.53	26.66	24.89	28.82	29.02	26.57	27.88	27.97	27.97
12	27.95	28.00	27.90	27.50	30.42	24.53	28.90	29.18	26.83	27.90	27.98	27.95
13	27.94	27.99	27.86	27.41	31.82	24.42	28.93	29.34	27.08	27.92	27.95	27.94
14	27.94	27.97	27.81	27.28	32.40	24.33	29.05	29.48	27.30	27.93	27.95	27.93
15	27.95	27.94	27.85	27.18	32.40	24.31	29.23	29.60	27.47	27.92	27.95	27.92
16	27.93	27.93	27.81	27.11	32.11	24.40	29.40	29.65	27.63	27.91	27.97	27.93
17	27.94	27.92	27.78	27.19	31.70	24.47	29.52	29.69	27.76	27.92	27.97	27.94
18	27.98	27.90	27.71	27.29	31.23	24.47	29.57	29.69	27.79	27.92	27.95	27.97
19	27.98	27.88	27.69	27.36	31.74	24.44	29.59	29.68	27.76	27.90	27.94	27.97
20	28.00	27.90	27.64	27.42	30.25	24.44	29.82	29.65	27.82	27.87	27.93	27.95
21	28.00	27.91	27.63	27.48	29.79	24.50	29.57	29.57	27.89	27.86	27.92	27.93
22	28.00	27.90	27.63	27.44	29.35	24.53	29.42	29.44	27.93	27.88	27.96	27.95
23	27.98	27.95	27.64	27.30	28.92	24.53	29.23	29.35	27.95	27.90	27.95	27.94
24	27.91	27.98	27.90	27.05	28.52	24.52	29.00	29.25	27.94	27.89	27.91	27.97
25	27.90	27.97	28.31	26.87	28.15	24.52	28.78	29.20	27.91	27.89	27.91	27.98
26	27.91	27.90	28.62	26.96	27.79	24.59	28.60	29.11	27.92	27.90	27.92	27.96
27	27.99	27.82	28.84	27.16	27.43	24.66	28.43	28.99	27.91	27.91	27.91	27.94
28	27.97	27.88	28.92	27.15	27.10	24.76	28.34	28.61	27.88	27.93	27.89	27.97
29	28.01	27.91	28.86	26.94	-	24.89	28.58	28.59	27.88	27.96	27.92	27.97
30	28.19	27.97	28.73	26.74	-	25.02	28.49	28.38	27.89	27.97	27.97	27.99
31	28.01	-	28.54	26.80	-	25.15	-	28.14	-	27.97	27.94	-

Note.--Add 2,100 ft to obtain elevation above mean sea level.

Monthly elevation and contents, water year October 1950 to September 1951

Date	Elevation (feet)†	Contents (acre-feet)	Change in contents during month (acre-feet)
Sept. 30	2,127.99	238,000	-
Oct. 31	2,127.86	231,800	-6,200
Nov. 30	2,128.00	238,500	+6,700
Dec. 31	2,128.46	260,900	+22,400
Calendar year 1950	-	-	+55,600
Jan. 31	2,126.84	189,400	-71,500
Feb. 28	2,126.92	192,300	+2,900
Mar. 31	2,125.21	141,000	-51,300
Apr. 30	2,128.55	265,400	+124,400
May 31	2,128.02	239,500	-25,900
June 30	2,127.89	233,200	-6,300
July 31	2,127.97	237,100	+3,900
Aug. 31	2,127.95	236,100	-1,000
Sept. 30	2,127.97	237,100	+1,000
Water year 1950-51	-	-	-900

† Elevation at 12 p.m.

## SPOKANE RIVER BASIN

Hayden Creek below North Fork, near Hayden Lake, Idaho

Location.--Lat 47°49'20", long. 116°39'20", in NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 25, T. 52 N., R. 3 W., on right bank 0.35 mile downstream from North Fork,  $2\frac{1}{4}$  miles upstream from mouth, and 7 miles northeast of Hayden Lake post office. Prior to June 27, 1951, at site 800 ft downstream.

Drainage area.--22.0 sq mi.

Records available.--April 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 2,370 ft (from topographic map). Prior to Nov. 2, 1948, staff gage and Nov. 2, 1948, to June 26, 1951, water-stage recorder at site 200 ft downstream and at 1.39 ft lower datum.

Extremes.--Maximum daily discharge during year, 600 cfs Feb. 11; maximum gage height, 4.93 ft Feb. 11 (ice jam); minimum discharge, 3.6 cfs Sept. 20.  
1948-51: Maximum discharge, 774 cfs Mar. 18, 1950 (gage height, 4.73 ft), from rating curve extended above 300 cfs on basis of slope-area determination at gage height, 4.38 ft; maximum gage height, that of Feb. 11, 1951; minimum recorded, 3.6 cfs about Nov. 8, 1949, Sept. 20, 1951.

Remarks.--Records good except those for periods of no gage-height record, those for July 11 to Aug. 16, which are fair, and those for periods of ice effect, which are poor. No diversion or regulation above station.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Dec. 24)

Oct. 1 to Dec. 24			Dec. 25 to June 26			June 27 to Sept. 30		
4.8	1.7	60	1.1	5.0	2.2	112	1.2	2.5
10	2.0	110	1.2	8.3	2.5	177	1.3	4.0
18	2.5	237	1.4	18	3.0	305	1.5	10
33	3.0	369	1.6	32	4.1	600	1.6	15
			1.9	66				

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.6	20	23	32	b40	32	66	52	19	10	4.9	5.2
2	5.6	18	19	34	b30	30	84	45	18	10	4.9	4.9
3	5.6	15	18	33	23	29	142	41	18	10	4.9	4.9
4	7.0	14	17	25	20	29	217	41	18	14	4.6	4.6
5	9.8	14	14	20	18	27	240	46	17	11	4.6	4.3
6	8.8	13	15	16	14	a26	222	46	17	10	4.6	4.3
7	6.8	12	15	14	15	a25	192	49	19	9.4	4.6	4.3
8	7.0	11	14	14	17	a24	172	45	16	9.0	4.6	4.3
9	9.8	10	13	13	62	a24	138	40	15	*8.6	4.6	4.3
10	8.2	9.8	14	11	b370	a23	105	39	15	8.3	4.6	4.6
11	7.6	10	18	11	b600	a22	90	41	*15	8.0	4.6	4.9
12	6.8	9.8	28	9.2	480	a22	83	42	16	8.0	4.6	4.3
13	7.6	*9.2	36	8.3	253	23	86	48	16	7.6	4.6	4.3
14	7.0	9.5	33	7.6	*155	102	102	*72	15	7.2	4.6	4.3
15	7.9	8.6	31	8.7	112	a28	92	77	14	6.9	4.6	4.0
16	7.6	9.8	32	8.7	86	30	80	69	14	6.9	4.6	3.7
17	8.5	10	49	9.2	73	a27	*74	62	14	6.9	*4.3	3.7
18	12	9.8	70	8.0	62	a25	76	58	14	6.3	4.6	3.7
19	12	8.8	69	7.3	57	26	73	49	14	6.0	4.3	3.7
20	25	8.8	76	6.0	53	a30	62	44	14	6.0	4.3	3.7
21	14	10	142	7.0	50	a32	54	39	14	6.0	4.3	3.7
22	10	12	156	6.3	46	a30	48	34	13	5.7	4.3	3.8
23	9.2	11	224	5.3	44	29	43	31	13	5.7	4.3	3.8
24	7.9	16	366	6.6	43	29	40	29	a13	5.7	4.6	3.8
25	8.2	20	177	21	41	33	37	26	a12	5.4	4.6	5.2
26	11	25	97	*155	37	*48	36	25	a12	5.4	4.3	5.4
27	9.8	30	67	107	34	52	38	23	*12	5.2	4.3	4.3
28	12	31	50	b60	33	54	43	23	11	4.9	5.4	4.0
29	24	28	36	b30	-	58	52	21	11	4.9	6.3	*4.0
30	45	26	36	b40	-	61	54	20	11	4.9	6.0	4.0
31	29	-	34	b50	-	63	-	20	-	4.9	5.7	-
Total	356.3	438.3	1,989	784.2	2,868	1,016	2,841	1,295	440	228.8	146.1	127.7
Mean	11.5	14.6	64.2	25.3	102	32.8	94.7	41.8	14.7	7.38	4.71	4.26
Cfsm	0.523	0.684	2.92	1.15	4.64	1.49	4.30	1.90	0.668	0.335	0.214	0.194
In.	0.60	0.74	3.36	1.33	4.85	1.72	4.80	2.19	0.74	0.39	0.25	0.22
Ac-ft	707	869	3,950	1,560	5,690	2,020	5,640	2,570	873	454	290	253

Calendar year 1950: Max 700 Min 4.0 Mean 56.9 Cfsm 2.59 In. 35.14 Ac-ft 41,220  
Water year 1950-51: Max 600 Min 3.7 Mean 34.3 Cfsm 1.56 In. 21.19 Ac-ft 24,880

Peak discharge (base, 200 cfs).--Dec. 24 (6 a.m.) 420 cfs (3.34 ft); Feb. 11 (7 a.m.) 4.93 ft (discharge unknown); Apr. 5 (5 p.m.) 253 cfs (2.80 ft).

\* Discharge measurement made on this day.  
a No gage-height record; discharge estimated on basis of weather records and flow during adjacent periods.

b Stage-discharge relation affected by ice.

## Hayden Lake at Hayden Lake, Idaho

Location.--Lat 47°46', long. 116°45', in sec. 18, T. 51 N., R. 3 W., at Avondale and Hayden Lake pumping plants, a quarter of a mile north of Bozanta Tavern at Hayden Lake.

Records available.--May 1920 to September 1951.

Gage.--Staff gage read once daily. Datum of gage is 2,200.21 ft above mean sea level, datum of 1929.

Extremes.--Maximum gage height observed during year, 40.60 ft May 17-20; minimum observed, 34.58 ft Oct. 16-19, 25-27, Nov. 30 to Dec. 4.  
1920-51: Maximum gage height observed, 41.55 ft May 18, 19, 1950; minimum observed, 19.38 ft Dec. 16, 1931.

Remarks.--Water is pumped from lake for irrigation and domestic supply.

Revisions (water years).--W 962: 1921(M). Gage heights for period Aug. 23 to Sept. 30, 1950, as published in Water-Supply Paper 1182 are in error and should be corrected by adding 0.11 ft.

Gage height, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	34.72	34.70	34.56	35.98	36.72	38.66	38.88	40.30	40.26	39.12	37.44	35.72
2	34.68	34.76	34.56	36.04	36.76	38.66	38.94	40.30	40.22	39.08	37.38	35.66
3	34.68	34.78	34.56	36.08	36.82	38.64	39.00	40.36	40.16	39.04	37.32	35.62
4	34.68	34.78	34.56	36.14	36.90	38.64	39.22	40.42	40.12	39.00	37.26	35.58
5	34.68	34.76	34.58	36.16	36.94	38.64	39.30	40.46	40.09	38.96	37.20	35.54
6	34.68	34.74	34.58	36.18	36.96	38.64	39.42	40.46	40.07	38.94	37.14	35.50
7	34.68	34.70	34.60	36.18	36.96	38.64	39.48	40.44	40.06	38.90	37.08	35.46
8	34.66	34.68	34.60	36.18	36.98	38.64	39.62	40.42	40.04	38.86	37.02	35.42
9	34.66	34.66	34.60	36.18	37.00	38.64	39.70	40.40	40.02	38.79	36.96	35.38
10	34.64	34.66	34.60	36.20	37.30	38.64	39.80	40.38	39.98	38.74	36.90	35.34
11	34.62	34.64	34.62	36.20	37.58	38.62	39.84	40.42	39.95	38.68	36.84	35.30
12	34.60	34.64	34.64	36.20	38.02	38.62	39.88	40.46	39.92	38.62	36.78	35.26
13	34.58	34.62	34.66	36.19	38.32	38.60	39.94	40.50	39.88	38.56	36.72	35.22
14	34.58	34.60	34.68	36.22	38.46	38.58	39.98	40.51	39.84	38.50	36.66	35.18
15	34.58	34.60	34.70	36.22	38.52	38.58	40.04	40.56	39.80	38.44	36.60	35.14
16	34.56	34.60	34.72	36.22	38.60	38.58	40.08	40.58	39.76	38.38	36.54	35.14
17	34.56	34.60	34.74	36.24	38.64	38.58	40.10	40.60	39.68	38.32	36.48	35.12
18	34.56	34.60	34.78	36.26	38.68	38.58	40.12	40.60	39.64	38.26	36.42	35.10
19	34.56	34.60	34.82	36.28	38.70	38.58	40.14	40.60	39.60	38.20	36.36	35.08
20	34.58	34.58	34.86	36.30	38.70	38.58	40.16	40.60	39.58	38.14	36.30	35.04
21	34.64	34.58	34.96	36.30	38.70	38.58	40.18	40.58	39.56	38.08	36.24	35.00
22	34.62	34.58	35.04	36.30	38.70	38.58	40.19	40.56	39.54	38.02	36.18	34.98
23	34.60	34.58	35.16	36.32	38.70	38.60	40.21	40.54	39.50	37.96	36.12	34.96
24	34.58	34.58	35.38	36.32	38.70	38.62	40.21	40.52	39.48	37.90	36.06	34.92
25	34.56	34.58	35.57	36.34	38.70	38.64	40.20	40.50	39.42	37.84	36.00	34.88
26	34.56	34.58	35.65	36.40	38.70	38.66	40.19	40.48	39.36	37.78	35.96	34.86
27	34.56	34.58	35.74	36.66	38.70	38.68	40.22	40.46	39.32	37.72	35.92	34.84
28	34.58	34.58	35.80	36.66	38.68	38.72	40.26	40.42	39.26	37.66	35.88	34.82
29	34.60	34.58	35.84	36.66	-	38.72	40.28	40.38	39.21	37.60	35.84	34.80
30	34.64	34.56	35.88	36.66	-	38.76	40.29	40.34	39.16	37.56	35.80	34.84
31	34.66	-	35.92	36.68	-	38.82	-	40.30	-	37.50	35.76	-



## Rathdrum Prairie Canal at Huetter, Idaho

Location.--Lat 47°43', long. 116°52', in sec. 6, T. 50 N., R. 4 W., on right bank 450 ft downstream from outlet of discharge pipe, five-eighths of a mile north of pumping plant, and three-quarters of a mile northwest of Huetter.

Records available.--April 1946 to September 1951.

Gage.--Water-stage recorder.

Extremes.--1946-51: Maximum daily discharge, 66 cfs June 29 to July 2, 1947; no flow for long periods each year.

Remarks.--Records good. Canal carries water which is pumped from Spokane River in sec. 7, T. 50 N., R. 4 W., for irrigation of first unit of Rathdrum Prairie project.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Avg.	Sept.
1							0	0	51	58	58	53
2							0	0	51	57	58	53
3							0	8.1	52	57	58	52
4							0	16	50	57	53	52
5							0	27	50	57	59	52
6							0	27	40	57	59	52
7							0	27	25	57	58	52
8							0	27	0	58	58	52
9							0	25	0	58	57	52
10							0	38	18	58	57	52
11							0	44	*49	59	57	52
12							0	27	54	58	57	52
13							0	*28	54	58	57	52
14							0	28	54	59	56	52
15							0	28	54	59	56	49
16							0	22	54	60	55	8.0
17							0	0	54	60	*56	0
18							0	0	54	*60	55	0
19							0	0	54	60	55	0
20							0	0	55	59	49	0
21							0	20	55	59	54	0
22							0	46	56	58	55	0
23							0	53	56	58	55	0
24							0	53	56	58	55	0
25							0	53	57	58	55	0
26							0	52	* 58	58	54	0
27							3.7	51	58	58	54	0
28							0	50	58	58	54	0
29							0	50	58	58	53	0
30							0	50	58	57	53	0
31							-	50	-	58	53	-
Total	0	0	0	0	0	0	3.7	900.1	1,443	1,804	1,723	787.0
Mean	0	0	0	0	0	0	0.12	29.0	48.1	58.2	55.6	26.2
Ac-ft	0	0	0	0	0	0	7.3	1,790	2,860	3,580	3,420	1,560

Calendar year 1950: Max 65 Min 0 Mean 15.2 Ac-ft 10,980  
 Water year 1950-51: Max 60 Min 0 Mean 18.2 Ac-ft 13,220

\* Discharge measurement made on this day.

## SPOKANE RIVER BASIN

Spokane Valley Farms Co.'s canal at Post Falls, Idaho

Location.--Lat 47°43', long. 116°57', in sec. 3, T. 50 N., R. 5 W., on left bank 300 ft downstream from headgate and half a mile northwest of Post Falls.

Records available.--May 1911 to September 1917, September 1919 to September 1951.

Gage.--Water-stage recorder. Prior to Apr. 22, 1938, staff gages at several sites within 1,000 ft at various datums.

Extremes.--1911-17, 1919-51: Maximum daily discharge, 306 cfs July 26, 1951; no flow or small amount of leakage during non-irrigation seasons.

Remarks.--Records good except those below 10 cfs, which are poor. Canal diverts water for irrigation from Spokane River in SE $\frac{1}{4}$  sec. 3, T. 50 N., R. 5 W.

Cooperation.--Water-stage recorder inspected by employee of Spokane Valley Farms Co. Five discharge measurements furnished by Washington Water Power Co.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	43							0	273	282	294	209
2	43							0	277	282	294	215
3	40							0	275	286	294	226
4	11							0	254	286	292	211
5	1							0	228	283	291	204
6	1							0	208	283	288	203
7	1							0	195	283	286	*201
8	1							0	199	284	284	198
9	1							0	208	282	278	194
10	1							0	206	277	277	195
11	1							0	*206	280	173	198
12	1							0	204	283	102	196
13	1							0	214	286	*266	183
14	1							36	222	286	270	172
15	1							107	245	288	165	70
16	1							135	259	289	142	32
17	1							157	263	290	*236	25
18	1							204	261	*294	271	*20
19	1							228	272	294	277	14
20	1							223	280	296	275	10
21	1							171	281	296	276	9
22	1							103	282	292	276	10
23	1							132	283	300	275	10
24	1							219	283	304	271	9
25	*0							253	281	300	235	9
26	0							259	280	306	280	9
27	0							275	282	303	279	8
28	0							271	*284	300	280	*8
29	0							273	277	299	271	8
30	0							269	278	297	245	8
31	0							270	-	294	219	-
Total	157	0	0	0	0	0	0	3,585	7,560	9,005	7,962	3,064
Mean	5.1	0	0	0	0	0	0	116	252	290	257	102
Ac-ft	311	0	0	0	0	0	0	7,110	15,000	17,860	15,790	6,080
Calendar year 1950: Max	292				Min 0		Mean 87.8	Ac-ft 63,570				
Water year 1950-51: Max	306				Min 0		Mean 85.8	Ac-ft 62,150				

\* Discharge measurement or field estimate made on this day.





## SPOKANE RIVER BASIN

Liberty Lake at Liberty Lake, Wash.

Location.--Lat 47°39'10", long. 117°05'20", in NE $\frac{1}{4}$  sec. 22, T. 50 N., R. 45 E., on left wall of concrete outlet flume at town of Liberty Lake and 15 miles east of Spokane Prior to June 12, 1951, on right wall of outlet flume.

Drainage area.--13.7 sq mi.

Records available.--December 1950 to September 1951 (fragmentary).

Gage.--Staff gage read once daily at frequent intervals. Datum of gage is 2,046.50 ft above mean sea level, adjustment of 1929, supplementary adjustment of 1947. Prior to June 12, 1951, staff gage on right wall of concrete outlet flume at same datum.

Extremes.--Maximum gage height observed during period, 3.12 ft Feb. 19; minimum observed, -0.12 ft Aug. 30.

Remarks.--Stage controlled by gate at lake outlet. No known diversion.

Gage height, in feet, December 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1			1.40	1.20	-	-	2.70	2.46	-	-	0.66	
2			1.36	1.20	1.70	2.84	-	-	1.90	1.48	.60	
3			-	-	1.75	-	2.66	2.30	1.90	-	.50	
4			1.36	1.20	1.80	2.80	-	-	-	1.46	-	
5			1.36	1.22	-	2.80	2.66	2.20	1.90	-	.40	
6			1.20	1.24	1.80	2.80	2.66	-	-	1.44	.34	
7			1.20	1.22	-	-	-	2.10	1.90	1.40	-	
8			1.20	-	1.90	2.80	2.62	2.06	-	1.58	.32	
9			1.16	1.20	2.00	-	-	-	1.90	1.54	-	
10			1.20	1.20	2.20	2.78	2.62	2.04	-	-	.30	
11			1.18	1.20	2.40	2.76	-	1.94	1.88	1.28	-	
12			-	1.20	-	-	2.60	1.90	-	-	.28	
13			1.14	1.18	2.60	2.78	-	1.84	1.88	1.24	.28	
14			-	1.18	2.70	2.78	2.60	-	1.84	1.22	-	
15			1.14	-	2.80	-	2.58	2.02	-	1.20	.22	
16			1.14	1.20	3.00	2.80	-	2.08	1.80	1.18	-	
17			1.12	1.22	3.04	2.82	2.56	-	1.78	-	.18	
18			-	1.24	3.10	2.86	-	2.10	-	1.12	.14	
19			1.12	-	3.12	-	2.56	2.10	1.72	-	.10	
20			1.14	1.26	3.08	2.86	-	2.10	-	1.04	-	
21			1.14	1.28	-	2.90	2.52	2.10	1.68	-	.06	
22			1.16	1.30	3.08	2.90	2.48	-	-	.98	.04	
23			1.18	1.30	-	2.90	-	2.10	1.64	.96	-	
24			1.20	-	3.02	2.90	2.46	-	-	-	.00	
25			1.20	1.50	3.00	2.90	-	2.10	1.60	.92	.00	
26			1.18	1.60	-	-	2.40	-	-	-	-	
27			-	1.70	2.96	2.90	-	2.08	1.56	.86	-	
28			1.18	1.80	2.92	-	2.40	-	-	.80	-	
29			1.18	-	-	2.66	2.48	2.00	1.52	-	-	
30			1.20	1.68	-	-	-	1.92	1.50	.72	-.12	
31			1.20	1.70	-	2.80	-	1.90	-	-	-	

## Spokane River at Greenacres, Wash.

Location.--Lat 47°40'45", long. 117°09'25", on east line of sec. 7, T. 25 N., R. 45 E., on downstream side of center pier of county road bridge, half a mile north of Greenacres, and 12 miles upstream from Spokane.

Drainage area.--4,150 sq mi, approximately, of which 122 sq mi in the vicinity of Hayden Lake is probably noncontributing.

Records available.--March 1948 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,975.82 ft above mean sea level (levels by Bureau of Reclamation). Prior to Apr. 1, 1949, water-stage recorder at site 1 mile downstream at different datum.

Extremes.--Maximum discharge during year, 26,200 cfs Feb. 15 (gage height, 9.10 ft); minimum, 108 cfs Sept. 2, 3 (gage height, 1.22 ft).

1948-51: Maximum discharge not determined, probably occurred May 30, 1948, during period of no gage-height record (comparison with other stations on this stream indicates a discharge of at least 40,000 cfs); minimum, 52 cfs Aug. 26, 27, 1949 (gage height, 1.04 ft).

Remarks.--Records good except those for periods of no gage-height record, which are fair. Some diversions above station for irrigation. Some regulation by Coeur d'Alene Lake at Post Falls, Idaho.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.2	100	4.0	3,560
1.5	230	5.0	6,270
2.0	575	7.0	14,200
2.5	1,060	9.1	26,600
3.0	1,710		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	256	9,000	7,160	15,000	3,800	11,400	7,790	15,600	13,600	1,380	250	116
2	411	6,790	8,760	14,600	*5,000	10,500	8,080	15,700	13,100	2,580	260	112
3	578	6,720	6,870	14,100	7,400	10,100	8,520	15,400	12,100	2,770	270	112
4	1,050	5,280	4,510	13,600	7,970	9,660	9,270	15,100	11,900	2,700	200	175
5	1,620	3,580	2,680	13,000	9,190	8,370	10,900	14,900	11,300	3,420	150	155
6	2,380	3,580	2,510	10,100	9,000	8,200	12,000	14,800	11,000	3,680	200	170
7	1,970	2,980	3,730	6,150	8,610	*8,000	13,100	15,000	10,700	2,940	180	132
8	1,260	*3,610	5,720	3,540	8,700	7,600	14,200	15,400	8,560	1,660	160	132
9	1,160	3,560	*5,690	3,490	9,080	7,300	15,100	16,100	6,780	2,310	160	128
10	1,230	3,360	5,720	3,490	12,600	7,000	15,900	16,400	4,780	1,740	150	314
11	1,080	3,250	4,410	4,060	15,800	6,700	16,400	16,600	1,950	*1,330	150	346
12	1,130	2,280	4,280	6,820	19,800	6,500	16,600	17,100	1,150	1,380	240	314
13	1,090	3,550	6,690	7,610	23,800	6,300	16,800	17,600	2,110	1,420	200	334
14	1,050	3,480	5,720	7,500	25,900	6,050	17,000	17,800	2,300	1,460	150	414
15	1,020	3,060	5,630	7,470	26,100	6,020	17,500	16,100	2,700	1,440	150	140
16	1,050	2,950	7,090	5,380	25,600	6,120	18,000	18,400	2,860	1,250	150	128
17	*1,020	3,560	7,790	3,340	25,000	6,300	18,200	18,200	4,310	1,180	140	308
18	1,180	3,520	8,480	3,520	23,400	6,430	18,200	17,800	5,010	970	140	318
19	1,930	2,070	9,120	3,490	21,800	6,400	18,000	17,800	5,000	1,200	140	312
20	2,410	2,690	9,810	3,470	20,500	6,400	18,000	18,100	3,620	1,100	140	308
21	2,410	2,650	10,200	4,440	19,100	6,460	18,000	18,100	2,960	300	180	350
22	*2,500	2,250	12,900	6,120	17,300	6,550	18,500	17,700	3,560	250	140	156
23	2,660	2,300	13,300	8,700	16,800	6,590	18,000	17,500	3,610	500	140	152
24	2,460	4,700	13,900	9,660	15,700	6,490	*17,000	17,100	4,150	600	140	368
25	2,020	7,590	14,800	9,460	14,900	6,490	16,500	16,900	4,640	250	140	882
26	1,570	9,510	15,500	9,500	14,000	6,660	15,900	16,700	3,590	230	140	842
27	1,740	7,550	16,100	9,870	15,000	6,760	15,500	16,400	3,560	210	140	315
28	2,720	5,840	16,200	10,600	12,300	6,920	15,200	*16,000	3,430	190	*140	324
29	3,370	5,930	16,200	10,500	-	7,060	15,300	15,300	2,980	180	136	552
30	8,710	5,870	16,000	7,300	-	7,300	15,400	14,900	2,350	200	811	883
31	13,000	-	15,500	3,800	-	7,580	-	14,400	-	220	483	-
Total	68,035	133,040	282,970	239,780	432,350	226,190	454,860	512,900	169,440	41,004	6,170	9,870
Mean	2,195	4,435	9,128	7,735	15,440	7,296	15,160	16,550	5,648	1,324	199	329
Ac-ft	134,900	263,900	561,300	475,600	857,600	448,600	902,200	*1,017	336,100	81,400	12,240	19,580
Calendar year 1950: Max		30,800		Min	97	Mean	9,757	Ac-ft	7,064,000			
Water year 1950-51: Max		26,100		Min	112	Mean	7,059	Ac-ft	5,110,000			

\* Discharge measurement made on this day.

\* Expressed in thousands.

Note.--No gage-height record Jan. 29 to Feb. 2, Mar. 6-13, Apr. 21-23, July 19 to Aug. 27; discharge estimated on basis of 1 discharge measurement and records for station below Trent Bridge, near Spokane.

## Spokane River below Trent Bridge, near Spokane, Wash.

Location.--Lat 47°41'50", long. 117°14'35", in NE<sup>1</sup> sec. 4, T. 25 N., R. 44 E., on right bank half a mile downstream from Trent Bridge and 9 miles east of Spokane.

Drainage area.--4,210 sq mi, approximately, of which 122 sq mi in the vicinity of Hayden Lake is probably noncontributing.

Records available.--January 1948 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,907.49 ft above mean sea level (levels by Bureau of Reclamation). Prior to Dec. 4, 1948, at site 20 ft upstream at same datum.

Extremes.--Maximum discharge during year, 27,100 cfs Feb. 14, 15 (gage height, 15.13 ft); minimum, 660 cfs Sept. 25 (gage height, 4.27 ft).  
1948-51: Maximum discharge, 40,100 cfs May 30 or 31, 1948 (gage height, 18.5 ft, from high-water mark on gage); minimum, 615 cfs Oct. 24, 1949 (gage height, 4.23 ft).

Remarks.--Records excellent. Some regulation by powerplant of Washington Water Power Co. at Post Falls, Idaho, and by Coeur d'Alene Lake (see p.263). Spokane Valley Farms Co.'s canal (see p. 268) and Rathdrum Prairie Canal (see p.267) divert water above station for irrigation. In 1946 approximately 22,600 acres were under irrigation upstream from Spokane, of which about 15,000 acres utilized surface water.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

4.3	650
5.0	1,130
6.0	2,310
8.0	5,650
11.0	13,100
15.2	27,200

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	855	9,180	7,200	15,600	4,190	12,100	8,150	15,900	14,200	2,280	972	718
2	827	6,860	8,980	15,100	5,130	11,300	8,410	16,000	13,700	3,120	984	700
3	1,060	6,830	7,250	14,600	7,460	10,800	8,820	15,800	13,100	3,400	1,020	700
4	1,450	5,730	5,140	14,100	7,870	10,400	9,420	15,400	12,500	3,370	796	700
5	1,950	4,020	3,310	13,600	9,250	9,280	11,200	15,200	12,000	4,020	760	742
6	2,680	3,950	3,160	11,100	9,080	8,900	12,300	15,000	11,600	4,200	855	724
7	2,410	3,370	4,120	7,340	8,850	*8,630	13,400	15,200	11,400	3,540	748	712
8	1,800	*3,980	6,010	4,300	8,700	8,250	14,400	15,700	9,280	2,600	730	695
9	1,610	3,950	*6,030	4,440	9,080	7,960	15,400	16,300	7,620	2,910	730	695
10	1,790	3,710	6,050	4,210	12,000	7,660	16,200	16,600	5,920	2,530	730	832
11	1,570	3,610	5,200	4,610	15,300	7,360	16,800	16,900	3,140	2,070	724	874
12	1,600	2,800	4,540	6,970	19,900	7,120	17,000	17,300	2,240	*2,000	904	859
13	1,580	3,870	6,970	7,940	24,200	6,900	17,100	17,800	2,900	2,100	742	874
14	1,560	3,830	6,330	7,910	26,600	6,720	17,300	18,100	3,160	2,080	718	938
15	1,480	3,460	5,950	7,910	27,000	6,620	17,700	18,400	3,210	2,090	718	730
16	1,490	3,380	7,320	6,220	26,300	6,660	18,200	18,600	3,570	2,020	700	685
17	1,530	3,870	7,960	4,050	25,200	6,860	18,500	18,600	4,860	1,850	695	814
18	1,580	3,850	8,650	4,150	24,000	6,920	18,700	18,100	5,590	1,740	700	822
19	2,260	2,730	9,250	4,150	22,500	6,880	18,700	18,100	5,570	2,150	690	814
20	2,740	3,010	9,990	4,120	21,100	6,880	18,800	18,300	4,410	1,960	700	821
21	2,740	3,110	10,400	4,760	19,800	6,940	18,800	18,300	3,700	1,050	730	849
22	2,820	2,810	12,800	6,310	18,500	7,010	18,500	18,100	4,290	855	690	703
23	3,010	2,700	13,600	8,610	17,500	7,050	18,000	17,800	4,270	1,550	685	674
24	2,830	4,710	14,100	9,910	16,500	7,010	*17,400	17,800	4,650	1,610	685	846
25	2,460	7,280	15,000	9,800	15,600	7,010	16,800	17,200	5,260	998	695	1,190
26	2,110	9,550	15,900	9,770	14,600	7,080	16,300	17,100	4,260	910	690	1,370
27	2,260	8,030	16,500	10,200	13,800	7,190	15,800	16,800	4,240	855	690	864
28	3,010	6,100	16,800	11,000	13,000	7,390	15,600	*16,400	4,150	790	*695	1,210
29	3,680	6,100	16,800	10,800	-	7,500	15,600	15,800	3,650	772	695	1,140
30	7,620	6,070	16,500	*8,000	-	7,730	15,700	15,300	3,180	858	1,150	1,190
31	12,900	-	16,000	4,270	-	7,960	-	14,900	-	890	1,150	-
Total	79,262	142,450	293,810	255,850	443,010	244,070	465,000	522,800	191,620	63,178	24,171	25,485
Mean	2,557	4,748	9,478	8,253	15,820	7,873	15,500	16,860	6,387	2,038	780	850
Ac-ft	157,200	282,500	562,800	507,500	878,700	484,100	922,300	*1,037	380,100	125,300	47,940	50,550
Calendar year 1950:	Max	31,400	Min	685	Mean	10,150	Ac-ft	7,348,000				
Water year 1950-51:	Max	27,000	Min	674	Mean	7,536	Ac-ft	5,456,000				

\* Discharge measurement made on this day.

\* Expressed in thousands.

Spokane River below Green Street, at Spokane, Wash.

Location.--Lat 47°40'40", long 117°22'20", in W $\frac{1}{2}$  sec. 10, T. 25 N., R. 43 E., on right bank 250 ft downstream from Green Street Bridge at Spokane  $\frac{5}{8}$  miles upstream from Latah Creek.

Drainage area.--4,230 sq mi, approximately, of which 122 sq mi in the vicinity of Hayden Lake is probably noncontributing.

Records available.--December 1948 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,864.31 ft above mean sea level (levels by Bureau of Reclamation).

Extremes.--Maximum discharge during year, 28,500 cfs Feb. 15 (gage height, 16.58 ft); minimum, 967 cfs Aug. 20, Sept. 18 (gage height, 4.33 ft); minimum daily, 976 cfs Aug. 23-25.

1948-51: Maximum discharge, 34,400 cfs May 16, 1949 (gage height, 18.54 ft); minimum, 702 cfs Sept. 10, 1949 (gage height, 4.09 ft); minimum daily, 916 cfs Sept. 6, 25, 1949.

Remarks.--Records excellent. Some regulation by powerplant of Washington Water Power Co. at Post Falls, Idaho, and by Coeur d'Alene Lake (see p. 263). Spokane Valley Farms Co.'s canal (see p. 268) and Rathdrum Prairie Canal (see p. 267) divert water above station for irrigation. In 1946, approximately 22,600 acres were under irrigation upstream from Spokane, of which 15,000 acres utilized surface water.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

4.3	940	10.0	10,200
5.0	1,660	12.0	15,200
6.0	3,030	14.0	20,800
7.0	4,590	16.5	28,200
8.0	6,300		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Avg.	Sept.
1	1,310	9,210	7,260	16,000	4,700	12,700	8,290	16,700	14,900	2,750	1,240	1,030
2	1,180	6,930	8,820	15,800	5,510	11,700	8,510	16,700	14,200	3,350	1,240	1,040
3	1,410	6,930	7,410	15,000	7,630	11,200	8,870	16,600	13,600	3,760	1,290	1,030
4	1,740	5,980	5,460	14,500	7,880	10,700	9,540	16,100	13,000	3,730	1,220	1,020
5	2,230	4,360	3,800	13,900	9,320	9,730	11,500	15,800	12,400	4,260	1,070	1,110
6	2,960	4,310	3,550	11,700	9,160	9,280	12,400	15,600	12,000	4,490	1,120	1,040
7	2,770	3,760	4,410	7,910	8,930	9,080	13,600	15,800	11,800	3,870	1,120	1,040
8	2,190	4,230	6,080	4,990	8,790	*8,510	14,600	16,300	9,870	3,040	1,040	1,030
9	1,980	*4,200	*6,160	4,840	9,210	8,230	15,700	16,900	8,070	3,240	1,060	1,020
10	2,140	4,040	6,140	4,750	12,100	7,930	16,500	17,300	6,500	2,930	1,040	1,100
11	1,950	3,890	5,560	5,060	15,300	7,610	17,100	17,600	3,880	2,370	1,040	1,320
12	1,990	3,220	4,680	7,130	19,900	7,360	17,500	18,000	2,970	*2,410	1,130	1,180
13	1,960	4,170	7,040	8,200	24,500	7,250	17,600	18,500	3,450	2,370	1,110	1,220
14	1,900	4,180	6,610	8,100	27,200	6,930	17,800	18,900	3,730	2,390	1,030	1,100
15	1,890	3,980	5,940	8,130	28,000	7,000	18,400	19,100	4,040	2,380	1,020	1,090
16	1,840	3,740	7,300	6,770	27,400	6,970	19,000	19,400	4,080	2,400	1,020	990
17	1,870	4,220	7,910	4,580	26,400	7,130	19,300	19,500	5,160	2,130	1,020	1,150
18	1,920	4,160	8,650	4,700	25,100	7,120	19,400	18,800	5,900	1,970	1,010	1,130
19	2,680	3,230	9,180	4,650	23,600	7,080	19,600	19,000	5,900	2,420	1,020	1,090
20	3,050	3,300	9,960	4,540	22,100	7,060	19,700	18,900	4,980	2,300	985	1,160
21	3,080	3,450	10,300	5,110	20,700	7,190	19,500	19,200	4,190	1,510	1,040	1,110
22	3,140	3,260	12,800	6,610	19,500	7,230	19,300	18,800	4,640	1,250	1,020	1,040
23	3,320	3,040	13,600	8,500	18,300	7,190	18,700	18,500	4,640	1,740	976	1,010
24	3,190	4,840	14,100	9,850	17,300	7,190	*18,100	18,200	4,950	1,860	976	1,130
25	2,740	7,300	15,000	9,750	16,300	7,150	17,500	18,000	5,550	1,430	976	1,280
26	2,440	9,230	16,000	9,800	15,300	7,230	17,000	*17,800	4,630	1,230	985	1,610
27	2,560	7,940	16,800	10,200	14,400	7,320	16,500	17,500	4,590	1,230	985	1,320
28	3,240	6,330	17,100	11,200	13,600	7,530	16,300	17,100	4,460	1,180	1,000	1,340
29	3,910	6,230	17,100	10,900	-	7,610	16,200	16,500	4,080	1,110	*1,010	1,530
30	7,830	6,290	16,900	8,470	-	7,880	16,300	16,000	3,660	1,176	1,240	1,370
31	12,800	-	16,400	*4,760	-	8,090	-	15,500	-	1,210	1,450	-
Total	89,190	149,850	298,020	266,200	458,130	252,200	480,110	544,600	205,720	73,480	33,483	34,630
Mean	2,877	4,995	9,614	8,587	16,360	8,135	16,000	17,570	6,857	2,370	1,080	1,154
Ac-ft	176,900	297,200	591,100	528,000	908,700	500,200	952,300	*1,080	408,000	145,700	66,410	68,690
Calendar year 1950: Max	32,800			Min	1,010		10,700	Ac-ft	7,742,000			
Water year 1950-51: Max	28,000			Min	976		7,908	Ac-ft	5,723,000			

\* Discharge measurement made on this day.

\* Expressed in thousands.

## SPOKANE RIVER BASIN

Spokane River at Spokane, Wash.

Location.--Lat 47°39'35" (revised), long. 117°26'50", in SW $\frac{1}{4}$  sec. 13, T. 25 N., R. 42 E., on right bank at Cochran Street in Spokane, half a mile upstream from Latah Creek.

Drainage area.--4,290 sq mi, approximately (revised), of which 122 sq mi in the vicinity of Hayden Lake is probably noncontributing.

Records available.--April 1891 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,696.6 ft above mean sea level, datum of 1929 (river-profile survey). Prior to July 1, 1921, staff or wire-weight gages, or water-stage recorders at several sites within 4 miles of present site, at various datums.

Average discharge.--60 years, 6,798 cfs.

Extremes.--Maximum discharge during year, 28,200 cfs Feb. 15 (gage height, 26.02 ft); minimum, 218 cfs July 27 (gage height, 16.22 ft); minimum daily, 871 cfs Aug. 26, 1891-1951; Maximum discharge, 49,000 cfs (estimated) May 31, 1894 (see Water-Supply Paper 532); minimum, 156 cfs Nov. 14, 1948 (gage height, 16.18 ft); minimum daily, 740 cfs Sept. 7, 1947.

Remarks.--Records excellent, except those for period of shifting control, which are good. Some regulation by powerplant of Washington Water Power Co. at Post Falls, Idaho, and at Spokane, and by Coeur d'Alene Lake (see p. 263). Spokane Valley Farms Co.'s canal (see p. 268) and Rathdrum Prairie Canal (see p. 267) divert water above station for irrigation. In 1946 approximately 22,600 acres were under irrigation upstream from Spokane, of which about 15,000 acres utilized surface water.

Cooperation.--Gage-height record collected in cooperation with Washington Water Power Co.

Revisions (water years).--W 532: 1891-1904.

Rating table, water year 1950-51, except period of shifting control (gage height, in feet, and discharge, in cubic feet per second)

17.1	790	21.0	7,930
17.5	1,190	22.0	11,000
18.0	1,780	23.0	14,800
18.5	2,490	24.5	20,900
19.0	3,330	26.0	28,100
20.0	5,380		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,320	9,340	7,080	16,000	4,750	12,800	8,380	16,700	14,800	2,640	1,210	1,010
2	1,060	7,070	9,150	15,400	*5,440	11,800	8,620	16,700	14,200	3,140	1,240	980
3	1,420	7,090	7,560	15,000	7,700	11,400	9,030	16,600	13,600	3,580	1,270	990
4	1,810	6,140	5,590	14,600	8,050	10,900	9,840	16,200	13,100	3,580	1,240	1,020
5	2,310	4,370	3,760	14,000	9,490	9,980	11,200	15,900	12,500	4,150	970	1,080
6	2,910	4,370	3,510	11,700	9,320	9,450	12,400	15,600	12,100	4,250	1,080	1,000
7	2,600	3,800	4,340	8,380	9,140	9,240	13,500	15,800	11,900	3,700	1,040	1,030
8	2,080	4,400	6,160	5,310	9,060	8,760	14,600	16,200	10,100	3,020	950	1,020
9	1,800	*4,210	6,220	5,000	9,320	*8,530	15,700	16,900	8,280	3,040	990	1,010
10	2,040	4,020	*6,240	4,840	12,200	8,180	16,500	17,300	6,760	2,800	1,000	1,090
11	1,780	3,860	5,600	5,010	15,300	7,900	17,100	17,400	3,860	2,360	975	1,280
12	1,820	3,060	4,660	7,280	19,300	7,620	17,400	17,900	2,820	*2,340	995	1,200
13	1,870	4,070	7,000	8,420	24,700	7,430	17,500	18,300	3,400	2,250	1,150	1,260
14	1,920	4,170	6,730	8,440	27,200	7,110	17,800	18,800	3,700	2,370	890	1,090
15	1,780	3,820	5,980	8,470	27,700	7,160	18,300	19,100	4,040	2,320	925	1,080
16	1,760	3,660	7,420	7,100	27,200	7,160	18,800	19,200	4,060	2,320	975	1,040
17	1,820	4,140	8,000	4,680	26,300	7,240	19,200	19,400	5,120	2,140	920	1,140
18	1,840	4,160	8,820	4,780	25,000	7,350	19,400	16,700	5,800	2,020	960	1,150
19	2,340	3,100	9,380	4,840	25,600	7,220	19,400	18,900	5,800	2,240	935	1,040
20	2,930	3,210	10,200	4,680	22,200	7,330	19,600	18,900	4,770	2,280	955	1,160
21	2,840	3,320	10,500	5,180	20,900	7,300	19,500	19,100	4,040	1,540	950	1,160
22	3,020	3,140	12,700	6,670	19,600	7,380	19,200	18,800	4,580	1,250	960	1,060
23	3,100	2,900	13,700	8,840	18,400	7,330	18,800	18,500	4,560	1,700	910	1,060
24	3,100	4,760	14,300	10,300	17,400	7,330	18,200	18,200	4,630	1,840	970	1,130
25	2,580	7,240	15,100	10,300	16,300	7,330	*17,600	17,900	5,510	1,410	940	1,280
26	2,410	9,390	15,900	10,300	15,400	7,380	17,000	17,700	4,580	1,340	871	1,620
27	2,380	7,940	16,700	10,800	14,500	7,460	16,500	17,400	4,520	1,180	990	1,360
28	2,980	6,290	17,200	11,400	13,600	7,650	16,300	17,100	4,300	1,140	1,000	1,340
29	3,730	6,220	17,200	11,000	-	7,710	16,300	*16,500	3,980	1,020	*960	1,600
30	7,260	6,280	16,900	8,700	-	7,990	16,500	16,000	3,500	1,290	1,280	1,400
31	12,900	-	16,900	4,880	-	8,210	-	15,600	-	1,120	1,580	-
Total	85,310	149,540	300,100	272,280	459,670	257,630	479,970	543,300	205,210	71,370	32,081	34,680
Mean	2,752	4,985	9,681	8,783	16,420	8,311	16,000	17,530	6,840	2,302	1,035	1,156
Ac-ft	169,200	296,600	595,200	540,100	911,700	511,000	952,000	*1,078	407,000	141,600	63,630	68,790
Calendar year 1950:	Max	32,100		Min	970		Mean	10,660	Ac-ft	7,721,000		
Water year 1950-51:	Max	27,700		Min	871		Mean	7,921	Ac-ft	5,735,000		

\* Discharge measurement made on this day.

† Expressed in thousands.

Note.--Shifting-control method used Aug. 31 to Sept. 30.

## Latah Creek at Spokane, Wash.

Location (revised).--Lat 47°39'10", long. 117°26'55", in NW¼ sec. 24, T. 25 N., R. 42 E., on left bank in Spokane three-quarters of a mile upstream from mouth.

Drainage area.--619 sq mi (revised).

Records available.--April 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,720 ft (from topographic map). Prior to Nov. 22, 1948, wire-weight gage at site half a mile upstream at different datum.

Extremes.--Maximum discharge during year, 6,080 cfs Mar. 15 (gage height, 9.98 ft); minimum, 10.5 cfs Aug. 6, 14, 15 (gage height, 2.41 ft).  
1948-51: Maximum discharge, 11,900 cfs May 24, 1948 (gage height, 18.73 ft, from floodmarks, site and datum then in use), from rating curve extended above 1,700 cfs on basis of slope-area and contracted-opening determinations of peak flow; minimum, 10 cfs Sept. 3, 1949; minimum gage height, 2.41 ft Aug. 6, 14, 15, 1951.

Remarks.--Records good except those for periods of ice effect or faulty intake action, which are poor. No diversion or regulation.

Rating table, water year 1950-51, except periods of ice effect or faulty intake action (gage height, in feet, and discharge, in cubic feet per second)

2.4	10	5.0	605
2.7	26	6.0	1,130
3.1	65	7.0	1,840
3.5	128	8.0	2,850
4.0	245	9.0	4,330

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	19	68	66	390	b230	221	500	138	45	28	14	17
2	18	60	72	318	b210	210	458	132	44	28	14	16
3	20	50	86	502	196	191	436	115	43	27	14	16
4	22	48	81	710	208	177	429	104	45	27	14	15
5	25	52	69	520	226	159	429	102	51	27	14	14
6	24	45	74	372	245	144	429	100	57	28	14	14
7	24	41	104	206	234	146	414	106	64	27	14	14
8	24	38	*461	223	689	*140	379	100	100	27	14	15
9	22	35	447	232	2,030	157	338	95	242	25	12	14
10	22	32	325	196	3,630	144	302	94	150	27	12	14
11	22	32	386	208	4,270	146	262	91	106	*25	13	14
12	22	*32	450	191	4,040	148	229	89	84	24	13	15
13	22	31	450	191	2,650	188	206	92	74	23	12	14
14	22	30	335	200	1,350	624	184	104	65	22	12	14
15	22	30	248	494	1,000	*2,180	168	109	61	22	12	14
16	22	31	305	918	825	2,690	159	115	55	21	12	14
17	23	32	362	672	720	1,730	152	107	50	20	12	15
18	22	35	352	574	664	1,180	144	92	47	18	12	14
19	25	38	286	520	560	1,060	e138	82	43	18	12	14
20	28	44	268	376	488	1,130	e130	77	40	18	12	14
21	28	51	271	325	556	1,170	e123	75	39	16	12	14
22	27	46	225	293	512	1,000	e115	68	38	18	*12	14
23	25	66	229	*376	396	825	e110	61	36	18	13	14
24	25	72	421	386	355	715	*e105	59	36	18	13	14
25	26	66	365	681	338	695	95	58	33	17	13	14
26	26	127	268	2,950	299	686	92	*57	32	16	12	14
27	28	136	213	2,940	254	650	86	55	31	16	13	14
28	29	92	213	b700	226	578	*e94	53	30	15	16	14
29	34	74	254	b320	-	516	106	50	28	15	16	15
30	38	69	328	b270	-	528	115	49	28	15	16	16
31	42	-	429	b250	-	556	-	47	-	14	16	-
Total	785	1,603	8,444	17,704	27,401	20,684	6,927	2,676	1,797	660	410	434
Mean	25.3	53.4	272	571	979	667	231	86.3	59.9	21.3	13.2	14.5
Cfsm	0.041	0.086	0.439	0.922	1.58	1.08	0.373	0.139	0.097	0.034	0.021	0.023
In.	0.05	0.10	0.51	1.06	1.65	1.24	0.42	0.16	0.11	0.04	0.02	0.03
Ac-ft	1,560	3,180	16,750	35,120	54,350	41,030	13,740	5,310	3,560	1,310	813	861

Calendar year 1950: Max 6,820 Min 17 Mean 369 Cfsm 0.596 In. 7.96 Ac-ft 267,100  
Water year 1950-51: Max 4,270 Min 12 Mean 245 Cfsm 0.396 In. 5.39 Ac-ft 177,600

Peak discharge (base, 2,500 cfs)--Jan. 26 (11 p.m.) 4,380 cfs (9.03 ft); Feb. 12 (1 a.m.) 4,640 cfs (9.19 ft); Mar. 15 (10:30 p.m.) 6,080 cfs (9.98 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

c Faulty intake action; discharge estimated on basis of records for stations on nearby streams.

## SPOKANE RIVER BASIN

Spokane River above Seven-Mile Bridge, near Spokane, Wash.

Location (revised).--Lat 47°43'05", long. 117°29'55", in E½ sec. 28, T. 26 N., R. 42 E., on left bank 5 miles northwest of Spokane.

Drainage area.--4,970 sq mi, approximately, of which 122 sq mi in the vicinity of Hayden Lake is probably noncontributing.

Records available.--November 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,630 ft (from topographic map).

Extremes.--Maximum discharge during year, 30,000 cfs Feb. 15 (gage height, 13.71 ft); minimum, 557 cfs July 27 (gage height, 4.13 ft); minimum daily, 1,020 cfs Aug. 26, 1948-51; Maximum discharge, 34,300 cfs May 16, 1949 (gage height, 14.62 ft); minimum, 302 cfs Sept. 9, 11, 12, 1949 (gage height, 3.57 ft); minimum daily, that of Aug. 26, 1951.

Remarks.--Records good. Some regulation by powerplant of Washington Water Power Co. at Post Falls, Idaho, and by Coeur d'Alene Lake (see p. 263). Spokane Valley Farms Co.'s canal (see p. 268) and Rathdrum Prairie Canal (see p. 267) divert water above station for irrigation. In 1946, approximately 22,600 acres were under irrigation upstream from Spokane, of which about 15,000 acres utilized surface water.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1-30

Oct. 31 to Sept. 30

4.6	1,170	4.5	920	6.5	3,880	9.0	10,100
5.2	1,900	5.0	1,500	7.0	4,880	10.0	13,600
6.0	3,090	5.5	2,180	7.5	5,970	12.0	22,400
7.0	4,920	6.0	2,980	8.0	7,200	13.6	29,500
7.7	6,480						

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,560	9,450	7,040	16,500	*5,060	13,100	9,000	16,900	15,100	2,960	1,370	1,130
2	1,250	7,070	8,280	16,000	5,800	12,300	9,090	16,900	14,500	3,360	1,450	1,090
3	1,620	6,900	7,930	15,600	7,890	11,600	9,510	16,900	14,000	3,950	1,440	1,080
4	1,770	6,350	5,870	15,400	8,180	11,100	10,000	16,500	13,400	3,880	1,420	1,090
5	2,480	4,340	3,990	14,600	9,720	10,200	11,700	16,200	12,800	4,390	1,160	1,170
6	2,950	4,300	3,820	12,500	9,540	9,700	12,800	16,000	12,700	4,850	1,330	1,090
7	2,780	3,780	4,450	8,630	9,480	9,330	13,900	16,100	12,300	4,080	1,210	1,110
8	2,360	4,320	6,670	5,530	9,870	9,000	14,900	16,500	10,700	3,390	1,170	1,100
9	2,080	4,160	6,840	5,310	12,800	*8,740	16,000	17,100	8,700	3,370	1,190	1,100
10	2,260	*4,120	*6,800	5,250	16,800	8,390	16,900	17,600	6,650	3,150	1,180	1,140
11	2,010	4,180	6,160	5,390	20,000	8,020	17,400	17,800	4,470	2,640	1,170	1,370
12	2,030	3,180	5,020	7,340	24,200	7,850	17,700	18,200	3,410	2,600	1,180	1,270
13	2,080	4,280	7,590	8,500	27,700	7,890	17,900	18,800	3,730	*2,500	1,350	1,350
14	2,100	4,320	7,160	8,470	29,100	7,740	18,100	19,200	4,080	2,710	1,080	1,170
15	1,960	3,940	6,340	8,790	29,500	9,520	18,600	19,400	4,380	2,610	1,120	1,120
16	1,980	3,800	7,690	7,980	28,800	10,500	19,200	19,700	4,400	2,650	1,150	1,140
17	2,030	4,380	8,330	5,470	27,700	9,120	19,600	19,800	5,390	2,370	1,130	1,170
18	1,980	4,320	9,120	5,500	26,100	8,530	19,800	19,300	6,070	2,290	1,130	1,210
19	2,480	3,460	9,580	5,390	24,600	8,420	19,800	19,300	6,130	2,500	1,110	1,110
20	3,040	3,540	10,400	5,150	22,900	8,500	20,100	19,300	6,170	2,610	1,180	1,210
21	3,040	3,560	10,700	5,480	21,500	8,650	19,900	19,600	3,450	1,860	1,090	1,210
22	3,040	3,420	12,100	6,970	20,200	8,560	19,700	19,300	4,890	1,430	1,170	1,140
23	3,280	3,110	13,900	8,990	19,000	8,220	19,100	19,000	4,850	1,850	1,070	1,070
24	3,290	4,850	14,500	10,500	17,800	8,130	18,600	18,600	5,020	2,120	1,130	1,160
25	2,760	7,130	15,400	11,000	16,700	8,100	*17,900	18,400	5,870	1,710	1,110	1,330
26	2,600	9,510	16,300	14,100	15,800	8,220	17,200	18,200	4,820	1,590	1,020	1,670
27	2,580	8,520	16,900	13,400	14,700	8,220	16,800	17,900	4,780	1,360	1,140	1,360
28	3,060	6,520	17,300	12,200	13,800	8,270	16,500	17,500	4,640	1,330	1,130	1,420
29	3,820	6,460	17,500	11,400	-	8,330	16,500	*16,800	4,160	1,240	*1,100	1,580
30	6,340	6,500	17,200	9,140	-	8,650	16,700	16,300	3,980	1,500	1,340	1,360
31	13,300	-	16,900	5,270	-	8,850	-	15,800	-	1,280	1,630	-
Total	89,870	153,570	307,580	291,750	495,040	281,550	490,900	554,900	215,540	79,910	37,430	36,520
Mean	2,899	5,119	9,922	9,411	17,680	9,082	15,360	17,900	7,185	2,573	1,207	1,217
Ac-ft	178,300	304,600	610,100	578,700	981,900	558,400	973,700	*1,101	427,500	158,500	74,240	72,440
Calendar year 1950:	Max	32,300	Min	1,220	Mean	11,130	Ac-ft	8,054,000				
Water year 1950-51:	Max	29,500	Min	1,020	Mean	8,314	Ac-ft	6,019,000				

\* Discharge measurement made on this day.

† Expressed in thousands.



## Little Spokane River at Elk, Wash.

Location.--Lat 48°01'20", long. 117°16'20", in SE $\frac{1}{4}$  sec. 8, T. 29 N., R. 44 E., on right bank half a mile north of Elk.

Drainage area.--115 sq mi (revised).

Records available.--July 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,870 ft (from topographic map).

Extremes.--Maximum discharge during year, 114 cfs Apr. 4 (gage height, 1.70 ft); minimum, 46 cfs Nov. 11 (gage height, 1.81 ft).  
1948-51: Maximum discharge, 141 cfs Mar. 19, 1950 (gage height, 1.82 ft); minimum not determined, probably occurred during period of no gage-height record in January or February 1950.

Remarks.--Records good except those for periods of no gage-height record, which are poor. No diversion or regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.2	46
1.4	66
1.7	114

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	63	54	63	53	73	96	89	70	57	49	52
2	50	59	53	64	56	73	98	88	70	57	49	51
3	50	58	52	68	59	72	101	88	69	57	49	51
4	52	56	52	66	62	74	105	88	69	55	49	50
5	57	55	50	64	63	73	106	88	70	55	48	50
6	56	53	50	63	*64	73	106	86	72	55	48	49
7	54	53	50	62	64	72	106	86	72	53	48	49
8	53	52	50	62	64	70	108	86	70	53	48	49
9	53	51	50	62	72	70	106	86	69	54	48	49
10	53	50	51	62	80	70	103	84	69	54	48	49
11	52	50	52	60	96	69	103	84	69	57	48	48
12	52	50	*53	60	99	*69	103	86	69	57	48	48
13	51	*50	53	62	92	70	101	88	68	57	49	47
14	51	50	53	63	89	72	99	84	68	54	49	47
15	51	50	54	62	86	78	101	83	66	57	49	47
16	51	52	57	62	84	83	99	82	65	*57	48	47
17	52	53	59	63	83	78	99	80	64	57	49	47
18	52	54	59	62	82	74	98	80	63	57	49	47
19	53	53	62	61	82	74	96	78	63	51	48	47
20	56	53	63	60	82	77	96	78	63	51	48	47
21	55	53	63	60	80	82	94	77	63	57	48	47
22	54	52	64	61	78	84	93	76	62	51	48	47
23	53	52	69	62	78	86	92	76	60	51	*49	47
24	52	54	72	62	77	86	90	76	63	57	49	48
25	52	57	72	63	77	88	88	74	63	57	49	48
26	52	57	69	64	76	91	88	74	62	57	49	48
27	52	57	65	66	74	89	*88	74	60	57	49	48
28	54	55	64	60	74	91	94	73	59	57	50	48
29	57	55	64	54	-	92	96	72	59	57	52	48
30	63	54	64	52	-	94	91	72	58	57	52	48
31	64	-	64	53	-	94	-	*70	-	47	52	-
Total	1,657	1,611	1,807	1,908	2,126	2,441	2,944	2,506	1,967	1,637	1,516	1,448
Mean	53.4	53.7	58.3	61.5	75.9	78.7	98.1	80.8	65.6	52.7	48.9	48.3
Cfsm	0.464	0.467	0.507	0.535	0.660	0.684	0.853	0.703	0.570	0.457	0.425	0.420
In.	0.54	0.52	0.58	0.62	0.69	0.79	0.95	0.81	0.64	0.57	0.49	0.47
Ac-ft	3,290	3,200	3,580	3,780	4,220	4,840	5,840	4,970	3,900	3,247	3,010	2,870

Calendar year 1950: Max 137 Min 37 Mean 64.8 Cfsm 0.563 In. 7.64 Ac-ft 46,890

Water year 1950-51: Max 108 Min 47 Mean 64.6 Cfsm 0.562 In. 7.63 Ac-ft 46,740

Peak discharge (base, 100 cfs).--Feb. 11 (10 p.m.) 101 cfs (1.63 ft); Apr. 4 (9 p.m.) 114 cfs (1.70 ft).

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 15 to Feb. 5, Apr. 21-26, June 30 to July 15, Sept. 30; discharge estimated on basis of recorded range in stage, weather records, and records for nearby stations.

## SPOKANE RIVER BASIN

Little Spokane River at Dartford, Wash.

Location (revised).--Lat 47°47'00", long. 117°24'50", in NE $\frac{1}{4}$  sec. 6, T. 26 N., R. 43 E., on right bank 50 ft downstream from highway bridge at Dartford, 6 miles upstream from mouth, and 8 miles north of Spokane.

Drainage area.--665 sq mi, approximately (revised).

Records available.--April 1929 to September 1932, December 1946 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,580 ft (from topographic map). Prior to Mar. 16, 1951, staff gage at same site and datum.

Average discharge.--7 years (1929-32, 1947-51), 310 cfs.

Extremes.--Maximum discharge observed during year, 1,400 cfs Feb. 11 (gage height, 4.02 ft); minimum discharge, 138 cfs Aug. 20 (gage height, 1.46 ft).  
1929-32, 1946-51: Maximum discharge, 2,240 cfs Mar. 18, 1950 (gage height, 5.1 ft, from graph based on gage readings); minimum observed, 63 cfs July 24, 1930 (gage height, 1.07 ft).

Remarks.--Records good. Small diversions for irrigation and domestic use above station. No regulation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

1.4	121
1.8	226
2.4	470
3.0	790
4.1	1,450

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	152	267	246	475	377	460	1,010	689	319	204	154	172
2	156	257	240	480	395	470	1,030	636	312	204	154	172
3	166	246	226	490	395	465	1,080	614	304	200	154	169
4	177	240	200	485	432	465	1,140	581	308	200	152	166
5	188	240	177	460	413	460	1,190	592	323	204	152	164
6	200	233	246	460	480	460	1,240	570	335	210	149	161
7	213	229	253	446	550	451	1,260	570	331	207	144	161
8	207	229	253	441	636	441	1,250	560	319	200	140	159
9	200	220	250	413	713	432	1,220	550	312	194	142	161
10	200	220	253	404	933	*413	1,180	535	300	191	147	159
11	204	213	*253	395	1,400	432	1,140	530	289	186	147	159
12	213	*207	260	382	1,270	451	1,080	535	289	183	147	161
13	204	200	287	386	1,150	465	1,040	535	289	183	147	161
14	200	207	253	395	933	480	1,010	535	282	*180	149	164
15	200	220	253	395	834	647	982	515	271	180	149	161
16	207	226	267	413	757	801	960	500	264	177	147	159
17	207	233	304	404	713	713	933	480	253	174	147	159
18	213	229	352	404	691	680	906	460	250	174	144	159
19	213	226	360	413	669	686	872	446	246	172	142	156
20	220	233	386	404	647	708	834	432	240	169	140	156
21	226	236	451	408	658	757	806	422	233	166	140	154
22	233	240	505	413	647	856	812	408	229	166	142	154
23	226	243	560	422	625	862	774	395	229	166	142	154
24	220	246	540	451	614	828	730	386	243	164	142	152
25	213	253	510	465	540	840	696	373	243	164	144	159
26	207	260	480	475	510	944	*664	364	229	161	144	166
27	213	253	470	500	480	1,030	642	356	223	161	144	166
28	207	246	480	413	480	1,000	647	348	213	161	152	166
29	240	246	470	*343	-	977	702	335	210	159	166	166
30	267	253	480	360	-	1,030	696	331	207	159	*174	180
31	282	-	480	352	-	1,050	-	*327	-	156	174	-
Total	6,474	7,051	10,725	13,167	18,942	20,754	28,526	14,890	8,095	5,575	4,611	4,859
Mean	209	235	346	425	676	669	951	480	270	180	149	162
Cfs/m	0.314	0.353	0.520	0.639	1.02	1.01	1.43	0.722	0.406	0.271	0.224	0.244
In.	0.36	0.39	0.60	0.74	1.06	1.16	1.60	0.83	0.45	0.31	0.26	0.27
Ac-ft	12,840	13,990	21,270	26,120	37,570	41,160	56,580	29,530	16,060	11,060	9,150	9,640
Calendar year 1950: Max	2,090	Min	140	Mean	410	Cfs/m	0.617	In.	8.37	Ac-ft	296,700	
Water year 1950-51: Max	1,400	Min	140	Mean	394	Cfs/m	0.592	In.	8.03	Ac-ft	285,000	

\* Discharge measurement made on this day.

Little Spokane River near Dartford, Wash.

Location (revised).--Lat 47°46'50", long. 117°29'45", in NW $\frac{1}{4}$  sec. 3, T. 26 N., R. 42 E., in left center of stream on downstream side of bridge 3 miles upstream from mouth and 4 miles west of Dartford.

Drainage area.--698 sq mi (revised).

Records available.--April 1948 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,550 ft (from topographic map).

Extremes.--Maximum discharge during year, 1,660 cfs Feb. 12 (gage height, 6.82 ft); minimum, 386 cfs Aug. 8 (gage height, 3.04 ft).  
1948-51: Maximum discharge, 2,220 cfs Mar. 18, 1950 (gage height, 7.40 ft); minimum, 377 cfs Sept. 3, 1949 (gage height, 2.89 ft).

Remarks.--Records good. Many small diversions for irrigation and domestic use above station. No regulation.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)

3.0	383	5.0	679
3.5	433	6.0	1,020
4.0	504	6.7	1,550

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Avg.	Sept.
1	400	554	498	750	618	730	1,220	909	558	442	394	414
2	399	510	496	722	635	730	1,220	881	550	438	394	413
3	399	501	494	744	648	709	1,270	864	542	437	394	412
4	409	494	484	757	668	696	1,320	841	544	441	393	410
5	426	489	453	733	*670	709	1,380	834	558	441	392	407
6	447	480	470	704	650	677	1,440	834	574	446	391	405
7	449	473	490	654	643	668	1,450	818	577	446	389	405
8	433	470	489	626	643	679	1,460	815	566	440	388	406
9	434	463	483	652	704	692	1,430	809	553	434	389	404
10	442	457	483	643	958	*665	1,400	797	544	431	390	404
11	441	*456	*489	633	1,320	648	1,350	785	530	427	391	404
12	437	456	489	629	1,480	656	1,300	788	530	425	392	405
13	436	453	507	626	1,250	689	1,260	788	528	421	393	405
14	431	453	506	633	1,140	725	1,230	791	522	*419	395	405
15	428	452	506	646	1,070	752	1,200	779	512	416	395	403
16	428	454	512	661	994	1,030	1,180	763	502	414	394	402
17	433	468	544	674	949	939	1,160	741	494	412	393	401
18	441	474	590	670	921	909	1,130	717	488	409	391	400
19	443	470	608	646	909	897	1,110	696	482	408	391	399
20	464	464	611	646	881	901	1,080	684	476	405	391	398
21	478	464	648	641	881	935	1,040	672	471	404	390	397
22	464	464	665	641	864	994	1,030	656	470	404	390	397
23	450	464	674	629	837	1,040	1,010	639	466	404	390	396
24	445	470	738	633	815	1,030	972	635	470	403	391	397
25	443	488	812	641	803	1,010	944	626	478	402	391	402
26	447	501	779	738	785	1,080	913	611	467	401	391	408
27	453	501	746	864	785	1,180	893	602	457	400	*392	410
28	457	492	722	673	735	1,230	*893	592	452	399	397	411
29	474	486	725	569	-	1,170	913	579	449	398	408	413
30	520	488	720	585	-	1,210	939	*571	443	396	419	421
31	561	-	722	613	-	1,240	-	566	-	395	416	-
Total	13,812	14,289	18,153	20,656	24,236	27,220	35,137	22,683	15,253	12,958	12,215	12,154
Mean	446	476	586	666	866	878	1,171	732	508	418	394	405
Cfsm	0.639	0.682	0.840	0.954	1.24	1.26	1.68	1.05	0.728	0.589	0.564	0.580
In.	0.74	0.76	0.87	1.10	1.29	1.45	1.87	1.21	0.81	0.69	0.65	0.65
Ac-ft	27,400	28,340	36,010	40,970	48,070	53,990	69,690	44,990	30,250	25,700	24,230	24,110

Calendar year 1950: Max 2,020 Min 399 Mean 627 Cfsm 0.898 In. 12.20 Ac-ft 454,000  
Water year 1950-51: Max 1,480 Min 388 Mean 627 Cfsm 0.898 In. 12.19 Ac-ft 453,800

Peak discharge (base, 1,000 cfs).--Feb. 12 (2 a.m.) 1,660 cfs (6.82 ft); Apr. 7 (6 p.m.) 1,470 cfs (6.81 ft).

\* Discharge measurement made on this day.

## Long Lake at Long Lake, Wash.

Location.--Lat 47°50'15", long. 117°50'10", in NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 13, T. 27 N., R. 39 E., at left end of spillway at Long Lake dam, 12 miles north of Reardan.

Drainage area.--5,920 sq mi, approximately.

Records available.--April 1939 to September 1951. Prior to September 1946, month end storage changes combined with those for Coeur d'Alene Lake, published with tables of monthly discharge for Spokane River at Long Lake. October 1946 to September 1950, month end storage changes for Long Lake published as adjustment to recorded discharge of Spokane River at Long Lake.

Gage.--Water-stage recorder and staff gage, with long distance indicator in powerhouse. Datum of gage is at mean sea level (levels by Washington Water Power Co.).

Extremes.--Maximum contents during year, 104,200 acre-ft Sept. 4, 5, 9, 10, 16, 17 (elevation, 1,536.0 ft); minimum, 77,700 acre-ft Dec. 26 (elevation, 1,530.6 ft). 1939-51: Maximum contents, 104,200 acre-ft during month of July 1950, Sept. 4, 5, 9, 10, 16, 17, 1951 (elevation, 1,536.0 ft); minimum, 16,100 acre-ft Apr. 4, 1944 (elevation, 1,516.35 ft).

Remarks.--Reservoir is formed by concrete dam. Capacity, 104,200 acre-ft between elevations 1,512 ft (lower limit of normal operation) and 1,536 ft (top of gates). Records given herein represent usable contents. Water used for power. Diversions above station for irrigation of large acreage in Idaho and Washington. Other regulation in Coeur d'Alene Lake and at powerplants along Spokane River.

Cooperation.--Lake elevations and capacity table furnished by Washington Water Power Co.

Monthly elevation and contents, water year October 1950 to September 1951

Date	Elevation (feet)†	Contents (acre-feet)	Change in contents during month (acre-feet)
Sept. 30.....	1,535.47	101,550	-
Oct. 31.....	1,535.81	103,250	+1,700
Nov. 30.....	1,535.82	103,300	+50
Dec. 31.....	1,532.57	87,140	-16,160
Calendar year 1950.....	-	-	-410
Jan. 31.....	1,535.52	101,800	+14,660
Feb. 28.....	1,534.90	98,700	-3,100
Mar. 31.....	1,535.65	102,450	+3,750
Apr. 30.....	1,534.60	97,200	-5,250
May 31.....	1,534.40	96,200	-1,000
June 30.....	1,535.64	102,400	+6,200
July 31.....	1,535.71	102,750	+350
Aug. 31.....	1,534.92	98,800	-3,950
Sept. 30.....	1,535.86	103,500	+4,700
Water year 1950-51.....	-	-	+1,850

† Elevation at midnight.

## Spokane River at Long Lake, Wash.

Location.--Lat 47°50'15", long. 117°50'25", in SW $\frac{1}{4}$  sec. 13, T. 27 N., R. 39 E., on left bank at Long Lake powerhouse  $1\frac{1}{2}$  miles upstream from Chamokane Creek, 12 miles north of Reardan.

Drainage area.--5,920 sq mi, approximately (revised), of which 122 sq mi in the vicinity of Hayden Lake is probably noncontributing.

Records available.--April 1939 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,299.00 ft above mean sea level, datum of 1929.

Average discharge.--12 years, 7,713 cfs (adjusted for storage).

Extremes.--Maximum discharge during year, 44,900 cfs Apr. 15 (gage height, 77.20 ft); minimum not determined, occurred during period of backwater from Little Falls powerplant; minimum daily, 222 cfs Sept. 2, 3 (determined from powerplant records).

1939-51: Maximum discharge recorded, 49,400 cfs May 24, 1948 (gage height, 78.66 ft); minimum recorded, 115 cfs Oct. 6, 1939 (gage height, 57.66 ft), but may have been less during periods of backwater; minimum daily, 144 cfs Sept. 15, 1946, Aug. 24, 1947 (determined from powerplant records).

Remarks.--Flow regulated above station by Coeur d'Alene (see p. 263) and Long Lakes, and by powerplants of Washington Water Power Co. Capacity of Long Lake 79,600 acre-ft, elevations 1,512 and 1,531 ft above mean sea level, adjustment of 1912. Water diverted for irrigation above station and is equivalent to that shown for Spokane River at Spokane (see p. 274).

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	727	11,100	8,750	18,400	5,760	13,600	11,300	17,600	15,400	3,230	2,230	305
2	2,630	9,710	9,710	13,600	6,340	13,700	10,000	17,800	14,300	4,500	2,410	222
3	3,130	6,310	9,130	14,700	9,340	11,000	10,900	18,200	17,000	4,770	2,300	222
4	3,020	7,680	7,250	12,900	10,200	12,900	8,600	19,000	15,000	2,620	747	1,730
5	3,510	5,250	5,030	16,300	9,450	10,500	12,800	17,800	12,700	5,490	1,180	2,430
6	3,680	5,200	5,070	15,900	11,000	11,300	16,000	16,200	12,600	5,160	2,280	2,240
7	3,100	4,920	4,820	14,800	10,500	9,350	14,900	17,100	13,500	4,950	1,940	1,910
8	1,010	5,780	5,350	4,950	10,600	9,940	21,000	16,300	14,300	3,920	2,180	538
9	3,130	4,720	7,460	5,110	14,900	9,800	13,100	18,500	9,810	3,400	2,230	1,000
10	3,320	4,560	7,280	5,280	15,200	10,100	19,300	19,200	9,000	2,090	2,380	2,450
11	3,120	4,990	7,180	5,310	23,000	9,780	19,200	16,600	5,640	2,350	549	2,150
12	3,080	4,060	6,680	7,230	27,600	7,170	19,700	20,500	5,550	3,090	561	1,150
13	3,080	4,710	6,130	10,000	27,600	8,530	18,200	20,200	5,560	3,090	3,030	2,200
14	2,250	4,940	8,190	9,670	31,700	8,170	18,500	20,100	5,680	3,010	1,960	2,050
15	559	4,400	7,610	9,610	30,300	10,100	20,600	21,100	5,540	3,150	1,850	716
16	3,250	4,930	6,720	9,000	30,200	13,600	20,600	21,000	5,250	2,840	1,290	728
17	3,170	4,780	9,940	7,040	28,300	11,600	20,400	21,700	3,690	3,160	2,090	2,450
18	3,250	4,540	10,200	6,600	31,400	6,240	21,500	20,000	4,830	3,180	1,110	2,370
19	3,220	3,990	11,200	6,620	24,700	7,170	21,500	21,600	5,360	3,080	516	2,220
20	4,150	4,750	11,600	6,600	25,500	9,960	21,700	20,600	5,500	3,080	2,410	2,250
21	3,700	4,410	12,200	6,220	20,800	10,000	20,800	20,200	5,450	2,170	2,220	2,540
22	2,570	4,160	14,000	7,420	20,100	9,850	21,100	19,600	5,330	1,340	2,180	1,220
23	4,480	3,060	17,400	8,990	19,400	9,690	20,700	21,000	5,170	2,410	2,050	2,380
24	3,870	4,740	21,800	11,300	19,100	9,950	18,800	19,900	4,740	2,490	2,050	2,500
25	4,280	6,800	21,700	12,000	19,000	9,610	19,900	18,300	9,580	2,470	898	2,210
26	3,550	10,400	13,700	15,000	17,900	9,230	17,700	20,300	5,960	2,630	415	1,960
27	3,360	9,680	17,200	14,800	15,400	9,450	18,700	20,100	5,290	2,710	2,330	2,210
28	4,250	7,960	17,700	15,200	13,300	10,000	19,300	17,000	4,620	1,080	2,550	2,340
29	2,720	6,150	18,100	11,500	-	10,500	17,600	17,300	4,810	1,430	2,390	2,120
30	4,820	7,610	20,900	8,620	-	9,240	20,000	20,300	4,740	1,970	2,410	1,750
31	14,000	-	15,700	6,560	-	10,500	-	15,900	-	2,490	2,380	-
Total	108,086	176,020	345,660	317,030	528,590	312,730	534,400	591,000	242,200	93,350	57,616	53,061
Mean	3,487	5,687	11,150	10,230	18,880	10,090	17,810	19,060	8,073	3,011	1,859	1,769
Ac-ft	214,400	349,100	685,600	628,800	1,048	620,300	1,060	1,172	480,400	185,200	114,300	105,200
(†)	+1,700	+50	-16,160	+14,660	-3,100	+3,750	-5,250	-1,000	+6,200	+350	-3,950	+4,700

## Adjusted for change in lake contents

Mean	3,515	5,869	10,890	10,470	18,820	10,150	17,730	19,040	8,178	3,018	1,795	1,847
Cfsm	-	-	-	-	-	-	-	-	-	-	-	-
In.	-	-	-	-	-	-	-	-	-	-	-	-
Ac-ft	216,100	349,200	669,400	643,500	1,045	624,000	1,055	1,171	486,600	185,600	110,400	109,900

## Observed

Calendar year 1950: Max	35,600	Min	202	Mean	12,010	Ac-ft	8,698,000
Water year 1950-51: Max	31,700	Min	222	Mean	9,205	Ac-ft	6,663,000

## Adjusted

Calendar year 1950: Mean	12,010	Cfsm	2.03	In.	27.54	Ac-ft	8,697,000
Water year 1950-51: Mean	9,207	Cfsm	1.56	In.	21.11	Ac-ft	6,666,000

† Change in contents in Long Lake, in acre-feet, furnished by Washington Water Power Co.

\* Expressed in thousands.

Note.--Backwater from Little Falls Dam Oct. 1 to Sept. 30; discharge computed by Washington Water Power Co. from powerplant records. Change in contents for Long Lake based on 12 p.m. gage readings.

## Franklin D. Roosevelt Lake at Grand Coulee Dam, Wash.

Location.--Lat 47°57'20", long. 118°59'10", in lot 3, sec. 1, T. 28 N., R. 30 E., in block 12 of Grand Coulee Dam at Grand Coulee.

Drainage area.--74,100 sq mi, approximately.

Records available.--April 1938 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, Bureau of Reclamation datum, or 1,425 ft above mean sea level, datum of 1929, supplementary adjustment of 1947 (levels by Bureau of Reclamation).

Extremes.--Maximum contents during year, 9,655,000 acre-ft July 9 (elevation, 1,290.00 ft); minimum, 8,983,000 acre-ft Mar. 27 (elevation, 1,281.83 ft).  
1938-51: Maximum contents recorded, 9,679,900 acre-ft July 17, 1942, June 3, 1945 (elevation, 1,290.3 ft); minimum observed, 16,200 acre-ft Aug. 29, 1938 (elevation, 956.1 ft).

Remarks.--Reservoir formed by concrete dam; construction of dam began in 1934; completed in 1941; storage began early in construction period. Capacity, 5,118,000 acre-ft between elevations 1,208 ft (proposed lower limit of operation) and 1,288 ft (top of gates) above mean sea level. Dead storage, 4,371,000 acre-ft. Figures given herein represent total contents. Water is used for power development and diversion by pumping, beginning in May 1951, for irrigation of Grand Coulee Project of Bureau of Reclamation.

Cooperation.--Gage-height record and reservoir areas furnished by Bureau of Reclamation.

Elevation, in feet, at 8 a.m., water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	87.77	87.98	87.12	87.19	85.20	86.57	82.02	84.78	89.02	89.79	89.83	87.87
2	87.68	88.02	87.12	87.11	84.90	86.60	82.01	84.73	85.85	87.81	89.88	87.90
3	87.65	87.88	87.01	86.66	84.77	86.55	82.14	84.58	88.83	87.81	89.83	87.89
4	87.45	87.59	87.04	86.15	84.87	86.40	82.12	84.42	89.01	87.93	89.90	87.88
5	87.51	87.15	86.89	86.11	85.15	86.36	82.28	84.43	86.98	87.83	89.80	87.91
6	87.59	87.02	86.79	86.43	85.16	86.61	82.59	84.73	86.88	87.86	89.80	87.81
7	87.70	87.03	86.61	86.52	85.23	86.42	82.97	84.93	88.83	87.87	89.50	87.70
8	87.65	86.94	86.59	86.17	85.25	86.26	83.45	84.85	88.71	89.95	88.86	87.58
9	87.69	86.98	86.51	86.29	85.17	85.95	83.90	84.24	88.54	90.00	88.10	87.64
10	87.64	87.00	86.66	86.51	85.04	85.57	84.76	83.25	88.57	89.92	87.29	87.65
11	87.98	86.98	86.80	86.74	85.25	85.36	85.31	82.58	88.62	89.91	87.06	87.54
12	87.93	86.98	86.89	86.82	85.64	85.06	86.10	82.38	88.93	89.90	87.22	87.66
13	87.84	86.96	86.78	86.92	86.01	84.68	86.83	82.50	89.12	89.90	87.17	87.69
14	87.88	86.98	86.72	86.95	86.47	84.45	87.51	82.36	89.07	89.98	87.06	87.70
15	87.97	87.10	86.72	87.02	86.88	84.25	88.09	82.23	89.06	89.88	86.99	87.68
16	88.08	87.18	86.80	86.88	87.12	84.05	88.37	82.41	89.10	89.80	87.05	87.57
17	87.97	87.11	86.80	86.73	86.95	83.91	88.24	82.47	89.87	89.87	87.33	87.59
18	87.66	86.93	86.94	86.70	86.86	83.64	87.79	82.36	89.05	89.81	87.78	87.50
19	87.49	87.01	86.99	86.64	86.96	83.30	87.17	82.20	89.00	89.94	87.95	87.56
20	87.54	86.88	87.03	86.44	86.85	83.01	86.45	82.63	89.19	89.92	87.88	87.56
21	87.51	86.58	87.00	86.27	86.80	82.66	85.73	82.80	89.35	89.87	87.90	87.51
22	87.49	86.80	87.05	85.85	86.91	82.52	85.10	83.26	89.52	89.87	87.95	87.62
23	87.43	86.92	87.07	85.83	86.78	82.30	84.49	83.35	89.65	89.83	87.95	87.68
24	87.47	86.89	87.24	86.00	86.88	82.00	85.13	84.24	89.75	89.89	87.87	87.69
25	87.40	87.01	87.58	85.98	86.57	81.95	84.15	85.35	89.83	89.92	87.90	87.62
26	87.30	87.16	87.83	85.91	86.62	81.90	84.26	86.34	89.85	89.83	87.91	87.79
27	87.20	86.96	87.76	85.83	86.52	81.91	84.28	87.28	89.81	89.80	87.91	87.87
28	87.28	86.99	87.86	85.98	86.56	82.04	84.35	87.60	89.82	89.79	87.84	87.75
29	87.46	87.00	87.93	86.10	-	82.07	84.47	88.22	89.82	89.77	87.87	87.66
30	87.47	87.15	87.76	85.88	-	82.00	84.60	88.85	89.78	89.80	87.91	87.86
31	87.74	-	87.59	85.58	-	82.05	-	89.01	-	89.77	87.88	-

Note.--Add 1,200 ft to obtain elevation above mean sea level, Bureau of Reclamation datum.

Monthly elevation and contents, water year October 1950 to September 1951

Date	Elevation (feet)†	Contents (acre-feet)	Change in contents during month (acre-feet)
Sept. 30.....	1,287.8	9,472,600	-
Oct. 31.....	1,287.8	9,472,600	C
Nov. 30.....	1,287.0	9,407,000	-65,600
Dec. 31.....	1,287.3	9,431,600	+24,600
Calendar year 1950....	-	-	+188,600
Jan. 31.....	1,285.3	9,267,600	-164,000
Feb. 28.....	1,286.6	9,374,200	+106,600
Mar. 31.....	1,282.0	8,999,000	-375,200
Apr. 20.....	1,284.6	9,210,200	+211,200
May 31.....	1,289.0	9,572,000	+361,800
June 30.....	1,289.9	9,646,700	+74,700
July 31.....	1,289.8	9,638,400	-8,300
Aug. 31.....	1,287.9	9,480,800	-157,600
Sept. 30.....	1,288.0	9,489,000	+8,200
Water year 1950-51....	-	-	+16,400

† Elevation at 12 p.m.

## Columbia River at Grand Coulee Dam, Wash.

Location.--Lat 47°58'00", long. 118°58'45", opposite lot 4, sec. 36, T. 29 N., R. 30 E., in Pier 3 of highway bridge, 2,500 ft downstream from Coulee Dam and 14 miles upstream from Nespelem River.

Drainage area.--74,100 sq mi, approximately.

Records available.--April 1913 to September 1951 (monthly discharge only, April 1913 to June 1923, January 1924 to May 1928).

Gage.--Water-stage recorder. Datum of gage is at mean sea level, Bureau of Reclamation, adjustment of 1937. June 27 to Dec. 31, 1923, June 12, 1928, to Feb. 14, 1931, staff gages, the latter at present datum, the former at datum 2.4 ft lower, both on right bank at site approximately 1,000 ft upstream. Feb. 15, 1931, to Dec. 31, 1935, water-stage recorder on right bank at site 850 ft downstream, at present datum.

Average discharge.--38 years, 107,700 cfs (adjusted for diversion by pumping from Franklin D. Roosevelt Lake since May 1951, and change in contents in Franklin D. Roosevelt Lake since October 1939).

Extremes.--Maximum discharge during year, 376,800 cfs May 28 (elevation 973.70 ft); minimum, 36,500 cfs Oct. 6 (elevation, 937.24 ft).

1913-51: Maximum discharge, 637,800 cfs June 12, 1948 (elevation, 987.90 ft); minimum, may have been less than 15,300 cfs (estimated) in January or February 1937, when stage-discharge relation was affected by ice.

Maximum discharge known, 725,000 cfs (estimated) during flood of June 1894.

Remarks.--Records excellent except those for periods of no gage-height record, which are good. Diversion by pumping from Franklin D. Roosevelt Lake for Columbia basin project. Other diversions above station for irrigation is small percentage of flow past gage. Flow regulated by Franklin D. Roosevelt Lake (see preceding page) and reservoirs in Kootenai, Pend Oreille, and Spokane River basins. Records of chemical analyses and water temperatures for the water year 1951 are given in Water-Supply Paper 1200.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	56,800	86,700	68,900	100,600	63,700	81,000	64,500	146,800	352,400	292,700	199,800	86,700
2	62,800	89,700	64,700	103,900	62,300	82,800	65,300	156,600	340,300	292,600	198,900	85,600
3	62,200	88,500	62,900	104,300	56,300	82,000	71,600	158,800	330,600	284,100	194,100	87,000
4	56,000	88,700	62,200	96,700	51,100	81,900	70,200	157,200	326,800	289,500	187,500	87,900
5	52,300	82,800	62,600	75,400	57,100	75,700	71,900	154,900	326,000	294,800	179,400	83,700
6	50,600	75,900	59,900	77,500	61,600	71,500	73,400	162,400	316,100	294,700	183,500	81,800
7	51,100	75,500	59,600	81,500	59,800	79,300	76,600	184,200	307,700	292,800	195,200	77,100
8	51,100	69,500	57,300	71,800	65,800	79,200	79,300	208,800	295,600	296,600	196,900	72,300
9	55,800	71,400	53,500	64,700	73,800	79,900	77,300	250,400	282,800	300,300	196,000	65,300
10	52,400	69,100	49,000	63,000	77,800	76,400	66,500	259,400	270,500	298,700	173,000	77,700
11	55,900	67,700	53,600	65,800	78,200	78,500	77,700	254,800	254,800	295,800	134,300	72,500
12	*10,100	67,100	58,700	76,200	81,900	78,000	72,000	260,200	252,600	292,800	132,100	71,000
13	54,600	62,800	61,200	76,700	69,300	76,900	81,100	284,400	269,900	285,300	133,400	70,600
14	54,600	59,800	61,000	76,200	92,800	74,300	92,400	305,500	277,000	266,400	119,700	71,400
15	53,200	63,400	60,200	77,500	97,700	75,300	105,500	305,500	283,500	284,400	107,200	70,200
16	60,500	67,300	56,500	77,300	122,300	78,600	122,500	314,400	*299,700	283,000	99,200	64,200
17	65,200	73,100	55,900	77,100	122,100	78,300	146,500	335,400	309,100	282,100	95,600	70,200
18	69,500	65,800	63,200	75,800	111,300	79,900	159,900	*351,900	319,900	275,600	94,400	61,200
19	63,700	57,800	62,400	78,100	117,400	79,900	167,400	341,100	320,900	280,600	99,800	60,300
20	64,000	65,600	62,500	79,900	114,000	79,300	168,800	342,900	316,900	282,400	94,900	61,600
21	68,400	56,100	67,000	80,400	*104,400	74,900	164,200	338,200	323,100	277,800	97,500	*60,700
22	67,200	56,500	68,000	74,300	99,300	74,900	161,200	343,200	318,800	266,300	87,000	61,600
23	64,200	49,700	66,600	67,200	102,500	73,500	155,300	*337,800	319,600	263,000	92,300	59,000
24	67,700	58,600	74,600	66,200	101,500	72,100	135,900	*337,800	320,500	255,000	90,700	62,800
25	70,600	59,400	85,200	73,300	99,200	61,400	128,700	336,400	317,000	249,100	88,400	57,500
26	71,200	67,600	97,100	74,200	92,600	65,000	132,700	340,400	314,800	243,400	90,200	59,800
27	71,400	67,500	98,500	75,600	89,100	62,400	135,200	353,400	*312,100	234,200	94,200	63,700
28	70,800	60,500	101,200	63,700	87,000	61,600	135,600	362,500	309,200	*228,500	93,200	64,100
29	70,300	60,400	102,600	68,300	-	*63,900	136,300	344,700	303,600	216,900	90,200	56,200
30	72,500	*64,100	103,000	66,600	-	-	139,300	*351,900	300,000	215,700	90,200	50,500
31	78,500	-	105,200	65,900	-	62,800	-	*352,300	-	208,700	89,400	-
Total	*1,920.2	*2,047.5	*2,164.1	*2,375.7	*2,431.9	*2,305	*3,334.8	*8,734.2	*9,191.8	*8,443.6	*4,017.2	*2,074.2
Mean	61,940	68,250	69,810	76,640	86,850	74,350	111,200	281,700	306,400	272,400	129,600	69,140
Ac-ft	3,809	4,061	4,292	4,712	4,824	4,572	8,614	21,732	18,250	16,750	7,968	4,114
(t)	0	-65,800	24,600	-164,000	-106,600	-375,200	-211,200	-339,800	-148,700	-134,700	-25,400	-126,200
Adjusted for diversion by pumping and change in contents												
Mean	61,940	67,140	70,210	73,970	88,790	68,260	114,700	288,000	308,900	274,500	130,000	71,290
Cfsm	-	-	-	-	-	-	-	-	-	-	-	-
In.	-	-	-	-	-	-	-	-	-	-	-	-
Ac-ft	3,809	3,995	4,317	4,548	4,931	4,197	6,825	17,710	18,380	16,880	7,993	4,242
observed												
Calendar year 1950: Max	494,500	Min	43,200	Mean	132,800	Ac-ft	96,140,000					
Water year 1950-51: Max	362,500	Min	48,700	Mean	134,400	Ac-ft	97,270,000					
Adjusted												
Calendar year 1950: Mean	133,000	Cfsm	-	In.	-	Ac-ft	96,320,000					
Water year 1950-51: Mean	135,100	Cfsm	1.82	In.	24.75	Ac-ft	97,830,000					

\* Discharge measurement made on this day.

† Diversion by pumping from Franklin D. Roosevelt Lake for Columbia basin Project, and change in contents in Franklin D. Roosevelt Lake, in acre-feet. Records furnished by Bureau of Reclamation.

‡ Expressed in thousands.

a No gage-height record; discharge estimated on basis of record collected by the Bureau of Reclamation.

Okanagan River at Okanagan Falls, British Columbia  
(International gaging station)

Location.--Lat 49°21', long. 119°35', on right bank 400 ft downstream from falls at Okanagan Falls, British Columbia, and 800 ft downstream from Skaha Lake.

Drainage area.--2,650 sq mi, approximately.

Records available.--October 1930 to September 1951 in reports of Geological Survey. March 1915 to September 1930 in reports of Department of Resources and Development, Canada.

Gage.--Water-stage recorder. Datum of gage is 1,092.82 ft above mean sea level (Geodetic Survey of Canada, 1947 joint adjustment). Prior to Oct. 2, 1933, staff gages at sites about 400 and 500 ft upstream at different datums. Oct. 2, 1933, to Apr. 14, 1938, staff gage at same site and datum.

Average discharge.--36 years, 498 cfs.

Extremes.--Maximum discharge during year, 1,440 cfs May 13 (gage height, 3.08 ft); minimum, 458 cfs Oct. 25 (gage height, 1.77 ft). 1915-51: Maximum discharge observed, 2,680 cfs June 10, 1928; minimum observed, 4.6 cfs Mar. 14, 1931.

Remarks.--Diversions above station for irrigation. Flow regulated by control dam at outlet of Okanagan Lake.

Cooperation.--This station is one of the international gaging stations maintained by Canada under agreement with the United States.

Revisions.--W 1152: Drainage area.

Rating table, water year 1950-51 (gage height, in feet, and  
discharge, in cubic feet per second)

1.8	475	2.5	940
2.0	590	2.8	1,180
2.2	715	3.1	1,460

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	480	519	608	696	590	868	822	1,040	1,120	1,190	*1,080	729
2	480	519	590	708	590	876	815	1,040	1,120	1,180	1,040	736
3	*475	524	590	722	608	852	815	1,040	1,140	1,180	1,010	756
4	480	519	590	722	620	860	822	1,060	1,180	1,190	*980	756
5	486	524	566	715	626	884	830	1,090	1,220	1,190	956	729
6	486	519	566	702	644	876	830	1,150	1,260	1,200	932	715
7	475	524	572	682	663	868	838	*1,220	1,280	1,210	908	715
8	502	530	578	676	656	860	838	1,280	1,280	1,230	900	715
9	492	519	596	670	670	868	845	1,340	1,290	1,230	900	689
10	492	524	602	670	682	845	838	1,380	1,290	1,230	900	696
11	497	524	620	676	676	838	845	1,390	1,290	1,210	900	*702
12	502	536	638	682	670	838	838	1,420	1,300	1,190	892	702
13	502	519	650	676	663	830	860	1,440	1,290	1,190	876	708
14	502	519	656	682	670	830	*860	1,360	1,290	1,190	868	715
15	514	524	663	682	676	838	868	1,340	1,290	1,210	868	702
16	514	572	670	682	676	845	884	*1,320	*1,280	1,210	868	708
17	508	578	676	682	696	845	892	1,330	1,270	1,200	876	715
18	508	578	676	682	729	830	940	1,320	1,270	1,200	876	702
19	519	548	689	682	757	822	932	1,290	1,270	1,180	868	722
20	524	542	689	*676	792	815	932	1,270	1,250	1,180	860	722
21	514	554	676	676	822	815	924	1,230	*1,230	1,160	*830	702
22	497	560	676	670	845	822	924	*1,200	1,240	1,140	822	*708
23	497	530	682	670	860	808	948	1,240	1,240	1,140	778	708
24	*486	542	682	682	852	800	948	1,270	1,240	1,160	757	708
25	486	560	696	696	860	808	956	1,270	1,210	1,140	743	729
26	492	572	689	729	*660	815	964	1,200	1,220	1,140	736	708
27	508	590	676	702	860	815	964	1,170	1,190	1,140	729	702
28	508	590	676	702	868	800	*988	1,140	1,180	1,140	764	689
29	508	*590	*682	750	-	808	1,020	1,140	1,180	1,130	785	689
30	508	602	702	638	-	822	1,020	1,140	1,200	1,130	757	696
31	508	-	702	590	-	822	-	1,150	-	1,130	743	-
Total	15,450	16,351	20,024	21,270	20,181	25,915	26,800	38,270	37,110	36,540	26,802	21,333
Mean	498	545	646	686	721	836	893	1,230	1,240	1,180	865	711
Ac-ft	30,640	32,430	39,720	42,190	40,030	51,400	53,160	75,910	73,610	72,460	53,160	42,310

Calendar year 1950: Max 1,300 Min 321 Mean 678 Ac-ft 490,800

Water year 1950-51: Max 1,440 Min 475 Mean 838 Ac-ft 607,000

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated.



Osoyoos Lake near Oroville, Wash.

(International gaging station)

Location.--Lat 48°59'15", long. 119°27'15", in lot 1, sec. 8, T. 40 N., R. 27 E., on west shore, 1 mile south of international boundary and 3 miles north of Oroville.

Drainage area.--3,250 sq mi, approximately.

Records available.--July 1928 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, U. S. Coast and Geodetic Survey, datum of 1929. Prior to Sept. 2, 1928, staff gage and Sept. 2, 1928, to Nov. 9, 1929, water-stage recorder 100 ft south of international boundary. Nov. 10, 1929, to Sept. 7, 1930, staff gage at present site. All elevations prior to Oct. 1, 1944, at datum 2.39 ft lower. To convert from present datum to Geodetic Survey of Canada 1934 datum, subtract 1.63 ft; to convert from present datum to 1947 joint adjustment of United States Coast and Geodetic Survey and Geodetic Survey of Canada, subtract 0.26 ft.

Extremes.--Maximum elevation during year, 914.09 ft May 14, 15; minimum, 911.05 ft Jan. 25, 26.

1928-51: Maximum elevation, 916.74 ft May 31, 1948; minimum, 908.82 ft (present datum) Oct. 14, 1929.

Flood of May 29, 1894, reached an elevation of 918.8 ft +0.5 ft (present datum), 1 mile below present lake outlet, from floodmark, on old Okanogan Hotel Building, pointed out in 1930 by Mr. and Mrs. Stansbury who kept a diary and operated the hotel in 1894.

Remarks.--Approximately 44,000 acres are irrigated above station in Canada. Elevation may occasionally be affected by dam at Zosel's mill in Oroville.

Cooperation.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	911.24	911.33	911.33	911.64	-	911.37	911.49	912.41	912.73	912.11	912.29	912.08
2	911.28	911.34	911.31	911.67	-	911.39	911.50	912.39	912.55	912.09	912.27	912.10
3	911.32	911.37	911.32	911.72	911.77	911.40	911.52	912.37	912.41	912.09	912.27	912.12
4	911.35	911.39	911.31	911.68	-	911.38	911.58	912.36	912.29	912.11	912.23	912.13
5	911.40	911.41	911.28	911.61	-	911.47	911.62	912.42	912.24	912.10	912.18	912.09
6	911.43	911.41	911.29	911.56	-	911.48	911.64	912.51	912.20	912.14	912.13	912.06
7	911.47	911.39	911.29	911.50	-	911.49	911.68	912.60	912.18	912.15	912.07	911.99
8	911.52	911.37	911.29	911.46	-	911.52	911.71	912.75	912.17	912.18	912.02	911.98
9	911.54	911.34	911.28	911.42	-	911.53	911.75	912.88	912.18	912.19	911.98	911.94
10	911.53	911.31	911.29	911.36	911.35	911.54	911.78	913.03	912.19	912.19	911.94	911.91
11	911.47	911.30	911.31	911.35	911.33	911.54	911.81	913.21	912.20	912.20	911.90	911.87
12	911.43	911.29	911.31	911.32	911.26	911.55	911.85	913.55	912.22	912.21	911.86	911.86
13	911.39	911.28	911.32	911.29	911.21	911.56	911.92	913.89	912.24	912.23	911.84	911.87
14	911.36	911.24	911.34	911.26	911.17	911.57	911.95	914.07	912.25	912.22	911.84	911.85
15	911.32	911.24	911.35	911.24	911.15	911.60	911.98	914.07	912.28	912.21	911.87	911.82
16	911.28	911.33	911.38	911.22	911.11	911.61	912.03	914.01	912.28	912.20	911.87	911.80
17	911.23	911.34	911.41	911.22	911.08	911.61	912.07	913.99	912.29	912.20	911.87	911.79
18	911.21	911.35	911.43	911.22	911.07	911.61	912.13	913.99	912.27	912.20	911.88	911.78
19	911.20	911.33	911.45	911.22	911.08	911.61	912.09	914.03	912.24	912.19	911.88	911.78
20	911.18	911.33	911.49	911.18	911.08	911.60	912.09	913.98	912.20	912.18	911.87	911.72
21	911.16	911.32	911.51	911.17	911.11	911.59	912.08	913.87	912.18	912.17	911.88	911.68
22	911.14	911.34	911.52	911.14	911.13	911.57	912.08	913.75	912.21	912.19	911.91	911.68
23	911.13	911.29	911.54	911.12	911.17	911.55	912.08	913.73	912.23	912.21	911.89	911.66
24	911.10	911.29	911.56	911.09	911.20	911.53	912.08	913.83	912.24	912.21	911.88	911.65
25	911.10	911.29	911.57	911.07	911.25	911.52	912.08	914.00	912.21	912.21	911.88	911.65
26	911.11	911.30	911.59	911.06	911.29	911.51	912.11	913.98	912.21	912.21	911.87	911.63
27	911.16	911.30	911.60	-	911.32	911.49	912.13	913.83	912.18	912.22	911.85	911.61
28	911.21	911.30	911.61	-	911.34	911.49	912.22	913.61	912.16	912.24	911.93	911.61
29	911.25	911.31	911.62	-	-	911.48	912.36	913.39	912.14	912.26	911.97	911.61
30	911.28	911.33	911.63	-	-	911.49	912.41	913.16	912.13	912.27	912.02	911.63
31	911.30	-	911.64	-	-	911.49	-	912.93	-	912.29	912.05	-

b Possibly affected by backwater from ice.

## OKANOGAN RIVER BASIN

Okanogan River at Oroville, Wash.

Location.--Lat 48°56', long. 119°51', in SW $\frac{1}{4}$  sec. 27, T. 40 N., R. 27 E., on left bank in Oroville half a mile downstream from Tonasket Creek and  $\frac{1}{2}$  miles downstream from Osoyoos Lake.

Drainage area.--3,210 sq mi, approximately.

Records available.--October 1942 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 900 ft above mean sea level, datum of 1929. Prior to Oct. 26, 1944, staff gage at Zosel's mill dam 200 ft upstream at same datum. Oct. 26, 1944, to Mar. 6, 1948, water-stage recorder on railroad trestle 20 ft upstream, at same datum. Auxiliary water-stage recorder half a mile downstream used during high-water periods since Apr. 10, 1948. May 15, 1946, to July 8, 1947, auxiliary staff gage at same site read during periods of high water.

Average discharge.--9 years, 730 cfs.

Extremes.--Maximum discharge during year, 2,500 cfs May 15; maximum gage height, 13.62 ft May 24, 25 (backwater from Similkameen River); minimum discharge, 173 cfs Jan. 26 (gage height, 5.98 ft).

1942-51: Maximum discharge observed, 3,430 cfs June 2, 1948; maximum gage height, 16.50 ft May 31, 1948 (backwater from Similkameen River); maximum daily reverse flow, 2,270 cfs May 29, 1948.

Remarks.--Records good except those for periods of no gage-height record or backwater from Similkameen River, which are fair. Diversions in Canada for irrigation. Natural regulation in several large lakes and artificial regulation in Okanogan Lake as an aid to navigation, and pondage bank of Zosel's mill dam at Oroville, 200 ft above station.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	426	519	651	748	600	827	926	1,700	1,880	1,230	1,100	765
2	432	519	635	756	650	827	917	1,710	1,740	1,210	1,100	774
3	432	526	643	818	700	836	908	1,710	1,650	1,220	*1,090	774
4	432	532	643	881	750	845	863	1,660	1,530	1,240	1,080	827
5	442	532	628	863	800	854	881	1,640	1,460	1,250	1,060	899
6	448	585	628	845	850	845	881	1,590	1,430	1,270	1,040	890
7	454	635	635	827	900	845	899	1,590	1,400	1,260	1,020	881
8	465	635	635	818	980	845	908	*1,700	1,400	1,300	998	881
9	538	621	628	809	1,000	845	926	1,910	1,380	1,300	971	863
10	666	621	628	809	1,100	845	944	*2,000	1,400	1,300	944	872
11	697	614	635	800	1,080	845	962	*1,870	1,410	1,300	944	854
12	690	614	635	791	1,240	856	980	1,660	1,420	1,300	926	*765
13	674	607	643	783	1,040	845	1,100	1,870	1,390	1,250	863	871
14	674	607	643	783	920	845	*1,130	2,250	1,380	1,250	809	818
15	658	607	635	783	880	854	1,150	*2,470	1,330	1,250	818	800
16	651	628	643	791	870	845	1,250	*2,350	1,430	1,250	827	791
17	635	628	658	809	860	845	1,340	2,290	1,520	1,200	818	791
18	628	628	666	809	850	845	1,400	1,990	1,500	1,160	809	791
19	621	628	682	*800	840	845	1,340	2,170	1,400	1,130	818	800
20	628	628	690	791	830	898	1,370	2,300	*1,320	1,120	809	783
21	621	621	697	791	820	962	1,380	*2,200	1,240	1,100	730	765
22	621	651	713	783	820	962	1,380	1,940	1,190	1,120	730	774
23	614	628	713	783	820	953	1,380	1,670	1,210	1,120	756	774
24	607	621	722	783	820	944	1,380	951	1,220	1,120	739	774
25	*551	621	722	783	*818	935	1,380	1,480	1,220	1,120	730	791
26	488	621	722	697	827	935	1,390	2,150	1,230	1,110	739	774
27	494	621	730	670	827	935	1,420	2,280	1,220	1,100	722	756
28	506	*628	739	640	827	926	1,450	2,290	1,230	1,100	730	748
29	513	635	739	620	-	926	1,520	2,270	1,230	1,100	739	756
30	519	643	748	590	-	926	1,640	2,150	1,240	1,100	722	765
31	519	-	756	590	-	926	-	2,010	-	1,100	739	-
Total	17,344	18,204	20,885	23,844	24,319	27,247	35,395	59,821	41,600	36,990	26,920	24,167
Mean	559	607	674	769	869	879	1,180	1,930	1,387	1,183	868	806
As-ft	34,400	36,110	41,420	47,290	48,240	54,040	70,200	118,700	82,510	73,370	53,400	47,930
Calendar year 1950: Max	2,850											
Water year 1950-51: Max	2,470											
Min	-844											
Mean	760											
As-ft	550,500											
Ac-ft	707,600											

\* Discharge measurement made on this day.

Note.--No gage-height record Jan. 27 to Feb. 24, July 28 to Aug. 2; discharge estimated on basis of weather records and records for station near Tonasket and Similkameen River near Nighthawk. Backwater from Similkameen River Apr. 18-21, Apr. 27 to July 7.

## Similkameen River near Nighthawk, Wash.

(International gaging station)

Location.--Lat 48°59'10", long. 119°37'00", in NW $\frac{1}{4}$  sec. 7, T. 40 N., R. 26 E., on left bank about 1 $\frac{1}{2}$  miles downstream from Nighthawk and 12 miles upstream from mouth.

Drainage area.--3,550 sq mi, approximately.

Records available.--May 1911 to September 1951 (prior to September 1928 mean monthly discharge included Oroville-Tonasket Irrigation District canal). Published as "near Oroville" 1911-28.

Gage.--Water-stage recorder. Datum of gage is 1,137.70 ft above mean sea level, International joint adjustment of 1947. Prior to Sept. 11, 1928, staff gages at sites 7 miles downstream (below Oroville-Tonasket Irrigation District canal) at various datums.

Average discharge.--40 years, 2,192 cfs.

Extremes.--Maximum discharge during year, 22,700 cfs May 24 (gage height, 13.71 ft); minimum, 460 cfs Jan. 30 (gage height, 3.16 ft), but may have been less during period of ice effect Jan. 31 to Feb. 7.

1928-51: Maximum discharge, 38,700 cfs May 30, 1948 (gage height, 17.62 ft); minimum, 120 cfs Jan. 6, 1930 (gage height, 2.05 ft).

Remarks.--Records good except those for periods of ice effect, which are poor. Flow at high stages regulated by natural diversion into and release from Palmer Lake. Several small diversions above station for irrigation of about 2,900 acres in the United States in 1946. An unknown area, estimated to be small, is irrigated in Canada.

Cooperation.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

Revisions.--W 1182: Drainage area.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

3.2	480	7.0	4,510
4.0	990	9.0	8,330
5.0	1,890	13.5	22,000

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	590	857	1,740	1,740	b500	1,250	948	5,330	9,310	6,420	1,360	1,410
2	578	808	1,590	1,690	b500	1,190	962	*5,160	9,060	6,420	1,320	1,360
3	560	787	1,360	*1,640	b500	1,150	1,010	5,160	9,310	6,230	1,230	1,320
4	560	766	1,740	1,590	b500	1,150	1,150	5,500	9,820	5,860	*1,180	1,190
5	572	1,230	1,690	1,460	b550	1,110	1,410	6,610	10,300	5,500	1,150	1,070
6	572	1,740	1,230	1,410	b650	962	1,590	8,330	10,600	5,500	1,110	1,010
7	578	1,460	1,150	1,190	b900	885	1,690	9,560	10,600	5,680	1,070	948
8	596	1,280	1,320	1,190	934	b600	1,840	11,200	10,900	5,160	1,030	920
9	608	1,150	1,320	1,320	976	b750	1,940	*12,600	10,800	4,670	990	899
10	*731	976	1,230	1,320	1,020	b750	2,000	14,400	10,600	4,510	962	913
11	843	878	1,590	1,230	1,360	b750	2,000	*16,600	10,100	4,210	983	892
12	1,110	1,030	1,940	1,190	2,580	b800	2,160	19,900	9,820	3,910	1,050	*892
13	998	998	1,840	1,150	2,340	b800	*2,850	19,900	9,560	3,770	1,020	899
14	985	927	1,640	1,150	2,160	1,070	3,770	17,500	9,310	3,630	962	864
15	990	871	1,500	1,150	2,060	1,100	3,910	15,600	8,570	3,490	920	829
16	976	948	1,500	1,150	1,940	1,110	4,210	*15,600	8,100	3,280	885	794
17	920	899	1,500	1,070	1,940	1,070	4,830	17,200	9,060	3,090	850	766
18	857	913	1,410	*1,060	1,890	1,040	5,680	18,500	9,820	2,960	822	758
19	808	843	1,360	1,010	1,840	1,050	6,040	17,800	10,900	2,760	794	717
20	815	759	1,320	941	1,790	1,070	5,500	16,200	*10,100	2,580	773	686
21	913	766	1,320	934	1,790	1,020	5,160	*15,900	9,310	2,400	745	668
22	976	822	1,410	976	1,690	1,020	4,990	16,900	8,810	2,280	717	656
23	899	829	1,460	976	1,590	1,010	4,830	18,800	8,810	2,160	698	656
24	843	801	1,460	983	*1,500	969	4,510	22,000	9,060	2,060	692	644
25	*808	822	1,890	998	1,500	962	4,510	20,900	9,060	1,940	680	632
26	787	1,020	2,830	1,020	1,460	948	4,670	17,500	8,330	1,890	668	614
27	976	1,840	2,400	985	1,360	962	4,990	15,300	7,870	1,730	650	620
28	955	*2,580	2,160	554	1,280	941	5,330	14,100	7,220	1,690	815	632
29	920	2,340	2,060	510	-	948	5,500	12,600	6,810	1,590	962	*638
30	920	1,940	1,940	495	-	955	5,500	11,200	6,610	1,500	1,110	656
31	892	-	1,840	b500	-	962	-	9,820	-	1,460	1,280	-
Total	25,134	33,880	50,740	54,580	39,000	30,634	105,460	433,270	278,630	110,390	29,488	25,533
Mean	811	1,129	1,637	1,715	1,593	988	3,515	13,980	9,288	3,581	951	851
Ac-ft	49,650	67,200	100,600	68,590	77,360	60,760	209,200	859,400	552,700	219,000	58,490	50,640
Calendar year 1950: Max			28,900		Min 500		Mean 3,515		Ac-ft 2,400,000			
Water year 1950-51: Max			22,000		Min 495		Mean 3,279		Ac-ft 2,374,000			

Peak discharge (base, 8,000 cfs).--May 24 (8 to 9 p.m.) 22,700 cfs (13.71 ft); June 19 (6 p.m.) 11,400 cfs (10.18 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

## Okanogan River near Tonasket, Wash.

(International gaging station)

Location.--Lat 48°38'00" long. 119°27'50", in lot 3, sec. 8, T. 36 N., R. 27 E., on right bank 1,000 ft upstream from Chewiliken Creek and  $\frac{5}{8}$  miles south of Tonasket.

Drainage area.--7,270 sq mi, approximately (revised)

Records available.--May 1911 to September 1925, April 1929 to September 1931 in reports of Geological Survey. Published as "at Okanogan" 1911-25. June 1911 to September 1933 (monthly records only) in State Water-Supply Bulletin 5.

Gage.--Water-stage recorder. Datum of gage is 860.78 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. Prior to Oct. 1, 1925, several staff or chain gages at Okanogan at different datum. Apr. 17 to May 20, 1929, staff gage at same site and datum.

Average discharge.--36 years (1911-25, 1929-51), 2,849 cfs.

Extremes.--Maximum discharge during year, 23,600 cfs May 25 (gage height, 16.77 ft); minimum, 895 cfs Oct. 4 (gage height, 5.28 ft).

1911-25, 1929-51: Maximum discharge, 40,900 cfs May 31, 1948 (gage height, 21.79 ft, from floodmark); minimum recorded, 126 cfs Sept. 5, 1931 (gage height, 3.43 ft).

Remarks.--Records excellent except those for periods of shifting control, which are good, and those for periods of ice effect or no gage-height record, which are poor. Diversions above station for irrigation of about 10,700 acres in the United States and 45,580 acres in Canada. Flow subject to natural regulation by several lakes and to some artificial regulation by Okanogan Lake for storage and as an aid to navigation. Some diurnal fluctuation at low flow caused by powerplant on Similkameen River.

Cooperation.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

Revisions (water years).--W 862: 1937.

Rating table, water year 1950-51, except periods of ice effect or shifting control (gage height, in feet, and discharge, in cubic feet per second)

5.4	950	10.0	6,910
6.0	1,350	13.0	13,700
7.0	2,330	16.7	23,300
8.0	3,590		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	980	1,480	2,560	2,620	1,200	2,220	2,060	7,100	11,400	7,670	2,330	2,110
2	980	1,480	2,330	2,560	1,250	2,160	2,060	*6,910	11,000	7,480	2,280	2,160
3	980	1,430	2,160	2,560	1,400	2,110	2,060	6,540	11,000	7,290	2,160	2,110
4	980	1,390	2,060	*2,560	1,600	2,110	2,110	6,910	*11,200	7,100	2,160	2,110
5	980	1,430	b1,900	2,500	b1,800	b2,050	2,330	7,480	11,600	6,720	2,060	2,060
6	1,010	2,000	b1,800	2,330	b1,900	b2,000	2,500	9,050	11,800	6,360	1,850	1,950
7	1,040	2,330	1,800	2,220	b2,000	b1,900	2,680	11,000	11,800	6,910	*1,950	1,850
8	1,070	2,110	1,950	2,110	2,060	1,800	2,740	12,500	12,300	6,540	1,900	1,800
9	1,070	2,000	2,110	2,110	2,060	1,650	2,880	13,700	12,300	5,820	1,850	1,750
10	1,200	1,850	2,060	2,220	2,220	1,600	2,920	*14,400	12,500	5,480	1,800	1,750
11	*1,430	1,660	2,000	2,160	2,220	1,600	2,980	16,000	12,800	5,310	1,800	1,750
12	1,610	1,610	2,500	2,110	2,740	1,700	3,050	*18,000	13,200	5,140	1,800	1,700
13	1,750	1,750	2,620	2,110	3,730	1,850	*3,380	20,600	13,400	4,810	1,850	*1,610
14	1,700	1,700	2,500	2,060	3,310	2,000	4,180	20,900	13,700	4,650	1,750	1,700
15	1,660	1,660	2,330	2,110	3,120	2,100	4,810	19,100	14,200	4,490	1,660	1,660
16	1,660	1,700	2,220	2,060	2,920	2,150	5,140	*18,000	15,000	4,330	1,610	1,610
17	1,610	1,750	2,280	*2,000	2,920	2,200	5,650	18,200	15,000	4,180	1,560	1,560
18	1,560	1,660	2,220	1,950	2,660	2,200	6,540	19,700	14,000	3,980	1,520	1,520
19	1,520	1,660	2,160	1,900	2,860	2,200	7,100	20,300	12,800	3,730	1,480	1,520
20	1,480	1,610	2,160	1,850	2,860	2,150	6,910	19,400	11,800	3,590	1,480	1,480
21	1,480	1,560	2,110	1,800	2,680	2,100	6,720	*18,500	*11,000	3,380	1,430	1,430
22	1,560	1,520	2,160	1,800	2,620	2,100	6,360	18,200	10,100	3,180	1,310	1,390
23	*1,610	1,610	2,220	1,800	2,500	2,100	6,180	19,100	9,980	3,050	1,350	1,430
24	1,520	1,560	2,280	1,900	*2,440	2,100	5,820	21,200	10,100	2,980	1,350	1,390
25	1,520	1,560	2,280	1,900	2,380	2,100	5,820	23,300	10,300	2,920	1,310	1,390
26	1,390	1,560	3,120	1,800	2,380	2,100	5,820	21,800	9,670	2,800	1,310	1,390
27	1,390	*1,900	3,310	b1,700	2,330	2,100	6,180	18,800	9,250	2,740	1,310	1,390
28	1,560	2,660	3,050	1,400	2,280	2,100	6,720	17,200	8,850	2,620	1,430	1,350
29	1,560	3,180	2,860	1,200	-	2,100	6,910	16,000	8,050	2,500	1,660	1,390
30	1,520	2,800	2,800	1,150	-	2,100	6,910	14,200	7,880	2,440	1,600	*1,430
31	1,520	-	2,680	1,150	-	2,100	-	12,900	-	2,390	1,650	-
Total	42,900	54,370	72,590	61,500	66,640	62,850	137,500	486,890	347,860	142,470	52,960	49,780
Mean	1,384	1,612	2,342	1,984	2,380	2,027	4,583	15,710	11,600	4,593	1,708	1,659
Ac-ft	85,090	107,800	144,000	122,000	132,200	124,700	272,700	965,100	690,000	282,600	105,000	98,740
Calendar year 1950: Max	29,200			Min 815			Mean 4,202	Ac-ft 3,043,000				
Water year 1950-51: Max	23,300			Min 980			Mean 4,324	Ac-ft 3,131,000				

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Jan. 28 to Feb. 4, Mar. 8-12, 14-31; discharge estimated on basis of records for Similkameen River near Nighthawk. Shifting-control method used Aug. 9 to Sept. 30.

## Methow River at Twisp, Wash.

Location.--Lat 48°21'40", long. 120°06'50", in NW¼ sec. 17, T. 33 N., R. 22 E., on left bank a quarter of a mile downstream from Twisp River and 0.3 mile east of center of Twisp.

Drainage area.--1,330 sq mi, approximately.

Records available.--June 1919 to September 1929, October 1933 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,580 ft (from topographic map). Prior to Oct. 3, 1919, several staff gages in the immediate vicinity at different datum. Oct. 3, 1919, to Nov. 6, 1933, chain gage 40 ft upstream at same datum as staff gages. Nov. 7 to Dec. 18, 1933, staff gage at present site at different datum.

Average discharge.--28 years, 1,280 cfs.

Extremes.--Maximum discharge during year, 17,600 cfs May 12 (gage height, 8.46 ft); minimum, 275 cfs Oct. 1, but may have been less during period of ice effect.  
1919-29, 1933-51: Maximum discharge, 40,800 cfs May 29, 1948 (gage height, 12.94 ft), from rating curve extended above 18,000 cfs on basis of slope-area determination of peak flow; minimum observed, 134 cfs Sept. 4, 5, 1926, Sept. 9, 10, 1929, but may have been less during period of ice effect Jan. 6 to Mar. 4, 1937.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of ice effect or no gage-height record, which are poor. A large part of the flow diverted above station for irrigation by two canals of Methow Valley Irrigation District, by Risley ditch, and by many other smaller ditches. It is estimated 7,410 acres were irrigated in 1946 by water diverted above this station.

Rating tables, water year 1950-51, except periods of ice effect or shifting control (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to May 11		May 12 to Sept. 30	
2.4	230	2.1	315
2.7	530	2.5	690
3.0	920	3.0	1,560
4.0	2,700	4.0	5,160
6.0	8,100	6.0	8,220
8.0	15,600	8.0	15,600

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	311	578	560	590	5280	663	892	3,740	5,080	4,840	966	738
2	400	566	550	580	4450	614	950	3,500	5,080	4,840	901	725
3	400	542	560	580	5520	625	1,130	3,620	5,460	4,720	875	714
4	390	590	600	578	5550	650	1,340	3,990	6,250	4,480	849	679
5	410	663	560	530	566	602	1,720	5,760	6,380	4,020	*836	624
6	442	702	490	497	566	590	2,000	7,200	6,380	3,800	798	591
7	442	702	490	519	566	578	2,340	9,000	6,250	3,260	762	580
8	453	676	510	519	554	578	2,640	11,200	5,980	2,960	738	602
9	475	626	510	519	566	578	2,810	11,200	6,250	2,960	702	580
10	554	614	530	566	794	554	2,830	12,800	6,800	2,960	726	550
11	542	638	600	566	1,090	530	2,880	15,600	7,360	2,760	786	540
12	508	626	680	566	1,150	566	*3,380	15,600	8,220	2,570	810	520
13	508	590	620	554	1,100	554	4,380	11,600	8,800	2,570	786	510
14	530	590	560	554	1,060	542	5,480	9,700	8,800	2,570	738	490
15	578	590	540	566	1,020	554	5,480	9,100	10,000	2,380	714	*462
16	602	626	530	*508	965	542	5,620	10,000	9,100	2,250	646	444
17	602	614	520	*497	935	519	6,180	*11,600	8,220	2,090	580	417
18	590	590	510	475	935	508	6,600	11,600	8,220	1,970	530	408
19	578	542	508	486	864	519	5,900	10,400	7,080	1,800	510	390
20	578	566	510	464	836	542	5,200	10,000	*6,250	1,630	500	382
21	578	566	510	486	822	578	4,510	10,000	5,720	1,540	471	382
22	566	590	475	794	590	590	4,120	*12,000	5,590	1,470	444	382
23	*542	554	508	453	*767	602	3,740	15,200	5,590	1,410	426	362
24	530	566	510	464	741	614	3,500	13,200	5,980	1,340	426	375
25	554	*590	540	475	715	638	3,500	10,400	5,850	1,320	417	368
26	590	620	580	497	689	676	3,740	8,800	5,720	1,270	399	360
27	650	660	620	400	676	715	3,990	8,200	5,340	1,180	417	360
28	626	710	610	320	676	754	4,120	*7,640	4,960	1,140	580	390
29	614	680	610	330	-	822	4,120	6,940	4,720	1,080	786	417
30	578	600	600	530	-	836	3,980	5,980	4,720	1,040	810	435
31	554	-	600	530	-	850	-	5,340	-	1,000	774	-
Total	16,275	18,367	17,136	15,234	21,347	19,084	108,952	290,930	196,150	75,220	20,703	14,798
Mean	525	612	553	491	762	616	3,632	9,385	6,538	2,426	668	493
Ac-ft	32,280	36,430	33,990	30,220	42,340	37,850	216,100	577,100	369,100	149,200	41,060	29,350
Calendar year 1950:	Max	18,800	Min	166	Mean	2,052	Ac-ft	1,485,000				
Water year 1950-51:	Max	15,600	Min	310	Mean	2,231	Ac-ft	1,615,000				

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--Shifting-control method used Dec. 19 to Feb. 17. No gage-height record Nov. 26 to Dec. 18, Dec. 20-22, Dec. 24 to Jan. 3; discharge estimated on basis of records for nearby stations and weather records.

## Stehekin River at Stehekin, Wash.

Location (revised).--Lat 48°19'30", long. 120°41'20", in SE  $\frac{1}{4}$  sec. 26, T. 33 N., R. 17 E., on left bank 1,200 ft upstream from Boulder Creek,  $\frac{1}{2}$  miles upstream from Lake Chelan, and 2 miles northwest of Stehekin.

Drainage area.--372 sq mi, includes that of Boulder Creek.

Records available.--October 1910 to October 1915, January 1927 to September 1951 (includes flow of Boulder Creek).

Gage.--Water-stage recorder. Datum of gage is 1,100 ft above mean sea level (unadjusted). Prior to Aug. 16, 1911, staff gage three-eighths of a mile upstream from mouth, at different datums (datum change made June 13, 1911). Aug. 17, 1911, to Oct. 31, 1915, staff gage a quarter of a mile downstream from Boulder Creek at different datum.

Average discharge.--29 years, 1,358 cfs.

Extremes.--Maximum discharge during year, 12,700 cfs May 11 (gage height, 26.89 ft); minimum, 325 cfs Mar. 12 (gage height, 19.06 ft).

1910-15, 1927-51: Maximum discharge, 18,900 cfs May 29, 1948 (gage height, 29.00 ft), from rating curve extended above 9,000 cfs on basis of slope-area determination of peak flow; minimum, 56 cfs Jan. 21, 1930.

Remarks.--Records good except those for period of ice effect, which are fair. At very high stages small part of flow is diverted above gage by natural sloughs; flow diverted included in daily discharge. No regulation.

Cooperation.--Gage-height record collected in cooperation with, and six discharge measurements furnished by Washington Water Power Co.

Revisions (water years).--W 412: 1914.

Rating table, water year 1950-51, except period of ice effect (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used June 15 to Sept. 30)

19.1	340
19.5	520
20.0	800
21.0	1,550
22.0	2,560
24.0	5,580
26.2	10,800

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	438	746	965	1,070	b400	565	495	1,920	2,660	5,020	1,820	752
2	398	698	881	1,070	b410	545	570	1,820	3,180	3,000	1,780	746
3	372	*848	836	1,000	b430	530	722	1,870	3,660	5,020	1,680	734
4	368	1,220	782	930	b440	530	*930	2,230	4,180	4,840	1,680	728
5	438	1,420	752	*860	448	500	1,180	2,980	4,180	4,180	1,640	722
6	430	1,180	740	818	425	480	1,300	3,590	4,180	3,450	1,500	734
7	638	1,070	698	782	416	b460	1,460	4,840	3,880	3,120	1,460	888
8	1,260	965	850	740	420	b430	1,550	5,020	3,600	3,180	1,500	1,420
9	930	848	850	710	560	b410	1,550	5,200	4,030	3,590	*1,800	1,000
10	1,300	812	842	680	1,970	b400	1,550	6,190	4,340	3,800	1,680	930
11	1,140	782	854	656	2,680	b390	*1,600	10,800	4,670	3,660	1,640	824
12	1,300	736	818	620	2,070	398	1,870	7,770	5,020	3,660	1,460	716
13	1,500	686	776	626	1,640	398	2,450	5,020	5,390	3,880	1,260	692
14	1,540	656	746	610	1,420	394	2,800	4,030	*6,190	4,030	1,220	698
15	1,300	638	734	580	1,300	407	2,740	4,030	7,530	3,800	1,220	692
16	1,070	638	698	580	*1,140	380	2,800	4,500	6,620	3,660	1,220	698
17	916	600	674	540	1,070	368	3,120	5,780	5,780	3,770	1,140	728
18	881	560	644	570	1,000	360	3,180	5,390	5,390	3,660	1,070	752
19	930	525	644	555	923	360	2,740	*4,840	5,200	3,180	1,100	710
20	1,040	535	680	535	867	364	2,400	4,840	4,840	2,740	1,180	638
21	888	530	764	525	812	380	2,120	5,200	4,670	2,660	1,260	585
22	800	540	788	510	770	384	1,920	6,400	4,670	2,660	1,220	560
23	746	530	1,000	475	740	384	1,820	8,490	4,840	2,860	1,070	540
24	704	575	1,820	466	704	389	1,780	6,620	4,670	2,920	965	540
25	965	788	2,560	555	668	402	1,870	5,020	4,840	2,800	874	794
26	*916	1,340	1,920	605	638	430	2,020	4,180	5,020	2,560	854	585
27	930	1,420	1,640	b470	505	448	2,120	3,680	5,020	2,450	854	515
28	930	1,260	1,460	b430	585	450	2,180	3,660	4,840	2,400	902	535
29	848	1,100	1,340	b400	-	461	2,120	3,240	4,670	2,340	824	764
30	794	1,070	1,220	b390	-	452	2,020	2,920	5,020	2,070	888	1,460
31	740	-	1,140	b390	-	466	-	2,740	-	1,870	782	-
Total	27,550	25,316	30,716	19,748	25,551	13,317	56,977	145,010	143,180	104,650	39,343	22,680
Mean	889	844	991	637	913	430	1,899	4,678	4,773	3,382	1,269	756
Cfs/m	2.39	2.27	2.66	1.71	2.45	1.16	5.10	12.6	12.8	9.03	3.41	2.03
In.	2.75	2.53	3.07	1.97	2.55	1.33	5.70	14.50	14.31	10.43	3.93	2.27
Ac-ft	54,640	50,210	60,920	39,170	50,680	26,410	113,000	287,600	284,000	208,000	78,040	44,990
Calendar year 1950: Max	13,500	Min	250	Mean	1,950	Cfs/m	5.24	In.	71.16	Ac-ft	1,412,000	
Water year 1950-51: Max	10,800	Min	360	Mean	1,792	Cfs/m	4.82	In.	65.39	Ac-ft	1,298,000	

Peak discharge (base, 5,000 cfs).--May 11 (3:30 p.m.) 12,700 cfs (26.89 ft); May 23 (8:30 a.m.) 8,990 cfs (25.51 ft); June 15 (1 a.m.) 8,250 cfs (25.12 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

## Railroad Creek at Lucerne, Wash.

Location.--Lat 48°11'45" (revised), long. 120°35'50", in sec. 9, T. 31 N., R. 18 E., on left bank half a mile upstream from mouth and half a mile southwest of Lucerne.

Drainage area.--64.8 sq mi (revised).

Records available.--December 1910 to June 1913, January 1927 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,250 ft (from topographic map). Prior to June 30, 1913, staff gage at site 1,800 ft downstream at different datum.

Average discharge.--25 years (1911-12, 1927-51), 196 cfs.

Extremes.--Maximum discharge during year, 2,440 cfs May 11 (gage height, 5.42 ft); minimum, 47 cfs Oct. 4 (gage height, 2.26 ft).

1910-13, 1927-51: Maximum discharge, 3,900 cfs May 28, 1948 (gage height, 8.1 ft, from floodmarks), from rating curve extended above 1,300 cfs on basis of slope-area and contracted-opening determinations of peak flow; minimum, less than 9.4 cfs sometime during period of ice effect Jan. 15-25, 1930.

Remarks.--Records fair except those for periods of doubtful or no gage-height record, which are poor. No diversion or regulation.

Cooperation.--Gage-height record collected in cooperation with, and five discharge measurements furnished by Washington Water Power Co.

Revisions (water years).--W 1042: 1944. W 1122: 1936.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)  
(Shifting-control method used Nov. 26 to Jan. 4)

2.1	32	5.5	575
2.4	96	4.0	1,020
2.7	177	5.0	2,000
3.1	330		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	62	118	150	136	66	84	80	360	474	885	316	139
2	55	*110	136	142	68	80	*85	350	500	849	298	128
3	49	136	125	134	71	78	*94	355	575	858	290	125
4	43	220	120	*118	72	76	125	418	687	894	281	120
5	62	214	110	110	72	75	159	515	705	813	265	120
6	60	168	113	105	70	70	180	643	687	660	265	118
7	106	147	115	100	70	67	207	948	634	515	265	139
8	217	128	113	98	75	64	224	966	592	454	*249	190
9	165	113	110	96	100	61	231	1,020	634	515	249	168
10	200	108	134	95	190	60	234	1,170	687	592	265	144
11	153	106	153	95	290	59	*249	1,950	768	618	273	134
12	217	103	139	95	240	59	294	1,260	876	584	245	115
13	242	98	125	94	210	59	396	885	*939	600	220	108
14	a260	96	115	94	190	59	454	750	1,020	660	207	106
15	a190	98	110	*94	170	59	468	723	1,260	678	203	108
16	a160	101	106	94	160	58	494	786	1,190	643	203	*110
17	a150	98	98	93	150	57	560	903	1,030	609	190	113
18	a140	101	91	92	140	56	575	921	957	592	177	115
19	a150	89	89	90	130	56	522	*831	930	634	177	118
20	a170	96	87	88	120	56	461	786	858	552	187	115
21	a140	96	98	86	115	57	418	813	795	448	200	113
22	a130	96	96	82	110	57	391	921	777	402	207	103
23	a120	96	108	76	105	58	365	1,300	804	386	190	101
24	a110	115	156	82	100	60	355	1,110	813	418	177	96
25	a150	159	290	92	98	63	365	912	804	448	162	94
26	*162	238	238	99	95	65	391	813	840	424	153	98
27	165	261	200	80	90	67	396	723	894	386	150	115
28	156	220	184	71	86	68	408	652	849	365	177	101
29	139	187	168	67	-	69	408	552	813	345	168	94
30	125	171	156	65	-	70	380	508	831	340	184	96
31	115	-	144	65	-	75	-	*480	-	330	162	-
Total	4,373	4,087	4,177	2,928	3,453	2,002	9,969	25,334	24,223	17,497	6,755	3,542
Mean	141	136	135	94.5	123	64.6	332	817	807	564	218	118
Cfsm	2.18	2.10	2.08	1.46	1.90	0.997	5.12	12.6	12.5	8.70	3.36	1.82
In.	2.51	2.35	2.40	1.68	1.98	1.15	5.72	14.54	13.90	10.04	3.88	2.03
Ac-ft	8,670	8,110	8,280	5,810	6,850	3,970	19,770	50,250	48,050	34,700	13,400	7,030
Calendar year 1950: Max	1,800			Min 37	Mean 268	Cfsm 4.14	In. 56.73	Ac-ft 193,900				
Water year 1950-51: Max	1,950			Min 49	Mean 297	Cfsm 4.58	In. 62.18	Ac-ft 214,900				

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for Stehekin River at Stehekin.

Note.--Doubtful gage-height record Jan. 5 to Apr. 2; discharge estimated on basis of 1 discharge measurement and records for Stehekin River at Stehekin.

## Lake Chelan at Chelan, Wash.

Location.--Lat 47°50'00", long. 120°03'40", in lot 3, sec. 15, T. 27 N., R. 22 E., on south shore 2 miles west of Chelan.

Drainage area.--952 sq mi (revised).

Records available.--September 1897 to December 1899, January to June 1905, December 1910 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, adjustment of 1912. Prior to Dec. 31, 1899, staff gage at Lakeside about 1 mile west of Chelan at datum 1,070.18 ft above mean sea level, adjustment of 1912. Jan. 1 to June 30, 1905, staff gage at upper highway bridge at Chelan at different datum. Dec. 5, 1910, to Nov. 13, 1927, staff gage at Forest Service boat landing at Chelan at datum 1,076.15 ft above mean sea level, adjustment of 1912.

Extremes.--Maximum elevation during year, 1,100.00 ft July 29; minimum, 1,091.54 ft Apr. 3.

1897-99, 1905, 1910-51: Maximum elevation, 1,100.05 ft July 19, 1947; minimum, 1,076.78 ft Jan. 27, 28, Dec. 2, 3, 1898.

Remarks.--Reservoir is formed by low concrete dam at lake outlet completed Sept. 3, 1927. Capacity, 676,100 acre-ft between elevations 1,079 and 1,100 ft. Regulation between these elevations is allowed by stipulation of Federal Power Commission. Water is used for power development. Elevation of lake maintained between 1,092 and 1,100 ft during period Aug. 16 to Sept. 15 for scenic effect and recreational purposes. In 1946, an estimated 6,280 acres were irrigated above station with an estimated annual depletion of about 11,000 acre-ft.

Cooperation.--Gage-height record collected in cooperation with Washington Water Power Co.

Capacity table, water year 1950-51 (elevation, in feet, capacity in acre-feet)

1,093	447,400	1,095	512,600	1,097	577,800	1,099	643,300
1,094	480,000	1,096	545,200	1,098	610,500	1,100	676,100

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	98.68	99.39	99.58	99.38	98.53	94.05	91.60	93.11	96.42	99.69	99.92	99.60
2	98.56	99.35	99.52	99.39	98.33	93.88	91.58	93.04	96.50	99.71	99.92	99.64
3	98.44	99.31	99.51	99.36	98.31	93.68	91.58	93.04	96.58	99.74	99.93	99.65
4	98.55	99.33	99.47	99.27	98.28	93.51	91.61	93.08	96.77	99.77	99.93	99.66
5	98.28	99.40	99.43	99.24	98.25	93.34	91.64	93.20	96.97	99.75	99.91	99.62
6	98.20	99.47	99.42	99.21	98.25	93.27	91.70	93.40	97.29	99.71	99.90	99.60
7	98.12	99.40	99.42	99.20	98.20	93.20	91.78	93.68	97.60	99.61	99.88	99.59
8	98.06	99.37	99.38	99.16	98.04	93.13	91.82	93.99	97.85	99.54	99.84	99.59
9	98.02	99.31	99.36	99.08	97.96	93.04	91.82	94.31	98.13	99.53	99.82	99.57
10	98.04	99.25	99.39	99.02	97.81	92.96	91.88	94.71	98.43	99.54	99.81	99.58
11	98.03	99.24	99.40	98.96	97.64	92.87	91.93	95.40	98.78	99.65	99.84	99.47
12	98.10	99.30	99.40	98.92	97.51	92.82	91.98	96.00	99.08	99.77	99.84	99.37
13	98.22	99.30	99.40	98.91	97.32	92.74	92.05	96.20	99.26	99.82	99.77	99.28
14	98.34	99.24	99.39	98.93	97.10	92.66	92.21	96.15	99.51	99.82	99.71	99.19
15	98.44	99.20	99.40	98.93	96.90	92.64	92.36	96.06	99.68	99.78	99.74	99.10
16	98.48	99.21	99.40	98.93	96.65	92.60	92.51	96.05	99.66	99.78	99.78	99.02
17	98.51	99.18	99.42	98.96	96.43	92.50	92.64	96.13	99.61	99.78	99.79	98.92
18	98.63	99.14	99.42	98.91	96.20	92.40	92.78	96.23	99.46	99.81	99.76	98.87
19	98.68	99.16	99.43	98.88	95.99	92.30	92.88	96.27	99.51	99.79	99.74	98.80
20	98.74	99.20	99.44	98.85	95.81	92.20	92.94	96.30	99.28	99.71	99.77	98.70
21	98.81	99.19	99.43	98.89	95.57	92.10	93.05	96.33	99.29	99.71	99.78	98.59
22	98.86	99.20	99.43	98.86	95.36	92.00	93.09	96.42	99.31	99.75	99.80	98.48
23	98.91	99.15	99.45	98.82	95.16	91.88	93.10	96.67	99.44	99.82	99.79	98.58
24	98.95	99.17	99.52	98.80	94.96	91.80	93.11	96.90	99.51	99.82	99.72	98.30
25	99.03	99.25	99.70	98.78	94.79	91.78	93.12	96.96	99.63	99.96	99.70	98.22
26	99.12	99.37	99.79	98.73	94.61	91.75	93.14	96.90	99.69	99.92	99.69	98.07
27	99.23	99.50	99.80	98.68	94.42	91.69	93.15	96.83	99.70	99.93	99.67	97.97
28	99.30	99.53	99.69	98.61	94.23	91.67	93.18	96.75	99.68	99.97	99.67	97.93
29	99.37	99.57	99.54	98.55	-	91.68	93.20	96.59	99.67	99.95	99.68	97.87
30	99.41	99.60	99.50	98.47	-	91.65	93.18	96.50	99.66	99.90	99.66	97.88
31	99.39	-	99.43	98.38	-	91.63	-	96.40	-	99.90	99.65	-

Note.--Add 1,000 ft to obtain elevation above mean sea level.

Monthly elevation and contents, water year October 1950 to September 1951

Date	Elevation (feet)†	Contents (acre-feet)	Change in contents during month (acre-feet)
Sept. 30.....	1,098.69	633,150	-
Oct. 31.....	1,099.34	654,470	+21,320
Nov. 30.....	1,099.61	663,330	+8,860
Dec. 31.....	1,099.41	656,770	-6,560
Calendar year 1950....	-	-	+152,700
Jan. 31.....	1,098.36	622,330	-34,440
Feb. 28.....	1,094.13	484,190	-138,100
Mar. 31.....	1,095.63	533,090	+48,900
Apr. 30.....	1,093.07	449,630	-83,460
May 31.....	1,096.38	557,540	+107,900
June 30.....	1,099.66	664,970	+107,400
July 31.....	1,099.84	670,870	+5,900
Aug. 31.....	1,099.56	661,690	-9,180
Sept. 30.....	1,097.90	607,240	-54,450
Water year 1950-51....	-	-	-25,910

† Elevations are 12 p.m. means based on records for stations at Stehekin and at Chelan.



## Chelan River at Chelan, Wash.

Location.--Lat 47°50'05", long. 120°00'40", in SE $\frac{1}{4}$  sec. 13 (revised), T. 27 N., R. 22 E., in Forebay upstream from control dam at Chelan.

Drainage area.--951 sq mi (revised).

Records available.--October 1903 to September 1951.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, adjustment of 1912. Prior to Jan. 7, 1927, staff gage at site 800 ft downstream at same datum. Jan. 7 to Sept. 30, 1927, staff gage about 500 to 1,000 ft below dam at same datum. Oct. 1, 1927, to Nov. 10, 1928, staff gage, and Nov. 11, 1928, to Mar. 20, 1939, water-stage recorder at sites 2 $\frac{1}{2}$  miles downstream at same datum.

Average discharge.--48 years, 2,029 cfs (adjusted for storage).

Extremes.--Maximum daily discharge during year, 10,400 cfs June 16; minimum daily, 55 cfs Oct. 15.

1903-51: Maximum daily discharge, 16,000 cfs May 30, 1948; no flow part of day Jan. 30, 1917, when lake outlet was blocked with ice, and at other times owing to artificial regulation.

Remarks.--Unmeasured water that is diverted for irrigation above station is small percentage of total runoff. Washington Water Power Co. diverts water at Chelan to develop an average of about 54,000 horsepower and to irrigate an unknown area near Chelan which quantity is included in records of daily discharge. An estimated 6,280 acres were irrigated from the Chelan River basin in 1946, resulting in an estimated depletion of 11,000 acre-ft.

Flow regulated by Lake Chelan (see preceding page).

Cooperation.--Records of water used for power and irrigation furnished by Washington Water Power Co.

Revisions (water years).--W 482: 1904-13. W 612: 1924.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,150	1,390	2,190	2,060	2,200	3,840	1,770	3,360	4,050	6,950	2,200	694
2	2,170	1,480	2,020	2,670	2,060	3,570	1,590	3,140	4,150	6,950	2,210	277
3	2,180	1,430	1,160	2,660	1,550	3,730	1,570	2,850	4,040	6,960	2,200	278
4	2,170	1,290	2,190	2,080	1,230	3,660	1,530	2,840	4,140	6,990	2,190	1,180
5	2,160	388	1,670	1,730	804	2,690	1,790	2,610	3,250	6,330	2,190	1,270
6	2,170	1,500	1,430	1,670	871	2,290	1,810	2,470	2,090	5,920	2,190	1,370
7	1,940	1,870	1,550	1,670	3,110	2,210	2,070	3,000	2,160	5,620	2,190	1,600
8	2,170	1,560	2,090	2,140	3,920	2,250	2,300	3,070	2,130	5,200	2,210	1,600
9	2,170	2,100	1,300	2,190	4,860	2,200	2,380	3,150	2,070	4,100	2,200	1,530
10	2,170	1,810	527	2,220	6,710	2,190	2,410	3,540	1,950	3,430	2,180	1,700
11	777	102	1,380	2,090	6,540	2,170	2,360	4,140	2,280	2,790	2,090	2,140
12	82	67	1,450	1,440	6,480	2,140	2,410	6,560	4,390	3,520	1,880	2,130
13	101	1,520	1,420	1,500	6,310	1,820	2,410	8,780	5,540	4,970	1,860	2,150
14	82	1,660	1,400	954	6,150	2,120	2,560	9,090	6,230	5,740	1,930	2,160
15	55	1,830	1,380	1,440	5,800	2,080	2,600	8,380	9,280	5,420	798	2,160
16	1,160	1,600	1,340	1,460	5,640	2,080	2,700	8,060	10,400	5,000	949	2,180
17	368	1,610	788	1,440	5,440	2,060	2,760	8,120	10,300	5,000	1,550	2,150
18	118	405	1,380	1,470	5,400	2,190	2,890	8,140	10,200	5,020	1,530	2,180
19	109	88	1,380	1,410	5,060	2,760	3,240	8,120	8,960	5,000	284	2,150
20	90	1,510	1,430	1,430	5,110	2,730	3,300	7,530	6,720	3,620	1,410	2,140
21	56	1,740	1,350	877	4,970	2,710	3,070	8,180	6,700	2,570	1,570	2,150
22	56	1,680	1,390	1,470	4,720	2,690	3,120	8,400	6,030	2,400	1,570	2,150
23	244	1,280	1,230	1,460	4,600	2,030	3,110	8,780	5,580	2,230	1,550	2,160
24	207	1,450	784	1,380	4,600	1,670	3,110	8,970	5,000	2,300	1,480	2,140
25	154	490	1,210	1,360	4,320	1,680	3,110	9,090	5,650	3,510	1,270	2,140
26	185	56	1,790	1,440	4,040	1,590	3,100	8,860	6,470	2,890	714	2,130
27	1,060	1,380	3,420	1,600	4,150	1,340	3,130	8,370	6,910	2,410	1,430	2,120
28	258	1,340	3,790	1,820	3,990	1,040	3,860	8,650	6,920	2,660	1,280	1,700
29	56	1,410	3,410	1,750	-	1,260	3,760	7,400	6,920	3,690	1,360	1,630
30	1,280	1,580	3,100	1,810	-	1,640	3,900	6,320	6,820	2,340	1,370	534
31	1,590	-	2,530	1,880	-	1,620	-	5,150	-	2,210	1,370	-
Total	29,518	37,596	53,479	52,061	120,635	70,050	79,720	195,140	167,290	133,440	51,185	51,873
Mean	952	1,253	1,725	1,679	4,308	2,260	2,657	6,295	5,576	4,305	1,651	1,729
Ac-ft	58,550	74,570	106,100	103,300	239,300	138,900	158,100	387,100	331,800	264,700	101,500	102,900
( $\bar{r}$ )	+21,320	+8,860	-6,560	-34,440	-138,140	+48,900	-83,460	+407,910	+107,430	+5,900	-9,180	-54,450

Adjusted for change in Lake Chelan contents

Mean	1,299	1,402	1,619	1,120	1,822	3,054	1,254	8,050	7,381	4,401	1,501	814
Cfsm	1.37	1.47	1.70	1.18	1.92	5.21	1.32	8.46	7.76	4.63	1.58	0.856
In.	1.57	1.64	1.96	1.36	2.00	3.70	1.47	9.76	8.66	5.34	1.82	0.96
Ac-ft	79,870	83,430	99,540	68,860	101,200	187,800	74,640	495,000	439,200	270,600	92,320	48,450

Observed

Calendar year 1950: Max	14,100	Min	51	Mean	2,588	Ac-ft	1,874,000
Water year 1950-51: Max	10,400	Min	55	Mean	2,855	Ac-ft	2,067,000

Adjusted

Calendar year 1950: Mean	2,800	Cfsm	2.94	In.	39.95	Ac-ft	2,027,000
Water year 1950-51: Mean	2,819	Cfsm	2.96	In.	40.24	Ac-ft	2,041,000

† Change in contents in Lake Chelan, in acre-feet, furnished by Washington Water Power Co.

Note.--Discharges are combined flow of power conduit, irrigation diversion below dam and waste water.

## Entiat River at Entiat, Wash.

Location.--Lat 47°39'40", long. 120°13'30", in SE $\frac{1}{4}$  sec. 17, T. 25 N., R. 21 E., on right bank at Entiat and a quarter of a mile upstream from mouth.

Drainage area.--419 sq mi.

Records available.--October 1910 to September 1925, June to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 690 ft (from topographic map). Prior to Sept. 30, 1925, staff gage at site three-quarters of a mile upstream at different datum.

Average discharge.--15 years, 491 cfs (unadjusted).

Extremes.--Maximum discharge during period, 3,460 cfs June 14 (gage height, 5.42 ft), caused by failure of earth dike at millpond, 10 miles upstream; minimum, 127 cfs Sept. 24 (gage height, 1.70 ft).  
1910-25, 1951: Maximum discharge observed, 5,150 cfs June 17, 1916 (gage height, 5.0 ft, site and datum then in use); minimum observed, 32 cfs Jan. 37, 1923 (discharge measurement), but may have been less sometime during period of ice effect.

Remarks.--Records fair. Many diversions above station for irrigation of an estimated 2,580 acres in 1946 with a resulting estimated depletion of 4,480 acre-ft of flow. Occasional regulation by millpond 10 miles upstream.

Discharge, in cubic feet per second, June to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1									a1,700	1,940	460	248
2									a1,800	1,890	430	234
3									a1,900	1,840	414	222
4									a2,100	1,790	392	206
5									a2,300	1,690	*380	194
6									a2,300	1,490	365	186
7									a2,200	1,340	345	186
8									a2,100	1,260	345	222
9									a2,100	1,260	335	210
10									a2,300	1,260	340	194
11									a2,600	1,260	330	186
12									a2,800	1,160	330	176
13									2,920	1,160	310	169
14									2,960	1,210	285	152
15									3,100	1,160	270	144
16									3,040	1,080	257	144
17									2,750	1,020	244	141
18									2,580	994	230	141
19									2,420	932	230	141
20									2,310	852	226	*138
21									2,200	772	226	138
22									2,090	724	230	138
23									2,090	716	222	138
24									2,090	716	214	134
25									2,040	672	202	144
26									2,040	637	190	166
27									*2,040	595	188	152
28									1,990	567	230	152
29									1,890	553	335	169
30									1,890	511	310	234
31									-	484	275	-
Total									68,640	33,535	9,138	5,199
Mean									2,288	1,082	295	175
Ac-ft									136,100	66,520	18,120	10,810
Calendar year	: Max			Min	Mean			Ac-ft				
Water year	: Max			Min	Mean			Ac-ft				

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for nearby stations.

## Wenatchee Lake near Plain, Wash.

Location.--Lat 47°49'50", long. 120°46'30", in sec. 19, T. 27 N., R. 17 E., or north shore, 2½ miles upstream from outlet, 7½ miles northwest of Plain, and 33 miles upstream from Leavenworth.

Drainage area.--276 sq mi (revised).

Records available.--January 1932 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,860.00 ft above mean sea level, subject to correction to datum of 1929; gage readings have been reduced to elevations above mean sea level. Prior to Jan. 4, 1935, staff gage at same site and datum.

Extremes.--Maximum elevation during year, 1,876.46 ft May 12; minimum, 1,869.66 ft Sept. 24.

1932-51: Maximum elevation recorded, 1,879.65 ft May 29, 1948; minimum elevation, 1,869.27 ft Dec. 1, 1936.

Remarks.--No diversion or regulation.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	69.92	70.99	71.62	71.36	70.34	70.50	70.31	71.70	72.56	72.90	70.72	70.08
2	69.87	70.83	71.39	71.32	70.42	70.47	70.36	71.60	72.49	72.89	70.69	69.94
3	69.82	70.86	71.23	71.31	70.40	70.42	70.46	71.56	72.72	72.87	70.63	69.90
4	69.82	71.22	71.12	71.16	70.40	70.42	70.63	71.63	73.01	72.76	70.59	69.89
5	69.93	71.60	71.00	71.03	70.39	70.40	70.85	71.97	73.19	72.47	70.56	69.89
6	70.12	71.64	70.91	70.93	70.37	70.37	71.04	72.31	73.22	72.10	70.55	69.88
7	70.28	71.52	70.85	70.83	70.37	70.33	71.24	72.91	73.12	71.83	70.48	69.89
8	70.73	71.32	70.79	70.78	70.43	70.31	71.38	73.41	72.98	71.72	70.44	70.02
9	70.93	71.15	70.71	70.71	70.83	70.30	71.46	73.50	72.94	71.87	70.42	70.08
10	71.45	71.01	70.73	70.67	72.74	70.26	71.47	73.83	73.03	71.96	70.41	70.04
11	72.12	70.90	70.84	70.62	-	70.25	71.47	75.09	73.20	71.97	70.39	69.98
12	71.70	70.81	70.93	70.56	-	70.28	71.55	76.29	73.37	71.94	70.33	69.94
13	71.44	70.73	70.80	70.57	73.53	70.24	71.77	75.40	73.57	71.98	70.27	69.88
14	71.51	70.65	70.83	70.55	72.65	70.23	72.12	74.32	73.67	71.99	70.23	69.87
15	71.19	70.59	70.80	70.53	72.34	70.28	72.32	73.72	74.10	71.93	70.20	69.86
16	70.97	70.58	70.75	70.50	72.00	70.28	72.37	73.57	74.31	71.83	70.18	69.85
17	70.81	70.53	70.72	70.47	71.74	70.22	72.48	73.97	74.03	71.73	70.17	69.84
18	70.74	70.48	70.70	70.43	71.54	70.20	72.62	74.22	73.70	71.70	70.15	69.84
19	70.85	70.41	70.69	70.42	71.34	70.17	72.59	74.01	73.52	71.60	70.13	69.80
20	71.11	70.42	70.72	70.38	71.25	70.17	72.38	73.74	73.38	71.40	70.14	69.78
21	71.04	70.48	70.92	70.39	71.10	70.18	72.14	73.69	73.19	71.25	70.16	69.76
22	70.91	70.58	71.16	70.33	70.98	70.22	71.95	73.96	73.10	71.19	70.15	69.72
23	70.80	70.62	71.53	70.31	70.88	70.21	71.78	74.60	73.06	71.14	70.11	69.71
24	70.70	70.75	72.44	70.31	70.79	70.21	71.68	74.98	73.10	71.15	70.07	69.67
25	70.83	71.20	73.36	70.43	70.74	70.22	71.67	74.70	73.10	71.14	70.02	69.72
26	71.10	72.09	73.24	70.57	70.67	70.24	71.70	74.08	73.08	71.08	69.97	69.81
27	71.14	72.36	72.74	70.68	70.61	70.25	71.76	73.61	73.08	70.99	69.94	69.82
28	71.22	72.39	72.32	70.53	70.55	70.26	71.81	73.33	73.02	70.92	70.00	69.80
29	71.14	72.09	71.98	70.41	-	70.29	71.83	72.98	72.94	70.89	70.05	69.90
30	71.03	71.83	71.73	70.36	-	70.29	71.80	72.67	72.90	70.82	70.07	70.32
31	70.93	-	71.53	70.33	-	70.29	-	72.42	-	70.77	70.04	-

Note.--No gage-height record Feb. 11, 12. Add 1,800 ft to obtain elevation above mean sea level.

## Wenatchee River below Wenatchee Lake, Wash.

Location.--Lat 47°49'50", long. 120°46'30", in sec. 19, T. 27 N., R. 17 E., on north shore of Wenatchee Lake, 2½ miles upstream from outlet, 7½ miles northwest of Plain, and 33 miles upstream from Leavenworth. Discharge measurements made just below highway bridge half a mile downstream from lake outlet.

Drainage area.--276 sq mi (revised).

Records available.--January 1932 to September 1942, October 1946 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,860.00 ft above mean sea level, datum of 1912; gage readings have been reduced to elevations above mean sea level. Prior to Jan. 4, 1935, staff gage at same site and datum.

Average discharge.--15 years, 1,324 cfs.

Extremes.--Maximum discharge during year, 7,990 cfs May 12 (elevation of lake surface, 1,876.46 ft); minimum, 238 cfs Sept. 24 (elevation of lake surface, 1,869.66 ft). 1932-42, 1946-51: Maximum discharge recorded, 13,700 cfs May 29, 1948 (elevation of lake surface, 1,879.65 ft); minimum discharge, 134 cfs Dec. 1, 1935 (elevation of lake surface, 1,869.27 ft).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair. Natural regulation in lake. No diversion.

Rating table, water year 1950-51, except period of ice effect (elevation, in feet, and discharge, in second-feet)

1,869.6	215	1,871.0	1,240
1,870.0	407	1,873.0	3,470
1,870.5	769	1,876.3	7,710

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	361	1,130	1,870	1,600	b550	769	618	1,980	2,750	3,350	966	457
2	335	1,070	1,650	1,540	b550	744	656	1,870	2,870	3,350	938	373
3	309	1,100	1,490	1,540	b550	703	736	1,820	3,110	3,350	883	350
4	309	1,440	1,340	1,390	b550	703	683	1,920	3,470	3,250	847	345
5	367	1,870	1,240	1,270	b550	687	1,090	2,260	3,710	2,610	821	345
6	484	1,920	1,150	1,170	b550	664	1,280	2,640	3,710	2,420	*795	340
7	596	1,760	1,090	1,070	b600	633	1,490	3,350	3,590	2,140	753	345
8	976	1,540	1,030	*1,020	712	618	1,650	3,950	3,470	1,980	720	420
9	1,170	1,390	956	956	1,070	610	*1,700	4,070	3,350	2,140	703	457
10	*1,700	1,250	976	920	3,110	581	1,700	4,430	3,470	2,260	695	432
11	2,420	1,140	1,080	674	a4,000	574	1,700	6,120	3,710	2,260	679	396
12	1,980	1,050	1,170	821	a4,200	596	1,820	7,710	3,950	2,260	633	373
13	1,700	976	1,140	830	4,070	567	2,040	6,510	4,190	2,310	568	340
14	1,540	902	1,070	812	3,230	560	2,420	5,080	4,310	2,310	560	335
15	1,440	847	1,040	795	2,700	596	2,640	*4,310	4,820	2,260	538	330
16	1,210	839	994	769	2,310	596	2,700	4,190	5,080	2,140	524	325
17	1,050	795	966	744	2,040	552	2,670	4,690	4,690	2,040	518	*319
18	985	753	947	712	1,820	538	2,990	4,950	4,310	1,980	504	319
19	1,090	695	938	703	1,600	518	2,990	4,690	*4,070	4,870	490	299
20	1,340	703	966	672	*1,490	518	2,750	4,310	3,950	1,650	497	290
21	1,280	753	1,160	679	1,340	524	2,480	4,310	3,710	1,490	511	281
22	1,150	*839	1,390	633	1,220	552	2,260	4,690	3,590	1,440	504	283
23	1,040	874	1,820	618	1,120	545	2,090	5,470	3,590	1,390	477	258
24	947	994	2,810	618	1,030	545	1,980	*5,990	3,590	1,390	451	242
25	1,070	1,440	3,950	712	985	552	1,920	5,600	3,590	1,390	420	263
26	1,340	2,420	3,710	830	929	567	1,960	4,820	3,590	1,320	390	304
27	1,390	2,700	3,110	929	865	574	2,040	4,190	3,590	1,230	373	309
28	1,440	2,750	2,640	795	812	581	2,090	3,830	3,470	1,160	407	299
29	1,390	2,420	2,310	695	-	603	2,140	3,470	3,350	1,130	438	350
30	1,270	2,140	2,040	648	-	603	2,090	3,050	3,350	1,060	451	325
31	1,170	-	-	b600	-	603	-	2,750	-	2,010	432	-
Total	34,849	40,500	49,863	27,965	44,753	18,576	57,793	129,020	112,000	62,120	18,506	10,384
Mean	1,124	1,350	1,608	902	1,598	599	1,926	4,162	3,733	2,004	597	346
Cfs/m	4.07	4.89	5.83	3.27	5.79	2.17	6.98	15.1	13.5	7.26	2.16	1.25
In.	4.70	5.46	6.72	3.77	6.03	2.50	7.79	17.38	15.09	8.37	2.49	1.40
Ac-ft	69,120	80,330	98,900	55,470	86,770	36,840	114,600	255,900	222,100	123,200	36,710	20,600

Calendar year 1950: Max 8,720 Min 309 Mean 1,808 Cfs/m 6.55 In. 68.94 Ac-ft 1,309,000  
Water year 1950-51: Max 7,710 Min 242 Mean 1,661 Cfs/m 6.02 In. 61.70 Ac-ft 1,203,000

Peak discharge (base, 5,500 cfs).--Feb. 11 (time and discharge unknown); May 12 (8:30 a.m.), 7,990 cfs (76.46 ft); May 24 (9 a.m.), 5,990 cfs (75.05 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for other stations on Wenatchee River.

b Stage-discharge relation affected by ice.

## Wenatchee River at Plain, Wash.

Location.--Lat 47°45'50", long. 120°39'30", in lot 8, sec. 12, T. 26 N., R. 17 E., on left bank at Plain, a quarter of a mile downstream from Beaver Creek, 7½ miles downstream from Nason Creek, and 12 miles north of Leavenworth.

Drainage area.--591 sq mi.

Records available.--November 1910 to September 1951 in reports of Geological Survey. Published as "near Leavenworth" 1910-31. August 1904 to September 1933 (monthly discharge) in State Water-Supply Bulletin 5.

Gage.--Water-stage recorder. Datum of gage is 1,805 ft above mean sea level (from river-profile map). Prior to Jan. 8, 1932, staff gage at site a quarter of a mile downstream at different datum.

Average discharge.--47 years (1904-51), 2,185 cfs.

Extremes.--Maximum discharge during year, 15,300 cfs May 12 (gage height, 10.18 ft); minimum, 450 cfs Sept. 24 (gage height, 1.98 ft).  
1910-29, 1931-51: Maximum discharge, 22,700 cfs May 29, 1948 (gage height, 12.43 ft, from high-water mark in well); minimum, 191 cfs Dec. 1, 1936 (gage height, 1.34 ft).

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are good. Wenatchee Park Land & Irrigation Co. diverts a maximum of about 12 cfs from Chlawa River for irrigation of 1,400 acres near Plain. Natural regulation by Wenatchee Lake.

Revisions (water years).--W 482: 1911-14.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

2.0	460	5.0	3,570
3.0	1,180	7.0	7,200
4.0	2,200	10.0	14,800

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	615	1,730	2,870	2,580	a980	1,500	1,270	3,920	*5,290	6,020	1,640	720
2	587	1,660	2,490	2,520	a960	1,450	1,570	3,700	a5,400	5,880	1,560	692
3	556	1,740	2,510	2,480	b950	1,400	1,550	3,730	a6,000	5,850	1,480	671
4	556	2,300	2,130	2,270	b960	1,400	1,840	3,970	a6,600	5,560	1,420	657
5	650	2,950	1,940	2,070	b970	1,350	2,260	4,700	a7,000	4,930	1,400	643
6	839	2,870	1,840	1,900	b1,000	1,310	2,500	5,450	7,140	4,240	*1,350	622
7	984	2,650	1,770	1,790	b1,100	1,270	2,840	7,450	6,850	3,680	1,270	643
8	1,380	2,360	1,660	1,710	1,290	1,240	3,080	8,250	6,470	3,570	1,230	790
9	1,690	2,080	1,580	*1,630	2,240	1,210	*3,180	8,310	6,470	3,710	1,220	811
10	*2,610	1,900	1,610	*1,570	5,920	1,170	3,210	9,060	6,650	3,970	1,220	755
11	3,380	1,770	1,790	1,500	8,720	1,130	3,220	12,300	7,070	3,910	1,210	720
12	2,640	1,660	1,930	1,420	7,960	1,160	3,480	14,900	7,470	3,790	a1,150	657
13	2,330	1,530	1,830	1,450	6,310	1,130	4,030	12,200	7,940	3,870	a1,050	622
14	2,200	1,450	1,740	1,420	5,090	1,120	4,900	9,560	8,140	3,940	a980	587
15	2,060	1,390	1,680	1,400	4,240	1,170	5,030	*8,310	9,200	3,780	a960	574
16	1,770	1,380	1,610	1,340	3,650	1,140	5,120	8,120	9,470	3,540	a960	562
17	1,580	1,340	1,560	1,300	3,240	1,080	5,410	9,110	8,540	3,380	940	*568
18	1,520	1,270	1,530	1,270	2,910	1,040	5,810	9,610	7,870	3,330	892	556
19	1,720	1,180	1,510	1,230	2,640	1,030	5,600	9,020	*7,480	3,060	853	544
20	2,100	1,190	1,600	1,190	2,470	1,040	5,140	8,450	7,180	2,740	846	526
21	1,920	1,280	1,950	1,170	*2,270	1,080	4,620	*8,420	6,770	2,500	853	508
22	1,730	*1,430	2,240	1,160	2,120	1,090	4,260	9,090	6,570	2,380	846	484
23	1,570	1,470	2,980	1,120	1,980	1,070	3,950	10,600	6,550	2,370	804	478
24	1,430	1,740	4,460	1,120	1,880	1,080	3,780	11,400	6,530	2,390	783	460
25	1,600	2,340	6,040	1,330	1,800	1,110	3,790	10,400	6,490	2,330	a750	514
26	1,970	3,780	5,700	1,610	1,700	1,140	3,910	8,840	6,430	2,200	a710	601
27	2,100	4,080	4,790	1,500	1,650	1,200	4,050	7,850	6,410	2,000	a690	550
28	2,240	4,100	4,110	1,250	1,570	1,190	4,190	7,300	6,270	1,920	a710	538
29	2,080	3,600	3,540	1,120	-	1,210	4,210	6,510	6,040	1,880	a790	636
30	1,900	3,200	3,180	b1,050	-	1,220	4,100	5,850	5,980	1,770	a790	1,110
31	1,760	-	2,680	a1,000	-	1,220	-	5,320	-	1,700	a750	-
Total	52,027	63,400	78,850	47,450	78,540	36,950	111,580	251,700	208,280	106,200	32,107	18,799
Mean	1,678	2,113	2,544	1,531	2,805	1,192	3,719	8,119	6,943	3,426	1,036	627
Cfs/m	2.84	3.58	4.30	2.59	4.75	2.02	6.29	13.7	11.7	5.80	1.75	1.06
In.	5.27	3.99	4.96	2.99	4.94	2.33	7.02	15.84	13.11	6.68	2.02	1.18
Ac-ft	103,200	125,800	156,400	94,120	155,800	73,290	221,500	499,200	413,100	210,600	63,680	37,290
Calendar year 1950: Max	15,100	Min	556	Mean	3,084	Cfs/m	5.22	In.	70.83	Ac-ft	2,233,000	
Water year 1950-51: Max	14,900	Min	460	Mean	2,975	Cfs/m	5.03	In.	68.33	Ac-ft	2,154,000	

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for nearby stations.

b Stage-discharge relation affected by ice.

Ice Creek above Snow Creek, near Leavenworth, Wash.

Location.--Lat 47°32'25", long. 120°42'55", in SE $\frac{1}{4}$  sec. 28, T. 24 N., R. 17 E., on right bank 0.4 mile upstream from Snow Creek and  $4\frac{1}{2}$  miles southwest of Leavenworth.

Drainage area.--193 sq mi.

Records available.--September 1936 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,450 ft (from river-profile map).

Average discharge.--15 years, 594 cfs.

Extremes.--Maximum discharge during year, 6,110 cfs May 11 (gage height, 11.12 ft); minimum, 110 cfs Sept. 23-25 (gage height, 2.41 ft).

1936-51: Maximum discharge, 17,500 cfs May 28, 1948 (gage height, 13.93 ft), from rating curve extended above 7,000 cfs on basis of slope-area determination of peak flow; minimum, 50 cfs Oct. 25, 26, 1942 (gage height, 1.92 ft).

Remarks.--Records good except those for period of ice effect, which are poor. No diversion. Some regulation in headwater lakes for irrigation.

Revisions (water years).--W 862: 1936-37.

Rating tables, water year 1950-51, except period of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 11 to Sept. 30

2.5	115	6.0	1,080	2.4	109	7.0	1,690
3.0	184	7.0	1,640	3.0	189	9.0	3,480
4.0	376	8.4	2,630	4.0	400	10.5	5,300
5.0	666			5.0	730		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	127	364	753	693	b240	415	338	910	1,450	1,680	375	195
2	126	352	666	666	b250	415	375	870	1,570	1,600	382	177
3	125	482	633	650	b250	400	460	890	1,830	1,600	338	165
4	127	700	586	617	b250	388	585	1,060	2,130	1,480	326	156
5	195	808	540	570	b260	375	710	1,380	2,210	1,250	314	148
6	216	683	511	511	b260	350	790	1,510	2,010	1,060	*301	144
7	260	617	511	496	270	350	870	2,010	1,900	952	288	151
8	376	540	482	468	341	338	890	2,010	1,720	975	277	183
9	368	482	468	440	1,130	326	890	2,280	1,940	1,040	270	166
10	1,130	454	511	427	2,630	314	*870	2,650	2,210	1,090	264	151
11	*868	414	540	414	2,750	303	890	5,300	2,380	1,020	262	145
12	570	388	570	388	1,860	301	1,020	3,590	2,560	875	250	137
13	454	364	526	*388	1,380	301	1,250	2,560	2,650	1,020	238	133
14	482	352	496	388	1,160	299	1,450	2,130	2,850	998	226	131
15	454	341	482	376	1,020	326	1,400	1,940	2,260	952	219	128
16	388	341	454	364	910	314	1,400	*2,210	2,750	990	214	*127
17	352	330	454	352	850	299	1,510	2,850	2,470	870	202	127
18	368	299	440	352	790	288	1,570	2,650	2,290	870	192	126
19	482	260	427	330	730	283	1,380	2,380	2,210	790	184	*125
20	617	299	468	320	690	294	1,220	2,290	2,130	710	183	124
21	496	*330	570	320	655	303	1,090	2,560	2,010	655	184	122
22	427	368	617	320	*620	296	1,020	3,050	2,010	620	184	113
23	376	388	1,020	309	568	294	952	3,810	2,050	638	180	111
24	352	540	1,350	*309	550	294	952	*3,150	2,130	620	170	110
25	414	668	1,760	401	520	303	1,020	*2,650	1,940	568	159	124
26	468	1,350	1,350	427	475	303	1,090	2,290	1,940	520	152	141
27	540	1,380	1,100	364	460	314	1,110	2,210	1,830	490	136	118
28	511	1,160	954	270	445	314	1,110	2,050	1,760	460	184	114
29	454	931	947	b250	-	326	1,040	1,690	1,660	445	270	137
30	401	828	790	b240	-	314	975	1,510	1,690	415	268	124
31	376	-	718	b240	-	314	-	1,400	-	358	236	-
Total	12,940	17,033	21,594	12,650	22,314	10,054	30,227	69,850	63,540	27,621	7,408	4,343
Mean	417	568	697	408	797	324	1,008	2,253	2,118	891	239	145
Cfsm	2.16	2.94	3.61	2.11	4.13	1.68	5.22	11.7	11.0	4.62	1.24	0.751
In.	2.49	3.28	4.16	2.44	4.30	1.94	5.82	13.46	12.24	5.32	1.43	0.84
Ac-ft	25,670	33,780	42,830	25,090	44,260	19,940	59,950	138,500	126,000	54,790	14,690	8,610

Calendar year 1950: Max 4,700 Min 125 Mean 822 Cfsm 4.26 In. 57.77 Ac-ft 594,800  
 Water year 1950-51: Max 5,300 Min 110 Mean 821 Cfsm 4.25 In. 57.72 Ac-ft 594,100

Peak discharge (base, 2,500 cfs).--Feb. 11 (12 p.m. to 1 a.m.), 2,950 cfs (8.54 ft); May 11 (11 a.m.) 6,110 cfs (11.12 ft); May 23 (8:30 a.m.) 3,930 cfs (9.42 ft); June 15 (12:15 a.m.) 3,480 cfs (8.97 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

## Wenatchee River at Peshastin, Wash.

Location.--Lat 47°34'50", long. 120°37'00", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 8, T. 24 N., R. 18 E., on right bank 1 mile northwest of Peshastin and  $\frac{3}{4}$  miles upstream from Peshastin Creek.

Drainage area.--1,000 sq mi, approximately.

Records available.--October 1928 to September 1951 (monthly discharge only, October 1928 to February 1929).

Gage.--Water-stage recorder. Datum of gage is 1,028.04 ft above mean sea level, datum of 1929. Prior to Mar. 24, 1932, staff gage at site  $\frac{1}{4}$  miles downstream at different datum.

Average discharge.--23 years, 2,906 cfs.

Extremes.--Maximum discharge during year, 20,600 cfs May 12 (gage height, 12.31 ft); minimum, 360 cfs Sept. 23 (gage height, 1.67 ft); minimum daily, 613 cfs Sept. 23-25. 1929-51: Maximum discharge, 32,300 cfs May 28, 1948 (gage height, 15.87 ft); minimum, 183 cfs Oct. 14, 1939 (gage height, 1.26 ft); minimum daily, 270 cfs Oct. 2, 1929, Nov. 30, 1936.

Remarks.--Records excellent except those for period of ice effect, which are fair. Numerous diversions upstream for irrigation of an estimated 3,200 acres above station, and domestic use above and below station. Ice irrigation canal diverts upstream and bypasses station, and supplies a substantial part of remaining 22,000 acres irrigated in basin. Some regulation by powerplant in Tumwater Canyon.

Rating table, water year 1950-51, except period of ice effect (gage height, in feet, and discharge, in cubic feet per second)

2.1	595	8.0	9,330
3.0	1,290	10.0	14,200
4.0	2,330	12.1	20,000
6.0	5,250		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	926	2,210	3,960	3,660	b1,300	2,210	2,160	5,250	7,160	8,220	2,100	1,030
2	886	2,100	3,590	3,520	b1,300	2,210	2,330	4,910	7,580	8,220	1,990	968
3	822	2,270	3,310	3,520	b1,300	2,100	2,700	4,910	8,220	8,000	1,940	902
4	850	3,100	3,100	3,240	b1,300	2,100	3,170	5,250	9,330	7,790	1,880	870
5	958	3,960	2,760	2,960	b1,300	2,040	3,810	6,560	9,790	6,760	*1,820	858
6	1,160	3,810	2,640	2,700	b1,400	1,990	4,110	7,370	10,000	5,790	1,720	798
7	1,340	3,520	2,570	2,570	b1,500	1,940	4,580	9,790	9,330	5,080	1,670	814
8	1,820	3,100	2,390	2,450	1,670	1,880	4,740	11,000	8,880	4,910	1,570	918
9	2,270	2,760	2,330	2,330	3,140	1,820	4,910	11,200	8,880	5,080	1,570	1,030
10	3,480	2,510	2,330	2,270	8,480	1,720	*4,910	12,400	9,330	5,430	1,570	982
11	*4,740	2,330	2,570	2,160	11,900	1,670	4,740	18,300	10,000	5,250	1,570	934
12	3,590	2,210	2,700	2,040	11,000	1,720	5,080	20,000	10,700	5,080	1,470	870
13	3,030	2,040	2,640	2,040	8,660	1,670	5,980	16,600	11,400	5,250	1,360	798
14	2,830	1,940	2,510	*2,040	6,960	1,670	6,960	*13,400	11,900	5,250	1,340	762
15	2,760	1,880	2,390	2,040	5,790	1,720	7,160	11,400	13,400	5,080	1,240	741
16	2,390	1,880	2,330	1,990	5,080	1,770	7,370	11,400	13,400	4,740	1,200	720
17	2,160	1,820	2,270	1,880	4,580	1,670	7,580	12,900	11,900	4,580	1,200	720
18	2,040	1,720	2,210	1,880	4,110	1,620	8,000	13,400	*11,200	4,580	1,110	720
19	2,270	1,570	2,160	1,620	3,740	1,570	7,790	12,700	10,500	4,110	1,110	681
20	2,630	1,620	2,270	1,720	*3,590	1,620	7,160	*11,900	10,000	3,740	1,070	*674
21	2,640	*1,770	2,700	1,670	3,310	1,720	6,360	11,900	9,560	3,380	1,070	655
22	2,330	1,990	3,030	1,670	3,170	1,720	5,790	13,900	9,330	3,240	1,070	637
23	2,100	2,100	4,260	1,620	2,960	1,720	5,430	15,600	9,330	3,170	1,070	613
24	1,940	2,330	6,170	1,620	2,830	1,770	5,250	*15,800	9,330	3,240	1,010	613
25	1,990	3,380	8,000	1,880	2,700	1,820	5,250	14,200	9,100	3,100	950	513
26	2,570	5,430	7,790	2,270	2,570	1,940	5,430	12,200	8,880	2,900	894	769
27	2,760	5,980	6,560	2,160	2,450	2,100	5,610	11,000	8,880	2,700	870	734
28	2,960	5,790	5,610	1,820	2,330	2,040	5,790	10,200	8,660	2,510	934	694
29	2,700	5,080	4,910	b1,650	-	2,100	5,790	8,880	8,440	2,450	1,240	734
30	2,510	4,580	4,420	b1,450	-	2,040	5,430	8,000	8,220	2,330	1,240	1,240
31	2,270	-	3,960	*b1,380	-	2,040	-	7,370	-	2,210	1,200	-
Total	69,902	86,780	110,440	68,020	110,420	57,720	161,370	348,690	292,630	144,170	42,066	24,070
Mean	2,255	2,893	3,563	2,194	3,544	1,862	5,379	11,250	9,754	4,651	1,357	802
Ac-ft	158,600	172,100	218,100	134,900	219,000	114,500	320,100	691,600	580,400	286,000	83,440	47,740
Calendar year 1950:	Max	21,500		Min	755	Mean	4,264	Ac-ft	3,087,000			
Water year 1950-51:	Max	20,000		Min	613	Mean	4,154	Ac-ft	3,007,000			

Peak discharge (base, 11,000 cfs)--Feb. 11 (6 p.m.) 12,400 cfs (9.29 ft); May 12 (2 to 7 a.m.) 20,600 cfs (12.31 ft); May 24 (2 a.m.) 16,400 cfs (10.80 ft); June 15 (9:30 p.m.) 14,000 cfs (9.88 ft).

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Douglas Creek near Alstown, Wash.

Location.--Lat 47°35'00", long. 120°00'50", in S $\frac{1}{2}$  sec. 12, T. 24 N., R. 22 E., on left bank  $\frac{1}{2}$  miles northwest of Alstown and 2.9 miles south of Douglas.

Drainage area.--114 sq mi.

Records available.--June 1949 to September 1951.

Gage.--Water-stage recorder and concrete control. Altitude of gage is 2,260 ft (by barometer).

Extremes.--Maximum discharge during year, 293 cfs Mar. 26, from rating curve extended above 60 cfs as explained below; maximum gage height, 3.83 ft Mar. 27; minimum discharge, 0.3 cfs Aug. 17, but may have been less sometime during periods of no gage-height record.

1949-51: Maximum discharge, 1,350 cfs June 18, 1950 (gage height, 8.70 ft, from high-water mark), from rating curve extended above 60 cfs on basis of slope-area determination at gage height 13.05 ft; minimum, 0.1 cfs Oct. 19, 1949, but may have been less during period of no gage-height record Jan. 21-24, 1950.

Flood of June 10, 1948, reached a stage of 13.05 ft, from floodmarks (discharge, 6,420 cfs), from rating curve extended above 60 cfs on basis of slope-area determination of peak flow.

Remarks.--Records fair except those above 50 cfs and those for periods of doubtful or no gage-height record, which are poor. No regulation. Possible minor diversions for domestic use above station.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)  
(Shifting-control method used Mar. 25-30)

1.9	0.3	2.3	23
2.0	1.7	2.6	65
2.1	5.1	3.1	157
2.2	12.5		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.6	0.7	*1.0	0.8					1.5	1.0	0.8	0.6
2	.6	.7	.7	.8					1.5	1.0	.8	.6
3	.6	.7	.7	1.0					2.1	1.0	.8	.6
4	.7	.7	.7	.7					2.7	1.2	.8	.6
5	.7	.6	.7	.6					a4.0	1.5	.8	.6
6	.7	.6	.7						a4.0	1.3	.8	.6
7	.7	.7	.8						a3.5	*1.2	.8	.6
8	.6	.7	.8					a4.0	a2.7	1.0	*.8	.7
9	.6	.6	1.0						1.9	1.2	.7	.6
10	.6	.7	.8						1.7	1.3	.4	.6
11	.4	.7	.8	(*)					1.5	1.5	.4	.8
12	.4	.7	.7			a25			1.5	1.0	.4	.8
13	*.6	.8	.8						1.5	1.0	.4	.8
14	.6	.8	.7						1.5	1.0	.4	.7
15	.7	.8	.8					*3.7	1.3	1.0	.4	.7
16	.7	.7	.8		a5.2		a25		3.7	1.2	.4	.7
17	.8	.8	.8						3.0	1.3	1.0	.8
18	.7	1.0	.8						2.7	1.3	1.2	.4
19	.6	1.0	.8						3.3	1.5	1.2	.4
20	.6	1.0	.8						3.0	1.5	1.2	*.7
21	.6	1.0	.8		(*)				3.0	1.5	1.2	.4
22	.6	1.0	.7						2.7	a1.4	1.3	.4
23	.6	1.0	.8						5.1	a1.4	1.3	.4
24	.7	1.2	.8			32			3.3	a1.4	1.3	.4
25	.7	1.2	.8			40			2.4	a1.3	1.3	.4
26	.8	1.2	.8			149			3.0	a1.3	1.3	.4
27	.8	1.0	.8			154			2.7	a1.2	1.3	.4
28	.6	.8	.8			145			2.1	1.2	1.3	.7
29	.7	.8	.8			79			2.1	1.2	1.0	.8
30	.7	.8	.8			*86			2.1	1.2	.8	.8
31	.7		.8			85			1.7		.8	.7
Total	20.0	25.0	24.4	35.1	145.6	1,343	750	105.6	52.8	33.7	17.3	20.5
Mean	0.65	0.83	0.79	1.13	5.20	43.3	25.0	3.41	1.76	1.15	0.56	0.68
Ac-ft	40	50	48	70	289	2,660	1,490	209	105	71	34	41
Calendar year 1950: Max	540			Min	0.2	Mean	12.7	Ac-ft	9,190			
Water year 1950-51: Max	154			Min	-	Mean	7.05	Ac-ft	5,110			

Peak discharge (base, 400 cfs).--No peak above base.

\* Discharge measurement made on this day.

A doubtful or no gage-height record; discharge estimated on basis of 2 discharge measurements, recorder graph and records for stations near Palisades and at Palisades.



## Douglas Creek near Palisades, Wash.

Location.--Lat 47°28'00", long. 119°52'30", in NW $\frac{1}{4}$  sec. 30, T. 23 N., R. 24 E., on right bank just upstream from Great Northern Railway bridge 1.3 miles upstream from Moses Coulee and 3.8 miles northeast of Palisades.

Drainage area.--206 sq mi.

Records available.--November 1949 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,360 ft (by barometer).

Extremes.--Maximum discharge during year, 1,520 cfs Mar. 26 (gage height, 5.77 ft), from rating curve extended above 70 cfs on basis of slope-area determination at gage height 6.30 ft; minimum, 6.8 cfs part of each day Aug. 11-23, but may have been less sometime during a period of doubtful or no gage-height record; minimum gage height, 1.68 ft Feb. 21.

1949-51: Maximum discharge, 1,960 cfs June 18, 1950 (gage height, 6.30 ft, from high-water mark in well), from rating curve extended above 70 cfs on basis of slope-area determination of peak flow; minimum, 5.6 cfs Jan. 24, 25, 1950; minimum gage height, that of Feb. 21, 1951.

Remarks.--Records fair except those for periods of doubtful or no gage-height record, and those above 60 cfs, which are poor. A few minor diversions above station for irrigation and domestic use. No regulation.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)  
(Shifting-control method used Feb. 11 to Mar. 19)

1.8	4.2	2.6	113
1.9	7.7	3.0	220
2.0	14	3.5	370
2.1	24	4.1	610
2.3	53		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.7	7.7	8.2	8.7	a8.0	9.8	530	*15.5	8.7		7.7	7.7
2	7.7	7.7	7.7	8.7	a8.0	9.2	490	15.5	8.2		7.7	7.2
3	7.2	7.7	8.2	8.2	8.2	9.2	470	15	8.2		7.7	7.2
4	7.7	7.7	7.7	8.2	8.2	9.8	340	15	10.5	a8.2	7.7	7.2
5	7.7	7.7	*7.7	7.7	8.2	10.5	220	15	15.5		7.7	7.2
6	7.7	7.7	7.7	7.7	7.7	9.8		15	15.5		7.7	7.2
7	7.7	7.7	7.7	7.7	8.2	8.7		18.5	14	*a8.2	7.7	7.2
8	7.7	7.7	7.7	7.7	7.7	9.2		19.5	11	8.2	*7.7	7.2
9	7.7	7.7	8.2	7.7	11.4	9.2		15.5	9.8	8.2	7.7	7.2
10	7.7	7.7	7.7	7.7	230	9.8		14	9.8	8.2	7.7	7.2
11	7.7	7.7	8.2	*7.7	191	9.2		24	8.7	8.2	7.2	7.2
12	7.7	7.7	8.2	7.2	33	9.2		29	8.7	8.2	7.2	7.2
13	*7.2	7.7	8.2	7.2	19.5	9.8		19.5		8.2	6.8	7.2
14	7.2	7.7	8.2	7.7	16.5	10.5		*16.5		8.2	6.8	7.2
15	7.2	8.2	8.2	8.2	16.5	27		15.5		8.2	6.8	7.2
16	7.2	8.2	8.2	8.2	13	27		15		7.7	6.8	7.2
17	7.7	7.7	8.2	8.2	12.5	16.5		13		7.7	6.8	7.2
18	7.2	7.7	8.2	7.7	13	15	a30	12.5		7.7	6.8	7.2
19	7.7	7.7	8.2	7.7	12	39		12		7.7	6.8	7.2
20	7.7	7.7	8.2	7.7	9.8	143		12		7.7	6.8	7.2
21	7.2	7.7	8.2	8.2	9.8	317		11	a8.4	7.7	7.2	7.2
22	7.7	7.7	8.2	7.7	*14	244		10.5		7.7	7.2	7.7
23	7.2	8.2	8.7	7.7	12.5	*208		10.5		7.7	7.2	7.7
24	7.7	8.2	8.7	7.7	11	325		15.5		7.7	7.2	7.7
25	7.7	8.7	8.7	8.2	12	310		10.5		7.7	7.2	7.7
26	8.2	8.2	11	8.2	10.5	590		9.8		7.7	7.2	7.2
27	8.2	8.2	9.2	7.7	9.8	430		11		7.7	7.7	7.7
28	8.2	8.2	9.2	a7.6	10.5	555		9.8		7.7	8.2	7.7
29	8.2	8.7	8.7	a7.6	-	a230		9.2		7.7	8.7	8.2
30	8.2	8.7	9.2	a7.7	-	a300		8.2		7.7	7.7	8.2
31	7.7	-	8.7	a7.8	-	470	-	9.2	-	7.7	7.2	-
Total	237.2	237.0	259.0	245.6	835.1	4,180.4	2,800	445.7	279.8	246.2	228.5	221.5
Mean	7.65	7.90	8.35	7.86	29.8	135	93.3	14.3	9.33	7.94	7.37	7.58
Ac-ft	470	470	514	483	1,660	8,290	5,550	880	555	488	453	439

Calendar year 1950: Max 976 Min 6.8 Mean 38.7 Ac-ft 27,990  
 Water year 1950-51: Max 590 Min 6.2 Mean 28.0 Ac-ft 20,250

\* Discharge measurement made on this day.  
 a Doubtful or no gage-height record; discharge estimated on basis of records for stations near Altstown and at Palisades.

## Douglas Creek at Palisades, Wash.

Location.--Lat 47°25', long. 119°56', in SE $\frac{1}{4}$  sec. 10, T. 22 N., R. 23 E., on left bank three-quarters of a mile south of Palisades.

Drainage area.--844 sq mi.

Records available.--January to September 1951 (fragmentary).

Gage.--Water-stage recorder. Altitude of gage is 955 ft (by barometer).

Extremes.--Maximum discharge during period, 1,990 cfs Mar. 26 (gage height, 7.22 ft), from rating curve extended above 260 cfs by logarithmic plotting; no flow at times during year.

Remarks.--Records fair except those above 300 cfs and those for periods of no gage-height record, which are poor. Daily discharge not published below 5 cfs; however, there is no flow at times. No regulation. A few minor diversions for irrigation and domestic use above station.

Rating table, January to September 1951 (gage height, in feet, and discharge, in cubic feet per second)

2.0	4.7	3.0	62
2.2	7.8	3.5	166
2.4	13	4.0	290
2.6	22	4.5	425
2.8	36	5.3	760

Discharge, in cubic feet per second, January to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1				-	-	-	a240	6.0	-			
2				-	-	-	a180	*5.4	-			
3				-	-	-	151	5.3	-			
4				-	-	-	127	5.3	-			
5				-	-	-		5.1	6.4			
6				-	-	-		5.0	*7.0			
7				-	-	-		7.0	a6			
8				-	-	-		7.5	a5			
9				-	-	-		6.0	-			
10				-	635	-		5.3	-			
11				-	466	-		6.6	-			
12				-	-	-		13	-			
13				-	-	-		7.6	-			
14				-	-	-		*6.6	-			
15				-	-	51		6.1	-			
16				-	-	78		5.5	-			
17				-	-	46	a10	5.4	-			
18				-	-	38		5.4	-			
19				-	-	100		5.3	-			
20				5.5	-	245		5.1	-			
21				6.8	-	a280		-	-			
22				5.0	(*)	*a250		-	-			
23				6.1	5.7	*a150		-	-			
24				5.7	5.1	191		6.0	-			
25				5.7	5.4	257		5.0	-			
26				-	-	758		-	-			
27				-	-	291		-	-			
28				-	-	a200		-	-			
29				-	-	a140		-	-			
30				-	-	*a170		-	-			
31				-	-	a200	-	-	-			

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for stations near Alstown and near Palisades.

## Columbia River at Trinidad, Wash.

Location.--Lat 47°13'30", long. 120°00'50", in SE¼ sec. 13, T. 20 N., R. 22 E., on left bank half a mile southwest of Trinidad, 8½ miles downstream from Colocham Creek, and 12 miles downstream from Rock Island Dam.

Drainage area.--89,700 sq mi, approximately.

Records available.--January to December 1910 (gage heights only), May 1913 to September 1951. Published as "at Wenatchee" 1910, 1913-16, and as "at Vernita" 1917-30.

Gage.--Water-stage recorder. Datum of gage is 500 ft above mean sea level, unadjusted. Prior to Jan. 1, 1916, staff gage one mile upstream from highway bridge at Wenatchee (24 miles upstream) at datum 583 ft above mean sea level, unadjusted. Jan. 1 to Dec. 31, 1916, staff gage on pier of highway bridge at Wenatchee at datum 579.30 ft above mean sea level, unadjusted. Jan. 14, 1917, to Sept. 30, 1930, staff gages at ferry at Vernita (50 miles downstream) at datum 388.7 ft above mean sea level, unadjusted.

Average discharge.--38 years, 117,700 cfs.

Extremes.--Maximum discharge during year, 408,000 cfs May 28 (gage height, 49.42 ft); minimum, 53,100 cfs Oct. 7 (gage height, 22.08 ft).

1913-51: Maximum discharge, 692,600 cfs June 12, 1948 (gage height, 59.35 ft); minimum, 4,120 cfs Feb. 10, 1932 (gage height, 11.40 ft).

Maximum discharge known, about 740,000 cfs June 7, 1894 (based on information obtained at other points).

Remarks.--Records excellent except those for period of no gage-height record, which are good. Diversion above station for irrigation of about 500,000 acres is small percentage of flow past gage. Some diurnal fluctuation caused by powerplants at Rock Island and at Grand Coulee Dam. Flow regulated by Franklin D. Roosevelt Lake (see p. 272) and reservoirs in Kootenai, Pend Oreille, Spokane, Okanogan, and Chelan River basins.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

22.6	56,700	30.0	118,800	40.0	250,100
23.0	59,500	32.0	140,600	42.0	285,300
24.0	66,500	34.0	164,600	44.0	319,300
26.0	82,500	36.0	190,700	46.0	357,800
28.0	99,500	38.0	219,100	48.1	401,000

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	66,000	86,600	77,100	118,000	73,700	98,700	73,200	162,700	376,000	323,700	215,800	86,900
2	64,300	95,200	80,400	115,500	72,200	93,800	76,900	169,000	374,800	317,000	208,900	84,200
3	68,800	97,800	74,300	117,000	69,600	94,200	77,700	177,600	361,800	317,400	207,100	82,400
4	69,200	97,400	*74,200	116,700	64,100	93,900	82,500	178,900	355,800	308,800	200,800	84,100
5	64,200	98,000	71,500	106,800	59,000	93,300	85,300	179,300	355,800	314,100	195,900	94,200
6	60,400	93,000	71,700	87,400	61,500	85,800	87,700	180,900	353,400	314,600	199,000	91,400
7	58,000	86,700	69,000	87,000	68,600	82,200	90,100	197,000	342,100	312,300	220,000	88,700
8	58,300	87,100	69,300	81,000	69,700	88,300	94,100	223,400	334,100	310,100	210,000	85,400
9	58,900	80,700	66,700	82,400	77,300	88,200	97,200	258,500	321,200	312,800	210,000	80,900
10	63,000	81,400	62,000	75,000	95,800	88,900	94,700	293,200	311,000	313,700	210,000	74,700
11	63,900	*77,200	57,300	73,800	107,100	85,400	86,900	308,700	301,100	311,000	190,000	84,500
12	62,700	75,500	81,200	*74,800	105,200	87,700	95,500	318,400	290,300	307,900	159,300	80,900
13	63,400	74,900	66,600	84,800	105,400	87,100	93,300	325,600	296,600	306,300	140,500	78,900
14	61,500	71,500	70,300	86,200	110,600	85,700	103,700	344,600	311,900	300,700	140,500	79,300
15	61,500	68,500	70,300	86,600	112,500	84,500	115,800	352,800	323,100	303,300	127,600	77,700
16	60,500	71,200	69,500	89,100	117,900	85,900	128,700	350,400	334,100	298,600	115,800	77,400
17	67,200	76,500	65,400	89,300	139,800	88,300	146,700	*363,800	346,100	297,100	105,600	72,400
18	71,600	80,200	63,400	89,300	136,800	87,800	170,900	385,200	*351,800	293,900	83,300	*76,100
19	76,500	72,700	71,400	84,700	128,400	89,400	184,000	401,000	359,600	288,500	94,400	69,500
20	71,100	65,100	71,100	86,900	135,000	90,400	191,500	*384,400	351,800	292,300	104,000	67,100
21	70,500	72,800	71,900	88,300	128,600	90,400	190,400	390,100	349,800	290,100	103,700	68,200
22	75,900	64,800	76,600	88,900	118,600	87,100	186,100	385,200	350,800	283,300	106,300	66,000
23	74,500	64,300	78,700	82,700	*116,400	86,200	182,600	399,900	345,700	273,100	98,200	67,400
24	71,300	59,300	80,100	75,200	116,200	84,800	174,500	396,800	345,700	289,700	89,000	65,400
25	74,100	65,300	89,500	74,300	116,100	82,500	157,500	392,200	346,500	262,300	*96,800	68,300
26	77,800	70,900	101,800	82,000	113,000	*71,600	151,500	390,900	343,000	258,600	94,800	64,400
27	79,500	78,300	112,500	82,500	106,000	76,400	154,900	398,000	341,700	250,300	96,400	64,400
28	79,800	80,700	115,400	82,600	101,500	73,000	159,000	400,000	*337,900	242,100	100,100	69,000
29	79,200	74,300	117,800	70,400	-	71,600	159,900	*394,700	333,700	235,700	100,800	69,600
30	78,300	74,300	117,000	74,500	-	73,400	161,100	375,800	327,900	226,300	98,400	63,000
31	83,400	-	116,300	74,500	-	74,900	-	392,100	-	223,400	98,200	-
Total	*2,133.3	*2,341.2	*2,460.3	*2,715	*2,822.4	*2,651.2	*3,853.9	*9,847.9	*10,175	*8,958.8	*4,382.2	*2,322.4
Mean	68,820	78,040	79,360	87,580	100,800	85,520	128,500	317,700	339,200	289,000	141,400	77,410
Ac-ft	*4,231	*4,644	*4,880	*5,385	*5,598	*5,259	*7,644	*19,530	*20,180	*17,770	*8,692	*4,606
Calendar year 1950:	Max	523,600	Min	50,000	Mean	147,800	Ac-ft	107,000,000				
Water year 1950-51:	Max	401,000	Min	57,300	Mean	149,800	Ac-ft	108,400,000				

\* Discharge measurement made on this day.

\* Expressed in thousands.

a No gage-height record; discharge estimated on basis of records for station at Grand Coulee Dam.

## Crab Creek at Irby, Wash.

Location.--Lat 47°21'30", long. 118°51'00", in NW¼ sec. 31, T. 22 N., R. 32 E., on right bank 8 ft upstream from highway bridge at Irby, 5 miles downstream from Lake Creek, and 7 miles west of Odessa.

Drainage area.--974 sq mi.

Records available.--September 1942 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,386.30 ft above mean sea level, 1947 supplementary adjustment, datum of 1929.

Average discharge.--9 years, 86.4 cfs.

Extremes.--Maximum discharge during year, 3,240 cfs Mar. 16 (gage height, 8.40 ft), from rating curve extended above 380 cfs by logarithmic plotting; minimum, 14.5 cfs Dec. 2 (gage height, 2.00 ft).  
1942-51: Maximum discharge, 3,640 cfs Mar. 5, 1950 (gage height, 8.96 ft), from rating curve extended above 1,200 cfs by logarithmic plotting; minimum, 2.0 cfs Jan. 12, 1948 (gage height, 1.80 ft).

Remarks.--Records good except those above 400 cfs, which are fair, and those for periods of ice effect or no gage-height record, which are poor. No regulation. Some diversion above station for irrigation.

Rating table, water year 1950-51, except period of ice effect (gage height, in feet, and discharge, in cubic feet per second)

2.0	14.5	4.0	460
2.2	36	5.0	705
2.4	64	6.0	1,100
2.7	118	7.0	1,720
3.0	190	8.1	2,840
3.5	350		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	21	18.5	15.5	31	49	257	326	127	70	36	28	22
2	20	17.5	14.5	32	49	244	316	125	70	36	28	21
3	20	18.5	15.5	35	52	232	306	127	69	39	26	21
4	21	17.5	15.5	39	54	232	296	125	70	40	26	21
5	21	17.5	16.5	40	54	217	282	118	74	39	28	21
6	21	17.5	17.5	41	54	217	271	114	74	*37	28	21
7	21	17.5	18.5	42	54	211	260	112	72	35	*28	21
8	21	17.5	19	44	875	214	244	112	72	32	26	21
9	20	17.5	19	*45	682	199	241	112	70	32	25	21
10	*20	17.5	20	48	1,910	199	232	104	70	35	24	21
11	19	17.5	21	48	2,160	199	223	108	67	35	24	21
12	19	17.5	21	48	1,600	226	217	108	64	34	23	21
13	19	17.5	22	48	1,080	264	211	106	64	34	23	21
14	19	17.5	23	49	668	527	199	104	62	35	23	20
15	19	17.5	24	48	490	858	193	102	61	31	23	20
16	19	17.5	24	49	430	2,780	185	96	55	31	23	20
17	19	16.5	24	49	400	2,760	172	91	52	30	22	20
18	18.5	17.5	24	52	372	1,460	164	*84	55	30	22	20
19	18.5	17.5	24	54	360	875	152	78	54	30	22	20
20	18.5	17.5	25	52	*352	645	145	80	52	29	22	20
21	18.5	16.5	25	54	341	532	142	70	41	29	22	*20
22	17.5	17.5	25	54	335	490	133	67	39	29	21	20
23	17.5	16.5	25	55	329	450	127	66	40	30	21	19
24	18.5	16.5	26	69	316	430	120	70	36	29	21	18.5
25	18.5	16.5	25	85	302	410	114	62	41	29	21	18.5
26	18.5	16.5	25	66	298	388	110	60	39	29	20	18.5
27	17.5	16.5	25	55	271	362	108	52	37	29	20	18.5
28	18.5	15.5	26	51	264	*360	110	62	36	28	21	19
29	19	*15.5	26	50	-	362	120	62	36	26	21	20
30	18.5	15.5	26	49	-	350	122	67	36	28	23	21
31	17.5	-	26	49	-	335	-	69	-	28	22	-
Total	594.5	514.0	683.5	1,531	13,391	17,285	5,841	2,850	1,678	984	723	607.0
Mean	19.2	17.1	22.0	49.4	478	558	195	91.9	-55.9	32.1	23.3	20.2
Ac-ft	1,180	1,020	1,360	3,040	26,560	34,280	11,590	5,650	3,330	1,970	1,480	1,200
Calendar year 1950: Max 3,360 Min 11 Mean 166 Ac-ft 120,000												
Water year 1950-51: Max 2,780 Min 14.5 Mean 128 Ac-ft 92,610												

Peak discharge (base, 300 cfs).--Feb. 11 (6 a.m.) 2,260 cfs (7.61 ft); Mar. 16 (11 p.m.) 3,240 cfs (8.40 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of record for part of day.

Note.--Stage-discharge relation affected by ice Jan. 27 to Feb. 7 (no gage-height record Jan. 29 to Feb. 7).

## Wilson Creek at Wilson Creek, Wash.

Location.--Lat 47°26', long. 119°06', in SW<sup>1</sup> sec. 6, T. 22 N., R. 30 E., on right bank half a mile upstream from mouth and town of Wilson Creek.

Drainage area.--470 sq mi, approximately.

Records available.--February to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 1,301 ft (by barometer).

Extremes.--Maximum discharge during period, 1,420 cfs Mar. 16 (gage height, 9.59 ft); no flow on many days.

Remarks.--Records fair. Diversions for irrigation above station. Some regulation by storage for irrigation above station.

Rating table, period Feb. 1 to June 30, 1951 (gage height, in feet, and discharge, in cubic feet per second)

4.7	0	5.3	25
4.8	.3	5.4	36
4.9	1.0	5.7	85
5.0	3.3	6.0	148
5.1	9.3	7.0	418
5.2	17	7.4	545

Discharge, in cubic feet per second February to September 1951 ,

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1					0	0	144	*21	0.1			
2					0	0	76	20	0			
3					0	0	61	18.5	0			
4					0	0	5.7	17.5	0			
5					0	0	32	16	.1			
6					0	0	44	13	*4.1			
7					0	0	39	14.5	4.6			
8					0	0	40	17.5	5.7			
9					21	0	56	16	3.3			
10					52	0	44	13.5	.7			
11					425	0	40	13	0			
12					80	0	11	13	0			
13					1.5	0	37	13.5	0			
14					.1	2.0	36	13	0			
15					0	2.7	32	12	0			
16					0	528	31	10	0			
17					0	195	31	7.8	0			
18					0	19	29	*7.1	0			
19					0	22	28	7.1	0			
20					0	3.3	28	5.7	0			
21					0	118	27	5.1	0			
22					0	219	25	4.1	0			
23					0	21	23	3.3	0			
24					0	.1	22	2.4	0			
25					0	497	22	3.3	0			
26					0	474	21	2.4	0			
27					0	*163	20	1.7	0			
28					0	*3.0	22	1.1	0			
29					-	.7	22	1.5	0			
30					-	12	22	1.3	0			
31					-	135	-	.6	-			
Total					579.6	2,414.8	1,068.7	296.5	18.6	0	0	0
Mean					20.7	77.9	35.6	9.56	0.620	0	0	0
Ac-ft					1,150	4,790	2,120	588	37	0	0	0

Calendar year : Max Min Mean Ac-ft  
Water year : Max Min Mean Ac-ft

\* Discharge measurement made on this day.

## CRAB CREEK BASIN

Crab Creek near Moses Lake, Wash.

Location.--Lat 47°11'25", long. 119°16'00", in SWSE<sup>1</sup> sec. 26, T. 20 N., R. 28 E., on right bank 3 miles upstream from Parker Horn and 4 miles north of town of Moses Lake.

Drainage area.--2,040 sq mi, approximately.

Records available.--September 1942 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,070.39 ft above mean sea level (Bureau of Reclamation benchmark).

Average discharge.--9 years, 33.6 cfs.

Extremes.--Maximum discharge during year, 1,590 cfs Mar. 18 (gage height, 5.26 ft); no flow Jan. 30 to Feb. 7, Feb. 12, 13.

1942-51: Maximum discharge, 2,810 cfs Feb. 27, 1949 (gage height, 5.57 ft); no flow during several months each year.

Remarks.--Records good above 10 cfs and fair below. Numerous small diversions for irrigation and domestic use above station. Most of flow from upper basin passes this station under ground. No regulation.

Rating table, water year 1950-51, except periods of indefinite stage-discharge relation (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Oct. 4 to Nov. 14)

1.1	0	1.6	5.6	3.0	132
1.2	.1	1.7	11.5	3.5	213
1.3	.4	1.8	17.5	4.0	395
1.4	1.5	2.0	35	4.5	730
1.5	3.6	2.5	87	4.9	1,120

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	e0.8	0.7	0.4	0.2	0	159	355	103	9.3	2.0	1.1	0.7
2	e1.0	.5	.2	.3	0	151	325	118	8.3	1.8	1.1	.6
3	e1.2	.5	.2	.3	0	158	313	112	7.8	2.0	1.0	.6
4	1.6	.6	.2	.2	0	143	291	102	10.5	2.2	1.1	.6
5	2.6	.5	*.2	.2	0	154	258	101	14	2.0	1.0	.5
6	1.5	.5	.2	.1	0	138	221	100	14.5	2.0	1.0	.5
7	1.0	.3	.3	.1	0	130	195	100	15	1.6	1.0	.5
8	1.5	.3	.2	.1	.2	132	190	87	14.5	*1.8	*1.0	.5
9	1.5	.2	.4	.1	.2	143	206	89	15	1.6	1.1	.5
10	1.0	.3	.4	.2	.2	132	202	90	16	1.4	1.1	.5
11	** .9	.4	.4	.2	.1	124	202	86	22	1.4	1.0	.5
12	.8	.4	.4	*.2	0	122	199	83	26	1.5	.9	.5
13	.8	.3	.3	.2	0	123	195	82	27	1.4	.9	.5
14	*.8	.3	.3	.2	860	121	175	75	28	1.4	.9	.4
15	1.1	e.3	.3	.2	1,040	130	165	68	29	1.2	.9	.4
16	.8	.3	.6	.2	891	132	164	*69	25	1.2	.9	.4
17	1.5	.3	.4	.2	678	190	162	72	22	1.2	.8	.4
18	1.4	.3	.3	.1	509	960	177	69	16	1.1	.8	.4
19	1.0	.3	.3	.1	370	900	147	63	14	1.2	.8	.4
20	1.2	.3	.3	.1	302	662	138	58	10.5	1.2	.8	.2
21	.9	.3	.3	.1	255	738	136	53	9.8	1.2	.8	.3
22	.9	.3	.3	.1	211	1,000	134	47	9.8	1.2	.9	*.4
23	.9	.2	.3	.1	190	846	130	41	9.8	1.2	.8	.3
24	.8	.3	.3	.1	179	730	127	33	9.3	1.2	.8	.3
25	.9	.4	.2	.2	170	606	123	25	6.2	1.2	.8	.3
26	.9	.3	.2	.2	*165	509	119	22	5.6	1.2	.8	.3
27	.9	.4	.2	.1	171	*536	115	19	4.7	1.4	.8	.3
28	.8	.3	.2	.2	170	620	116	15	3.6	1.4	.8	.3
29	1.0	.3	.2	.1	-	627	116	12	2.6	1.2	1.0	.3
30	1.5	.4	.2	0	-	529	107	11.5	2.2	1.2	1.0	.4
31	.8	-	.2	0	-	425	-	9.8	1.2	1.2	.8	-
Total	34.3	10.8	9.1	4.7	6,161.7	12,050	5,503	2,015.3	408.0	44.8	28.5	12.8
Mean	1.11	0.36	0.29	0.15	220	389	183	65.0	13.6	1.45	0.92	0.43
Ac-ft	68	21	18	9.3	12,220	23,900	10,920	4,000	809	89	57	25
Calendar year 1950:	Max	2,520	Min	0	Mean	102	Ac-ft	74,050				
Water year 1950-51:	Max	1,040	Min	0	Mean	72.0	Ac-ft	52,140				

Peak discharge (base, 200 cfs).--Feb. 14 (7 p.m.) 1,440 cfs (5.16 ft); Mar. 5 (11 a.m.) 425 cfs (4.05 ft); Mar. 18 (8 p.m.) 1,590 cfs (5.26 ft); Mar. 22 (3 a.m.) 1,030 cfs (4.83 ft); Mar. 29 (2 a.m.) 650 cfs (4.38 ft).

\* Discharge measurement made on this day.

\*\* Field estimate made on this day.

e Stage-discharge relation indefinite; discharge estimated on basis of 1 discharge measurement and weather records.

## Park Lake near Coulee City, Wash.

Location.--Lat 47°35', long. 119°24', in NW¼ sec. 14, T. 24 N., R. 27 E., or southeast shore 1 mile upstream from outlet and 5½ miles southwest of Coulee City.

Records available.--March 1938 to September 1951 (fragmentary).

Gage.--Staff gage read two or three times a month. Datum of gage is at mean sea level (Bureau of Reclamation benchmark).

Extremes.--1938-51: Maximum water-surface elevation observed, 1,096.44 ft Feb. 9, 1950; minimum observed, 1,094.17 ft Sept. 30, 1939.  
Maximum elevation known, 1,101.3 ft (from well-defined alkali line at gage), date of occurrence unknown.

Remarks.--Some diversion from tributary for irrigation.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	95.62	-	-	-	95.72	-	-	-	-
5	95.37	-	95.59	-	96.07	95.66	95.90	-	95.68	95.50	-	95.47
6	-	95.50	-	-	-	-	-	-	-	95.60	95.33	-
7	-	-	-	-	-	-	-	95.80	-	-	95.10	-
8	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	95.88	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-
11	95.39	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	95.80	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	95.86	-	-	-	-	-	-	-	-
20	95.40	95.45	95.71	-	95.86	95.80	95.80	-	95.58	95.43	95.26	95.40
21	-	-	-	-	-	-	-	95.75	-	-	-	95.43
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	95.94	-	-	-	-	-	-
29	-	95.52	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-

Note.--Add 1,000 ft to obtain elevation above mean sea level.

Park Creek below Park Lake, near Coulee City, Wash.

Location.--Lat 47°34', long. 119°25', in SW<sup>1</sup>/<sub>4</sub> sec. 15, T. 24 N., R. 27 E., on left bank 100 ft upstream from mouth, 500 ft downstream from Park Lake and 6½ miles southeast of Coulee City.

Drainage area.--About 400 sq mi (revised).

Records available.--July 1945 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,091.52 ft above mean sea level (Bureau of Reclamation benchmark).

Average discharge.--6 years, 6.40 cfs.

Extremes.--Maximum discharge during year, 47 cfs Feb. 9 (gage height, 2.71 ft); minimum, 0.8 cfs Aug. 29 (gage height, 1.77 ft).

1945-51: Maximum discharge, that of Feb. 9, 1951; maximum gage height, 3.05 ft Jan. 28, 1950 (backwater from ice); minimum discharge not determined, probably less than 0.1 cfs during period Aug. 17 to Sept. 21, or Oct. 1-17, 1945 (gage height, less than 1.4 ft).

Remarks.--Records fair except those for period of ice effect, which are poor. Some diversion during summer months for irrigation above Park Lake. Occasional regulation by operation of fish screen at outlet of Park Lake.

Rating table, water year 1950-51, except period of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.8	1.0	2.2	7.1
1.9	1.8	2.3	10.5
2.0	3.0	2.4	17
2.1	4.8	2.5	26

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.2	8.9	10	12	b2.0	15.5	15.5	8.9	5.4	5.0	1.9	1.2
2	5.0	8.6	7.1	12	b2.0	8.9	15.5	8.9	7.4	3.2	1.4	1.2
3	4.8	8.6	11.5	12	b2.0	15.5	14.5	8.9	7.4	2.7	1.2	1.2
4	5.0	8.3	4.4	6.4	b2.1	14.5	14.5	8.9	4.2	1.8	1.2	1.6
5	5.4	6.3	1.0	2.7	b2.2	14.5	13	8.9	4.4	1.5	1.2	1.6
6	5.4	8.6	1.0	2.4	b2.7	14.5	13	8.6	8.6	*3.8	1.0	1.5
7	5.6	8.6	1.7	2.4	b4.0	14.5	14.5	9.6	8.9	6.6	*1.3	3.4
8	5.4	8.0	1.2	2.7	7.1	14.5	14	10	9.3	6.3	1.4	9.3
9	5.4	8.3	1.2	*2.8	16.2	8.6	13	9.6	9.6	6.3	1.2	9.3
10	5.6	8.3	8.6	3.1	20	4.4	13	10	10	6.1	1.0	8.0
11	*6.1	9.3	16	3.2	20	3.6	13	10.5	10.5	5.9	1.1	7.4
12	6.1	10	15.5	3.2	8.3	10.5	13	10	9.6	5.6	1.0	6.3
13	6.6	9.3	15.5	3.4	15.5	18	12.5	10	9.6	4.8	1.3	2.1
14	6.8	9.3	13	3.2	20	18	3.2	10	9.3	5.6	1.3	1.4
15	6.8	9.6	13	9.2	21	18	8.7	*10	8.9	4.4	1.4	1.2
16	6.6	9.6	14.5	17	19.5	18	12	10	8.6	2.6	1.3	1.2
17	6.6	9.6	14.5	16	18	18	12.5	9.6	8.3	1.8	1.2	1.2
18	6.8	9.6	14.5	15.5	18	18	7.7	9.3	7.7	1.7	1.1	1.3
19	7.1	10	14.5	15.5	18	18	5.4	9.3	6.8	1.7	1.4	1.5
20	7.4	10.5	14.5	14.5	*18	19	11	9.3	6.3	1.3	1.0	1.6
21	6.6	9.3	15.5	14.5	18	18	11	9.3	6.6	1.2	1.0	*1.4
22	6.6	8.9	14.5	14.5	17	7.7	11	9.3	6.3	2.6	1.0	1.4
23	6.8	8.6	14.5	14.5	17	3.6	10.5	9.3	4.4	2.1	1.5	2.5
24	7.4	8.9	14	14.5	16	4.2	10.5	8.9	2.4	1.5	1.1	8.3
25	7.4	10.5	13	14	15.5	14	10.5	8.6	2.7	1.4	1.0	8.0
26	8.0	11	13	10.5	15.5	24	10	8.6	1.9	1.5	1.3	7.1
27	8.0	11	12.5	b5.0	14	22	9.6	8.0	1.5	1.5	1.3	5.9
28	8.0	10.5	12	b3.0	15.5	*20	10	7.1	2.7	1.7	1.0	1.9
29	8.3	*10.5	12	b2.3	-	16	9.6	6.1	5.4	2.2	.9	3.0
30	8.6	11	12	b2.2	-	14	9.3	3.0	5.4	2.2	1.0	9.6
31	8.6	-	12	b2.1	-	15.5	-	3.6	-	1.4	1.1	-
Total	204.0	281.5	338.2	256.3	365.1	443.5	341.5	272.1	200.1	98.0	37.1	112.6
Mean	6.58	9.38	10.9	8.27	13.0	14.3	11.4	8.78	6.67	3.16	1.20	3.75
Ac-ft	405	558	671	508	724	880	677	540	397	194	74	223

Calendar year 1950: Max 23

Min 0.6

Mean 7.43

Ac-ft 5,380

Water year 1950-51: Max 24

Min 0.9

Mean 8.08

Ac-ft 5,850

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.



## Blue Lake near Coulee City, Wash.

Location.--Lat 47°34', long. 119°26', in SE $\frac{1}{4}$  sec. 16, T. 24 N., R. 27 E., on right shore  $2\frac{1}{2}$  miles upstream from outlet and 7 miles southwest of Coulee City.

Records available.--March 1938 to September 1951 (fragmentary).

Gage.--Staff gage read two or three times a month. Datum of gage is at mean sea level (Bureau of Reclamation benchmark).

Extremes.--1938-51: Maximum elevation observed, 1,093.42 ft Feb. 20, 1951; minimum observed, 1,090.50 ft Nov. 10, 1939.  
Maximum elevation known, 1,101.2 ft (from alkali line at gage); date of occurrence unknown.

Remarks.--Some diversion from tributaries for irrigation.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	93.22	-	-	-	92.97	-	-	-	-
5	91.95	-	93.11	-	93.28	93.12	93.12	-	92.92	92.77	-	92.14
6	-	92.65	-	-	-	-	-	-	-	92.79	92.45	-
7	-	-	-	-	-	-	-	-	-	-	92.43	-
8	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	93.12	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-
11	92.05	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	93.04	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	93.21	-	-	-	-	-	-	-	-
20	92.22	92.96	93.27	-	93.42	93.14	92.94	-	92.88	92.65	92.22	92.12
21	-	-	-	-	-	-	-	93.01	-	-	-	92.17
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	93.23	-	-	-	-	-	-
29	-	93.14	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-

Note.--Add 1,000 ft to obtain elevation above mean sea level.

Lenore Lake near Soap Lake, Wash.

Location.--Lat 47°31', long. 119°30', in SW $\frac{1}{4}$  sec. 1, T. 23 N., R. 26 E., on east shore 5 $\frac{1}{2}$  miles upstream from outlet and 9 miles north of town of Soap Lake.

Records available.--July 1936, March 1938 to September 1951 (fragmentary).

Gage.--Benchmark or reference point; readings made two or three times per month. Prior to March 21, 1950, staff gage at same site. Datum of gage and reference points is mean sea level (Bureau of Reclamation benchmark).

Extremes.--1936, 1938-51: Maximum elevation observed, 1,085.79 ft May 15, 1951; minimum observed, 1,076.65 ft Oct. 26, 1940.

Maximum elevation known, 1,092.2 ft (from well-defined alkali line at gage); date of occurrence unknown.

Remarks.--Some diversion from tributaries for irrigation.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	83.70	-	-	-	85.72	-	-	-	-
5	82.94	-	83.15	-	84.19	84.63	85.47	-	85.75	85.49	-	84.54
6	-	83.00	-	-	-	-	-	-	-	85.55	84.93	-
7	-	-	-	-	-	-	-	85.77	-	-	84.95	-
8	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	83.79	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-
11	82.84	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	85.79	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	83.99	-	-	-	-	-	-	-	-
20	82.96	82.98	83.44	-	84.47	85.25	85.63	-	85.65	85.32	84.68	84.27
21	-	-	-	-	-	-	-	85.77	-	-	-	84.37
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	85.67	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	83.05	-	-	-	85.45	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-

Note.--Add 1,000 ft to obtain elevation above mean sea level.

Soap Lake near Soap Lake, Wash.

Location.--Lat 47°25', long. 119°30', in SE $\frac{1}{4}$  sec. 12, T. 22 N., R. 26 E., on east shore 1 $\frac{1}{2}$  miles upstream from outlet and 2 miles north of town of Soap Lake.

Records available.--May to August 1936, March 1938 to September 1951 (fragmentary).

Gage.--Reference point; readings made two or three times a month. Elevation of reference point is 1,076.02 ft above mean sea level (Bureau of Reclamation benchmark). Mar. 21, 1950, to Feb. 1, 1951, reference point 0.06 ft lower. All readings have been reduced to elevations above mean sea level. Prior to Mar. 21, 1950, staff gage at same site and at sea level datum.

Extremes.--1936, 1938-51: Maximum elevation observed, 1,077.03 ft June 5, 1951; minimum observed, 1,070.87 ft Oct. 21, 1939.  
Maximum elevation known, 1,083.1 ft (from well-defined alkali line at gage); date of occurrence unknown.

Remarks.--Some diversion from tributaries for irrigation.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	75.91	-	-	-	76.87	-	-	-	-
5	74.86	-	75.44	-	76.25	76.52	76.88	-	77.03	76.87	-	76.37
6	-	75.15	-	-	-	-	76.86	-	-	76.96	76.57	-
7	-	-	-	-	-	-	-	76.96	-	-	76.10	-
8	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	75.95	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	76.92	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	76.07	-	-	-	77.01	-	-	-	-
20	75.00	75.26	75.73	-	76.40	76.73	76.84	-	76.96	76.77	76.36	76.27
21	-	-	-	-	-	-	-	77.01	-	-	-	76.26
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	76.80	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	73.35	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-

Note.--Add 1,000 ft to obtain elevation above mean sea level.

## Rocky Ford Creek near Ephrata, Wash.

Location.--Lat 47°18'20", long. 119°26'50", in NW¼NW¼ sec. 21, T. 21 N., R. 27 E., on right bank 5 miles east of Ephrata and 5½ miles upstream from mouth.

Drainage area.--490 sq mi, of which only 12 sq mi contribute directly to surface runoff.

Records available.--June 1909 to April 1910, July to December 1911, August 1942 to September 1951. Prior to January 1910, published as Upper Crab Creek near Ephrata.

Gage.--Water-stage recorder. Datum of gage is 1,064.87 ft above mean sea level (Bureau of Reclamation benchmark). June 1909 to December 1911, staff gages at sites 4½ to 5½ miles downstream at different datums. Aug. 19, 1942, to May 23, 1945, water-stage recorder at site 3½ miles downstream at datum 1,059.51 ft above mean sea level (Bureau of Reclamation benchmark).

Average discharge.--9 years (1942-51), 64.9 cfs.

Extremes.--Maximum discharge during year, 108 cfs June 28 (gage height, 2.48 ft); minimum, 64 cfs Jan. 28, Mar. 15 (gage height, 1.89 ft).  
1909-11, 1942-51: Maximum discharge, 143 cfs Apr. 23, 1949 (gage height, 2.84 ft); minimum, 20 cfs Aug. 13-18, 1911.

Remarks.--Records good. Some regulation by temporary dams for irrigation and by fish hatchery. Diversions for irrigation are minor part of flow past gage.

Rating table, water year 1950-51 (gage height, in feet,  
and discharge, in cubic feet per second)

1.9	65
2.2	85
2.5	110

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	96	87	79	71	67	67	70	95	100	103	96	93
2	96	87	78	71	67	67	70	95	100	103	96	93
3	96	87	78	70	67	67	72	95	100	103	96	92
4	95	86	78	70	67	67	72	96	102	103	96	92
5	95	85	*78	70	67	67	73	97	102	103	96	92
6	95	85	78	70	67	67	74	97	101	103	96	92
7	95	85	77	70	67	67	75	99	101	103	96	92
8	95	84	77	70	67	68	76	98	100	*103	96	93
9	94	84	77	70	67	67	77	98	100	103	*96	92
10	*94	84	77	70	67	67	78	98	100	102	95	92
11	93	84	77	69	67	67	79	99	101	102	95	92
12	93	84	77	69	66	67	80	99	101	99	95	92
13	93	84	76	*68	66	67	81	99	101	99	95	91
14	93	83	76	68	66	67	82	99	101	99	95	91
15	92	83	75	69	66	67	82	99	101	97	95	91
16	92	83	75	68	66	67	84	*99	101	97	94	91
17	91	82	75	68	66	67	84	99	100	97	94	91
18	91	82	74	68	66	67	85	99	100	95	94	91
19	91	82	74	68	66	67	85	99	101	95	94	91
20	91	82	74	68	67	67	86	99	101	95	93	90
21	91	82	74	68	67	67	87	99	101	95	93	90
22	90	82	73	68	67	67	88	99	101	95	93	*90
23	89	81	73	68	67	67	88	99	102	95	93	89
24	89	81	73	68	67	68	89	99	102	95	93	89
25	89	81	73	68	67	68	91	99	102	97	93	89
26	89	80	72	67	*67	68	91	99	102	97	93	89
27	88	80	72	67	67	*68	92	99	102	97	93	88
28	88	79	72	67	67	69	95	99	102	97	93	88
29	88	79	72	67	-	69	94	99	102	95	95	89
30	87	79	72	67	-	69	94	100	103	97	94	89
31	87	-	72	67	-	69	-	100	-	95	93	-
Total	2,846	2,487	2,328	2,127	1,868	2,090	2,474	3,049	3,033	3,067	2,929	2,724
Mean	91.8	82.9	75.1	68.6	66.7	67.4	82.5	98.4	101	98.9	94.5	90.8
Ac-ft	5,640	4,930	4,620	4,220	3,710	4,150	4,910	6,050	6,020	6,080	5,810	5,400
Calendar year 1950: Max	135			Min 58		Mean 96.1		Ac-ft 69,580				
Water year 1950-51: Max	104			Min 66		Mean 85.0		Ac-ft 61,540				

\* Discharge measurement made on this day.

## Moses Lake at Moses Lake, Wash.

Location.--Lat 47°06', long. 119°20', in NE $\frac{1}{4}$  sec. 32, T. 19 N., R. 28 E., near west shore on downstream side of bridge on State Highway 18, 1 $\frac{1}{2}$  miles upstream from outlet and 3 miles southwest of town of Moses Lake.

Drainage area.--About 2,970 sq mi.

Records available.--June 1909 to September 1914, November 1936 to September 1945 (fragmentary), October 1945 to September 1951. Published as "at Neppel" 1912-14.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (Bureau of Reclamation benchmark). Prior to Apr. 3, 1910, staff gage 1 mile northeast across lake at different datum. Apr. 3, 1910, to Sept. 30, 1914, Nov. 19, 1936, to Nov. 24, 1944, staff gages  $\frac{3}{4}$  miles northeast across lake at Parker Horn at various datums.

Extremes.--Maximum elevation during year, 1,048.28 ft Mar. 23; minimum recorded, 1,046.17 ft Sept. 27, 28.  
1909-14, 1936-51: Maximum elevation, 1,048.29 ft Mar. 10, 1950; minimum observed, 1,038.17 ft Aug. 27, 1910.

Remarks.--Elevation controlled by dam at lake outlet. Many small diversions for irrigation.

Elevation, in feet, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	46.32	46.88	47.30	47.69	-	47.72	47.95	47.89	47.59	47.36	46.72	46.27
2	46.32	46.90	47.30	47.69	-	47.69	47.88	47.92	47.58	47.35	46.69	46.28
3	46.33	46.91	47.33	47.70	-	47.64	47.81	47.96	47.58	47.34	46.67	46.28
4	46.34	46.93	47.35	47.72	-	47.61	47.74	47.98	47.63	47.32	46.64	46.28
5	46.37	46.94	47.36	47.73	-	47.57	47.65	48.02	47.67	47.32	46.62	46.28
6	46.39	46.94	47.38	47.74	-	47.60	47.57	48.04	47.68	47.31	46.60	46.28
7	46.42	46.97	47.39	47.74	46.61	47.63	47.48	48.10	47.69	47.28	46.56	46.28
8	46.46	46.98	47.40	47.75	46.61	47.67	47.48	48.10	47.67	47.27	46.54	46.27
9	46.48	46.98	47.42	47.76	46.63	47.70	47.48	48.07	47.67	47.26	46.52	46.27
10	46.49	46.99	47.43	47.78	46.66	47.73	47.48	48.03	47.67	47.23	46.50	46.26
11	46.52	47.02	47.44	47.80	46.69	47.75	47.49	48.03	47.67	47.26	46.47	46.25
12	46.54	47.03	47.45	47.82	46.71	47.77	47.50	48.01	47.67	47.18	46.44	46.25
13	46.55	47.03	47.48	47.83	46.73	47.78	47.51	47.94	47.67	47.15	46.43	46.25
14	46.57	47.04	47.49	47.83	46.78	47.73	47.49	47.90	47.67	47.14	46.41	46.25
15	46.60	47.03	47.51	47.84	47.05	47.67	47.48	47.91	47.67	47.12	46.40	46.25
16	46.61	47.05	47.54	47.84	47.28	47.61	47.47	47.90	47.65	47.10	46.39	46.24
17	46.63	47.07	47.57	47.86	47.40	47.56	47.47	47.91	47.64	47.09	46.37	46.24
18	46.66	47.08	47.58	47.87	47.57	47.58	47.50	47.91	47.62	47.04	46.36	46.25
19	46.68	47.10	47.58	47.88	47.72	47.65	47.54	47.91	47.60	47.01	46.35	46.24
20	46.69	47.10	47.60	47.89	47.82	47.65	47.57	47.89	47.58	46.98	46.34	46.21
21	46.71	47.12	47.61	47.90	47.95	47.92	47.58	47.89	47.56	46.97	46.33	46.21
22	46.73	47.14	47.62	47.85	47.94	48.05	47.58	47.88	47.54	46.95	46.31	46.21
23	46.74	47.15	47.63	47.82	47.92	48.23	47.60	47.85	47.51	46.93	46.28	46.20
24	46.75	47.16	47.64	47.82	47.88	48.27	47.62	47.83	47.49	46.90	46.27	46.19
25	46.77	47.18	47.65	47.83	47.86	48.23	47.65	47.80	47.47	46.87	46.26	46.19
26	46.78	47.20	47.66	47.84	47.82	48.19	47.69	47.79	47.47	46.85	46.25	46.18
27	46.78	47.21	47.67	-	47.78	48.13	47.72	47.75	47.45	46.83	46.24	46.17
28	46.80	47.23	47.68	-	47.76	48.10	47.78	47.71	47.42	46.80	46.23	46.17
29	46.83	47.25	47.68	-	-	48.07	47.85	47.67	47.41	46.77	46.26	46.18
30	46.86	47.28	47.68	-	-	48.05	47.88	47.65	47.38	46.75	46.27	46.20
31	46.87	-	47.68	-	-	48.01	-	47.62	-	46.74	46.27	-

Note.--Add 1,000 ft to obtain elevation above mean sea level.

## CRAB CREEK BASIN

Crab Creek near Warden, Wash.

Location.--Lat 46°58'45", long. 119°15'45", in NE¼ sec. 11, T. 17 N., R. 28 E., on right bank a quarter of a mile downstream from O'Sullivan Dam, 0.4 mile downstream from Lind Coulee and 10 miles west of Warden.

Drainage area.--About 4,150 sq mi, of which 500 sq mi in the vicinity of Soap Lake is probably noncontributing.

Records available.--June 1909 to June 1912 (fragmentary), October 1942 to September 1951. Published as Lower Crab Creek near Warden 1909-12.

Gage.--Water-stage recorder. Datum of gage is 887.98 ft above mean sea level (Bureau of Reclamation benchmark). Prior to June 20, 1912, staff gages at several sites within 5 miles downstream at various datums. October 1942 to September 1950, water-stage recorder at site 0.4 mile downstream at different datum.

Average discharge.--8 years (1942-50), 49.1 cfs.

Extremes.--Maximum discharge during year, 472 cfs Apr. 11 (gage height, 3.09 ft), was probably higher sometime during period of no gage-height record; minimum not determined, occurred during period of doubtful gage-height record. 1909-12, 1942-51: Maximum discharge, 3,000 cfs Feb. 7, 1943 (gage height, 4.25 ft, datum then in use), from rating curve extended above 20 cfs on basis of slope-area measurement of flood in Lind Coulee; no flow for short intervals in June and July 1948, when water was shut off during construction of O'Sullivan Dam.

Remarks.--Records fair except those below 20 cfs, which are poor. Many small diversions for irrigation. Flow regulated by O'Sullivan Dam and Moses Lake.

Rating table, period Apr. 11 to Sept. 30, 1951 (gage height, in feet, and discharge, in cubic feet per second)

0.0	0.5	0.7	20
.1	1.3	1.0	44
.2	2.5	1.5	105
.3	4.3	2.0	190
.4	6.8	3.1	475
.5	10		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1							-	2.1	14	19	24	24
2							+464	d.1	32	19	24	24
3							-	d.1	33	19	24	24
4							-	d.1	31	19.5	24	24
5							-	d.1	31	19.5	24	24
6							-	d.1	30	19	24	24
7			+31				-	d.1	26	19	24	24
8							-	d.1	21	*19.5	*24	24
9							-	1.4	21	19.5	25	24
10							-	1.7	21	19.5	25	*24
11							469	1.7	21	19.5	25	24
12							*466	1.5	20	21	25	24
13							457	1.4	20	21	24	24
14				+35			448	1.4	20	21	24	23
15							439	1.1	21	21	24	23
18							433	30	21	22	24	23
17							427	*29	21	23	24	23
18	+14.5						409	29	20	24	24	22
19							382	29	20	24	24	22
20							355	29	20	24	24	22
21							325	30	20	24	24	23
22							300	30	20	24	24	23
23							280	30	20	24	24	*23
24							245	12	19.5	24	24	23
25							208	d.4	19.5	24	24	22
26							178	d.1	19.5	*24	24	22
27							86	d.1	19.5	24	24	22
28							16.5	d.1	19.5	24	24	22
29							8.8	d.1	19.5	24	24	22
30							4.7	d.1	19	24	24	22
31							-	d1.0	-	24	24	-
Total							-	272.8	660.0	677.0	748	694
Mean							-	8.80	22.0	21.8	24.1	23.1
Ac-ft							-	541	1,310	1,347	1,480	1,380
Calendar year	: Max		Min		Mean		Ac-ft		Ac-ft			
Water year	: Max		Min		Mean		Ac-ft		Ac-ft			

\* Discharge measurement made on this day.

† Result of discharge measurement.

d Doubtful gage-height record; discharge is estimated flow through bypass valve in O'Sullivan Dam.

Note.--No gage-height record Aug. 28 to Sept. 9, Sept. 11-19, 24-31, discharge interpolated.

## Crab Creek near Smyrna, Wash.

Location.--Lat 46°50'35", long. 119°36'25", in SE $\frac{1}{4}$  sec. 30, T. 16 N., R. 26 E., on left bank at highway bridge  $2\frac{1}{2}$  miles east of Smyrna.

Drainage area.--About 4,500 sq mi, of which about 500 sq mi in the vicinity of Soap Lake is probably noncontributing (revised).

Records available.--August 1942 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 530.83 ft above mean sea level (Bureau of Reclamation benchmark).

Average discharge.--9 years, 46.8 cfs.

Extremes.--Maximum discharge during year, 620 cfs Feb. 10 (gage height, 4.9<sup>2</sup> ft); minimum, 1.0 cfs July 29 (gage height, 0.95 ft).

1942-51: Maximum discharge, 3,300 cfs Feb. 8, 1943 (gage height, 7.5 ft, estimated by observer), from rating curve extended above 1,000 cfs; possibly no flow at times during summer of 1947.

Remarks.--Records good except those below 10 cfs, which are fair, and those for periods of ice effect or no gage-height record, which are poor. Many diversions above station for irrigation. Some regulation by O'Sullivan Dam, Moses Lake (see p. 313) and other headwater lakes.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 11 to Sept. 30

2.0	7.4	3.5	170	0.9	0.8	2.0	17
2.2	16.5	4.0	280	1.1	2.0	2.3	28
2.6	45	4.8	540	1.3	3.9	2.6	47
3.0	89			1.5	6.3	3.0	89
				1.7	9.9		

Note.--Same as preceding table above 3.0 ft.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	11	14	37	34	a25	304	427	126	9.0	4.3	2.6	6.6
2	10.5	14	32	36	a27	301	*439	108	8.8	4.1	2.8	6.3
3	10	13.5	27	43	a28	310	451	59	12	4.8	3.2	6.2
4	13.5	14	31	39	a28	322	451	41	20	4.9	3.6	6.2
5	17	14.5	34	37	a27	295	454	36	28	5.3	3.8	6.2
6	18.5	14	*33	29	a27	343	468	34	30	7.0	3.3	6.0
7	19	13.5	39	29	a33	298	480	34	28	*7.0	4.1	5.9
8	20	13	38	32	a100	295	488	36	25	5.1	*5.1	6.3
9	21	12.5	39	37	a400	258	484	32	21	4.3	5.4	6.3
10	21	12	41	36	540	258	472	30	17	5.0	4.4	5.9
11	19.5	15	39	35	421	216	468	32	16	4.7	4.3	7.0
12	18	42	37	39	343	198	468	33	15	4.3	4.2	7.3
13	17	70	36	*39	295	190	460	30	14	4.0	2.4	7.7
14	11.5	75	35	43	316	182	451	28	13	3.5	1.5	7.2
15	12.5	63	31	42	322	204	448	28	13	3.1	2.1	7.2
16	14	43	27	43	265	289	448	28	11.5	3.9	2.4	7.2
17	12.5	31	25	40	230	298	430	*25	11	4.8	2.7	7.5
18	*14	26	22	39	319	316	439	24	11	4.0	2.8	7.7
19	13	23	19.5	35	262	325	412	24	11	3.0	2.7	7.8
20	12	25	19	28	115	331	406	25	9.9	3.4	2.9	8.0
21	12	27	18.5	29	158	331	385	25	8.0	3.7	2.9	8.2
22	10.5	26	41	48	129	328	370	25	5.1	4.1	2.7	*8.6
23	10.5	27	62	43	108	343	343	24	4.2	4.1	3.0	8.6
24	10.5	30	65	65	147	325	322	24	4.6	3.5	3.5	8.8
25	10.5	31	64	97	216	316	295	23	4.9	3.1	4.2	9.0
26	11.5	32	52	102	255	322	255	20	4.8	3.1	4.6	9.7
27	11	32	41	b66	*280	382	228	15	4.4	1.9	4.6	10
28	11.5	32	37	b40	295	382	232	12	4.1	2.1	4.8	9.9
29	14.5	30	35	b23	-	397	202	11.5	4.8	1.2	5.8	10.5
30	19.5	32	34	b23	-	415	154	11.5	4.6	1.4	6.6	11
31	18.5	-	35	b24	-	421	-	11	-	2.0	7.0	-
Total	446.0	847.0	1,126.0	1,295	5,711	9,495	11,830	1,015.0	373.5	120.5	116.0	230.8
Mean	14.4	28.2	36.3	41.8	204	306	394	32.7	12.4	3.89	3.74	7.69
Ac-ft	885	1,680	2,230	2,570	11,330	18,830	23,460	2,010	741	239	230	458

Calendar year 1950: Max 750 Min 0.1 Mean 129 Ac-ft 93,180  
 Water year 1950-51: Max 540 Min 1.2 Mean 89.3 Ac-ft 64,660

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on b basis of records for nearby stations.

b Stage-discharge relation affected by ice.

## YAKIMA RIVER BASIN

## Yakima River near Martin, Wash.

Location.--Lat 47°19'10", long. 121°20'10", in NE½ sec. 12, T. 21 N., R. 11 E., on left bank 800 ft downstream from dam at outlet of Keechelus Lake, 3½ miles northwest of Martin, and 12 miles upstream from Easton.

Drainage area.--55.8 sq mi (revised).

Records available.--October 1903 to September 1951.

Gage.--Water-stage recorder and masonry channel. Altitude of gage is about 2,450 ft (from topographic map). Prior to July 20, 1923, staff gages at several sites within 2 miles of present site at various datums.

Average discharge.--47 years (1904-51), 328 cfs (adjusted for storage since January 1906).

Extremes.--Maximum discharge during year, 1,220 cfs Aug. 18-21 (gage height, 8.21 ft); minimum, 2.8 cfs Nov. 17; minimum gage height, 2.13 ft Nov. 20.

1903-51: Maximum discharge, 7,370 cfs Mar. 26, 1915, when temporary crib dam was washed out; practically no flow when gates in Keechelus Lake Dam are closed.

Remarks.--Records good. Flow regulated by Keechelus Lake (see p. 336). Keechelus Lake spillway discharge, computed from reservoir elevations and spillway rating, bypasses gage and is added to flow at station. Spill occurred June 5 to July 9.

Cooperation.--Gage-height record collected in cooperation with, and 6 discharge measurements furnished by Bureau of Reclamation.

Rating table, water year 1950-51, except period of combined flow at gage and over spillway (gage height, in feet, and discharge, in cubic feet per second)  
(Shifting-control method used Nov. 15-18, July 9 to Sept. 30)

2.0	1.8	3.5	102
2.1	4.5	4.0	165
2.2	7.8	5.0	325
2.4	16	6.0	540
2.7	31	7.5	992
3.0	52		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	761	808	12	457	632	578	7.4	157	98	389	280	808
2	746	808	12	491	515	528	7.4	*186	98	367	280	776
3	746	808	12	528	515	503	7.8	200	99	346	280	776
4	746	808	110	528	515	503	7.8	239	100	316	280	776
5	761	808	287	528	435	503	8.1	264	*162	335	280	776
6	617	824	363	528	298	446	8.1	264	445	339	280	761
7	552	923	403	528	200	414	8.1	264	642	290	280	746
8	552	992	435	528	*169	414	8.5	186	682	303	280	731
9	552	992	*435	528	171	414	8.5	153	708	282	280	716
10	552	992	435	528	171	414	8.5	153	735	316	280	716
11	94	992	435	632	172	414	8.8	82	779	344	280	716
12	370	992	435	688	230	414	8.8	21	793	403	280	716
13	*552	992	435	688	373	*414	8.8	8.8	807	491	280	716
14	552	992	435	688	528	403	9.2	8.8	807	565	280	716
15	552	*429	435	688	632	414	9.2	8.8	880	565	280	731
16	552	3.3	435	*673	659	414	9.2	8.8	851	591	571	746
17	552	3.6	435	688	659	414	9.6	8.5	755	604	992	*746
18	552	3.1	435	688	659	403	9.6	8.5	668	604	1,180	776
19	552	3.3	435	688	604	354	9.6	8.1	601	*604	1,180	808
20	552	3.3	435	688	578	307	9.6	8.1	576	604	1,180	824
21	552	4.5	435	688	578	239	*9.6	7.8	564	604	*1,180	824
22	552	7.4	435	688	578	200	9.6	7.8	551	604	1,180	808
23	552	5.4	446	688	578	200	9.6	7.8	540	604	1,180	824
24	552	6.4	446	688	578	200	9.2	7.8	516	604	1,140	856
25	552	7.1	457	688	578	200	10.5	8.1	504	604	1,140	824
26	552	5.4	457	688	578	200	10	7.8	479	407	1,100	808
27	552	8.1	457	688	578	156	10	8.1	456	280	1,060	746
28	552	12	457	688	578	132	10	7.8	434	280	992	731
29	552	12	457	688	-	132	10	8.1	400	280	923	645
30	632	12	457	673	-	55	103	8.1	389	280	923	604
31	761	-	457	688	-	7.8	-	72	-	280	856	-
Total	17,639	13,256.9	11,815	19,534	13,339	10,388.8	364.1	2,388.6	16,099	13,480	20,977	22,747
Mean	569	442	430	630	478	335	12.1	77.1	537	435	677	758
Ac-ft	34,980	26,290	23,430	38,750	26,460	20,610	722	4,740	31,950	26,740	41,610	45,120
(+)	-12,560	+7,040	+11,270	-21,880	+6,920	-10,390	+29,610	+52,960	+5,790	-17,940	-38,300	-42,180

Adjusted for change in lake contents

Mean	365	560	564	274	601	166	510	938	634	143	53.8	49.4
Cfs/m	6.54	10.0	10.1	4.91	10.8	2.97	9.14	16.8	11.4	2.56	0.964	0.885
In.	7.53	11.20	11.66	5.67	11.22	3.45	10.19	19.39	12.67	2.96	1.11	0.99
Ac-ft	22,420	33,330	34,700	16,870	33,380	10,220	30,330	57,700	37,720	8,800	3,310	2,940

Observed

Calendar year 1950: Max	1,870	Min	3.1	Mean	454	Ac-ft	328,600
Water year 1950-51: Max	1,180	Min	3.1	Mean	444	Ac-ft	321,400

Adjusted

Calendar year 1950: Mean	459	Cfs/m	8.23	In.	111.73	Ac-ft	332,500
Water year 1950-51: Mean	403	Cfs/m	7.22	In.	98.02	Ac-ft	291,700

\* Discharge measurement made on this day.

+ Change in contents in Keechelus Lake, in acre-feet.

Note.--Discharge June 5 to July 9 is combined flow at gage and over spillway.



## Kachess River near Easton, Wash.

Location.--Lat 47°15'30", long. 121°11'50", in NE¼ sec. 3, T. 20 N., R. 13 E., on left bank three-quarters of a mile downstream from Kachess Lake and 2 miles northwest of Easton.

Drainage area.--63.6 sq mi (revised).

Records available.--October 1903 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 2,215 ft (from topographic map). Prior to July 22, 1913, staff gage and July 22, 1913, to Aug. 14, 1916, water-stage recorder at site a quarter of a mile upstream at different datum. Aug. 15, 1916, to Oct. 8, 1927, water-stage recorder half a mile downstream at different datum.

Average discharge.--48 years, 285 cfs (adjusted for storage since October 1905).

Extremes.--Maximum discharge during year, 1,320 cfs July 17-19 (gage height, 5.45 ft); minimum not determined, probably occurred during period of no gage-height record in September; minimum daily, 0.2 cfs Sept. 13-24, 26, 27.

1903-51: Maximum discharge, 2,530 cfs May 28, 1948 (gage height, 7.12 ft); no flow at times when gates in dam are closed.

Remarks.--Records excellent except those below 50 cfs, which are fair, and those for period of no gage-height record, which are poor. No diversion. Flow regulated by Kachess Lake (see p. 336).

Cooperation.--Gage-height record collected in cooperation with, and seven discharge measurements furnished by Bureau of Reclamation.

Revisions (water years).--W 369: 1904, 1907-8.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

-0.4	0	0.6	15
-.3	.3	.9	28
-.2	.6	1.4	64
-.1	1.0	2.0	126
0	1.6	2.5	205
.1	2.7	3.0	325
.3	6.9	5.5	1,350

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	205	2.7	3.3	600	298	600	6.9	190	540	940	1,300	0.5
2	171	2.7	3.1	600	298	567	6.9	*199	540	940	1,300	.4
3	119	3.1	2.6	600	298	520	7.1	199	540	1,020	1,300	.4
4	119	3.1	*2.2	600	298	520	7.1	199	*540	1,120	1,300	.4
5	46	3.1	2.2	600	298	520	7.1	201	540	1,120	1,300	.4
6	2.9	3.1	2.0	600	298	471	7.4	201	448	1,170	1,300	.4
7	3.1	3.1	250	600	298	432	7.9	72	325	1,210	1,300	.3
8	2.7	2.7	420	600	*298	432	8.8	8.1	225	1,210	1,300	.3
9	2.7	2.7	420	362	304	432	9.3	7.9	158	1,190	1,300	.3
10	3.8	2.7	420	223	313	432	9.1	82	158	1,190	1,300	.3
11	2.7	2.7	424	223	319	428	8.8	185	174	1,190	1,300	.3
12	2.7	2.7	424	223	319	*428	8.8	258	342	1,240	1,300	.3
13	2.7	2.9	440	223	313	428	9.3	258	388	1,210	1,280	.2
14	2.7	3.1	540	225	310	364	9.3	239	500	1,210	1,280	.2
15	2.7	3.1	600	*223	407	328	9.3	243	680	1,210	1,280	.2
16	*2.6	3.1	600	223	472	322	9.1	292	800	1,210	1,040	.2
17	2.6	3.1	600	223	472	322	9.1	328	750	1,260	428	.2
18	2.6	3.1	600	223	472	322	9.1	328	760	1,320	79	*.2
19	2.7	3.1	600	223	472	322	9.1	328	760	*1,320	2.7	.2
20	2.7	3.1	600	223	472	251	8.6	328	740	1,300	*1.6	.2
21	2.6	6.0	600	223	557	174	*7.4	443	740	1,300	1.0	.2
22	2.6	11	600	223	600	108	7.1	653	740	1,300	.7	.2
23	2.7	7.9	600	221	600	108	*176	720	720	1,300	.6	.2
24	2.7	8.1	600	221	620	107	319	740	700	1,300	.6	.2
25	2.7	8.3	600	269	600	107	319	760	700	1,300	.6	.3
26	2.7	8.1	600	298	600	107	319	627	720	1,300	.6	.2
27	3.5	8.1	600	298	600	107	319	540	800	1,300	.5	.2
28	3.8	6.0	600	298	600	44	319	540	840	1,300	.5	.3
29	2.7	4.2	600	298	-	6.2	319	540	900	1,300	.5	.3
30	2.7	3.8	600	298	-	6.4	264	540	940	1,300	.5	.3
31	2.7	-	600	298	-	6.9	-	540	-	1,300	.5	.3
Total	733.3	130.5	13,553.4	10,562	11,806	9,322.5	2,536.6	10,789.0	17,698	37,880	20,997.9	9.0
Mean	23.7	4.35	437	322	361	301	84.6	348	590	1,222	677	0.30
Ac-ft	1,450	259	26,880	20,950	23,420	18,490	5,030	21,400	35,100	75,130	41,850	18
(t)	+14,260	+28,070	+5,020	-3,280	+8,430	-7,770	+26,780	+33,080	-3,150	-68,950	-41,200	+2,660

Adjusted for change in lake contents

	Mean	255	476	519	287	573	174	535	886	537	101	7.32	45.0
Cfs	4.01	7.48	8.18	4.51	9.01	2.74	8.41	13.9	8.44	1.59	0.115	0.708	
In.	4.63	8.35	9.40	5.21	9.39	3.16	9.38	16.06	9.42	1.82	0.13	0.79	
Ac-ft	15,710	28,330	31,900	17,670	31,850	10,720	31,810	54,480	31,950	6,180	450	2,680	

Observed

Calendar year 1950: Max	1,280	Min	1.7	Mean	376	Ac-ft	271,800
Water year 1950-51: Max	1,320	Min	0.2	Mean	373	Ac-ft	269,800

Adjusted

Calendar year 1950: Mean	402	Cfs	6.32	In.	85.81	Ac-ft	291,100
Water year 1950-51: Mean	364	Cfs	5.72	In.	77.74	Ac-ft	265,700

\* Discharge measurement made on this day.

† Change in contents in Kachess Lake, in acre-feet.

Note.--No gage-height record Aug. 27 to Sept. 17, Sept. 19-30; discharge estimated on basis of 1 discharge measurement and weather records.

## Cle Elum River near Roslyn, Wash.

Location (revised).--Lat 47°14'30", long. 121°03'50", in NW¼ sec. 11, T. 20 N., R. 14 E., on left bank 1,000 ft downstream from dam at Cle Elum Lake and 4 miles northwest of Roslyn.

Drainage area.--203 sq mi (revised).

Records available.--October 1903 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,102.10 ft above mean sea level (Bureau of Reclamation benchmark). Prior to Oct. 14, 1913, and Sept. 4, 1931, to Apr. 19, 1933, staff gages and Oct. 14, 1913, to Sept. 3, 1931, water-stage recorder at about same site at same datum.

Average discharge.--48 years, 907 cfs (adjusted for storage since January 1906).

Extremes.--Maximum discharge during year, 3,800 cfs May 25 (gage height, 9.37 ft); minimum, 9 cfs Apr. 10, 11 (gage height, 3.88 ft).  
1903-51: Maximum discharge, 18,700 cfs Nov. 15, 1906 (gage height, 14.05 ft); no flow at times when gates in dam are closed.

Remarks.--Records excellent. No diversion above station. Flow regulated by Cle Elum Lake. (See p. 336).

Cooperation.--Gage-height record collected in cooperation with, and six discharge measurements furnished by Bureau of Reclamation.

Revisions (water years).--W 369: 1906-8.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

4.5	70	7.0	1,370
4.6	142	8.0	2,230
5.0	275	9.3	3,680
6.0	720		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,370	990	550	732	990	1,370	354	556	1,650	1,610	2,530	1,650
2	1,500	990	550	738	990	1,370	354	236	1,770	1,610	2,530	1,530
3	1,120	990	550	732	990	1,370	354	*342	2,130	1,610	2,530	1,530
4	1,020	990	550	738	990	1,370	354	346	2,330	1,610	2,530	1,530
5	1,020	990	404	738	990	1,370	354	346	*2,640	1,530	2,530	1,610
6	1,020	990	565	744	990	1,370	350	346	2,530	1,530	2,530	1,750
7	900	990	560	750	990	1,370	350	346	2,430	1,530	2,530	1,690
8	840	990	*560	750	990	1,230	354	346	2,380	1,530	2,530	1,690
9	840	990	560	750	*990	1,160	350	350	2,280	1,530	2,530	1,690
10	606	990	560	744	782	1,160	137	350	2,330	1,530	2,530	1,690
11	126	990	560	744	247	1,160	88	350	2,530	1,530	2,530	1,690
12	618	990	550	744	240	1,120	284	350	2,750	1,570	2,530	1,690
13	1,020	990	545	738	240	1,120	284	350	2,970	1,650	2,530	1,690
14	1,020	990	545	738	258	*1,060	284	346	2,970	1,690	2,530	1,690
15	1,060	990	545	738	258	1,020	284	777	3,320	1,690	2,580	1,690
16	1,020	990	545	738	545	1,020	284	1,230	3,440	1,690	2,330	1,690
17	*1,020	990	545	*810	870	1,020	284	1,530	3,200	1,770	2,430	*1,690
18	1,020	693	545	870	990	1,020	284	1,950	2,640	1,860	2,590	1,690
19	1,020	560	845	870	1,180	900	284	2,180	2,130	*1,860	2,530	1,750
20	1,020	565	710	870	1,260	840	284	2,250	2,350	1,950	*2,530	1,820
21	1,020	520	710	870	1,230	840	284	2,230	2,380	2,000	2,530	1,860
22	1,020	530	715	870	1,230	606	261	2,230	2,180	2,040	2,530	1,860
23	1,020	530	720	960	1,370	484	*261	2,530	2,040	2,040	2,530	1,860
24	1,020	535	720	990	1,410	484	444	3,080	2,000	2,040	2,530	1,860
25	1,020	530	720	990	1,410	480	685	3,680	1,950	2,180	2,530	1,860
26	1,020	530	720	990	1,410	480	690	3,440	1,950	2,330	2,530	1,820
27	1,020	530	726	990	1,410	408	700	2,970	1,860	2,530	2,530	1,690
28	1,020	545	726	990	1,370	362	705	2,750	1,770	2,530	2,530	1,160
29	1,020	550	732	990	-	362	705	2,530	1,690	2,530	2,330	900
30	990	*550	732	990	-	358	705	2,040	1,610	2,530	2,130	900
31	990	-	732	990	-	358	-	1,730	-	2,530	1,860	-
Total	30,138	23,998	19,097	25,696	26,556	26,642	11,195	44,067	70,180	58,167	76,760	49,180
Mean	972	807	616	835	848	873	353	1,422	2,339	1,877	2,476	1,639
Ac-ft	59,780	47,600	37,890	51,360	52,670	56,810	22,200	87,410	139,200	115,407	152,500	97,550
(+)	-15,400	+20,270	+39,290	-12,930	+25,270	-30,540	+77,580	+103,800	+960	-59,877	+32,900	-87,230

Adjusted for change in lake contents

Mean	754	1,141	1,255	625	1,403	427	1,677	3,110	2,356	903	316	173
Cfs	3.71	5.62	6.18	3.08	6.91	2.10	8.26	15.3	11.6	4.45	1.56	0.852
In.	4.28	6.27	7.13	3.55	7.20	2.45	9.22	17.66	12.95	5.13	1.79	0.95
Ac-ft	46,380	67,870	77,170	38,430	77,940	26,270	99,780	191,200	140,200	55,537	19,400	10,320

Observed

Calendar year 1950: Max	4,290	Min	0	Mean	1,139	Ac-ft	824,400
Water year 1950-51: Max	3,680	Min	88	Mean	1,271	Ac-ft	920,200

Adjusted

Calendar year 1950: Mean	1,265	Cfs	6.23	In.	84.60	Ac-ft	915,900
Water year 1950-51: Mean	1,175	Cfs	5.79	In.	78.56	Ac-ft	850,500

\* Discharge measurement made on this day.

† Change in contents in Cle Elum Lake, in acre-feet.

## Yakima River at Cle Elum, Wash.

Location.--Lat 47°11'20" long. 120°56'40", in sec. 27, T. 20 N., R. 15 E., on left bank at highway bridge at Cle Elum just upstream from Roslyn Creek, 7 miles upstream from Teanaway River.

Drainage area.--500 sq mi, approximately.

Records available.--August 1906 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 1,902.27 ft above mean sea level, subject to adjustment to datum of 1929. Prior to Aug. 12, 1910, chain gage on highway bridge at different datum. Aug. 12, 1910, to July 11, 1911, staff gage 30 ft below bridge at present datum. July 12, 1911, to June 27, 1923, water-stage recorder on right bank under highway bridge at present datum. Several staff gages at various locations near bridge, all at present datum, June 28, 1923, to Oct. 21, 1924.

Average discharge.--45 years, 1,964 cfs (adjusted for storage since October 1906 and Kittitas Canal diversion since 1930).

Extremes.--Maximum discharge during year, 4,880 cfs May 25 (gage height, 9.25 ft); minimum, 480 cfs Oct. 12 (gage height, 5.59 ft).

1906-51: Maximum discharge, 25,600 cfs Nov. 14, 1908 (gage height, 12.5 ft, from floodmarks); minimum, 64 cfs Nov. 16, 17, 1929, Dec. 4, 1936.

Remarks.--Records fair. Kittitas high-line canal diverts water from river at Easton for irrigation below station. Several smaller diversions for irrigation of several hundred acres above station. Considerable regulation by Keechelus, Kachnas, and Cle Elum Lakes (see p. 336).

Cooperation.--Gage-height record collected in cooperation with, and nine discharge measurements furnished by Bureau of Reclamation.

Revisions (water years).--W 369: 1910-11. W 832: 1936.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,780	2,140	1,620	2,640	b1,800	2,980	1,100	1,310	2,140	2,080	3,190	2,140
2	1,750	2,140	1,810	2,710	b1,800	2,980	1,130	842	2,260	2,080	3,190	1,980
3	1,560	2,320	1,460	2,840	b1,900	2,840	1,210	*950	2,640	2,020	3,190	1,860
4	1,460	2,380	1,410	2,710	b2,000	2,840	1,560	1,010	*2,780	2,140	3,190	1,900
5	1,510	2,450	1,280	2,640	b2,100	2,780	1,510	1,360	2,980	2,140	3,260	1,960
6	1,510	2,450	1,410	2,580	2,140	2,780	1,510	1,510	3,120	2,140	3,260	2,080
7	1,310	2,450	1,410	2,520	2,020	2,580	1,270	1,580	3,120	2,320	3,260	2,080
8	1,210	2,520	*1,680	2,450	1,960	2,520	1,250	1,510	3,120	2,260	3,260	2,080
9	1,220	2,520	1,900	2,580	*2,580	2,320	*1,860	1,460	3,050	2,320	3,260	2,020
10	1,460	2,450	1,900	2,080	3,580	2,320	1,460	1,880	3,120	2,320	3,240	2,020
11	695	2,450	1,960	2,080	3,480	2,320	1,280	*3,340	3,340	2,320	3,340	2,020
12	736	2,450	2,020	2,140	3,340	2,320	1,510	2,980	3,640	2,380	3,340	1,960
13	*1,460	2,380	2,020	2,200	2,780	2,320	1,620	2,260	3,950	2,520	3,340	1,980
14	1,620	2,380	2,020	2,200	*2,450	*2,520	1,860	1,840	3,790	2,640	3,340	*1,960
15	1,680	2,320	2,080	*2,200	2,450	2,320	1,960	1,900	4,280	2,640	3,260	1,960
16	1,780	1,840	2,080	2,200	2,580	2,320	1,780	2,450	4,530	2,580	3,190	2,580
17	1,780	1,840	2,080	2,260	2,840	2,260	1,900	2,980	4,280	2,640	3,120	1,960
18	1,780	1,600	2,080	2,260	2,980	2,200	1,840	3,410	3,580	*2,840	3,120	1,960
19	1,780	1,360	2,140	2,260	2,980	2,140	1,730	3,480	2,910	2,840	3,050	1,960
20	1,780	1,290	2,260	2,200	3,050	1,960	*1,460	3,340	2,910	2,840	*3,050	2,080
21	1,730	1,160	2,380	2,260	2,980	1,840	1,250	3,340	2,980	2,910	3,120	2,080
22	1,730	1,560	2,580	2,200	3,050	1,620	1,140	3,410	2,710	2,980	3,050	2,080
23	1,730	1,620	3,340	2,200	3,120	1,360	1,070	3,870	2,580	2,980	3,050	2,080
24	1,730	1,780	3,790	2,320	3,120	1,360	1,280	4,190	2,450	2,980	2,980	2,080
25	1,730	2,020	3,710	2,520	3,120	1,360	1,560	4,880	2,380	3,050	2,980	2,080
26	1,780	2,260	3,480	b2,500	3,050	1,410	1,510	4,530	2,320	3,190	2,980	2,020
27	1,900	2,200	3,190	b2,200	3,050	1,410	1,460	5,780	2,320	3,260	2,980	1,840
28	1,960	2,140	3,050	b2,000	2,980	1,290	1,460	3,480	2,260	3,190	2,980	1,700
29	1,960	1,900	2,910	b1,900	-	1,220	1,460	3,120	2,140	3,190	2,640	1,500
30	1,960	*1,730	2,840	b1,800	-	1,180	1,410	2,640	2,080	3,190	2,520	1,400
31	2,020	-	2,710	b1,800	-	1,120	-	2,200	-	3,190	2,320	-
Total	50,071	62,100	70,280	71,250	75,260	64,590	45,780	80,622	89,740	82,177	96,550	58,840
Mean	1,615	2,070	2,267	2,298	2,688	2,084	1,459	2,601	2,991	2,651	3,108	1,961
Ac-ft	99,310	125,200	139,400	141,500	149,300	128,100	86,840	159,900	178,000	165,000	191,100	116,700
(†)	-11,700	+55,360	+55,580	-36,090	+40,620	-48,700	+134,000	+189,800	+5,600	-146,800	+22,400	+26,800
(*)	11,510	0	0	0	0	0	12,610	37,760	53,290	66,670	68,590	42,760
Adjusted for change in lake contents, and diversion												
Mean	1,612	3,001	3,171	1,678	3,419	1,291	3,922	6,302	3,948	1,343	769	549
Cfsm	3.22	6.00	6.34	3.36	6.84	2.58	7.84	12.6	7.90	2.77	1.54	1.10
In.	3.72	6.70	7.31	3.87	7.12	2.98	8.75	14.53	8.81	3.11	1.77	1.22
Ac-ft	99,120	178,600	195,000	103,200	189,900	79,400	235,400	387,500	234,900	82,877	47,290	32,660
Observed												
Calendar year 1950: Max	6,800											
Water year 1950-51: Max	4,880											
Calendar year 1950: Mean	2,841											
Water year 1950-51: Mean	2,575											
Adjusted												
Calendar year 1950: Mean	2,841											
Water year 1950-51: Mean	2,575											

\* Discharge measurement made on this day.

† Change in contents in Keechelus, Kachnas, and Cle Elum Lakes, in acre-feet.

(\*) Diversion by Kittitas Canal, in acre-feet.

b Stage-discharge relation affected by ice.

## Teanaway River near Cle Elum, Wash.

Location.--Lat 47°12', long. 120°47', in SW $\frac{1}{4}$  sec. 25, T. 20 N., R. 16 E., on right bank 4 miles upstream from mouth and 8 miles east of Cle Elum.

Drainage area.--200 sq mi, approximately.

Records available.--April 1909 to September 1914, October 1946 to September 1951. Prior to October 1912, published as "near Clealum".

Gage.--Water-stage recorder. Altitude of gage is about 1,950 ft (from topographic map). Prior to Sept. 30, 1914, chain gage on highway bridge  $3\frac{1}{2}$  miles downstream at different datum. Oct. 1, 1946, to Oct. 20, 1949, water-stage recorder at site 100 ft downstream at different datum.

Average discharge.--9 years (1909-11, 1912-14, 1946-51), 391 cfs.

Extremes.--Maximum discharge during year, 2,880 cfs Feb. 11 (gage height, 6.91 ft); minimum recorded, 7.0 cfs Aug. 17 (gage height, 0.68 ft).

1909-14, 1946-51: Maximum discharge, 4,170 cfs May 28, 1948 (gage height, 35.57 ft, from high-water mark, site and datum then in use); minimum observed, 1 cfs Aug. 6, 1914 (gage height, 2.17 ft, site and datum then in use).

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of ice effect or no gage-height record, which are poor. Small discharges in Teanaway Valley for irrigation. No regulation.

Rating tables, water year 1950-51 except periods of shifting control or ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Nov. 27

Nov. 28 to Sept. 30

1.0	20	0.6	3.0	2.0	195
1.2	43	.7	8.0	3.0	490
1.6	107	.8	14	4.0	900
2.0	205	1.0	31	5.0	1,430
2.8	500	1.3	64	6.0	2,070
		1.6	109		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	21	175	408	420	b170	342	810	855	508	240	26	34
2	21	170	354	411	b180	350	975	788	525	227	24	32
3	21	268	324	434	b200	318	1,220	832	*580	207	22	29
4	27	464	294	378	250	324	1,550	1,020	640	180	21	27
5	36	500	262	339	300	306	1,730	1,310	*640	170	19	25
6												
7	49	404	255	315	232	291	1,610	1,340	620	200	18	24
8	50	332	240	294	*222	276	1,670	1,490	580	190	17	25
9	54	282	222	279	232	270	1,610	1,400	560	180	16	26
10	70	247	*245	268	1,160	260	1,490	1,400	580	160	15	24
11	190	223	270	260	1,860	252	1,370	1,550	600	150	14	22
12												
13	*187	199	309	252	2,640	242	1,510	2,610	640	140	13	23
14	132	181	351	242	2,070	245	1,460	2,350	680	120	12	23
15	115	168	351	240	1,430	242	1,730	1,670	700	110	11	21
16	109	158	339	242	1,180	276	1,860	1,280	700	100	10	20
17	103	152	315	235	950	402	1,670	1,220	700	95	9.0	19
18												
19	98	150	303	222	810	424	1,550	*1,370	650	90	8.0	18
20	99	143	300	202	720	378	1,610	1,610	600	83	*7.0	17.5
21	105	132	300	225	640	366	1,670	1,430	500	76	8.0	17
22	124	122	318	220	580	384	1,400	1,200	450	71	7.5	*16
23	146	132	351	202	542	438	1,150	1,080	400	67	7.5	15
24												
25	141	202	490	208	490	508	1,000	*1,080	370	62	7.5	*15
26	130	356	640	208	472	508	900	1,220	540	60	8.0	16
27	120	360	1,500	195	444	508	*878	1,400	380	57	8.6	14
28	113	464	1,550	190	434	525	878	1,200	300	53	8.6	11
29	111	910	1,340	240	414	620	950	*1,000	290	48	8.6	12
30												
31	175	1,050	1,100	378	396	700	1,050	855	320	45	8.6	14.5
1	112	1,100	878	424	375	742	1,100	810	350	41	8.6	17
2	226	720	720	548	360	742	1,120	785	320	38	12	17.5
3	211	560	600	b250	-	755	1,080	680	300	34	26	34
4	193	490	542	b190	-	742	975	580	280	31	40	30
5	175	-	472	b170	-	720	-	525	-	28	38	-
Total	3,480	10,814	15,945	8,481	19,753	13,446	39,376	37,900	15,043	3,353	459.5	629.5
Mean	112	360	514	274	705	434	1,315	1,225	501	108	14.8	21.0
Ac-ft	6,900	21,450	31,620	16,820	39,180	26,670	78,100	75,170	29,840	6,630	911	1,250
Calendar year 1950: Max	3,270			Min	6.0		Mean	484		Ac-ft	350,700	
Water year 1950-51: Max	2,640			Min	7.0		Mean	462		Ac-ft	334,500	

Peak discharge (base, 2,900 cfs).--No peak above base.

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Feb. 4, 5, June 15 to Aug. 16; discharge estimated on basis of weather records and records for nearby stations. Shifting-control method used Nov. 25-27, Dec. 24 to May 14.

## Yakima River at Umtanum, Wash.

Location.--Lat 46°51'45", long. 120°28'30", in NW¼ sec. 20, T. 16 N., R. 19 E., on right bank at Umtanum half a mile upstream from Umtanum Creek and 10 miles south of Ellensburg.

Drainage area.--1,590 sq mi, approximately (revised).

Records available.--August 1906 to September 1951 (fragmentary October 1915 to March 1931).

Gage.--Water-stage recorder. Datum of gage is 1,300.00 ft above mean sea level, datum of 1929. Prior to Sept. 28, 1911, staff and chain gages at approximately same site at various datums. Sept. 28, 1911, to Nov. 23, 1936, water-stage recorder at site 300 ft upstream at datum 26.70 ft higher.

Extremes.--Maximum discharge during year, 12,000 cfs Feb. 12 (gage height, 35.34 ft); minimum, 1,160 cfs Oct. 13 (gage height, 31.01 ft).  
1906-51: Maximum discharge, 41,000 cfs Nov. 15 or 16, 1906 (gage height, 41.1 ft, from floodmarks, present datum); minimum, 138 cfs Oct. 3, 1915 (gage height, 2.86 ft, site and datum then in use).

Remarks.--Records excellent except those for periods of ice effect or no gage-height record, which are fair. Flow partly regulated by Keechelus, Kachess, and Cle Elum Lakes (see p. 336). Water diverted above station for irrigation of about 97,000 acres.

Cooperation.--Gage-height record collected in cooperation with, and 8 discharge measurements furnished by Bureau of Reclamation.

Revisions (water years).--W 412: 1914.

Rating table, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

31.1	1,260
32.0	2,550
33.0	4,600
34.0	7,340
35.0	10,800

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,380	2,550	*2,730	3,920	2,100	3,920	2,820	3,100	3,500	2,820	3,300	2,910
2	2,380	2,640	2,460	4,030	2,100	3,920	3,100	2,550	3,200	2,820	3,300	2,730
3	2,220	2,730	2,380	4,260	2,300	3,820	3,600	2,300	*3,500	2,730	3,300	2,550
4	2,060	3,000	2,220	4,030	2,500	3,710	4,370	2,550	3,920	2,730	3,300	2,550
5	2,220	3,200	*2,060	3,620	2,700	3,600	5,350	3,600	4,840	2,820	3,300	2,460
6	2,140	3,100	1,910	3,600	2,820	3,600	5,350	4,030	5,480	3,100	3,300	2,460
7	2,060	3,100	1,980	3,500	*2,730	3,500	5,090	4,600	5,480	3,100	3,300	2,460
8	1,910	3,000	2,060	3,400	2,640	3,400	5,090	*4,720	5,220	3,000	3,300	2,550
9	1,840	2,910	2,460	3,300	3,600	3,100	4,840	4,480	4,840	3,000	3,300	2,460
10	2,060	2,910	2,820	3,100	8,410	3,000	4,840	4,720	4,720	2,910	3,300	2,380
11	1,980	2,820	2,910	2,910	10,000	3,000	4,370	8,150	4,840	2,820	3,200	2,380
12	1,280	2,820	3,100	2,820	10,400	3,000	4,720	*10,000	4,980	2,730	3,200	*2,380
13	1,700	2,730	3,100	2,910	*7,340	3,000	5,220	7,500	5,350	2,730	3,200	2,300
14	2,140	2,730	3,000	3,000	5,880	3,200	6,160	5,880	5,220	2,910	3,200	2,300
15	2,140	2,730	3,000	3,000	5,090	*3,710	5,880	5,090	5,220	2,910	3,200	2,220
16	2,220	2,460	3,100	2,910	4,720	4,140	5,610	5,480	5,610	2,910	3,200	2,220
17	*2,500	2,220	3,300	*2,910	4,840	5,600	5,350	6,160	5,480	2,820	*3,200	2,300
18	2,220	2,140	3,400	2,910	4,840	3,500	5,480	6,800	4,720	*2,910	3,200	2,220
19	2,220	1,780	3,400	2,910	4,720	3,500	5,220	6,300	4,030	3,000	3,100	2,220
20	2,220	1,670	3,500	2,820	4,600	3,500	*4,370	5,880	3,600	3,000	3,100	2,300
21	2,220	1,590	3,710	2,910	4,600	3,600	3,820	5,480	3,710	3,100	3,100	2,460
22	2,220	2,060	4,140	2,820	4,480	3,500	3,300	5,480	3,500	3,100	3,100	2,460
23	2,140	2,550	6,160	2,820	4,480	2,910	3,000	5,880	3,300	3,100	3,100	2,460
24	2,060	2,550	7,190	2,910	4,480	2,910	2,730	6,450	3,200	3,100	3,100	2,550
25	2,060	3,000	6,740	b2,850	4,370	3,100	3,100	6,740	3,200	3,200	3,100	2,550
26	2,140	3,710	6,300	b2,600	4,260	3,300	3,100	6,600	3,200	3,300	3,100	2,640
27	2,220	3,920	5,610	b2,300	4,140	3,400	3,300	5,740	3,100	3,400	3,100	2,550
28	2,460	3,820	5,090	b2,200	4,030	3,200	3,500	5,220	3,000	3,400	3,300	2,380
29	2,460	3,400	4,720	b2,100	-	3,100	3,600	4,840	2,910	3,400	3,600	1,910
30	2,460	3,000	4,480	2,100	-	2,910	3,400	4,260	2,820	3,400	3,400	1,840
31	2,460	-	4,140	2,100	-	2,910	-	3,710	-	3,400	3,200	-
Total	66,590	82,840	113,170	93,770	129,170	104,560	129,680	164,090	125,470	93,670	100,000	72,150
Mean	2,148	2,761	3,651	3,025	4,613	3,373	4,323	5,293	4,182	3,022	3,226	2,405
Ac-ft	132,100	164,300	224,500	186,000	256,200	207,400	257,200	325,500	248,900	185,800	198,300	143,100
Calendar year 1950: Max			9,320		Min 800	Mean 3,317	Ac-ft 2,402,000					
Water year 1950-51: Max			10,400		Min 1,280	Mean 3,494	Ac-ft 2,529,000					

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

Note.--No gage-height record Jan. 30 to Feb. 5, July 27 to Aug. 16, Sept. 11; discharge estimated on basis of records for station at Cle Elum, weather records, and recorded range in stage.

## Bumping River near Nile, Wash.

Location.--Lat 46°52', long. 121°18, in NE $\frac{1}{4}$  sec. 23, T. 16 N., R. 12 E., on left bank a quarter of a mile downstream from spillway of Bumping Lake Dam and 19 miles west of Nile.

Drainage area.--68.6 sq mi (revised).

Records available.--June to July 1906, April 1909 to September 1951.

Gage.--Water-stage recorder. Altitude of gage is 3,360 ft (from river-profile map). June 13 to July 31, 1906, staff gage at site half a mile upstream at different datum. Apr. 27 to Aug. 6, 1909, and June 25, 1912, to June 13, 1913, staff gage at site three-eighths of a mile upstream at different datum. Aug. 7, 1909, to June 24, 1912, staff gage at site about 1,300 ft upstream at different datum.

Average discharge.--42 years (1909-51), 290 cfs (adjusted for storage since November 1910).

Extremes.--Maximum discharge during year, 1,240 cfs June 16 (gage height, 4.28 ft); minimum, 4.4 cfs Oct. 1-3 (gage height, 0.99 ft).

1906, 1909-51: Maximum discharge, 5,180 cfs Dec. 29, 1917 (gage height, 9.33 ft); practically no flow when gates in outlet conduit are closed.

Remarks.--Records good except those for period of no gage-height record, which are fair. No diversion. Flow regulated by Bumping Lake (see p. 336).

Cooperation.--Gage-height record collected in cooperation with, and three discharge measurements furnished by Bureau of Reclamation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.9	3.0	1.7	60
1.0	4.6	2.1	136
1.1	7.3	2.6	280
1.2	11	3.4	640
1.4	25	4.3	1,240

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4.4	9.8	730	850	220	450	114	510	658	64C	450	173
2	4.4	10	790	820	220	440	12	258	646	610	450	173
3	4.4	11	820	790	220	440	13	318	694	59C	450	168
4	5.1	12	820	760	220	432	15	490	736	55C	445	168
5	6.5	13	880	724	217	388	16	480	760	55C	455	165
6	5.4	13	850	670	214	360	18	485	790	44C	450	165
7	4.9	14	850	630	217	356	20	*490	*820	404	450	168
8	4.6	14	880	600	223	352	23	490	760	38C	455	181
9	4.6	14	880	535	262	344	24	495	790	424	372	189
10	8.5	13	880	412	308	336	24	505	850	49C	368	*208
11	6.5	13	880	368	352	328	27	575	950	52C	368	230
12	6.0	11	850	360	376	324	31	585	1,020	55C	364	284
13	5.4	11	880	356	388	320	35	580	1,020	55C	348	316
14	5.1	11	915	348	392	312	a35	575	1,020	55C	*316	320
15	5.1	11	880	356	392	312	a36	658	1,160	55C	296	312
16	5.7	11	880	352	392	304	a37	754	1,200	55C	276	316
17	6.2	200	850	312	392	300	a38	790	1,090	*56C	276	316
18	7.3	288	880	266	388	292	a39	880	1,020	57C	273	300
19	*7.7	259	850	248	388	284	a40	950	950	56C	270	296
20	7.0	226	850	245	384	276	227	950	915	53C	256	256
21	6.5	230	880	245	380	273	356	950	880	47C	245	217
22	6.0	266	880	242	376	266	356	950	850	46C	239	186
23	6.2	288	950	239	432	259	360	985	820	46C	206	163
24	6.2	296	985	220	500	252	480	1,020	820	46C	176	146
25	8.1	308	985	211	495	245	555	754	760	46C	173	136
26	8.1	312	1,020	217	485	242	555	545	736	46C	173	146
27	13	356	985	217	480	236	555	850	718	46C	173	163
28	11	404	950	220	465	230	555	880	694	46C	170	132
29	10	470	950	220	-	226	555	850	664	45C	170	114
30	10	610	915	220	-	220	485	760	658	45C	173	129
31	8.9	-	880	220	-	206	-	700	-	46C	176	-
Total	208.8	4,704.8	27,475	12,473	9,778	9,605	5,636	21,072	25,449	15,63C	9,462	6,236
Mean	6.74	157	886	402	349	310	188	680	848	504	305	208
Ac-ft	414	9,330	54,500	24,740	19,390	19,050	11,180	41,800	50,480	31,01C	18,770	12,570
(†)	+12,920	+15,010	-19,060	-5,570	+5,040	-7,740	+13,620	+16,940	-160	-11,65C	-12,070	-8,850

Adjusted for change in reservoir contents

Mean	217	409	576	312	440	184	417	955	846	31C	109	59.2
Cfsm	3.16	5.96	8.40	4.55	6.41	2.68	6.08	13.9	12.3	4.58	1.59	0.863
In.	3.64	6.65	9.69	5.24	6.68	3.09	6.78	16.05	13.75	5.22	1.83	0.96
Ac-ft	13,330	24,340	35,440	19,170	24,430	11,310	24,800	58,740	50,320	19,36C	6,700	3,520

## Observed

Calendar year 1950: Max	1,920	Min	4.3	Mean	449	Ac-ft	324,700
Water year 1950-51: Max	1,200	Min	4.4	Mean	405	Ac-ft	293,000

## Adjusted

Calendar year 1950: Mean	446	Cfsm	6.50	In.	88.31	Ac-ft	323,100
Water year 1950-51: Mean	403	Cfsm	5.87	In.	79.65	Ac-ft	291,500

\* Discharge measurement made on this day.

† Change in contents in Bumping Lake, in acre-feet, furnished by Bureau of Reclamation.

‡ No gage-height record; discharge estimated on basis of recorded range in stage.

American River near Nile, Wash.

Location.--Lat 46°58'30", long. 121°10'10", in SW<sup>1</sup>/<sub>4</sub> sec. 12, T. 17 N., R. 13 E., on right bank 300 ft upstream from Bumping Lake road crossing, three-quarters of a mile upstream from mouth, and 16 miles northwest of Nile.

Drainage area.--78.9 sq mi (revised).

Records available.--April 1909 to September 1911, July 1913 to September 1915 (fragmentary), October 1939 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,700.0 ft above mean sea level (Washington State Highway Department benchmark). Prior to Sept. 12, 1915, staff gage at site 300 ft downstream at different datum. Oct. 12 to Dec. 7, 1939, staff gage at present site and datum.

Average discharge.--14 years (1909-11, 1939-51), 242 cfs.

Extremes.--Maximum discharge during year, 1,700 cfs May 11 (gage height, 75.44 ft); minimum, 46 cfs Sept. 23, 24 (gage height, 71.91 ft).  
1909-11, 1913-15, 1939-51: Maximum discharge, 2,600 cfs May 27, 1948 (gage height, 76.6 ft, from high-water mark in well), from rating curve extended above 1,400 cfs; minimum, 20 cfs Nov. 22, 1940.

Remarks.--Records good except those for periods of shifting control, which are fair, and those for periods of ice effect, which are poor. No diversion or regulation.

Cooperation.--Gage-height record collected in cooperation with, and six discharge measurements furnished by Bureau of Reclamation.

Revisions (water years).--W 982: 1940-42.

Rating table, water year 1950-51, except periods of ice effect and shifting control (gage height, in feet, and discharge, in cubic feet per second)

71.9	41	73.5	485
72.2	77	74.0	750
72.6	156	75.2	1,520
73.0	275		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	66	151	456	333	70	155	142	370	505	596	111	70
2	63	159	383	313	70	150	154	345	530	555	107	67
3	63	190	341	287	75	145	185	333	596	540	104	64
4	66	250	305	270	80	140	243	401	624	515	102	61
5	93	287	270	247	95	135	298	505	624	437	98	61
6	104	256	260	222	117	130	321	560	668	379	97	58
7	98	231	*273	210	122	125	362	646	*678	345	95	57
8	115	207	240	193	154	120	388	*668	662	337	93	58
9	122	185	240	188	317	120	401	722	895	349	91	57
10	210	169	270	*185	722	115	392	865	778	362	88	56
11	231	156	287	182	985	115	392	1,480	865	333	87	*56
12	164	142	309	177	865	115	424	1,450	895	309	87	55
13	134	130	291	169	656	128	515	1,080	925	305	87	55
14	117	126	273	161	510	126	624	895	895	298	*83	53
15	111	119	263	156	424	142	634	805	1,020	273	82	52
16	102	117	250	151	362	*159	624	835	985	263	80	52
17	102	113	253	149	329	146	662	1,020	895	*240	77	51
18	124	106	243	146	298	139	*722	1,040	835	234	76	50
19	*164	92	240	139	270	137	646	955	805	213	71	49
20	182	93	263	130	250	142	570	895	750	190	71	48
21	156	113	313	119	231	154	480	895	722	177	69	47
22	137	134	345	110	216	149	428	985	695	166	66	47
23	122	146	678	100	199	144	396	1,200	695	159	64	46
24	111	222	895	100	193	142	375	1,170	695	154	64	46
25	177	437	835	100	188	146	598	1,040	656	146	63	51
26	216	778	722	110	169	146	414	895	634	142	62	52
27	243	955	602	90	159	142	419	805	634	134	62	50
28	237	*865	515	80	159	144	442	778	612	130	67	50
29	202	668	442	*73	-	146	428	673	585	124	74	52
30	182	555	406	70	-	144	396	590	590	117	74	106
31	164	-	366	70	-	139	-	535	-	113	71	-
Total	4,378	8,153	11,829	5,030	8,285	4,280	12,865	25,456	21,748	8,635	2,523	1,677
Mean	141	272	382	162	296	138	429	821	725	279	81.4	55.9
Cfsm	1.79	3.45	4.84	2.05	3.75	1.75	5.44	10.4	9.19	3.54	1.03	0.708
In.	2.06	3.84	5.58	2.37	3.91	2.02	6.06	12.00	10.25	4.07	1.19	0.79
Ac-ft	8,680	16,170	23,460	9,980	16,430	8,490	25,520	50,490	43,140	17,130	5,000	3,330

Calendar year 1950: Max 1,520 Min 58 Mean 329 Cfsm 4.17 In. 56.57 Ac-ft 238,000  
Water year 1950-51: Max 1,480 Min 46 Mean 315 Cfsm 3.99 In. 54.14 Ac-ft 227,800

Peak discharge (base, 700 cfs).--Nov. 27 (7 p.m.) 1,040 cfs (74.58 ft); Dec. 24 (7 a.m.) 925 cfs (74.28 ft); Feb. 11 (2 p.m.) 1,020 cfs (74.43 ft); Apr. 18 (10 a.m.) 722 cfs (74.03 ft); May 11 (7 p.m.) 1,700 cfs (75.44 ft); May 23 (11 p.m.) 1,240 cfs (74.73 ft); June 15 (10 a.m.) 1,040 cfs (74.46 ft).

\* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice Jan. 20, Jan. 22 to Feb. 5, Mar. 1-12.

## YAKIMA RIVER BASIN

Tieton River at Tieton Dam, near Naches, Wash.

Location.--Lat 46°39'30", long. 121°07'20". In sec. 31, T. 14 N., R. 14 E. (unsurveyed), on left bank 900 ft upstream from Wild Cat Creek, 1,200 ft downstream from Tieton Dam, 19 miles upstream from Oak Creek, and 22 miles southwest of Naches.

Drainage area.--187 sq mi.

Records available.--August 1908 to September 1914 (fragmentary), October 1918 to March 1919, and April 1925 to September 1951 in reports of Geological Survey. September 1908 to December 1913, July to September 1914, October 1918 to September 1920, and May 1925 to September 1933 (mean monthly discharge) in State Water-Supply Bulletin 5. Published as "at McAllister Meadows" 1908-14 and as "at Rimmock" 1918-19.

Gage.--Water-stage recorder. Altitude of gage is 2,720 ft (river-profile survey). Prior to Oct. 1, 1914, staff gage at site a third of a mile upstream at different datum. Oct. 1, 1918, to Mar. 31, 1919, Apr. 27 to Sept. 4, 1925, staff gage and reference point and Sept. 5, 1925, to Apr. 23, 1933, water-stage recorder at site 800 ft downstream at different datum. Apr. 24, 1933, to Dec. 11, 1934, at datum 2.0 ft higher. Average discharge.--32 years (1908-12, 1918-20, 1925-51), 480 cfs (adjusted for storage since October 1925).

Extremes.--Maximum discharge during year, 2,240 cfs June 10 (gage height, 6.04 ft); minimum observed, 8.4 cfs Feb. 15 (gage height, 1.51 ft).

1908-14, 1918-19, 1925-51: Maximum discharge, 8,450 cfs Dec. 22, 1933 (gage height, 9.24 ft); no flow Apr. 4-6, 10, 1930.

Remarks.--Records good except those for period of no gage-height record, which are fair, and those below 20 cfs, which are poor. No diversion. Flow regulated by Tieton Reservoir (see p. 336).

Cooperation.--Gage-height record collected in cooperation with, and six discharge measurements furnished by Bureau of Reclamation.

Revisions (water years).--W 369: 1909-10.

Rating tables, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to Feb. 10

Feb. 11 to Sept. 30

3.2	291	1.5	8.0	2.1	53	3.5	430
3.7	500	1.6	12	2.5	117	4.0	690
4.2	795	1.8	24	3.0	243	5.4	1,680

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	428	460	795	795	*723	930	275	422	900	1,070	1,240	930
2	336	460	795	795	663	840	275	430	810	1,070	1,280	930
3	365	460	795	795	663	750	278	350	810	1,070	1,240	930
4	369	455	795	795	663	750	278	350	810	1,070	1,240	930
5	369	460	795	795	603	750	278	354	930	970	1,360	930
6	369	603	*795	795	423	750	278	366	*1,070	840	1,400	930
7	373	669	795	795	361	750	278	*366	1,140	730	1,400	930
8	373	669	795	795	361	750	278	350	1,070	770	1,400	930
9	373	675	795	795	365	660	278	350	1,140	870	1,400	930
10	373	675	795	795	325	605	278	350	1,300	1,070	1,400	900
11	373	675	795	795	13	580	282	350	1,360	1,140	1,400	870
12	369	675	795	*795	12	580	231	350	1,480	1,140	1,360	840
13	369	675	795	795	10.5	580	150	350	1,560	1,240	1,210	810
14	369	675	795	795	9.2	580	150	346	1,560	1,370	1,070	810
15	397	675	795	795	168	580	152	346	1,680	1,370	1,000	810
16	397	675	795	795	338	580	152	346	1,640	*1,370	1,000	810
17	389	735	795	795	390	580	*152	354	1,560	1,270	1,040	810
18	*373	789	795	795	386	580	152	378	1,480	1,270	1,140	810
19	373	783	795	795	551	*580	152	382	1,400	1,270	1,140	840
20	432	783	795	795	750	580	205	386	1,320	1,270	1,140	870
21	465	789	795	795	840	580	246	402	1,320	1,270	1,180	*870
22	455	789	795	795	930	580	246	580	1,240	1,270	1,180	870
23	455	789	795	795	930	520	246	810	1,240	1,270	*1,280	870
24	455	795	795	789	930	475	243	930	1,240	1,370	1,320	840
25	455	795	795	789	930	480	243	1,070	1,180	1,370	1,180	810
26	455	795	795	783	930	480	243	1,210	1,140	1,370	1,100	810
27	455	*795	795	789	900	422	306	1,210	1,100	1,370	1,140	780
28	455	795	795	783	600	390	350	1,210	1,070	1,210	1,070	690
29	455	795	795	a780	-	390	350	1,210	1,070	1,330	965	605
30	455	795	795	a780	-	318	350	1,210	1,040	1,440	930	575
31	460	-	795	a780	-	282	-	1,100	-	1,370	930	-
Total	12,589	20,658	24,645	24,558	14,767.7	18,252	7,375	18,218	36,660	36,310	37,135	25,270
Mean	406	689	795	792	527	589	246	588	1,222	1,171	1,198	842
Ac-ft	24,970	40,970	48,880	48,710	29,290	36,200	14,650	36,130	72,710	72,030	73,660	50,120
(†)	+3,020	-520	+5,040	-18,260	+15,100	-10,420	+35,880	+54,360	+42,720	-31,250	-52,580	-34,710

Adjusted for change in reservoir contents

	Mean	455	680	877	495	799	419	849	1,472	1,268	663	343	259
Cfs	2.43	3.64	4.69	2.65	4.27	2.24	4.54	7.87	6.78	3.55	1.83	1.39	
In.	2.81	4.06	5.41	3.05	4.45	2.58	5.06	9.07	7.56	4.09	2.11	1.55	
Ac-ft	27,990	40,450	53,920	30,450	44,390	25,780	50,510	90,490	75,430	40,760	21,080	15,410	

Observed

Calendar year 1950: Max	2,110	Min	336	Mean	786	Ac-ft	569,100
Water year 1950-51: Max	1,680	Min	9.2	Mean	757	Ac-ft	548,300

Adjusted

Calendar year 1950: Mean	760	Cfs	4.06	In.	55.17	Ac-ft	550,100
Water year 1950-51: Mean	714	Cfs	3.82	In.	51.80	Ac-ft	516,700

\* Discharge measurement made on this day.

† Change in contents in Tieton Reservoir, in acre-feet, furnished by Bureau of Reclamation.

No gage-height record; discharge estimated on basis of records for nearby stations and weather records.



Tieton River at headworks of Tieton Canal, near Naches, Wash.

Location.--Lat 46°40'10", long. 121°00'20", in sec. 30, T. 14 N., R. 15 E. (unsurveyed), on right bank 1,000 ft downstream from headworks of Tieton Canal, 12 miles upstream from Oak Creek, and 16 miles southwest of Naches.

Drainage area.--239 sq mi (revised).

Records available.--April to September 1906 (fragmentary gage-height records), July 1907 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 2,280.44 ft above mean sea level, unadjusted. Prior to July 28, 1909, staff gages at same site or sites within  $\frac{1}{2}$  miles downstream at different datums.

Average discharge.--42 years (1907-16, 1918-51), 546 cfs (adjusted for diversions since 1910 and for storage since October 1924).

Extremes.--Maximum discharge during year, 2,150 cfs June 10 (gage height, 4.93 ft); minimum, 19 cfs Feb. 28 (gage height, 1.57 ft).

1907-51: Maximum discharge, 8,910 cfs Dec. 22, 1933 (gage height, 9.77 ft); no flow at times in 1926, 1929, 1931, 1932, 1934, 1945.

Remarks.--Records good. Diversion for irrigation by Tieton Canal. Flow regulated by Tieton Reservoir, 7 miles above station.

Cooperation.--Gage-height record collected in cooperation with, and six discharge measurements furnished by Bureau of Reclamation.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

2.4	195
3.0	470
4.0	1,230
4.3	1,500

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	452	420	892	836	796	948	355	288	677	705	876	635
2	310	426	868	844	670	852	375	306	551	691	884	628
3	350	459	868	844	670	764	410	206	551	684	884	628
4	355	454	860	836	670	756	464	226	600	649	884	628
5	350	454	828	820	*621	756	492	242	788	565	956	628
6	345	518	*828	820	448	764	470	266	*876	482	1,000	635
7	345	628	812	820	375	764	470	*258	932	420	1,030	635
8	350	628	804	820	380	764	470	223	900	426	1,040	635
9	350	635	812	820	705	677	470	230	940	512	1,040	635
10	360	642	812	812	836	614	454	262	1,100	656	1,040	621
11	355	649	820	812	500	607	442	459	1,100	772	1,050	586
12	355	649	820	*804	360	593	442	310	1,230	772	1,010	572
13	355	663	820	804	262	600	415	246	1,320	860	868	512
14	355	663	812	804	206	607	437	220	1,320	956	756	512
15	375	663	804	804	284	656	380	209	1,500	948	698	512
16	380	665	796	796	410	649	345	226	1,410	*932	677	512
17	375	712	796	796	426	642	*340	254	1,280	868	705	506
18	*365	772	796	788	415	642	310	250	1,140	876	820	512
19	370	733	796	796	544	*642	246	230	1,040	884	836	551
20	395	733	788	730	726	628	242	226	972	884	844	586
21	420	748	804	788	836	663	266	242	956	884	844	*593
22	426	820	908	780	916	656	246	415	908	884	852	600
23	410	812	1,060	780	916	586	234	677	892	916	*932	614
24	405	876	1,020	788	924	530	216	788	884	948	996	586
25	405	908	996	820	948	551	216	908	828	948	884	593
26	400	948	956	836	956	572	202	1,040	804	940	796	593
27	415	*1,000	916	828	972	512	220	1,030	780	940	844	579
28	420	964	892	820	514	448	266	1,000	756	844	788	470
29	410	924	884	812	-	454	246	996	726	964	691	405
30	410	900	876	812	-	390	234	988	726	1,060	642	426
31	410	-	852	804	-	350	-	876	-	932	642	-
Total	11,778	21,064	26,596	25,108	17,286	19,637	10,365	14,097	28,487	24,802	26,809	17,128
Mean	380	702	858	810	617	633	345	455	950	800	865	571
Ac-ft	23,360	41,780	52,750	49,800	34,290	38,950	20,560	27,960	56,500	49,190	53,170	33,970
( $\dagger$ )	+3,020	-520	+5,040	-18,260	+15,100	-10,420	+35,880	+54,560	+2,720	-31,260	-52,580	-34,710
( $\dagger$ )	0	1,040	0	0	802	323	5,230	17,960	17,750	20,320	20,700	18,220

Adjusted for change in reservoir contents and diversion

Mean	428	711	940	513	904	469	1,036	1,631	1,294	622	346	294
Cfs	1.79	2.97	3.93	2.15	3.78	1.95	4.33	6.82	5.41	2.60	1.45	1.23
In.	2.07	3.32	4.53	2.47	3.94	2.26	4.84	7.87	6.04	3.00	1.67	1.37
Ac-ft	26,380	42,300	57,790	31,540	50,190	28,850	61,670	100,300	76,970	38,250	21,290	17,480

Observed

Calendar year 1950: Max	1,900	Min	310	Mean	718	Ac-ft	519,800
Water year 1950-51: Max	1,500	Min	202	Mean	666	Ac-ft	482,300

Adjusted

Calendar year 1950: Mean	824	Cfs	3.45	In.	46.79	Ac-ft	596,400
Water year 1950-51: Mean	764	Cfs	3.20	In.	43.38	Ac-ft	553,000

\* Discharge measurement made on this day.

$\dagger$  Change in contents in Tieton Reservoir, in acre-feet.

$\dagger$  Diversion by Tieton Canal, in acre-feet.

## YAKIMA RIVER BASIN

Naches River below Tieton River, near Naches, Wash.

Location.--Lat 46°44'40", long. 120°46'00", in SW 1/4 sec. 36, T. 15 N., R. 16 E., on left bank half a mile downstream from Wapatox power canal, three-quarters of a mile downstream from Tieton River, and 3 1/2 miles northwest of Naches.

Drainage area.--841 sq mi (revised).

Records available.--August to October 1905, November 1908 to October 1912, and May 1915 to September 1951 in reports of Geological Survey. September 1905 and October 1908 to September 1912 (mean monthly discharge) in State Water-Supply Bulletin 5.

Gage.--Water-stage recorder. Datum of gage is 1,549.67 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. Prior to Dec. 7, 1916, staff gage and Dec. 7, 1916, to Sept. 9, 1936, water-stage recorder at site five-eighths of a mile upstream at different datums. Sept. 10 to Oct. 30, 1936, staff gage at present site and datum 12.27 ft lower.

Average discharge.--39 years (1908-12, 1916-51), 1,670 cfs (adjusted for diversions by Selah Valley and Tieton Canals since 1909, city of Yakima at Oak Flat since 1935, and by Wapatox Canal since 1936, and for change in contents in Bumping Lake since November 1910, and in Tieton Reservoir since October 1924).

Extremes.--Maximum discharge during year, 9,370 cfs May 11 (gage height, 16.48 ft); minimum, 174 cfs Oct. 2 (gage height, 10.10 ft).

1905, 1908-12, 1915-51: Maximum discharge, 32,200 cfs Dec. 22, 23, 1933 (gage height, 14.33 ft, site and datum then in use); minimum, 1 cfs Nov. 7, 1942, and many days during winter of 1943-44, result of regulation and diversion.

Remarks.--Records good except those for periods of ice effect, which are poor. Flow regulated by Bumping Lake and Tieton Reservoir (see p. 336), by diversion at Oak Flat for municipal supply of city of Yakima below station, and by diversion of Selah Valley, Tieton, and Wapatox Canals. Small unmeasured diversions for irrigation of approximately 1,420 acres above station.

Cooperation.--Gage-height record collected in cooperation with, and seven discharge measurements furnished by Bureau of Reclamation.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	187	672	2,580	2,740	*b1,200	1,780	1,050	2,190	2,740	2,120	1,000	341
2	105	522	2,420	2,740	b1,200	1,660	1,020	2,120	*2,500	1,640	1,000	336
3	113	656	2,340	2,580	b1,150	1,480	1,210	1,860	2,580	1,770	986	336
4	117	890	*2,190	2,500	b1,100	1,540	1,720	2,260	2,740	1,640	995	325
5	127	1,030	2,190	2,340	1,040	1,480	2,260	2,920	3,000	1,410	1,070	315
6	150	1,020	2,120	2,190	855	1,410	2,420	3,090	3,180	1,200	1,060	310
7	133	1,030	2,120	2,050	768	1,350	2,580	*3,450	3,180	1,050	1,060	315
8	133	946	2,050	1,980	848	b1,200	2,660	3,540	3,000	1,040	1,040	325
9	148	862	2,120	1,640	2,190	b1,150	2,660	3,640	3,180	1,140	1,010	330
10	224	814	2,190	1,720	4,800	b1,100	2,500	4,300	3,450	1,340	1,000	325
11	474	781	2,340	1,800	5,100	1,070	2,420	8,030	3,730	1,390	1,010	*315
12	*282	748	2,260	1,540	4,400	1,050	2,580	7,780	4,110	1,370	895	320
13	179	703	2,420	1,480	*3,360	1,050	3,000	5,510	4,300	1,460	776	325
14	174	690	2,420	1,480	2,740	1,060	3,730	4,500	4,300	1,520	*741	325
15	174	690	2,420	1,480	2,420	1,200	3,640	4,020	4,800	1,460	608	320
16	187	703	2,340	1,430	2,340	*1,260	3,360	4,110	4,700	*1,360	545	320
17	182	722	2,340	1,380	2,120	1,180	3,450	4,900	4,110	1,330	531	325
18	165	839	2,340	*1,320	1,910	1,170	*3,730	5,100	3,730	1,310	643	315
19	206	890	2,340	1,290	1,840	1,160	3,270	4,700	3,560	1,290	857	330
20	318	855	2,340	1,280	1,980	1,220	2,740	4,300	3,180	1,230	671	358
21	356	953	2,500	1,280	1,980	1,320	2,580	4,200	3,000	1,180	650	315
22	288	1,200	3,000	1,240	1,980	1,320	2,340	4,700	2,830	1,150	645	280
23	246	1,540	4,700	1,220	1,910	1,250	2,120	5,720	2,740	1,160	685	248
24	227	1,840	5,100	1,190	1,980	1,180	2,050	5,720	2,660	1,150	727	223
25	270	2,500	4,900	1,310	1,980	1,230	2,190	5,300	2,500	1,150	615	215
26	450	3,180	4,600	1,480	1,840	1,270	2,340	4,500	2,420	1,130	471	253
27	586	3,730	4,020	1,480	1,840	1,230	2,420	4,400	2,420	1,090	524	244
28	678	*3,540	3,640	1,340	1,480	1,180	2,580	4,200	2,190	1,000	524	174
29	582	3,000	3,270	1,240	-	1,190	2,580	3,820	2,120	1,210	439	112
30	516	2,740	3,180	b1,200	-	1,060	2,340	3,540	2,050	1,180	374	133
31	498	-	2,920	b1,200	-	1,040	-	3,180	-	1,040	358	-
Total	8,457	40,366	87,710	51,140	58,351	38,940	75,540	131,400	94,800	40,710	23,306	8,703
Mean	273	1,305	2,829	1,650	2,084	1,256	2,518	4,239	3,160	1,315	752	290
Ac-ft	16,770	80,060	174,000	101,400	115,700	77,240	149,800	280,600	188,000	80,750	46,230	17,260
(+)	+15,940	+14,490	-14,020	-23,630	-20,140	-18,160	+49,500	+71,300	+2,560	-42,910	-64,650	-43,560
(#)	35,580	32,880	30,800	29,210	27,810	31,330	40,500	57,510	56,610	59,910	61,250	56,140

Adjusted for change in lake and reservoir contents and diversion

	Mean	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
Mean	1,111	2,141	3,103	1,737	2,946	1,470	4,030	6,333	4,154	1,590	697	501	
Cfsm	1.18	2.28	3.30	1.85	3.13	1.56	4.28	6.73	4.41	1.69	0.741	0.532	
In.	1.36	2.54	3.80	2.13	3.26	1.80	4.78	7.76	4.93	1.95	0.85	0.59	
Ac-ft	63,290	127,400	190,800	106,800	163,600	90,410	239,500	389,400	247,200	97,750	42,850	29,840	

Observed

Calendar year 1950: Max	7,290	Min	105	Mean	1,962	Ac-ft	1,420,000
Water year 1950-51: Max	8,030	Min	105	Mean	1,807	Ac-ft	1,308,000

Adjusted

Calendar year 1950: Mean	2,611	Cfsm	2.77	In.	37.65	Ac-ft	1,890,000
Water year 1950-51: Mean	2,475	Cfsm	2.63	In.	35.75	Ac-ft	1,794,000

\* Discharge measurement made on this day.

† Change in contents in Bumping Lake and Tieton Reservoirs, in acre-feet.

# Diversions, in acre-feet, by Tieton, Selah Valley, and Wapatox Canals, and City of Yakima (furnished by water superintendent of City of Yakima).

b Stage-discharge relation affected by ice.

## North Fork Ahtanum Creek near Tampico, Wash.

Location.--Lat 46°33'40", long. 120°55'10", in NW $\frac{1}{4}$  sec. 2, T. 12 N., R. 15 E., on left bank 150 ft (revised) downstream from Nasty Creek,  $3\frac{1}{2}$  miles upstream from Tampico and confluence with South Fork, and 20 miles west of Yakima.

Drainage area.--68.9 sq mi (revised).

Records available.--August 1907 to September 1924, March 1931 to September 1951. No winter records 1907, 1908, 1916-24.

Gage.--Water-stage recorder and sharp-crested weir. Altitude of gage is 2,450 ft (from Topographic map). Prior to Apr. 2, 1913, and Aug. 20, 1915, to Sept. 5, 1916, staff gage and Apr. 2, 1913, to Aug. 19, 1915, Sept. 6, 1916 to Sept. 30, 1924, and Mar. 1, 1931, to Sept. 19, 1934, water-stage recorders at site 50 ft upstream at different datum.

Average discharge.--26 years (1909-15, 1931-51), 68.3 cfs.

Extremes.--Maximum discharge during year, 655 cfs May 11 (gage height, 2.70 ft); minimum, 17 cfs Nov. 19 (gage height, 0.29 ft).

1907-24, 1931-51: Maximum discharge, 770 cfs May 27, 1948 (gage height, 2.97 ft); maximum gage height, 4.6 ft June 18, 1916 (site and datum then in use); minimum discharge, 5.0 cfs Nov. 14, 15, 1944, Jan. 20 1945 (gage height, 0.18 ft), but may have been less during periods of ice effect.

Remarks.--Records good except those for periods of no gage-height record, which are poor. No diversion of importance. No regulation.

Cooperation.--Gage-height record collected in cooperation with, and 12 discharge measurements furnished by Office of Indian Affairs.

Rating table, water year 1950-51 (gage height, in feet, and discharge, in cubic feet per second)

0.3	18	1.5	245
.5	41	2.0	395
.7	71	2.5	574
1.0	127		

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	26	38	*90	109	a35	68	103	170	214	138	*40	30
2	25	38	78	107	a35	66	111	166	214	133	40	28
3	26	44	76	*99	a40	65	133	170	219	125	38	27
4	30	51	69	94	a45	66	166	192	251	117	38	*27
5	34	57	66	80	a45	57	196	202	265	111	40	27
6	33	48	73	71	*54	49	204	214	265	103	38	26
7	30	45	68	73	a60	44	214	227	251	96	38	27
8	26	42	65	73	69	a40	216	245	*242	92	38	27
9	*26	34	76	76	243	a40	227	265	248	88	40	26
10	32	34	83	73	477	a50	222	314	259	85	37	26
11	31	36	*83	73	435	a40	214	566	279	*78	38	26
12	*28	34	85	69	344	a40	219	474	286	76	38	25
13	27	31	83	68	262	a35	248	379	302	71	38	25
14	27	32	83	68	216	a50	290	*329	311	68	37	25
15	27	35	81	68	184	a80	279	311	314	66	*37	25
16	26	37	81	66	157	a70	279	338	290	61	36	25
17	28	34	80	65	138	a70	299	382	267	60	34	24
18	33	30	76	*60	121	68	308	369	253	58	33	23
19	36	23	78	54	*111	71	*285	344	237	55	32	22
20	38	34	81	52	101	80	256	335	224	55	32	22
21	31	41	85	a60	96	86	229	348	212	54	31	22
22	30	46	107	a60	90	88	216	376	204	52	31	22
23	27	48	194	a50	86	86	202	418	196	51	31	22
24	27	85	206	57	83	90	189	379	189	48	30	*22
25	40	103	204	58	80	96	192	348	177	46	30	23
26	37	119	184	58	74	101	204	326	170	46	30	23
27	32	148	163	a50	75	103	209	317	166	45	28	23
28	46	151	150	a45	68	*103	202	299	155	42	36	23
29	42	109	140	a40	-	107	187	267	148	42	34	23
30	*40	99	129	a35	-	103	177	245	142	41	31	30
31	37	-	117	a35	-	101	-	224	-	40	30	-
Total	998	1,684	3,234	2,042	3,821	2,213	6,476	9,539	6,960	2,243	1,084	746
Mean	32.2	56.1	104	65.9	136	71.4	216	308	232	72.4	35.0	24.9
Cfsm	0.467	0.814	1.51	0.956	1.97	1.04	3.13	4.47	3.37	1.05	0.508	0.361
In.	0.54	0.91	1.75	1.10	2.06	1.19	3.50	5.15	3.76	1.21	0.59	0.40
Ac-ft	1,980	3,340	6,410	4,050	7,580	4,590	12,840	18,920	13,800	4,450	2,150	1,480

Calendar year 1950: Max 381 Min 9 Mean 94.6 Cfsm 1.37 In. 18.65 Ac-ft 68,520  
Water year 1950-51: Max 566 Min 22 Mean 112 Cfsm 1.63 In. 22.16 Ac-ft 81,390

Peak discharge (base, 200 cfs).--Dec. 24 (8 to 12 p.m.) 209 cfs (1.36 ft); Feb. 10 (8 p.m.) 532 cfs (2.33 ft); Apr. 17 (11 p.m.) 655 cfs (1.67 ft); May 11 (6 a.m.) 655 cfs (2.70 ft); May 22 (11 p.m.) 432 cfs (2.11 ft); June 14 (10:30 p.m.) 341 cfs (1.83 ft).

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for nearby stations, 1 discharge measurement, recorded range in stage, and weather records.

South Fork Ahtanum Creek at Conrad Ranch, near Tappico, Wash.

Location.--Lat 46°30'30", long. 120°54'50", in W½ sec. 23, T. 12 N., R. 15 E., on left bank at Conrad Ranch, 2½ miles upstream from confluence with North Fork, 2½ miles southwest of Tappico, and 20 miles southwest of Yakima.

Drainage area.--24.5 sq mi.

Records available.--March 1915 to September 1924 (fragmentary), March 1931 to September 1951.

Gage.--Water-stage recorder. Concrete control since Sept. 6, 1916. Altitude of gage is 2,400 ft. (from topographic map). Prior to Aug. 9, 1918, staff gage at same site at datum 1.00 ft lower. Aug. 9, 1918, to Mar. 22, 1951, staff gage at present site and datum.

Extremes.--Maximum discharge observed during year, 365 cfs Feb. 10 (gage height, 2.50 ft); minimum discharge, 7.8 cfs Oct. 1, 2, but may have been less during a period of ice effect.

1915-24, 1931-51: Maximum discharge observed, 424 cfs Dec. 23, 1933 (gage height, 3.10 ft), from rating curve extended above 80 cfs; minimum, 2.6 cfs Aug. 23, 25, 1931 (gage height, 0.35 ft).

Remarks.--Records good except those prior to Mar. 22, which are fair, and those for periods of ice effect, which are poor. Diversion for irrigation of about 55 acres above station. No regulation.

Cooperation.--Gage-height record collected in cooperation with, and 13 discharge measurements furnished by Office of Indian Affairs.

Revisions (water years).--W 312: 1910. W 902: 1939, drainage area.

Rating tables, water year 1950-51, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

Oct. 1 to May 10

May 11 to Sept. 30

0.5	5.0	1.1	54	0.5	8.0	1.1	54
.6	9.0	1.6	135	.7	17	1.5	115
.8	23	2.3	305	.9	32	1.8	175

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.8	11	28	30	b11	23	35	37	*55	33	*13.5	10.5
2	7.8	11.5	24	34	b11	20	36	36	57	29	13.5	10.5
3	9.0	11.5	22	*32	b12	18.5	41	35	57	29	13	10
4	10.5	13	20	28	b13	18.5	57	41	63	28	13	*10
5	9.0	13	*18	27	b15	b18	66	45	59	28	13	10
6	9.0	13	19	24	*16	b17	66	47	64	26	12.5	9.8
7	9.0	12	18	21	16	b16	63	53	64	24	12.5	10
8	9.0	12	18.5	21	29	b13	59	57	*66	23	12	9.8
9	*9.0	11.5	20	21	175	b12	*62	67	63	22	11.5	9.8
10	9.0	10.5	21	21	290	b14	63	82	66	21	11.5	9.8
11	9.0	9.0	*22	20	178	b12	58	159	66	*20	11.5	9.4
12	*9.0	9.0	24	18.5	135	15	67	123	70	19.5	11.5	9.4
13	9.0	9.0	26	18	93	13.5	63	98	70	19.5	11.5	9.4
14	8.2	9.0	26	17	62	15	68	*85	72	19	11.5	8.9
15	8.2	10.5	25	16	63	18.5	67	78	79	18.5	*11.5	8.9
16	8.2	11.5	26	15	55	22	64	80	78	17.5	11.5	8.9
17	9.0	10.5	26	18	43	22	67	92	73	17	11.5	8.9
18	10.5	13	27	*18	36	22	70	96	68	17	11.5	8.4
19	10.5	13	29	19	*37	24	*64	93	60	16.5	11	9.4
20	10.5	13	32	22	37	26	58	90	57	16	11	8.4
21	9.6	18	35	19	37	27	52	92	55	16	11	8.4
22	8.2	20	40	16	33	29	48	98	52	15.5	10.5	8.4
23	8.2	19	67	15	28	30	44	96	48	15	10.5	8.4
24	8.2	22	74	15.5	28	30	41	98	46	15.5	10.5	8.4
25	8.2	28	70	18	25	32	41	92	43	15	10.5	8.4
26	13	36	60	21	23	33	41	92	39	15	10.5	8.9
27	22	42	53	b17	27	34	42	88	37	14	10.5	8.9
28	20	38	47	b15	28	*34	42	87	36	14	12.5	8.9
29	13.5	33	46	b13	-	36	40	82	36	14	12	8.9
30	*11.5	30	41	b11	-	35	39	72	34	14	11.5	10
31	10.5	-	34	b11	-	34	-	63	-	14	11	-
Total	314.1	512.5	1,039.5	608.0	1,578	714.0	1,614	2,452	1,733	605.5	361.0	276.8
Mean	10.1	17.1	33.5	19.6	56.4	23.0	53.8	79.1	57.8	19.5	11.6	9.23
Ac-ft	623	1,020	2,060	1,210	3,130	1,420	3,200	4,860	3,440	1,200	716	549

Calendar year 1950: Max 105 Min 4.0 Mean 26.9 Ac-ft 19,500  
 Water year 1950-51: Max 290 Min 7.8 Mean 32.3 Ac-ft 23,430

\* Discharge measurement made on this day.

b Stage-discharge relation affected by ice.

## Ahtanum Creek at Union Gap, Wash.

Location.--Lat 46°32'10", long. 120°28'15", in SW $\frac{1}{4}$  sec. 8, T. 12 N., R. 19 E., on left bank just upstream from Union Pacific Railway bridge, a quarter of a mile upstream from mouth and 1 mile south of Union Gap.

Drainage area.--171 sq mi (revised).

Records available.--May to November 1904, August 1907 to July 1908, March 1910 to September 1912 (fragmentary), May to September 1951. Published as "near Yakima" 1904, 1907-8, 1910-12.

Gage.--Water-stage recorder. Altitude of gage is 940 ft (from topographic map). Prior to Sept. 30, 1912, staff gages at approximately same site at different datums.

Extremes.--Maximum discharge during period, 780 cfs May 12 (gage height, 2.75 ft); minimum, 12 cfs Aug. 16, 17, 18 (gage height, 0.55 ft).

1904, 1907-8, 1910-12, 1951: Maximum discharge observed, 1,530 cfs Mar. 3, 1910 (gage height, 8.9 ft, datum then in use); no flow for many days during September and October 1904.

Remarks.--Records good except those below 20 cfs and above 400 cfs, which are fair, and those for period of no gage-height record, which are poor. Water diverted for irrigation of about 9,000 acres above station. Occasional diurnal fluctuation from unknown cause.

Rating table, May 12 to Sept. 30, 1951 (gage height, in feet, and discharge, in cubic feet per second)

0.5	10	1.6	110
.6	14	1.9	180
.8	26	2.2	305
1.0	42	2.5	515
1.3	70	2.8	840

Discharge, in cubic feet per second, May to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1								-	247	63	21	27
2								-	*234	59	20	26
3								-	226	47	20	27
4								-	270	45	20	28
5								-	335	47	20	28
6								-	428	41	20	28
7								-	428	39	20	28
8								-	*386	38	20	28
9								-	365	36	20	29
10								-	359	35	20	30
11								-	365	35	19	30
12								744	372	29	19.5	29
13								687	379	28	*19.5	28
14								553	372	26	18.5	28
15								475	372	30	18	27
16								428	365	29	15	27
17								421	353	27	13	27
18								451	329	27	12.5	27
19								443	300	25	13.5	26
20								421	265	25	15.5	26
21								400	222	23	17	26
22								386	200	25	16	26
23								407	180	28	17.5	27
24								443	166	25	*19.5	*28
25								428	152	21	21	25
26								414	134	21	20	24
27								386	110	21	20	26
28								379	94	21	21	28
29								355	80	21	22	29
30								295	55	21	26	34
31								270	-	21	27	-
Total								-	8,153	979	591.5	827
Mean								-	272	31.6	19.1	27.6
Ac-ft								-	16,170	1,940	1,170	1,640

Calendar year : Max Min Mean Ac-ft  
Water year : Max Min Mean Ac-ft

\* Discharge measurement made on this day.

Note.--No gage-height record July 26 to Aug. 12; discharge estimated on basis of records for North Fork Ahtanum Creek near Tampico and South Fork Ahtanum Creek at Conrad Ranch, near Tampico.

## YAKIMA RIVER BASIN

Yakima River near Parker, Wash.

Location.--Lat 46°29'40", long. 120°26'10", in sec. 28, T. 12 N., R. 19 E., on left bank just downstream from Sunnyside diversion dam, 1½ miles east of Parker, and 3 miles downstream from Ahtanum Creek.

Drainage area.--3,650 sq mi (revised), approximately.

Records available.--April 1908 to September 1951 (October 1921 to September 1931, monthly discharge only published in Water-Supply Paper 870). Prior to October 1916, published as "near Wapato."

Gage.--Water-stage recorder. Datum of gage is 886.05 ft above mean sea level (Bureau of Reclamation benchmark). Apr. 25, 1908, to Feb. 17, 1909, hook gage at site 25 ft above headgate of Sunnyside Canal, with datum same as the elevation of crest of diversion dam. Feb. 18, 1909, to Oct. 23, 1914, chain gage and Oct. 24, 1914, to Aug. 16, 1915, staff gage at present site at datum 2.00 ft higher than present datum Feb. 18, 1909, to Dec. 31, 1913, and at present datum thereafter.

Extremes.--Maximum discharge during year, 19,300 cfs Feb. 12 (gage height, 10.75 ft); minimum, 51 cfs Sept. 19 (gage height, 1.62 ft).

1908-21, 1931-51: Maximum discharge, 65,000 cfs Dec. 23, 1933 (gage height, 15.0 ft, from high-water marks); practically no flow for several days during latter part of irrigation season in most years as result of diversions.

Remarks.--Records good except those for periods of shifting control or no gage-height record, which are fair. Diversions above station for irrigation of large area. During the irrigation season when Sunnyside Canal is carrying water, as much as 18 cfs, depending upon the stage of the canal, is released ahead of the fish screens and passes the river and canal gaging stations unmeasured. Some regulation by diversions and by Keechelus, Kachess, Cle Elum, and Bumping Lakes, and Tieton Reservoir (see p. 336).

Cooperation.--Gage-height record collected in cooperation with and eight discharge measurements furnished by Bureau of Reclamation.

Revisions (water years).--W 982: 1942. W 1122: 1934. Revised figures of discharge for water years 1949 and 1950, superseding those published in Water-Supply Papers 1152 and 1182, are given herewith.

Day (water year)	Discharge (cfs)	Day (water year)	Discharge (cfs)	Day (water year)	Discharge (cfs)	Day (water year)	Discharge (cfs)
1948-49		1948-49		1948-49		1949-50	
Jan. 5....	3,480	Jan. 24....	1,060	Feb. 12....	901	Jan. 18....	1,120
6....	3,570	25....	978	13....	867	19....	1,210
7....	3,660	26....	966	14....	832	20....	1,320
8....	3,400	27....	977	15....	1,180	21....	1,740
9....	3,230	28....	1,010			22....	1,730
10....	2,740	29....	1,030	1949-50		23....	1,680
11....	2,130	30....	1,050	Jan. 5....	1,680	24....	1,520
12....	1,570	31....	1,070	6....	1,940	25....	1,420
13....	1,620	Feb. 1....	1,070	7....	2,080	26....	1,410
14....	1,620	2....	1,080	8....	2,080	27....	1,410
15....	1,860	3....	1,080	9....	1,940	28....	1,420
16....	1,810	4....	1,070	10....	1,870	29....	1,420
17....	1,770	5....	1,080	11....	1,740	30....	1,410
18....	1,670	6....	1,050	12....	1,700	31....	1,420
19....	1,490	7....	1,040	13....	1,350	Feb. 1....	1,410
20....	1,190	8....	1,040	14....	1,100	2....	1,410
21....	1,100	9....	1,040	15....	1,130	3....	1,510
22....	1,100	10....	958	16....	1,170		
23....	1,120	11....	945	17....	1,260		

Month	Mean discharge in cubic feet per second						Combined flow of Yakima River and canals (acre-feet)
	Yakima River near Parker	Roa Canal at mile 26.9	Union Gap Canal (esti- mated)	New Reserva- tion Canal	Old Reserva- tion Canal	Sunny- side canal	Combined flow, Yakima River and canals
January 1949.....	2,038	0	0	0	6.10	0	2,044
February.....	2,003	0	0	0	5.28	0	2,008
Water year 1948-49..	3,004	326	17.9	869	19.6	640	4,876
Calendar year 1949..	3,291	332	18.2	868	18.5	645	5,173
January 1950.....	1,588	0	0	0	1.35	0	1,589
February.....	2,622	0	0	0	6.39	0	2,628
Water year 1949-50..	3,613	392	18.2	856	29.0	659	5,567
							4,032,000

Discharge, in cubic feet per second, of Yakima River near Parker, Wash., 1948-51

1948-49

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	612	1,700	2,160	3,930	1,070	3,230	3,570	3,480	8,000	580	372	317
2	596	1,630	2,300	3,840	1,080	3,230	3,750	3,060	*7,270	474	551	290
3	292	1,570	2,740	3,680	1,080	3,570	*3,840	2,680	6,800	732	659	217
4	211	1,470	2,590	3,480	1,070	4,110	4,110	2,160	6,350	940	410	266
5	340	1,460	2,520	*3,480	1,060	4,490	4,780	1,490	7,270	690	410	416
6	399	1,350	2,440	3,570	1,050	5,280	6,350	1,060	9,300	345	410	545
7	*416	1,330	2,520	3,660	1,040	*5,700	7,030	1,290	10,400	416	416	566
8	498	1,310	2,660	3,400	1,040	6,550	7,270	2,520	10,700	*275	*604	559
9	433	1,260	2,740	3,230	1,040	*5,700	7,270	5,080	9,300	200	466	450
10	366	1,260	2,740	2,740	958	5,280	7,510	8,250	*8,250	218	612	404
11	311	1,250	3,660	2,130	945	4,780	8,250	*10,700	8,000	474	433	372
12	279	*1,250	4,020	1,570	901	4,580	9,300	11,900	7,750	439	279	416
13	292	1,250	4,110	1,620	867	4,680	8,510	*12,500	7,270	262	253	486
14	238	1,240	4,300	1,620	832	4,680	7,270	13,200	6,570	167	316	456
15	211	1,260	4,400	1,860	1,180	4,490	*6,570	13,500	6,130	201	433	580
16	96	1,350	4,400	1,810	1,980	4,200	8,800	14,100	5,700	159	377	970
17	58	1,380	4,300	1,770	4,780	4,300	7,750	12,500	5,280	114	292	1,080
18	122	1,370	4,110	1,670	3,660	4,880	9,300	10,100	4,490	188	292	1,100
19	626	1,360	4,110	1,490	3,400	6,350	9,570	8,250	4,020	416	292	1,100
20	1,070	1,370	4,580	1,190	3,140	7,270	9,030	7,030	3,750	552	297	*1,130
21	1,390	1,390	4,680	1,100	2,820	7,030	7,750	6,800	2,450	416	316	1,190
22	1,470	1,380	4,780	1,100	2,900	6,350	6,570	6,800	1,630	404	377	1,180
23	1,630	1,450	4,880	1,120	3,060	5,910	5,280	6,800	504	462	399	1,100
24	1,700	1,820	4,880	1,020	2,900	5,700	4,680	6,800	1,430	498	351	1,120
25	1,620	2,980	4,680	978	2,960	5,910	4,200	6,800	1,960	*566	356	1,080
26	1,760	3,060	4,490	966	3,060	5,490	3,570	7,270	2,160	188	416	1,070
27	2,300	2,820	3,230	977	3,060	5,080	3,320	9,570	*1,960	103	439	1,270
28	2,980	2,440	2,660	1,010	3,140	4,680	3,840	10,700	1,780	136	439	1,570
29	2,900	2,370	3,480	1,030	-	4,300	*4,680	10,400	1,500	181	462	1,630
30	2,900	2,300	4,110	1,050	-	3,840	4,490	9,570	1,190	151	410	1,890
31	2,090	-	4,110	1,070	-	3,570	-	8,770	-	222	188	-

\* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice Jan. 11 to Feb. 14. Shifting-control method used June 29 to Sept. 30.

1949-50

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,150	4,320	5,720	2,450	1,410	3,880	*4,320	2,080	8,000	10,800	582	714
2	2,220	4,220	5,300	2,150	1,410	3,770	5,510	2,220	8,280	10,500	650	923
3	2,080	3,860	5,100	1,870	1,510	3,770	5,300	2,760	8,520	9,620	674	869
4	2,010	3,680	4,800	1,500	1,940	6,370	4,900	2,680	8,520	8,780	754	869
5	2,150	3,590	4,420	1,680	2,600	8,000	4,600	2,300	9,340	8,280	770	950
6	2,150	3,420	4,130	1,940	2,600	8,000	4,700	2,220	8,780	8,000	746	941
7	2,220	3,420	*3,860	2,080	2,600	7,050	4,700	2,220	7,760	7,280	860	950
8	2,150	2,760	3,590	2,080	2,520	6,150	4,510	*2,380	6,820	6,590	674	923
9	2,150	2,080	3,420	1,940	2,450	5,510	4,420	2,680	6,150	5,510	561	1,040
10	1,050	2,010	3,340	1,870	2,450	4,900	3,950	3,420	5,720	4,510	505	1,110
11	1,170	1,940	3,080	1,740	2,600	4,700	3,770	4,700	6,150	*3,770	498	1,120
12	2,080	1,940	3,080	1,700	2,680	4,320	3,860	7,050	7,050	4,320	534	1,040
13	2,300	2,150	3,080	1,350	2,680	4,130	4,420	10,800	8,000	4,510	526	1,040
14	2,300	2,380	2,920	1,100	2,600	3,950	4,800	12,600	8,260	2,230	626	990
15	1,540	3,080	2,840	1,130	2,450	3,500	4,800	11,400	9,060	266	634	1,000
16	533	3,000	2,840	1,170	2,450	3,590	5,100	10,200	9,060	970	1,010	1,030
17	1,400	*2,760	2,840	1,260	2,680	3,950	5,720	9,340	*10,500	1,000	1,050	1,030
18	3,160	2,600	2,840	1,120	2,450	5,100	5,930	8,520	11,400	851	1,030	1,040
19	3,340	2,450	2,760	*1,210	2,450	5,000	5,510	7,050	11,400	*950	730	960
20	3,500	2,450	2,520	1,320	2,300	4,700	5,100	6,150	11,400	1,010	762	833
21	4,420	2,300	2,680	1,740	2,220	4,510	6,590	6,370	12,300	833	842	770
22	4,600	2,220	2,780	1,730	2,150	4,420	6,590	8,260	*11,700	788	*582	730
23	4,510	2,300	2,760	1,680	2,080	4,320	5,510	*8,520	10,200	833	575	690
24	*4,600	3,160	2,360	1,520	*2,450	*4,130	4,600	7,520	9,620	832	722	561
25	4,220	4,420	2,010	1,420	3,680	4,040	3,860	7,050	9,060	867	860	610
26	4,130	4,510	1,870	1,410	4,900	3,950	3,160	7,280	8,000	779	626	714
27	3,950	6,470	2,870	1,410	4,800	3,770	2,520	8,520	6,590	642	400	833
28	3,950	10,500	2,150	1,420	4,320	3,680	2,150	9,620	6,590	730	340	1,270
29	4,700	8,260	3,000	1,420	-	3,590	2,010	9,060	7,760	833	377	1,390
30	4,320	6,820	2,920	1,410	-	3,500	1,940	8,260	9,620	668	470	1,050
31	4,320	-	2,660	1,420	-	3,680	-	*8,000	-	477	449	-

\* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice Jan. 13 to Feb. 3. Shifting-control method used Oct. 1-17.

## YAKIMA RIVER BASIN

Discharge, in cubic feet per second, of Yakima River near Parker, Wash., 1948-51--Continued

1950-51

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,150	3,860	*6,370	7,760	a5,200	6,590	3,930	*1,820	2,660	1,350	194	456
2	1,130	3,950	5,930	7,520	*5,100	6,820	3,930	1,630	2,230	1,370	258	130
3	1,080	3,950	5,720	7,760	4,900	6,370	4,300	612	2,370	1,220	345	68
4	1,040	4,510	5,510	7,520	4,900	6,370	5,280	770	3,230	970	154	94
5	1,080	4,900	5,300	6,820	4,800	6,150	6,800	2,300	4,490	669	146	90
6	1,300	5,000	5,100	6,590	4,600	6,150	7,510	3,320	6,130	538	275	99
7	1,320	4,900	5,100	6,370	4,320	5,930	7,510	4,020	6,570	330	268	162
8	1,200	4,800	5,000	6,150	4,130	5,720	7,510	4,490	6,130	104	326	253
9	1,170	4,700	5,300	5,930	5,100	5,510	7,270	4,490	5,700	70	292	175
10	1,190	4,600	5,930	5,720	13,100	5,100	6,570	4,780	5,700	71	306	208
11	1,710	4,510	6,150	5,510	17,700	5,100	6,130	8,770	5,910	159	316	144
12	762	4,320	6,590	5,300	*12,500	5,000	5,910	15,100	5,910	*110	311	137
13	561	4,320	6,590	5,300	14,700	5,000	6,570	11,500	6,570	79	462	162
14	1,040	4,220	6,590	5,300	11,400	5,100	8,250	8,250	6,570	253	538	112
15	1,190	4,220	6,370	5,300	9,900	5,300	8,510	6,130	6,570	321	*480	110
16	1,740	4,320	6,370	5,300	9,060	6,590	7,510	5,910	7,030	335	234	117
17	2,300	*3,770	6,590	5,100	8,780	5,930	6,800	7,030	6,570	156	204	146
18	2,300	3,950	6,820	5,000	8,520	5,720	6,800	8,000	5,490	181	255	79
19	2,380	3,590	6,820	*5,000	8,000	5,510	6,130	8,000	4,300	288	230	*52
20	*2,760	3,420	6,820	4,800	8,000	5,720	4,980	7,270	3,400	262	236	64
21	3,500	3,420	7,050	4,800	8,000	*5,930	4,110	6,570	3,140	230	297	151
22	3,420	3,680	7,520	4,800	7,760	5,720	3,320	6,350	2,900	149	311	178
23	3,340	4,800	10,200	4,800	7,760	5,300	2,590	7,270	2,520	181	137	208
24	3,250	5,000	13,000	4,800	7,520	4,900	1,890	8,510	2,370	175	230	238
25	3,250	5,930	13,300	4,900	7,520	4,900	1,980	8,250	2,370	167	258	270
26	3,420	7,520	13,000	5,510	7,520	4,900	2,090	7,750	2,230	258	95	393
27	3,590	8,260	11,400	5,930	7,050	4,900	2,230	6,800	2,090	297	148	388
28	3,950	8,520	10,200	5,720	6,820	4,600	2,630	5,910	1,820	279	351	326
29	3,950	7,760	9,340	a5,600	-	4,420	2,740	5,280	1,630	97	820	335
30	3,860	6,820	8,780	a5,500	-	4,220	2,370	4,580	1,350	283	741	393
31	3,770	-	8,260	a5,300	-	4,040	-	*3,570	-	*326	628	-

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for station at Kiona and weather records.

Note.--Shifting-control method used Mar. 23 to Sept. 30.

Monthly discharge, in cubic feet per second, 1948-51

Month	Mean discharge in cubic feet per second							Combined flow of Yakima River and canals (acre-feet)
	Yakima River near Parker	Roza Canal at mile 26.9	Union Gap Canal (estimated)	New Reservation Canal	Old Reservation Canal	Sunnyside Canal	Combined flow, Yakima River and canals	
October 1948.....	981	185	8	385	2.14	435	1,996	122,700
November.....	1,648	0	0	0	4.06	0	1,652	98,300
December.....	3,657	0	0	0	6.86	0	3,664	225,300
Calendar year 1948..	3,029	280	16.5	824	14.3	631	4,795	3,481,000
January 1949.....	2,038	0	0	0	6.10	0	2,044	125,700
February.....	2,003	0	0	0	5.28	0	2,008	111,500
March.....	5,000	57.2	0	73.5	9.37	118	5,258	323,300
April.....	6,207	465	10	832	18.0	975	8,507	506,200
May.....	7,584	672	40	2,061	95.5	1,251	11,700	719,400
June.....	5,306	743	40	1,967	42.7	1,271	9,370	557,600
July.....	360	718	40	1,974	29.0	1,298	4,409	271,100
August.....	397	621	40	1,718	9.53	1,271	4,057	249,500
September.....	627	436	35	1,358	6.93	1,030	3,693	219,700
Water year 1948-49..	3,004	326	17.9	869	19.6	640	4,676	3,530,000

Note.--New Reservation, Old Reservation, and Sunnyside Canals divert from river above station and below Union Gap. Roza and Union Gap Canals head above Union Gap but records given herein show flow in these canals that reaches the valley below Union Gap. Records for Roza and Sunnyside Canals furnished by Bureau of Reclamation. Records for Union Gap Canal estimated on basis of discharge measurements and records of flow at canal headworks. Combined flow represents flow of Yakima River that reaches valley below Union Gap.



Monthly discharge, in cubic feet per second, of Yakima River near Parker, Wash., 1948-51--Continued

Month	Mean discharge in cubic feet per second							Combined flow of Yakima River and canals (acre-feet)
	Yakima River near Parker	Roza Canal at mile 26.9	Union Gap Canal (estimated)	New Reservation Canal	Old Reservation Canal	Sunnyside Canal	Combined flow, Yakima River and canals	
October 1949.....	2,883	216	12	371	0	494	3,976	244,500
November.....	3,656	0	0	0	0	0	3,656	216,400
December.....	3,212	0	0	0	0	0	3,212	197,500
Calendar year 1949	3,291	532	18.2	868	18.5	645	5,173	3,742,000
January 1950.....	1,588	0	0	0	1.35	0	1,589	97,700
February.....	2,622	0	0	0	6.39	0	2,628	146,000
March.....	4,642	159	0	154	44.0	218	5,197	319,600
April.....	4,495	491	15	829	49.1	947	6,826	406,200
May.....	6,491	749	40	2,069	111	1,244	10,700	657,900
June.....	8,720	837	35	1,765	51.3	1,309	12,720	756,900
July.....	3,488	856	35	1,919	66.1	1,301	7,665	471,300
August.....	652	779	40	1,726	11.4	1,262	4,470	274,800
September.....	933	644	40	1,378	4.54	1,092	4,092	243,500
Water year 1949-50	3,613	392	18.2	856	29.0	659	5,567	4,032,000
October 1950.....	2,184	305	12	346	1.58	479	3,328	204,600
November.....	4,917	0	0	0	8.90	0	4,924	293,000
December.....	7,517	0	0	0	7.06	0	7,524	462,600
Calendar year 1950	4,024	402	18.2	854	30.3	658	5,987	4,334,000
January 1951.....	5,733	0	0	0	25.7	0	5,759	354,100
February.....	8,238	0	0	0	18.7	0	8,257	458,600
March.....	5,468	0	0	61.6	19.7	176	5,723	352,000
April.....	5,138	586	25	1,144	69.2	1,005	7,967	474,100
May.....	5,962	885	35	2,014	116	1,281	10,297	632,700
June.....	4,198	790	40	1,694	52.6	1,289	8,064	479,800
July.....	364	866	35	1,875	56.9	1,273	4,477	274,800
August.....	318	742	35	1,733	51.2	1,272	4,151	255,200
September.....	191	480	35	1,414	12.1	1,029	3,161	188,100
Water year 1950-51	4,159	390	18.2	862	36.7	654	6,127	4,430,000

Note.--New Reservation, Old Reservation, and Sunnyside Canals divert from river above station and below Union Gap. Roza and Union Gap Canals head above Union Gap but records given herein show flow in these canals that reaches the valley below Union Gap. Records for Roza and Sunnyside Canals furnished by Bureau of Reclamation. Records for Union Gap Canal estimated on basis of discharge measurements and records of flow at canal headworks. Combined flow represents flow of Yakima River that reaches valley below Union Gap.

## Yakima River at Kiona, Wash.

Location.--Lat 46°15'10", long. 119°28'50", in sec. 19, T. 9 N., R. 27 E., on left bank just upstream from highway bridge at Kiona, 3½ miles downstream from intake of Kiona Canal and 25 miles upstream from mouth.

Drainage area.--5,600 sq mi (revised), approximately.

Records available.--August to December 1895 (gage heights only, fragmentary), August 1896 to March 1915, February 1933 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 454.41 ft above mean sea level, datum of 1929, supplementary adjustment of 1947. Prior to July 27, 1934, staff, wire, chain, or steel tape-weight gages at highway bridge at datum 1.00 ft lower prior to Feb. 6, 1933, and at present datum thereafter.

Extremes.--Maximum discharge during year, 20,900 cfs Feb. 13 (gage height, 12.99 ft); minimum, 1,550 cfs July 19, 20, 30, 31 (gage height, 3.78 ft).  
1896-1915, 1933-51: Maximum discharge, 67,000 cfs Dec. 23, 1933 (gage height, 21.57 ft, from high-water marks); minimum, 105 cfs Sept. 11, 1906 (gage height, 2.35 ft).

Remarks.--Records good except those for periods of shifting control, ice effect, or no gage-height record, which are fair. Water diverted above gage for irrigation of about 424,000 acres. Some regulation by diversions and by Keechelus, Kachess, Cle Elum, and Bumping Lakes, and Tieton Reservoir (see following page).

Cooperation.--Gage-height record collected in cooperation with and 6 discharge measurements furnished by Bureau of Reclamation.

Revisions (water years).--W 214: 1905. W 1122: 1934(M). Revised figures of discharge for water years 1949 and 1950, superseding those published in Water-Supply Papers 1152 and 1182, are given herewith.

Day (water year)	Discharge (cfs)	Day (water year)	Discharge (cfs)	Day (water year)	Discharge (cfs)	Day (water year)	Discharge (cfs)
1948-49		1948-49		1948-49		1949-50	
Dec. 27....	5,080	Jan. 17....	2,340	Feb. 7.....	1,520	Jan. 13.....	2,300
28....	3,730	18....	2,210	8.....	1,530	14.....	2,680
29....	3,070	19....	2,070	9.....	1,530	15.....	1,850
30....	3,980	20....	1,810	10.....	1,510	16.....	1,680
31....	4,650	21....	1,650	11.....	1,370	17.....	1,740
Jan. 1....	4,490	22....	1,540	12.....	1,320	18.....	1,860
2....	4,260	23....	1,550	13.....	1,290	19.....	1,870
3....	4,070	24....	1,550	14.....	1,320	20.....	2,580
4....	3,930	25....	1,480	15.....	1,670	21.....	2,410
5....	3,570	26....	1,430	16.....	2,470	22.....	2,220
6....	3,410	27....	1,390			23.....	2,070
7....	3,670	28....	1,390			24.....	2,040
8....	4,030	29....	1,420	1949-50		25.....	2,000
9....	3,630	30....	1,450	Jan. 4.....	2,360	26.....	1,990
10....	3,430	31....	1,520	5.....	2,420	27.....	1,970
11....	3,280	Feb. 1....	1,550	6.....	2,750	28.....	1,950
12....	2,690	2....	1,560	7.....	2,820	29.....	1,980
13....	2,250	3....	1,550	8.....	3,100	30.....	2,000
14....	2,420	4....	1,550	9.....	3,030	31.....	2,050
15....	2,480	5....	1,510	10.....	2,960		2,230
16....	2,410	6....	1,500	11.....	2,820		3,480
				12.....	2,680		
Month		Cfs-days		Maximum	Minimum	Mean	Runoff in acre-feet
Calendar year 1948.....		1,666,820		36,800	1,550	4,554	3,306,000
December 1948.....		132,360		5,530	2,960	4,270	262,500
January 1949.....		78,820		4,490	1,390	2,543	156,300
February.....		63,010		6,440	1,290	2,955	164,600
Water year 1948-49.....		1,589,060		15,200	1,290	4,354	3,152,000
Calendar year 1949.....		1,697,320		15,200	1,290	4,657	3,367,000
January 1950.....		74,810		3,620	1,660	2,413	148,400
February.....		100,930		7,400	1,980	3,605	200,200
Water year 1949-50.....		1,839,390		14,780	1,660	5,039	3,648,000

Rating table, water year 1950-51, except periods of ice effect and shifting control (gage height, in feet, and discharge, in cubic feet per second)

3.8	1,550
5.0	2,960
8.0	8,200
10.0	12,600
12.8	20,200

## Yakima River at Kiona, Wash.

Discharge, in cubic feet per second, water year October 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,420	*4,840	8,200	10,300	b5,400	8,200	6,070	*4,180	6,070	2,550	1,600	2,480
2	2,420	4,840	*7,600	9,660	b5,400	8,000	5,890	3,550	5,180	2,480	1,600	2,560
3	2,480	5,010	7,200	9,450	b5,500	8,000	5,890	3,250	4,870	2,550	1,600	2,120
4	2,480	5,010	7,010	9,450	b5,600	7,600	6,440	2,620	4,840	2,550	1,600	2,020
5	2,620	5,530	6,820	9,240	b5,700	7,400	7,600	2,550	6,440	2,560	1,600	2,020
6	2,680	5,890	a6,700	8,610	b5,800	7,200	8,820	3,860	8,200	2,240	1,600	2,020
7	2,890	5,890	a6,550	8,200	b5,800	7,200	9,660	5,010	9,660	2,070	1,600	1,960
8	2,890	5,890	a6,400	8,000	5,890	7,010	9,660	5,710	10,300	1,960	1,600	1,900
9	*2,820	5,710	6,250	7,800	6,630	6,820	9,660	6,250	9,870	1,750	1,600	1,960
10	2,680	5,710	6,440	7,600	9,440	6,630	*9,450	6,070	9,450	1,650	1,600	1,960
11	2,750	5,530	7,010	7,200	14,200	6,250	8,820	6,820	9,450	1,600	1,600	1,900
12	3,250	5,530	7,400	6,820	18,000	6,070	8,200	10,400	9,240	1,600	1,650	1,850
13	2,820	5,550	8,000	6,630	*20,200	6,070	8,000	14,700	9,240	1,650	*1,650	1,800
14	2,680	5,180	8,000	6,440	*19,900	6,070	8,610	*14,700	9,450	1,600	1,750	1,750
15	3,180	5,180	7,800	6,630	16,000	6,250	9,870	11,200	9,240	1,600	1,960	1,700
16	3,250	5,180	7,800	*6,630	13,500	7,010	10,300	9,030	9,030	1,650	1,900	1,650
17	3,780	5,180	8,000	6,440	12,100	8,200	9,450	8,820	9,450	1,700	1,750	1,850
18	4,020	4,840	8,400	8,440	11,400	7,400	8,820	9,660	8,820	1,650	1,650	1,650
19	4,020	5,010	8,610	*6,440	*10,800	7,010	9,030	10,500	7,600	1,550	1,700	1,650
20	4,180	*4,670	8,400	6,250	10,300	6,630	8,610	10,500	6,440	1,600	1,750	*1,650
21	4,500	4,500	8,610	6,250	10,100	7,010	7,200	9,870	*5,350	1,800	1,750	1,650
22	4,840	4,500	9,030	6,250	9,870	*7,200	6,070	9,030	5,010	1,850	1,750	1,750
23	4,670	5,010	9,240	6,070	9,660	7,200	5,180	8,820	4,500	1,800	1,700	1,900
24	4,500	5,890	11,400	6,070	9,240	6,630	4,340	9,660	4,020	1,750	1,650	*2,070
25	4,340	6,250	13,700	b6,000	9,240	6,250	3,620	10,800	3,860	1,750	1,600	2,070
26	4,340	7,200	14,700	b5,800	9,030	6,440	3,550	10,800	3,700	1,700	1,700	2,070
27	4,500	8,400	15,000	b5,600	8,820	6,630	3,550	10,300	3,550	1,600	1,650	2,180
28	4,500	*9,240	14,000	b5,500	8,610	6,630	3,620	9,240	3,250	1,600	1,650	2,300
29	4,840	9,660	12,600	b5,400	-	6,440	4,180	8,610	3,030	1,600	1,850	2,360
30	5,180	9,030	11,600	*b5,400	-	6,440	4,340	7,800	2,750	1,600	2,240	2,420
31	5,010	-	11,000	b5,400	-	6,250	-	8,820	-	1,600	2,480	-
Total	111,530	175,650	279,470	217,970	282,130	214,140	214,500	251,130	201,660	57,010	53,380	58,820
Mean	3,598	5,855	8,035	7,031	10,080	6,908	7,150	8,101	6,722	1,833	1,722	1,961
Ac-ft	221,200	346,400	554,300	432,300	559,600	424,700	425,500	498,100	400,000	113,100	105,900	116,700
Calendar year 1950: Max			15,000		Min 1,660		Mean 5,511		Ac-ft 3,990,000			
Water year 1950-51: Max			20,200		Min 1,550		Mean 5,801		Ac-ft 4,200,000			

\* Discharge measurement made on this day.

a No gage-height record; discharge estimated on basis of records for station near Parker.

b Stage-discharge relation affected by ice.

Note.--Shifting-control method used Sept. 22-30.

## YAKIMA RIVER BASIN

## Reservoirs in Yakima River basin, Wash.

Keechelus Lake.--Lat. 47°19', long. 121°20', in NE $\frac{1}{4}$  sec. 12, T. 21 N., R. 11 E., at dam on Yakima River at outlet of Keechelus Lake, 3 $\frac{1}{2}$  miles northwest of Martin and 9 $\frac{1}{2}$  miles northwest of Easton. Records available, January 1906 to September 1951. Staff gage read twice daily. Datum of gage is at mean sea level (Bureau of Reclamation benchmark). Maximum contents observed during year, 155,020 acre-ft June 15 (elevation, 2,515.92 ft); minimum observed, 55,550 acre-ft Sept. 30 (elevation, 2,466.60 ft). Maximum contents observed during period 1906-51, 160,570 acre-ft May 16, 1925 (elevation, 2,518.09 ft); minimum observed, 448 acre-ft Sept. 6, 12, 13, 1906 (original crib dam); minimum elevation observed, 2,428.30 ft Sept. 20, 1926.

Reservoir is formed on natural lake by earth- and gravel-fill dam completed in 1917; storage began above crib dam Jan. 12, 1906, above present dam Aug. 19, 1914. To aid in construction and clearing of reservoir site, the water surface was kept low and present reservoir was not filled until June 15, 1920. Capacity, 153,000 acre-ft between gate sill (elevation, 2,425.00 ft), and spillway crest (elevation, 2,515.00 ft). Records given herein represent usable contents. Water used for irrigation.

Kachess Lake.--Lat 47°16', long. 121°12', in SW $\frac{1}{4}$  sec. 34, T. 21 N., R. 13 E., at dam on Kachess River at outlet of Kachess Lake, 2 $\frac{1}{2}$  miles northwest of Easton. Records available, September 1905 to September 1951. Staff gage read twice daily. Datum of gage is at mean sea level (Bureau of Reclamation benchmark). Maximum contents observed during year, 240,930 acre-ft June 15, 16 (elevation, 2,262.43 ft); minimum observed, 120,120 acre-ft Aug. 19 (elevation, 2,233.20 ft). Maximum contents observed during period 1905-51, 241,300 acre-ft July 11, 1943 (elevation, 2,262.51 ft); minimum observed, 525 acre-ft Sept. 14, 15, 1910 (original crib dam); minimum elevation observed, 2,197.73 ft Sept. 26, 27, 1915.

Reservoir is formed on natural lake by earth- and gravel-fill dam completed in 1912. Original crib dam creating capacity of 21,000 acre-ft used Sept. 20, 1905, to June 30, 1911. Storage above present dam began June 30, 1911. Capacity, 239,000 acre-ft between gate sill (elevation, 2,192.75 ft) and top of spillway gate (elevation, 2,262.00 ft). Records given herein represent usable contents. Water used for irrigation.

Cle Elum Lake.--Lat 47°15', long. 121°04', in NE $\frac{1}{4}$  sec. 10, T. 20 N., R. 14 E., at dam on Cle Elum River, at outlet of Cle Elum Lake, 4 miles northwest of Roslyn. Records available, May 1906 to September 1951. Staff gage read twice daily. Datum of gage is at mean sea level (Bureau of Reclamation benchmark). Maximum contents observed during year, 440,470 acre-ft June 16 (elevation, 2,240.73 ft); minimum observed, 158,410 acre-ft Sept. 30 (elevation, 2,171.73 ft). Maximum contents observed during period 1906-51, 443,700 acre-ft May 31, 1945, May 28, 1949 (elevation, 2,241.40 ft); minimum observed, 2,380 acre-ft Aug. 31, 1906; minimum elevation observed, 2,114.35 ft Oct. 14, 1932. Storage was uncontrolled Oct. 3, 1931, to Feb. 26, 1932.

Reservoir is formed on natural lake by earth- and gravel-fill dam completed in 1933; storage began above present dam Feb. 26, 1932. Capacity, 436,000 acre-ft between gate sill (elevation, 2,110.00 ft) and top of spillway gate (elevation, 2,240.00 ft). Records given herein represent usable contents. Water used for irrigation.

Revisions (water years).--W 1182: 1948-49.

Bumping Lake.--Staff gage, lat 46°52', long. 121°18', in SW $\frac{1}{4}$  sec. 23 (unsurveyed), T. 16 N., R. 12 E., at dam on Bumping River, at outlet of Bumping Lake, 11 $\frac{1}{2}$  miles upstream from American River, and 19 miles west of Niles. Records available, June to July 1906, April 1909 to September 1951. Staff gage read twice daily. Datum of gage is at mean sea level (Bureau of Reclamation benchmark). Maximum contents observed during year, 26,480 acre-ft June 14-17 (elevation, 3,428.09 ft); minimum observed, 2,950 acre-ft Sept. 30 (elevation, 3,393.63 ft). Maximum contents observed during period 1906, 1909-51, 39,840 acre-ft June 21, 22, 1925 (elevation, 3,430.55 ft); minimum observed, 1,130 acre-ft Feb. 5-9, 1949 (elevation, 3,390.80 ft).

Reservoir is formed on natural lake by earth-fill dam completed in 1910; storage began Nov. 3, 1910. Capacity, 33,800 acre-ft between gate sill (elevation, 3,389.00 ft) and spillway crest (elevation, 3,426.00 ft). Records given herein represent usable contents. Water used for irrigation.

Tieton Reservoir.--Lat 46°39', long. 121°07', in SW $\frac{1}{4}$  sec. 31 (unsurveyed), T. 14 N., R. 14 E., on face of dam on Tieton River, at spillway, at Rimrock, 2,000 ft upstream from Wild Cat Creek, 7 $\frac{1}{2}$  miles upstream from headworks of Tieton Canal, and 22 $\frac{1}{2}$  miles southwest of Naches. Records available, April 1925 to September 1951. Staff gage read twice daily. Datum of gage is at mean sea level (Bureau of Reclamation benchmark). Maximum contents observed during year, 200,000 acre-ft June 15, 16 (elevation, 2,926.79 ft); minimum observed, 80,480 acre-ft Sept. 30 (elevation, 2,867.86 ft). Maximum contents observed during period 1925-51, 201,380 acre-ft June 21, 1937 (elevation, 2,927.33 ft); minimum observed, 89 acre-ft Oct. 12, 1926 (elevation, 2,768.77 ft).

Reservoir is formed by earth- and gravel-fill dam completed in 1925; storage began Apr. 27, 1925. Capacity, 197,000 acre-ft between sill of tunnel entrance (elevation, 2,766.00 ft) and crest of spillway gates (elevation, 2,926.00 ft). Records given herein represent usable contents. Water used for irrigation.

Cooperation.--Records furnished by Bureau of Reclamation, reviewed and prepared for publication by Geological Survey.

## YAKIMA RIVER BASIN

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Monthly elevation and contents of reservoirs in Yakima River basin, Wash.,  
water year October 1950 to September 1951

Date	Keechelus Lake			Kachess Lake		
	Elevation (feet)†	Contents (acre- feet)	Change in contents during month (acre-feet)	Elevation (feet)†	Contents (acre- feet)	Change in contents during month (acre-feet)
Sept. 30.....	2,484.38	85,270	-	2,235.82	129,830	-
Oct. 31.....	2,477.35	72,710	-12,560	2,239.57	144,080	+14,250
Nov. 30.....	2,481.36	79,750	+7,040	2,246.60	172,150	+28,070
Dec. 31.....	2,487.41	91,020	+11,270	2,247.81	177,170	+5,020
Calendar year 1950....	-	-	+3,950	-	-	+19,230
Jan. 31.....	2,475.21	69,140	-21,880	2,247.02	173,890	-3,280
Feb. 28.....	2,479.27	76,060	+6,920	2,249.04	182,330	+8,430
Mar. 31.....	2,473.10	65,670	-10,390	2,247.18	174,550	-7,770
Apr. 30.....	2,489.59	95,280	+29,610	2,253.50	201,330	+26,780
May 31.....	2,513.23	148,240	+52,960	2,260.99	234,410	+33,080
June 30.....	2,515.53	154,030	+5,790	2,260.29	231,260	-3,150
July 31.....	2,508.26	156,090	-17,940	2,244.19	162,310	-68,950
Aug. 31.....	2,490.85	97,790	-58,300	2,233.47	121,110	-41,200
Sept. 30.....	2,466.64	55,610	-42,180	2,234.19	123,770	+2,660
Water year 1950-51....	-	-	-29,660	-	-	-6,050

Date	Cle Elum Lake			Bumping Lake		
	Elevation (feet)†	Contents (acre- feet)	Change in contents during month (acre-feet)	Elevation (feet)†	Contents (acre- feet)	Change in contents during month (acre-feet)
Sept. 30.....	2,191.28	228,360	-	3,396.05	4,500	-
Oct. 31.....	2,187.70	214,960	-13,400	3,411.82	17,470	+12,920
Nov. 30.....	2,193.09	235,230	+20,270	3,425.05	32,430	+15,010
Dec. 31.....	2,203.08	274,520	+39,290	3,407.62	13,420	-19,060
Calendar year 1950....	-	-	+91,440	-	-	-1,640
Jan. 31.....	2,199.85	261,590	-12,930	3,400.73	7,800	-5,570
Feb. 28.....	2,206.12	286,860	+25,270	3,407.02	12,800	+5,040
Mar. 31.....	2,198.52	256,320	-30,540	3,396.35	5,150	-7,740
Apr. 30.....	2,217.56	333,900	+77,580	3,413.20	18,770	+13,620
May 31.....	2,240.16	437,720	+103,820	3,427.52	35,710	+16,940
June 30.....	2,240.36	438,680	+960	3,427.40	35,500	-160
July 31.....	2,227.55	378,810	-59,870	3,417.94	23,900	-11,650
Aug. 31.....	2,195.86	245,910	-132,900	3,405.78	11,830	-12,070
Sept. 30.....	2,171.81	158,680	-87,230	3,393.67	2,900	-8,850
Water year 1950-51....	-	-	-69,680	-	-	-1,570

Date	Tieton Reservoir					
	Elevation (feet)†	Contents (acre- feet)	Change in contents during month (acre-feet)			
Sept. 30.....	2,886.35	112,160	-			
Oct. 31.....	2,887.97	115,180	+3,020			
Nov. 30.....	2,887.69	114,660	-520			
Dec. 31.....	2,890.35	119,700	+5,040			
Calendar year 1950....	-	-	+18,970			
Jan. 31.....	2,880.43	101,440	-18,260			
Feb. 28.....	2,888.69	116,540	+15,100			
Mar. 31.....	2,883.05	106,120	-10,420			
Apr. 30.....	2,901.50	142,000	+35,880			
May 31.....	2,925.35	196,360	+54,360			
June 30.....	2,926.43	199,080	+2,720			
July 31.....	2,913.39	167,820	-31,260			
Aug. 31.....	2,888.00	115,240	-52,580			
Sept. 30.....	2,867.89	80,530	-34,710			
Water year 1950-51....	-	-	-31,630			

† Elevation is mean for day.

## MISCELLANEOUS DISCHARGE MEASUREMENTS

Measurements of streamflow in Pacific slope basins in Washington and upper Columbia River basin made at points other than gaging stations are given in the following table:

Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951

## Naselle River basin, Wash..

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
Feb. 9	Lane Creek.....	Naselle River.....	SE $\frac{1}{4}$ sec. 4, T. 10 N., R. 9 W., at crossing of U. S. Highway 830, 1 $\frac{1}{2}$ miles northeast of Naselle.	†142

SE/ Discharge of crest flow on Jan. 20, 1950, has been revised to 172 cfs, superseding figure published in Water-Supply Paper 1182.

† Flow at crest stage; discharge computed by contracted-opening method.

## Nemah River basin, Wash.

Feb. 9	Unnamed stream....	North Nemah River..	NW $\frac{1}{4}$ sec. 24, T. 12 N., R. 10 W., on Nemah Road, 1 $\frac{1}{2}$ miles east of U. S. Highway 101, 11 miles south of South Bend.	†56.8
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† Flow at crest stage; discharge computed by contracted-opening method.

## Willapa River basin, Wash.

Feb. 9	Green Creek.....	Willapa River.....	NE $\frac{1}{4}$ sec. 30, T. 13 N., R. 7 W., at county road crossing, 2 $\frac{1}{2}$ miles northeast of Lebam.	†217
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† Flow at crest stage; discharge computed by contracted-opening method.

## North River basin, Wash.

Feb. 9	Joe Creek.....	North River.....	SE $\frac{1}{4}$ sec. 30, T. 16 N., R. 8 W., at crossing of U. S. Highway 101, 8 miles southeast of Cosmopolis.	†203
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† Flow at crest stage; discharge computed by contracted-opening method.

## Chehalis River basin, Wash.

Feb. 9	Shield Creek.....	Rock Creek.....	SE $\frac{1}{4}$ sec. 33, T. 13 N., R. 5 W., at crossing of State Highway 12, 4 miles southwest of Pe Ell.	†112
Aug. 16	Elk Creek.....	Chehalis River.....	NE $\frac{1}{4}$ sec. 8, T. 13 N., R. 5 W., at former gaging station near Doty.	10.9
16	South Fork Chehalis River.	....do.....	NW $\frac{1}{4}$ sec. 12, T. 12 N., R. 4 W., at former gaging station at Boistfort.	3.70
16	Newaukum River....	....do.....	On line between secs. 28 and 33, T. 13 N., R. 1 E., at former gaging station near Onalaska.	23.9
16	Lincoln Creek.....	....do.....	SW $\frac{1}{4}$ sec. 34, T. 15 N., R. 4 W., at former gaging station near Rochester.	.42
Oct. 17	Black River.....	....do.....	NE $\frac{1}{4}$ sec. 2, T. 16 N., R. 3 W., at former gaging station at Little Rock.	48.5
Aug. 14	Cedar Creek.....	....do.....	NW $\frac{1}{4}$ sec. 14, T. 16 N., R. 5 W., at former gaging station near Oakville.	10.0
14	Porter Creek.....	....do.....	NE $\frac{1}{4}$ sec. 22, T. 17 N., R. 5 W., at former gaging station at Porter.	7.89
14	Wynoochee River...	....do.....	NW $\frac{1}{4}$ sec. 35, T. 18 N., R. 8 W., at former gaging station below Black Creek, 2 $\frac{1}{2}$ miles northwest of Montesano.	50.6
Sept. 26	....do.....	....do.....	....do.....	115

† Flow at crest stage; discharge computed by contracted-opening method.

## Humtulpis River basin, Wash.

Feb. 9	Big Creek.....	Humtulpis River...	SE $\frac{1}{4}$ sec. 11, T. 19 N., R. 10 W., on Larson Road 300 ft east of U. S. Highway 101 and 11 $\frac{1}{2}$ miles north of Hoquiam.	†81.5
9	Unnamed stream....	Big Creek.....	SE $\frac{1}{4}$ sec. 11, T. 19 N., R. 10 W., at crossing of U. S. Highway 101, 11 $\frac{1}{2}$ miles north of Hoquiam.	†20.8

† Flow at crest stage; discharge computed by contracted-opening method.

## Quillayute River basin, Wash.

Feb. 10	Grader Creek.....	Bogachiel River....	SW $\frac{1}{4}$ sec. 17, T. 28 N., R. 13 W., at crossing of U. S. Highway 101, 2 miles southwest of Forks.	†252
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† Flow at crest stage; discharge computed by contracted-opening method.

## MISCELLANEOUS DISCHARGE MEASUREMENTS

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Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

## Basins tributary to Strait of Juan de Fuca, Wash.

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
Feb. 9	Cross Creek.....	Lake Crescent.....	E $\frac{1}{2}$ sec. 31, T. 30 N., R. 9 W., at crossing of U. S. Highway 101, 2 miles east of Fairholm.	+59.7
Aug. 28	Port Angeles industrial canal.	Right side Elwha River.	NE $\frac{1}{4}$ sec. 10, T. 30 N., R. 7 W., just below railroad crossing, 1 $\frac{1}{2}$ miles west of Port Angeles.	125
Feb. 10	East Valley Creek.	Valley Creek.....	SW $\frac{1}{4}$ sec. 15, T. 30 N., R. 6 W., on Hister Road, $\frac{1}{2}$ mile south of Port Angeles.	+15.0
9	Lees Creek.....	Strait of Juan de Fuca.	SE $\frac{1}{4}$ sec. 12, T. 30 N., R. 6 W., at crossing of U. S. Highway 101, 2 $\frac{1}{2}$ miles east of Port Angeles.	+99
Dec. 24	Dean Creek.....	Sequim Bay.....	NW $\frac{1}{4}$ sec. 12, T. 29 N., R. 3 W., 50 ft east of U. S. Highway 101 at Blyn.	+35.1

+ Flow at crest stage; discharge computed by contracted-opening method.

## Skokomish River basin, Wash.

June 14	Big Creek.....	Lake Cushman.....	SE $\frac{1}{4}$ sec. 17, T. 23 N., R. 4 W., at road crossing, 5 miles northwest of Lilliwaup.	10.3
July 6	....do.....	....do.....	....do.....	3.72
16	....do.....	....do.....	....do.....	2.60
Sept. 5	....do.....	....do.....	....do.....	No flow
5	Unnamed stream.....	Big Creek.....	NE $\frac{1}{4}$ sec. 20, T. 23 N., R. 4 W., at road crossing, 4 $\frac{1}{2}$ miles west of Lilliwaup.	.14
June 14	Vance Creek.....	South Fork Skokomish River.	SW $\frac{1}{4}$ sec. 11, T. 21 N., R. 5 W., at road crossing, 7 $\frac{1}{2}$ miles southwest of Potlatch.	11.0
26	....do.....	....do.....	....do.....	4.57
July 10	....do.....	....do.....	....do.....	24
Aug. 3	....do.....	....do.....	....do.....	No flow
Sept. 18	....do.....	....do.....	....do.....	No flow
June 7	....do.....	....do.....	NW $\frac{1}{4}$ sec. 18, T. 21 N., R. 4 W., at road crossing, 6 $\frac{1}{2}$ miles southwest of Potlatch.	29.8
26	....do.....	....do.....	....do.....	16.9
July 10	....do.....	....do.....	....do.....	14.8
Aug. 3	....do.....	....do.....	....do.....	12.6
Sept. 18	....do.....	....do.....	....do.....	9.19
Aug. 3	Purdy Creek.....	....do.....	SW $\frac{1}{4}$ sec. 14, T. 21 N., R. 4 W., at road crossing, 4 $\frac{1}{2}$ miles southwest of Union.	2.32
Sept. 18	....do.....	....do.....	....do.....	1.38
Aug. 3	Unnamed stream.....	Purdy Creek.....	SW $\frac{1}{4}$ sec. 14, T. 21 N., R. 4 W., 100 ft above mouth and 4 $\frac{1}{2}$ miles southwest of Union.	3.25
Sept. 18	....do.....	....do.....	....do.....	2.88
Aug. 3	....do.....	Skokomish River.....	SE $\frac{1}{4}$ sec. 14, T. 21 N., R. 4 W., 4 miles southwest of Union.	a.10
Sept. 17	....do.....	....do.....	....do.....	a.05
Aug. 3	Unnamed creek.....	....do.....	NW $\frac{1}{4}$ sec. 13, T. 21 N., R. 4 W., 3 $\frac{1}{2}$ miles southwest of Union.	a1.00
Sept. 17	....do.....	....do.....	....do.....	a.90

a Estimated.

## Basins tributary to Hood Canal other than Skokomish River basin, Wash.

Aug. 1	Tarboo Creek.....	Dabob Bay.....	SW $\frac{1}{4}$ sec. 33, T. 28 N., R. 1 W., at road crossing, 4 miles northeast of Quilcene.	2.26
Sept. 6	....do.....	....do.....	....do.....	1.80
Aug. 1	Donovan Creek.....	Quilcene Bay.....	SW $\frac{1}{4}$ sec. 18, T. 27 N., R. 1 W., just below Tommy Creek, 1,000 ft above mouth, $\frac{1}{2}$ mile northeast of Quilcene.	.14
Sept. 6	....do.....	....do.....	....do.....	a.05
Aug. 1	Leland Lake outlet	Little Quilcene River.	SW $\frac{1}{4}$ sec. 25, T. 28 N., R. 2 W., at road crossing, 4 $\frac{1}{2}$ miles north of Quilcene.	No flow
Sept. 6	....do.....	....do.....	NE $\frac{1}{4}$ sec. 14, T. 27 N., R. 2 W., 50 ft above mouth, 1 mile northwest of Quilcene.	.45
Aug. 1	Big Quilcene River	Quilcene Bay.....	SE $\frac{1}{4}$ sec. 19, T. 27 N., R. 2 W., 300 ft above Townsend Creek and 5 miles west of Quilcene.	23.6
Sept. 6	....do.....	....do.....	....do.....	14.8
Aug. 1	Townsend Creek....	Big Quilcene River.	SE $\frac{1}{4}$ sec. 19, T. 27 N., R. 2 W., 600 ft above mouth and 5 miles west of Quilcene.	7.24
Sept. 6	....do.....	....do.....	....do.....	4.90
Aug. 6	Tunnel Creek.....	....do.....	S $\frac{1}{2}$ sec. 31, T. 27 N., R. 2 W., 40 ft above mouth and 5 $\frac{1}{2}$ miles southwest of Quilcene.	42.6
Sept. 6	....do.....	....do.....	....do.....	24.8
July 24	Port Townsend municipal diversion	Left side Big Quilcene River.	S $\frac{1}{2}$ sec. 31, T. 27 N., R. 2 W., 5 $\frac{1}{2}$ miles southwest of Quilcene.	26.2
Dec. 24	Penny Creek.....	Big Quilcene River.	SE $\frac{1}{4}$ sec. 22, T. 27 N., R. 2 W., 500 ft above mouth and 2 miles west of Quilcene.	+352
Aug. 2	....do.....	....do.....	SE $\frac{1}{4}$ sec. 22, T. 27 N., R. 2 W., 200 ft above hatchery diversion and 2 miles southwest of Quilcene.	4.29
Sept. 6	....do.....	....do.....	....do.....	3.18

\* Computed by weir formula.

a Estimated.

## MISCELLANEOUS DISCHARGE MEASUREMENTS

Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

Basins tributary to Hood Canal other than Skokomish River basin, Wash.--Continued

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
Aug. 2	Penny Creek.....	Big Quilcene River.	SE $\frac{1}{4}$ sec. 22, T. 27 N., R. 2 W., below hatchery diversion, 2 miles southwest of Quilcene.	2.55
2	Spencer Creek.....	Jackson Cove.....	SE $\frac{1}{4}$ sec. 11, T. 26 N., R. 2 W., at crossing of U. S. Highway 101, $\frac{1}{2}$ miles south of Quilcene.	.50
Sept. 6	.....do.....	.....do.....	.....do.....	a.03
Aug. 2	Jackson Creek.....	Dabob Bay.....	SW $\frac{1}{4}$ sec. 13, T. 26 N., R. 2 W., at crossing of U. S. Highway 101, 4 miles north of Brinnon.	No flow
2	Turner Creek.....	.....do.....	NE $\frac{1}{4}$ sec. 26, T. 26 N., R. 2 W., at crossing of U. S. Highway 101, $2\frac{1}{2}$ miles north of Brinnon.	a.10
Sept. 6	.....do.....	.....do.....	.....do.....	No flow
Aug. 2	Unnamed stream....	.....do.....	S $\frac{1}{2}$ sec. 35, T. 26 N., R. 2 W., at crossing of U. S. Highway 101, 0.2 mile north of store at Brinnon.	No flow
2	Wilson Creek.....	Dosewallips River..	SE $\frac{1}{4}$ sec. 24, T. 26 N., R. 3 W., or Dosewallips Road, 5 miles northwest of Brinnon.	No flow
Feb. 10	Unnamed stream....	.....do.....	NW $\frac{1}{4}$ sec. 28, T. 26 N., R. 2 W., at Dosewallips River road crossing, 3 miles off U. S. Highway 101 and $3\frac{1}{2}$ miles northwest of Brinnon.	+52
June 13	Rocky Brook.....	.....do.....	NW $\frac{1}{4}$ sec. 28, T. 26 N., R. 2 W., at road crossing, 3 miles northwest of Brinnon.	6.36
July 6	.....do.....	.....do.....	.....do.....	3.73
17	.....do.....	.....do.....	.....do.....	2.69
Aug. 2	.....do.....	.....do.....	.....do.....	2.69
Sept. 18	.....do.....	.....do.....	.....do.....	1.32
Aug. 2	Unnamed stream....	.....do.....	W $\frac{1}{2}$ sec. 28, T. 26 N., R. 2 W., at road crossing, 3 miles northwest of Brinnon.	No flow
3	Unnamed creek.....	Duckabush River....	SW $\frac{1}{4}$ sec. 16, T. 25 N., R. 2 W., at road crossing, 3 miles southwest of Brinnon.	.24
Sept. 6	.....do.....	.....do.....	.....do.....	a.10
Aug. 2	McDonald Creek....	Hood Canal.....	E $\frac{1}{2}$ sec. 29, T. 25 N., R. 2 W., at crossing of U. S. Highway, $\frac{1}{2}$ miles southwest of Brinnon.	No flow
June 13	Fulton Creek.....	.....do.....	NE $\frac{1}{4}$ sec. 31, T. 25 N., R. 2 W., at crossing of U. S. Highway, $5\frac{1}{2}$ miles southwest of Brinnon.	3.36
July 6	.....do.....	.....do.....	.....do.....	2.04
17	.....do.....	.....do.....	.....do.....	1.47
Aug. 3	.....do.....	.....do.....	.....do.....	1.09
Sept. 6	.....do.....	.....do.....	.....do.....	.84
20	Schaerer Creek....	.....do.....	W $\frac{1}{2}$ sec. 6, T. 24 N., R. 2 W., at crossing of U. S. Highway 101, $\frac{1}{2}$ miles northeast of Eldon.	No flow
Aug. 3	Unnamed stream....	.....do.....	SW $\frac{1}{4}$ sec. 13, T. 24 N., R. 3 W., at crossing of U. S. Highway 101, 2.2 miles northeast of Eldon.	.57
3	Waketick Creek..	.....do.....	NW $\frac{1}{4}$ sec. 15, T. 24 N., R. 3 W., at Hamma Hamma River road crossing, $2\frac{1}{2}$ miles northwest of Eldon.	1.01
Sept. 18	.....do.....	.....do.....	.....do.....	.50
June 13	.....do.....	.....do.....	E $\frac{1}{2}$ sec. 23, T. 24 N., R. 3 W., at crossing of U. S. Highway 101, $1\frac{1}{2}$ miles northeast of Eldon.	4.13
July 6	.....do.....	.....do.....	.....do.....	2.92
17	.....do.....	.....do.....	.....do.....	1.20
Aug. 6	.....do.....	.....do.....	.....do.....	1.19
Sept. 18	.....do.....	.....do.....	.....do.....	.79
18	Watson Creek.....	Hamma Hamma River..	NW $\frac{1}{4}$ sec. 7, T. 24 N., R. 3 W., at road crossing, 5 miles northwest of Eldon.	No flow
18	Unnamed stream....	.....do.....	SE $\frac{1}{4}$ sec. 8, T. 24 N., R. 3 W., at road crossing, $3\frac{1}{2}$ miles northwest of Eldon.	No flow
Aug. 6	Hamma Hamma River.	Hood Canal.....	NW $\frac{1}{4}$ sec. 27, T. 24 N., R. 3 W., $\frac{1}{2}$ mile above mouth and $\frac{1}{2}$ mile northwest of Eldon.	102
Sept. 18	.....do.....	.....do.....	.....do.....	43.2
June 13	Jorstad Creek.....	.....do.....	SW $\frac{1}{4}$ sec. 34, T. 24 N., R. 3 W., at road crossing, $1\frac{1}{2}$ miles south of Eldon.	4.86
July 5	.....do.....	.....do.....	.....do.....	4.66
16	.....do.....	.....do.....	.....do.....	5.02
25	.....do.....	.....do.....	.....do.....	4.40
31	.....do.....	.....do.....	.....do.....	4.42
Sept. 20	.....do.....	.....do.....	.....do.....	2.98
5	Unnamed stream....	.....do.....	NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 9, T. 25 N., R. 3 W., at crossing of U. S. Highway 101, 3 miles northeast of Lilliwaup.	.54
5	Unnamed creek.....	.....do.....	SW $\frac{1}{4}$ sec. 9, T. 23 N., R. 3 W., at crossing of U. S. Highway 101, $2\frac{1}{2}$ miles northeast of Lilliwaup.	1.66
July 31	Unnamed stream....	.....do.....	NW $\frac{1}{4}$ sec. 20, T. 23 N., R. 3 W., at crossing of U. S. Highway 101, $1\frac{1}{2}$ miles northeast of Lilliwaup.	.21
Sept. 5	.....do.....	.....do.....	.....do.....	.12

+ Flow at crest stage; discharge computed by contracted-opening method.  
a Estimated.



Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

Basins tributary to Hood Canal other than Skokomish River basin, Wash.--Continued

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
June 12	Lilliwaup Creek...	Hood Canal.....	W $\frac{1}{2}$ sec. 19, T. 23 N., R. 3 W., $\frac{1}{2}$ mile above crossing of U. S. Highway 101, at Lilliwaup.	23.6
28	do.....	do.....	do.....	15.2
July 16	do.....	do.....	do.....	15.8
31	do.....	do.....	do.....	10.8
Sept. 5	do.....	do.....	do.....	10.5
July 31	Little Lilliwaup Creek.	do.....	NW $\frac{1}{4}$ sec. 30, T. 23 N., R. 3 W., at crossing of U. S. Highway 101, half a mile south of Lilliwaup.	4.57
Sept. 5	do.....	do.....	do.....	4.15
July 30	Sund Creek.....	do.....	NW $\frac{1}{4}$ sec. 31, T. 23 N., R. 3 W., at crossing of U. S. Highway 101, $\frac{1}{2}$ miles south of Lilliwaup.	No flow
30	Miller Creek.....	do.....	NE $\frac{1}{4}$ sec. 1, T. 22 N., R. 4 W., at crossing of U. S. Highway 101, 2 miles north of Hoodsport.	No flow
30	Clark Creek.....	do.....	SW $\frac{1}{4}$ sec. 1, T. 22 N., R. 4 W., at crossing of U. S. Highway 101, 1 mile north of Hoodsport.	No flow
Aug. 6	Unnamed stream....	Finch Creek.....	SE $\frac{1}{4}$ sec. 11, T. 22 N., R. 4 W., 20 ft above mouth at Hoodsport.	2.04
Sept. 5	do.....	do.....	do.....	1.63
July 31	Hill Creek.....	Hood Canal.....	SE $\frac{1}{4}$ sec. 14, T. 22 N., R. 4 W., at crossing of U. S. Highway 101, $\frac{1}{2}$ mile south of Hoodsport.	6.63
Sept. 20	do.....	do.....	do.....	4.27
Feb. 10	Unnamed stream....	Annas Bay.....	SW $\frac{1}{4}$ sec. 35, T. 22 N., R. 4 W., at crossing of U. S. Highway 101, 2 $\frac{1}{2}$ miles south of Potlatch.	†113
Aug. 3	do.....	Hood Canal.....	SW $\frac{1}{4}$ sec. 8, T. 21 N., R. 3 W., at crossing of State Highway 14, 1.9 miles south of Union.	a.15
Sept. 17	do.....	do.....	do.....	a.10
Aug. 3	do.....	do.....	SW $\frac{1}{4}$ sec. 6, T. 21 N., R. 3 W., at crossing of State Highway 14, 1.8 miles south of Union.	a.10
Sept. 17	do.....	do.....	do.....	a.05
Aug. 3	do.....	do.....	SW $\frac{1}{4}$ sec. 6, T. 21 N., R. 3 W., at crossing of State Highway 14, 1.7 miles south of Union.	.70
Sept. 17	do.....	do.....	do.....	.45
3	do.....	do.....	SW $\frac{1}{4}$ sec. 6, T. 21 N., R. 3 W., at crossing of State Highway 14, 1.6 miles south of Union.	a.20
Sept. 17	do.....	do.....	do.....	a.15
Aug. 3	do.....	do.....	SW $\frac{1}{4}$ sec. 6, T. 21 N., R. 3 W., at crossing of State Highway 14, 1.5 miles south of Union.	a.10
Sept. 17	do.....	do.....	do.....	a.02
Aug. 3	do.....	do.....	N $\frac{1}{2}$ sec. 6, T. 21 N., R. 3 W., at crossing of State Highway 14, 1.3 miles south of Union.	a.10
Sept. 17	do.....	do.....	do.....	a.10
Aug. 3	do.....	do.....	N $\frac{1}{2}$ sec. 6, T. 21 N., R. 3 W., at crossing of State Highway 14, 0.8 mile south of Union.	a.02
Sept. 17	do.....	do.....	do.....	a.01
Aug. 3	do.....	do.....	SE $\frac{1}{4}$ sec. 32, T. 22 N., R. 3 W., at crossing of State Highway 14, 1 mile east of Union.	a.05
Sept. 17	do.....	do.....	do.....	a.02
Aug. 3	do.....	do.....	SW $\frac{1}{4}$ sec. 33, T. 22 N., R. 3 W., at crossing of State Highway 14, 1.3 miles east of Union.	1.37
Sept. 17	do.....	do.....	do.....	1.14
Aug. 2	Dalby Creek.....	do.....	SW $\frac{1}{4}$ sec. 33, T. 22 N., R. 3 W., at crossing of State Highway 14, $\frac{1}{2}$ miles east of Union.	1.18
Sept. 17	do.....	do.....	do.....	1.24
Aug. 2	Unnamed stream....	do.....	SE $\frac{1}{4}$ sec. 33, T. 22 N., R. 3 W., at crossing of State Highway 14, 2 miles east of Union.	.88
Sept. 17	do.....	do.....	do.....	.77
Aug. 2	do.....	do.....	SW $\frac{1}{4}$ sec. 34, T. 22 N., R. 3 W., at crossing of State Highway 14, 2.3 miles east of Union.	a.05
Sept. 17	do.....	do.....	do.....	a.05
Aug. 2	do.....	do.....	NW $\frac{1}{4}$ sec. 36, T. 22 N., R. 3 W., at crossing of State Highway 14, 4.2 miles east of Union.	a.20
Sept. 17	do.....	do.....	do.....	a.20
Aug. 2	do.....	do.....	NW $\frac{1}{4}$ sec. 36, T. 22 N., R. 3 W., at crossing of State Highway 14, 4.3 miles east of Union.	a.05
Sept. 17	do.....	do.....	do.....	a.05
Aug. 2	do.....	do.....	NW $\frac{1}{4}$ sec. 36, T. 22 N., R. 3 W., at crossing of State Highway 14, 4.6 miles east of Union.	a.20
Sept. 17	do.....	do.....	do.....	a.15
Aug. 2	do.....	do.....	SE $\frac{1}{4}$ sec. 25, T. 22 N., R. 3 W., at crossing of State Highway 14, 4.8 miles east of Union.	a.10

† Flow at crest stage; discharge computed by contracted-opening method.

a Estimated.

## MISCELLANEOUS DISCHARGE MEASUREMENTS

Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued<sup>a</sup>

Basins tributary to Hood Canal other than Skokomish River basin, Wash.--Continued

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
Sept. 17	Unnamed stream...	Hood Canal.....	SE $\frac{1}{4}$ sec. 25, T. 22 N., R. 3 W., at crossing of State Highway 14, 4.8 miles east of Union.	a0.10
Aug. 2	...do.....	...do.....	SE $\frac{1}{4}$ sec. 25, T. 22 N., R. 3 W., at crossing of State Highway 14, 5 miles east of Union.	.95
Sept. 17	...do.....	...do.....	...do.....	.89
Aug. 2	...do.....	...do.....	NW $\frac{1}{4}$ sec. 30, T. 22 N., R. 2 W., at crossing of State Highway 14, 5.5 miles east of Union.	1.93
Sept. 6	...do.....	...do.....	...do.....	1.87
Aug. 2	...do.....	...do.....	NW $\frac{1}{4}$ sec. 30, T. 22 N., R. 2 W., at crossing of State Highway 14, 5.8 miles east of Union.	a.10
Sept. 6	...do.....	...do.....	...do.....	a.10
Aug. 2	...do.....	...do.....	NE $\frac{1}{4}$ sec. 30, T. 22 N., R. 2 W., at crossing of State Highway 14, 6 miles east of Union.	3.08
Sept. 6	...do.....	...do.....	...do.....	2.29
Aug. 2	...do.....	...do.....	SE $\frac{1}{4}$ sec. 20, T. 22 N., R. 2 W., at crossing of State Highway 14, 6 miles west of Allyn.	1.19
Sept. 6	...do.....	...do.....	...do.....	1.16
Aug. 2	...do.....	...do.....	NW $\frac{1}{4}$ sec. 22, T. 22 N., R. 2 W., at crossing of State Highway 14, 4 $\frac{1}{2}$ miles west of Allyn.	a.05
Sept. 6	...do.....	...do.....	...do.....	No flow
Aug. 2	...do.....	...do.....	N $\frac{1}{2}$ sec. 22, T. 22 N., R. 2 W., at crossing of State Highway 14, 4 miles west of Allyn.	.55
Sept. 6	...do.....	...do.....	...do.....	.48
Aug. 2	...do.....	...do.....	SW $\frac{1}{4}$ sec. 12, T. 22 N., R. 2 W., at crossing of State Highway 14, 3 miles northeast of Allyn.	1.55
Aug. 2	...do.....	...do.....	SW $\frac{1}{4}$ sec. 6, T. 22 N., R. 1 W., at crossing of State Highway 14, 3 miles north of Allyn.	No flow
2	...do.....	...do.....	NW $\frac{1}{4}$ sec. 6, T. 22 N., R. 1 W., at crossing of State Highway 14, 3 $\frac{1}{2}$ miles north of Allyn.	No flow
13	Anderson Creek...	...do.....	S $\frac{1}{2}$ sec. 17, T. 24 N., R. 2 W., at former gaging station $\frac{1}{2}$ mile above mouth and 1 mile northeast of Holley.	6.36
13	Stavis Creek.....	...do.....	SW $\frac{1}{4}$ sec. 25, T. 25 N., R. 2 W., at former gaging station $\frac{1}{2}$ mile above mouth and 2 miles west of Seabeck.	9.13

<sup>a</sup> Estimated.

Minor basins tributary to Puget Sound above Nisqually River, Wash.

Aug. 13	Kitsap Creek....	Dickerson Creek....	SW $\frac{1}{4}$ sec. 8, T. 24 N., R. 1 E., at lake outlet, 2 miles south of Chico.	0.36
13	Clear Creek.....	Dyes Inlet.....	North line sec. 16, T. 25 N., R. 1 E., at former gaging station 1 mile above mouth and 1 $\frac{1}{2}$ miles north of Silverdale.	2.71
13	Gurley Creek....	Puget Sound.....	NE $\frac{1}{4}$ sec. 8, T. 23 N., R. 2 E., 1 mile below Long Lake and 4 miles southeast of Port Orchard.	6.21
13	Burley Creek....	Henderson Bay.....	NE $\frac{1}{4}$ sec. 11, T. 22 N., R. 1 E., at former gaging station at Burley.	15.8
1	Shumocher Creek..	Mason Lake.....	NW $\frac{1}{4}$ sec. 15, T. 21 N., R. 3 W., at road crossing, 3 $\frac{1}{2}$ miles southeast of Union.	4.50
Sept. 20	...do.....	...do.....	...do.....	2.98
June 7	Sherwood Creek...	North Bay.....	NE $\frac{1}{4}$ sec. 34, T. 22 N., R. 2 W., at road crossing, 4 $\frac{1}{2}$ miles southwest of Allyn.	11.0
27	...do.....	...do.....	...do.....	35.8
July 10	...do.....	...do.....	...do.....	18.0
30	...do.....	...do.....	...do.....	.60
Sept. 6	...do.....	...do.....	...do.....	.58
July 30	...do.....	...do.....	SW $\frac{1}{4}$ sec. 20, T. 22 N., R. 1 W., $\frac{1}{2}$ mile above mouth and $\frac{1}{2}$ mile southwest of Allyn.	7.65
Sept. 6	...do.....	...do.....	...do.....	7.89
Aug. 7	Jones Creek.....	Pickering Passage.	SE $\frac{1}{4}$ sec. 33, T. 21 N., R. 2 W., at road crossing, 8 miles northeast of Shelton.	1.34
Sept. 6	...do.....	...do.....	...do.....	1.39
Aug. 7	Unnamed stream...	...do.....	SW $\frac{1}{4}$ sec. 4, T. 20 N., R. 2 W., at road crossing, 7 $\frac{1}{2}$ miles northeast of Shelton.	No flow
7	...do.....	...do.....	W $\frac{1}{2}$ sec. 9, T. 20 N., R. 2 W., at road crossing, 7 $\frac{1}{2}$ miles northeast of Shelton.	.18
Sept. 6	...do.....	...do.....	...do.....	.11
Aug. 7	...do.....	Hammersly Inlet...	On 1 line between sec. 17 and 20, T. 20 N., R. 2 W., at road crossing, 6 $\frac{1}{2}$ miles east of Shelton.	No flow

Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

Minor basins tributary to Puget Sound above Nisqually River, Wash.--Continued

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
Aug. 7	Unnamed stream.	Hammersly Inlet...	Line between secs. 18 and 19, T. 20 N., R. 2 W., at road crossing, 5½ miles east of Shelton.	Trace
Sept. 6	...do.....	...do.....	...do.....	Trace
Aug. 8	...do.....	...do.....	Line between secs. 18 and 19, T. 20 N., R. 2 W., 5½ miles east of Shelton.	No flow
7	Campbell Creek...	Oakland Bay.....	NW¼ sec. 15, T. 20 N., R. 3 W., 100 ft above road crossing, 4 miles northeast of Shelton.	.57
Sept. 6	...do.....	...do.....	...do.....	.47
Aug. 7	Spencer Creek...	...do.....	Line between secs. 1 and 2, T. 20 N., R. 3 W., at road crossing, 5 miles northeast of Shelton.	.78
Sept. 6	...do.....	...do.....	...do.....	.70
Aug. 7	Spring Creek....	Deer Creek.....	SE¼ sec. 36, T. 21 N., R. 3 W., at culvert, 6 miles northeast of Shelton.	1.45
Sept. 6	...do.....	...do.....	...do.....	1.34
Aug. 1	Cranberry Creek..	Oakland Bay.....	SE¼ sec. 27, T. 21 N., R. 3 W., at road crossing, 5 miles northeast of Shelton.	5.86
1	...do.....	...do.....	...do.....	5.95
Sept. 20	...do.....	...do.....	...do.....	5.09
Aug. 2	Unnamed stream...	...do.....	SW¼ sec. 35, T. 21 N., R. 3 W., at road crossing, 5 miles northeast of Shelton.	Trace
Sept. 6	...do.....	...do.....	...do.....	Trace
Aug. 2	...do.....	...do.....	NE¼ sec. 3, T. 20 N., R. 3 W., at road crossing, 4 miles northeast of Shelton.	a.03
Sept. 6	...do.....	...do.....	...do.....	a.02
Nov. 10	Johns Creek.....	...do.....	NE¼ sec. 5, T. 20 N., R. 3 W., 2½ miles above mouth, 3 miles north of Shelton at former gaging station.	19.1
Aug. 28	Unnamed stream...	...do.....	NW¼ sec. 16, T. 20 N., R. 3 W., at road crossing, 1½ miles northeast of Shelton.	a.01
Sept. 6	...do.....	...do.....	...do.....	a.01
Aug. 1	North Fork Goldsborough Creek.	Goldsborough Creek	NW¼ sec. 17, T. 20 N., R. 4 W., at road crossing, 5 miles west of Shelton.	5.31
Aug. 27	...do.....	...do.....	...do.....	5.25
Aug. 1	Coffee Creek.....	...do.....	SE¼ sec. 24, T. 20 N., R. 4 W., at road crossing, ½ mile southwest of Shelton.	4.49
27	...do.....	...do.....	...do.....	3.69
6	Unnamed stream...	Hammersly Inlet...	SE¼ sec. 25, T. 20 N., R. 3 W., at road crossing, 4 miles east of Shelton.	a.02
Sept. 4	...do.....	...do.....	...do.....	a.02
July 31	Gosnell Creek....	Isabella Lake....	SE¼ sec. 2, T. 19 N., R. 4 W., 4 miles southwest of Shelton.	10.4
Aug. 27	...do.....	...do.....	...do.....	9.43
6	Mill Creek.....	Hammersly Inlet...	SE¼ sec. 25, T. 20 N., R. 3 W., at road crossing, 4½ miles east of Shelton.	13.4
Sept. 4	...do.....	...do.....	...do.....	12.8
Aug. 6	Unnamed stream...	Totten Inlet....	NW¼ sec. 32, T. 20 N., R. 2 W., at road crossing, 7 miles northeast of Kamilche.	Trace
Sept. 4	...do.....	...do.....	...do.....	No flow
Aug. 6	...do.....	Skookum Inlet....	SE¼ sec. 2, T. 19 N., R. 3 W., at road crossing, 4 miles northeast of Kamilche.	.12
Sept. 4	...do.....	...do.....	...do.....	.09
Aug. 6	...do.....	...do.....	NW¼ sec. 10, T. 19 N., R. 3 W., at road crossing, 2½ miles northeast of Kamilche.	1.59
Sept. 4	...do.....	...do.....	...do.....	1.16
Aug. 6	...do.....	...do.....	SE¼ sec. 8, T. 19 N., R. 3 W., at road crossing, 1½ miles northeast of Kamilche.	a.06
Sept. 4	...do.....	...do.....	...do.....	a.05
July 31	...do.....	Skookum Creek....	NW¼ sec. 25, T. 19 N., R. 4 W., at crossing of State Highway 9-D, 2 miles southwest of Kamilche.	a.03
Aug. 27	...do.....	...do.....	...do.....	No flow
July 31	Little Creek.....	...do.....	SE¼ sec. 18, T. 19 N., R. 3 W., 75 ft below bridge on State Highway 9-D, at Kamilche.	.28
Aug. 27	...do.....	...do.....	...do.....	.27
July 31	Schneider Creek..	Totten Inlet....	NW¼ sec. 2, T. 18 N., R. 3 W., at road crossing, 6 miles northwest of Olympia.	No flow
Feb. 10	Unnamed stream...	Schneider Creek...	SE¼ sec. 32, T. 19 N., R. 3 W., at crossing of U. S. Highway 101, 8½ miles south of Shelton.	†96.3
July 31	...do.....	Eld Inlet.....	SE¼ sec. 2, T. 18 N., R. 3 W., at road crossing, 5 miles west of Olympia.	No flow
June 5	Ferry Creek.....	...do.....	South line sec. 11, T. 18 N., R. 3 W., along gravel road, 4½ miles west of Olympia.	.95
25	...do.....	...do.....	...do.....	.27
July 10	...do.....	...do.....	...do.....	.21
31	...do.....	...do.....	...do.....	a.02
Aug. 27	...do.....	...do.....	...do.....	No flow

† Flow at crest stage; discharge computed by contracted-opening method.  
a Estimated.

## MISCELLANEOUS DISCHARGE MEASUREMENTS

Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

## Minor basins tributary to Puget Sound above Nisqually River, Wash.--Continued

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
July 31	Unnamed stream...	McLean Creek.....	SE $\frac{1}{4}$ sec. 24, T. 18 N., R. 3 W., at road crossing, $\frac{3}{4}$ miles southwest of Olympia.	1.23
Aug. 27	....do.....	....do.....	....do.....	1.05
July 31	....do.....	....do.....	SW $\frac{1}{4}$ sec. 19, T. 18 N., R. 2 W., at road crossing, 3 miles west of Olympia.	2.15
Aug. 27	....do.....	....do.....	....do.....	2.10
June 5	McLean Creek.....	Eld Inlet.....	W $\frac{1}{2}$ sec. 19, T. 18 N., R. 2 W., at road crossing, 3 miles west of Olympia.	6.25
25	....do.....	....do.....	....do.....	3.98
July 10	....do.....	....do.....	....do.....	3.42
31	....do.....	....do.....	....do.....	2.14
Aug. 27	....do.....	....do.....	....do.....	2.03
14	Spurgeon Creek...	Deschutes River...	West line sec. 20, T. 17 N., R. 1 W., at former gaging station, $\frac{1}{2}$ mile above mouth and 7.2 miles southeast of Olympia.	10.1

a Estimated.

## Nisqually River basin, Wash.

Nov. 7	Centralia power canal.	Nisqually River...	NW $\frac{1}{4}$ sec. 1, T. 16 N., R. 2 E., $\frac{1}{2}$ mile below head and $\frac{3}{4}$ miles southeast of McKenna.	374
Dec. 8	....do.....	....do.....	....do.....	362
Jan. 17	....do.....	....do.....	....do.....	351
Mar. 16	....do.....	....do.....	....do.....	358
Apr. 13	....do.....	....do.....	....do.....	363
May 17	....do.....	....do.....	....do.....	359
July 19	....do.....	....do.....	....do.....	388
Sept. 10	....do.....	....do.....	....do.....	364

## Chambers Creek basin, Wash.

July 10	Clover Creek....	Steilacoom Lake...	SE $\frac{1}{4}$ sec. 16, T. 19 N., R. 3 E., at county bridge at 138th St., $2\frac{1}{2}$ miles south of Tacoma.	3.31
23	....do.....	....do.....	....do.....	2.92
Aug. 7	....do.....	....do.....	....do.....	2.18
24	....do.....	....do.....	....do.....	2.12
Sept. 4	....do.....	....do.....	....do.....	2.57
4	Unnamed stream...	Clover Creek.....	SE $\frac{1}{4}$ sec. 16, T. 19 N., R. 3 E., 60 ft below county bridge at 138th St., and $2\frac{1}{2}$ miles south of Tacoma.	.91
July 10	Clover Creek....	Steilacoom Lake...	NE $\frac{1}{4}$ sec. 18, T. 19 N., R. 3 E., just above Morey Creek on McChord Field.	15.5
23	....do.....	....do.....	....do.....	11.5
Aug. 7	....do.....	....do.....	....do.....	8.66
24	....do.....	....do.....	....do.....	6.16
Sept. 4	....do.....	....do.....	....do.....	5.28
July 10	Morey Creek.....	Clover Creek.....	NE $\frac{1}{4}$ sec. 18, T. 19 N., R. 3 E., at mouth in McChord Field.	2.07
23	....do.....	....do.....	....do.....	2.20
Aug. 7	....do.....	....do.....	....do.....	1.68
24	....do.....	....do.....	....do.....	1.51
Sept. 4	....do.....	....do.....	....do.....	1.40
Dec. 12	Clover Creek....	Steilacoom Lake...	SE $\frac{1}{4}$ sec. 18, T. 19 N., R. 3 E., 600 ft east of main hangar at south end of runway on McChord Field.	125
July 10	....do.....	....do.....	SE $\frac{1}{4}$ sec. 12, T. 19 N., R. 2 E., at concrete bridge at west edge McChord Field.	16.3
23	....do.....	....do.....	....do.....	12.2
Aug. 7	....do.....	....do.....	....do.....	9.19
24	....do.....	....do.....	....do.....	4.66
Sept. 4	....do.....	....do.....	....do.....	4.51
July 10	....do.....	....do.....	SE $\frac{1}{4}$ sec. 11, T. 19 N., R. 2 E., at bridge on U. S. Highway 99, 6 miles northeast of main entrance to Fort Lewis.	15.2
23	....do.....	....do.....	....do.....	11.6
Aug. 7	....do.....	....do.....	....do.....	7.36
24	....do.....	....do.....	....do.....	1.91
Sept. 4	....do.....	....do.....	....do.....	2.13
July 10	....do.....	....do.....	NW $\frac{1}{4}$ sec. 11, T. 19 N., R. 2 E., at bridge on Gravelly Lake road, $\frac{1}{2}$ miles southwest of Lakeview.	13.4
23	....do.....	....do.....	....do.....	10.4
Aug. 7	....do.....	....do.....	....do.....	6.19
24	....do.....	....do.....	....do.....	1.52
Sept. 4	....do.....	....do.....	....do.....	1.11

## Puyallup River basin, Wash.

Aug. 14	Gale Creek.....	South Prairie....	Near center of sec. 28, T. 19 N., R. 6 E., at former gaging station in Wilkeson.	4.64
14	Voight Creek....	Carbon River.....	SW $\frac{1}{4}$ sec. 1, T. 18 N., R. 5 E., at former gaging station near Crocker.	7.14

Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

## Puyallup River basin, Wash.--Continued

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
Aug. 14	Fennel Creek.....	Puyallup River...	NE $\frac{1}{4}$ sec. 7, T. 19 N., R. 5 E., at former gaging station near McMillan.	11.2
Feb. 10	Cyclone Creek.....	White River.....	SW $\frac{1}{4}$ sec. 34, T. 20 N., R. 8 E., at crossing of U. S. Highway 410, 10 miles east of Enumclaw.	+100
Apr. 25	Clark Creek.....	Puyallup River...	NE $\frac{1}{4}$ sec. 32, T. 20 N., R. 4 E., at former gaging station at Puyallup	27.5
May 19	...do.....	...do.....	...do.....	37.0
Aug. 13	...do.....	...do.....	...do.....	31.6
Feb. 9	Swan Creek.....	Clear Creek.....	W $\frac{1}{2}$ sec. 28, T. 20 N., R. 3 E., at south 72nd Street crossing in Tacoma.	+170

† Flow at crest stage; discharge computed by contracted-opening method.

## Hylebos Creek basin, Wash.

Feb. 9	South Fork Hylebos Creek.	Hylebos Creek.....	SE $\frac{1}{4}$ sec. 33, T. 21 N., R. 4 E., at crossing of State Highway 5D, 5 miles north of Puyallup.	6.56
9	...do.....	...do.....	...do.....	+6.8
Oct. 3	Hylebos Creek.....	Commencement Bay..	NW $\frac{1}{4}$ sec. 32, T. 21 N., R. 4 E., at former gaging station near Tacoma.	8.37
Aug. 14	...do.....	...do.....	...do.....	8.77

† Flow at crest stage; discharge computed by contracted-opening method.

## Duwamish River basin, Wash.

Mar. 16	Deep Creek.....	Deep Lake.....	SE $\frac{1}{4}$ sec. 21, T. 21 N., R. 7 E., at railroad crossing at Cumberland.	19.7
Feb. 10	...do.....	...do.....	...do.....	+109
Aug. 31	Newaukum Creek.....	Green River.....	SW $\frac{1}{4}$ sec. 16, T. 20 N., R. 7 E., 100 ft below springs and $3\frac{1}{2}$ miles northeast of Enumclaw.	1.56
31	Unnamed stream....	Newaukum Creek....	SW $\frac{1}{4}$ sec. 16, T. 20 N., R. 7 E., 600 ft above mouth and $3\frac{1}{2}$ miles northeast of Enumclaw.	.21
31	Newaukum Creek....	Green River.....	SW $\frac{1}{4}$ sec. 8, T. 20 N., R. 7 E., on Byrd Ranch, 3 miles northeast of Enumclaw.	1.44
31	North Fork Green River.	...do.....	NE $\frac{1}{4}$ sec. 7, T. 20 N., R. 7 E., at road crossing, $2\frac{1}{2}$ miles northeast of Enumclaw.	.20
31	Stonequarry Creek.	North Fork Green River.	SE $\frac{1}{4}$ sec. 6, T. 20 N., R. 7 E., at railroad crossing, 3 miles northeast of Enumclaw.	1.07
15	Newaukum Creek....	Green River.....	SW $\frac{1}{4}$ sec. 28, T. 21 N., R. 6 E., at former gaging station near Black Diamond.	15.4
Feb. 9	Dolloff Lake Outlet	...do.....	SW $\frac{1}{4}$ sec. 14, T. 14 N., R. 4 E., on State Highway 5, 2 miles west of Auburn.	99.7
9	...do.....	...do.....	...do.....	+112

† Flow at crest stage; discharge computed by contracted-opening method.

## Lake Washington basin, Wash.

Aug. 16	May Creek.....	Lake Washington...	SE $\frac{1}{4}$ sec. 32, T. 24 N., R. 5 E., at former gaging station near Renton.	3.07
Feb. 2	Unnamed stream....	Mercer Creek.....	NE $\frac{1}{4}$ sec. 27, T. 25 N., R. 5 E., on county road, $2\frac{1}{2}$ miles northeast of Bellevue.	21.5
10	...do.....	...do.....	...do.....	+241
9	...do.....	Evans Creek.....	NW $\frac{1}{4}$ sec. 16, T. 25 N., R. 6 E., on Redmond-Fall City highway, $5\frac{1}{2}$ miles southeast of Redmond.	+59.7
10	...do.....	...do.....	...do.....	36.3
10	Evans Creek.....	Bear Creek.....	NE $\frac{1}{4}$ sec. 17, T. 25 N., R. 6 E., on Redmond-Fall City highway, 3 miles southeast of Redmond.	+182
Aug. 15	Bear Creek.....	Sammamish River...	SE $\frac{1}{4}$ sec. 12, T. 25 N., R. 5 E., at former gaging station at Redmond.	18.0

† Flow at crest stage; discharge computed by contracted-opening method.

\* Computed by weir formula.

## Snohomish River basin, Wash.

Feb. 10	Unnamed stream....	South Fork Skykomish River.	NE $\frac{1}{4}$ sec. 2, T. 26 N., R. 10 E., on Great Northern Ry. crossing a quarter of a mile east of post office at Baring.	+143
Aug. 17	North Fork Skykomish River.	Skykomish River...	NW $\frac{1}{4}$ sec. 20, T. 27 N., R. 10 E., at former gaging station at Index.	220
Feb. 9	Olney Creek.....	Wallace River.....	SW $\frac{1}{4}$ sec. 6, T. 28 N., R. 9 E., at former gaging station near Gold Bar.	*3,540
Aug. 16	West Fork Woods Creek.	Woods Creek.....	NW $\frac{1}{4}$ sec. 33, T. 28 N., R. 7 E., 300 ft above mouth and $2\frac{1}{2}$ miles northeast of Monroe.	6.33
Feb. 10	Unnamed stream....	South Fork Snoqualmie River.	NW $\frac{1}{4}$ sec. 13, T. 22 N., R. 10 E., at crossing of U. S. Highway 10, 15 miles southeast of North Bend.	+33.0

\* Flow at crest stage; discharge computed by slope-area method.

† Flow at crest stage; discharge computed by contracted-opening method.

## MISCELLANEOUS DISCHARGE MEASUREMENTS

Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

## Snohomish River basin, Wash.--Continued

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
Aug. 15	Raging River.....	Snoqualmie River...	West line sec. 27, T. 24 N., R. 7 E., at former gaging station near Fall City.	7.52
Feb. 9	....do.....	....do.....	Near Fall City, 0.6 mile downstream from former gaging station.	†3,430
Aug. 15	Patterson Creek....	....do.....	NW¼ sec. 8, T. 24 N., R. 7 E., at former gaging station near Fall City.	9.38
16	Cherry Creek.....	....do.....	NW¼ sec. 17, T. 26 N., R. 7 E., at former gaging station near Duvall.	2.91
Oct. 16	Stevens Creek.....	Little Pilchuck River.	East line sec. 8, T. 29 N., R. 6 E., at former gaging station at Lake Stevens.	.52
Dec. 5	....do.....	....do.....	....do.....	48.4
Aug. 16	....do.....	....do.....	....do.....	No flow
16	Dubuque Creek.....	Pilchuck River.....	NW¼ sec. 22, T. 29 N., R. 6 E., at former gaging station near Lake Stevens.	.24
17	Wood Creek.....	Snohomish River....	East line sec. 8, T. 28 N., R. 5 E., at former gaging station near Everett.	4.25

† Flow at crest stage; discharge computed by contracted-opening method.

## Allen Creek basin, Wash.

Nov. 27	Munson Creek.....	Allen Creek.....	NW¼ sec. 26, T. 30 N., R. 5 E., 2 miles northeast of Marysville.	†15.4
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† Flow at crest stage; discharge computed by contracted-opening method.

## Tulalip Creek basin, Wash.

Aug. 16	Tulalip Creek.....	Possession Sound....	SW¼ sec. 22, T. 30 N., R. 4 E., 200 ft below road crossing at Tulalip.	5.19
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## Stillaguamish River basin, Wash.

Oct. 3	Benson Creek.....	South Fork Stillaguamish River.	NE¼ sec. 16, T. 30 N., R. 8 E., at former gaging station near Granite Falls.	2.12
Oct. 11	....do.....	....do.....	....do.....	24.5
Aug. 13	....do.....	....do.....	....do.....	.65
13	Canyon Creek.....	....do.....	NE¼ sec. 5, T. 30 N., R. 7 E., at site of former gaging station near Granite Falls.	42.3
Oct. 3	Boulder Creek.....	North Fork Stillaguamish River.	NW¼ sec. 9, T. 32 N., R. 8 E., at former gaging station near Oso.	61.4
3	....do.....	....do.....	....do.....	60.3
Aug. 16	....do.....	....do.....	....do.....	45.7
Oct. 11	Deer Creek.....	....do.....	SE¼ sec. 5, T. 32 N., R. 7 E., at site of former gaging station at Oso.	884
Aug. 16	....do.....	....do.....	....do.....	26.1
Apr. 16	Lake Creek.....	Pilchuck Creek.....	SW¼ sec. 22, T. 33 N., R. 6 E., at outlet of Cavanaugh Lake, 6 miles northwest of Oso.	35.9
Aug. 17	Portage Creek.....	South Slough.....	NW¼ sec. 17, T. 31 N., R. 5 E., at site of former gaging station near Arlington.	10.8
Oct. 2	Church Creek.....	Stillaguamish River	SE¼NW¼ sec. 29, T. 32 N., R. 4 E., at site of former gaging station near Stanwood.	.42
2	....do.....	....do.....	....do.....	.42

## Skagit River basin, Wash.

Oct. 5	Bacon Creek.....	Skagit River.....	Line between secs. 20 and 21, T. 35 N., R. 11 E., at former gaging station near Marblemount.	400
Aug. 15	....do.....	....do.....	....do.....	181
16	Clear Creek.....	Sauk River.....	SW¼ sec. 31, T. 31 N., R. 10 E., at mouth, 3 miles southeast of Darrington.	19.4
15	Jackman Creek.....	Skagit River.....	SW¼ sec. 13, T. 35 N., R. 8 E., at site of former gaging station at Van Horn.	12.3
16	Finney Creek.....	....do.....	Sec. 19, T. 35 N., R. 8 E., at approximate site of former gaging station near Concrete.	17.2
16	Grandy Creek.....	....do.....	SE¼ sec. 10, T. 35 N., R. 7 E., at site of former gaging station near Concrete.	6.09
Feb. 10	Unnamed stream....	....do.....	SE¼ sec. 25, T. 35 N., R. 5 E., at county road crossing, 3 miles southwest of Lyman.	†148
Aug. 15	Coal Creek.....	....do.....	S¼ sec. 10, T. 35 N., R. 5 E., at site of former gaging station near Sedro Woolley.	.26

† Flow at crest stage; discharge computed by contracted-opening method.

## MISCELLANEOUS DISCHARGE MEASUREMENTS

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Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

## Skagit River basin, Wash.--Continued

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
Mar. 13	Unnamed stream....	Tom Moore Slough..	SE $\frac{1}{4}$ sec. 4, T. 32 N., R. 4 E., at crossing of U. S. Highway 99, 9 $\frac{1}{2}$ miles south of Mt. Vernon.	+27.0

† Flow at crest stage; discharge computed by contracted-opening method.

## Samish River basin, Wash.

Feb. 10	Unnamed stream....	Samish Lake.....	NW $\frac{1}{4}$ sec. 23, T. 37 N., R. 3 E., at crossing of U. S. Highway 99, 6 $\frac{1}{2}$ miles southeast of Bellingham.	+208
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† Flow at crest stage; discharge computed by contracted-opening method.

## Whatcom Creek basin, Wash.

Aug. 15	Austin Creek.....	Lake Whatcom.....	SW $\frac{1}{4}$ sec. 8, T. 37 N., R. 4 E., at site of former gaging station near Bellingham.	0.25
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## Nooksack River basin, Wash.

Aug. 14	East Branch Double Ditch Creek.	Double Ditch Creek.	Middle sec. 31, T. 41 N., R. 3 E., at international boundary, 4 miles north of Lynden.	3.21
14	West Branch Double Ditch Creek.	....do.....	....do.....	4.06
14	Bertrand Creek....	Nooksack River....	SE $\frac{1}{4}$ sec. 27, T. 40 N., R. 2 E., at site of former gaging station near Lynden.	9.04
Feb. 10	Unnamed stream....	Tenmile Creek.....	N $\frac{1}{2}$ sec. 27, T. 39 N., R. 3 E., at Starry Road crossing 2 miles northwest of Noon and 7 miles northeast of Bellingham.	+56.5
14	Tenmile Creek.....	Barrett Lake.....	NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 22, T. 39 N., R. 2 E., at site of former gaging station near Ferndale.	3.93

† Flow at crest stage; discharge computed by contracted-opening method.

## Frazier River basin, Wash.

Feb. 14	Sumas River.....	Vedder River.....	NE $\frac{1}{4}$ sec. 11, T. 40 N., R. 4 E., at site of former gaging station near Sumas.	11.4
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## Kootenay River basin

Oct. 10	Kootenay River....	Columbia River....	Grohman Narrows, 2 miles below Nelson, British Columbia; measurements referred to gage No. 10 at Nelson (station 8 N., J. 9 of Water Resources Division, Department of Resources and Development, Canada).	20,390
Dec. 5	....do.....	....do.....	....do.....	12,340
Feb. 27	....do.....	....do.....	....do.....	23,500
Apr. 10	....do.....	....do.....	....do.....	21,380
May 10	....do.....	....do.....	....do.....	58,010
11	....do.....	....do.....	....do.....	63,820
13	....do.....	....do.....	....do.....	76,380
15	....do.....	....do.....	....do.....	87,820
25	....do.....	....do.....	....do.....	106,600
28	....do.....	....do.....	....do.....	108,900
July 12	....do.....	....do.....	....do.....	84,020

## Blackfoot River basin, Mont.

Nov. 28	Douglas Creek....	Blackfoot River...	NW $\frac{1}{4}$ sec. 5, T. 12 N., R. 11 W., at county road bridge on Helmville-Drummond road, 4 miles southwest of Helmville.	7.7
Dec. 27	....do.....	....do.....	....do.....	11.8
Jan. 25	....do.....	....do.....	....do.....	8.7
Feb. 19	....do.....	....do.....	....do.....	12.3
Mar. 21	....do.....	....do.....	....do.....	10.3
Apr. 27	....do.....	....do.....	....do.....	19.2
May 16	....do.....	....do.....	....do.....	74.1
June 14	....do.....	....do.....	....do.....	32.5

## Flathead River basin, Mont.

Apr. 9	Dayton Creek.....	Flathead Lake....	SW $\frac{1}{4}$ sec. 17, T. 25 N., R. 21 W., 4.7 miles northwest of Dayton.	26.2
May 10	....do.....	....do.....	....do.....	58.8
May 25	....do.....	....do.....	....do.....	27.1

## MISCELLANEOUS DISCHARGE MEASUREMENTS

Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

## Pend Oreille River basin

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
Oct. 13	Pend Oreille River	Columbia River....	In lot 4, sec. 28, T. 56 N., R. 5 W., at town of Priest River, Idaho, 1½ miles downstream from Priest River.	12,200
Dec. 20	....do.....	....do.....	....do.....	22,800
Feb. 6	....do.....	....do.....	....do.....	21,600
Apr. 4	....do.....	....do.....	....do.....	22,200
Sept. 20	....do.....	....do.....	....do.....	14,100
May 1	....do.....	....do.....	In SW¼ sec. 24, T. 56 N., R. 6 W., at Newport, Wash., 0.2 mile upstream from bridge on U. S. Highway 2.	44,600
22	....do.....	....do.....	....do.....	92,000
July 17	....do.....	....do.....	....do.....	55,300
Aug. 24	....do.....	....do.....	....do.....	16,700
Sept. 6	....do.....	....do.....	SW¼ sec. 5, T. 37 N., R. 3 E., at highway crossing, ½ mile south of Ione, Wash.	14,000

## Colville River basin, Wash.

Apr. 8	Sheep Creek.....	Colville River....	Line between secs. 32 and 33, T. 30 N., R. 41 E., at former gaging station, 1 mile west of town of Loon Lake.	3.34
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## Spokane River basin, Wash.

Nov. 11	Little Spokane River.	Spokane River....	NW¼ sec. 5, T. 28 N., R. 42 E., just below highway crossing, 1 mile above mouth.	484
Dec. 11	....do.....	....do.....	....do.....	481
Feb. 5	....do.....	....do.....	....do.....	670
Mar. 10	....do.....	....do.....	....do.....	731
July 14	....do.....	....do.....	....do.....	437
Aug. 27	....do.....	....do.....	....do.....	405

## Okanogan River basin, Wash.

Sept. 14	Toato Coulee Creek	Sinlahekin Creek..	SW¼ sec. 28, T. 39 N., R. 25 E., just below bridge 3½ miles northwest of Loomis.	22.0
14	....do.....	....do.....	SW¼ sec. 28, T. 39 N., R. 25 E., 50 ft above dam and 3½ miles northwest of Loomis.	20.7
14	Toato Coulee Creek diversion.	Right side of Toato Coulee Creek.	SW¼ sec. 28, T. 39 N., R. 25 E., just below intake, 3½ miles northwest of Loomis.	18.1

## Wenatchee River basin, Wash.

May 16	Icicle irrigation ditch.	Right side of Icicle Creek.	SW¼ sec. 27, T. 24 N., R. 17 E., at crossing over Snow Creek, 6 miles southwest of Leavenworth.	34.9
15	Icicle Creek.....	Wenatchee River...	SE¼ sec. 23, T. 24 N., R. 17 E., at fish hatchery, 2 miles south of Leavenworth.	1,720

## Yakima River basin, Wash.

Oct. 13	Kittitas Canal....	Right side of Yakima River.	Sec. 11, T. 20 N., R. 13 E., at headworks near Easton.	248
Apr. 21	....do.....	....do.....	....do.....	350
June 4	....do.....	....do.....	....do.....	945
Aug. 21	....do.....	....do.....	....do.....	1,180
Apr. 13	Rozza Canal.....	....do.....	NE¼ sec. 19, T. 12 N., R. 20 E., 7½ miles southwest of Yakima.	550
Aug. 22	....do.....	....do.....	....do.....	692
Apr. 16	City of Yakima municipal diversion	Left side of Naches River.	NW¼ sec. 34, T. 15 N., R. 16 E., below pipe outlet at headworks, 6 miles west of Naches.	8.99
Oct. 20	Seilah Valley Canal	....do.....	NW¼ sec. 26, T. 15 N., R. 16 E., above all diversions near Naches.	47.3
Apr. 16	....do.....	....do.....	....do.....	95.5
June 2	....do.....	....do.....	....do.....	122
Aug. 24	....do.....	....do.....	....do.....	131
Apr. 17	Tieton Canal.....	Right side of Tieton River.	Sec. 30, T. 14 N., R. 15 E., at former gaging station near Naches.	55.0
June 6	....do.....	....do.....	....do.....	265
Aug. 23	....do.....	....do.....	....do.....	337
Oct. 12	Wapatox power canal.	Left side of Naches River.	NW¼ sec. 36, T. 15 N., R. 16 E., at headworks near Naches.	520
Dec. 4	....do.....	....do.....	....do.....	506
Feb. 5	....do.....	....do.....	....do.....	447
Apr. 16	....do.....	....do.....	....do.....	519
June 2	....do.....	....do.....	....do.....	530
Aug. 22	....do.....	....do.....	....do.....	530
Apr. 12	Union Gap Canal...	Left side of Yakima River.	NE¼ sec. 17, T. 12 N., R. 19 E., at entrance to Union Gap, 1 mile south of town of Union Gap.	29.2
Aug. 16	....do.....	....do.....	....do.....	36.2
Apr. 13	New Reservation Canal.	Right side of Yakima River.	NW¼ sec. 20, T. 12 N., R. 19 E., at gaging station near Parker.	896



Miscellaneous discharge measurements in Pacific slope basins in Washington and upper Columbia River basin during water year October 1950 to September 1951--Continued

## Yakima River basin, Wash.--Continued

Date	Stream	Tributary to or diverting from--	Locality	Discharge (cfs)
June 1	New Reservation Canal.	Right side of Yakima River.	NW $\frac{1}{4}$ sec. 20, T. 12 N., R. 19 E., at gaging station near Parker.	1,970
Aug. 16	....do.....	....do.....	....do.....	1,600
Dec. 5	Old Reservation Canal.	....do.....	SW $\frac{1}{4}$ sec. 28, T. 12 N., R. 19 E., at gaging station near Parker.	7.27
Feb. 2	....do.....	....do.....	....do.....	36.8
Apr. 13	....do.....	....do.....	....do.....	46.0
June 1	....do.....	....do.....	....do.....	80.7
Aug. 16	....do.....	....do.....	....do.....	58.3
Oct. 20	Sunnyside Canal...	Left side of Yakima River.	SW $\frac{1}{4}$ sec. 27, T. 12 N., R. 19 E., at gaging station near Parker.	46.6
Apr. 12	....do.....	....do.....	....do.....	927
May 31	....do.....	....do.....	....do.....	1,300
Aug. 22	....do.....	....do.....	....do.....	1,310

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