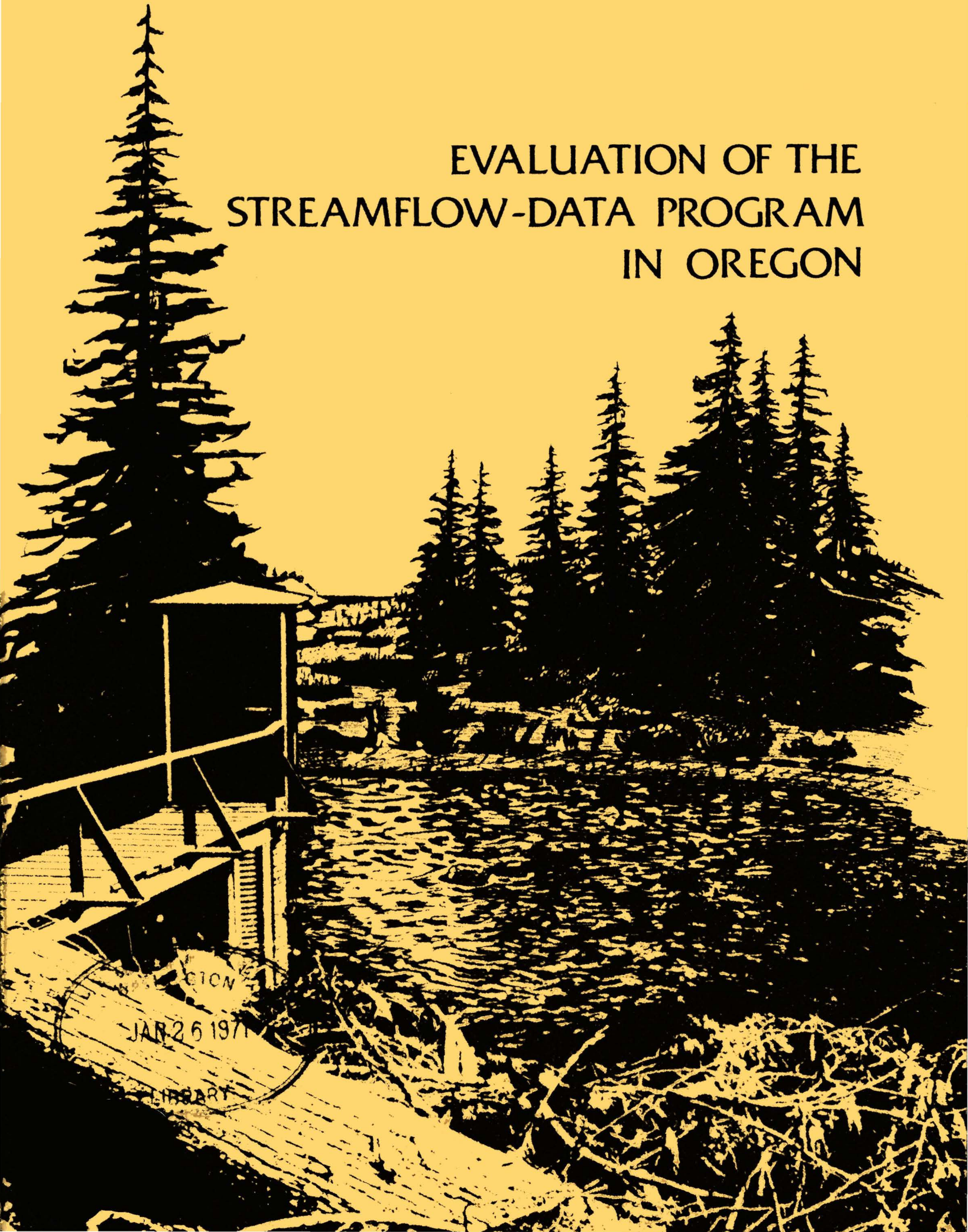
EVALUATION OF THE STREAMFLOW-DATA PROGRAM IN OREGON



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division

EVALUATION OF THE STREAMFLOW-DATA PROGRAM IN OREGON

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By David J. Lystrom

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ABSTRACT

The streamflow data available for Oregon are evaluated and guidelines for planning future programs are provided. Basic steps in the evaluation procedure are (1) definition of the long-term goals of the streamflow-data program in quantitative form, (2) examination and analysis of all available data to determine which goals have been achieved, and (3) consideration of alternative programs and techniques to meet remaining objectives. It was found that only a few of the goals could be met by generalization of the data now available for gaged basins. Therefore, recommendations are made to improve the generalization methods, and deficiencies in the present network are pointed out. Based on the needs described in this study, a streamflow-data program is proposed for the future.

INTRODUCTION

The stream-gaging program of the U.S. Geological Survey in Oregon has evolved through the years as Federal and State interests in surface-water resources have increased and as funds have become available for operating the station network.

Many State, local, and private organizations have cooperated with the Geological Survey in the stream-gaging programs, as have many bureaus of the U.S. Government. Details of the cooperation have been acknowledged in annual reports and water-supply papers of the Geological Survey.

As early as 1858, records of maximum river stages were recorded on the Columbia River, and in 1878 the U.S. Army Corps of Engineers began observations of daily stages at a gage on the Columbia River upstream from The Dalles, Oreg. U.S. Weather Bureau records of Willamette River stage date back prior to 1880. During the decade beginning in 1890, the Geological Survey established gaging stations on the Malheur, Owyhee, Umatilla, Deschutes, and Hood Rivers. Many of the records collected prior to the turn of the century were of short duration, usually 1 to 2 years and during summer months and ice-free periods only.

Expansion of the stream-gaging program has generally occurred in surges rather than at a uniform rate. The years 1902-3 mark the start of one such era of expansion to meet the needs of the newly created U.S. Reclamation Service for investigation and design of irrigation projects. Since 1905, the State of Oregon has participated in cooperative programs with the Geological Survey and has provided one of the principal sources of funds to expand and maintain the streamflow-data network. By 1910, 143 stream-gaging stations were in operation in Oregon. In 1928 the Corps of Engineers supported a considerable expansion of streamflow data collection under a program authorized by the Rivers and Harbors Act of 1927. In following years, the vast development of hydroelectric power fostered constant increases in the program. Increased water utilization during and after World War II created new water problems and effected a marked increase in collection of basic records. By 1950 the data-collection network totaled 319 active gaging stations. Since 1950 a number of stations have been added and others dropped, so that the present (1970) network includes 307 gaging stations.

Since 1951, the Geological Survey has operated a network of crest-stage-gage stations to determine peak discharges from small drainage basins, expanding from 23 stations initially to 146 at present. Through 1970, peak-discharge data were collected at a total of 210 sites in Oregon.

Increasing cost of operation, restriction of funds and manpower, and the need for a greater variety of hydrologic information made it imperative to systematically evaluate the streamflow-data program to efficiently apply the funds and manpower available.

The concepts and procedures used in this study are presented in detail by Carter and Benson (1969) and are summarized only briefly in this report. The basic steps are (1) definition of the long-term objectives of the streamflow-data program in quantitative form, (2) examination and analysis of all available data to determine which objectives have already been met, (3) consideration of alternative means of meeting the remaining objectives, and (4) to propose a program of data collection and analysis to meet the remaining objectives.

This report was prepared in the Oregon District of the Geological Survey, Water Resources Division, under the general supervision of Stanley F. Kapustka, district chief. The author gratefully acknowledges the assistance provided by members of the Oregon District staff and by H. F. Matthai, Geological Survey, Menlo Park, Calif.

HYDROLOGY OF THE STATE

Oregon has a large supply of surface water, but it is unevenly distributed with respect to location and, to a lesser degree, time. Floods may occur every few years in the humid western part of the State and, although less frequent, floods are not unknown in the semiarid eastern region. Water shortages common to eastern Oregon can also occur in the humid western section, especially during the typically dry summers.

Some streams that lie almost side by side differ markedly in their patterns of flow. Most of this diversity results from differences in topography, climate, and geology.

The several mountain ranges in Oregon exert a great influence on surface-water hydrology. The Cascade Range, spanning the State about 90 miles inland from the Pacific Ocean, lies parallel to the coastline and acts as a natural barrier which the marine airmasses and the prevailing westerly winds must cross. The orographic effect of the Cascade and Coast Ranges causes a significant Statewide variation in annual rainfall. Precipitation ranges from 200 inches in places in the Coast Range to less than 40 inches on the Willamette Valley floor in western Oregon and to less than 10 inches in parts of north-central and southeastern Oregon. Much of the precipitation falls as snow at altitudes above 3,500 feet, the approximate mean altitude of the State.

In general, Oregon has a rather mild, winter-rain type climate. "The climate of the western third of Oregon is characterized by moderate temperatures, wet winters, and dry summers; about 78 percent of the annual precipitation occurs in the period October to March. The eastern two-thirds of the State has greater extremes of temperature but somewhat less seasonal variation in precipitation; about 65 percent of the precipitation occurs in the period October to March." (Phillips, 1969).

Many of the geologic features of Oregon are of volcanic origin, but parts of the State have marine and continental sediments, metamorphic rocks, or unconsolidated deposits laid down by water, wind, or ice. The diverse rocks produce geologically controlled variations in surface-water hydrology, particularly storm runoff and low flow. For instance, the broad areas of pumice and young lava flows in the southern part of the Cascade Range have poorly developed stream systems because the highly permeable rocks at the surface readily absorb or retain rainfall. As a result, peak flows from rainstorm and snowmelt runoff are low, but the discharge of ground water through springs and seeps produces relatively large and sustained low flows.

In contrast, altered volcanic and marine rocks in parts of the Coast Range and some of the older rocks in the Klamath and Blue Mountains have low permeabilities that allow little infiltration of precipitation. Streams draining such areas are flashy. They respond rapidly to intense precipitation, but their flows may recede to nearly zero during the drier months.

Between these two extremes are all degrees of gradation. In places, surficial deposits allow a sizable amount of infiltration from moderate rates of precipitation, but reject a large part of precipitation from intense storms. Low flows from such areas generally are moderate; however, peak flows may be flashy.

In some areas, geologic structure controls the location and hydrologic characteristics of springs. Spring-fed streams may have relatively large low flows, whereas streams draining adjacent areas of comparable size may be dry during low-flow periods.

CONCEPTS USED IN THIS STUDY

The principal concept of this study is that streamflow information may be needed at any point on any stream in Oregon and that the program must be designed to accommodate this need. This information can be provided by a combination of data collection and hydrologic studies that generalize the information obtained at gaging sites.

Another important concept is that the goals of the program, including accuracy goals, should be specifically identified. This permits evaluation of existing data to determine which goals have been accomplished and how the program should be modified to accomplish the remaining goals.

The procedures used in this study are those that have been adopted for standard use throughout the U.S. Geological Survey and are presented with reference to the general framework shown in table 1. Streamflow data are classified into four types:

1. Data for current use.

2. Data for planning and design.

3. Data to define long-term trends.

4. Data on the stream environment.

For the second type of data, streams are classified as natural or regulated, and each classification is further subdivided into principal or minor streams, with the separation of the two occurring at a drainage area of 500 square miles. The criteria for each of the four types of data and the methods of obtaining the data are described in the following sections.

Data for Current Use

Streamflow data for current use are needed at many sites for the management of water, the assessment of current water availability, the management of water quality, the forecast of water hazards, and the surveillance necessary to comply with legal requirements. This classification represents the need for information on the actual flow at any moment or during any specific day, week, month, or year. The user's interest is in flows as they occur, as well as in the historical record.

Data for current use are obtained by operating gaging stations to meet the specific requirements of the water-management systems. Current-purpose-data stations are considered separately in this study because (1) justification can be related to specific needs, (2) the data may have little or no transfer value in a hydrologic sense, and (3) the locations of the stations, the accuracy requirements, and the period of operation are specified by the data user, who usually provides the financing.

Table 1.--Framework for design of data-collection program

Type of data	Current use	Planning and Design				Long-term trends	Stream environment
		Natural Flow		Regulated Flow			
		Minor streams	Principal streams	Minor streams	Principal streams		
Goals	To provide current data on streamflow needed for day-by-day decisions on water management as required.	To provide information on statistical characteristics of flow at any site on any stream to the specified accuracy.				To provide a long-term data base of homogeneous records on natural-flow streams.	To describe the hydrologic environment of stream channels and drainage basins.
Drainage area limits	Full range	Less than 500* sq mi.	Greater than 500* sq mi.	Less than 500* sq mi.	Greater than 500* sq mi.	Full range	Full range
Accuracy goal	As required	Equivalent to 10 years of record.	Equivalent to 25 years of record.	Equivalent to 10 years of record.	Equivalent to 25 years of record.	Highest obtainable	As required
Approach	Operate gaging stations as required to provide specific information needed.	Relate flow characteristics to drainage basin characteristics using data for gaged basins.	Operate gaging stations to obtain 25 years of record (or the equivalent by correlation) at a network of points on principal streams; interpolate between points.	Develop generalized relations that account for the effect of storage, diversion or regulation on natural flow characteristics.	Utilize analytical model of stream system with observed data as input to compute homogeneous records for both natural flow conditions and present conditions of development.	Operate a number of carefully selected gaging stations indefinitely.	Observe and publish information on stream environment.
Evaluate available data	Identify stations where data is used currently and code the specific use of data.	Develop relationship for each flow characteristic and compare standard error with accuracy goal. Evaluate sample.	Lay out network of points on principal streams and compare data available at these points with goal.	Appraise type of regulation, data available, and areas where relationships are needed.	Identify stream systems that should be studied using model approach and determine data requirements.	Select two stations in each WRC subregion to operate indefinitely for this purpose.	Evalualte information available in relation to goals.
Design future program		Identify goals that have not been attained. Consider alternate means of attaining goals. Identify elements of future program.					

*May be varied with terrain and hydrologic conditions.

This part of the program is not subject to design, but changes in response to specific needs for data in water management.

Data for Planning and Design

Designers and planners of water-related facilities increasingly use the statistical characteristics of streamflow rather than flow at specific times. The probability that the historical sequence of flow observed at a given site will occur again is remote. Predictions of future flows needed in design and planning must consider all probable flows and sequences of flow. This information enables prediction of future streamflows, not in terms of specific events, but in terms of probability of occurrence over a span of years. For example, many highway bridges are designed on the basis of the flood that will be equaled or exceeded once in 50 years on the average; storage reservoirs can be designed on the basis of the probability of deficiency of storage for a given draft rate; the water available for irrigation, dilution of waste, or other purposes may be stated in terms of the mean flow or probability of flow magnitudes for periods of a year, season, month, week, or day.

A long record of streamflow is the best basis for defining statistical characteristics. Although it is not feasible to collect a long, continuous record at every site where data are needed, a number of such stations are required to provide information that can be transferred to ungaged sites or to sites where a small amount of streamflow data is available.

Natural-Flow Streams

For natural streams, streamflow information may be transferred by regression methods which relate flow characteristics to basin characteristics such as drainage area, topography, and climate. Other transfer methods include relating a short record to a longer one, or interpolating between gaged points on a stream channel.

Regulated-Flow Streams

The natural-flow regimen of many streams is altered by construction of storage reservoirs or by diversion of water for consumptive use. Data collected at gaging stations in a regulated-stream system can be used only to define the flow at these sites and do not provide any basis for transfer of regulated-flow data to other streams. Consequently, the methods of regression, correlation, and interpolation cannot be applied.

For regulated streams, a systems approach is necessary to provide meaningful information on the statistical characteristics of flow. This approach requires an analytical model and detailed information on the water-management scheme that has been imposed on the stream. This information includes stage-capacity curves for reservoirs, operating-rule curves for release of water, losses due to evaporation and seepage, records of diversion, and the channel geometry of the stream. Such models are usually simple in concept and generally consist of water-budget and flow-storage equations. However, in many instances the use of the digital computer is required for complex computations or to handle large volumes of data.

Information on flow at some point or points on a stream is also necessary to develop and verify an analytical model. Fortunately, many of the stations operated for current-use purposes are on regulated streams and the records provide a base for the systems study.

Accuracy Goals

In using past hydrologic experience to appraise the probability of future occurrences, some error must be tolerated. Natural streamflow is not truly random, but the great variation in time and space makes the assumption that natural streamflow is random a reasonable one. Therefore, many characteristics of natural streamflow can be interpreted in terms of statistical distributions. Estimates of the magnitude and frequency of occurrence of events of interest to the planner can then be studied, and the probable accuracy of the estimates can be appraised.

The principal measure of the accuracy with which a particular streamflow characteristic can be estimated is the "standard error of estimate," expressed in this report as "standard error," a percentage of the average value of the characteristic. The standard error is the estimated limit above and below the average within which about 67 percent (that is, two of three) of future values of the characteristic are expected to fall, if all assumptions as to normality and randomness are sound. Conversely, there is one chance in three that any given future value of a characteristic will differ from the estimated value by more than one standard error.

In general, the longer the record, the more reliable the estimates of probable future occurrences. However, even with a long record, 50 to 100 years or more, it is not possible to determine flow characteristics with great precision. The accuracy goals proposed in this report are based on the accuracy that can be obtained from a selected number of years of record. The goals are expressed in terms of the standard error and are computed from a theoretical relation of standard error to variability index and number of years of record (Hardison, 1969). Because of noticeable differences in streamflow variability between eastern and western Oregon, accuracy goals are considered separately for the two regions. The standard error of streamflow characteristics decreases with years of available record, but at a decreasing rate (fig. 1). The incremental economic value of additional years of record beyond a reasonable limit in planning and design of projects is under continuing study, but usable guidelines are not presently available.

At sites on natural-flow streams where streamflow records are not available, the desired streamflow characteristics may be estimated by means of the relation between the streamflow parameter and the characteristics of the drainage basin. This relation is accomplished by multiple-regression analysis, a statistical method of handling sample data that can relate a streamflow characteristic to the topographic and climatic characteristics that affect streamflow. This analysis produces a regression equation that can be used to compute a flow characteristic

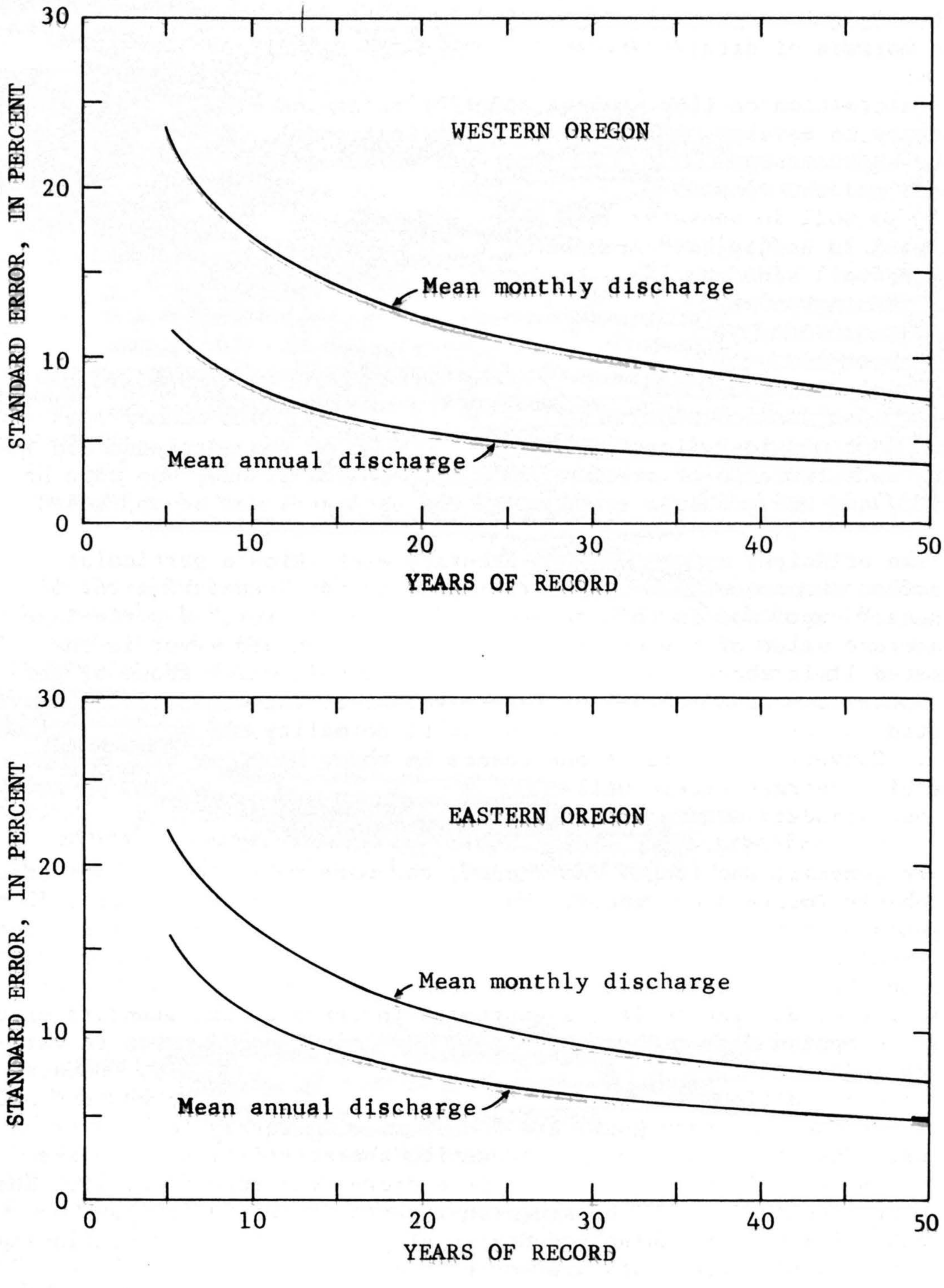

Figure 1.--Curves showing relation of standard error to length of record.

at any point on natural streams in a homogeneous region. The standard error of a regression equation provides a measure of the accuracy of an estimate made from the equation for an ungaged site. That error may be compared with the accuracy goal associated with the same characteristic to determine whether the accuracy objective has been met.

Data to Define Long-Term Trends

A long, continuing series of consistent observations of streamflow is needed (1) to define long-term hydrologic trends and (2) to provide a reference or comparative base for noting changes in the flow regime of streams because of increased regulation. Past records are used to estimate future streamflow characteristics, and it is assumed that the observed record is a representative sample of the long-term flows. To affirm this assumption, or to better define the ways in which flow characteristics change with time, selected gaging stations on natural streams should be operated indefinitely.

Streamflow stations to define long-term trends should be selected in basins that have undergone no significant manmade changes and that are expected to remain unchanged in the future. The stations should be well distributed areally and should gage basins having different physical characteristics.

Data on Stream Environment

Stream discharge and water use are intimately related to the environment in which the water occurs. Environmental data include a wide variety of water-related information other than stream discharge. These data are useful in hydrologic studies and in planning, designing, and operating systems for controlling water or pollution. For example, (1) data on the geometry of stream channels are useful in appraising the use of a stream for recreation or in determining its capacity to assimilate waste; (2) data on profiles of flood elevations are used in determining areas subject to inundation by floods, and (3) data on aquifer characteristics are valuable in hydrologic studies of the variability of low flow and in planning the conjunctive use of surface water and ground water.

GOALS OF THE OREGON STREAMFLOW-DATA PROGRAM

The objective of the Oregon streamflow-data program is to provide the type of information needed for any point on any stream. Within this general objective, specific goals are set for each of the four types of data that represent the particular information needed.

Data for Current Use

The program goal for this type of data is to provide the particular information needed at specific sites for current use. Because demands change frequently in response to changing conditions, this part of the program is not subject to design in advance. Accuracy goals at a given site depend on the requirements of the data user and can be met by intensive observation or sophisticated instrumentation as required.

Data for Planning and Design

The goal for this type of data is to define, with the specified accuracy, the statistical flow characteristics for all Oregon streams. This goal includes all streams with natural flow as well as those streams affected by regulation or diversion.

The accuracy goals in this report are based on the accuracy obtained from 10 years of record for minor streams (drainage areas of less than 500 square miles) and to that obtained from 25 years of record for principal streams (drainage areas of more than 500 square miles). The most costly developments are usually on large streams; therefore, the size of the drainage area may be used to justify a higher accuracy goal.

The accuracy goals equivalent to 10 and 25 years of record for selected streamflow characteristics in Oregon were calculated using methods described by Hardison (1969) and are tabulated in table 2. The western and eastern regions are divided by the Cascade Range.

Table 2.--Accuracy of statistical characteristics of streamflow in Oregon

Streamflow characteristic	Standard error, in percent, for indicated length of record			
	Western Oregon		Eastern Oregon	
	10 years	25 years	10 years	25 years
Mean annual flow	8*	5*	11	7*
Standard deviation of annual flow	22	14	22	14
Mean monthly flow (average)	17	11	16	10
Standard deviation of monthly flow	22	14	22	14
2-year flood	15	10	18	12
50-year flood	28	16	32	20
2-year 7-day high flow	10	6*	14	9*
50-year 7-day high flow	24	15	26	16
2-year 7-day low flow	10	6*	10	6*
20-year 7-day low flow	15	10	15	10

* A minimum of 10 percent is used as the accuracy goal for defining these characteristics by regression methods.

The standard errors in table 2, except those less than 10 percent, are considered to be reasonable accuracy goals for Oregon. A minimum accuracy goal of 10 percent is recommended because (1) many of the streamflow records used in this evaluation to define natural-flow characteristics were affected by regulation or diversions by as much as 10 percent, (2) the lowest standard errors in table 2 approach the precision at which streamflow is physically measured, and (3) 10 percent is a realistic goal for accuracy required by most users.

Data to Define Long-Term Trends

The goal for collection of data to define long-term trends is to operate indefinitely a small network of gaging stations on streams expected to be relatively free from manmade changes. One or two stations should be located in each major drainage in the State, and the stations should be on streams that have differing physical characteristics.

Data on Stream Environment

Environmental data describe the flow and the stream channel in terms that will be valuable in guarding against water hazards and in planning the use of a stream for any purpose, such as recreation, waste disposal, and conjunctive surface water-ground water supply. The long-range goals for this type of data in Oregon are given below.

1. Hydrometric surveys of stream-aquifer systems.

2. Time-of-travel studies of solutes in stream channels.

3. Definition of flood profiles along stream channels.

4. Identification of inundation limits for floods of different frequencies.

5. Reconnaissance surveys of streamflow and stream-channel parameters that are related to the use of the stream for recreation. These parameters may include velocities, depths, bank vegetation, bed material, water temperature, water quality, and accessibility to the stream.

6. Research studies of the effect on streamflow of manmade changes in the environment.

EVALUATION OF EXISTING DATA IN OREGON

In this evaluation, all available data are considered and analyzed in relation to program objectives. A separate evaluation is made for each of the four types of data.

Data for Current Use

About 80 percent of the gaging stations in Oregon are operated to provide current-purpose data. It is assumed that the need for this type of data is being met and that this part of the program can be modified as requirements change. A summary of the 257 stations operated to provide data for current purposes is listed below. (Many stations provide data for more than one use.)

	Use of data	Number of stations
1.	Assessment	15
2.	Operation or management	177
3.	Forecasting	71
4.	Waste disposal	0
5.	Water quality (chemical, sediment, and biological)	29
6.	Compact or legal	30
7.	Research or special studies	36

Gaging stations that are operated to satisfy the need for current-purpose data are listed in table A-1 and are coded according to the specific use of data.

Summaries of daily discharges for selected stations in the coastal and Columbia River basins are reported on a weekly and monthly basis by the Northwest Water Resources Data Center. The summaries are designed for general use and do not provide real-time data.

Data for Planning and Design

The statistical characteristics of streamflow can be defined by gaging, generalization, systems studies, or by any combination of the three. The following evaluation of this type of data follows the framework shown in table 1.

Evaluation of Natural-Flow Streams

The purpose of evaluating natural-flow stream data is to determine how accurately selected statistical characteristics of streamflow can be defined by regionalization of the data now available.

The most effective method of regionalization presently known is the technique of multiple regression which defines streamflow characteristics in terms of the basin and climatic characteristics that cause variation in streamflow from one location to another (Benson, 1962, 1964).

Once the regression equations and their constants are defined, streamflow characteristics for a specific site in a given basin can be approximated by substituting the appropriate values of the hydrologic variables in the formulas.

The 304 streamflow records used in the regression analysis are those having 10 or more years of record (up to and including 1967 water year) of mostly unregulated flow, or flow that can be adjusted to natural conditions. Both minor and principal streams are included. Records were not selected from or adjusted to a base period. At many stations, regulation or diversion affected some characteristics, such as low flows, but insignificantly affected peaks and mean annual flow. In general, only those characteristics estimated to be affected by less than 10 percent by regulation or diversion were used in the analysis. Peak- and high-flow characteristics were not computed for recurrence intervals greater than twice the length of record.

Streamflow characteristics.--Streamflow characteristics analyzed in this study represent the full range of flow and are defined for gaged basins as follows:

1. Flood-peak characteristics are represented by discharges at recurrence intervals of 2, 5, 10, 25, and 50 years were used in this analysis (Q_2, Q_5, Q_{10}, Q_{25}, and Q_{50}). These were determined from the annual flood-frequency curve computed according to the Log-Pearson Type III method described by the Water Resources Council (1967).

2. Mean-flow characteristics are described by the mean of the annual means, Q_a, and by the mean of record for each calendar month, q_n, where the subscript "n" refers to the numerical order of the month beginning with January as 1.

3. Flow-variability characteristics are represented by the standard deviations of the annual and monthly means. The symbols used are, respectively, SD_a and SD_n, where the subscript "n" refers to the numerical order of months with January as 1.

4. Low-flow characteristics are the annual minimum 7-day mean flows at 2-, 10-, and 20-year recurrence intervals ($M_{7,2}$, $M_{7,10}$, and $M_{7,20}$). These were computed from low-flow frequency curves using the Log-Pearson Type III method.

5. Flood-volume characteristics are represented by the annual maximum 7-day mean flow at 2-, 10-, and 50-year recurrence intervals ($V_{7,2}$, $V_{7,10}$, and $V_{7,50}$). These were determined from high-flow frequency curves using the Log-Pearson Type III method.

Drainage-basin characteristics.--Drainage-basin characteristics defined for this study are:

1. Drainage area, A, in square miles, as shown in the latest Geological Survey streamflow-data reports.

2. Main-channel slope, S, in feet per mile, determined from elevations at points 10 and 85 percent of the distance along the channel from the gaging station to the divide. This index was described and used by Benson (1962, 1964).

3. Main-channel length, L, in miles, from the gaging station to the basin divide, as measured in accordance with guidelines given by the Water Resources Council (1968) or taken in part from the various River Mile Index publications prepared by the Hydrology and Hydraulics Committee of the Pacific Northwest River Basins Commission (1963-68).

4. Area of lakes and ponds, S_t, expressed as a percentage of the drainage area plus 1 percent, determined from the most recent quadrangle maps available.

5. Mean basin elevation, E, in feet above mean sea level, determined from quadrangle map of a practical scale by laying a grid over the map, recording the elevation at each grid intersection, and averaging those elevations. The grid spacing was selected to give at least 25 intersections within the basin boundary.

6. Forest cover, F, expressed as the percentage of the drainage area covered by forests plus 1 percent, as shown on the most recent quadrangle maps available.

7. Mean annual precipitation, P, in inches, determined from an isohyetal map prepared by the U.S. Weather Bureau River Forecast Center, Portland, Oreg., using adjusted climatological data (1930-57) and values derived by correlation with physiographic factors.

8. Precipitation intensity, $I_{24,2}$, defined as the maximum 24-hour rainfall having a recurrence interval of 2 years (24-hour 2-year rainfall), expressed in inches. These values were determined from U.S. Weather Bureau publication (1961).

9. Temperature index, T_1, is defined as the mean minimum January temperature in ^{o}F. This parameter was determined from a U.S. Weather Bureau publication (Sternes, 1960).

10. The values of soils index, S_i, were determined from a map compiled from computed values of soils indexes according to procedures described by the Soil Conservation Service (1959, 1964). Data for these computations were derived from soils-association and land-use maps included in the Columbia North-Pacific Framework Study (unpub. manuscript). Data were also furnished by the Soil Conservation Service staff, State office, Portland, Oreg.

Values of the above basin characteristics for each of the 304 gaging stations used in the regression analysis are listed in table A-2.

Regression analysis.--Streamflow characteristics were related to basin and climatic characteristics in equations developed by using multiple-regression techniques. The equation has the form

$$Y = a A^b S^c P^d \ldots$$

where Y is a streamflow characteristic and A, S, P, etc., are basin characteristics. The constants, a, b, c, d, etc., are determined by standard multiple-regression procedures.

All the basin characteristics listed in table A-2, except main-channel length were used initially in each regression. Length was eliminated because it showed a high degree of correlation with drainage area. A high-speed digital computer was used to calculate the regression equation, the standard error of estimate, and the significance of each basin parameter. Automatically, then, the computer repeated the calculations, omitting the least significant basin parameter in each calculation until only the most significant parameter remained. After all the relations for a given streamflow characteristic had been computed, the entire computation process was repeated relating another streamflow characteristic to the same set of basin characteristics.

The first regression equations were computed on a Statewide basis for four selected characteristics (Q_a, Q_{10}, $M_{7,10}$, and $V_{7,10}$) which were chosen as representative characteristics. The residuals, defined as the percentage deviation of the simulated characteristic from the observed characteristic at each station were computed and plotted on a map of Oregon. The magnitude and sign of the residuals were not random over the State but defined the two major regions--eastern and western Oregon, divided by the Cascade Range. The two regions have distinct differences in precipitation and geology. The regression equations subsequently developed separately for the two regions revealed improved standard errors of estimate. In addition, the residuals were more randomly distributed than was indicated by the Statewide regression. An attempt was made to divide the western region into northern and southern regions; however, the results were inconclusive.

Results of the regression computations for the 37 streamflow characteristics are shown in tables A-3 and A-4. The basin characteristics specified for each equation are only those found to be statistically significant at the 95 percent level. The standard error of estimate for each equation is also given. For example, the equation for the mean annual flow in the western region is:

$$Q_a = 0.0187 A^{1.004} P^{1.231}$$

and the standard error of estimate is 20 percent.

A comparison of the standard errors of the regression equations in table A-3 with the accuracy goals in table 2 indicates that none of the goals equivalent to 25 years of record was met. A few of the goals equivalent to 10 years of record were achieved for the western region only (i.e., SD_3, $V_{7,50}$, and q_3).

Many of the standard errors of the regression equations exceed the accuracy goals because the basin characteristics used did not completely describe the wide variations of streamflow in Oregon. Parameters are needed that will accurately define the effect of geology and snow accumulation on the characteristics of streamflow. It is evident that mean monthly precipitation data and more detailed precipitation-intensity data are also needed. These data are not available, and their development would require research effort beyond the scope of this study.

Minor streams.--The regression equations, except those for low flows and monthly means for low-flow periods, are usable even though the accuracy goals have not been met. If the equations are used, they should be qualified with respect to their individual standard errors.

The equations should not be applied to conditions outside the range of conditions from which they were developed.

Drainage area and mean annual precipitation were the most significant and prevalent parameters used in the equations. Figures 2 and 3 show the range of drainage area and precipitation for gaged basins used in the regression analysis. Drainage-area size is an obvious limitation with few continuous-record stations for drainage areas of less than 20 square miles in either the eastern or western region of Oregon. Figures 2 and 3 also show little definition of streamflow from areas with precipitation greater than 120 inches in western Oregon and greater than 50 inches in eastern Oregon. Areas with precipitation greater than these amounts are less than 2 percent of the total area of the State. Peak discharges for small drainages are inadequately defined for eastern Oregon and also in areas above 2,000 feet elevation in western Oregon.

It is apparent, therefore, that additional stream-gaging stations will be needed to sample a more complete range of hydrologic conditions than has been sampled previously.

The characteristics of low flows and mean monthly flows during low-flow months cannot be estimated accurately by regression methods. A more applicable method requires a series of base-flow measurements that are correlated with concurrent flows at a suitable index station. An index station should be on a perennial stream representing natural-flow conditions. There should be at least one such station with a drainage area of less than 500 square miles in each geologic region. About 20 years of record is considered adequate to define low-flow characteristics at index stations. Operation of the index station beyond 20 years is not required because discharge measurements at the index station and the ungaged site can be made at the same time.

Principal streams.--The accuracy goals for principal streams cannot be met by the regression equations. Because of the importance of data on principal streams, the goals can best be met by operating gaging stations at selected points for a minimum of 25 years. Flow characteristics can be interpolated between gaging stations.

Under the criteria established, an adequate principal-stream network should include sites on the most upstream segment of streams with drainage areas of about 500 square miles and proceeding downstream to sites where the drainage area is approximately double that of the upstream site. To meet this criteria, stations will be needed in addition to those in the current network.

Evaluation of Regulated-Stream Systems

The goals for regulated streams are more difficult to attain than for natural-flow streams because the technique of regionalization does not apply, the characteristics are not necessarily stationary in time, and a meaningful correlation seldom exists between flows at two sites if at least one of the flows is regulated. A systems approach may be used to define the characteristics of streamflow under different patterns of regulation. The concepts used in systems studies of regulated streams are briefly described in the "Concepts" section of this report.

Systems studies for all regulated streams in Oregon would require a major effort. Therefore, the present evaluation is limited to identifying (1) data available to define regulated streamflow in Oregon, and (2) stream systems that should be studied.

Streamflow data obtained before and after reservoir construction and availability of reservoir-content records are shown in table A-5.

Because of the major effort required for systems studies of all regulated minor streams, it is assumed that specific needs and local economics will dictate which minor-streams studies will be needed. The more important streams that should be studied in the near future are the regulated segments of principal streams. The regulated principal stream systems are as follows:

1. Klamath River
2. Owyhee River
3. Malheur River
4. Burnt River
5. Powder River
6. Deschutes River
7. Willamette River

The Columbia and Snake Rivers are major interstate streams with complex regulation patterns. The effects of regulation on these streams are under continuing study by the U.S. Army Corps of Engineers.

Data to Define Long-Term Trends

At present one streamflow station, 13-3315 Minam River at Minam, is designated as a long-term-trend or benchmark station for indefinite operation.

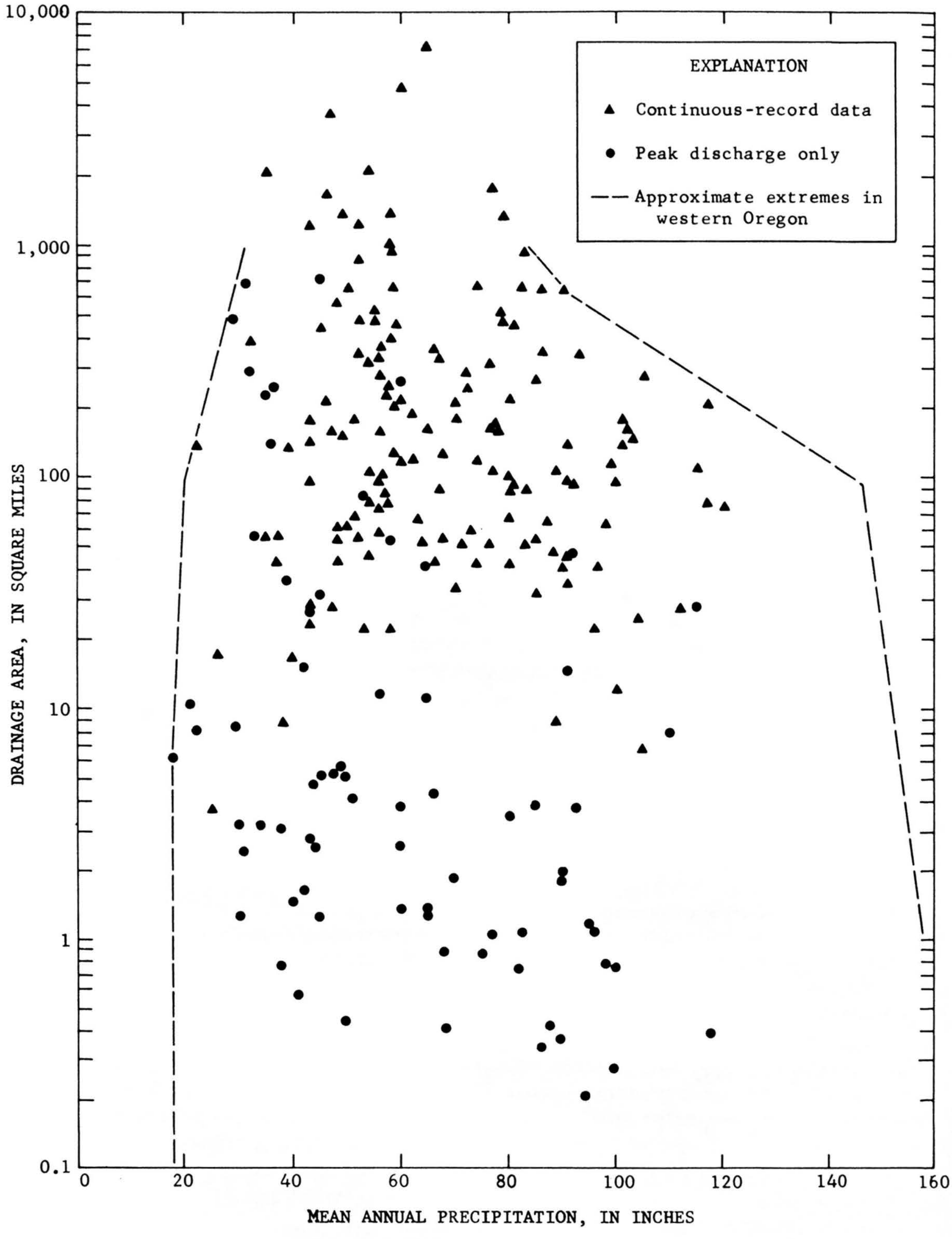

Figure 2.--Combinations of mean annual precipitation and drainage area for western Oregon.

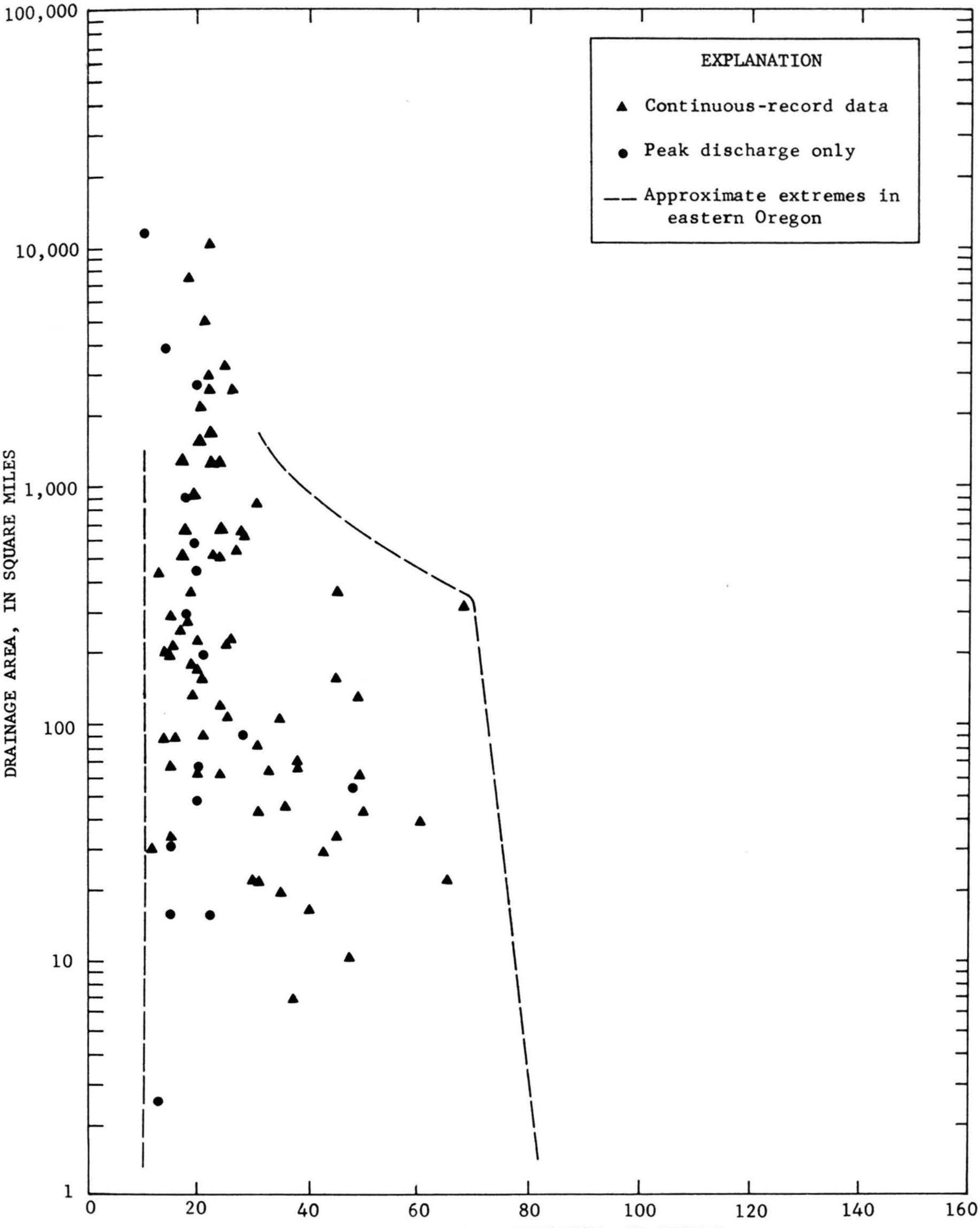

Figure 3.--Combinations of mean annual precipitation and drainage area for eastern Oregon.

Because of the extreme variations in climatic, topographic, and geologic conditions within the State, at least one long-term-trend station should be designated in each major stream basin.

Data on Stream Environment

Many environmental factors were determined for the drainage areas of the 304 gaging stations used in the present study and are tabulated in table A-2.

Flood-prone areas have been outlined on 50 quadrangle maps. Detailed studies of flood profiles and flood plains are available for a number of streams in Oregon (U.S. Geol. Survey, U.S. Corps of Engineers, and others). Channel surveys have been made at many sites in connection with indirect determinations of peak flows for large floods.

Time of travel of solutes has been defined for the main stem and principal tributaries of the Willamette, John Day, and Umpqua River systems as well as for specific reaches of the Columbia River.

Studies of the effects of manmade changes on the stream environment are generally related to pollution or sedimentation problems. Data collected for these studies are in response to specific needs and are considered under "Data for current use."

THE PROPOSED PROGRAM

The information developed in different segments of this study has been merged to plan a streamflow-information program that will eventually attain as many of the remaining goals as possible within the limits of available funds. For the optimum program, a balance must be maintained between data collection and data analysis. Continuous interaction between the two is needed, not only to gain a better understanding of the hydrologic system, but also to guide future evaluation of the program in meeting ever-changing needs and in adapting to changing technology.

Data Collection

Data for Current Use

The operation of 257 stations identified as current-purpose stations in table A-1 will be continued as long as specific needs dictate. The changing needs will be assessed continuously, and the data-collection network will be modified by discontinuing unneeded stations or by adding the required stations when financing permits. The data requirements for each site will be examined to determine whether a continuous record of discharge is needed or whether measurement of specific-flow characteristics, such as peak flow or instantaneous flow, will suffice.

The acoustic-velocity meter and mathematical-modeling techniques have recently become available for measuring streamflow under variable backwater conditions. These methods are recommended to determine flows in the variable backwater reaches of the streams such as the lower Columbia and Willamette Rivers.

Data for Planning and Design

The objective of providing the necessary streamflow information on any stream in Oregon has been only partially attained. This evaluation has indicated the need for continued operation of certain stations to obtain continuous-record and partial-record data. The need for some additional gaging stations is also apparent.

Flood-peak characteristics at recurrence intervals of 100 years are often estimated for project design. Although the objectives include only the 50-year flood for both minor and principal streams, it would be desirable to collect 50 years of flood-peak data at selected sites to define the 100-year flood. When a continuous-record station is to be discontinued, consideration will be given to continuing the collection of peak-discharge data. Thus, by operating a partial-record station, needed data can be obtained at a low cost.

The requirements needed in the future data-collection program to achieve as many of the remaining goals as possible are proposed in the following sections.

Natural-flow, minor streams.--It is concluded that some method of regionalization is required to define streamflow characteristics for minor streams. Thus, to provide an adequate basis for future regionalization, the data-collection program must sample data from streams representing the full range of characteristics that affect streamflow. About 20 years of record at each station is considered adequate to define streamflow characteristics in Oregon. Stream-gaging stations that provide this type of data are recommended for continuation until 20 years of record are collected. These stations are coded in table A-1 with an "H" in column 6; the parentheses, (H), indicate that 20 years of record are available.

This evaluation has indicated a need for additional gaging stations to define flow characteristics of drainages of less than 20 square miles. Twelve continuous-record stations, not included in this analysis because of insufficient length of record, will provide for most of this need. The following four additional stations are proposed to provide streamflow definition in areas that have little data available.

	Station number	Station name	Previous record (years)	Drainage area (sq mi)
1.	11-	Williamson River above Klamath Marsh-----	--	1/300
2.	14-	Wind Creek near Dayville (tributary to South Fork John Day River)------------	--	1/20
3.	14-	Service Creek near Service Creek (tributary to John Day River)---------------	--	1/3
4.	14-2470	Clatskanie River near Clatskanie---------	5	53

1/ Drainage area is approximate, depending on location.

Because the above streams were chosen primarily to provide areal coverage, substitute sites that may provide data for other purposes can also be considered in the same general areas.

The requirements for low-flow-index stations can generally be met by station data now available and by stations in the proposed network. Should a future study of low-flow characteristics point out a need for additional index stations and base-flow measurements, the network should be adjusted accordingly.

For the purpose of defining 100-year-recurrence flood peaks for minor streams, the following stations should be continued as partial-record stations to collect 50 years of peak flows.

	Station number	Station name
1.	14-0780	Beaver Creek nr Paulina
2.	14-1185	West Fork Hood River nr Dee
3.	14-1340	Salmon River nr Government Camp
4.	14-1465	Salmon Creek nr Oakridge
5.	14-1565	Mosby Creek at mouth, nr Cottage Grove
6.	14-1825	Little North Santiam River nr Mehama
7.	14-1900	Luckiamute River at Pedee
8.	14-2115	Johnson Creek nr Sycamore
9.	14-3715	Grave Creek at Pease Bridge, nr Placer
10.	14-3725	East Fork Illinois River nr Takilma

The need to define flood peaks for small drainage basins is generally being fulfilled by the crest-gage program now in operation. Many of these stations were not used in the regression analysis because they had less than 10 years of record. The general requirement for a crest-gage network is to collect data at sites with an overall density of about one station per 450 square miles. Ten to 15 years of record are required for each station, and 25 years of record are needed at a number of these stations to define the 50-year flood.

About half the crest-gage stations below 2,000 feet elevation in western Oregon were discontinued in 1968 because the average period of record was approximately 15 years. The low-elevation stations retained should be continued in operation for an additional 10 years. All the crest-gage stations established at higher elevation sites in 1965 should be operated for an additional 5 to 10 years, and some of these stations should be selected for collection of 25 years of record. To improve areal and hydrologic coverage, some additional stations are needed in the Coos and Clatsop County vicinities of western Oregon.

The current network in eastern Oregon should be continued for an additional 10 years. To fulfill the general requirements for areal coverage, some additional crest-gage stations will be required in ungaged areas in southeastern Oregon and on the eastern slopes of the Cascade Range.

It is assumed that the additional stations will be established as funds become available. Locations of crest-gage stations in operation and those discontinued are shown on plate 1.

Natural flow, principal streams.--The objectives for principal streams are to be attained by sampling progressively doubled increments of drainage area. The objective of 25 years of record has already been achieved at a number of principal-stream stations in Oregon. However, most of these stations now in operation are required for the collection of current-purpose data.

Additional stations required to meet the objectives are as follows.

	Station number	Station name	Previous record (years)	Drainage area (sq mi)
1.	10-3925	Silvies River near Silvies	2	510
2.	11-4990	Sycan River near Beatty	3	540
3.	13-	Crooked Creek above Rattlesnake Creek, near Burns Junction	--	1/ 800
4.	13-1815	Crooked Creek near Rome	3	1,700
5.	13-	Malheur River below Pine Creek, near Drewsey	--	1/ 500
6.	13-2155	South Fork Malheur River at Riverside	2	630
7.	13-3320	Wallowa River at Minam	8	880
8.	14-0395	South Fork John Day River near Dayville	5	590
9.	14-	North Fork John Day River below Potamus Creek, near Monument	--	1/ 1,100
10.	14-	South Fork Crooked River at the mouth, near Paulina	--	1/ 750
11.	14-	Trout Creek near Willowdale	--	1/ 500
12.	14-0970	Warm Springs River near Warm Springs	6	517

1/ Drainage area is approximate, depending on location.

For the purpose of defining 100-year-recurrence flood peaks on principal streams, the following stations should be continued as partial-record stations to collect peak flows.

	Station number	Station name
1.	13-2920	Imnaha River at Imnaha
2.	13-3325	Grande Ronde River at Rondowa
3.	14-0405	John Day River at Picture Gorge, nr Dayville

Regulated-flow streams.--It is beyond the scope of this report to propose any specific systems analysis; therefore, recommendations for data collection are of a general nature.

The future data program should include provisions to continue the collection of records of inflow, outflow, reservoir contents, diversions, and other pertinent hydrologic data at the major reservoirs in the regulated-stream systems identified in this report. Because of the continual development of the regulated-stream systems, it is recommended that gaging stations defining regulated streamflow not be discontinued unless changes in the regime of regulation are not expected to occur.

Data to Define Long-Term Trends in Streamflow

Minam River at Minam, the only streamflow station operated as a long-term station in the existing network, should be continued in operation indefinitely. As a part of this study, 15 additional stations have been designated from the present network as long-term-trend stations and should be operated indefinitely to meet the needs for this type of data. The additional stations were selected to provide a long-term sample reflecting areal coverage of the State and a variety of climatic and physiographic characteristics. Most of the stations chosen have accumulated a considerable period of record. The 16 stations designated for indefinite operation in Oregon are coded with a "B" in column 1 of table A-1.

Summary of Data Collection

Table A-1 identifies the types of data collected at each station in the current network. According to the criteria used in this report, many stations have sufficient length of record for hydrologic-data purposes; however, continued operation of most of these stations is required to provide current information for other purposes.

Although the gaging-station program is not subject to radical revision, certain modifications are desirable. Deficiencies in the streamflow program have been identified, and specific recommendations for collection of additional data have been made. The proposed streamflow stations are listed in table A-1. The economic advantage of operating partial-record stations has been considered to provide needed peak-flow data at stations where a continuous record is not needed. The locations of gaging stations in the current network and locations of proposed stations are shown in plate 2. Stations no longer needed for the purpose indicated are identified by parentheses in column 6 of table A-1.

Frequent appraisal of the data-collection network is recommended in light of the changing needs for current-purpose data, or when goals for statistical flow characteristics are met.

Data Analysis

The proposed program of data analyses for Oregon streams may be classed in two phases--those based on streamflow data collected to date and those for which additional or specialized data are required.

The streamflow-data network operated through the years supplies the basic data for analysis to provide information needed by designers of water projects and for water management. Analytical studies of this type should be implemented when sufficient data become available and should be updated periodically to include recent streamflow data. The analysis by regression techniques presented in this report will provide a basis for designing future regionalization studies; other forms of regression equations might also be explored. Data analyses and appropriate reports should be scheduled in future programs as finances permit. These include the following:

1. Magnitude and frequency of peak flows--an update of the reports, "Magnitude and frequency of floods," published in U.S. Geological Survey water-supply papers for the major basin designations for the United States in 1960 based on data collected through 1958. When sufficient data are available at the high-altitude crest gages, established in 1965, a flood-frequency study should also be made for small drainages.

2. Flood-volume frequency analysis of annual maximum average flows for selected periods of time.

3. Statistics of mean annual and mean monthly flows.

The second type of data analysis needed is for studies that require the collection of specialized data in addition to that provided by the stream-gaging network. The following studies are proposed:

1. Low-flow characteristics of Oregon streams. A study should be initiated to define the requirements for reporting low-flow characteristics at selected stream sites. Characteristics of low flow are determined for ungaged streams by using the method of correlating base-flow measurements with base flow at an index station, as described briefly in this report. A continuing program of base-flow measurements should then follow to define low-flow characteristics in a concentrated area. After a report is assembled for each study area, available funds and manpower can be applied to an adjacent area.

2. Time of travel and dispersion of solutes in streams, giving priority to streams flowing through urban and industrial areas.

3. Definition of flood profiles for floods of different frequencies to satisfy Federal guidelines for flood-plain zoning of lands under Federal jurisdiction or to meet local requirements.

4. Systems analysis to develop flow characteristics of regulated streams in Oregon.

5. Effect of urbanization on flood runoff in major urban areas.

6. Hydraulic geometry of stream channels in Oregon.

7. Relation of flow characteristics to channel geometry.

These are only a few of the data-analysis and hydrologic studies that could be made in Oregon. Changing needs for streamflow information as well as changes in water-related technology must be evaluated frequently.

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Table A-1.--Classification of existing streamflow stations and those proposed for the network

Column 1: B, benchmark or long-term-trend station.

Column 2: C, current-purpose station.

Columns 3-5: Purposes for which current-purpose station is operated; 1, assessment; 2, operation; 3, forecasting; 4, disposal; 5, water quality; 6, compact or legal; 7, research or special studies.

Column 6: P, principal-stream station; H, hydrologic station to meet objective of defining regional streamflow characteristics except when classified as P; R, regulated-stream station which provides data required for a systems analysis of regulated flow; ( ), station is no longer required for the purpose indicated.

Column 7: Effect of regulation or diversion on low and monthly flow; --, no appreciable effect; 1, no appreciable effect on daily flow (diurnal fluctuation only); 2, no appreciable effect on weekly flows; 3, monthly flow not affected by more than 10 percent of natural conditions; 4, monthly flow affected, but published data available to adjust to natural conditions with an error of less than 10 percent; 5, effect of regulation has not been evaluated; 6, effect on daily flow is more than 10 percent; 7, effect on weekly flow is more than 10 percent; 8, monthly flow affected by more than 10 percent and data not available to adjust to natural conditions with an error of less than 10 percent; 9, effect varies by month or season.

Column 8: Effect of regulation on peak flow; --, no appreciable effect; 1, annual peak flow affected by less than 10 percent; 2, annual peak flow affected by more than 10 percent; 3, annual peak flow affected by an undetermined amount.

Column 9: Financing of station; 1, U.S. Geological Survey; 2, cooperative program; 3, other Federal agency; 4, combination of 1 and 2; 5, combination of 1 and 3; 6, combination of 2 and 3; 7, combination of 1, 2, and 3; 8, FPC license.

Station number	Station name	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10-3660	Twentymile Creek nr Adel[1/]	--	C	2	3	--	(H)	9	--	2
10-3700	Camas Creek nr Lakeview	--	C	7	--	--	(H)	9	--	2
10-3710	Drake Creek nr Adel	--	C	7	--	--	H	9	1	2
10-3715	Deep Creek ab Adel[1/]	--	C	2	3	--	(H)	9	--	2
10-3785	Honey Creek nr Plush[1/]	--	C	2	3	--	(H)	9	1	2
10-3840	Chewaucan River nr Paisley[1, 2/]	--	C	2	3	--	(H)	9	--	2
10-3875	Summer Lake Canal nr Summer Lake	--	C	2	--	--	--	--	--	2
10-3880	Ana River nr Summer Lake	--	C	2	--	--	--	4	1	2
10-3900	Silver Creek nr Silver Lake[1/]	--	C	2	3	--	R	4	2	2
10-3925	Silvies River nr Silvies[3/]						P	--	--	
10-3935	Silvies River nr Burns[1, 2/]	B	C	2	3	--	(P)	--	--	2
10-3960	Donner und Blitzen River nr Frenchglen[1/]	B	C	2	3	--	(H)	--	--	3
10-3970	Bridge Creek nr Frenchglen	--	C	2	--	--	(H)	--	--	3
10-4030	Silver Creek nr Riley[1/]	--	C	3	--	--	H	9	--	1
10-4065	Trout Creek nr Denio, Nev.[1/]	--	C	2	3	--	(H)	9	--	2
11-3395	Drews Creek nr Lakeview	--	C	2	--	--	(H)	9	2	2
11-3405	Cottonwood Creek nr Lakeview	--	C	2	--	--	(H)	9	2	2
11-	Williamson River ab Klamath Marsh[3/]						H	--	--	
11-4935	Williamson River nr Klamath Agency	--	C	2	--	--	P	9	--	2
11-4975	Sprague River nr Beatty	B	C	2	--	--	P	9	--	2
11-4990	Sycan River nr Beatty[3/]						P	--	--	
11-5010	Sprague River nr Chiloquin[1/]	--	C	2	3	--	(P)	9	1	2
11-5025	Williamson R. bl Sprague River, nr Chiloquin[1/]	--	C	6	3	--	(P)	8	1	8
11-5075	Link River at Klamath Falls[1/]	--	C	6	2	3	R	8	2	8
11-5095	Klamath River at Keno	--	C	6	2	--	--	8	2	8
11-5107	Klamath River bl J. C. Boyle powerplant, nr Keno	--	C	6	2	--	--	8	2	8
13-1780	Jordan Cr. ab Lone Tree Creek, nr Jordan Valley[1/]	--	C	3	--	--	(H)	9	--	3
13-1810	Owyhee River nr Rome[2/]	--	C	2	--	--	R	8	2	8
13-	Crooked Cr. ab Rattlesnake Cr., nr Burns Junction[3/]						P	--	--	
13-1815	Crooked Creek nr Rome[3/]						P	--	--	
13-1830	Owyhee River bl Owyhee Dam	--	C	2	1	--	R	8	2	2
13-	Malheur River bl Pine Creek, nr Drewsey[3/]						P	--	--	
13-2140	Malheur River nr Drewsey[1/]	--	C	2	3	--	(P)	9	1	2
13-2150	Malheur R. bl Warmsprings Res., nr Riverside	--	C	2	--	--	R	4	2	2
13-2155	South Fork Malheur River at Riverside[3/]						P	--	--	

See footnotes at end of table.

Table A-1.--Classification of existing streamflow stations and those proposed for the network--Continued

Station number	Station	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
13-2165	N. Fork Malheur River ab Beulah Res., nr Beulah	B	C	2	--	--	(H)	3	--	2
13-2175	North Fork Malheur River at Beulah[1]	--	C	2	3	--	R	4	2	2
13-2200	Malheur River at Little Valley, nr Hope	--	C	2	--	--	--	8	2	2
13-2265	Bully Creek at Warm Springs, nr Vale	--	C	2	--	--	--	8	1	2
13-2693	North Fork Burnt River nr Whitney	--	C	2	--	--	--	8	1	2
13-2708	South Fork Burnt River ab Barney Creek, nr Unity	--	C	2	--	--	H	--	--	2
13-2730	Burnt River nr Hereford[1]	--	C	2	3	--	R	4	2	2
13-2742	Burnt River nr Bridgeport	--	C	2	--	--	--	8	2	3
13-2750	Burnt River at Huntington	--	C	2	3	--	--	8	2	2
13-2753	Powder River nr Sumpter	--	C	2	--	--	R	4	2	2
13-2867	Powder River nr Richland	--	C	6	2	--	R	8	2	8
13-2882	Eagle Creek ab Skull Creek, nr New Bridge	--	C	2	--	--	H	3	--	2
13-2901.9	Pine Creek nr Oxbow	--	C	6	2	--	H	9	1	8
13-2920	Imnaha River at Imnaha	--	--	--	--	--	(P)	3	--	2
13-3188	Grande Ronde River at Hilgard	--	C	7	--	--	--	9	1	3
13-3190	Grande Ronde River at La Grande[1]	--	C	2	--	--	(P)	9	1	5
13-3200	Catherine Creek nr Union[1]	--	C	2	3	--	(H)	3	--	2
13-3235	Grande Ronde River nr Elgin	--	C	7	--	--	P	9	--	3
13-3250	East Fork Wallowa River nr Joseph[1]	--	C	6	2	3	(H)	--	--	8
13-3275	Wallowa River at Joseph	--	C	2	--	--	R	4	2	2
13-3295	Hurricane Creek nr Joseph[1]	--	C	2	3	--	(H)	--	--	2
13-3300	Lostine River nr Lostine[1]	--	C	2	3	--	(H)	--	--	2
13-3305	Bear Creek nr Wallowa	--	C	2	--	--	(H)	3	--	2
13-3315	Minam River at Minam	B	C	5	--	--	H	--	--	1
13-3320	Wallowa River at Minam[3]						P	3	1	
13-3325	Grande Ronde River at Rondowa	--	--	--	--	--	(P)	9	1	2
13-3330	Grande Ronde River at Troy[2]	--	C	2	3	--	(P)	9	1	3
14-0100	South Fork Walla Walla River nr Milton[1, 2]	--	C	2	3	--	(H)	--	--	5
14-0110	North Fork Walla Walla River nr Milton[1]	--	C	2	3	--	(H)	3	--	2
14-0192	Columbia River at McNary Dam nr Umatilla	--	C	2	--	--	R	4	2	3
14-0200	Umatilla River ab Meacham Creek nr Gibbon[1]	B	--	--	--	--	(H)	--	--	2
14-0207	Umatilla River nr Cayuse	--	C	7	--	--	H	9	--	3
14-0210	Umatilla River at Pendleton[1, 2]	--	C	2	3	--	(P)	9	--	2
14-0225	McKay Creek nr Pilot Rock[1]	--	C	2	3	--	(H)	9	--	2
14-0235	McKay Creek nr Pendleton[2]	--	C	2	3	--	R	4	2	2
14-0242	East Birch Creek nr Pilot Rock	--	C	7	--	--	H	3	--	3
14-0250	Birch Creek at Rieth	--	C	2	--	--	(H)	9	--	2
14-0260	Umatilla River at Yoakum	--	C	2	--	--	(P)	4	1	2
14-0270	Furnish Canal nr Echo	--	C	2	--	--	--	--	--	2
14-0290	Umatilla project feed canal nr Echo	--	C	2	--	--	--	--	--	2
14-0300	Allen Canal nr Echo	--	C	2	--	--	--	--	--	2
14-0305	Western Land Canal nr Echo	--	C	2	--	--	--	--	--	2
14-0315	Maxwell Canal nr Hermiston	--	C	2	--	--	--	--	--	2
14-0320	Butter Creek nr Pine City[1]	--	C	2	3	--	(H)	9	--	2
14-0325	West Division main canal nr Umatilla	--	C	2	--	--	--	--	--	2
14-0335	Umatilla River nr Umatilla	--	C	2	3	5	R	8	2	6
14-0345	Willow Creek at Heppner	--	C	2	--	--	H	9	--	2
14-0348	Rhea Creek nr Heppner	--	C	2	--	--	H	9	--	2
14-0360	Willow Creek nr Arlington	--	C	2	5	--	P	3	--	3
14-0375	Strawberry Cr. ab Slide Creek, nr Prairie City[1]	--	C	2	3	--	(H)	--	--	2
14-0385.3	John Day River nr John Day[1]	--	C	3	--	--	H	9	1	2
14-	Wind Creek nr Dayville[3]						H	--	--	
14-0395	South Fork John Day River nr Dayville[3]						P	--	--	
14-0405	John Day River at Picture Gorge, nr Dayville	--	--	--	--	--	(P)	9	1	2
14-0420	Camas Creek near Lehman	--	C	2	--	--	H	--	--	3
14-0425	Camas Creek nr Ukiah	B	--	--	--	--	(H)	3	--	2
14-0435.6	Snipe Creek nr Ukiah	--	C	2	--	--	H	3	--	3
14-	N. Fk. John Day R. bl Potamus Cr., nr Monument[3]						P	--	--	
14-0440	Middle Fork John Day River at Ritter[1]	--	C	3	--	--	(P)	9	--	2
14-0460	North Fork John Day River at Monument[2]	--	C	2	--	--	(P)	9	1	2

See footnotes at end of table.

Table A-1.--Classification of existing streamflow stations and those proposed for the network--Continued

Station number	Station	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
14-	Service Creek nr Service Creek[3/]						H	--	--	
14-0465	John Day River at Service Creek[2/]	--	C	1	2	3	(P)	9	1	6
14-0480	John Day River at McDonald Ferry	--	C	1	5	--	(P)	9	1	5
14-0500	Deschutes River bl Snow Creek, nr La Pine[1/]	--	C	2	3	--	(H)	9	1	2
14-0505	Cultus River ab Cultus Creek, nr La Pine	--	C	2	--	--	(H)	--	--	2
14-0510	Cultus Creek ab Crane Prairie Res., nr La Pine	--	C	2	--	--	(H)	--	1	2
14-0520	Deer Creek ab Crane Prairie Res., nr La Pine	--	C	2	--	--	(H)	--	--	2
14-0525	Quinn River nr La Pine	--	C	2	--	--	--	--	--	2
14-0530	Charlton Cr. ab Crane Prairie Res., nr La Pine	--	C	2	--	--	--	--	--	2
14-0540	Deschutes River bl Crane Prairie Res., nr La Pine	--	C	2	--	--	R	4	2	2
14-0545	Brown Creek nr La Pine	--	C	2	--	--	(H)	--	--	2
14-0555	Odell Creek nr Crescent[1/]	--	C	2	3	--	(H)	--	--	2
14-0565	Deschutes River bl Wickiup Res., nr La Pine	--	C	2	--	--	R	4	2	2
14-0575	Fall River nr La Pine	--	C	2	--	--	(H)	1	1	2
14-0600	Crescent Creek at Crescent Lake, nr Crescent[1/]	--	C	2	3	--	H	4	2	2
14-0630	Little Deschutes River nr La Pine[1/]	--	C	2	3	--	R	4	2	2
14-0645	Deschutes River at Benham Falls, nr Bend[1/]	--	C	2	3	--	R	5	2	2
14-0655	Arnold Canal nr Bend	--	C	2	--	--	--	--	--	2
14-0665	Central Oregon Canal ab Pilot Butte Canal, nr Bend	--	C	2	--	--	--	--	--	2
14-0685	Deschutes Cnty Mun. Improve. Dist. Canal at Bend	--	C	2	--	--	--	--	--	2
14-0690	North Unit main canal nr Bend	--	C	2	--	--	--	--	--	2
14-0695	North Canal nr Bend	--	C	2	--	--	--	--	--	2
14-0700	Swalley Canal nr Bend	--	C	2	--	--	--	--	--	2
14-0705	Deschutes River bl Bend	--	C	2	--	--	--	8	2	2
14-0730	Tumalo Creek nr Bend[1/]	--	C	2	3	--	(H)	8	--	2
14-0750	Squaw Creek nr Sisters[1/]	--	C	2	3	--	(H)	9	--	2
14-0765	Deschutes River nr Culver	--	C	6	2	--	--	8	2	8
14-0780	Beaver Creek nr Paulina	--	--	--	--	--	(H)	9	--	2
14-	South Fork Crooked River at mouth, nr Paulina[3/]						P	--	--	
14-0795	Crooked River nr Post	--	--	--	--	--	P	9	--	3
14-0805	Crooked River nr Prineville	--	C	2	--	--	R	8	2	3
14-0873	Crooked River nr Terrebonne	--	C	2	--	--	R	8	2	3
14-0874	Crooked River bl Opal Springs, nr Culver	--	C	6	--	--	P	8	2	8
14-0880	Lake Creek nr Sisters	--	--	--	--	--	(H)	--	--	2
14-0915	Metolius River nr Grandview	B	C	6	--	--	(H)	3	--	8
14-0925	Deschutes River nr Madras	--	C	6	--	--	R	8	2	8
14-	Trout Creek nr Willowdale[3/]						P	--	--	
14-0970	Warm Springs River nr Warm Springs[3/]						P	--	--	
14-0972	White River nr Government Camp	--	C	7	--	--	H	--	--	3
14-0974	Clear Creek bl Clear Lake, nr Government Camp	--	C	2	--	--	H	4	2	3
14-0981	Clear Creek ditch nr Government Camp	--	C	2	--	--	--	--	--	3
14-0986	Clear Creek nr Pine Grove	--	C	2	--	--	H	4	2	3
14-1015	White River bl Tygh Valley[1, 2/]	--	C	2	3	--	(H)	9	--	2
14-1030	Deschutes River at Moody, nr Biggs[2/]	--	C	1	2	3	R	8	2	6
14-1057	Columbia River at The Dalles	--	C	2	5	1	R	4	2	1
14-1058.5	South Fork Mill Creek nr The Dalles	--	C	2	--	--	H	4	1	2
14-1132	Mosier Creek nr Mosier	--	--	--	--	--	H	--	--	2
14-1134	Dog River nr Parkdale	--	C	2	--	--	H	--	--	2
14-1185	West Fork Hood River nr Dee[1/]	--	--	--	--	--	(H)	9	--	2
14-1200	Hood River at Tucker Bridge, nr Hood River	--	C	2	3	--	H	1	--	3
14-1340	Salmon River nr Government Camp	--	--	--	--	--	(H)	--	--	2
14-1370	Sandy River nr Marmot	--	--	--	--	--	(H)	--	--	2
14-1388	Blazed Alder Creek nr Rhododendron	--	C	2	--	--	H	--	--	2
14-1388.5	Bull Run River nr Multnomah Falls	--	C	2	5	--	H	3	1	2
14-1389	North Fork Bull Run River nr Multnomah Falls	--	C	2	--	--	H	8	1	2
14-1397	Cedar Creek nr Brightwood	--	C	2	--	--	H	--	--	2
14-1400	Bull Run River nr Bull Run	--	C	2	--	--	R	4	2	2
14-1415	Little Sandy River nr Bull Run	--	--	--	--	--	(H)	--	--	2
14-1447	Columbia River at Vancouver, Wash.	--	C	5	3	7	R	4	2	1
14-1448	Middle Fork Willamette River nr Oakridge[1/]	--	C	2	3	--	H	--	--	3

See footnotes at end of table.

Table A-1.--Classification of existing streamflow stations and those proposed for the network--Continued

Station number	Station name	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
14-1449	Hills Creek ab Hills Creek Reservoir, nr Oakridge	--	C	2	--	--	H	--	--	3
14-1455	M. Fk. Willamette R. ab Salt Creek, nr Oakridge	--	C	2	--	--	R	4	2	3
14-1465	Salmon Creek nr Oakridge	--	--	--	--	--	(H)	--	--	2
14-1469	Waldo Lake outlet nr Oakridge	--	C	5	7	--	H	--	--	3
14-1475	N. Fk. of Middle Fork Willamette R., nr Oakridge	--	--	--	--	--	(H)	--	--	2
14-1480	M. Fk. Willamette River bl N. Fk., nr Oakridge	--	C	2	--	--	R	4	2	3
14-1500	Middle Fork Willamette River nr Dexter	--	C	2	--	--	R	4	2	3
14-1503	Fall Creek nr Lowell	--	C	2	--	--	H	--	--	3
14-1508	Winberry Creek nr Lowell	--	C	2	--	--	H	--	--	3
14-1510	Fall Creek bl Winberry Cr., nr Fall Creek	--	C	2	--	--	R	4	2	3
14-1520	Middle Fork Willamette River at Jasper	--	C	2	--	--	R	4	2	3
14-1525	Coast Fork Willamette River at London	--	C	2	--	--	(H)	--	--	3
14-1535	Coast Fk. Willamette River bl Cottage Grove Dam	--	C	2	--	--	R	4	2	3
14-1545	Row River ab Pitcher Creek, nr Dorena1/	--	C	2	--	--	(H)	1	--	3
14-1555	Row River nr Cottage Grove	--	C	2	--	--	R	4	2	3
14-1565	Mosby Creek at mouth, nr Cottage Grove	--	--	--	--	--	(H)	--	--	2
14-1575	Coast Fork Willamette River nr Goshen2/	--	C	2	3	--	R	4	2	6
14-1585	McKenzie River at outlet of Clear Lake	--	C	6	2	--	(H)	--	--	8
14-1587.9	Smith River ab Smith R. Res., nr Belknap Springs	--	C	6	2	--	H	--	--	8
14-1588.5	McKenzie R. bl Trail Br. Dam, nr Belknap Springs	--	C	6	2	--	R	4	2	8
14-1590	McKenzie River at McKenzie Bridge1/	--	C	3	--	--	(H)	4	2	2
14-1592	S. Fk. McKenzie R. ab Cougar Res., nr Rainbow	--	C	2	--	--	H	--	--	3
14-1595	South Fork McKenzie River nr Rainbow	--	C	2	--	--	R	4	2	3
14-1611	Blue River bl Tidbits Creek, nr Blue River	--	C	2	--	--	H	--	--	3
14-1615	Lookout Creek nr Blue River	B	C	2	--	--	H	--	--	3
14-1622	Blue River at Blue River	--	C	2	--	--	H	4	2	3
14-1625	McKenzie River nr Vida1/	--	C	2	6	3	R	4	2	8
14-1630	Gate Creek at Vida	--	C	7	--	--	H	--	--	3
14-1650	Mohawk River nr Springfield	--	C	7	--	--	H	1	--	5
14-1655	McKenzie River nr Coburg	--	C	3	2	--	(P)	4	2	3
14-1660	Willamette River at Harrisburg	--	C	5	3	2	R	4	2	6
14-1665	Long Tom River nr Noti	--	C	2	--	--	(H)	1	--	3
14-1670	Coyote Creek nr Crow	--	C	2	--	--	(H)	9	--	3
14-1685	Coyote Creek nr Alvadore	--	C	2	--	--	--	8	2	3
14-1690	Long Tom River nr Alvadore	--	C	2	--	--	R	4	2	3
14-1693	Amazon Creek at Eugene	--	--	--	--	--	H	--	--	3
14-1700	Long Tom River at Monroe2/	--	C	2	--	--	(H)	4	2	3
14-1710	Marys River nr Philomath	--	C	3	--	--	(H)	--	1	3
14-1720	Calapooia River at Holley	--	C	7	--	--	(H)	1	--	3
14-1735	Calapooia River at Albany	--	C	7	--	--	(H)	9	--	3
14-1740	Willamette River at Albany2/	--	C	2	3	--	R	4	2	1
14-1780	North Santiam R. bl Boulder Cr., nr Detroit	--	C	2	--	--	(H)	--	--	3
14-1790	Breitenbush River ab Canyon Cr., nr Detroit	--	C	2	--	--	(H)	--	--	3
14-1815	North Santiam River at Niagara2/	--	C	2	--	--	R	4	2	3
14-1825	Little North Santiam River nr Mehama	--	--	--	--	--	(H)	--	--	2
14-1830	North Santiam River at Mehama1/	--	C	3	--	--	(P)	4	2	3
14-1850	South Santiam River bl Cascadia	--	C	7	2	--	(H)	--	--	2
14-1858	Middle Santiam River nr Cascadia	--	C	2	--	--	H	--	--	3
14-1859	Quartzville Creek nr Cascadia	--	C	2	--	--	H	--	--	3
14-1867	South Santiam River at Foster	--	C	2	--	--	R	4	2	3
14-1870	Wiley Creek nr Foster	--	C	7	--	--	(H)	--	--	3
14-1875	South Santiam River at Waterloo1/	--	C	2	3	--	(P)	4	2	6
14-1887	Crabtree Creek nr Crabtree	--	--	--	--	--	H	1	--	3
14-1888	Thomas Creek nr Scio	--	C	7	--	--	H	1	--	3
14-1890	Santiam River at Jefferson	--	C	2	3	--	R	4	2	3
14-1895	Luckiamute River nr Hoskins	--	C	2	--	--	(H)	1	--	2
14-1900	Luckiamute River at Pedee	--	--	--	--	--	(H)	1	--	3
14-1901	Little Luckiamute River at Falls City	--	--	--	--	--	(H)	--	--	3
14-1905	Luckiamute River nr Suver2/	--	C	3	--	--	(H)	--	--	3
14-1907	Rickreall Creek nr Dallas	--	--	--	--	--	H	4	2	3

See footnotes at end of table.

Table A-1.--Classification of existing streamflow stations and those proposed for the network--Continued

Station number	Station name	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
14-1910	Willamette River at Salem[1/]	--	C	5	2	3	R	4	2	5
14-1920	Mill Creek at Salem	--	C	5	--	--	--	8	2	3
14-1925	South Yamhill River nr Willamina	--	--	--	--	--	(H)	9	--	2
14-1930	Willamina Creek nr Willamina	B	--	--	--	--	(H)	--	--	2
14-1933	Mill Creek nr Willamina	--	C	7	--	--	H	--	--	3
14-1940	South Yamhill River nr Whiteson[2/]	--	C	2	3	--	(P)	1	--	2
14-1943	North Yamhill River nr Fairdale	--	--	--	--	--	H	9	--	2
14-1960	Haskins Creek bl reservoir, nr McMinnville	--	C	2	--	--	R	4	2	2
14-1970	North Yamhill River at Pike	--	C	2	--	--	(H)	9	1	3
14-1980	Willamette River at Wilsonville[2/]	--	C	1	2	--	R	4	2	6
14-1985	Molalla River ab Pine Creek, nr Wilhoit	B	--	--	--	--	(H)	--	--	6
14-2000	Molalla River nr Canby[2/]	--	C	7	--	--	(H)	3	--	3
14-2015	Butte Creek at Monitor	--	--	--	--	--	H	1	--	2
14-2030	Scoggins Creek nr Gaston	--	C	7	--	--	(H)	9	--	2
14-2035	Tualatin River nr Dilley	--	C	2	--	--	(H)	1	--	3
14-2040	Gales Creek nr Gales Creek	--	C	7	--	--	H	--	--	3
14-2070	Oswego Canal nr Lake Oswego	--	C	2	--	--	--	--	--	2
14-2075	Tualatin River at West Linn[2/]	--	C	1	--	--	(P)	4	--	2
14-2080	Clackamas River at Big Bottom[1/]	--	C	6	3	--	(H)	--	--	8
14-2087	Oak Grove Fork nr Government Camp	--	C	6	--	--	R	4	2	8
14-2090	Oak Grove Fork ab powerplant intake[1/]	--	C	6	3	--	(H)	4	2	8
14-2095	Clackamas River ab Three Lynx Creek[1, 2/]	--	C	6	3	--	R	4	2	8
14-2100	Clackamas River at Estacada[1/]	--	C	6	3	--	(P)	1	1	8
14-2110	Clackamas River nr Clackamas[2/]	--	C	1	--	--	P	1	1	5
14-2115	Johnson Creek at Sycamore	--	--	--	--	--	(H)	1	--	1
14-2470	Clatskanie River nr Clatskanie[3/]						H	--	--	
14-2487	Bear Creek nr Svensen	--	C	2	--	--	--	8	2	2
14-3010	Nehalem River nr Foss[2/]	--	C	1	3	--	(H)	3	--	2
14-3015	Wilson River nr Tillamook[2/]	B	C	1	3	--	(H)	--	--	5
14-3025	Trask River nr Tillamook	--	--	--	--	--	(H)	--	--	3
14-3029	Nestucca River nr Fairdale	--	C	2	--	--	H	--	--	2
14-3036	Nestucca River nr Beaver[2/]	--	--	--	--	--	H	--	--	2
14-3055	Siletz River at Siletz[2/]	--	C	1	--	--	(H)	--	--	2
14-3060.36	Mill Creek nr Toledo	--	C	2	--	--	H	4	--	2
14-3061	North Fork Alsea River at Alsea	--	--	--	--	--	H	--	--	2
14-3064	Five Rivers nr Fisher	--	--	--	--	--	H	--	--	2
14-3065	Alsea River nr Tidewater[2/]	B	C	1	2	--	(H)	--	--	2
14-3066	Drift Creek nr Salado	--	--	--	--	--	H	--	--	3
14-3067	Needle Branch nr Salado	--	C	7	5	--	H	--	--	2
14-3068	Flynn Creek nr Salado	--	C	7	5	--	H	--	--	2
14-3068.1	Deer Creek nr Salado	--	C	7	5	--	H	--	--	2
14-3075.8	Lake Creek nr Deadwood	--	C	7	--	--	H	3	--	2
14-3076.2	Siuslaw River nr Mapleton	--	C	5	7	--	H	--	--	2
14-3076.45	North Fork Siuslaw River nr Minerva	--	C	7	--	--	H	3	--	2
14-3077	Jackson Creek nr Tiller	--	--	--	--	--	H	--	--	2
14-3080	South Umpqua River at Tiller[2/]	--	C	2	3	5	(H)	3	--	2
14-3085	Elk Creek nr Drew	--	--	--	--	--	H	3	--	2
14-3087	Days Creek at Days Creek	--	--	--	--	--	H	3	--	2
14-3090	Cow Creek nr Azalea	--	C	5	--	--	(H)	3	--	2
14-3095	West Fork Cow Creek nr Glendale	--	--	--	--	--	H	--	--	2
14-3100	Cow Creek nr Riddle	--	C	5	--	--	H	3	--	3
14-3107	South Myrtle Creek nr Myrtle Creek	--	--	--	--	--	H	3	--	2
14-3110	North Myrtle Creek nr Myrtle Creek	--	--	--	--	--	H	3	--	2
14-3112	Olalla Creek nr Tenmile	--	C	5	7	--	H	9	--	2
14-3113	Tenmile Creek at Tenmile	--	C	7	--	--	H	3	--	2

See footnotes at end of table.

Table A-1.--Classification of existing streamflow stations and those proposed for the network--Continued

Station number	Station name	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
14-3115	Lookingglass Creek at Brockway	--	C	5	7	--	H	3	--	2
14-3120	South Umpqua River nr Brockway2/	--	C	5	--	--	(H)	3	--	3
14-3122	Deer Creek nr Roseburg	--	C	5	7	--	H	9	--	2
14-3135	N. Umpqua R. bl Lemolo Lake, nr Toketee Falls1/	--	C	6	--	--	R	4	2	8
14-3144	Clearwater No. 1 power canal nr Toketee Falls	--	C	6	--	--	--	--	--	8
14-3145	Clearwater River ab Trap Cr., nr Toketee Falls1/	--	C	6	--	--	(H)	4	--	8
14-3160	Fish Creek at Big Camas, nr Toketee Falls	--	C	6	--	--	(H)	4	--	8
14-3165	N. Umpqua R. ab Copeland Cr., nr Toketee Falls	--	C	6	--	--	(H)	4	3	8
14-3167	Steamboat Creek nr Glide	--	C	5	7	--	H	--	--	2
14-3176	Rock Creek nr Glide	B	--	--	--	--	H	--	--	2
14-3180	Little River at Peel	--	--	--	--	--	H	3	--	2
14-3195	North Umpqua River at Winchester	--	C	5	--	--	(P)	3	1	2
14-3207	Calapooya Creek nr Oakland	--	C	5	--	--	H	9	--	2
14-3210	Umpqua River nr Elkton2/	--	C	5	1	--	(P)	3	--	1
14-3214	Elk Creek nr Elkhead	--	C	7	--	--	H	3	--	2
14-3220	Elk Creek nr Drain	--	C	5	--	--	H	3	--	2
14-3231	Smith River nr Gardiner	--	--	--	--	--	H	--	--	2
14-3232	Tenmile Creek nr Lakeside	--	C	2	--	--	H	--	--	2
14-3245	West Fork Millicoma River nr Allegany	--	C	6	5	2	H	3	--	2
14-3246	S. Fk. Coquille River ab Panther Cr., nr Illahe	--	C	6	--	--	H	--	--	8
14-3247	South Fork Coquille River nr Illahe	B	C	6	--	--	H	--	--	8
14-3249	South Fork Coquille River nr Powers	--	C	6	--	--	H	--	--	8
14-3250	South Fork Coquille River at Powers	--	C	3	--	--	(H)	3	--	2
14-3268	North Fork Coquille River nr Fairview	--	C	7	--	--	H	3	--	2
14-3271.5	Sixes River at Sixes	--	C	5	7	--	H	--	--	1
14-3273	Elk River nr Sixes	--	C	7	--	--	H	3	--	1
14-3280	Rogue River ab Prospect1/	B	C	3	--	--	(H)	--	--	2
14-3300	Rogue River bl Prospect	--	C	2	--	--	--	--	--	3
14-3320	South Fork Rogue River nr Prospect1/	--	C	6	--	--	(H)	4	--	8
14-3335	Red Blanket Creek nr Prospect	--	C	7	--	--	(H)	3	--	2
14-3347	South Fork Rogue River south of Prospect1/	--	C	2	--	--	H	3	--	3
14-3355	South Fork Big Butte Cr. nr Butte Falls	--	C	2	--	--	(H)	8	--	2
14-3375	Big Butte Creek nr McLeod	--	C	2	--	--	H	9	--	3
14-3376	Rogue River nr McLeod1/	--	C	2	--	--	H	3	--	3
14-3380	Elk Creek nr Trail	--	--	--	--	--	(H)	3	--	1
14-3390	Rogue River at Dodge Bridge, nr Eagle Point	--	C	2	--	--	(P)	9	--	2
14-3415	South Fork Little Butte Creek nr Lakecreek1/	--	C	2	3	--	(H)	3	--	2
14-3425	N.Fk.Little Butte Cr. at Fish Lake, nr Lakecreek1/	--	C	2	3	--	--	8	2	2
14-3430	North Fork Little Butte Creek nr Lakecreek	--	C	2	--	--	--	8	2	2
14-3500	Emigrant Creek nr Ashland	--	C	2	--	--	--	8	2	2
14-3575	Bear Creek at Medford	--	C	2	--	--	--	8	2	2
14-3590	Rogue River at Raygold, nr Central Point	--	C	2	3	--	(P)	3	1	2
14-3615	Rogue River at Grants Pass	--	C	2	--	--	--	8	2	2
14-3620	Applegate River nr Copper	--	--	--	--	--	(H)	9	1	2
14-3660	Applegate River nr Applegate	--	--	--	--	--	(H)	9	1	2
14-3715	Grave Creek at Pease Bridge, nr Placer	--	--	--	--	--	(H)	3	--	2
14-3723	Rogue River nr Agness	--	C	1	2	3	P	8	3	6
14-3725	East Fork Illinois River nr Takilma	--	--	--	--	--	(H)	--	--	2
14-3751	Sucker Creek bl Little Grayback Cr., nr Holland	--	--	--	--	--	--	3	--	2
14-3755	West Fork Illinois R. bl Rock Cr., nr O'Brien	--	--	--	--	--	H	1	--	2
14-3771	Illinois River nr Kerby	--	--	--	--	--	H	3	--	2
14-3782	Illinois River nr Agness	--	C	1	--	--	P	3	--	2
14-4000	Chetco River nr Brookings	--	--	--	--	--	H	--	--	2

1/ Snow forecast station (Soil Conservation Service).
2/ Hydromet station (designated for current reporting by the Interagency Hydromet Task Force of the Columbia River Water Management Group).
3/ Station proposed for the network.

Table A-2.--Basin characteristics for gaging stations used in regression analysis

Station number	Drainage area A	Slope S	Length L	Storage S_t	Elevation E	Forest F	Precipitation P	Precipitation intensity $I_{24,2}$	Temperature index T_1	Soils index S_i	Regressions in which data were used[1/]
10-3660	194	120	20.0	3.98	5.80	21	15	1.00	17	3.9	ABC̲ E
10-3700	62.0	111	12.0	1.00	6.21	69	20	1.00	17	7.0	ABC̲ E
10-3710	67	76.2	14.0	1.74	5.88	11	15	1.00	18	3.5	ABC̲ E
10-3715	249	96.9	22.0	2.72	6.11	46	17	1.00	17	5.6	ABC̲ E
10-3785	170	93.3	20.0	1.35	5.91	21	20	1.00	18	4.6	ABC̲ E
10-3840	275	33.3	32.0	1.09	6.05	84	18	1.20	17	9.5	ABC̲ E
10-3935	934	12.3	65.0	1.01	5.20	70	19	1.00	11	5.8	ABCDE
10-3960	200	97.8	22.5	1.10	6.16	12	14	1.00	13	3.5	ABCDE
10-3970	30	197	12.2	1.20	5.89	20	12	1.00	14	3.5	ABCDE
10-4030	228	41.7	25.6	1.05	5.18	72	20	1.00	15	7.1	ABC̲ E
10-4065	87.0	152	22.0	1.00	5.92	9	14	1.00	13	3.3	ABC̲ E
11-3395	212	53.3	25.0	3.59	5.51	69	15	1.20	17	3.6	B
11-3405	32.9	246	6.5	1.27	6.21	93	15	1.20	17	2.9	B
11-3410	30	70.6	17.0	1.00	6.03	31	15	1.20	17	3.1	A
11-4935	1,290	20.1	59.6	7.08	5.02	75	24	1.90	12	13.8	ABC̲ E
11-4975	513	51.0	37.2	1.60	5.49	66	17	1.30	14	9.6	ABC̲ E
11-5010	1,580	4.90	95.2	2.48	5.32	66	20	1.40	13	10.9	ABC̲ E
11-5025	3,000	1.99	100.0	4.40	5.16	71	22	1.40	12	12.2	ABC̲ E
11-5040	89.0	130	18.4	1.00	5.68	85	28	2.60	16	11.3	A E
13-1780	440	37.6	39.0	1.02	5.78	41	13	1.00	14	2.3	ABC̲ E
13-1840	11,300	14.9	259.0	1.36	5.12	4	11	1.00	13	4.4	A
13-2140	910	44.7	49.2	1.20	4.90	30	16	1.00	12	5.3	A E
13-2165	355	67.4	34.4	1.00	5.36	51	19	1.00	12	4.9	ABCDE
13-2270	570	39.4	52.4	1.00	4.15	1	18	1.00	14	5.0	A E
13-2280	3,880	14.6	155.0	1.11	3.94	8	13	1.00	15	4.9	A
13-2755	219	56.9	28.6	1.00	5.17	76	25	1.10	12	5.8	ABC̲ E
13-2882	156	143	26.4	1.16	5.79	60	45	1.25	12	3.4	ABC̲ E
13-2920	622	72.6	56.0	1.04	5.69	52	28	1.20	13	3.7	ABCDE
13-3185	505	70.1	35.2	1.02	4.80	87	24	1.50	17	5.9	ABCDE
13-3190	678	26.8	44.8	1.03	4.64	85	24	1.50	19	5.6	ABC̲ E
13-3200	105	114	26.4	1.00	5.32	89	25	1.20	17	2.8	ABCDE
13-3204	15.8	454	8.2	1.00	5.16	74	15	1.30	20	1.3	A
13-3213	15.5	134	8.4	1.00	4.14	24	22	1.30	21	3.3	A
13-3230	21.0	436	5.2	1.00	5.63	101	30	1.30	20	5.2	ABCDE
13-3235	1,250	35.3	68.0	1.05	4.19	64	23	1.30	19	4.2	ABC̲ E
13-3250	10.3	422	6.0	1.87	7.89	51	47	1.25	11	2.3	ABCDE
13-3255	42.0	310	10.4	2.86	7.52	57	50	1.25	11	2.3	ABC̲
13-3295	29.6	296	10.8	1.20	7.46	54	43	1.30	13	2.3	ABCDE
13-3300	70.9	189	20.1	1.42	6.82	81	38	1.25	14	2.8	ABCDE
13-3305	67.0	178	18.4	1.00	5.81	86	38	1.30	15	2.5	ABCDE
13-3325	2,555	25.1	87.6	1.18	4.45	61	26	1.35	18	3.9	ABC̲ E
13-3330	3,275	22.6	120.0	1.14	4.46	67	25	1.40	18	4.3	ABC̲ E
14- 100	62.0	189	17.8	1.00	4.26	87	33	2.00	20	5.6	ABCDE
14- 105	80	149	25.0	1.00	3.94	73	31	2.00	20	3.8	ABCDE
14- 110	41.0	167	16.4	1.00	3.59	68	31	2.00	21	3.4	ABCDE
14- 200	131	138	17.8	1.00	3.89	70	19	2.00	20	5.6	ABCDE
14- 210	637	47.1	45.3	1.01	3.12	38	18	1.74	21	3.3	ABC̲ E
14- 216	2.56	172	2.5	1.00	1.48	1	13	1.25	24	2.5	A
14- 220	700	46	47.8	1.01	3.00	36	18	1.74	21	3.1	ABC̲ E
14- 225	180	115	26.5	1.00	3.21	40	19	1.60	19	2.3	ABC̲ E
14- 250	291	64.2	35.3	1.00	3.03	20	18	1.34	21	1.9	A E
14- 260	1,280	32.1	62.3	1.00	2.92	30	17	1.50	21	2.8	ABC̲
14- 320	291	78.5	37.2	1.00	3.15	12	15	1.25	23	2.3	AB E
14- 345	87	117	21.6	1.00	3.52	26	16	1.20	24	2.5	AB E
14- 375	6.00	523	5.2	2.07	6.90	68	37	1.00	18	5.6	ABCDE

See footnote at end of table.

Station number	Drainage area A	Slope S	Length L	Storage S_t	Elevation E	Forest F	Precipitation P	Precipitation intensity $I_{24,2}$	Temperature index T_1	Soils index S_i	Regressions in which data were used[1/]
14- 385.01	231	94.9	21.2	1.04	5.10	66	26	1.00	19	2.7	ABC E
14- 405	1,680	27.3	78.1	1.01	4.58	49	22	1.00	12	5.2	ABC E
14- 415	525	73	46.0	1.09	5.45	98	27	1.25	11	4.7	ABC E
14- 420	60.0	66.6	10.4	1.00	4.68	75	24	1.40	14	2.7	ABCDE
14- 425	121	60.7	16.9	1.00	4.68	79	24	1.35	13	2.9	ABCDE
14- 440	515	26.8	65.7	1.00	4.80	82	23	1.20	8	4.6	ABC E
14- 445	90.2	58.0	15.6	1.03	4.83	41	21	1.20	10	3.5	ABC E
14- 460	2,520	24.9	99.6	1.02	4.58	71	22	1.30	14	4.9	ABC E
14- 465	5,090	20	143.0	1.02	4.40	58	21	1.10	16	4.9	ABC E
14- 480	7,580	12	279.0	1.01	3.88	43	19	1.00	20	4.2	ABC E
14- 500	132	328	22.4	2.40	5.85	75	49	2.30	20	11.9	ABC E
14- 505	16.5	120	11.3	1.96	5.23	99	40	2.30	17	9.6	ABCDE
14- 510	33.2	90.9	8.8	8.22	5.27	93	45	2.50	18	13.8	ABCDE
14- 520	21.5	188	6.4	3.79	5.29	95	31	2.50	17	13.8	ABCDE
14- 545	19.7	127	9.8	1.15	5.15	100	35	2.40	16	13.8	ABCDE
14- 555	39	186	10.4	15.10	5.54	84	60	2.70	17	13.8	ABCDE
14- 575	45.1	20.8	9.6	1.00	4.69	99	36	1.80	13	13.1	ABCDE
14- 600	60.7	214	11.2	12.20	5.69	89	49	2.70	17	13.8	BC
14- 630	859	18.5	50.4	2.11	5.00	93	30	1.90	12	12.4	BC
14- 730	47.3	199	17.8	1.10	5.63	62	20	1.70	18	15.8	A
14- 750	54.8	236	16.7	1.23	5.84	79	48	2.10	20	7.0	A
14- 775	64.4	132	13.6	1.00	4.67	44	20	1.00	22	8.4	E
14- 780	450	57.9	33.6	1.42	4.60	22	20	1.00	21	2.5	A E
14- 785	159	41.7	19.2	1.00	5.13	72	21	1.00	19	7.0	AB E
14- 795	2,160	34.2	56.2	1.34	4.65	24	20	1.10	18	5.5	AB E
14- 805	2,700	4.20	120.0	1.27	4.65	27	20	1.10	18	5.1	A E
14- 830	200	92.6	21.6	1.00	4.65	62	21	1.20	17	6.4	A
14- 880	22.2	250	6.4	5.95	4.44	95	65	2.50	20	13.8	ABCDE
14- 915	316	48.6	38.4	1.75	4.32	92	68	2.30	19	4.7	ABCDE
14- 930	104	106	29.6	1.19	3.26	62	35	1.90	18	3.5	ABC E
14-1015	368	81.7	44.4	1.23	2.94	71	45	2.20	20	2.2	ABC E
14-1030	10,500	17.9	268.0	1.66	4.06	48	22	1.40	18	6.4	ABCDE
14-1185	95.6	138	18.4	1.62	3.17	86	100	3.40	27	3.2	ABC E
14-1210.01	329	114	38.4	1.21	3.11	84	56	2.90	25	2.8	ABC E
14-1310	3.70	1020	6.4	1.00	5.08	58	93	3.00	23	5.6	ABCDE
14-1312	3.82	640	5.9	1.00	4.00	62	85	3.00	24	5.6	A
14-1340	8.70	590	5.2	1.00	4.80	94	88	2.90	22	5.6	ABCDE
14-1345	53.0	135	15.6	1.11	4.00	94	85	2.90	22	5.6	ABCDE
14-1350	100	129	24.8	1.18	3.61	97	80	3.50	23	5.6	ABCDE
14-1370	262	92.2	37.6	1.08	3.35	93	85	3.50	26	5.5	ABCDE
14-1395	73.0	171	15.2	3.56	2.99	98	120	3.50	29	5.6	BC
14-1400.01	107	136	22.0	2.77	2.62	99	115	3.50	29	5.6	ABC E
14-1415	22.3	196	13.6	1.67	2.44	99	96	3.50	29	5.6	ABCDE
14-1448	258	107	32.7	1.18	4.38	98	60	3.00	24	5.4	A
14-1449	52.7	259	14.5	1.06	4.09	97	58	3.00	24	5.6	A
14-1455	392	75	42.1	1.34	4.08	96	58	3.00	24	5.2	ABCDE
14-1460	113	135	33.0	2.15	4.46	97	60	2.90	21	5.5	ABCDE
14-1465	117	89.7	24.7	1.51	4.14	98	62	3.00	24	5.0	ABCDE
14-1475	246	112	51.0	5.23	3.76	91	58	2.90	25	4.6	ABCDE
14-1480	924	64.5	53.3	2.38	3.97	95	58	3.00	25	4.9	ABCDE
14-1487	.44	817	1.2	1.00	1.54	101	50	3.00	31	3.2	A
14-1500	1,001	42.0	72.3	2.76	3.82	94	58	3.00	26	4.7	BC
14-1510	186	43.7	27.0	1.00	2.32	92	62	3.00	31	3.7	ABCDE
14-1515	52.5	89	18.0	1.00	2.10	99	64	3.00	32	3.2	ABCDE
14-1520	1,340	41.0	78.5	1.95	3.37	93	58	3.00	29	4.3	ABC

See footnote at end of table.

Table A-2.--Basin characteristics for gaging stations used in regression analysis--Continued

Station number	Drainage area A	Slope S	Length L	Storage S_t	Elevation E	Forest F	Precipitation P	Precipitation intensity $I_{24,2}$	Temperature index T_1	Soils index S_i	Regressions in which data were used[1/]
14-1525	72.1	58.0	16.4	1.00	2.12	80	56	3.00	33	3.4	ABCDE
14-1535	104	35.3	22.9	1.00	1.92	77	54	3.00	33	3.3	BC
14-1539	5.69	628	3.3	1.00	2.63	98	49	3.00	31	3.2	A
14-1545	211	98.3	24.0	1.05	2.85	93	60	3.00	31	3.2	ABCDE
14-1555	270	82.3	31.7	1.04	2.63	92	56	3.00	31	2.6	ABC
14-1560	85	49.4	21.3	1.02	2.12	96	57	3.00	32	3.2	ABCDE
14-1565	95.3	42.8	24.0	1.02	2.03	94	56	3.00	32	3.1	ABCDE
14-1570	529	29.3	32.3	1.00	2.21	84	55	3.00	33	2.8	ABCDE
14-1580	2,030	34.3	88.2	1.63	2.87	88	54	3.00	31	3.8	ABCDE
14-1582.50	.21	1590	.9	1.00	4.63	49	95	3.00	23	5.6	A
14-1585	92.4	76.6	12.3	1.65	4.12	90	81	3.00	21	4.9	ABCDE
14-1590	348	44.6	30.8	1.45	4.22	85	86	2.90	20	5.1	ABCDE
14-1592	160	137	26.2	2.00	4.29	97	65	3.00	23	5.6	ABC E
14-1595	208	123	32.5	1.77	4.08	97	70	3.00	24	5.5	ABCDE
14-1612	.39	1690	1.1	1.00	2.46	101	118	3.00	26	5.6	A
14-1615	24.1	258	9.5	1.00	3.19	92	104	3.00	26	5.6	ABC E
14-1616	.37	1490	1.0	1.00	2.38	101	90	3.00	26	5.6	A
14-1620	75	145	14.7	1.00	3.17	97	117	3.00	26	5.6	ABCDE
14-1625	930	58.3	54.6	1.27	3.85	91	83	2.90	23	5.3	ABCDE
14-1630	47.6	101	12.0	1.00	2.15	93	92	3.00	31	3.8	A
14-1650	177	39.8	29.5	1.00	1.51	86	70	2.90	32	2.8	ABCDE
14-1655	1,337	13.7	94.8	1.19	3.18	87	79	2.90	30	4.6	ABCDE
14-1665	89.3	13.1	18.3	1.07	.74	79	67	3.50	31	1.9	ABCDE
14-1670	95.1	10.9	23.3	1.00	.73	61	43	3.00	32	1.7	ABC E
14-1697	5.20	67.5	5.3	1.00	.86	55	48	3.30	32	1.2	A
14-1700	391	6	48.9	1.65	.62	44	48	3.00	32	1.5	ABC E
14-1705	14.6	277	7.8	1.00	1.51	101	91	3.80	31	3.2	A
14-1710	159	13.4	37.7	1.00	.93	83	78	3.90	31	1.9	ABCDE
14-1720	105	64.6	30.5	1.00	2.06	88	89	3.00	31	4.3	ABCDE
14-1723	5.10	221	4.1	1.00	.88	60	50	3.00	33	.8	A
14-1735	372	21.1	72.9	1.00	.95	32	56	3.00	33	1.9	ABC E
14-1740	4,840	18.8	154.0	1.03	2.23	72	60	3.10	31	3.1	ABCDE
14-1780	216	93.3	35.7	1.60	3.72	93	80	2.90	20	5.4	ABCDE
14-1788	1.03	1420	1.5	1.00	3.01	101	77	2.90	21	5.6	A
14-1790	106	180	21.8	1.19	3.72	93	77	3.00	23	5.5	ABCDE
14-1815	453	66.3	49.1	1.33	3.51	91	81	2.90	22	5.6	ABCDE
14-1817	.41	529	1.4	1.00	1.44	101	69	3.00	27	1.2	A
14-1825	112	77.4	29.5	1.36	2.64	96	97	3.00	27	4.5	ABCDE
14-1830	655	53.3	68.5	1.24	3.35	91	86	3.00	27	5.0	ABCDE
14-1849	.89	714	1.9	1.00	1.78	101	68	3.00	28	3.2	A
14-1850	174	102	23.5	1.03	2.87	93	101	3.00	27	5.5	ABCDE
14-1860	271	71.6	32.4	1.02	2.97	97	106	3.00	26	5.2	ABCDE
14-1870	51.8	129	13.6	1.00	2.48	84	71	3.00	30	4.7	ABCDE
14-1875	640	35.7	49.4	1.02	2.56	87	90	3.00	28	4.5	ABCDE
14-1890	1,790	36.2	96.8	1.09	2.47	79	78	3.00	27	4.0	ABCDE
14-1895	34.3	115	15.2	1.00	1.31	96	91	5.40	30	3.3	ABCDE
14-1900	115	39.5	28.7	1.00	1.01	90	74	3.90	30	1.8	ABCDE
14-1902	3.46	138	3.7	1.00	.87	84	80	4.00	30	.6	A
14-1905	240	17.8	44.9	1.00	.91	79	72	4.10	31	2.1	ABCDE
14-1906	.57	124	1.1	1.00	.37	15	41	3.00	33	.6	A
14-1907	27.4	114	13.7	1.00	1.63	61	112	5.10	30	4.1	BC
14-1910	7,280	11.2	189.0	1.02	2.15	71	64	3.00	31	3.2	ABCDE
14-1921	2.72	256	3.2	1.00	.63	38	43	3.00	32	.6	A
14-1922	4.83	227	4.0	1.10	.59	35	44	3.00	32	.6	A
14-1925	133	40.5	21.1	1.08	.95	85	101	5.80	30	3.2	ABCDE

See footnote at end of table.

Table A-2.--Basin characteristics for gaging stations used in regression analysis--Continued

Station number	Drainage area A	Slope S	Length L	Storage S_t	Elevation E	Forest F	Precipitation P	Precipitation intensity $I_{24,2}$	Temperature index T_1	Soils index S_i	Regressions in which data were used[1/]
14-1928	1.81	284	2.4	1.00	.63	55	70	4.80	29	.9	A
14-1930	64.7	124	15.1	1.00	1.06	86	88	5.10	29	3.6	ABCDE
14-1933	27.4	120	9.7	1.00	1.72	101	115	5.50	29	5.6	A
14-1940	502	9.40	49.9	1.10	.75	48	78	3.80	30	2.1	ABCDE
14-1950	6.70	335	5.1	1.00	2.32	95	105	4.40	28	4.0	ABÇ E
14-1965	48.8	147	9.8	1.00	1.40	79	88	4.30	29	2.5	ABÇ E
14-1970	66.8	95.4	12.3	1.00	1.27	73	80	4.00	29	2.0	ABÇ E
14-1973	3.19	518	2.6	1.00	1.40	90	91	4.30	28	3.2	A
14-1985	96.0	83.1	17.8	1.02	2.91	81	91	3.00	27	3.8	ABCDE
14-1997	4.16	192	3.8	1.04	.91	73	51	3.00	32	.8	A
14-2000	323	40.5	44.0	1.03	1.91	71	68	3.00	31	2.3	ABCDE
14-2010	204	72.3	35.4	1.04	1.28	48	60	3.00	31	1.8	ABCDE
14-2015	58.7	103	28.6	1.01	1.67	65	73	3.00	31	2.5	ABCDE
14-2020	479	23.6	67.7	1.02	.86	31	55	3.00	33	1.5	ABCDE
14-2025	51	96.1	20.3	1.03	1.26	38	76	3.80	29	2.2	ABÇ E
14-2030	43.3	87.3	15.9	1.18	1.09	49	66	3.40	29	2.1	ABCDE
14-2035	125	76.5	23.8	1.09	1.26	43	59	3.30	30	1.7	ABCDE
14-2038	4.31	121	3.2	1.23	.94	93	66	3.60	28	5.6	A
14-2040	33.2	127	10.5	1.03	1.31	50	70	3.80	28	3.8	ABCDE
14-2041	1.27	467	2.4	1.00	1.14	88	65	3.50	29	3.2	A
14-2045	66	71.2	19.3	1.03	1.08	61	63	3.50	29	2.5	ABCDE
14-2055	42.0	96.7	13.1	1.03	1.12	86	48	3.00	31	1.9	ABCDE
14-2060	27.6	136	11.1	1.03	1.08	81	48	3.00	32	2.2	ABÇ E
14-2065	568	12.9	51.5	1.02	.75	47	48	3.00	31	1.7	ABCDE
14-2075	706	4.33	83.0	1.02	.66	45	46	3.00	32	1.5	ABCDE
14-2080	136	136	19.3	1.22	3.90	98	91	2.90	20	5.6	ABCDE
14-2085	53.0	47.6	9.8	2.59	3.74	99	70	2.95	21	5.6	ABCDE
14-2090	126	87.5	19.2	1.08	3.75	88	69	2.90	22	5.6	ABCDE
14-2091	3.75	343	3.8	1.00	3.40	91	60	3.00	23	5.6	A
14-2095	479	95.3	30.5	1.35	3.57	93	79	3.00	23	5.3	ABCDE
14-2099	2.52	227	3.3	1.00	1.01	3	60	3.00	31	.9	A
14-2100	671	60.9	55.2	1.29	3.35	92	77	3.00	25	4.6	ABCDE
14-2108	2.52	107	3.0	1.00	.58	26	45	3.00	32	.9	A
14-2115	28.2	31.9	13.8	1.07	.52	37	43	3.00	32	.7	ABCDE
14-2118	1.46	538	1.6	1.00	.82	100	40	3.00	34	.9	A
14-2515	40.1	55.4	14.2	1.00	.93	93	97	4.00	34	5.6	ABCDE
14-2990	7.99	336	4.4	1.00	1.17	69	110	4.10	35	5.6	A
14-2995	1.97	1030	2.5	1.00	1.01	100	90	4.00	36	5.6	A
14-3002	11.6	111	8.4	1.00	1.43	100	56	3.30	30	3.2	A
14-3010	667	6.40	104.0	1.01	1.18	81	82	3.90	30	4.7	ABCDE
14-3014	1.87	360	2.1	1.00	.53	87	90	5.30	34	.9	A
14-3015	161	50.4	32.3	1.00	1.64	13	103	5.00	29	5.6	ABCDE
14-3025	145	62	29.7	1.01	1.74	27	103	5.40	29	5.6	ABCDE
14-3030	8.82	16.7	5.6	1.16	2.07	95	100	4.50	28	4.4	ABCDE
14-3037	1.09	397	3.0	1.00	.95	39	96	5.10	33	5.6	A
14-3055	202	41.8	35.7	1.29	1.26	58	118	5.80	31	5.1	ABCDE
14-3061	62.0	44.2	16.6	1.02	1.41	96	98	3.90	31	5.2	ABÇ E
14-3065	334	21.9	45.0	1.03	1.15	75	93	4.00	31	5.0	ABCDE
14-3067	.27	580	1.1	1.00	.65	81	100	4.00	34	5.6	A
14-3068	.78	174	1.3	1.00	.95	101	98	4.00	34	5.6	A
14-3068.10	1.17	458	1.6	1.00	1.02	96	95	4.00	35	5.6	A
14-3075	52.7	45.5	16.3	2.16	1.43	85	83	3.70	31	3.9	ABCDE
14-3075.50	.75	308	1.6	1.00	1.00	101	100	4.00	31	5.6	A
14-3076.10	.42	479	1.3	1.00	.50	96	88	4.00	33	5.6	A
14-3077	152	27.5	21.8	1.00	3.57	98	49	3.00	30	5.2	ABCDE

See footnote at end of table.

Table A-2.--Basin characteristics for gaging stations used in regression analysis--Continued

Station number	Drainage area A	Slope S	Length L	Storage S_t	Elevation E	Forest F	Precipitation P	Precipitation intensity $I_{24,2}$	Temperature index T_1	Soils index S_i	Regressions in which data were used[1/]
14-3080	449	87.1	39.8	1.09	3.13	99	45	3.00	31	5.3	ABCDE
14-3085	54.4	133	10.0	1.60	2.90	93	52	3.00	31	5.6	ABÇ E
14-3087	55.3	480	13.5	1.00	1.68	95	37	2.90	32	2.1	ABÇ E
14-3089	36.9	168	11.1	1.00	2.10	99	39	2.90	32	2.6	A
14-3090	78	73.3	20.0	1.00	2.92	96	54	2.90	32	4.2	ABCDE
14-3095	86.9	52.5	20.3	1.00	1.99	100	83	3.90	30	5.0	ABCDE
14-3100	456	18.8	49.5	1.00	.68	97	59	3.40	31	3.7	ABCDE
14-3107	43.9	128	15.0	1.01	1.95	87	37	3.00	33	3.1	ABCDE
14-3109	3.16	545	3.1	1.63	1.55	78	30	3.00	33	1.2	A
14-3110	54.2	42.3	20.5	1.02	2.05	85	35	3.00	33	2.4	ABCDE
14-3112	60.5	146	10.2	1.00	1.74	92	48	3.30	30	3.6	ABÇ E
14-3115	158	26.8	26.9	1.03	1.43	78	47	3.30	30	2.3	ABÇ E
14-3120	1,670	19.3	94.0	1.02	2.23	93	46	3.00	32	3.4	ABCDE
14-3121	2.42	274	2.5	1.00	1.13	80	31	3.00	33	.6	A
14-3122	54.3	115	14.2	1.03	1.08	49	33	3.00	33	1.4	ABÇ E
14-3123	1.26	236	1.9	1.00	.75	31	30	3.00	33	.6	A
14-3125	54.9	522	10.5	9.67	5.83	89	48	3.00	19	13.8	AB E
14-3135	175	90.5	24.6	5.40	5.67	96	44	3.00	18	13.8	ABCDE
14-3145	41.6	257	9.8	1.16	5.18	97	65	3.00	21	11.2	ABCDE
14-3155	339	69	40.0	3.42	5.13	96	52	3.00	24	12.5	ABCDE
14-3160	68.8	187	13.8	1.17	4.88	96	51	3.00	24	3.2	ABCDE
14-3165	475	63.6	48.0	2.77	4.87	97	52	3.00	20	9.4	ABÇ
14-3167	227	60.7	24.2	1.02	2.64	100	57	3.00	30	4.1	ABCDE
14-3175	886	69.6	79.0	1.96	3.98	98	52	3.00	27	7.1	ABCDE
14-3176	97.4	163	17.2	1.02	2.80	80	56	3.00	32	4.6	ABÇ E
14-3180	177	139	23.9	1.10	2.59	91	51	3.00	32	4.9	ABCDE
14-3186	.75	517	1.5	1.00	1.18	50	38	3.00	33	2.8	A
14-3192	16.4	55.9	7.4	1.04	.90	46	40	3.00	34	.8	ABÇ E
14-3195	1,344	47.5	108.0	1.65	3.48	88	49	3.00	34	5.9	ABCDE
14-3206	1.28	188	2.3	1.00	.81	23	45	3.00	34	1.8	A
14-3207	210	54.6	28.8	1.00	1.31	59	46	3.00	34	2.3	ABÇ E
14-3210	3,683	8.15	170.0	1.25	2.48	87	47	3.20	32	4.1	ABCDE
14-3219	25.0	23	7.7	1.30	.70	38	43	3.00	34	1.8	A
14-3220	104	27.0	19.5	1.04	1.02	56	43	3.00	34	2.2	ABÇ E
14-3227	5.13	163	3.8	1.00	1.28	49	45	3.00	34	2.2	A
14-3232	87	15.3	15.3	7.01	.50	89	80	4.00	36	5.6	ABÇ E
14-3233	10.0	12	6.6	19.81	.19	75	65	4.00	40	5.6	A
14-3245	46.5	35.5	28.2	1.02	1.22	100	91	4.00	34	5.6	ABCDE
14-3246	31.2	96.3	12.6	1.00	2.86	97	85	4.50	34	5.6	ABCDE
14-3247	40.6	79.2	16.0	1.04	2.78	95	90	5.00	34	5.6	ABCDE
14-3249	93.2	103	25.0	1.04	2.42	98	92	5.30	35	5.6	ABCDE
14-3250	169	82	36.6	1.06	2.20	96	77	4.60	35	5.0	ABCDE
14-3265	305	33	38.8	1.04	1.46	93	76	4.00	32	4.6	ABCDE
14-3266	1.45	194	1.8	1.00	.60	67	65	4.40	36	2.2	A
14-3270	282	18.1	44.1	1.02	1.18	85	72	3.90	34	4.5	ABCDE
14-3271	1.36	100	2.8	1.00	.26	99	60	4.00	40	.7	A
14-3274	.86	542	1.4	1.00	.69	96	75	5.00	39	5.6	A
14-3275	155	76.6	28.2	1.16	5.20	97	56	3.00	23	4.1	ABCDE
14-3280	312	59.1	44.7	1.08	4.90	98	54	3.00	23	5.3	ABCDE
14-3305	61.3	138	17.4	1.84	5.22	99	50	2.50	20	5.6	ABCDE
14-3310	22.2	311	9.0	1.17	4.85	100	58	2.50	21	5.6	ABCDE
14-3320	83.8	134	17.9	1.68	5.15	100	53	2.50	20	5.6	ABCDE
14-3330	57	242	15.3	1.36	5.31	100	56	2.60	21	5.6	ABCDE
14-3335	45.5	220	15.1	1.00	5.29	99	54	2.70	20	5.7	ABCDE
14-3350	650	60.0	53.8	1.18	4.70	98	50	2.80	23	5.0	ABCDE

See footnote at end of table.

Table A-2.--Basin characteristics for gaging stations used in regression analysis--Continued

Station number	Drainage area A	Slope S	Length L	Storage S_t	Elevation E	Forest F	Precipitation P	Precipitation intensity $I_{24,2}$	Temperature index T_1	Solids index S_i	Regressions in which data were used 1/
14-3355	138	141	16.4	1.34	3.95	98	36	2.10	22	4.2	A E
14-3375	249	109	29.8	1.20	3.52	96	36	2.30	24	3.3	A $\underline{C}$ E
14-3380	133	121	20.5	1.00	3.10	100	39	2.80	28	3.5	AB$\underline{C}$ E
14-3390	1,215	34.2	79.5	1.11	3.93	97	43	2.60	25	3.9	AB$\underline{C}$ E
14-3392	6.42	71.0	5.0	1.00	1.57	49	18	2.10	29	1.2	A
14-3395	16.0	108	7.5	1.05	5.35	100	26	1.80	22	5.6	ABCDE
14-3415	138	182	22.3	1.01	4.44	87	22	1.70	25	3.6	ABCDE
14-3530	10.5	617	5.8	1.00	5.12	100	21	1.90	27	5.6	A
14-3535	8.14	535	6.2	1.00	5.04	100	22	1.85	26	5.6	A
14-3590	2,053	30.3	92.3	1.16	3.56	86	35	2.00	25	3.6	ABCDE
14-3613	7.41	334	4.0	1.00	1.98	94	29	2.80	30	3.2	A
14-3620	223	166	17.5	1.09	4.28	95	35	2.80	27	2.1	A E
14-3630	297	95.3	28.4	1.07	3.90	96	32	2.70	28	2.6	A E
14-3660	483	64.7	37.1	1.04	3.66	93	29	2.60	29	3.2	A E
14-3685	8.60	475	5.0	1.00	3.22	97	38	3.40	28	3.2	ABCDE
14-3695	694	38.1	56.1	1.03	3.63	90	31	2.70	29	2.8	A E
14-3698	3.07	376	3.1	1.00	1.76	85	38	3.90	31	3.2	A
14-3700	31.4	180	10.4	1.00	2.16	92	45	4.00	31	3.2	ABCDE
14-3702	3.16	332	2.7	1.00	1.63	100	34	3.70	30	3.2	A
14-3715	22.1	132	10.3	1.00	3.48	101	53	3.00	31	1.2	ABCDE
14-3725	42.3	308	9.7	1.04	3.90	99	74	5.30	29	3.2	ABCDE
14-3750	76	170	15.1	1.05	3.91	98	57	3.80	27	3.6	ABCDE
14-3755	42.4	128	9.7	1.02	2.50	93	80	5.80	31	3.2	ABCDE
14-3770	364	112	26.9	1.04	2.93	88	66	5.00	29	3.2	ABCDE
14-3775	23	333	6.8	1.04	3.37	97	43	3.60	28	3.2	ABCDE
14-3778	1.62	1240	2.5	1.00	3.05	93	42	4.60	31	.6	A
14-3780	665	38.1	48.3	1.02	2.78	88	58	4.80	29	3.1	ABCDE
14-3788	1.05	423	2.7	1.00	6.00	96	83	5.70	41	2.2	A
14-3789	.74	222	2.2	1.00	.43	52	82	5.70	40	2.2	A

1/ A, peak discharges,
B, annual flow characteristics,
C, monthly flow characteristics,
$\underline{C}$, winter months only,
D, low flows,
E, high flows.

Table A-3.--Summary of regression equations for western Oregon

$$\left[Y = aA^{b_1} S^{b_2} S_t^{b_3} E^{b_4} F^{b_5} P^{b_6} I_{24,2}^{b_7} T_1^{b_8} S_i^{b_9} \right]$$

Flow characteristic Y	Drainage area b_1	Channel slope b_2	Storage b_3	Elevation b_4	Forest b_5	Annual precipitation b_6	Precip. intensity b_7	Temperature index b_8	Soils index b_9	Regression constant a	Standard error of estimate (percent)
	Exponent of basin characteristic										
Q_a	1.004					1.231				1.87×10^{-2}	20
SD_a	.993		-0.170			.680	0.354			3.13×10^{-2}	31
q_1	1.009				-0.134	1.042	.692	0.935	-0.128	3.07×10^{-3}	20
q_2	1.022					1.038	.616	.846	-.173	2.51×10^{-3}	19
q_3	1.005					1.031	.357	.754		3.43×10^{-3}	16
q_4	1.016			0.384		1.247		.435		3.52×10^{-3}	27
q_5	1.009		.273	.713		1.440	-.464		-.157	7.60×10^{-3}	26
q_6	1.040		.300	.647		1.617	-.907	-1.319		1.92×10^{-1}	33
q_7	1.052		.359	.562		1.627	-.682	-2.626		4.67	41
q_8	1.072		.380	.607		1.327		-3.807		1.89×10^{2}	52
q_9	1.059		.398	.604	-.411	1.762	-.752	-3.109		5.06×10^{1}	52
q_{10}	.996			.607	-.486	1.696		-.862		8.58×10^{-2}	39
q_{11}	1.018			.186	-.351	1.681		.744		9.55×10^{-4}	26
q_{12}	1.022	0.059			-.178	1.216	.449	.920	-.125	1.74×10^{-3}	21
Mean of standard errors for mean monthly discharges											31
SD_1	1.039	.104				.947	.739	1.891	-.252	3.49×10^{-5}	28
SD_2	1.064	.081				.983	.792	1.301	-.315	1.69×10^{-4}	25
SD_3	1.000					.925	.410	1.675	-.141	1.15×10^{-4}	22
SD_4	.963					1.013		1.076		7.42×10^{-4}	25
SD_5	.969			.503		.992		.846		9.43×10^{-4}	30
SD_6	1.024		.441	.991		1.919	-1.191		-.313	5.22×10^{-4}	43
SD_7	1.056		.336	.529		1.745	-1.061	-1.494		3.60×10^{-2}	45
SD_8	.991		.423	.453	-.322	1.439	-.737	-2.241		2.90	44
SD_9	1.017				-.602	2.42	-1.128	-1.638	.448	3.68×10^{-2}	62
SD_{10}	1.083	.211		.529		1.875	.643	1.926	-.574	1.87×10^{-7}	48
SD_{11}	1.091	.105				1.806		1.651	-.350	2.93×10^{-6}	32
SD_{12}	.988			.333		.958	.730	2.248	-.309	1.90×10^{-5}	35
Mean of standard errors for standard deviations of mean monthly discharges											37
Q_2	.921		-.400	.343		.806	.692	2.604	-.203	1.59×10^{-4}	45
Q_5	.919		-.419	.416		.722	.668	2.552	-.232	4.09×10^{-4}	45
Q_{10}	.919		-.424	.454		.684	.678	2.469	-.245	7.70×10^{-4}	46
Q_{25}	.899		-.476	.503		.783	.594	2.301	-.253	1.35×10^{-3}	46
Q_{50}	.903		-.310	.741		1.194		2.714	-.560	1.70×10^{-4}	40
$M_{7,2}$	1.124			.645		1.255		-4.716		2.82×10^{3}	65
$M_{7,10}$	1.134			.628		1.228		-4.621	.425	8.82×10^{2}	70
$M_{7,20}$	1.139			.674		1.275		-4.584	.468	5.13×10^{2}	73
$V_{7,2}$	.976		-.184			1.022	.587	1.493	-.152	1.17×10^{-3}	24
$V_{7,10}$	.974		-.178	.275		.951	.658	1.917	-.263	5.43×10^{-4}	27
$V_{7,50}$	.980			.501		.949	.744	1.960	-.406	5.34×10^{-4}	23

Table A-4.--Summary of regression equations for eastern Oregon

$$\left[Y = aA^{b_1} S^{b_2} S_t^{b_3} E^{b_4} F^{b_5} P^{b_6} I_{24,2}^{b_7} T_1^{b_8} S_i^{b_9} \right]$$

Flow characteristic Y	Drainage area b_1	Channel slope b_2	Storage b_3	Elevation b_4	Forest b_5	Annual Precipitation b_6	Precip. intensity b_7	Temperature index b_8	Soils index b_9	Regression constant a	Standard error of estimate (percent)
	Exponent of basin characteristic										
Q_a	0.826		-0.362		0.308	1.331				7.66×10^{-3}	52
SD_a	.861				.502	.478			-0.188	1.78×10^{-2}	35
q_1	.915					.588	2.110		-.471	1.10×10^{-1}	58
q_2	.934						2.127		-.484	9.28×10^{-1}	55
q_3	.873			-1.897		.641				4.26	52
q_4	.937		-.493			.756		0.871		2.02×10^{-2}	44
q_5	.984	0.270	-.376			1.115				1.95×10^{-2}	48
q_6	.961		-.745	3.228	-.599	2.461		2.667		2.82×10^{-8}	50
q_7	.657		-.740		-1.224	3.482				5.41×10^{-3}	102
q_8	.672		-1.453		-2.221	4.465			1.077	1.29×10^{-3}	138
q_9	.716		-1.607		-2.264	4.459			1.207	9.65×10^{-4}	153
q_{10}	.726		-1.395		-1.845	3.990			.938	1.34×10^{-3}	125
q_{11}	.858		-.464			1.522	1.580			3.03×10^{-3}	89
q_{12}	.877		-.316			.979	1.393	.762		3.28×10^{-3}	56
Mean of standard errors for mean monthly discharges											81
SD_1	.878			-1.122	.385		.577	.786		6.72×10^{-2}	47
SD_2	.887			-1.419	.267			.703		3.12×10^{-1}	45
SD_3	.896			-1.642						8.84	46
SD_4	.925		-.264							1.02	44
SD_5	.996	.235		.665	.673				-.331	1.08×10^{-2}	37
SD_6	.942		-.528	2.796		1.389		2.183		2.91×10^{-7}	45
SD_7	.775		-.556	2.413		2.360				6.37×10^{-6}	79
SD_8	.743				-1.068	2.728				2.65×10^{-3}	121
SD_9	.719		-1.057		-1.511	3.596			.883	3.07×10^{-4}	108
SD_{10}	.794					1.753				9.72×10^{-4}	103
SD_{11}	.893					.891	2.358		-.647	1.70×10^{-2}	65
SD_{12}	.872				.658			1.725		3.99×10^{-4}	58
Mean of standard errors for standard deviations of mean monthly discharges											66
Q_2	.775				.211	.450			-.608	3.71	56
Q_5	.751					.375			-.581	1.92×10^{1}	56
Q_{10}	.726								-.584	8.89×10^{1}	58
Q_{25}	.740								-.582	1.16×10^{2}	60
Q_{50}	.794				.291				-.685	3.71×10^{1}	56
$M_{7,2}$	.745		-2.315		-2.685	5.117			1.586	2.50×10^{-4}	182
$M_{7,10}$	.682		-2.634		-3.007	5.608			1.633	1.57×10^{-4}	225
$M_{7,20}$	.660		-2.724		-3.099	5.775			1.641	1.27×10^{-4}	237
$V_{7,2}$	.807				.537	.578			-.582	3.61×10^{-1}	46
$V_{7,10}$	.815				.364	.448			-.491	1.60	48
$V_{7,50}$	.846				.245	.613			-.487	1.70	49

Table A-5.--Records for streams materially affected by regulation

Station number	Station name	Length of record through 1970 water year: Before reservoir construction	Length of record through 1970 water year: After reservoir construction
10-3900	Silver Creek nr Silver Lake	a 16	ba 49
11-3395	Drews Creek nr Lakeview	a 4	ba 58
11-3405	Cottonwood Creek nr Lakeview	a 11	ba 47
11-4835	Miller Creek at Gerber Reservoir, nr Lorella	a 6	c 26
11-4870	Lost River at Wilson Bridge, nr Olene	0	bc 9
11-5075	Link River at Klamath Falls	14	b 52
11-5095	Klamath River at Keno	10	41
11-5105	Klamath River at Spencer Bridge, nr Keno	5	bc 13
11-5107	Klamath River bl John C. Boyle powerplant, nr Keno	0	11
13-1810	Owyhee River nr Rome	0	b 21
13-1820	Owyhee River ab Owyhee Reservoir	0	bc 22
13-1830	Owyhee River bl Owyhee Reservoir	0	41
13-1840	Owyhee River nr Owyhee	a 19	bac 13
13-2150	Malheur River bl Warmsprings Reservoir, nr Riverside	a 5	52
13-2175	North Fork Malheur River at Beulah	9	35
13-2185	North Fork Malheur River at Juntura	a 12	ac 5
13-2190	Malheur River nr Namorf	6	ac 10
13-2200	Malheur River at Little Valley, nr Hope	0	21
13-2205	Malheur River nr Hope	a 1	ac 30
13-2290	Malheur River bl Nevada Dam, nr Vale	0	dac 35
13-2305	Willow Creek bl reservoir, nr Malheur	a 2	ac 10
13-2730	Burnt River nr Hereford	a 11	33
13-2742	Burnt River nr Bridgeport	0	14
13-2750	Burnt River at Huntington	4	12
13-2753	Powder River nr Sumpter	2	3
13-2755	Powder River nr Baker	a 54	c 1
13-2867	Powder River nr Richland	0	b 13
13-2895	Powder River nr Robinette	3	bc 26
13-3275	Wallowa River at Joseph	0	ba 56
13-3310	Wallowa River nr Wallowa	0	bc 3
14-0235	McKay Creek nr Pendleton	a 7	a 44
14-0260	Umatilla River at Yoakum	a 7	ba 57
14-0335	Umatilla River nr Umatilla	6	b 61
14-0540	Deschutes River bl Crane Prairie Reservoir, nr La Pine	a 5	b 48
14-0550	Deschutes River ab Davis Creek, nr Lapine	0	c 7
14-0565	Deschutes River bl Wickiup Reservoir, nr La Pine	0	32
14-0570	Deschutes River at Pringle Falls, nr Lapine	a 3	bc 30
14-0600	Crescent Creek at Crescent Lake	a 4	a 44
14-0605	Crescent Creek bl Cold Creek, nr Crescent	0	ac 7
14-0620	Little Deschutes River ab Walker Basin intake, nr Lapine	a 7	ac 7
14-0630	Little Deschutes River nr La Pine	a 9	46
14-0635	Little Deschutes River at Allen's Ranch, nr Lapine	a 11	ac 4
14-0645	Deschutes River at Benham Falls, nr Bend	a 11	b 46
14-0650	Deschutes River ab Lava Island, nr Bend	a 3	bac 8
14-0660	Deschutes River bl Lava Island, nr Bend	0	bc 39
14-0705	Deschutes River bl Bend	8	b 48
14-0745	Deschutes River at Cline Falls, nr Redmond	a 4	bac 19
14-0765	Deschutes River nr Culver	0	18
14-0805	Crooked River nr Prineville	a 26	10
14-0873	Crooked River nr Terrebonne	0	3
14-0874	Crooked River bl Opal Springs, nr Culver	0	b 9
14-0875	Crooked River nr Culver	2	bc 44
14-0925	Deschutes River nr Madras	0	b 47
14-0935	Deschutes River at Mecca	8	bc 8
14-0974	Clear Creek bl Clear Lake, nr Government Camp	0	2

See footnotes at end of table.

Table A-5.--Records for streams materially affected by regulation--Continued

Station number	Station name	Length of record through 1970 water year: Before reservoir construction	Length of record through 1970 water year: After reservoir construction
14-0986	Clear Creek nr Pine Grove	0	3
14-1020	Deschutes River at Sherars Bridge	0	bac 10
14-1030	Deschutes River at Moody, nr Biggs	a 20	b 48
14-1395	Bull Run River bl Lake Ben Morrow	0	c 25
14-1400	Bull Run River nr Bull Run	21	42
14-1420	Bull Run River at Bull Run	0	c 5
14-1425	Sandy River bl Bull Run River, nr Bull Run	4	c 37
14-1455	Middle Fork Willamette River ab Salt Creek, nr Oakridge	26	10
14-1480	Middle Fork Willamette River bl North Fork, nr Oakridge	37	10
14-1500	Middle Fork Willamette River nr Dexter	7	17
14-1510	Fall Creek bl Winberry Creek, nr Fall Creek	30	5
14-'520	Middle Fork Willamette River at Jasper	a 12	18
14-1535	Coast Fork Willamette River bl Cottage Grove Dam	3	28
14-1555	Row River nr Cottage Grove	10	21
14-1570	Coast Fork Willamette River at Saginaw	19	c 9
14-1575	Coast Fork Willamette River nr Goshen	6	20
14-1580	Willamette River at Springfield	25	c 15
14-1588.5	McKenzie River bl Trail Bridge Dam, nr Belknap Springs	3	8
14-1590	McKenzie River at McKenzie Bridge	52	8
14-1595	South Fork McKenzie River nr Rainbow	16	7
14-1622	Blue River at Blue River	0	4
14-1625	McKenzie River nr Vida	38	8
14-1655	McKenzie River nr Coburg	18	8
14-1660	Willamette River at Harrisburg	0	26
14-1690	Long Tom River nr Alvadore	2	29
14-1700	Long Tom River at Monroe	a 21	29
14-1740	Willamette River at Albany	a 55	29
14-1815	North Santiam River at Niagara	a 27	18
14-1830	North Santiam River at Mehama	a 40	18
14-1867	South Santiam River at Foster	0	4
14-1875	South Santiam River at Waterloo	a 48	4
14-1890	Santiam River at Jefferson	22	18
14-1907	Rickreall Creek nr Dallas	2	11
14-1910	Willamette River at Salem	a 27	29
14-1950	Haskins Creek nr McMinnville	c 23	0
14-1960	Haskins Creek bl reservoir, nr McMinnville	0	19
14-1980	Willamette River at Wilsonville	0	22
14-2085	Oak Grove Fork at Timothy Meadows	c 16	0
14-2087	Oak Grove Fork nr Government Camp	0	14
14-2090	Oak Grove Fork ab powerplant intake	47	14
14-2095	Clackamas River ab Three Lynx Creek	a 41	14
14-2487	Bear Creek nr Svensen	0	5
14-3135	North Umpqua River bl Lemolo Lake, nr Toketee Falls	26	17
14-3140	North Umpqua River ab Clearwater River, nr Toketee Falls	5	c 1
14-3165	North Umpqua River ab Copeland Creek, nr Toketee Falls	4	17
14-3425	North Fork Little Butte Creek at Fish Lake, nr Lakecreek	a 1	54
14-3430	North Fork Little Butte Creek nr Lakecreek	a 2	48
14-3445	N. F. Little Butte Cr. ab intake of Rogue River Valley Canal, nr Lakecreek	0	ac 34
14-3500	Emigrant Creek nr Ashland	a 5	a 46
14-3505	Emigrant Creek bl Walker Creek, nr Ashland	0	c 8
14-3545	Bear Creek nr Ashland	a 2	ac 16
14-3570	Bear Creek bl Phoenix Canal, nr Talent	a 2	ac 7
14-3575	Bear Creek at Medford	a 10	46
14-3585	Bear Creek nr Central Point	a 2	ac 4

a Streamflow records are partially incomplete.
b Records of reservoir content are incomplete.
c Discontinued station.
d Includes streamflow records published by State Engineer.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

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STREAM GAGING STATION

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
PORTLAND, OREGON