STATE OF CALIFORNIA

EARL WARREN

Governor

PUBLICATION OF

STATE WATER RESOURCES BOARD

BULLETIN NO. 1

WATER RESOURCES OF CALIFORNIA

1951

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CHAPTER I. INTRODUCTION

WATER A MAJOR FACTOR IN CALIFORNIA ECONOMY

Few convictions are more generally or more firmly fixed in the minds of the people of California than that our number one economic problem is to put to best use our invaluable water supply.

Previous investigations have shown that this supply is adequate for a population much larger than the present 10,500,000, and that with additional storage and redistribution of water, most of the agricultural lands of the State, except only some desert and higher areas, can be serviced for irrigation as our expanding economy and human requirements justify the costs involved. Furthermore, without too great a sacrifice of reasonable needs, our multiple uses of water for domestic and municipal consumption, for agriculture, industry, power, recreation, and wild life preservation can be so coordinated as to achieve maximum benefits for the largest number of people.

This bulletin presents the first results of new studies, under direction of the State Water Resources Board, aimed at a solution of this number one problem. It brings together in one volume the principal basic data regarding water in California that have been accumulated up to 1947, thereby becoming an inventory of the water resources of the State. Concurrently with preparation of this inventory, work has progressed on the other principal phases of the program: determination of present use of water and of ultimate water requirement, and formulation of "The California Water Plan" to meet that requirement.

NEED FOR AN INVENTORY OF WATER RESOURCES

Several inventories of the water resources of California have been made in the past, but succeeding years have added to the basic records and generally to the knowledge of the water resources of the State. It is for this reason and because planning for the future must start with a thorough understanding of the location, amount, and quality of the waters of the State, and of physical conditions which determine their occurrence and availability, that the State Water Resources Board was authorized by the Legislature to make this state-wide investigation.

AUTHORITY AND FUNDS FOR INVESTIGATION

The State Water Resources Act of 1945, as amended by Chapter 908, Statutes of 1947, invested in the State Water Resources Board broad powers to initiate and conduct investigations of the water resources of the State. Section 17 (a) of the amended act reads as follows:

> "The Water Resources Board is authorized to conduct investigations of the water resources of the State; to formulate plans for the control, conservation, protection, and utilization of such water resources, including solutions for the water problems of each portion of the State as deemed expedient and economically feasible; and to render reports thereon."

Chapter 1541, Statutes of 1947, appropriated $140,000 to the board for expenditure during the Fiscal Year 1947-48 in conducting investigations and otherwise carrying out the provisions of the State Water Resources Act. The Budget Acts of 1948, 1949, and 1950 made appropriations for continuance of the investigation and for preparation of reports.

HISTORY OF WATER DEVELOPMENT IN CALIFORNIA

History of the use of water in California starts with the Spanish missions in the final third of the Eighteenth Century. Profiting by their experience in arid Baja California, the padres established most of the Alta California missions where water for irrigation was available. Except for some small Indian cultivations along the west bank of the Colorado River, it was in the mission "gardens" of fruits and vegetables, and perhaps in occasional fields of grain, that irrigation in California had its beginnings. Even yet, a century and a half later, remnants of mission works to supply irrigation and domestic water may be seen, notably at San Diego Mission Dam on San Diego River and at Santa Barbara Mission Dam and Reservoir above Santa Barbara.

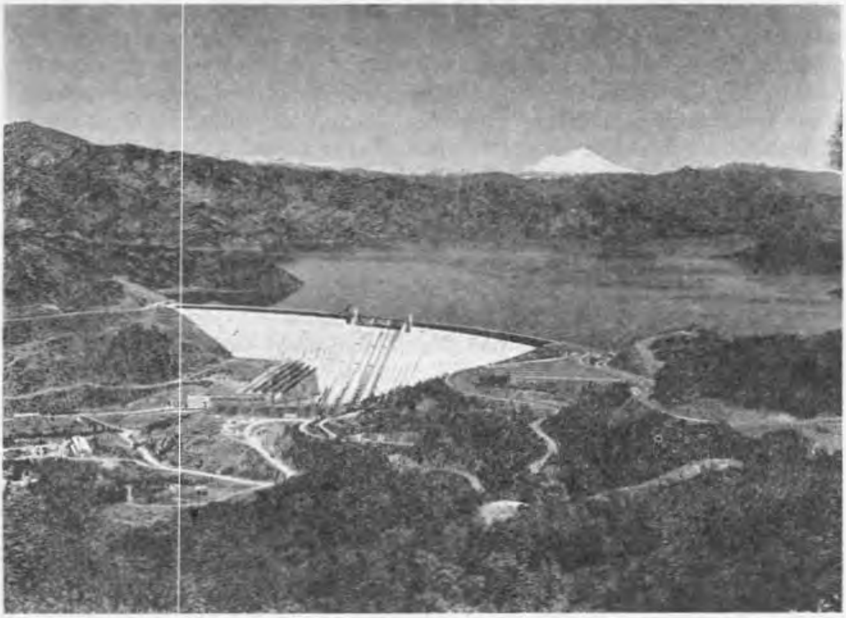
Acreage irrigated at the Spanish missions was small, yet it provided an important object lesson for American and European settlers who began arriving in California in the 1830's and 1840's.

During the first two decades of American occupation, from 1850 to 1870, settlers in the southern part of California built small ditches from streams of the Coastal Plain, mainly in the San Gabriel and Santa Ana Basins. In the northern and central parts of the State water was also diverted from streams, obtained from artesian flows, and to a limited extent was pumped from streams, with steam-driven pumps. In the Sierra Nevada foothills water was acquired from mining ditches, irrigation being accelerated by the expansion in population that accompanied and followed the Gold Rush.

The first irrigation was from nearby streams, without storage, and lands irrigated were limited to those that could be watered from low summer flows. In the southern part of California, however, the need for storage reservoirs was early recognized and several important dams, including Bear Valley, Hemet, Sweetwater, and Cuyamaca, were constructed or begun in the 1880's. In the remainder of the State, on the other hand, all major storage reservoirs primarily for irrigation have been provided since 1900. A number of these, such as Melones, Don Pedro, and Exchequer, were made feasible only by the power to be developed with the water stored.

Early irrigators following Spanish and Mexican days were mainly individuals. By 1856, however, a "commercial" company had constructed canals to irrigate wheat near Woodland in Yolo County, and about that time groups of settlers were joining together to build ditches in the south. Construction of larger irrigation works by development companies and cooperatives was well under way by the 1870's and 1880's, both in the southern part of the State and in the central and southern parts of San Joaquin Valley. In 1887, the original Wright Irrigation District Act was passed by the Legislature. By following the general pattern of this act, the principal irrigation expansion in California has been accomplished during the past 30 or 40 years. Owing largely to authority granted by the Legislature to irrigation and similar districts

MISSION DAM ON SAN DIEGO RIVER



(U. S. Bureau of Reclamation Photo)

SHASTA DAM AND RESERVOIR ON SACRAMENTO RIVER to finance, construct, and operate irrigation works, and also because of the activities of many individuals, cooperatives, and water utilities, irrigated acreage of California has increased to some 6,000,000 acres.

Ground waters have been extensively tapped for irrigation, as well as for domestic and municipal uses. Improvement of pumping equipment, and extension of electric power service generally over important ground water basins, have so stimulated development that in some of these basins ground waters have been overdrawn. Serious losses have already resulted and more will follow unless corrective measures are taken, either by adjusting draft to natural underground supply, or by providing replenishment of that supply or supplemental surface water. Underground sources furnished about half of the domestic, municipal, industrial, and irrigation water in California in 1949.

Advances in the use of water in other fields have also been striking. Hydroelectric power, first developed in California in 1893, constitutes approximately half of the presently installed power capacity in the State. Water supplies for municipalities, initially secured locally, are now in some cases being brought great distances. Outstanding illustrations are the aqueducts importing Sierra Nevada water to San Francisco and its environs, to the East Bay cities and to Los Angeles, and the conduit bringing Colorado River water to Los Angeles and the other communities constituting the Metropolitan Water District of Southern California.

During the last 20 years federal agencies have entered the field of water resource development in California in a large way in the financing and construction of projects for water conservation, irrigation, navigation, and flood control, and for the protection of wild life. Both the Corps of Engineers of the Department of the Army and the Bureau of Reclamation of the Department of the Interior have outlined comprehensive proposals, some of which have been authorized, with construction of several under way. The most extensive federal project now under construction is the Central Valley Project, which is being built in substantial accord with the State Water Plan referred to later in this chapter.

Progress in the use of water in California has been made despite two incompatible doctrines governing rights to the use of water in surface streams, those of appropriative and of riparian rights. A similar conflict has been encountered in rules applicable to ground water, between the overlying right, formulated by analogy to the riparian right, and appropriation. Recognition of pueblo rights is based on terms of the treaty with Mexico when Alta California was acquired by the United States, but such rights are now exercised only by Los Angeles and San Diego.

The appropriation doctrine in its generally accepted form originated in this State in the early mining customs. These were recognized by the courts, but the earliest statute sanctioning this doctrine was enacted March 21, 1872. (Cal. Civ. Code, Secs. 1410-1422). Prior to December 19, 1914, an appropriative water right could be established in California either by actual diversion and application of the water to beneficial use, or by posting a notice at the point of diversion and recording the notice with the county recorder, followed by diligence in construction and application of the water to beneficial use. Since that date an appropriative right to water, other than percolating ground water, must be initiated by filing an application with the Division of Water Resources of the State

Department of Public Works, pursuant to Divisions 1 and 2 of the State Water Code (formerly the Water Commission Act). In contrast with either a riparian right to surface water or an overlying right to ground water, an appropriative right is created by use and is lost by nonuse.

The opposing riparian doctrine as now established in California consists of the old common law rule, as modified by California court decisions, and particularly by Section 3 of Article XIV of the State Constitution adopted in 1928, and decisions following and applying it. Under this doctrine, a riparian landowner is entitled to a reasonable use of water correlative with all other riparian owners bordering on the same stream, lake, or watercourse, except that all the water may be consumed by an upper riparian owner if necessary for domestic use. The State Supreme Court in a line of decisions between 1886, *Lux* v. *Haggin* and 1927 *Herminghaus* v. *Southern California Edison Co.,* vacillated between strict application and liberalization of the old common law rule. The harsh construction of the rule in the latter case brought about a general demand for modification. The result was adoption of the constitutional amendment of 1928. This amendment, which has repeatedly been upheld by the courts of the State, imposed reasonable and beneficial use on riparian as well as other water users. It provides as follows:

> "Sec. 3. It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare.
>
> "The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water. Riparian rights in a stream or water course attach to, but to no more than so much of the flow thereof as may be required or used consistently with this section, for the purpose for which such lands are, or may be made adaptable, in view of such reasonable and beneficial uses; provided, however, that nothing herein contained shall be construed as depriving any riparian owner of the reasonable use of water of the stream to which his land is riparian under reasonable methods of diversion and use, or of depriving any appropriator of water to which he is lawfully entitled. This section shall be self-executing, and the Legislature may also enact laws in the furtherance of the policy in this section contained."

In 1935, the Supreme Court of California in the case of *Peabody* v. *City of Vallejo,* 2 Cal.2d 351, fully approved and upheld the constitutional amendment, saying in part as follows:

> "The limitations and prohibitions of the constitutional amendment now apply to every water right and every method of diversion. Epitomized the amendment declares:
>
> "1. The right to the use of water is limited to such water as shall be reasonably required for the beneficial use to be served.

"2. Such right does not extend to the waste of water.

"3. Such right does not extend to unreasonable use or unreasonable method of use or unreasonable method of diversion of water.

"4. Riparian rights attach to, but to no more than so much of the flow as may be required or used consistently with this section of the Constitution.

"The foregoing mandates are plain, they are positive, and admit of no exception. They apply to the use of all water, under whatever right the use may be enjoyed. The problem is to apply these rules in the varying circumstances of cases as they arise."

During the last few years quality of water has become a matter of vital concern to some areas of the State. It has long been common practice to discharge various sewage and industrial wastes into water sources and onto the land, thereby often impairing the quality of surface and ground water supplies. Local communities have made some efforts to cope with the problems thus created, but without great success. The need for effective action was finally brought sharply into focus by the tremendous expansion in industrial development during and since World War II. An increase in population of about 4,000,000 in the last decade intensified pollution damage, and the ever increasing threat to the quality of their water supplies became a matter of grave anxiety to water users. As a result, under provisions of a series of laws enacted by the Legislature in 1949, the State has recognized the continuing threat of water pollution and assumed responsibility for maintaining the quality of its water resources. These acts created nine regional water pollution control boards and one state board, and endowed them with broad powers to control water pollution.

THE CALIFORNIA WATER PROBLEM

The over-all water problem of California is made up of many interrelated problems, some of which are mainly local while others are statewide in implication. Prior to the time when the southern part of California had to turn to the Colorado River, and until rapidly receding ground waters in southern San Joaquin Valley brought about initiation of the Central Valley Project, water needs were met in most instances by some form of local action. It is now generally realized, however, that a greater measure of state leadership and participation in planning and construction is required if the water resources of California are to be properly controlled and utilized to meet rapidly increasing needs of the people.

From a state-wide point of view, redistribution of the water supply from areas of surplus to areas of deficiency provides the greatest challenge, especially in the northern and central portions of California. About two-thirds of the water is in the northern third of the State, whereas the greater demands—agricultural, industrial, and municipal—are in the central and southern portions. The solution of such a geographical problem must involve transportation and exchange of water, generally from north to south. It must include construction of surface storage reservoirs and utilization of the great ground water storage capacity of the valleys for regulating stream flow. Multiple-purpose basin and trans-basin developments will be required, involving many complex technical, financial, and legal problems. There must be increased development and transmission of hydroelectric power for project purposes and to help meet growing demands for electric energy. Solution of the problems of flood control involves construction of detention reservoirs, levees, revetments, and by-pass channels. In many situations flood control and conservation works can be combined, but even where this is possible complete flood control may require additional separate works. In the Central Valley, conservation features will provide a substantial measure of salinity control, as well as improvements to navigation. On many if not most streams of the State, water conservation will contribute to recreation, support of fish and wild life, and other beneficial uses. These in broad outline are the elements of the California Water Problem.

A century of experience in California has demonstrated that growth and development of the State depend on the adequacy and economical utilization of its water supply. The California Water Plan to be set forth in State Water Resources Board Bulletin No. 3 will furnish a pattern to meet that need. Its implementation will provide a truly comprehensive and coordinated development of this great and most vital resource. However, as the future unfolds and conditions change, planning must continue.

PREVIOUS INVESTIGATIONS

The first broad investigation of the irrigation problem of California was made by a board of commissioners on "The Irrigation of the San Joaquin, Tulare, and Sacramento Valleys of the State of California," published by the House of Representatives in 1874 as Ex. Doc. No. 290, Forty-third Congress, First Session. It outlined a hypothetical irrigation system for the San Joaquin, Tulare, and Sacramento Valleys. Other investigations by federal and state agencies followed during the next several decades, the most noteworthy of which were by Wm. Ham. Hall, State Engineer from 1878 to 1889. His reports contain meteorological and stream flow data, with notes on irrigation, drainage, and flood control, all of which proved of great value in planning water developments in the years that followed.

The most comprehensive recent investigations of the water resources of California were those by the State Engineer under authority of acts of the Legislature in 1921, 1925, and 1929. First reports of these investigations were presented in Division of Engineering and Irrigation bulletins Nos. 4, 5, and 6, and in Division of Water Resources bulletins Nos. 9, 12, 13, 14, and 20. A report giving results of subsequent investigations and outlining revised proposals was published in 1930 as Division of Water Resources Bulletin No. 25. This was entitled "Report to Legislature of 1931 on State Water Plan." It outlined a coordinated plan for conservation, development, and utilization of the water resources of California. The plan was approved and adopted by the Legislature by Chapter 1185, Statutes of 1941, and designated the "State Water Plan." The State Water Plan was amended by Chapter 329, Statutes of 1945, which eliminated the proposed Trinity River Diversion. Division of Water Resources bulletins Nos. 26, 27, 28, 29, and 31 outlined in greater detail project plans for coordinated development of the water resources of the Central Valley, and for water conservation and flood control in the Santa Ana River Basin. Bulletins Nos. 34, 35, and 36 dealt with collateral matters of water charges and costs and rates of irrigation development. Bulletin

No. 31 discussed briefly the plans for diversion and transmission of Colorado River water to the South Coastal Basin under the project of the Metropolitan Water District of Southern California.

OBJECTIVE OF STATE-WIDE WATER RESOURCES INVESTIGATION

Although investigations that led to the State Water Plan were conceived as comprehensive and state-wide, they were never completed in that pattern. All phases were not considered for certain areas of the State, and important projects were omitted and left for future study. Furthermore, although adopted by the Legislature in 1941, the plan was formulated in 1930 and was based on investigations and studies conducted in the preceding decade. Since 1930 the population of California has almost doubled, and the need for flood control, water conservation, and power has more than kept pace with population and industrial growth.

Objective of the current state-wide water resources investigation is, therefore, the preparation of a revised and more complete plan for the fullest conservation, control, and utilization of the water resources of California, both surface and underground, to meet present and future water needs for all beneficial purposes and uses in all areas of the State, so far as is practicable. This plan has been designated "The California Water Plan."

SCOPE OF BULLETIN

The present bulletin—the first of four to be concerned with preparation of the California Water Plan—comprises an inventory of the water resources of the State. As the state-wide water resources investigation progresses, this bulletin will be followed by others concerned with present utilization and ultimate water requirement in California, the California Water Plan for development of the water resources of the State to meet the ultimate requirement, and finally a summary of the earlier bulletins and restatement of the California Water Plan.

This bulletin outlines and describes the drainage basins of California by major hydrographic areas, with a summary of "mountain and foothill" and "valley and mesa" lands. It discusses conditions relating to precipitation and runoff, on a state-wide basis, and contains estimates of the probable frequency of floods on principal streams. Since this bulletin comprises an inventory of the water resources of the State, it includes available records of precipitation and runoff at most stations or points of measurement, and records or estimates of the natural flow of streams of all drainage basins. Finally, it summarizes available data regarding quality and suitability for beneficial uses of both the surface and underground waters of California.

Consideration is given to the principal sources of ground waters of the State. These consist of surface inflow from mountain and foothill lands tributary to ground water basins, and precipitation on valley and mesa lands overlying the basins. However, subsurface inflow from tributary drainage basins is not included in the present inventory. Subsurface inflow is known to be locally significant in certain underground basins, but in most tributary drainage areas the soil mantle is either nonwater-bearing, or too thin to transmit appreciable subsurface flow. On a state-wide basis, the aggregate of such flow is small compared with recharge of ground water basins from surface runoff and from precipitation on overlying lands.

RELATED SUBJECTS

For reasons later indicated, certain subjects relating in various degree to the water resources of California have been excluded from the scope of this bulletin.

The relatively large water storage capacity of valley fills in California comprises one of the more important natural resources of the State, its great value stemming from its natural regulation and conservation of precipitation and runoff. However, ground water storage capacity in itself is not an additional water resource, and has not been evaluated in the present inventory. It is briefly discussed in the ensuing section, "Natural Regulation of Water Resources."

Recent technological advances have called attention to sea water conversion and to cloud seeding as possible means of adding to the water resources of California. Similarly, reclamation of sewage and waste waters for beneficial use, which already has been accomplished in certain instances, is under discussion and investigation. Possible augmentation of the water resources of the State by these methods has not been considered in the present inventory. However, the three methods are briefly discussed in ensuing sections, and a tentative evaluation of potential reclamation of sewage and waste water is contained in an appendix to this bulletin.

Natural Regulation of Water Resources

The extensive ground water basins of California provide natural regulation for runoff from tributary mountain and foothill drainage areas, and for precipitation directly on overlying mesa and valley floor lands. More than half of the State's water presently utilized on irrigated lands, and for domestic, municipal, and industrial purposes, is regulated in ground water basins.

Additional natural regulation of water resources would be provided if presently unused ground water storage capacity were utilized to the full extent of safe yield of the ground water basins. Furthermore, as additional surface water supplies are developed and made available for storage in ground water basins, safe yield of the underground reservoirs will be increased. Under ultimate development of water resources in the State, the maximum amount of firm water could be made available on demand through operation of surface reservoirs on an average yield basis in conjunction with cyclic underground storage. Such coordinated operation would necessitate an adequate supply of energy to pump ground water in a series of dry years.

Usability of a ground water basin as a natural regulator of water resources is dependent upon method and rate of replenishment of stored water, as well as extraction from the basin for beneficial use. The largest bodies of usable ground water storage capacity in California are in the Sacramento and San Joaquin Valleys in the Central Valley Area. Other important natural regulators of lesser magnitude are those in Santa Clara, Napa, Santa Rosa, and Livermore Valleys, and the Niles Cone in the San Francisco Bay Area; the Pajaro, Salinas, Santa Maria, and Santa Ynez River Basins in the Central Coastal Area; the Ventura, Santa Clara, Los Angeles, San Gabriel, and Santa Ana River Basins in the South Coastal Area; Antelope, Owens, and Mojave Valleys in the Lahontan Area; and the Coachella Valley in the Colorado Desert Area.

Results of cooperative ground water investigations in California conducted by the United States Geological Survey and the Department of Engineering of the State of California were published in a series of Geological Survey Water-Supply Papers between 1901 and 1924. Several investigations have been made by the State Division of Water Resources and its statutory predecessors to determine storage capacity of various ground water basins of the State within limited ranges below ground surface.

Ground water investigational work in California was resumed by the United States Geological Survey in 1948, in cooperation with the State Water Resources Board and the Department of Public Works, as a phase of the current State-wide Water Resources Investigation. Geologic features of ground water basins are being appraised by the Geological Survey in areas where little or inadequate information exists relative to natural regulation of water resources. Such work has been completed in the Sacramento Valley, and is in progress in the North Coastal Area and the west side of the San Joaquin Valley.

A summary statement by the United States Geological Survey of an unpublished report on ground water storage capacity of the Sacramento Valley, made pursuant to the recent cooperative agreement with the State, appears as an appendix to this bulletin. Further results of the cooperative geological investigations of ground water basins, and a comprehensive appraisal of natural regulation of water resources in California, will be presented in subsequent bulletins containing results of the State-wide Water Resources Investigation.

Sea Water Conversion

There has been speculation in some quarters since World War II relative to the possibility that sea water conversion might add to the California fresh water supply. The two presently known methods of conversion involve chemical precipitation and distillation, respectively. Various agencies including the Federal Government are conducting research on this subject.

Engineering and economic feasibility of sea water conversion on a scale sufficient to be of significance as a source of water supply for California has not been demonstrated. Furthermore, even though costs were substantially reduced so as to compete with available alternate water sources, areas where sea water conversion might be undertaken probably would be limited to those adjacent to the southern coast of California. where growing demands are already large and limited local water supplies are approaching full development. For these reasons, sea water conversion has not been considered in the inventory of the water resources of California, and is not included in the scope of this bulletin. However, a brief discussion of the subject is contained in the following paragraphs.

One handicap to sea water conversion is the relatively high cost of desalting and conveying the water from sea level to place of water demand. In order for conversion to be feasible, such cost must be reduced sufficiently to compete with salvage of fresh water surpluses wasting to the ocean. In this connection, mean runoff of fresh water into the Pacific Ocean in the area extending from the Smith River on the north to the Santa Ynez on the south is relatively large, and surface reservoir sites and ground water basins are available for development to conserve a substantial portion of such runoff.

An important phase of sea water conversion is the power needed for its accomplishment. Firm water from this source in quantity commensurate with requirements would call for a large and unfailing supply of power. Hence the question arises as to the advisability of depleting oil and natural gas resources of the State for such purpose. No surplus hydroelectric power is now available, and none is likely to be available in the future. Harnessing of other possible power sources such as wind, tides, or solar or nuclear energy on an economic basis seems only remotely possible.

Other obstacles encountered in sea water conversion include corrosion of equipment and the excessive scale-forming property of sea water. These and the other difficulties eliminate sea water conversion from present consideration as a solution of the California water problem.

Cloud Seeding

Cloud seeding, or "milking," to produce precipitation or to dissipate threatening hailstorms and downpours has been undertaken by several agencies in different parts of the United States since World War II with rather impressive results. In some experiments clouds were bombed with dry ice and strafed with silver iodide from a plane flying in and over the clouds. In New Mexico experiments were made on the ground by feeding silver iodide into a hydrogen flame that burned at about 2500 degrees F. It is claimed the invisible silver iodide vapor makes nuclei around which raindrops and snowflakes are formed.

It appears that dry ice and silver iodide are effective only on clouds that are supercooled, but, except in winter, such clouds are scarce in California. In the Rogue River Valley in Oregon a new substance, designated "Element X," was used in the summer of 1949 in an effort to control hail damage to fruit crops by dissipating storm clouds en route to the area. It is claimed that Element X works on "hot clouds," where dry ice and silver iodide would be ineffective.

In 1950 New Mexico inaugurated at the School of Mines in Socorro the first state-fostered rainmaking study project. Objective of the study is to determine the relative effectiveness and stability of several cloud-seeding materials, and to find methods of dispersing such materials that might spread great distances and cause damage.

The State Water Resources Board believes that exploration of this new field of activity has reached a stage where it should receive official recognition and the aid, protection, and supervision of the State.

Reclamation of Sewage and Waste Waters

Study of large scale sewage reclamation in California is a relatively new field in which advances are being made, particularly in the San Francisco Bay and South Coastal Areas. The term "sewage," as herein used, is defined as liquid wastes flowing in sewers from residences, business buildings, institutions, and industrial establishments, with such ground, surface, and storm waters as may be admitted to or find their way into the sewers.

Many sewage treatment plants are so designed as to be capable of converting sewage into a stable, inoffensive, and sterile effluent. However, knowledge of the quality and quantity of sewage available for reclamation is necessary for planning and designing the various features of the reclamation process. Domestic sewage may be of sufficiently good mineral quality to be reclaimable for irrigation and industrial uses. By contrast, sewage containing certain industrial wastes may be highly mineralized and not acceptable for irrigation. Mineral solubles from industrial sources are especially harmful when composed of high salt concentrations.

Investigation of the feasibility of reclaiming and utilizing sewage is recognized as a phase in planning for complete or ultimate development of the water resources of California. However, because of presently unsolved problems in the reclamation and utilization process, and lack of reliable data on quantity of sewage available and its quality, sewage has not been considered in this bulletin as a primary water resource of the State.

Tentative evaluations of potential sources of reclaimable sewage and waste waters in the San Francisco Bay and South Coastal Areas, with respect to both quantity and quality, are included in this bulletin as Appendix A, "Reclamation of Sewage and Waste Waters." Flow data presented are limited to total quantities measured or estimated at points of outfall to San Francisco Bay or the Pacific Ocean, and in all cases pertain to dry weather flow exclusive of storm waters.

Disposal of sewage onto lands overlying underground basins and into inland streams augments ground water replenishment and stream flow. Sewage so disposed of is generally recoverable for re-use by natural processes of reclamation, and is not considered in Appendix A.

CHAPTER II. SUMMARY

The purpose of this chapter is to outline the nature of the investigation reported, to describe briefly the physical conditions that govern occurrence, quantity, and quality of the water resources of California, and to summarize for the State as a whole, statistical and other information presented and discussed by major hydrographic Areas in succeeding chapters. Plate 1, "Map of California," has been included to assist in following the presentation. It has been placed inside the back cover for convenience of use.

MAJOR HYDROGRAPHIC AREAS

The State has been divided into seven Areas, numbered from 1 to 7, which generally coincide with major hydrographic divisions. The portion of the State included within each Area and the names by which the Areas are designated are:

1. **North Coastal Area.** Lower Klamath Lake and Lost River Basins, and all basins draining into the Pacific Ocean from the California-Oregon state line southerly to the northern boundary of Lagunitas Creek Basin in Marin County.

2. **San Francisco Bay Area.** All basins draining into San Francisco, San Pablo, and Suisun Bays, and into Sacramento River downstream from Collinsville; Winter and Browns Islands in Contra Costa County; basins west of the eastern boundary of Kirker Creek Basin in Contra Costa County; and basins directly tributary to the Pacific Ocean from the northern boundary of Lagunitas Creek Basin to the southern boundary of Pescadero Creek Basin, in San Mateo and Santa Cruz Counties.

3. **Central Coastal Area.** All basins draining into the Pacific Ocean from the southern boundary of Pescadero Creek Basin in Santa Cruz County, to the southeastern boundary of Rincon Creek Basin in the western part of Ventura County.

4. **South Coastal Area.** All basins draining into the Pacific Ocean from the southeastern boundary of Rincon Creek Basin to the California-Mexico boundary.

5. **Central Valley Area.** All basins draining into the Sacramento and San Joaquin Rivers above the eastern boundary of the San Francisco Bay Area near Collinsville, including Goose Lake Basin in Modoc County.

6. **Lahontan Area.** All basins east of the Santa Ana and Los Angeles River Basins and all basins east of the Central Valley Area, between the California-Oregon boundary and the southern boundary of basins draining into Antelope Valley and Mojave River, and into Dry Lake Basin near the California-Nevada line north of Ivanpah.

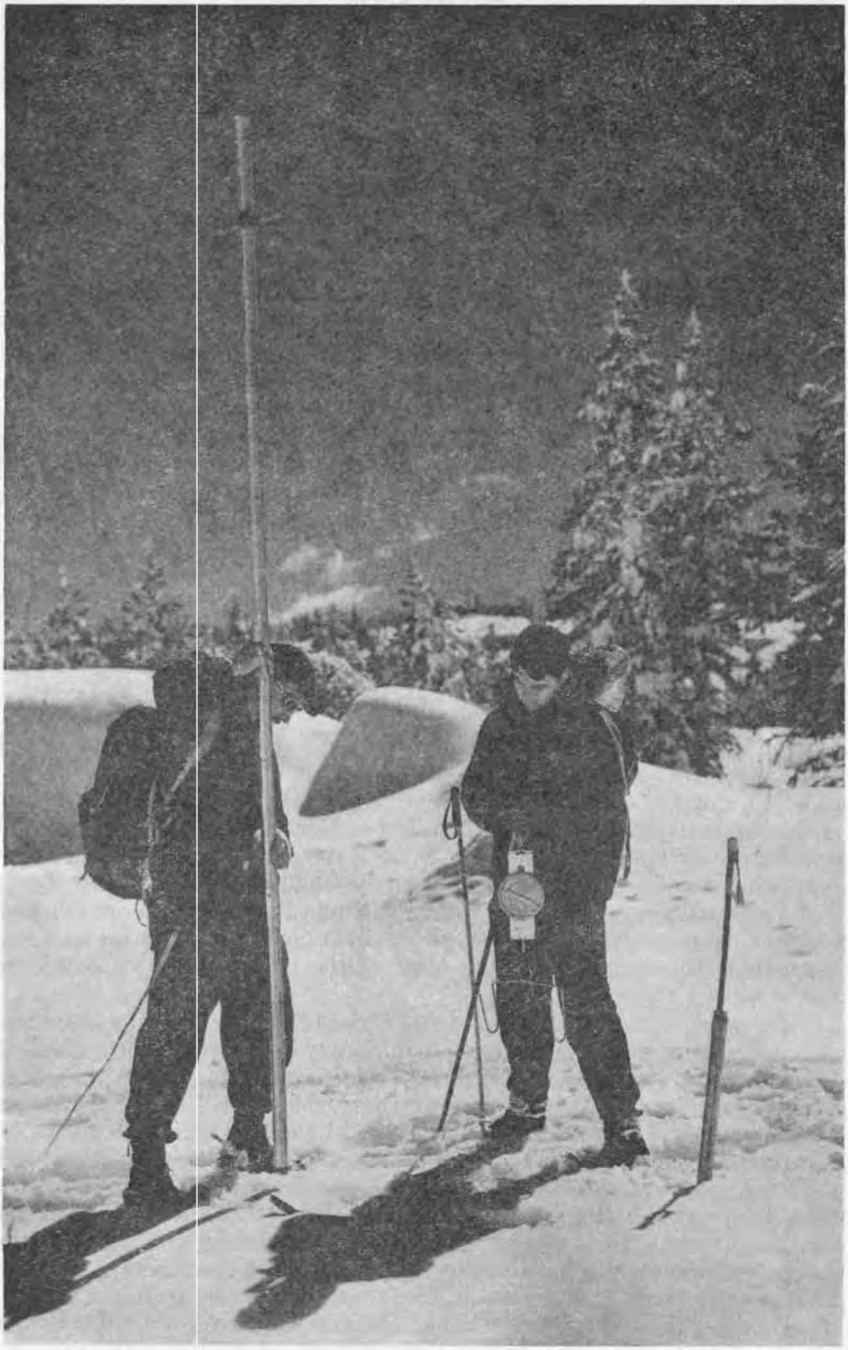
7. **Colorado Desert Area.** All basins east of the South Coastal Area that drain into the Colorado River within California; also Salton Sea Basin and local sinks between the southern boundary of the Lahontan Area and the California-Mexico boundary.

Portions of the State in the seven Areas have been segregated by drainage basins and sub-basins into "mountain and foothill" and "valley and mesa" lands, principally on the basis of topography. A summary of this segregation is contained in Table 1. Lands sloping less than 200 feet to the mile were classed as valley and mesa, and those with steeper slopes as mountain and foothill. Water areas within San Francisco, Humboldt, and San Diego Bays, and the portion of Lake Tahoe in California, have been included in adjacent land areas. Drainage basins of the State are delineated on Plate 2, "Drainage Basins in California," placed inside the back cover of this bulletin, and are described in Appendix C, "Descriptions of Drainage Basins."

TABLE 1

SUMMARY OF "MOUNTAIN AND FOOTHILL" AND "VALLEY AND MESA" LANDS IN CALIFORNIA, BY MAJOR HYDROGRAPHIC AREAS

Area	Areas in square miles		
	Mountain and foothill	Valley and mesa	Totals
1. North Coastal, including Humboldt Bay (26 square miles)	16,965	2,621	19,586
2. San Francisco Bay, including islands and water surface in Bay (442 square miles)	2,674	1,735	4,409
3. Central Coastal	9,147	2,137	11,284
4. South Coastal, including San Diego Bay (24 square miles)	7,924	3,031	10,955
5. Central Valley	36,374	23,050	59,424
6. Lahontan, including Lake Tahoe in California (136 square miles)	23,012	9,895	32,907
7. Colorado Desert	9,929	9,801	19,730
Totals, including all lakes; Humboldt, San Francisco, and San Diego Bays; but not including islands in the Pacific Ocean	106,025	52,270	158,295



SNOW SURVEYING IN THE SIERRA NEVADA

PRECIPITATION

Precipitation in California is mainly rain at lower elevations and snow at higher elevations. On rare occasions rain falls at elevations up to 8,000 feet, and snow that occasionally falls in valley areas is light and melts in a short time. At elevations above 5,000 feet snow usually remains until late spring and early summer, and its melt produces most of the sustained runoff from the higher basins. At lower elevations winter storms produce runoff that for the most part drains rapidly into stream channels.

The general and over-all nature of the climate of California is the result of three controlling factors: The latitude, the influence of the Pacific Ocean, and the orientation and extreme range of the topography of the State. Situation of the Pacific high pressure area with respect to the California coast determines the general effect of Pacific storms upon the weather. Influence of the Pacific Ocean gives the immediate coastal areas a true maritime climate, the prevailing westerly winds in their long track over the water being modified to maritime air masses. However, the unusually wide variations and abrupt discontinuities in the climatic factors of California are due principally to the influence of mountain ranges.

Storms

While the major controlling factor of the climate of California is the topography of the State, the location and intensity of the semipermanent high pressure area of the eastern Pacific Ocean also exercises considerable control over the weather, particularly in northern and central California. The permanence of the high is more statistical than practical, but the center can normally be found in the region between 140 degrees and 150 degrees west longitude and 30 degrees to 40 degrees north latitude. In summer months this high pressure area moves northeastward and extends over northern California and Nevada. The resulting divergent air movement over most of the State is the primary cause of the rainless summer months. As winter approaches, the high retreats southward, and low pressure areas developing in the North Pacific Ocean are allowed to enter the coastline at more southerly latitudes. These storms and the associated frontal systems bring most of the precipitation to northern and central California.

In addition to the Pacific storms, there are three other type storms of less frequent occurrence which principally affect the South Coastal, Lahontan, and Colorado Desert Areas. Degenerate tropical storms infrequently move far enough north to affect southern California. These disturbances have been responsible for some of the historic local storms of this part of the State. Late summer rains in the Lahontan and Colorado Desert Areas occur as showers caused by solar heating of air masses and their orographic lifting over mountains. These are the so-called Sonora storms. Moisture for these showers is transported by the deep southeasterly wind current forming the western part of the North American high pressure area, found aloft in the summer over the southern part of the United States. These storms occasionally spill over into the South Coastal Area causing particularly heavy localized rainfall. The remaining storm type, often designated "Interior," develops in the Great Basin as a secondary wave. These disturbances do not move into California but are accompanied by a flow of moist, warm air from the southwest which causes widespread rain in southern California.

Effect of Topography on Precipitation

Topography is the most important influence in areal distribution of precipitation in California. This is shown on Plate 3, "Geographical Distribution of Precipitation in California," placed inside the back cover of this bulletin. The pattern of this map of lines of equal long-time mean precipitation in California reflects the topography of the State. Precipitation is pronounced on the windward side of the coastal ranges due to lifting of the moisture-bearing winds over the mountains. The Central Valley to the east of the coastal ranges has a drier, continental climate, but the western slope of the Sierra Nevada is a region of normally heavy precipitation. These latter mountains lie across the path followed by moist air in moving inland, and reach a much higher elevation than the coastal ranges. In crossing the Sierra Nevada, air masses have practically all their available moisture precipitated on the windward side, leaving very little for the Lahontan Area and the vast areas of the Great Basin.

Owing to the maritime influence on the west and the mountain barrier on the north and east, the South Coastal Area has one of the most equable climates in the United States. The Lahontan and Colorado River Areas to the east, however, are extremely dry, with large ranges in temperature.

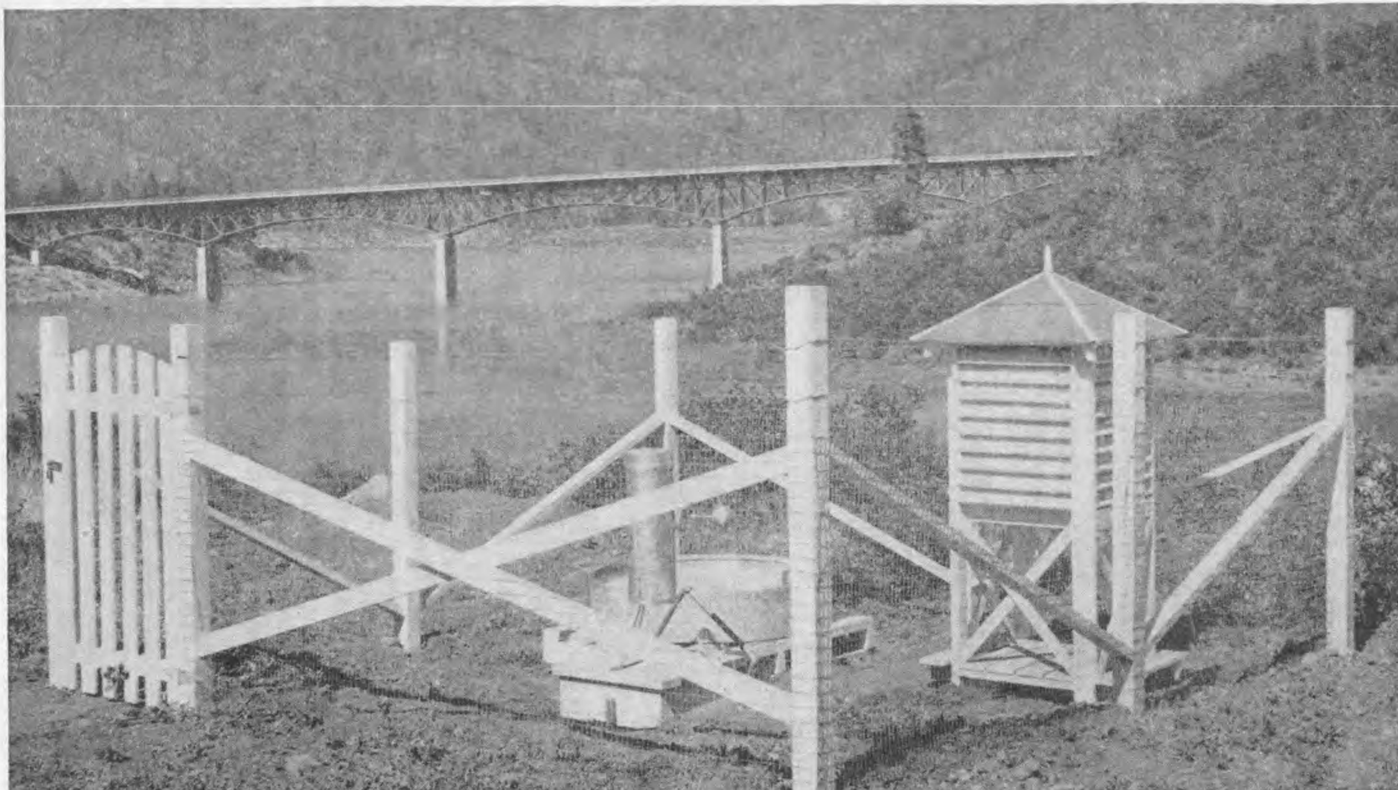
Major state-wide storms in California result when the deep southwest wind current in the warm sector of a Pacific storm is superimposed upon the topography. The amount of precipitation at a certain station from any particular storm is influenced by elevation, shape and steepness of slopes, direction of slopes in relation to moisture-bearing winds, wind gradient, length of time critical flow is sustained, and thermodynamics of the air mass. However, the long-time mean isohyetal map for most of California is an image of the topography.

Precipitation Records

Records of precipitation in California have been kept for many years by the United States Weather Bureau and its predecessor, the Army Signal Corps. These records were begun at Sacramento and San Francisco in 1849, and at San Diego in 1850. The number of precipitation stations has gradually increased until records from about 800 stations are now published by the Weather Bureau. Unbroken records for a number of stations extend back 65 or more years, but at a few of the older stations the records have been discontinued. Also available are unpublished records of precipitation kept by various agencies and individuals.

Since precipitation is the source of all water supplies, an inventory of precipitation records is an integral part of a water resources investigation. Available precipitation records for the State have been assembled and are included in appropriate succeeding chapters. An alphabetical list of California precipitation stations, divided into stations with records of 10 years or longer and those with shorter records appears as Appendix B, "Alphabetical List of Precipitation Stations."

Precipitation records included in chapters dealing with the seven major hydrographic areas have also been divided into those of 10 years or longer, and those of less than 10 years. It is believed that reliable estimates of long-time mean precipitation can be made for only those stations



(*U. S. Bureau of Reclamation Photo*)

WEATHER STATION AT SHASTA RESERVOIR

with records of at least 10 years. For stations with such records the tables show average seasonal precipitation for periods of record, and estimated seasonal mean for the 50-year period from 1897-98 to 1946-47. They also show maximum and minimum seasonal precipitation, citing seasons in which these extremes occurred. Other tables are presented listing stations at which continuous recorders are maintained. Finally, each chapter dealing with one of the seven Areas includes a table showing the average monthly precipitation, and maximum and minimum precipitation of record for each month, at stations chosen because of their long-time records and their representative character to indicate both geographical variation and monthly distribution of precipitation.

Variation in Precipitation

Seasonal precipitation at sea level on the coast decreases from about 40 inches in the northwestern corner of California to about 10 inches at the Mexican border. In addition to this variation with latitude, as has been previously stated, precipitation is influenced to a marked degree by altitude and by configuration of the mountains. It increases with elevation on the windward side of mountain ranges and decreases rapidly as the elevation drops on the leeward side. Varying slopes of the mountain masses frequently cause marked differences in precipitation within very short distances.

Seasonal precipitation varies from over 100 inches in the mountains of the northwest corner of the State to less than two inches in the deserts of the southeast. In most valley and coastal plain areas, where the bulk of agricultural crops is grown, precipitation would be insufficient for all crop needs even if it were properly distributed within and between seasons. The maximum, shown in Table 2, varies from 181 to 289 percent, and the minimum from 11 to 54 percent of the seasonal averages.

TABLE 2

VARIATION IN SEASONAL PRECIPITATION AT REPRESENTATIVE CALIFORNIA STATIONS

Precipitation station	Area	Period of record	Seasonal precipitation in inches		
			Maximum	Minimum	Average
Eureka	North Coastal	1878–1947	74.10	20.72	38.34
Oakland	San Francisco Bay	1874–1947	45.38	11.58	23.38
San Luis Obispo	Central Coastal	1869–1947	42.92	7.20	21.44
Los Angeles	South Coastal	1877–1947	38.18	5.59	15.43
San Diego	South Coastal	1850–1947	25.97	3.75	10.08
Nevada City	Central Valley	1863–1947	115.26	17.28	51.63
Sacramento	Central Valley	1849–1947	36.35	4.71	18.08
Fresno	Central Valley	1878–1947	17.03	4.43	9.42
Susanville	Lahontan	1889–1947	36.26	9.14	18.26
Needles	Colorado Desert	1892–1947	13.36	0.50	4.63

Furthermore, there are wet and dry periods lasting several years in which average precipitation departs far from the mean, although there may be dry seasons in the wet periods and wet seasons in the dry periods. One of the most severe recorded dry periods in most of the State extended from 1928 to 1934. A most severe drouth was experienced in the southern part of California from 1895 to 1904. Generally in California, however, the seasons of 1923-24 and 1930-31 were the driest of record. Table 2 lists maximum, average and minimum seasonal precipitation at representative stations throughout the State.

Precipitation is not distributed uniformly throughout the winter rainy season in California, but occurs in storms, some of which are of sufficient duration and magnitude to produce major floods. The extent of this unequal distribution is shown by tables of monthly precipitation at representative stations in each of the seven Areas, as presented in Chapters IV to X, inclusive.

Precipitation on Valley and Mesa Lands

Precipitation on valley and mesa lands comprises a significant portion of the water resources of the State, its total mean seasonal amount being estimated at about 32,400,000 acre-feet for the 50-year period from 1897-98 to 1946-47. In round numbers, mean seasonal precipitation varies from 15 to 25 inches on the Sacramento Valley floor, from 5 to 15 inches on the San Joaquin Valley floor, and from 10 to 20 inches on the South Coastal Plain.

Precipitation on valley and mesa lands is in part utilized by consumptive use of crops and native vegetation, while some evaporates from soil and water surfaces. On lands overlying absorptive areas, a portion of the precipitation may penetrate below the root zone of plants and thus replenish ground water. Any remainder of valley floor precipitation drains from the lands and reaches water courses to augment stream flow.

The Isohyetal Map

Geographical distribution of precipitation in California is shown on Plate 3 by isohyets or lines of equal rainfall. Also shown, to the extent permitted by the map scale, are locations of precipitation stations with reliable records of 10 years or longer. Numbers assigned to precipitation stations appear both on Plate 3 and in tables of precipitation stations.

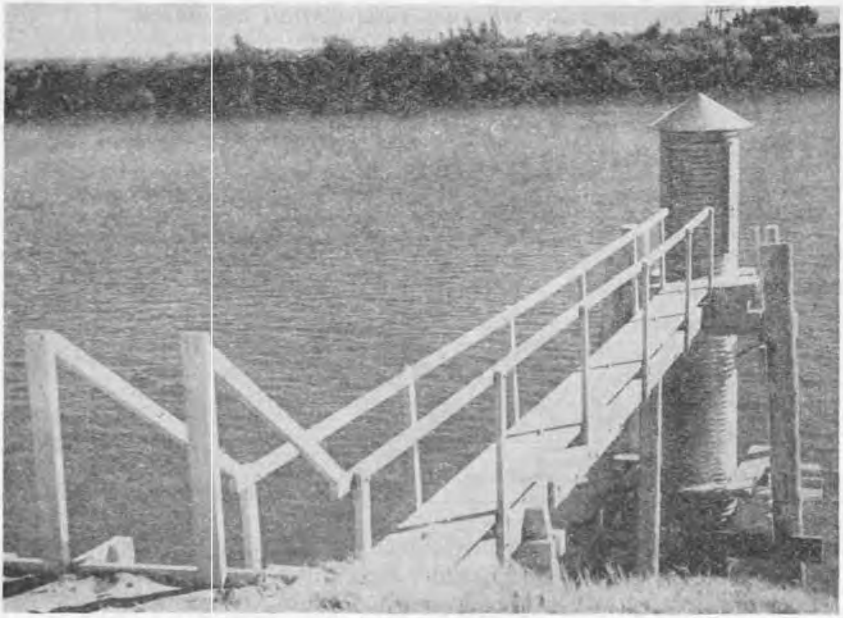
Weighted mean seasonal precipitation by Areas, and geographical distribution of precipitation expressed as percentages of total precipitation in the State, are given in Table 3. Weighted mean precipitation was derived from the isohyetal map in the manner indicated under "Definitions" in Chapter III.

RUNOFF

The portion of precipitation that drains through natural surface channels is defined as runoff. In general, estimates of runoff given in this bulletin include only the part of precipitation that flows from mountain and foothill lands. However, for the Sacramento Valley, runoff from precipitation on the valley floor is included in estimated runoff.

Runoff Records

The first gaging stations in California were established on some of the major streams in 1878, under the direction of State Engineer Wm. Ham. Hall. Records were discontinued at these stations in 1884. The



AUTOMATIC WATER STAGE RECORDER INSTALLATION IN SACRAMENTO-SAN JOAQUIN DELTA

MEASURING FLOOD RUNOFF IN YOLO BY-PASS OF SACRAMENTO RIVER

TABLE 3

WEIGHTED MEAN SEASONAL PRECIPITATION ON MAJOR HYDROGRAPHIC AREAS

Area	Weighted mean seasonal precipitation, in inches	Percent of total precipitation in the State
1. North Coastal	53.5	28.5
2. San Francisco Bay	23.4	2.8
3. Central Coastal	20.4	6.3
4. South Coastal	18.5	5.7
5. Central Valley	27.8	46.4
6. Lahontan	8.7	8.0
7. Colorado Desert	4.1	2.3
Entire State	22.7	100.0

longest unbroken records now available are those for Sweetwater River at Sweetwater Dam and for Boulder Creek at Cuyamaca Dam, both in San Diego County, which were begun in 1887. A station was established on Kern River near Bakersfield in 1893 by the Kern County Canal and Water Company, and on Alameda Creek in 1883 by the Spring Valley Water Company. The first United States Geological Survey gaging station in California was established on the Sacramento River at Jellys Ferry near Red Bluff in April, 1895. Geological Survey records of runoff for San Gabriel River are available from September, 1895, and for Santa Ana River from July, 1896. Gaging stations on other major streams were established by the Geological Survey shortly after 1900. Since 1903 the State has cooperated with the Geological Survey in establishing and maintaining stream gaging stations, and the scope of this work has been extended to cover most major streams of the State and many of the tributaries. Numerous stream flow records furnished by other federal agencies, and by municipalities, irrigation districts, and public utilities are published by the Geological Survey, and some additional records, heretofore unpublished, have also been available for the present investigation.

In studies for this bulletin, previous estimates of runoff have been reviewed, and changes have been made where later or more detailed information has provided a better basis of estimate. Tables are presented that list stream gaging stations for each of the seven major Areas, and for those stations with records of 10 years or longer, the average, maximum, and minimum seasonal runoff is given. Also tabulated are estimates of mean seasonal natural runoff of California streams for the 53-year period from 1894-95 to 1946-47, and estimates of seasonal natural runoff of principal streams for which there are runoff records.

As estimated in this bulletin, mean seasonal natural runoff for the entire State for the 53-year period from 1894-95 to 1946-47 was 70,798,000 acre-feet. Maximum seasonal runoff during this period is estimated to have been 135,000,000 acre-feet in 1937-38, and the minimum 18,300,000 acre-feet in 1923-24. Average seasonal runoff during the critical 10 years from 1927-28 to 1936-37 was 69 percent of the mean for the 53-year period, and runoff during each season of that period was less than this long-time mean.

A summary of estimates of runoff for the 53-year period from 1894-95 to 1946-47 for the various Areas in the State is given in Table 4.

TABLE 4

ESTIMATED MEAN SEASONAL NATURAL RUNOFF OF CALIFORNIA STREAMS, 1894-95 TO 1946-47

Area	Acre-feet	Acre-feet	Percent
1. North Coastal		28,886,000	40.8
2. San Francisco Bay		1,245,000	1.8
3. Central Coastal		2,448,000	3.4
4. South Coastal		1,227,000	1.7
5. Central Valley			
Sacramento River Basin	22,390,000		31.6
Tulare Lake Basin	3,313,000		4.7
San Joaquin River Basin	6,386,000		9.0
Delta Tributary Area	1,547,000		2.2
Subtotal		33,636,000	47.5
6. Lahontan		3,177,000	4.5
7. Colorado Desert		179,000	0.3
Total for State		70,798,000	100.0

FLOOD FLOWS AND FREQUENCIES

Ever since the first settlement on flat lands along the banks of streams, periodic floods have endangered life and property, and man has endeavored to protect himself and his possessions against them. Various measures, involving major as well as minor works, have been taken to eliminate or minimize flood damage. Early control measures were intended to protect against floods equal to the largest flood of record. However, destruction of protective structures built to withstand such floods has shown need for designing works to control even greater and more prolonged flows. This is especially urgent where settlement has encroached on natural flood ways. A large portion of the agricultural, urban, and industrial development of California has taken place in parts of the valleys, and on detrital cones of streams over which floods have frequently spread, sometimes causing great damage. On many streams permanent channels with well defined banks have sufficed only for low flows.

Destruction and havoc caused by floods in California have frequently been accompanied by the economic anomaly of flood water wastage into the ocean in areas of deficient water supply. Therefore, flood control by storage in upstream areas may accomplish the dual purpose of conservation of needed water and reduction of flood flows to downstream channel capacities. Complete protection and conservation would require large and expensive reservoirs, and generally it is not feasible to control and conserve the total flood flow by storage. The point of economic balance is reached when the cost of flood protection and accompaying water conservation is equal to the combined benefits derived. The degree of protection and conservation to be provided depends on requirements of the people, and is determined by consideration of the magnitude and frequency of floods expected in the future.

Early California Floods

In flood-frequency studies, hereinafter described, computations were limited to the 53-year period from 1894 to 1947, owing to lack of reliable data about stream discharge and precipitation during earlier years. However, there were many earlier known floods, and ample geological evidence indicates that floods have been a recurring natural phenomenon in California through many centuries. Information about early floods has been preserved in many old documents, some of which contain stories of intense human interest. This information is briefly noted under "Flood Flows" in succeeding chapters. Despite the absence of reliable information on magnitude of these early floods, and the apparent exaggeration in some of the accounts, the records furnish valuable background in the study of possible future floods.

Methods of Estimating Flood Flows

There are several methods of estimating future maximum flood flows, some based on precipitation and others on runoff records. All methods are subject to criticism, in that they assume that past experience is indicative of the future, and in that records from which future floods are estimated are too short to furnish wholly reliable answers.

A purported maximum possible flood is sometimes adopted as the basis for design of flood control works. Examination of assumptions basic in estimating such a flood reveals that one or more assumed values could logically have been increased. In many cases, when plotted on frequency graphs made up from analyses of record floods, "maximum possible floods" have shown a probable frequency of only once in many hundred thousands or even millions of years. In the present investigation the probable frequency with which floods of different magnitude will occur or be exceeded in 100 years and in 250 years, respectively, was estimated by the "California method," described in Chapter III, for those stream gaging stations having records for more than 20 years. Graphs setting forth these estimates are presented in succeeding chapters. All floods occurring between November 1 and April 15 during the period of stream flow records, irrespective of cause or source of water, were included in the studies. Floods occuring from April 1 to July 15 and due primarily to snow melt were considered separately, and estimates regarding them are also presented in graphs.

Rainwater Floods

Storms which produce rain in sufficient quantity and intensity to cause destructive floods in California are of two types. The cloudburst type of flood results from rainfalls of high intensity covering only limited areas. It occurs principally in the desert regions, especially in the Lahontan and Colorado Desert Areas and in adjacent portions of the Central Valley and South Coastal Areas. Analyses of floods caused by cloudbursts are not included in this bulletin, since sufficient data with reference to areal extent and frequency of occurrence are not available.

Those rainstorms in California which produce floods not associated with cloudbursts are general and cover large areas. In nearly all cases they occur during winter and early spring, and may last several days, although periods of intense rainfall are comparatively short. While general storms are common during the rainy season, destructive floods are only infrequently produced. To cause a major flood the storm must either be of long duration, or must occur while watersheds are saturated and little channel storage space is available. The combination of a saturated watershed and such a storm is rare.

Estimated magnitudes of mean daily flows of rainwater floods with probable frequencies of once in 100 years and once in 250 years on seven representative streams in the State are given in Table 5. This table also shows maximum instantaneous recorded flows on these streams, including preliminary estimates for the floods of November, 1950, where applicable. No estimates are given for streams in the Colorado Desert Area, as floods in this Area are mainly of the cloudburst type.

Snow Floods

Floods resulting from melting snow occur in streams that drain the higher mountains of the State, and characteristically have longer duration and lower peak flows than rainwater floods. Data relating to daily flow for one, two, three, five or even ten days have little significance in these floods. In the present investigation snow-melt season from April to July, inclusive, has been considered as one flood period, and total volume of flow has been computed for these four months. Volumes of snow melt were determined for those 13 streams of the Sierra Nevada on which have occurred the greatest snow-melt floods experienced in the State. Nine of the streams are in San Joaquin Valley in the Central Valley Area, and four are in the Lahontan Area. Estimates of volumes of snow floods with probable frequencies of once in 100 years and once in 250 years are shown in Table 5, for two of the representative streams of California.

QUALITY OF WATER

Most fresh waters in California are of excellent quality and well suited to irrigation and other beneficial uses. This is especially true of drainage from the North Coastal Area and from the eastern side of the Central Valley Area, both of which Areas have large watersheds with high water yield. Analyses show that their surface and underground waters possess remarkably slight concentrations of salts, low percent sodium, and relatively small amounts of elemental boron. These waters are of the bicarbonate type, and calcium is the predominating base. Surface waters of comparatively high salinity are found in streams on the west side of the San Joaquin Valley, in Cache Creek in the Sacramento Valley, in basins on the west slope of the Diablo Range that separates the Central Coastal and Central Valley Areas, in Cuyama and Santa Maria Rivers in the Central Coastal Area, and in Piru and Sespe Creeks

TABLE 5

MAGNITUDE OF FLOODS ON REPRESENTATIVE STREAMS IN CALIFORNIA

Area and stream	Drainage area in square miles	Maximum instantaneous flow of record		Probable magnitude of mean daily rainwater flood flows in second-feet occurring once in		Probable magnitude of April-July snow floods in acre-feet occurring once in	
		Date	Second-feet	100 years	250 years	100 years	250 years
North Coastal Area							
Eel River at Scotia	3,140	Dec. 11, 1937	345,000	389,000	449,000		
San Francisco Bay Area							
Coyote Creek near Madrone	192	Mar. 7, 1911	25,000	12,700	14,400		
Central Coastal Area							
Santa Ynez River near Lompoc	789	Mar. 3, 1938	45,000	43,400	49,700		
South Coastal Area							
San Gabriel River near Azusa	211	Mar. 2, 1938	65,700	36,900	48,100		
Central Valley Area							
Kings River at Piedra	1,694	Nov. 19, 1950	*110,000	45,400	53,400	2,900,000	3,000,000
Sacramento River near Red Bluff	9,258	Feb. 28, 1940	291,000	301,000	342,000		
Lahontan Area							
Truckee River between Lake Tahoe and Farad	425	Nov. 21, 1950	*17,000	12,800	16,400	730,000	790,000

* Preliminary estimate, subject to revision.

in the South Coastal Area. Mineral solubles in these waters include significant amounts of boron, and relatively high concentrations of sulphates or chlorides. Ground waters receiving replenishment from such inferior surface waters have similar chemical characteristics.

Gradations in the quality of fresh water supplies of California are mainly correlated with climate, soil, and geologic complex. Any significant variation in chemical properties not correlated with these natural factors is usually caused by pollution or contamination from foreign sources. These may include industrial wastes and sewage, unconsumed irrigation water, or imported water of inferior quality. Depreciation in quality of ground water may also result from infiltration of sea water along the coastal strip, from defective wells, and from lack of salt balance due to inadequate ground water outflow.

Basic data relating to quality of water used in this investigation include analyses of some 20,000 samples of surface and ground waters. However, for purposes of tabulation and ease of discussion, 180 analyses of surface waters and 278 of ground waters have been selected for presentation in subsequent chapters. These are broadly representative of chemical characteristics predominating in the waters of each Area. Inorganic chemical analyses of waters in nine representative streams are listed in Table 6.

TABLE 6

INORGANIC ANALYSES OF WATERS OF REPRESENTATIVE STREAMS IN CALIFORNIA

Source and place of sampling	Date	Conductance $K \times 10^6$ at 25° C	Boron ppm	Percent sodium	Reacting values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3 + HCO_3	Cl	SO_4	NO_3
North Coastal Area											
Eel River at 101 Highway Bridge near Scotia	2/28/49	12.5	0.04	22	0.74 *23%*	0.50 *16%*	0.37 *11%*	1.17 *42%*	0.04 *2%*	0.18 *6%*	Trace ------
San Francisco Bay Area											
Coyote Creek at Cochran Road	2/16/49	36.6	0.22	20	1.85 *23%*	1.37 *17%*	0.85 *10%*	2.45 *30%*	0.33 *4%*	1.07 *13%*	0.21 *3%*
Central Coastal Area											
Salinas River at San Ardo Bridge	12/29/41	29	------	22	1.25 *22%*	0.91 *17%*	0.61 *11%*	1.55 *27%*	0.35 *6%*	0.96 *17%*	------ ------
South Coastal Area											
Santa Ana River near Mentone	1/20/47	19.6	0.00	28	1.22 *26%*	0.45 *10%*	0.65 *14%*	1.88 *42%*	0.10 *2%*	0.23 *5%*	Trace ------
Central Valley Area											
Feather River near Oroville	8/ 4/48	9.7	------	22	0.50 *23%*	0.34 *16%*	0.24 *11%*	0.97 *46%*	0.04 *2%*	0.04 *2%*	------ ------
Panoche Creek in W½ Sec. 27, T15S, R11E, MDB&M	5/22/30	279	4.89	50	7.11 *11%*	9.36 *14%*	15.83 *25%*	5.20 *8%*	4.85 *8%*	22.25 *34%*	------ ------
San Joaquin River at El Solyo pumps	5/28/48	17.0	------	48	0.55 *16%*	0.36 *10%*	0.83 *24%*	0.67 *20%*	0.76 *22%*	0.27 *8%*	------ ------
Lahontan Area											
Owens River in SW¼ Sec. 22, T2S, R28E, MDB&M	8/ 5/30	19.9	0.40	48	0.41 *11%*	0.55 *15%*	0.91 *24%*	1.45 *39%*	0.35 *9%*	0.07 *2%*	------ ------
Colorado Desert Area											
Whitewater River in NW¼ Sec. 35, T2S, R3E, SBB&M	4/13/37	34.7	0.08	16	1.77 *28%*	0.88 *14%*	0.54 *8%*	3.12 *46%*	0.13 *2%*	0.12 *2%*	------ ------

CHAPTER III. METHODS AND PROCEDURES

The complexity and magnitude of the task of assembling and interpreting basic data presented in this bulletin justify some explanation of the procedure followed. In explaining this procedure it has been found desirable in some instances to indicate the nature and scope of the physical data available, and in other instances to review historically the technical approach to solution of the problems involved.

DEFINITIONS

Basin—Total drainage area above the mouth of a stream.

Subbasin—Total drainage area of any subdivision of a basin.

Stream Group—Two or more minor streams within a drainage basin, designated either by the name of the principal stream or by reference to a geographical feature.

Seasonal Precipitation—Total precipitation from July 1st of one year to June 30th of the following year.

Mean Seasonal Precipitation—Average seasonal precipitation for the 50-year period from 1897-98 to 1946-47.

Average Seasonal Precipitation—Average seasonal precipitation for a period other than the 50-year period from 1897-98 to 1946-47.

Weighted Mean Seasonal Precipitation—Summation of the products of means of adjacent isohyets and the areas between them, divided by the summation of the areas.

Natural Flow—Flow of a stream unaltered by diversions or storage of its waters, or by importation of water from another drainage basin.

Seasonal Runoff—Total runoff at any station from October 1st of one year to September 30th of the following year.

Mean Seasonal Runoff—Average seasonal runoff for the 53-year period from 1894-95 to 1946-47. This is taken to be the long-time mean.

Average Seasonal Runoff—Average seasonal runoff for a period other than the 53-year period from 1894-95 to 1946-47.

Flood Plain—Valley areas subject to periodic inundation by a stream are collectively termed its flood plain.

LOCATION MAPS

Plate 1, "Map of California," referred to previously, shows location of physical features and place names. Even greater detail was desirable for congested portions of the San Francisco Bay and South Coastal Areas. Accordingly, larger scale maps of those vicinities are included as Plate 10, "Portion of the San Francisco Bay Area," and Plate 16, "Los Angeles Coastal Plain of the South Coastal Area." Plate 1 has been placed inside the back cover of this bulletin for convenience of use, while Plates 10 and 16 appear in Chapters V and VII, respectively.

AREA OF CALIFORNIA

Although the total area of California has been estimated many times, recently expanded activities of the Topographic Division of the United States Geological Survey, in cooperation with the State of California, have provided more accurate topographic maps sufficient in number to justify redetermination of the area of much of the State. This redetermination has been made and the results are reflected in figures presented in this bulletin.

The land surface of California has been arbitrarily divided in this investigation into "mountain and foothill" and "valley and mesa" areas, by placing in the former category lands having slopes exceeding 200 feet to the mile, with the remainder classed as valley and mesa. Bays having only narrow outlets to the ocean—i.e., Humboldt, Tomales, San Francisco and San Diego Bays—and all inland waters, were included with adjacent valley and mesa areas. To permit determination of net land surface including only small inland waters, the areas of Humboldt, San Francisco and San Diego Bays and Lake Tahoe were computed and are given in the summary of land areas in Table 1 in Chapter II.

In making areal determinations under the two classifications of land adopted, U. S. G. S. topographic quadrangles were repeatedly planimetered, until the sums for each quadrangle checked within two-tenths of 1 percent with areas computed by scaling the quadrangles and averaging their opposite sides. A planimeter constant, obtained by equating the planimetered area to the true area of the quadrangle as taken from geographic tables, was then applied to the measured area of each basin and subbasin, and the corrected area in square miles was thus obtained.

In the South Coastal Area, land areas determined as described in the preceding paragraph were divided by areas found in investigations reported in Division of Water Resources Bulletins Nos. 48 and 53 to obtain corrective factors applicable to the planimetered areas. In the Central Valley Area, quadrangles or portions of quadrangles making up the area were first combined and then projected to a scale of 1:500,000. Subdivisions below gaging stations were planimetered on this projection. Areas above gaging stations were taken from determinations by the Water Resources Division of the Geological Survey and subtracted from the total in the Central Valley Area. The remainder was divided by the planimetered area to obtain a corrective constant, which was then applied to all planimeter determinations.

DESCRIPTIONS OF DRAINAGE AREAS

On Plate 2 the drainage areas of the State are indicated and numbered by stream basins, subbasins, and stream groups. The "mountain and foothill" and "valley and mesa" lands, and the estimated 53-year mean seasonal runoff of California streams are tabulated in Chapters IV to X according to these drainage areas. Abridged descriptions of the areas are given in Appendix C.

PRECIPITATION

After study of precipitation records throughout California, it was concluded that the 50 years from 1897-98 to 1946-47, inclusive, constitute the most satisfactory period for estimating long-time mean seasonal precipitation. Records of 70 or more years at stations well distributed throughout the State show definite wet and dry periods. Although these wet and dry periods for the southern portions of California do not correspond to those for the northern part, it was determined that mean seasonal precipitation for the 50-year period from 1897-98 to 1946-47 does not vary materially from averages found from long-time records in both northern and southern portions of the State. Fifty-year means for stations with records of less than 50 years were computed by comparison with the nearest station having 50 or more years of unbroken record. The 50-year mean seasonal precipitation for a station having an unbroken record of 50 years or more, multiplied by the average for the period of record at a station with a shorter or broken record, and divided by the average for a corresponding period at the 50-year station, has been taken as estimated mean seasonal precipitation for the station with the shorter or broken record.

Rainfall Intensities

Because rainfall intensities may be a controlling factor in the severity of floods and in the deterioration of watersheds, the succeeding chapters include data on maximum recorded rainfall rates at 12 California precipitation stations. These data are from United States Weather Bureau Technical Paper No. 2, "Maximum Recorded United States Point Rainfall." They cover periods of record of 10 years or longer, through 1945. Although fragmentary, this information is indicative of maximum rainfall intensities that may be expected. More complete consideration of this subject will be possible when records at stations with continuous recorders cover more extended periods.

Isohyetal Map

Preparation of the isohyetal map of California appearing as Plate 3, placed inside the back cover of this bulletin, involved: (1) plotting 50-year mean seasonal precipitation at all stations having records of 10 years or longer; (2) projecting to the scale of the base map used those insohyetal maps prepared for various portions of the State by the Corps of Engineers of the Department of the Army; and (3) revision of the resulting map, by adjusting isohyets to take into consideration local variations in topography and catch in rain gages. The relatively small number of precipitation records available in the North Coastal, Central Coastal, Lahontan, and Colorado Desert Areas render the isohyets for those Areas of limited value.

Precipitation on Valley and Mesa Lands

The isohyetal map of the State was utilized to estimate precipitation on valley and mesa lands. These lands were delineated on a copy of the map, and each of the areas between adjacent isohyets traversing valley or mesa lands was determined. Depth of precipitation on the included areas was assumed to be the mean of precipitation on the adjacent isohyets. Products of areas between adjacent isohyets and this mean depth of precipitation were summed, to obtain mean weighted volume of precipitation for all subareas and Areas of the State.

RUNOFF

Estimates of runoff given in this bulletin generally include only the portion of precipitation that flows from mountain and foothill lands. For the Sacramento Valley, however, runoff from precipitation on the valley floor also is included in estimated runoff.

Runoff data previously published by the Division of Water Resources, principally in Bulletins Nos. 5, 26, and 29, have been extended or revised to conform to later information.

The 53-year period from 1894-95 to 1946-47 was selected for determining mean seasonal runoff, in order to include dry years between 1894 and 1904 in the southern part of the State. The period from 1894 to 1904 was the driest of record in that region, whereas the driest period of record in the north was from 1923 to 1934.

All estimates of runoff in this bulletin are for natural flow as defined earlier in this chapter. In computing runoff data, measured runoff was adjusted to natural flow by adding known upstream diversions and quantities stored in reservoirs, and subtracting importations and reservoir releases. Evaporation from reservoirs and lakes was also added to measured runoff where large enough to be significant. In the absence of records at a reservoir or lake, evaporation was estimated from records at comparable locations. Where no records were available and water was known to have been stored, storage and release were estimated either from records of operation in other seasons, or from records of operation of other reservoirs in the same watershed, taking into account differences in runoff between seasons with available records and seasons for which estimates were made. The foregoing method of computing natural runoff was used only for periods for which records of measured runoff were available.

One of the three methods described in the following paragraphs was used to estimate runoff for periods of incomplete records, although the first and second methods were used to only a limited extent.

The first method involved use of the "index of seasonal wetness," which is defined as precipitation for the season expressed as a percentage of the long-time seasonal mean. In pursuing this method, indexes of wetness developed in Division of Engineering and Irrigation Bulletin No. 5, "Flow in California Streams," were used. In this previous study the State was divided into 26 "precipitation divisions" and indexes of seasonal wetness were determined for each division. A "curve of probable runoff" was then drawn for the stream being studied, by plotting runoff for seasons for which records were available against corresponding indexes of seasonal wetness. The curves were extended to give runoff for indexes as great as 200. Runoff for seasons lacking stream flow records was then taken from the appropriate curve of indexes of seasonal wetness.

In the second method, runoff for seasons of record was plotted against precipitation, and runoff for seasons lacking records was then taken from the curve. This method was followed where good coverage of precipitation records was available over the drainage basin.

The third method consisted of establishing a relationship between adjacent streams by comparing concurrent runoff records. Missing runoff records for one stream were then estimated from the record of the other stream. This method was used in a majority of runoff estimates in this bulletin.

For minor streams or stream groups for which no runoff records were available, mean seasonal runoff has been estimated. Estimates for groups that occupy frontal positions on the coast involved use of the following empirical formula, developed in the investigation:

$$R = \frac{A \times B \; (\text{latitude} - 30) \times \text{Elevation}}{\text{Distance} + 5} - C$$

in which

R = 53-year mean seasonal natural runoff for the period from 1894 to 1947, in inches depth.

A = A coefficient representing the coastal region of the basin or basin group.

B = A coefficient representing orientation of the watershed as related to maximum runoff.

C = A coefficient representing water losses (losses in runoff, such as evaporation and transpiration) not related to latitude, elevation, distance from coast, or orientation of watershed.

Distance = Distance from the areal center of the water-producing area of the basin or group of basins, to the nearest point on the shoreline, in miles.

Latitude = Latitude of the areal center of the basin or group of basins, *minus* 30 (the latitude at which the effect of latitude on runoff appears to approach zero).

Elevation = Average elevation of the boundary of the water-producing area of the basin or group of basins, in feet.

Estimates of runoff for inland minor streams and stream groups were variously based on available records, usually of short duration, in streams or groups under consideration, on the relationship of measured runoff to runoff of adjacent major streams for periods of parallel record, on topography of the area under consideration, and on other available data.

FLOOD FLOWS AND FLOOD FREQUENCIES

In designing levee systems and reservoirs for flood control, and in determining appropriate spillway capacities, it is necessary to adopt some one flood flow as the maximum for which provision should be made. Various methods of estimating this maximum have been employed in the past, all of which were based on the assumption that the magnitude of former floods should be an indication of what may be expected in the future. Unfortunately, in California the longest runoff records available are too short to furnish wholly reliable basis for conclusions regarding magnitudes of future floods.

Probably the earliest method of deciding on the maximum flood flow for design purposes was to search out the highest known high-water mark and add to it a certain number of feet as a factor of safety. A later adaptation of this method increased the largest flood of record by whatever percentage the designer might consider best.

A more scientific approach in estimating future flood flows came into use with development of formulas for this purpose. These formulas range in scope from those involving only the size of drainage areas, to those that include rainfall intensity and consider drainage basin characteristics.

In spillway design, use is sometimes made of what purports to be the maximum flood that conceivably could occur at a given site during our present geological and climatic era. Such a theoretical maximum flood presupposes simultaneous occurrence in the area of every possible natural condition or phenomenon that might so influence runoff as to create the flood.

During the past 35 years flood frequencies have received increasing attention. Stated simply, estimating flood frequencies involves determining the number of times a flood of given magnitude may be expected to occur in a certain period. The general procedure is to plot frequency in years against peak discharge, draw a smooth curve through the plotted points, and extend this curve into the higher values. A number of methods of applying statistical methods to hydrological data in flood-frequency analyses have been proposed. Although the same general principle is common to all these methods, different ways of plotting and use of papers with special rulings have been advocated.

Methods of flood-frequency analysis have usually been identified by the names of their originators. The first was the Fuller method, published in 1914. Among others thus identified were those of Hazen, Foster, Goodrich, and Gumbel. The "California method" was first used in Division of Engineering and Irrigation Bulletin No. 5, "Flow in California Streams," published in 1923. An exhaustive review of these and other methods of flood analysis appears in United States Geological Survey Water-Supply Paper 771, entitled "Floods in the United States," published in 1936.

In the course of the present investigation all methods heretofore mentioned were applied, in order to determine which might be most suitable for California conditions. Thorough study indicated that the California method would give the most satisfactory results, and it was used exclusively in flood-frequency analyses presented in this bulletin. In this method the frequency of occurrence of each flood is calculated by the equation:

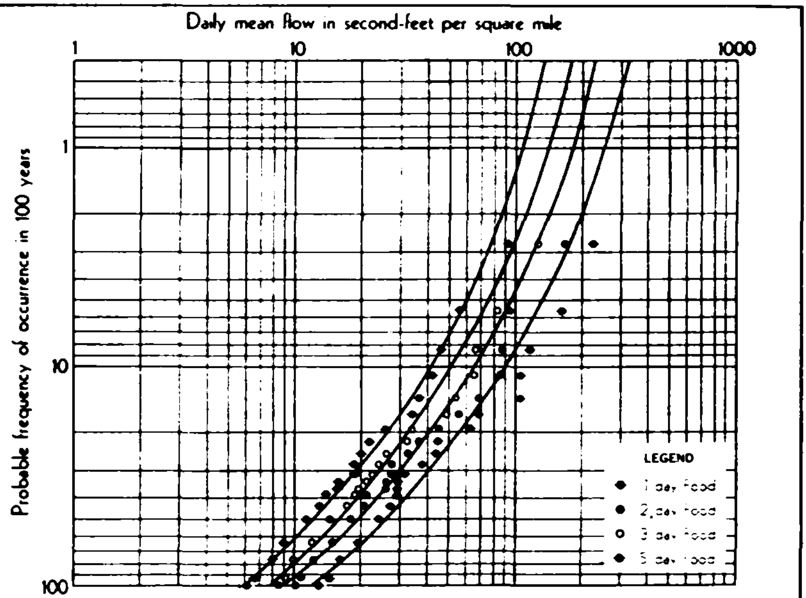
$$F = \frac{100\ m}{y}$$

in which "F" is the number of times a given flood will be equalled or exceeded in 100 years, "m" is the numerical position of the flood when all floods considered are listed in order of decreasing magnitude, and "y" is the number of years in the record.

Flood-frequency data presented in this bulletin are in the form of curves drawn on logarithmic paper, as illustrated by the accompanying curves for the Arroyo Seco near Pasadena. From these curves, probable magnitude of a flood of a given frequency, expressed as second-feet of daily mean flow per square mile, can readily be estimated.

A curve cutting the 10-ordinate line indicates a probable frequency of occurrence of 10 times in 100 years, or one time in 10 years. If it cuts the 1-ordinate line, the indicated probable frequency is one time in 100 years. Reading upward from the 1-ordinate, the ordinate lines decrease by tenths, as 0.9, 0.8, 0.7, 0.6, 0.5 and 0.4. The 0.4-ordinate (top line) indicates a probable frequency of 0.4 times in 100, or four times in 1,000, or one time in 250 years.

The abscissa on the graphs expresses the rate of daily mean flow in second-feet per square mile. Reading from left to right, the first curve is that of a five-day flood; the second, a three-day flood; the third, a two-day flood; and the last, a one-day flood.



ARROYO SECO FLOOD DISCHARGE

NEAR PASADENA

AREA OF DRAINAGE BASIN 16 SQUARE MILES

Using the Arroyo Seco near Pasadena as an example, interpretation of the graphs is as follows: The first curve, for the five-day flood, shows flow at a rate of approximately 135 second-feet per square mile for a probable frequency of once in 250 years. For a frequency of once in 100 years the indicated flow is 110 second-feet per square mile, and for a frequency of 5 times in 100 years, or once in 20 years, it is 60 second-feet per square mile. Similarly, the one-day curve shows 325 second-feet per square mile for a probable frequency of once in 250 years, 260 second-feet for a frequency of once in 100 years, and 140 second-feet for a frequency of once in 20 years. To obtain the total volume of a flood in second-foot days, it is necessary to multiply the scaled figure by duration of the flood in days, and by the drainage area in square miles.

Expression of flood quantities in terms of units of discharge per square mile of drainage basin permits direct comparison of adjacent drainage basins, since areas of basins as components of magnitude have been eliminated. However, this form of expression does not give a true measure of winter floods from drainage basins subject to substantial snow cover. Size of the area actually contributing to runoff will vary, depending upon the extent and absorptive capacity of snow cover at the time of flood. Only limited information on snow cover and its effect on rain floods is available.

For streams with flow records of 20 years or longer, analyses have been made and graphs prepared for 1-, 2-, 3-, 5- and 10-day floods in drainage basins throughout California embracing areas in excess of 1,000 square miles, and for all except 10-day floods in basins of less than 1,000-square miles. Floods of various durations were determined on the basis of the following criteria:

(1) **One-day Peak Flow.** This is defined as a daily flow that was both preceded and followed by lower flows. However, if two or more consecutive daily flows were equal, that flow was considered the one-day peak flow if the series of equal daily flows was both preceded and followed by lower flows.

(2) **Multiple-day Peak Flow.** (a) Moving totals of a sequence of daily flows may be obtained by subtracting flows of the first day from the summation of flows of "n" days, and adding flow of the day succeeding the "nth" day. The largest total flow for "n" days, over a given flood period determined by such moving totals, was taken as the "n"-day peak flow of the flood.

(b) If consecutive flood periods occurred with one or more days in common, only the larger flood was considered.

(c) If one or more days included in a peak flow fell beyond the date arbitrarily set as the limit of the flood season, the flood was considered if the sum of daily flows within the season was greater than the sum of flows beyond the season.

Flood-frequency data on rainwater floods as developed in the current investigation are presented on plates in succeeding chapters. Frequency data on volume of snow runoff, for the period from April 1st to July 31st, are presented only for the Central Valley and Lahontan Areas.

QUALITY OF WATER

Inorganic chemical analyses used in this bulletin for evaluating the quality of water resources were obtained from files and publications of the Division of Water Resources, the United States Department of Agriculture, the United States Bureau of Reclamation, the United States Geological Survey, and the University of California. Analyses of municipal supplies were also obtained from the California State Department of Public Health, from United States Department of Agriculture Technical Bulletin 448, from the City and County of San Francisco, from the City of San Diego and from the Department of Water and Power of the City of Los Angeles.

Principal bases in mineral constituents of natural water solubles are calcium, magnesium, and sodium. These occur almost entirely as bicarbonates, sulphates, chlorides, and nitrates. Boron, usually present in smaller amounts than the foregoing constituents, may be particularly injurious in irrigation waters. All constituents, except boron, are expressed in this bulletin in milligram equivalents per liter (me/l). Elemental boron, if determined, and total mineral solubles are expressed in parts per million (ppm). The unit "milligram equivalents per liter" corresponds to equivalents per million (epm) when the specific gravity of water being analyzed is unity. For practical purposes, milligram equivalents per liter may be considered identical with equivalents per million in waters suitable for irrigation. Concentrations expressed in equivalents per million may be multiplied by the equivalent weight of the ion, to convert to parts per million. The equivalent weight is obtained by dividing the atomic or molecular weight by the valence.

Specific electrical conductance is expressed in reciprocal ohms at 25° centigrade ($K \times 10^5$ at 25° C), and indicates total dissolved electrolytes in the water. An approximation of total milligram equivalents per liter of the anions, or of the bases, may be obtained by dividing specific electrical conductance by 10, and total solubles may be approximated by multiplying it by 7. Use of the latter multiple may assist in interpretation of water-analysis tables where total solubles are discussed but not given in the tables.

Results of computations of the character formula and percent sodium of each analysis appear in succeeding chapters. The character formula of mineral solubles was computed by dividing the reacting value (milligram equivalents per liter) of each base by that of total bases, and each anion by total anions, and multiplying each result by 50. Each constituent in the character formula is expressed as a percentage, and the total is equal to 100 percent. Percent sodium was computed by dividing the sum of reacting values (milligram equivalents per liter) of calcium, magnesium, and sodium into that of sodium, and multiplying by 100.

Although many analyses of water samples give the hydrogen ion concentration (pH), it is not included in data presented in this bulletin. The pH is usually not stable, and may change materially between time of collection and analysis of a sample if the period exceeds a few hours. For this reason, values shown in the laboratory may be misleading if imputed to the natural or inherent condition of the water source.

Standards for Quality of Irrigation Water

Frequent references are made in succeeding chapters to the suitability of particular waters for irrigation. To assist readers in interpreting water analyses given, from the standpoint of their suitability for irrigation, there is inserted the following statement by Dr. L. D. Doneen of the Irrigation Division of the University of California at Davis.

"Because of diverse climatological conditions, crops, and soils in California, it has not been possible to establish rigid limits for all conditions involved. Instead, irrigation waters are divided into three broad classes based upon work done at the University of California, and at the Rubidoux and Regional Salinity laboratories of the U. S. Department of Agriculture.

"Class 1. **Excellent to Good.** Regarded as safe and suitable for most plants under any condition of soil or climate.

"Class 2. **Good to Injurious.** Regarded as possibly harmful for certain crops under certain conditions of soil or climate, particularly in the higher ranges of this class

"Class 3. **Injurious to Unsatisfactory.** Regarded as probably harmful to most crops and unsatisfactory for all but the most tolerant.

"Tentative standards for irrigation waters have taken into account four factors or constituents, as listed below.

QUALITATIVE CLASSIFICATION OF IRRIGATION WATERS

Factor	*Class 1 Excellent to good*	*Class 2 Good to injurious*	*Class 3 Injurious to unsatisfactory*
Conductance (K x 10^6 at 25° C)	Less than 100	100-300	More than 300
Boron, ppm	Less than 0.5	0.5-2.0	More than 2.0
Percent sodium	Less than 60	60-75	More than 75
Chloride, me/*l*	Less than 5	5-10	More than 10

"A chemical analysis of an irrigation water may include some or all of the following items:

"**Specific Electrical Conductance** (K x 10^6 at 25°). This measures the electrical conductance of water. Addition of salt to the water increases its conductance. This unit is an excellent and rapid determination for obtaining an estimation of the total salt content, but does not give the individual salts that may predominate in a water. Another method of measuring total saits is to evaporate the water to dryness and weigh the residue, and the results are usually reported as total dissolved solids in parts per million (ppm). To make a rough estimate of the conductance from parts per million, divide by 7.

"**Boron.** Boron is expressed as parts per million of the element, and is often not determined unless in an area where boron is suspected.

"**Percent Sodium.** This is the proportion of the element to the total bases—that is, sodium (Na), calcium (Ca), and magnesium (Mg) found in the water. These bases are listed as the cations. Percent sodium is found by the formula $\frac{Na \times 100}{Na + Ca + Mg}$, when these bases are expressed as milligram equivalents per liter.

"**Chloride (Cl).** This element is considered one of the most troublesome anions that normally occur in irrigation waters. Other anions which are usually determined in irrigation water are carbonate (CO_3), bicarbonate (HCO_3), and sulfate (SO_4). These last three anions are not usually considered extremely toxic to most plants unless in exceptionally high concentrations. The analyses for these are important in determining the type of salt occurring in the water. The sulfate anion is generally considered about half as toxic as the chloride; therefore, plants tolerate about twice the concentration of sulfates as chlorides. If the total salts occur largely in the form of calcium sulfate (gypsum), the total salt value can be raised about 50 percent.

"Recent investigations indicate waters containing sodium carbonate or sodium bicarbonate as the predominant salt may be more harmful than other sodium salts. The accumulation of sodium carbonate or bicarbonate (soda ash) in the surface soils produces a black alkali soil.

"The cation sodium and anion chloride at relatively low concentrations in the soil, also, have been found toxic to some sensitive plants The accumulation of these elements in the soil from irrigation water should be considered, especially under conditions of restricted drainage and in areas of low rainfall."

CHAPTER IV. NORTH COASTAL AREA

This Area, designated Area No. 1 on Plate 2, embraces the region of heaviest annual rainfall in California lying along the north coast, but it extends nearly across the northern end of the State to include regions of much lighter precipitation. Several of the most northerly streams receive some runoff from Oregon.

LOCATION AND DESCRIPTION

The North Coastal Area lies between latitudes 38° and 42° N., extends 270 miles along the coast from the California-Oregon line south to the northern boundary of Lagunitas Creek Basin, in Marin County, and ranges in width from 180 miles at the Oregon boundary to 30 miles in the southern portion. It includes Lost River, Lower Klamath Lake, and Tule Lake Basins, which are considered part of Klamath River Basin. About one-third of the Klamath Basin is in Oregon, where Klamath River has its upper source east of the Cascade Range.

The northern section of the Area is largely mountainous, with many peaks above 6,000 feet in elevation, reaching a maximum elevation of 14,161 feet at Mount Shasta in Siskiyou County, on the divide between the North Coastal and Central Valley Areas. A fairly thick and absorptive soil mantle helps to sustain stream flow through summer and early fall. Moderate and equable temperatures, and heavy and recurrent fogs and northwest winds prevail along the coast. Inland, temperatures have a wider range, and winds in the interior are generally moderate.

STREAMS AND AREAS OF DRAINAGE BASINS

Principal streams of the North Coastal area are Smith, Klamath, Mad, Eel, and Russian Rivers, all draining large interior basins, and Mattole, Noyo, Navarro, and Gualala Rivers, which drain the larger basins on the coastal slope. More than half of the area is made up of the drainage of Klamath River and its main tributaries in California: the Trinity, Salmon, Scott, Shasta, and Lost Rivers. Areas of drainage basins are listed in Table 7.

PRECIPITATION

Storms are more frequent and monthly precipitation is higher in parts of this Area than in any of the other six major Areas of the State. It is heaviest on western slopes of the coastal ranges and decreases from north to south. During seasons of normal or greater than normal precipitation, moderate amounts of snow fall at the higher altitudes, but snow seldom appears along the coast.

Forty precipitation stations in the Area have records of 10 or more seasons. The longest unbroken record, which dates from 1878, is for the United States Weather Bureau station at Eureka. Other stations have records of earlier beginning, but are interrupted. Continuous recorders have been operated at 29 precipitation stations. Tables 8, 9, and 10 contain data relating to precipitation stations and records.

TABLE 7

AREAS OF DRAINAGE BASINS, NORTH COASTAL AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, North Coastal Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
1	Rogue River Basin in California	**147**	**0**	**147**
2	Winchuck River Group in California	**17**	**1**	**18**
	Smith River Basin			
3-1	Above gage near Crescent City	604	0	604
3-2	Remainder of Smith River	100	14	114
	Total, Smith River Basin:			
	In California	**617**	**14**	**631**
	In Oregon	(87)	(0)	(87)
4	Elk Creek Group	**28**	**47**	**75**
	Klamath River Basin			
5-1	Above gage at Klamath Falls (Link River)	1,906	1,906	3,812
5-2	From gage at Klamath Falls to gage at Keno (includes Lost River, Lower Klamath Lake, and Butte Valley Basins)	1,162	2,435	3,597
	Above gage at Keno	3,068	4,341	7,409
5-3	From gage at Keno to gage near Copco	430	8	438
	Above gage near Copco	3,498	4,349	7,847
5-4	Shasta River above gage near Yreka	515	281	796
5-5	Scott River above gage near Fort Jones	561	101	662
5-6	Remainder of Klamath River above gage near Seiad Valley	1,065	13	1,078
	Above gage near Seiad Valley	5,639	4,744	10,383
5-7	Salmon River above gage at Somesbar (Salmon River gage)	745	0	745
5-8	Remainder of Klamath River above gage at Somesbar (Klamath River gage)	839	0	839
	Above gage at Somesbar (Klamath River gage)	7,223	4,744	11,967
	Trinity River Basin			
5-9	Above gage at Lewiston	722	9	731
5-10	From gage at Lewiston to gage near Hoopa	2,081	34	2,115
	Above gage near Hoopa	2,803	43	2,846
5-11	Remainder of Klamath River above gage near Requa	794	14	808
	Above gage near Requa	10,820	4,801	15,621
5-12	Remainder of Klamath River	87	7	94
	Total, Klamath River Basin			
	In California	**7,970**	**2,050**	**10,020**
	In Oregon	(2,937)	(2,758)	(5,695)
6	Home Creek Group	**12**	**1**	**13**
	Redwood Creek Basin			
7-1	Above gage at Orick	272	2	274
7-2	Remainder of Redwood Creek	3	2	5
	Total, Redwood Creek Basin	**275**	**4**	**279**
8	Maple Creek Group	**126**	**15**	**141**
	Mad River Basin			
9-1	Above Sweasey Dam	371	0	371
9-2	From Sweasey Dam to gage near Arcata	103	10	113
	Above gage near Arcata	474	10	484
9-3	Remainder of Mad River	5	7	12
	Total, Mad River Basin	**479**	**17**	**496**
10	Elk River Group (including Humboldt Bay)	**143**	**76**	**219**

TABLE 7—Continued

AREAS OF DRAINAGE BASINS, NORTH COASTAL AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, North Coastal Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
	Eel River Basin			
11-1	Above Van Arsdale Dam	346	0	346
11-2	Middle Eel River above gage near Covelo	405	0	405
11-3	Remainder of Eel River above gage at Scotia	2,330	59	2,389
	Above gage at Scotia	3,081	59	3,140
11-4	Van Dusen River above gage at Bridgeville	200	0	200
11-5	Remainder of Van Dusen River	221	9	230
	Total, Van Dusen River above mouth	421	9	430
11-6	Remainder of Eel River	72	59	131
	Total, Eel River Basin	**3,574**	**127**	**3,701**
12	Bear River Group	**190**	**0**	**190**
	Mattole River Basin			
13-1	Above gage near Petrolia	215	0	215
13-2	Remainder of Mattole River	58	0	58
	Total, Mattole River	**273**	**0**	**273**
14	Four Mile Creek Group	**78**	**0**	**78**
15	Ten Mile River Group	**262**	**0**	**262**
16	Noyo River Basin	**114**	**0**	**114**
17	Big River Group	**290**	**0**	**290**
18	Navarro River Basin	**305**	**11**	**316**
19	Alder Creek Group	**118**	**6**	**124**
20	Garcia River Basin	**110**	**4**	**114**
21	Arena Creek Group	**30**	**2**	**32**
22	Gualala River Basin	**299**	**0**	**299**
23	Stewart's Point Group	**63**	**0**	**63**
	Russian River Basin			
24-1	Above gage at Guerneville	1,121	246	1,367
24-2	Remainder of Russian River	131	0	131
	Total, Russian River Basin	**1,252**	**246**	**1,498**
25	Salmon Creek Group	**253**	**0**	**253**
	TOTALS, NORTH COASTAL AREA IN CALIFORNIA	**16,965**	**2,621**	**19,586**

(*Division of Highways Photo*)

REDWOOD HIGHWAY—NORTH COASTAL AREA

Eureka and Point Reyes are the North Coastal Area precipitation stations for which the Weather Bureau has published data on maximum rainfall intensities in its Technical Paper No. 2. The Bureau's record shows the following:

MAXIMUM RECORDED RAINFALL IN INCHES IN SPECIFIED MINUTE AND HOUR PERIODS AT NORTH COASTAL AREA PRECIPITATION STATIONS

Precipitation station and date	Minutes					Hours				
	5	10	15	30	60	2	3	6	12	24
Eureka	0.29	0.37	0.51	0.74	1.04	1.30	1.79	2.73	3.52	5.10
Month, Day	1 / 1	1 / 1	11/11	11/15	11/15	12/10	12/10	12/10	12/10	1 /20
Year	1931	1931	1926	1941	1941	1939	1939	1939	1939	1903
Point Reyes	0.32	0.54	0.69	1.02	1.40	1.55	1.56	1.64	2.26	3.29
Month, Day	11/29	11/29	11/29	11/29	3[a]/ 3	3 / 3	3 / 3	12/11	12/11	12/21
Year	1905	1905	1905	1905	1906	1906	1906	1925	1925	1924

Table 11 gives average monthly precipitation, and maximum and minimum precipitation of record for each month, at five stations considered to be representative in elevation and topographic pattern of the North Coastal Area. The bar diagrams of Plate 4, "Distribution of Precipitation at Selected Stations, North Coastal Area," show graphically for four of these stations the monthly distribution of precipitation during maximum and minimum seasons of record. They also show monthly distribution during the season in which precipitation was nearest to the average seasonal total shown in Table 11.

A maximum recorded seasonal precipitation of 134.92 inches occurred at Upper Mattole, at an elevation of 244 feet in Humboldt County, in 1889-90. Average seasonal precipitation for this station for the period of record is 78.99 inches. A recorded minimum of 4.14 inches occurred at Montague, at an elevation of 2,523 feet in Siskiyou County, during 1897-98, for which station the seasonal average for the period of record is 12.12 inches. Records of precipitation are for elevations ranging from sea level to 5,000 feet.

Mean seasonal precipitation on valley and mesa lands of the North Coastal Area for the period from 1897-98 to 1946-47 is estimated at 3,360,000 acre-feet, as shown in Table 12. Large areas of valley lands are included in the Klamath River Basin. However, these lands lie mostly in upper reaches of this watershed, in areas of moderate precipitation. The one other large area of valley and mesa lands lies in the Russian River Basin where precipitation is moderate to heavy. Other valleys in the Area are not extensive but some are located where precipitation is very heavy.

TABLE 8

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, NORTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
1-1	Crescent City (near)	Del Norte	41° 50′ 124° 07′	125	1885-86 1946-47	B USWB	75.31	75.77	1889-90 1923-24	113.06 34.52
1-5	Crescent City Lighthouse	Del Norte	41° 45′ 124° 12′	47	1935-36 1945-46	B Private	52.70	49.34	1937-38 1943-44	79.65 33.26
1-16	China Flat	Humboldt	40° 58′ 123° 38′	600	1909-10 1946-47	B USWB	44.26	47.14	1937-38 1923-24	70.30 22.55
1-18	Eureka	Humboldt	40° 48′ 124° 10′	62	1878-79 1946-47	AB USWB	38.34	37.41	1889-90 1923-24	74.10 20.72
1-15	Fort Gaston	Humboldt	41° 03′ 123° 41′	397	1861-62 1891-92	B USWB	54.49	53.54	1865-66 1872-73	128.97 31.09
1-13	Orleans	Humboldt	41° 18′ 123° 32′	401	1885-86 1946-47	B USWB	47.18	48.86	1903-04 1919-20	81.93 20.01
1-20	Rhonerville	Humboldt	40° 35′ 124° 08′	75	1901-02 1919-20	B USWB	42.86	40.98	1903-04 1919-20	61.49 25.49
1-22	Scotia	Humboldt	40° 29′ 124° 06′	146	1926-27 1946-47	B USWB	44.85	46.74	1937-38 1930-31	77.02 25.48
1-17	Table Bluff Lighthouse	Humboldt	40° 42′ 124° 16′	160	1916-17 1945-46	B Private	36.03	39.47	1920-21 1930-31	63.49 17.29
1-14	Trinidad Head	Humboldt	41° 03′ 124° 09′	198	1918-19 1946-47	B Private	43.92	47.29	1940-41 1930-31	68.09 23.33
1-24	Upper Mattole	Humboldt	40° 15′ 124° 12′	244	1887-88 1946-47	B USWB	78.99	77.63	1889-90 1923-24	134.92 34.07
1-27	Branscomb	Mendocino	39° 39′ 123° 38′	2,000	1900-01 1922-23	B USWB	82.68	77.60	1903-04 1919-20	132.62 46.12
1-26	Covelo Ranger Station	Mendocino	39° 50′ 123° 05′	1,500	1881-82 1946-47	BC USWB	36.61	35.73	1937-38 1923-24	72.60 16.12
1-25	Cummings	Mendocino	39° 50′ 123° 34′	1,200	1930-31 1946-47	B USWB	69.27	68.83	1937-38 1930-31	117.92 45.30
1-28	Fort Bragg	Mendocino	39° 26′ 123° 48′	80	1895-96 1946-47	B USWB	37.33	37.20	1940-41 1923-24	60.79 17.81
1-31	Point Arena Lighthouse	Mendocino	38° 55′ 123° 42′	100	1902-03 1941-42	AC Private	36.66	36.31	1906-09 1923-24	62.75 16.29
1-29	Ridgewood Ranch	Mendocino	39° 19′ 123° 20	1,300	1905-06 1946-47	BC Private	40.77	40.38	1937-38 1945-46	75.84 15.43
1-30	Ukiah	Mendocino	39° 09′ 123° 12′	650	1877-78 1946-47	B USWB	35.56	35.27	1889-90 1923-24	60.48 16.19
1-38	Willits	Mendocino	39° 25′ 123° 21′	1,365	1878-79 1946-47	B NWPR	50.07	50.36	1878-79 1923-24	87.34 18.55
1-4	Steele Swamp	Modoc	41° 52′ 120° 57′	5,000	1923-24 1946-47	B USWB	12.20	11.92	1944-45 1938-39	18.23 6.64
1-40	Hullville	Lake	39° 25′ 122° 57′	1,925	1907-08 1936-37	B USWB	45.22	48.77	1913-14 1923-24	78.47 23.87
1-12	Edgewood	Siskiyou	41° 28′ 122° 26′	2,963	1888-89 1914-15	B USWB	21.08	18.37	1889-90 1898-99	36.34 9.42
1-11	Grenada	Siskiyou	41° 39′ 122° 32′	2,260	1908-09 1937-38	C Private	11.97	12.43	1926-27 1917-18	20.91 6.40

TABLE 8—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, NORTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
1-6	Happy Camp	Siskiyou	41° 48′ 123° 23′	1,090	1915-16 1946-47	B USWB	44.64	44.24	1937-38 1923-24	85.60 24.71
1-2	Hornbrook	Siskiyou	41° 54′ 122° 34′	2,154	1888-89 1917-18	B USWB	14.44	12.74	1889-90 1912-13	25.65 6.85
1-10	Montague	Siskiyou	°41 44′ 122° 33′	2,523	1888-89 1946-47	AB USWB	12.12	12.24	1889-90 1897-98	24.19 4.14
1-7	Scott Bar	Siskiyou	41° 44′ 123° 00′	1,800	1922-23 1934-35	B USWB	24.76	29.77	1926-27 1923-24	49.18 15.04
1-3	Tule Lake	Siskiyou	41° 58′ 121° 28′	4,036	1932-33 1946-47	B USWB	9.81	10.52	1939-40 1932-33	14.18 4.78
1-8	Walla Walla Creek	Siskiyou	41° 41′ 122° 51′	2,570	1854-55 1946-47	B USWB	25.45	29.43	1889-90 1874-75	49.97 12.72
1-9	Yreka	Siskiyou	41° 44′ 122° 40′	2,625	1871-72 1946-47	B USWB	17.49	15.45	1903-04 1923-24	31.29 7.89
1-32	Cloverdale	Sonoma	38° 48′ 123° 01′	315	1893-94 1946-47	B USWB	38.62	37.66	1940-41 1923-24	68.90 15.75
1-33	Fort Ross	Sonoma	38° 30′ 123° 16′	100	1875-76 1946-47	B USWB	47.01	44.69	1877-78 1923-24	92.86 19.10
1-36	Graton	Sonoma	38° 26′ 122° 50′	190	1896-97 1946-47	B USWB	39.59	39.58	1940-41 1923-24	70.81 19.93
1-34	Hallberg	Sonoma	38° 26′ 122° 52′	200	1928-29 1946-47	BC Private	36.20	37.53	1940-41 1938-39	67.59 19.69
1-35	Healdsburg	Sonoma	38° 36′ 122° 51′	110	1877-78 1946-47	B USWB	40.00	38.94	1940-41 1884-85	72.55 16.35
1-39	Mt. St. Helena	Sonoma	38° 40′ 122° 40′	2,300	1901-02 1911-12	B USWB	60.20	55.78	1906-07 1911-12	79.56 32.44
1-37	Santa Rosa	Sonoma	38° 27′ 122° 43′	167	1888-89 1946-47	B USWB	29.66	29.19	1889-90 1919-20	56.06 13.25
1-21	Hayfork	Trinity	40° 33′ 123° 10′	2,300	1915-16 1933-34	B USWB	26.96	32.22	1920-21 1923-24	45.30 13.53
1-23	Ruth	Trinity	40° 22′ 123° 20′	2,750	1907-08 1937-38	B USWB	38.59	43.30	1937-38 1923-24	95.17 13.59
1-19	Weaverville	Trinity	40° 44′ 122° 56′	2,050	1871-72 1946-47	B USWB	37.04	35.73	1889-90 1923-24	67.04 17.92

ABBREVIATIONS—NORTH COASTAL AREA

TYPE OF RECORD

Abbreviation	*Name*
A	Hourly
B	Daily
C	Monthly

SOURCE OF RECORD

NWPR	Northwestern Pacific Railroad
USWB	United States Weather Bureau

TABLE 9

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, NORTH COASTAL AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
1-001	Crescent City	Del Norte	41° 45′ 124° 12′	50	Feb. 1941 June 1947	USFS
1-003	Klamath	Del Norte	41° 32′ 124° 02′	25	Jan. 1944 June 1947	USWB
1-18*	Eureka	Humboldt	40° 48′ 124° 10′	62	Dec. 1910 June 1947	USWB
1-009	Hoopa	Humboldt	41° 03′ 123° 41′	350	Feb. 1941 June 1947	USFS
1-011	Kneeland (near) No. 2	Humboldt	40° 40′ 123° 55′	2,500	Jan. 1944 June 1947	USWB
1-012	Miranda (near)	Humboldt	40° 12′ 123° 46′	300	Apr. 1940 June 1947	USWB
1-015	Weitchpec	Humboldt	41° 11′ 123° 43′	228	April 1940 May 1941	USWB
1-016	Lake Pillsbury	Lake	39° 25′ 122° 58′	1,900	Mar. 1940 June 1947	USWB
1-019	Covelo (near)	Mendocino	39° 50′ 123° 05′	1,500	June 1941 June 1947	USFS
1-28*	Fort Bragg	Mendocino	39° 26′ 123° 48′	80	Mar. 1940 June 1947	USWB
1-021	Hopland (near)	Mendocino	39° 01′ 123° 00′	2,510	Nov. 1939 June 1947	USWB
1-023	Laytonville	Mendocino	39° 42′ 123° 28′	1,640	Feb. 1940 June 1947	USWB
1-026	Point Arena	Mendocino	38° 55′ 123° 42′	100	May 1940 June 1947	USWB
1-028	Redwood Valley	Mendocino	39° 16′ 123° 12′	750	Jan. 1940 June 1947	USWB
1-033	Willits (near) No. 4	Mendocino	39° 20′ 123° 19′	1,900	June 1941 June 1947	Calif. Div. of For.
1-034	Yorkville (near)	Mendocino	38° 55′ 123° 18′	1,150	Nov. 1939 June 1947	USWB
1-039	Etna	Siskiyou	41° 28′ 122° 54′	2,950	Sept. 1940 June 1947	USWB
1-040	Fort Jones (near)	Siskiyou	41° 35′ 122° 43′	3,400	Oct. 1943 June 1947	USWB
1-6*	Happy Camp	Siskiyou	41° 48′ 123° 23′	1,090	Feb. 1941 June 1947	USFS
1-044	Montague Airport	Siskiyou	41° 44′ 122° 33′	2,523	May 1940 June 1947	USWB
1-3*	Tule Lake	Siskiyou	41° 58′ 121° 28′	4,036	Sept. 1940 June 1947	USBR
1-049	Cloverdale (near)	Sonoma	38° 46′ 123° 13′	1,750	Nov. 1939 June 1947	USWB
1-052	Sebastopol (near)	Sonoma	38° 21′ 122° 50′	175	Jan. 1940 June 1947	USWB
1-053	The Geysers	Sonoma	38° 48′ 122° 49′	1,600	Dec. 1939 June 1947	USWB
1-054	Venado (near)	Sonoma	38° 37′ 123° 01′	1,260	Dec. 1939 June 1947	USWB
1-057	Hyampom	Trinity	40° 37′ 123° 28′	1,240	April 1940 June 1947	USWB
1-058	Lake Mountain	Trinity	40° 02′ 123° 24′	3,200	Jan. 1944 June 1947	USWB
1-059	Trinity Center	Trinity	41° 00′ 122′ 42′	2,300	Feb. 1941 June 1947	USFS
1-19*	Weaverville	Trinity	40° 44′ 122° 56′	2,050	Sept. 1941 June 1947	USFS

SOURCE OF RECORD

Abbreviation	*Name*
USFS	United States Forest Service
USWB	United States Weather Bureau
USBR	United States Bureau of Reclamation

TABLE 10

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, NORTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
1-001	Crescent City	Del Norte	41° 45′ 124° 12′	50	1941-47	A
1-002	Elk Valley	Del Norte	42° 00′ 123° 43′	1,171	1937-39	B
1-003	Klamath	Del Norte	41° 32′ 124° 02′	25	1944-47	A
1-004	Monumental	Del Norte	41° 59′ 123° 48′	2,420	1905-10	B
1-005	Monumental Mine	Del Norte	41° 59′ 123° 48′	2,750	1905-10	B
1-006	Dyerville No. 1	Humboldt	40° 21′ 123° 55′	250	1909-11	B
1-007	Dyerville No. 2	Humboldt	40° 21′ 123° 55′	250	1933-36 1944-47	B
1-008	Fortuna	Humboldt	40° 36′ 124° 09′	100	1942-47	B
1-009	Hoopa	Humboldt	41° 03′ 123° 41′	350	1941-47	A
1-010	Hydesville	Humboldt	40° 33′ 124° 06′	400	1896-1900	B
1-011	Kneeland (near) No. 2	Humboldt	40° 40′ 123° 55′	2,500	1944-47	A
1-012	Miranda (near)	Humboldt	40° 12′ 123° 46′	300	1940-47	A
1-013	Orick	Humboldt	41° 17′ 124° 04′	152	1937-39	B
1-014	Shively	Humboldt	40° 26′ 124° 58′	200	1916-17	B
1-015	Weitchpec	Humboldt	41° 11′ 123° 43′	228	1940-41	A
1-016	Lake Pillsbury	Lake	39° 25′ 122° 58′	1,900	1940-47	A
1-017	Covelo, Barton	Mendocino	39° 47′ 123° 15′	1,400	1920-21	C
1-018	Covelo, Brown	Mendocino	39° 47′ 123° 15′	1,385	1935-39	B
1-019	Covelo (near)	Mendocino	39° 50′ 123° 05′	1,500	1941-47	A
1-020	Hearst	Mendocino	39° 30′ 123° 12′	1,350	1909-17	B
1-021	Hopland (near)	Mendocino	39° 01′ 123° 00′	2,510	1939-47	A
1-022	Howard Forest	Mendocino	39° 20′ 123° 00′	1,950	1940-48	B
1-023	Laytonville	Mendocino	39° 42′ 123° 28′	1,640	1940-47	A
1-024	Laytonville, Division of Highways	Mendocino	39° 42′ 123° 29′	1,600	1939-47	B
1-025	Laytonville No. 2	Mendocino	39° 42′ 123° 29′	1,600	1910-13	B
1-026	Point Arena	Mendocino	38° 55′ 123° 42′	100	1940-47	A
1-027	Potter Valley	Mendocino	39° 17′ 123° 04′	1,000	1938-39	B
1-028	Redwood Valley	Mendocino	39° 16′ 123° 12′	750	1940-47	A

TABLE 10—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, NORTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
1-029	Soda Creek	Mendocino	39° 25′ 122° 57′	1,900	1940-43	B
1-030	Willits	Mendocino	39° 25′ 123° 21′	1,350	1940-41	B
1-031	Willits No. 2	Mendocino	39° 24′ 123° 21′	1,364	1905-07	B
1-032	Willits (near) No. 3	Mendocino	39° 22′ 123° 20′	1,500	1941-47	B
1-033	Willits (near) No. 4	Mendocino	39° 20′ 123° 19′	1,900	1941-47	A
1-034	Yorkville (near)	Mendocino	38° 55′ 123° 18′	1,150	1939-47	A
1-035	Alturas No. 2	Modoc	41° 29′ 120° 32′	4,346	1940-45	B
1-036	Alturas No. 3	Modoc	41° 29′ 120° 32′	4,360	1929-32	B
1-037	Lake City	Modoc	41° 39′ 120° 13′	4,600	1930-39	B
1-038	Butte Valley Irr. Dist.	Siskiyou	41° 50′ 122° 00′	4,260	1930-39	B
1-039	Etna	Siskiyou	41° 28′ 122° 54′	2,950	1940-47	A
1-040	Fort Jones (near)	Siskiyou	41° 35′ 122° 43′	3,400	1943-47	A
1-041	Gazelle	Siskiyou	41° 31′ 122° 31′	2,750	1937-38	B
1-042	Gilta	Siskiyou	41° 12′ 123° 20′	3,000	1909-16	B
1-043	Macdoel	Siskiyou	41° 50′ 122° 00′	4,250	1909-17	B
1-044	Montague Airport	Siskiyou	41° 44′ 122° 33′	2,523	1940-47	A
1-045	Mt. Hebron	Siskiyou	41° 46′ 122° 00′	4,250	1906-09	B
1-046	Seiad Valley Ranger Station	Siskiyou	41° 50′ 123° 13′	1,370	1937-39	B
1-047	Bassett	Sonoma	38° 24′ 122° 49′	200	1898-1900	B
1-048	Cloverdale	Sonoma	38° 47′ 123° 13′	1,750	1929-30	B
1-049	Cloverdale (near)	Sonoma	38° 46′ 123° 13′	1,750	1939-47	A
1-050	Lytton Springs	Sonoma	38° 40′ 122° 52′	200	1896-99	B
1-051	Mt. St. Helena	Sonoma	38° 40′ 122° 36′	2,300	1909-13	B
1-052	Sebastopol	Sonoma	38° 21′ 122° 50′	175	1940-47	A
1-053	The Geysers	Sonoma	38° 48′ 122° 49′	1,600	1939-47	A
1-054	Venado (near)	Sonoma	38° 37′ 123° 01′	1,260	1939-47	A
1-055	Dedrick (near)	Trinity	40° 49′ 123° 03′	2,100	1940-41	B

TABLE 10—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, NORTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
1-056	Hyampom	Trinity	40° 37′ 123° 29′	1,400	1912-17	B
1-057	Hyampom, HN	Trinity	40° 37′ 123° 28′	1,240	1940-47	A
1-058	Lake Mountain	Trinity	40° 02′ 123° 24′	3,200	1944-47	A
1-059	Trinity Center	Trinity	41° 00′ 122° 42′	2,300	1941-47	A
1-060	Zenia	Trinity	40° 12′ 123° 29′	3,000	1906-07	B

LIST OF ABBREVIATIONS USED IN TABLE 10

TYPE OF RECORD

Abbreviation	*Name*
A	Hourly
B	Daily
C	Monthly

TABLE 11

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATION IN EACH MONTH FOR THE PERIOD OF RECORD, AT FIVE STATIONS, NORTH COASTAL AREA

In Inches

Month	Monumental, Del Norte County Number in Table 10: 1-004			Eureka, Humboldt County Number on Plate 3: 1-18			Ukiah, Mendocino County Number on Plate 3: 1-30			Yreka, Siskiyou County Number on Plate 3: 1-9			Santa Rosa, Sonoma County Number on Plate 3: 1-37		
	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum
July	0.47	1.60	0.00	0.10	1.34	0.00	0.02	0.42	0.00	0.37	1.51	0.00	0.04	0.75	0.00
August	0.39	2.49	0.00	0.14	2.66	0.00	0.01	0.41	0.00	0.21	1.35	0.00	0.02	0.32	0.00
September	2.28	3.82	0.53	0.87	4.26	0.00	0.46	3.03	0.00	0.48	2.35	0.00	0.41	4.39	0.00
October	7.88	16.17	3.30	2.37	8.36	0.00	1.67	8.05	0.00	1.13	4.35	0.00	1.48	8.78	0.00
November	17.31	39.73	8.51	5.00	14.80	Trace	4.12	19.24	0.00	2.44	8.50	0.00	3.27	12.64	0.00
December	17.92	35.89	11.29	6.38	12.88	1.17	6.85	15.75	0.68	2.97	8.01	0.00	5.53	15.94	0.62
January	21.14	43.84	9.34	6.61	18.26	1.87	7.64	30.75	0.12	2.87	11.78	0.39	6.11	18.45	0.40
February	17.50	25.80	3.60	6.01	19.49	0.50	6.22	19.41	0.23	2.40	8.89	0.15	5.35	14.42	0.00
March	10.57	17.70	3.22	5.15	19.05	0.07	4.63	18.18	0.01	1.67	6.68	0.00	4.07	12.93	0.05
April	4.58	11.34	0.51	3.21	11.13	0.00	2.33	11.78	0.00	1.02	2.73	0.00	1.91	9.58	0.00
May	6.23	12.23	2.66	1.84	7.20	0.00	1.13	4.97	0.00	0.99	3.96	0.00	1.19	5.11	0.00
June	3.16	9.04	0.25	0.72	4.66	0.00	0.36	2.44	0.00	0.62	2.39	0.00	0.29	2.48	0.00
SEASONAL TOTALS	109.43	-------	-------	38.41	-------	-------	35.44	-------	-------	17.17	-------	-------	29.67	-------	-------

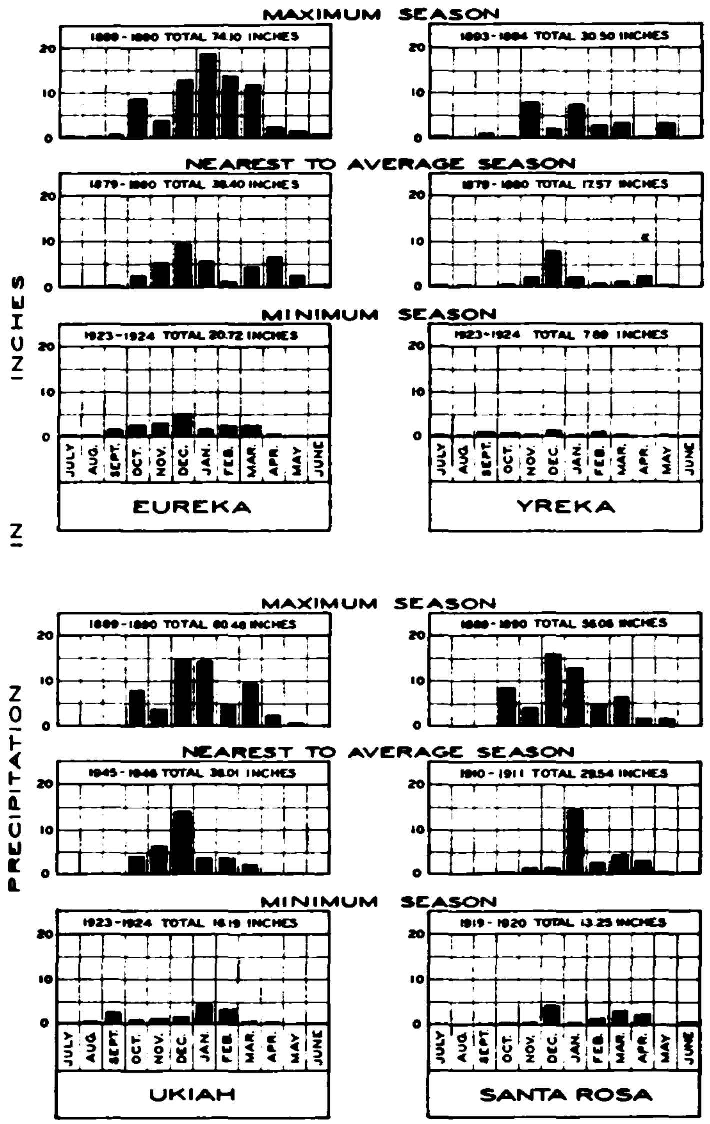
TABLE 12

ESTIMATED MEAN SEASONAL PRECIPITATION ON VALLEY AND MESA LANDS
1897-98 TO 1946-47

NORTH COASTAL AREA

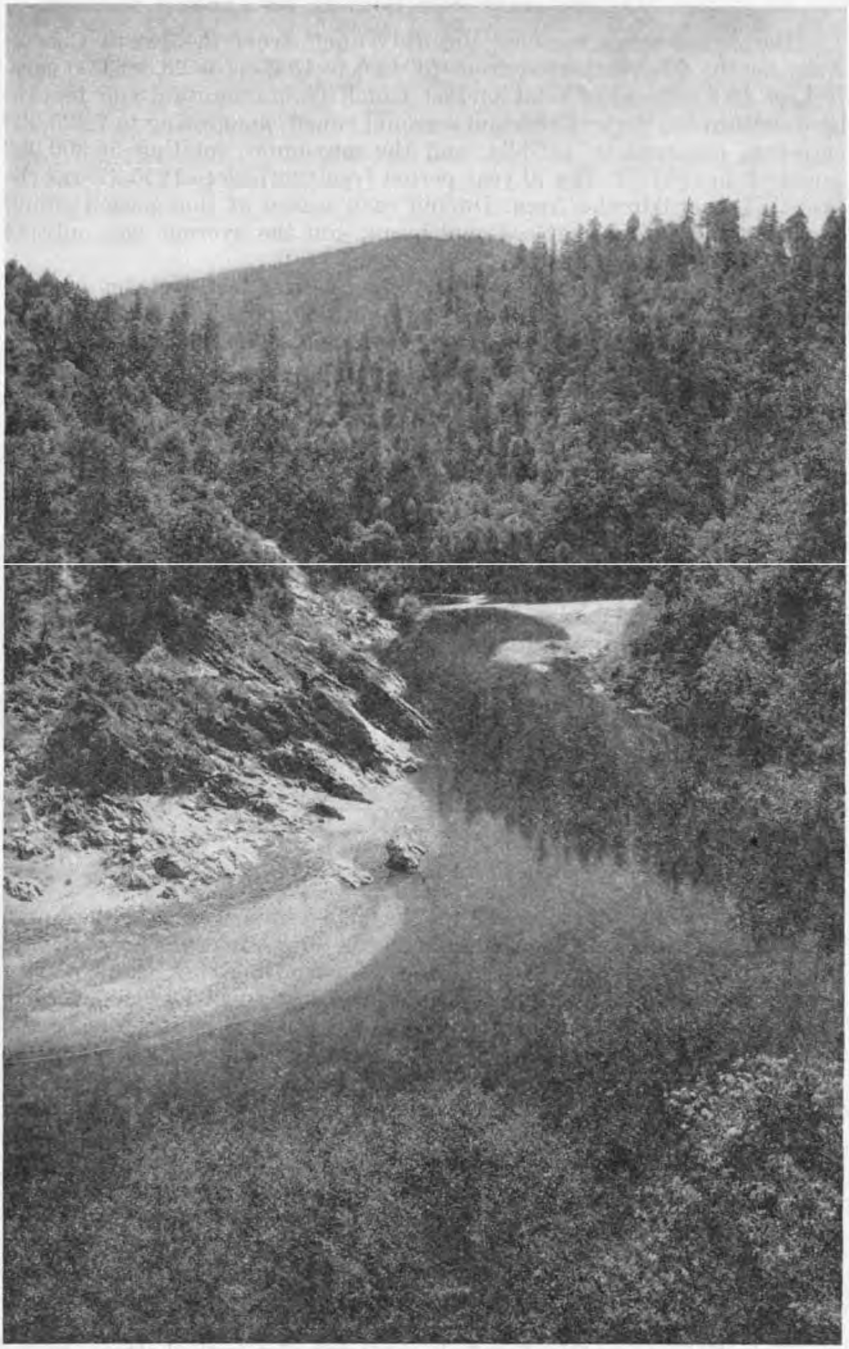
Number on Plate 2	Stream or stream group basin	Precipitation in acre-feet
2	Winchuck River Group in California	3,800
	Smith River Basin	
3-2	Remainder of Smith River (below gage near Crescent City)	56,700
4	Elk Creek Group	158,000
	Klamath River Basin	
5-2	From gage at Klamath Falls to gage at Keno (includes portions in California of Lost River, Lower Klamath Lake, and Butte Valley Basins)	1,435,000
5-3	From gage at Keno to gage near Copco (portion in California)	8,100
5-4	Shasta River above gage near Yreka	315,000
5-5	Scott River above gage near Fort Jones	167,000
5-6	Remainder of Klamath River above gage near Seiad Valley	14,600
	Trinity River	
5-9	Above gage at Lewiston	23,000
5-10	From gage at Lewiston to gage near Hoopa	74,300
5-11	Remainder of Klamath River above gage near Requa (below gage at Somesbar)	41,800
5-12	Remainder of Klamath River	22,800
6	Home Creek Group	2,800
	Redwood Creek Basin	
7-1	Above gage at Orick	5,900
7-2	Remainder of Redwood Creek	5,700
8	Maple Creek Group	40,800
	Mad River Basin	
9-2	From Sweasey Dam to gage near Arcata	28,800
9-3	Remainder of Mad River	16,400
10	Elk River Group (not including Humboldt Bay)	112,000
	Eel River Basin	
11-3	Remainder of Eel River above gage at Scotia (below Van Arsdale Dam and gage near Covelo on Middle Eel River)	142,000
11-5	Remainder of Van Duzen River (below gage at Bridgeville)	22,600
11-6	Remainder of Eel River	126,000
18	Navarro River Basin	35,200
19	Alder Creek Group	13,400
20	Garcia River Basin	8,500
21	Arena Creek Group	3,900
	Russian River Basin	
24-1	Above gage at Guerneville	472,000
	TOTAL, NORTH COASTAL AREA	3,356,100

PLATE 4



DISTRIBUTION OF PRECIPITATION AT SELECTED STATIONS

NORTH COASTAL AREA



(Division of Highways Photo)

TRINITY RIVER

RUNOFF

Estimated mean seasonal natural runoff from the North Coastal Area for the 53-year period from 1894-95 to 1946-47 is 28,886,000 acre-feet, or 40.8 percent of total surface runoff from mountain and foothill lands within the State. Minimum seasonal runoff, amounting to 7,420,000 acre-feet, occurred in 1923-24, and the maximum, totaling 55,300,000 acre-feet, in 1937-38. The 10-year period from 1927-28 to 1936-37 was the driest of record in the Area. During each season of that period runoff was less than the 53-year seasonal mean, and the average was only 71 percent of this long-time mean.

Runoff from the North Coastal Area is derived largely from rainfall, only a relatively small portion of the Area being subject to snow cover. Consequently, about half of the seasonal runoff generally comes between October 1 and January 30, approximately 30 percent during the following two months, and about 20 percent after March 31st, the approximate date when the snow melt begins. Monthly runoff varies from less than 1 percent of the seasonal total during the period from July to October, inclusive, to nearly 25 percent in the maximum month, usually in early spring.

As of September 30, 1947, the United States Geological Survey was maintaining 24 gaging stations in the Smith, Klamath, Eel, and Russian River Basins and a number of additional stations are proposed for early installation. Stream gaging stations are listed in Table 13, together with average, maximum and minimum seasonal runoff for stations with records of 10 years or longer. The principal stations presently maintained are:

Station	*Drainage area in square miles*
Smith River near Crescent City	604
Klamath River at Somesbar	11,967
Trinity River near Hoopa	2,846
Eel River at Scotia	3,140
Van Duzen River at Bridgeville	200
Russian River at Guerneville	1,367

Although runoff from 20,124 of the 25,368 square miles in the North Coastal Area is presently measured, records for Klamath River at Somesbar did not commence until 1927, those for Smith River near Crescent City not until 1931, and for Russian River not until December, 1939. The only available long-time record in the Area is for Eel River at Scotia, which was begun in December, 1910, and is unbroken except for the period from March, 1915, to September, 1916. Other gaging stations now maintained in the Area are upstream from the six main stations listed in the preceding paragraph.

Estimated mean seasonal natural runoff from the Area by basins, subbasins, and stream groups for the 53-year period from 1894-95 to 1946-47 is given in Table 14. Of total mean seasonal runoff from the area, 4,924,000 acre-feet was estimated by the empirical formula described in Chapter III. Estimates of seasonal natural runoff from main stream and tributary basins for which there are partial records are given in Table 15.

Variation in monthly flow to be expected of a typical stream in the North Coastal Area is indicated by the following data for Eel River at Scotia covering the period of record.

AVERAGE MONTHLY DISTRIBUTION OF AVERAGE SEASONAL RUNOFF, EEL RIVER AT SCOTIA

(Drainage Area—3,140 Square Miles)

Month	Percent of seasonal average	Acre-feet
October	0.4	18,000
November	5.9	266,000
December	15.2	685,000
January	21.1	950,000
February	23.2	1,045,000
March	15.8	712,000
April	11.4	513,000
May	4.7	212,000
June	1.5	67,000
July	0.4	18,000
August	0.2	9,000
September	0.2	9,000
Totals	100.0	4,504,000

TABLE 13

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, NORTH COASTAL AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Klamath River Basin—										
1-1	Klamath River (Link River) at Klamath Falls	42° 13′ 121° 48′	4,084	1904-47	USGS	A	1,110,000	1906-07	2,100,000	1930-31	420,000
1-2	Lost River near Clear Lake	41° 55′ 121° 05′	4,500	1904-09	USGS	B					
*1-3	Antelope Creek near MacDoel	41° 37′ 121° 48′	4,800	1921-22	USGS	D					
*1-4	Butte Creek near MacDoel	41° 45′ 122° 00′	4,600	1921-22	USGS	D					
*1-5	Bear Creek near MacDoel	41° 53′ 122° 08′	4,000	1921-22	USGS	D					
1-6	Klamath River at Keno	42° 08′ 121° 58′	4,000	1904-47	USGS	A	1,118,000	1906-07	1,950,000	1930-31	395,000
1-7	Fall Creek at Copco	41° 58′ 122° 22′	2,350	1928-47	USGS	A	24,700	1937-38	28,500	1938-39	21,560
1-8	Klamath River below Fall Creek near Copco	41° 58′ 122° 22′	2,310	1928-47	USGS	A	1,070,000	1937-38	1,755,000	1930-31	550,000
1-8a	Klamath River near Copco	41° 58′ 122° 23′	2,350	1923-28	USGS	A					
1-9	Jenny Creek near Copco	41° 58′ 122° 24′	2,300	1922-24	USGS	D					
1-10	Shasta River above Edson-Foulke Ditch	41° 25′ 122° 26′	2,500	1934-47	DWRWA	D					

1-11	Beaughan Creek below Long-Bell	41° 27′ 122° 25′	3,000	1941-47	DWRWA	D					
1-12	Shasta River at Edgewood Bridge	41° 28′ 122° 26′	2,900	1936-47	DWRWA	D					
1-13	Carrick Springs near Weed	41° 27′ 122° 22′	3,500	1934-47	DWRWA	D					
1-14	Parks Creek above Duke North Ditch	41° 25′ 122° 31′	3,900	1934-47	DWRWA	D					
1-15	Parks Creek at Robertson Weir	41° 32′ 122° 27′	2,600	1939-47	DWRWA	D					
1-16	Big Springs at head	41° 36′ 122° 26′	2,550	1934-47	DWRWA	D					
1-17	Shasta River above Grenada Dam	41° 37′ 122° 28′	2,550	1922-23 1929-38	DWRWA	D					
1-18	Little Shasta River above Harp Ditch	41° 45′ 122° 18′	3,200	1928-47	DWRWA	D					
1-19	Cleland Springs at head	41° 45′ 122° 19′	3,000	1928-47	DWRWA	D					
1-20	Shasta River near Montague	41° 42′ 122° 32′	2,500	1911-47	USGS DWRWA	A	107,080	920-21	216,000	1930-31	62,700
1-21	Shasta River near Yreka	41° 49′ 122° 35′	2,000	1933-41 1944-47	USGS	A	111,000	940-41	226,100	1933-34	56,500
1-22	Scott River, East Fork, near Callahan	41° 19′ 122° 42′	3,500	1910-13	USGS	D					
1-23	Scott River, East Fork, at Callahan	41° 19′ 122° 48′	3,120	1913-21	USGS	D					
1-24	Scott River at Callahan	41° 20′ 122° 49′	3,100	1911-21	USGS	D					
1-25	Scott River near Ft. Jones	41° 38′ 123° 00′	2,625	1941-47	USGS	A					
1-26	Scott River near Scott Bar	41° 47′ 123° 02′	1,550	1911-13	USGS	A					
1-27	Klamath River near Seiad Valley	41° 50′ 123° 10′	1,450	1912-25	USGS	A	2,581,000	913-14	3,970,000	1919-20	1,460,000
1-28	Indian Creek near Happy Camp	41° 52′ 123° 24′	1,300	1911-21	USGS	D					
1-29	Indian Creek, Reeve-Davis Flume, near Happy Camp	41° 23′ 123° 24′	1,400	1911-13	USGS	D					

TABLE 13—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, NORTH COASTAL AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
1-30	Klamath River near Happy Camp	41° 47′ 123° 19′	1,200	1911-12	USGS	A					
1-31	Salmon River at Somesbar	41° 23′ 123° 28′	500	1911-15 1927-47	USGS	A	1,109,000	1937-38	2,234,000	1930-31	473,000
1-32	Klamath River at Somesbar	41° 23′ 123° 29′	450	1927-47	USGS	A	4,752,000	1937-38	9,590,000	1930-31	2,240,000
1-33	Coffee Creek at Coffee	41° 06′ 122° 47′	3,000	1910-14	USGS	D					
1-34	Swift Creek near Trinity Center	40° 58′ 122° 44′	2,600	1910-14	USGS	D					
1-35	Trinity River near Trinity Center	40° 59′ 122° 40′	2,230	1910-13	USGS	AD					
1-36	Trinity River, East Fork, near Trinity Center	40° 58′ 122° 40′	2,250	1910-14	USGS	D					
1-37	Trinity River at Lewiston	40° 42′ 122° 48′	1,794	1911-47	USGS	A	1,107,000	1940-41	2,547,000	1923-24	266,000
1-38	Trinity River near Douglas City	40° 40′ 122° 59′	1,520	1944-47	USGS	A					
1-39	Trinity River, North Fork, at Helena	40° 46′ 123° 08′	1,400	1911-13	USGS	A					
1-40	Trinity River near Burnt Ranch	40° 47′ 123° 25′	1,010	1931-40	USGS	A					
‡1-41	New River near Denny	40° 55′ 123° 24′	1,200	1927-28	USGS	A					

1-42	Trinity River near China Flat	40° 54′ 123° 35′	600	1911-13	USGS	A					
1-43	Trinity River, South Fork, near China Flat	40° 52′ 123° 37′	550	1911-13	USGS	A					
1-44	Trinity River near Hoopa	41° 02′ 123° 39′	315	1911-14 1916-18 1931-47	USGS	A	3,781,000	1937-38	7,601,000	1933-34	1,900,000
1-45	Klamath River near Requa	41° 30′ 123° 58′	50	1910-26	USGS	A	10,900,000	1920-21	16,800,000	1923-24	3,740,000
1-46	Smith River, Middle Fork, near Crescent City	41° 50′ 123° 58′	380	1911-18	USGS	D					
1-47	Smith River, North Fork, near Crescent City	41° 51′ 123° 58′	380	1911-18	USGS	D					
1-48	Smith River, South Fork, near Crescent City	41° 48′ 124° 03′	150	1911-13	USGS	A					
1-49	Smith River near Crescent City	41° 47′ 124° 04′	100	1931-47	USGS	A	2,402,000	1942-43	3,567,000	1933-34	1,550,000
1-50	Redwood Creek near Korbel	40° 58′ 123° 50′	750	1911-13	USGS	A					
1-51	Redwood Creek at Orick	41° 17′ 124° 03′	10	1911-13	USGS	A					
1-52	Mad River near Arcata	40° 54′ 124° 02′	10	1910-13	USGS	A					
1-53	Lake Pillsbury at Hullville	39° 24′ 122° 57′	1,800	1922-47	USGS	E					
1-54	Eel River at Hullville	39° 24′ 122° 58′	1,800	1922-47	USGS	A	337,000	1937-38	949,200	1923-24	68,300
1-55	Eel River at Van Arsdale Dam near Potter Valley	39° 23′ 123° 07′	1,400	1909-22 1922-47	USGS	A	382,000	1937-38	921,900	1930-31	7,860
1-56	Potter Valley Powerhouse Tailrace near Potter Valley	39° 21′ 123° 07′	1,000	1909-47	USGS	A	138,000	1927-28	188,000	1923-24	70,800
1-57	Eel River at Hearst	39° 30′ 123° 13′	1,320	1910-13	USGS	A					
1-58	Eel River, Middle Fork, near Covelo	39° 49′ 123° 08′	1,380	1911-23	USGS	AD					
1-59	Eel River at Dos Rios	39° 43′ 123° 21′	850	1911-13	USGS	A					

TABLE 13—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, NORTH COASTAL AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
1-60	Eel River, South Fork, at Garberville	40° 05′ 123° 48′	400	1911-13 1939-40	USGS	A					
1-61	Eel River, South Fork, near Miranda	40° 12′ 123° 46′	200	1946-47	USGS	A					
1-62	Eel River, at Scotia	40° 29′ 124° 06′	36	1910-15 1916-47	USGS	A	4,512,000	1937-38	10,280,000	1919-20	1,360,000
1-63	Van Dusen River at Bridgeville	40° 28′ 123° 48′	591	1911-13 1939-47	USGS	A					
1-64	Yager Creek at Carlotta	40° 32′ 124° 04′	30	1911-14	USGS	A					
1-65	Mattole River near Petrolia	40° 19′ 124° 16′	50	1911-13	USGS	A					
1-66	Russian River near Ukiah	39° 12′ 123° 12′	600	1911-13	USGS	A					
1-67	Russian River, East Fork, near Calpella	39° 15′ 123° 09′	720	1941-47	USGS	A					
1-68	Russian River, East Fork, near Ukiah	39° 12′ 123° 10′	650	1911-13	USGS	A					
1-69	Russian River near Hopland	39° 01′ 123° 08′	497	1939-47	USGS	A					
1-70	Dry Creek near Cloverdale	38° 45′ 123° 05′	320	1941-45	USGS	A					

1-71	Russian River at Geyserville........	38° 43′ 122° 54′	200	1910-13	USGS	A			
1-72	Dry Creek near Healdsburg..........	38° 43′ 123° 00′	190	1939-42	USGS	A			
1-73	Russian River near Healdsburg......	38° 37′ 127° 50′	77	1939-47	USGS	A			
1-74	Santa Rosa Creek at Santa Rosa....	38° 26′ 122° 43′	138	1939-41	USGS	A			
1-75	Mark West Creek near Windsor.....	38° 30′ 122° 45′	135	1940-41	USGS	A			
1-76	Laguna de Santa Rosa near Graton..	38° 27′ 122° 50′	40	1940-47	USGS	E			
1-77	Russian River at Guerneville........	38° 30′ 122° 59′	9	1939-47	USGS	A			

* Approximate location.
‡ Rough approximation.

TYPE OF RECORD

A—Daily.
B—Monthly.
C—Seasonal.
D—Intermittent.
E—Reservoir contents only.

SOI :E OF RECORD

Abbreviation	*Name*
USGS	United ates Geological Survey.
DWRWA	Divisio of Water Resources Water Rights Adju ation.

TABLE 14

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, NORTH COASTAL AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
1	Rogue River Basin in California			320,000
2	Winchuck River Group in California			50,000
	Smith River Basin			
3-1	Above gage near Crescent City	2,567,000		
3-2	Remainder of Smith River	360,000		2,927,000
4	Elk Creek Group			54,000
	Klamath River Basin			
5-1	Above gage at Klamath Falls (Link River)	1,333,000		
5-2	From gage at Klamath Falls to gage at Keno	462,000		
	Above gage at Keno		1,795,000	
5-3	From gage at Keno to gage near Copco	213,000		
	Above gage near Copco		2,008,000	
5-4	Shasta River above gage near Yreka	201,000		
5-5	Scott River above gage near Fort Jones	417,000		
5-6	Remainder of Klamath River above gage near Seiad Valley	714,000		
	Above gage near Seiad Valley		3,340,000	
5-7	Salmon River above gage at Somesbar	1,200,000		
5-8	Remainder of Klamath River above gage at Somesbar	1,605,000		
	Above gage at Somesbar		6,145,000	
	Trinity River			
5-9	Above gage at Lewiston	1,273,000		
5-10	From gage at Lewiston to gage near Hoopa	2,659,000		
	Above gage near Hoopa		3,932,000	
5-11	Remainder of Klamath River above gage near Requa	2,589,000		
	Above gage near Requa		12,666,000	
5-12	Remainder of Klamath River	316,000		
	Klamath River at mouth			12,982,000
	In Oregon			(1,861,000)
6	Home Creek Group			14,000
	Redwood Creek Basin			
7-1	Above gage at Orick	819,000		
7-2	Remainder of Redwood Creek	4,500		823,500
8	Maple Creek Group			270,000
	Mad River Basin			
9-1	Above Sweasey Dam	764,000		
9-2	From Sweasey Dam to gage near Arcata	157,000		
	Above gage near Arcata		921 000	
9-3	Remainder of Mad River	4,500		925,500
10	Elk River Group			300,000
	Eel River Basin			
11-1	Above Van Arsdale Dam	465,000		
11-2	Middle Eel River above gage near Covelo	710,000		
11-3	Remainder of Eel River above gage at Scotia	4,092,000		
	Above gage at Scotia		5,267,000	
11-4	Van Duzen River above gage at Bridgeville	516,000		
11-5	Remainder of Van Duzen River	398,000		
	Van Duzen River above mouth		914,000	
11-6	Remainder of Eel River	92,000		
	Eel River at mouth			6,273,000

TABLE 14—Continued

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, NORTH COASTAL AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
12	Bear River Group			375,000
	Mattole River Basin			
13-1	Above gage near Petrolia	950,000		
13-2	Remainder of Mattole River	145,000		1,095,000
14	Four Mile Creek Group			260,000
15	Ten Mile River Group			520,000
16	Noyo River Basin			155,000
17	Big River Group			280,000
18	Navarro River Basin			375,000
19	Alder Creek Group			160,000
20	Garcia River Basin			195,000
21	Arena Creek Group			35,000
22	Gualala River Basin			530,000
23	Stewart's Point Group			85,000
	Russian River Basin			
24-1	Above gage at Guerneville	1,403,000		
24-2	Remainder of Russian River	220,000		1,623,000
25	Salmon Creek Group			120,000
	TOTAL, NORTH COASTAL AREA IN CALIFORNIA			28,886,000

TABLE 15

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, NORTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Smith River near Crescent City	Klamath River at Klamath Falls	Lost River and Lower Klamath Lake	Klamath River at Keno	Klamath River Keno to Copco	Klamath River at Copco
1894-95	3,325,000	1,760,000	694,000	2,454,000	230,000	2,684,000
95-96	3,150,000	1,670,000	635,000	2,305,000	225,000	2,530,000
96-97	3,025,000	1,575,000	575,000	2,150,000	225,000	2,375,000
97-98	1,850,000	960,000	271,000	1,231,000	200,000	1,431,000
98-99	2,075,000	1,060,000	312,000	1,372,000	205,000	1,577,000
1899-1900	2,725,000	1,400,000	481,000	1,881,000	220,000	2,101,000
00-01	2,750,000	1,420,000	481,000	1,901,000	220,000	2,121,000
01-02	3,175,000	1,680,000	627,000	2,307,000	225,000	2,532,000
02-03	2,950,000	1,525,000	541,000	2,066,000	225,000	2,291,000
03-04	3,850,000	2,150,000	931,000	3,081,000	240,000	3,321,000
1904-05	3,075,000	1,660,000	304,000	1,964,000	225,000	2,189,000
05-06	3,150,000	1,670,000	575,000	2,245,000	225,000	2,470,000
06-07	3,550,000	2,155,000	838,000	2,993,000	235,000	3,228,000
07-08	2,550,000	1,535,000	323,000	1,858,000	215,000	2,073,000
08-09	3,725,000	1,675,000	634,000	2,309,000	235,000	2,544,000
1909-10	2,900,000	1,885,000	525,000	2,410,000	220,000	2,630,000
10-11	2,975,000	2,065,000	734,000	2,799,000	225,000	3,024,000
11-12	2,825,000	1,690,000	428,000	2,118,000	230,000	2,348,000
12-13	2,725,000	1,650,000	418,000	2,068,000	230,000	2,298,000
13-14	3,275,000	1,820,000	685,000	2,505,000	230,000	2,735,000
1914-15	2,750,000	1,350,000	322,000	1,672,000	220,000	1,892,000
15-16	3,025,000	1,505,000	416,000	1,921,000	220,000	2,141,000
16-17	2,300,000	1,390,000	710,000	2,100,000	220,000	2,320,000
17-18	1,450,000	1,175,000	254,000	1,429,000	215,000	1,644,000
18-19	2,600,000	1,255,000	430,000	1,685,000	215,000	1,900,000
1919-20	1,250,000	1,065,000	221,000	1,286,000	150,000	1,436,000
20-21	3,450,000	1,670,000	667,000	2,337,000	230,000	2,567,000
21-22	2,150,000	1,355,000	456,000	1,811,000	220,000	2,031,000
22-23	1,450,000	1,160,000	269,000	1,429,000	210,000	1,639,000
23-24	800,000	930,000	187,000	1,117,000	215,000	1,332,000
1924-25	2,850,000	1,300,000	370,000	1,670,000	190,000	1,860,000
25-26	2,000,000	850,000	205,000	1,055,000	195,000	1,250,000
26-27	3,100,000	1,460,000	612,000	2,072,000	240,000	2,312,000
27-28	2,375,000	1,240,000	476,000	1,716,000	200,000	1,916,000
28-29	1,475,000	915,000	235,000	1,150,000	195,000	1,345,000
1929-30	1,925,000	880,000	305,000	1,185,000	205,000	1,390,000
30-31	1,200,000	695,000	149,000	844,000	155,000	999,000
31-32	2,450,000	855,000	397,000	1,252,000	200,000	1,452,000
32-33	2,810,000	830,000	228,000	1,058,000	210,000	1,268,000
33-34	1,550,000	740,000	158,000	898,000	175,000	1,073,000
1934-35	2,753,000	935,000	413,000	1,348,000	195,000	1,543,000
35-36	2,297,000	1,070,000	493,000	1,563,000	220,000	1,783,000
36-37	2,187,000	910,000	356,000	1,266,000	210,000	1,476,000
37-38	4,200,000	1,535,000	992,000	2,527,000	265,000	2,792,000
38-39	1,677,000	935,000	253,000	1,188,000	195,000	1,383,000
1939-40	2,362,000	1,170,000	666,000	1,836,000	210,000	2,046,000
40-41	2,416,000	1,010,000	416,000	1,426,000	210,000	1,636,000
41-42	2,593,000	1,155,000	619,000	1,774,000	200,000	1,974,000
42-43	3,567,000	1,825,000	862,000	2,687,000	180,000	2,867,000
43-44	1,736,000	1,070,000	313,000	1,383,000	210,000	1,593,000
1944-45	2,623,000	1,090,000	322,000	1,412,000	190,000	1,602,000
45-46	3,095,000	1,360,000	465,000	1,825,000	220,000	2,045,000
1946-47	1,949,000	950,000	263,000	1,213,000	205,000	1,418,000
MEAN	2,567,000	1,333,000	462,000	1,795,000	213,000	2,008,000

TABLE 15—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, NORTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Shasta River near Yreka	Scott River near Fort Jones	Klamath Basin Copco to Seiad Valley	Klamath River near Seiad Valley	Salmon River at Somesbar	Klamath Basin Seiad Valley to Somesbar
1894-95	275,000	570,000	880,000	4,409,000	1,625,000	2,250,000
95-96	260,000	535,000	845,000	4,170,000	1,530,000	2,090,000
96-97	240,000	495,000	815,000	3,925,000	1,450,000	1,950,000
97-98	130,000	260,000	540,000	2,361,000	800,000	1,050,000
98-99	155,000	315,000	605,000	2,652,000	925,000	1,180,000
1899-1900	210,000	435,000	755,000	3,501,000	1,275,000	1,650,000
00-01	215,000	450,000	765,000	3,551,000	1,300,000	1,675,000
01-02	260,000	535,000	845,000	4,172,000	1,540,000	2,100,000
02-03	235,000	480,000	805,000	3,811,000	1,400,000	1,850,000
03-04	345,000	725,000	1,000,000	5,391,000	1,990,000	2,825,000
1904-05	250,000	510,000	830,000	3,779,000	1,480,000	2,000,000
05-06	260,000	530,000	850,000	4,110,000	1,530,000	2,090,000
06-07	305,000	635,000	930,000	5,098,000	1,775,000	2,500,000
07-08	195,000	410,000	720,000	3,398,000	1,180,000	1,500,000
08-09	320,000	660,000	945,000	4,469,000	1,890,000	2,700,000
1909-10	220,000	450,000	770,000	4,070,000	1,370,000	1,770,000
10-11	235,000	485,000	805,000	4,549,000	1,420,000	1,900,000
11-12	235,000	470,000	775,000	3,828,000	1,330,000	1,875,000
12-13	210,000	450,000	770,000	3,728,000	1,280,000	1,600,000
13-14	355,000	580,000	1,030,000	4,700,000	1,600,000	1,435,000
1914-15	205,000	460,000	720,000	3,277,000	1,300,000	1,770,000
15-16	260,000	520,000	830,000	3,751,000	1,450,000	1,900,000
16-17	180,000	350,000	645,000	3,495,000	1,050,000	1,225,000
17-18	135,000	200,000	445,000	2,424,000	600,000	885,000
18-19	185,000	420,000	595,000	3,100,000	1,200,000	1,585,000
1919-20	135,000	170,000	255,000	1,996,000	500,000	810,000
20-21	305,000	625,000	915,000	4,412,000	1,700,000	2,665,000
21-22	175,000	320,000	625,000	3,151,000	950,000	1,125,000
22-23	135,000	200,000	505,000	2,479,000	600,000	785,000
23-24	130,000	100,000	540,000	2,102,000	300,000	350,000
1924-25	185,000	480,000	675,000	3,200,000	1,350,000	1,900,000
25-26	150,000	290,000	635,000	2,325,000	875,000	1,075,000
26-27	270,000	540,000	790,000	3,912,000	1,500,000	2,000,000
27-28	185,000	370,000	695,000	3,166,000	1,090,000	1,460,000
28-29	130,000	200,000	520,000	2,195,000	593,000	1,085,000
1929-30	135,000	275,000	540,000	2,340,000	825,000	1,050,000
30-31	125,000	160,000	315,000	1,599,000	473,000	715,000
31-32	125,000	350,000	700,000	2,627,000	1,050,000	1,240,000
32-33	125,000	340,000	760,000	2,493,000	1,010,000	1,360,000
33-34	120,000	195,000	435,000	1,823,000	581,000	870,000
1934-35	130,000	390,000	680,000	2,743,000	1,134,000	1,290,000
35-36	140,000	395,000	715,000	3,033,000	1,144,000	1,515,000
36-37	135,000	330,000	635,000	2,576,000	980,000	1,185,000
37-38	270,000	840,000	1,290,000	5,192,000	2,234,000	3,300,000
38-39	140,000	250,000	485,000	2,258,000	758,000	945,000
1939-40	210,000	450,000	815,000	3,521,000	1,277,000	1,775,000
40-41	275,000	445,000	730,000	3,086,000	1,265,000	1,730,000
41-42	230,000	535,000	760,000	3,499,000	1,320,000	1,795,000
42-43	220,000	640,000	740,000	4,467,000	1,735,000	2,595,000
43-44	120,000	205,000	450,000	2,368,000	633,000	835,000
1944-45	135,000	330,000	760,000	2,827,000	1,130,000	1,295,000
45-46	175,000	495,000	930,000	3,645,000	1,520,000	1,995,000
1946-47	145,000	255,000	450,000	2,268,000	770,000	950,000
MEAN	201,000	417,000	714,000	3,340,000	1,200,000	1,605,000

TABLE 15—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, NORTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Klamath River at Somesbar	Trinity River at Lewiston	Trinity River Lewiston to Hoopa	Trinity River near Hoopa	Klamath Basin Somesbar to Requa	Klamath River near Requa
1894-95	8,284,000	1,940,000	3,790,000	5,730,000	3,630,000	17,644,000
95-96	7,790,000	1,780,000	3,500,000	5,280,000	3,400,000	16,470,000
96-97	7,325,000	1,610,000	3,240,000	4,850,000	3,185,000	15,360,000
97-98	4,211,000	675,000	1,565,000	2,240,000	1,680,000	8,131,000
98-99	4,757,000	825,000	1,815,000	2,640,000	1,925,000	9,322,000
1899-1900	6,426,000	1,320,000	2,680,000	4,000,000	2,730,000	13,156,000
00-01	6,526,000	1,370,000	2,780,000	4,150,000	2,800,000	13,476,000
01-02	7,812,000	1,790,000	3,520,000	5,310,000	3,415,000	16,537,000
02-03	7,061,000	1,530,000	3,110,000	4,640,000	3,105,000	14,806,000
03-04	10,206,000	2,625,000	4,900,000	7,525,000	4,450,000	22,181,000
1904-05	7,259,000	1,680,000	3,360,000	5,040,000	3,275,000	15,574,000
05-06	7,730,000	1,770,000	3,500,000	5,270,000	3,390,000	16,390,000
06-07	9,373,000	2,230,000	4,270,000	6,500,000	3,980,000	19,853,000
07-08	6,078,000	1,170,000	2,430,000	3,600,000	2,480,000	12,158,000
08-09	9,059,000	2,340,000	4,450,000	6,790,000	4,190,000	20,039,000
1909-10	7,210,000	1,380,000	2,820,000	4,200,000	2,890,000	14,300,000
10-11	7,869,000	1,550,000	3,150,000	4,700,000	3,110,000	15,679,000
11-12	7,033,000	1,030,000	2,310,000	3,340,000	1,960,000	12,333,000
12-13	6,608,000	1,070,000	2,680,000	3,750,000	2,965,000	13,323,000
13-14	7,735,000	2,030,000	3,500,000	5,530,000	3,865,000	17,130,000
1914-15	6,347,000	2,150,000	2,900,000	5,050,000	2,960,000	14,357,000
15-16	7,101,000	1,510,000	3,200,000	4,710,000	3,290,000	15,101,000
16-17	5,770,000	651,000	2,050,000	2,701,000	2,425,000	10,896,000
17-18	3,909,000	603,000	1,400,000	2,003,000	1,590,000	7,502,000
18-19	5,885,000	1,150,000	2,600,000	3,750,000	2,725,000	12,360,000
1919-20	3,306,000	408,000	1,002,000	1,410,000	1,130,000	5,846,000
20-21	8,777,000	1,800,000	3,600,000	5,400,000	3,485,000	17,662,000
21-22	5,226,000	784,000	2,000,000	2,784,000	1,940,000	9,950,000
22-23	3,864,000	686,000	1,400,000	2,086,000	1,270,000	7,220,000
23-24	2,752,000	266,000	550,000	816,000	575,000	4,143,000
1924-25	6,450,000	1,500,000	3,100,000	4,600,000	2,870,000	13,920,000
25-26	4,275,000	808,000	1,852,000	2,660,000	1,800,000	8,735,000
26-27	7,412,000	1,830,000	3,300,000	5,130,000	3,100,000	15,642,000
27-28	5,716,000	1,060,000	2,575,000	3,635,000	2,400,000	11,751,000
28-29	3,873,000	528,000	1,400,000	1,928,000	1,550,000	7,351,000
1929-30	4,215,000	815,000	1,650,000	2,465,000	1,700,000	8,380,000
30-31	2,787,000	402,000	800,000	1,202,000	1,050,000	5,039,000
31-32	4,917,000	720,000	1,970,000	2,690,000	2,050,000	9,657,000
32-33	4,863,000	803,000	1,977,000	2,780,000	2,100,000	9,743,000
33-34	3,274,000	683,000	1,217,000	1,900,000	1,300,000	6,474,000
1934-35	5,167,000	965,000	2,473,000	3,438,000	2,250,000	10,855,000
35-36	5,692,000	1,025,000	2,600,000	3,625,000	2,450,000	11,767,000
36-37	4,741,000	1,000,000	1,860,000	2,860,000	1,900,000	9,501,000
37-38	10,726,000	2,105,000	5,496,000	7,601,000	4,800,000	23,127,000
38-39	3,961,000	573,000	1,585,000	2,158,000	1,600,000	7,719,000
1939-40	6,573,000	1,613,000	3,524,000	5,137,000	2,950,000	14,660,000
40-41	6,081,000	2,547,000	4,142,000	6,689,000	2,900,000	15,670,000
41-42	6,614,000	1,804,000	3,281,000	5,085,000	2,950,000	14,649,000
42-43	8,797,000	1,108,000	3,359,000	4,467,000	3,350,000	16,614,000
43-44	3,836,000	654,000	1,341,000	1,995,000	1,350,000	7,181,000
1944-45	5,252,000	1,048,000	2,577,000	3,625,000	2,300,000	11,177,000
45-46	7,160,000	1,415,000	3,372,000	4,787,000	3,150,000	15,097,000
1946-47	3,988,000	732,000	1,434,000	2,166,000	1,550,000	7,704,000
MEAN	6,145,000	1,273,000	2,659,000	3,932,000	2,589,000	12,666,000

TABLE 15—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, NORTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Eel River above Van Arsdale Dam	Middle Fork Eel River near Covelo	Eel River Basin Covelo and Van Arsdale to Scotia	Eel River at Scotia	Van Duzen River at Bridgeville	Van Duzen River Bridgeville to mouth
1894-95	694,000	1,013,000	5,799,000	7,506,000	681,000	567,000
95-96	642,000	945,000	5,398,000	6,985,000	650,000	528,000
96-97	644,000	947,000	5,414,000	7,005,000	651,000	529,000
97-98	45,000	137,000	825,000	1,007,000	117,000	76,000
98-99	206,000	354,000	2,061,000	2,621,000	334,000	198,000
1899-1900	519,000	777,000	4,449,000	5,745,000	573,000	434,000
00-01	552,000	821,000	4,703,000	6,076,000	595,000	459,000
01-02	695,000	1,016,000	5,796,000	7,507,000	681,000	567,000
02-03	623,000	919,000	5,248,000	6,790,000	640,000	513,000
03-04	698,000	1,270,000	7,422,000	9,390,000	782,000	710,000
1904-05	639,000	941,000	5,375,000	6,955,000	649,000	526,000
05-06	668,000	981,000	5,596,000	7,245,000	667,000	548,000
06-07	770,000	1,115,000	6,372,000	8,257,000	721,000	624,000
07-08	434,000	662,000	3,800,000	4,896,000	516,000	370,000
08-09	819,000	1,182,000	6,749,000	8,750,000	747,000	661,000
1909-10	390,000	790,000	4,662,000	5,842,000	579,000	441,000
10-11	465,000	553,000	3,072,000	4,090,000	459,000	309,000
11-12	227,000	506,000	2,902,000	3,635,000	477,000	275,000
12-13	389,000	707,000	4,252,000	5,348,000	535,000	404,000
13-14	899,000	1,240,000	6,561,000	8,700,000	746,000	657,000
1914-15	719,000	955,000	6,180,000	7,854,000	700,000	594,000
15-16	645,000	869,000	5,378,000	6,892,000	644,000	521,000
16-17	414,000	607,000	3,292,000	4,313,000	473,000	326,000
17-18	188,000	308,000	1,782,000	2,278,000	299,000	172,000
18-19	423,000	717,000	4,167,000	5,307,000	544,000	401,000
1919-20	126,000	193,000	1,104,000	1,423,000	192,000	108,000
20-21	692,000	1,040,000	6,083,000	7,815,000	696,000	591,000
21-22	256,000	500,000	2,937,000	3,693,000	429,000	279,000
22-23	288,000	374,000	2,098,000	2,760,000	349,000	209,000
23-24	58,000	117,000	694,000	869,000	85,000	66,000
1924-25	500,000	972,000	5,716,000	7,188,000	661,000	543,000
25-26	259,000	445,000	2,580,000	3,284,000	395,000	248,000
26-27	713,000	1,062,000	6,080,000	7,855,000	699,000	593,000
27-28	452,000	626,000	3,549,000	4,627,000	499,000	350,000
28-29	147,000	259,000	1,511,000	1,917,000	256,000	145,000
1929-30	355,000	476,000	2,695,000	3,526,000	396,000	266,000
30-31	116,000	219,000	1,283,000	1,618,000	211,000	122,000
31-32	293,000	489,000	2,840,000	3,622,000	267,000	274,000
32-33	235,000	491,000	2,916,000	3,642,000	427,000	275,000
33-34	299,000	336,000	1,856,000	2,491,000	320,000	188,000
1934-35	412,000	686,000	3,984,000	5,082,000	530,000	384,000
35-36	517,000	779,000	4,468,000	5,764,000	574,000	436,000
36-37	275,000	485,000	2,817,000	3,577,000	416,000	270,000
37-38	1,054,000	1,408,000	7,950,000	10,412,000	853,000	787,000
38-39	168,000	363,000	2,153,000	2,684,000	341,000	203,000
1939-40	715,000	987,000	5,594,000	7,296,000	625,000	551,000
40-41	885,000	1,113,000	6,244,000	8,242,000	718,000	623,000
41-42	708,000	1,003,000	5,706,000	7,417,000	680,000	561,000
42-43	508,000	770,000	4,417,000	5,695,000	568,000	430,000
43-44	192,000	305,000	1,762,000	2,259,000	267,000	171,000
1944-45	335,000	644,000	3,792,000	4,771,000	522,000	361,000
45-46	468,000	817,000	4,748,000	6,033,000	591,000	456,000
1946-47	228,000	356,000	2,045,000	2,629,000	310,000	199,000
MEAN	465,000	710,000	4,092,000	5,267,000	516,000	398,000

TABLE 15—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, NORTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Van Duzen River at mouth	Mattole River near Petrolia	Russian River at Guerneville
1894–95	1,248,000	1,254,000	2,134,000
95–96	1,178,000	1,197,000	1,850,000
96–97	1,180,000	1,199,000	1,861,000
97–98	193,000	216,000	193,000
98–99	532,000	615,000	532,000
1899–1900	1,007,000	1,055,000	1,339,000
00–01	1,054,000	1,096,000	1,464,000
01–02	1,248,000	1,254,000	2,137,000
02–03	1,153,000	1,179,000	1,756,000
03–04	1,492,000	1,440,000	3,379,000
1904–05	1,175,000	1,195,000	1,834,000
05–06	1,215,000	1,228,000	1,988,000
06–07	1,345,000	1,328,000	2,582,000
07–08	886,000	950,000	1,060,000
08–09	1,408,000	1,376,000	2,892,000
1909–10	1,020,000	1,066,000	1,372,000
10–11	768,000	845,000	871,000
11–12	752,000	854,000	763,000
12–13	939,000	1,020,000	1,202,000
13–14	1,403,000	1,374,000	2,855,000
1914–15	1,294,000	1,289,000	2,338,000
15–16	1,165,000	1,186,000	1,802,000
16–17	799,000	871,000	924,000
17–18	471,000	551,000	458,000
18–19	945,000	1,002,000	1,190,000
1919–20	300,000	354,000	273,000
20–21	1,287,000	1,282,000	2,315,000
21–22	708,000	790,000	776,000
22–23	558,000	643,000	563,000
23–24	151,000	157,000	166,000
1924–25	1,204,000	1,218,000	1,956,000
25–26	643,000	728,000	680,000
26–27	1,292,000	1,288,000	2,337,000
27–28	849,000	919,000	999,000
28–29	401,000	472,000	380,000
1929–30	662,000	729,000	737,000
30–31	333,000	389,000	315,000
31–32	541,000	492,000	760,000
32–33	702,000	786,000	764,000
33–34	508,000	589,000	504,000
1934–35	914,000	976,000	1,118,000
35–36	1,010,000	1,057,000	1,345,000
36–37	686,000	766,000	749,000
37–38	1,640,000	1,571,000	4,198,000
38–39	544,000	628,000	546,000
1939–40	1,176,000	1,151,000	1,953,000
40–41	1,341,000	1,322,000	3,087,000
41–42	1,241,000	1,252,000	2,202,000
42–43	998,000	1,046,000	1,308,000
43–44	438,000	492,000	628,000
1944–45	883,000	962,000	981,000
45–46	1,047,000	1,088,000	1,389,000
1946–47	509,000	571,000	544,000
MEAN	914,000	950,000	1,403,000

FLOOD FLOWS

History reveals several extreme floods in the North Coastal Area that seriously damaged roads, farms, towns, and mining equipment. The main rivers—the Klamath, Smith, Eel, and Russian—are noted for very large increases in flow during flood periods. According to attested high-water marks, the maximum flows were in the season of 1861-62, but their magnitude has been approximated by several others. In 1862 a flood in Klamath River washed out a suspension bridge 98 feet above the river bed. Peak of the 1861 flood at Martins Ferry on the Klamath was recently estimated to have reached 102 feet above low water.

Runoff records have been maintained at some stations on Klamath River since April, 1904. One of the most complete of these is at Somesbar covering the period from October, 1927, to date, for which the maximum instantaneous discharge recorded was 97,000 second-feet on December 28, 1945. This flow may have been exceeded many times prior to the beginning of the record. Maximum peak flow on Trinity River, a principal tributary of the Klamath, at the station at Lewiston was 40,300 second-feet, recorded on February 28, 1940.

The Smith River gaging station near Crescent City has been maintained since October, 1931. The peak flow recorded was 123,000 second-feet on December 28, 1945, but this may have been exceeded substantially in 1861, 1881, 1890, and 1927.

The majority of accounts of floods on Eel River prior to installation of gaging stations are statements from local residents. The floods of 1852, 1862, 1879, 1881, 1890, and 1907 are reputed to have been of great magnitude. Records of discharge at Scotia start in December, 1910, and show 345,000 second-feet on December 11, 1937, the largest instantaneous flow officially recorded.

In January, 1862, Russian River reached a stage near Guerneville not since equalled at that point. Above Guerneville, near Healdsburg, a flood in 1890 was claimed by some residents to have surpassed that of 1862. However, downstream from Guerneville the crest of the flood of 1890 was lower than that in 1862. Records at Guerneville start in December, 1939, and show 88,000 second-feet on February 28, 1940, as the maximum instantaneous flow.

FLOOD FREQUENCIES

In flood-frequency studies for streams of the North Coastal Area, illustrated by the plates at the end of this section, measured flow at indicated stream gaging stations was used, except as noted in the following paragraphs.

Shasta River Near Yreka. The study of flood-frequency at this point was based on stream flow records of Shasta River near Yreka and Shasta River near Montague. Floods at each of these stations were reduced to second-feet per square mile before the records were combined.

Klamath River Between Copco and Somesbar. Because of natural and artificial regulation on upper Klamath River, only floods from that portion of the drainage area between the gaging stations at Copco and Somesbar were considered. Floods were determined by subtracting the flow at Copco from that at Somesbar. A two-day time lag between the two stations was allowed.

Eel River at Van Arsdale Dam. The study for this station included corrections for regulation by Lake Pillsbury and for diversions to the Potter Valley powerhouse.

Noyo River at Bridge No. 10. This study included only a one-day frequency curve. Although based on meager information, it was used because there was no record for any other stream in the vicinity. Since 1931 the California Western Railroad and Navigation Company has taken staff gage readings during flood flows at this point. From these readings hydrographs were constructed and mean daily discharges estimated. It was apparent, however, that data supplied by the railroad company did not include all floods. Therefore a correlation was worked out between floods at Bridge No. 10 and concurrent flow of Russian River at Guerneville.

Russian River at Guerneville. At the time of the flood-frequency study of Russian River at Guerneville, only a seven-year runoff record was available, and this was not considered sufficient to determine a frequency curve. A daily correlation was worked out between flow of Russian River at this station and flow of Eel River at Scotia, thereby extending the study for Russian River at Guerneville over a period of 38 years.

Plates 5 to 9, inclusive, show 10 flood frequency studies for streams of the North Coastal Area.

QUALITY OF WATER

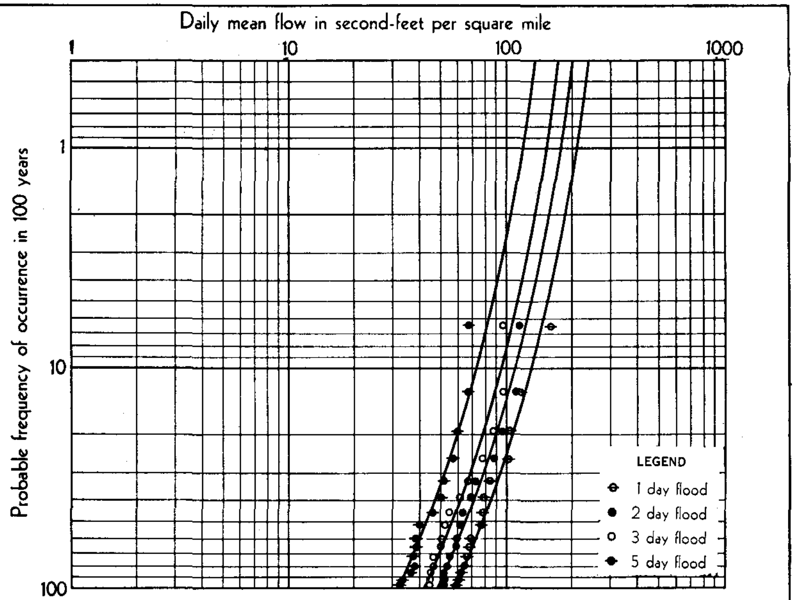
Water supply of the North Coastal Area is principally from surface sources. Use of ground water for irrigation is restricted mainly to comparatively small areas in Russian River Valley, Eel River Delta, and Butte Valley, and its use for domestic and municipal purposes is limited.

Inorganic analyses of samples taken intermittently between May, 1948, and March, 1949, from 10 major rivers in the Area are listed in Table 16. They show specific electrical conductance ($K \times 10^5$ at 25° C.) not exceeding 25, and percent sodium less than 40. In no instance was the concentration of elemental boron over 0.5 part per million, except for late summer flow in Russian River, when it was close to the limit of tolerance for more sensitive crop plants. Total mineral solubles in these ten rivers did not in any case exceed 175 parts per million. The analyses show little or no significant variation in composition and concentration of salts between summer and winter runoff, except for boron in Russian River. Heavy precipitation, perennial stream flow, and small return flow are conducive to such uniformity.

Mineral solubles in surface waters of the Area are largely calcium and magnesium carbonate. Calcium is the predominant basic constituent, except in Smith River. Water in that stream has a preponderance of magnesium, almost to the exclusion of calcium, this being attributed to prevalence of highly magnesiumized rock in Smith River Basin.

Inorganic chemical analyses of ground waters used by five municipalities in the North Coastal Area are listed in Table 17. All these waters are of good quality for irrigation. Differences in amounts of the sodium, calcium, and magnesium constituents are due to base-exchange activity in the movement of the percolate through water bearing formations.

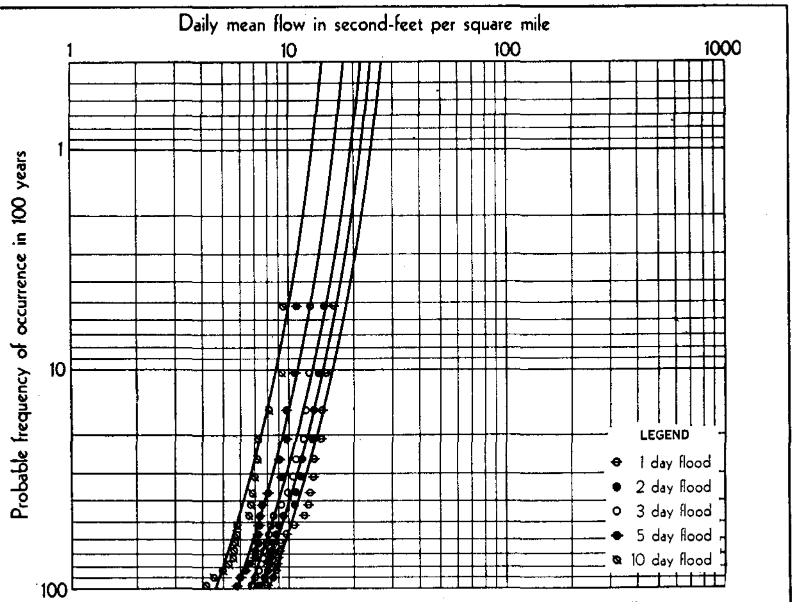
PLATE 5



SMITH RIVER FLOOD DISCHARGE

NEAR CRESCENT CITY

AREA OF DRAINAGE BASIN 604 SQUARE MILES

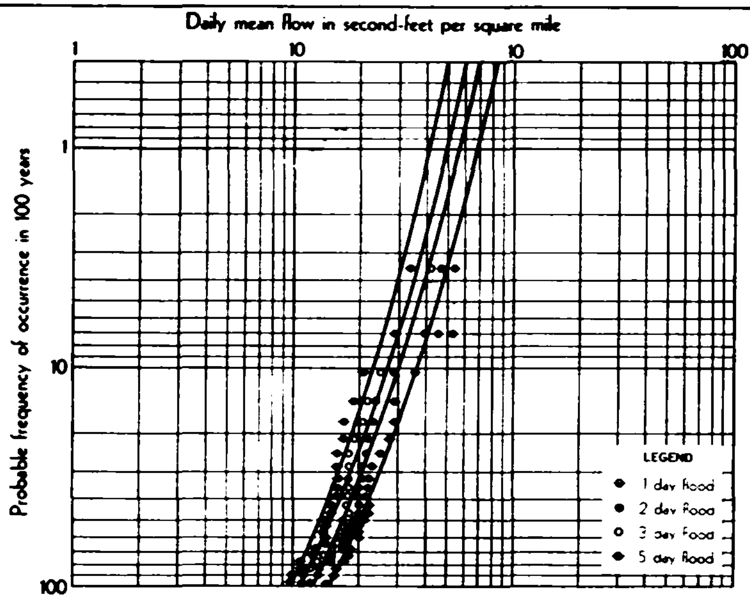


KLAMATH RIVER FLOOD DISCHARGE

BETWEEN COPCO AND SOMESBAR

AREA OF DRAINAGE BASIN 4120 SQUARE MILES

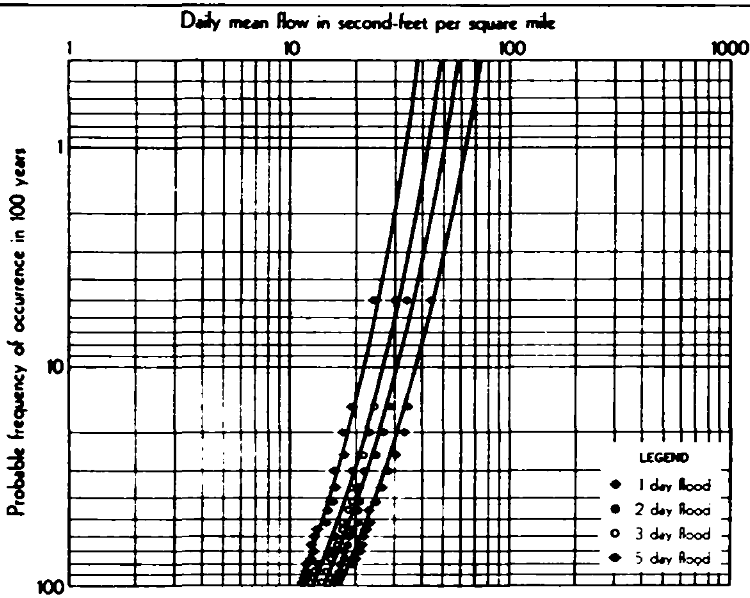
PLATE 6



SHASTA RIVER FLOOD DISCHARGE

NEAR YREKA

AREA OF DRAINAGE BASIN 796 SQUARE MILES

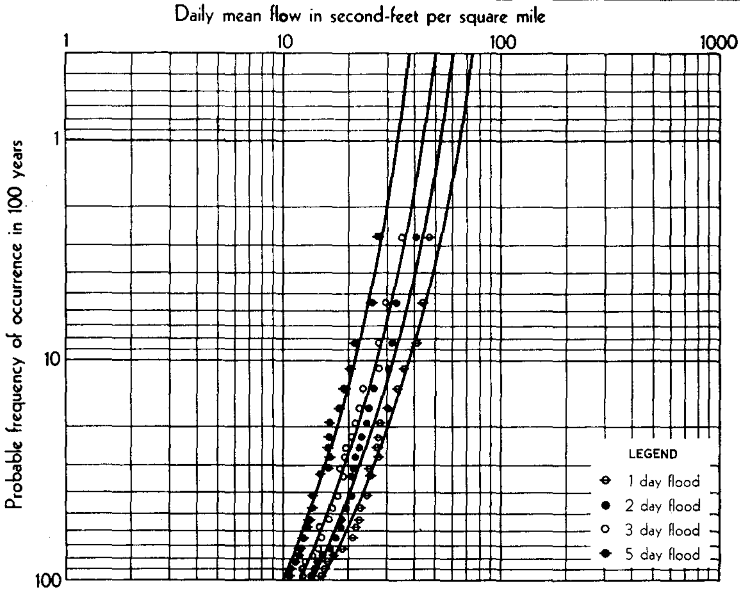


SALMON RIVER FLOOD DISCHARGE

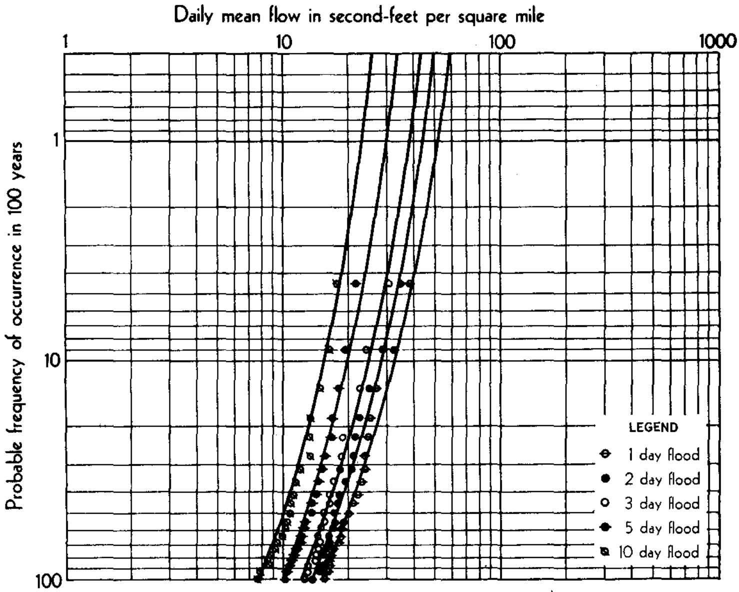
AT SOMESBAR

AREA OF DRAINAGE BASIN 745 SQUARE MILES

PLATE 7

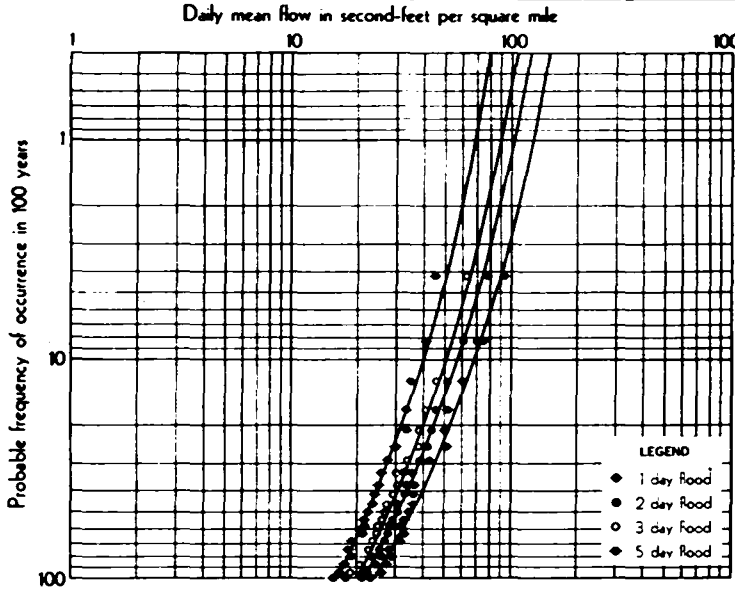


TRINITY RIVER FLOOD DISCHARGE
AT LEWISTON
AREA OF DRAINAGE BASIN 731 SQUARE MILES

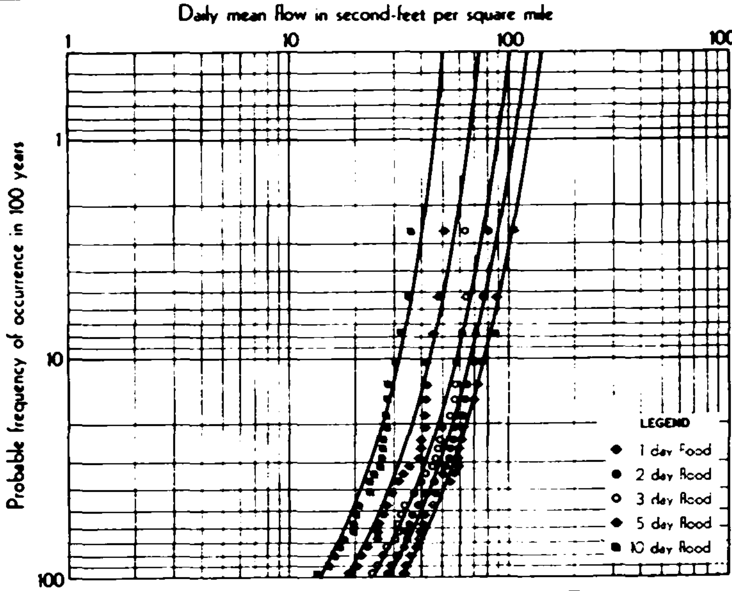


TRINITY RIVER FLOOD DISCHARGE
NEAR HOOPA
AREA OF DRAINAGE BASIN 2846 SQUARE MILES

PLATE 8

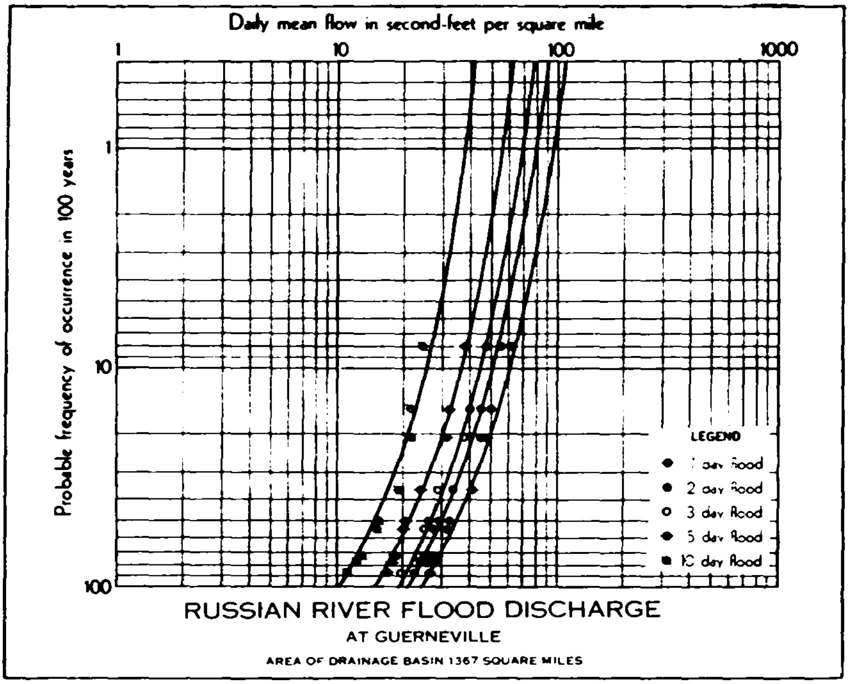


EEL RIVER FLOOD DISCHARGE
AT VAN ARSDALE DAM
AREA OF DRAINAGE BASIN 346 SQUARE MILES



EEL RIVER FLOOD DISCHARGE
AT SCOTIA
AREA OF DRAINAGE BASIN 3140 SQUARE MILES

PLATE 9


Daily mean flow in second-feet per square mile
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
1 day flood
2 day flood
3 day flood
5 day flood
10 day flood
RUSSIAN RIVER FLOOD DISCHARGE
AT GUERNEVILLE
AREA OF DRAINAGE BASIN 1367 SQUARE MILES

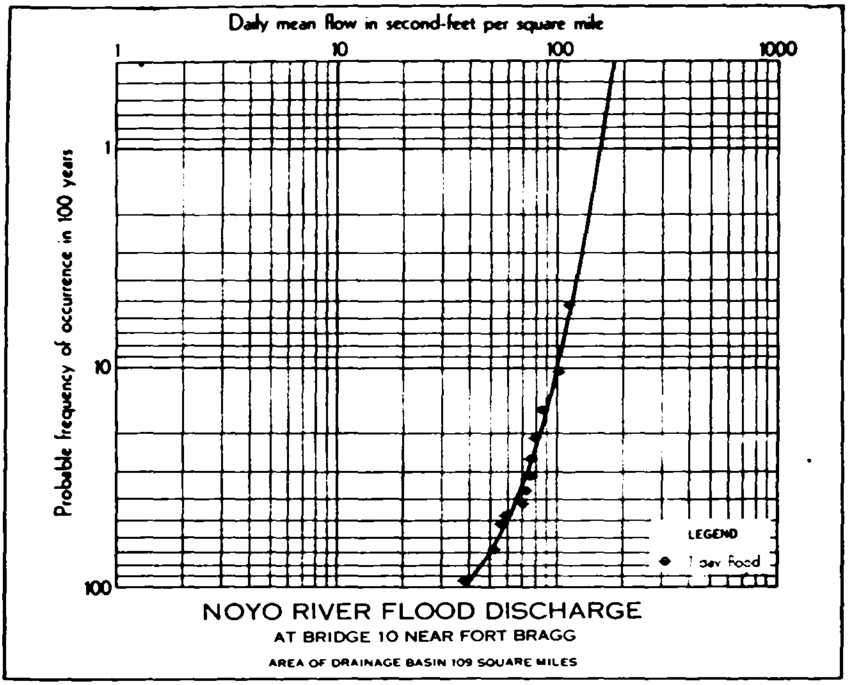

Daily mean flow in second-feet per square mile
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
1 day flood
NOYO RIVER FLOOD DISCHARGE
AT BRIDGE 10 NEAR FORT BRAGG
AREA OF DRAINAGE BASIN 109 SQUARE MILES

TABLE 16

INORGANIC ANALYSES OF SURFACE WATERS, NORTH COASTAL AREA

Source and place of sampling	Date	Conductance (K x 10^6)	Boron, ppm	Percent sodium	Reacting values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3+HCO_3	Cl	SO_4	NO_3
Smith River at USGS gaging station near Crescent City, ½-mile below confluence of main forks	5/ 4/48	7.2	0.00	14	0.10	0.69	0.13	0.71	0.06	0.03	Trace
					5%	*38%*	*7%*	*44%*	*4%*	*2%*	------
	8/11/48	11.4	0.00	16	0.25	1.03	0.25	1.25	0.06	0.05	------
					8%	*34%*	*8%*	*45%*	*3%*	*2%*	------
	12/ 8/48	7.0	-------	16	0	0.80	0.16	0.71	0.04	0.03	------
					0	*42%*	*8%*	*46%*	*2%*	*2%*	------
	3/ 1/49	9.5	0.00	20	0.09	0.69	0.19	0.70	0.05	T	0.14
					4%	*36%*	*10%*	*39%*	*3%*	*0*	*8%*
Klamath River at Klamath City	5/ 5/48	11.2	0.00	12	0.57	0.61	0.16	1.14	0.09	0.11	Trace
					21%	*23%*	*6%*	*43%*	*3%*	*4%*	------
	8/11/48	17.2	0.06	32	0.74	0.75	0.66	1.58	0.12	0.29	------
					17%	*17%*	*16%*	*40%*	*3%*	*7%*	------
	12/ 8/48	9.3	0.00	20	0.37	0.50	0.23	0.83	0.04	0.09	------
					17%	*23%*	*10%*	*43%*	*2%*	*5%*	------
	3/ 1/49	11.6	0.00	20	0.52	0.63	0.27	1.06	0.03	0.11	Trace
					18%	*22%*	*10%*	*44%*	*1%*	*5%*	------
Redwood Creek at Orick	5/ 5/48	6.3	0.00	30	0.34	0.18	0.21	0.46	0.11	0.08	Trace
					23%	*12%*	*15%*	*35%*	*8%*	*7%*	------
	8/11/48	10.1	0.00	22	0.75	0.20	0.27	0.94	0.13	0.12	------
					31%	*8%*	*11%*	*40%*	*5%*	*5%*	------
	12/ 8/48	5.3	0.00	34	0.25	0.17	0.22	0.35	0.12	0.10	------
					20%	*13%*	*17%*	*31%*	*10%*	*9%*	------
	3/ 1/49	5.8	0.00	36	0.31	0.14	0.24	0.44	0.10	0.02	0.11
					22%	*10%*	*18%*	*33%*	*7%*	*2%*	*8%*

TABLE 16—Continued

INORGANIC ANALYSES OF SURFACE WATERS, NORTH COASTAL AREA

Source and place of sampling	Date	Conductance ($K \times 10^6$)	Boron, ppm	Percent sodium	Reacting values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3 + HCO_3	Cl	SO_4	NO_3
Mad River at Blue Lake	5/ 5/48	8.4	0.00	18	0.57	0.29	0.18	0.76	0.03	0.14	...
					27%	14%	9%	40%	1%	9%	...
	8/11/48	17.3	0.06	20	1.30	0.50	0.42	1.80	0.10	0.25	...
					29%	11%	10%	42%	2%	6%	...
	12/ 8/48	7.8	0.00	20	0.50	0.32	0.20	0.74	0.04	0.24	...
					24%	16%	10%	36%	2%	12%	...
	3/ 1/49	9.7	0.02	20	0.50	0.29	0.20	0.69	0.05	0.10	0.11
					25%	15%	10%	36%	3%	5%	6%
Eel River at 101 Highway Bridge near Scotia	5/ 7/48	13.7	0.03	14	0.85	0.55	0.21	1.20	0.12	0.19	...
					26%	17%	7%	40%	3%	7%	...
	8/10/48	22.4	0.06	22	1.41	0.80	0.56	2.43	0.17	0.24	...
					25%	14%	11%	43%	3%	4%	...
	12/ 7/48	13.1	...	20	0.71	0.53	0.33	0.88	0.07	0.52	Trace
					23%	17%	10%	30%	2%	18%	...
	2/28/49	12.5	0.04	22	0.74	0.50	0.37	1.17	0.04	0.18	Trace
					23%	16%	11%	42%	2%	6%	...
Mattole River 2 miles below Petrolia	5/10/48	14.5	0.03	24	0.95	0.37	0.40	1.20	0.17	0.28	...
					28%	10%	12%	36%	5%	9%	...
	8/11/48	20.2	0.08	22	1.46	0.44	0.48	1.85	0.15	0.38	...
					30%	9%	11%	39%	3%	8%	...
	12/ 9/48	11.4	...	22	0.88	0.08	0.27	0.69	0.35	0.30	...
					36%	3%	11%	24%	13%	13%	...
	3/ 1/49	12.1	0.07	28	0.71	0.33	0.40	0.97	0.14	0.21	0.07
					25%	11%	14%	35%	5%	8%	2%

Noyo River 3 miles upstream from mouth	5/11/48	12.1	0.06	34	0.51	0.44	0.49	1.07	0.19	0.12	0.06
					18%	*15%*	*17%*	*37%*	*7%*	*4%*	*2%*
	8/12/48	15.6	0.11	32	0.73	0.54	0.60	1.47	0.27	0.09	----
					20%	*14%*	*16%*	*40%*	*7%*	*3%*	----
	12/10/48	11.8	------	32	0.55	0.47	0.50	1.00	0.17	0.09	----
					18%	*15%*	*16%*	*39%*	*7%*	*4%*	----
	3/ 3/49	9.0	0.06	40	0.36	0.42	0.50	0.70	0.21	0.09	Trace
					14%	*16%*	*20%*	*35%*	*10%*	*5%*	----
Navarro River 5.6 miles upstream from Highway 1	5/12/48	19.6	0.06	24	1.11	0.81	0.64	1.93	0.23	0.24	----
					22%	*16%*	*12%*	*40%*	*5%*	*5%*	----
	8/13/48	25.0	0.15	24	1.31	0.98	0.68	2.53	0.27	0.24	----
					22%	*16%*	*12%*	*42%*	*4%*	*4%*	----
	12/10/48	20.6	------	26	1.09	0.91	0.70	1.85	0.24	0.35	----
					20%	*17%*	*13%*	*38%*	*5%*	*7%*	----
	3/ 3/49	12.1	0.05	26	0.56	0.65	0.43	1.00	0.14	0.28	Trace
					17%	*20%*	*13%*	*35%*	*5%*	*10%*	----
Gualala River at main forks, two miles east of Gualala	5/13/48	17.2	0.04	30	0.86	0.66	0.62	1.67	0.22	0.21	----
					20%	*15%*	*15%*	*40%*	*5%*	*5%*	----
	8/13/48	19.3	0.00	30	0.93	0.76	0.72	1.85	0.22	0.23	----
					19%	*16%*	*15%*	*40%*	*5%*	*5%*	----
	12/10/48	15.6	------	28	0.78	0.63	0.52	1.43	0.13	0.21	----
					20%	*16%*	*14%*	*40%*	*4%*	*6%*	----
	3/ 4/49	10.9	0.05	32	0.49	0.55	0.45	0.91	0.13	0.19	Trace
					16%	*18%*	*16%*	*37%*	*5%*	*8%*	----
Russian River at Highway Bridge near Hopland	5/ 3/48	17.9	0.24	12	0.98	0.96	0.29	1.83	0.13	0.20	0.05
					22%	*22%*	*6%*	*41%*	*3%*	*5%*	*1%*
	8/10/48	23.1	0.99	22	1.16	1.06	0.62	2.39	0.18	0.18	Trace
					20%	*19%*	*11%*	*44%*	*3%*	*3%*	----
	12/10/48	19.2	------	18	1.04	1.00	0.46	1.89	0.12	0.29	----
					21%	*20%*	*9%*	*41%*	*3%*	*6%*	----
	2/28/49	17.2	0.58	28	0.82	0.82	0.59	1.56	0.14	0.20	Trace
					18%	*18%*	*14%*	*41%*	*4%*	*5%*	----

TABLE 17

INORGANIC ANALYSES OF GROUND WATERS FROM SUPPLIES OF FIVE NORTH COASTAL MUNICIPALITIES, 1940

In Milligram Equivalents per Liter

Constituent	Ft. Jones	Fortuna	Healdsburg	Santa Rosa	Ukiah
Calcium (Ca)	2.65	2.80	1.25	1.55	1.05
Magnesium (Mg)	2.21	1.07	2.62	1.64	0.49
Sodium (Na)	0.61	1.91	0.17	2.09	0.61
Carbonate (CO_3) + Bicarbonate (HCO_3)	5.05	4.29	3.32	4.52	1.55
Chloride (Cl)	0.22	0.62	0.37	0.76	0.25
Sulphate (SO_4)	0.17	0.87	0.35	0.00	0.35
Total anions	5.47	5.78	4.04	5.28	2.15
Percent sodium	11	33	4	40	28

CHAPTER V. SAN FRANCISCO BAY AREA

This is the smallest of the seven Areas into which California was divided for the state-wide investigation of water resources. Substantial water supplies are locally available, although they are far from sufficient for the metropolitan centers, or even for some of the outlying urban, suburban, and rural communities. Importation of water from sources outside the Area, first initiated by San Francisco about 50 years ago, will be an increasing need as the population grows.

LOCATION AND DESCRIPTION

The San Francisco Bay Area, designated Area No. 2 on Plate 2, and shown in part on Plate 10, "Portion of the San Francisco Bay Area," lies between latitudes 37° and 38½° N. It comprises all stream basins draining into San Francisco, San Pablo, and Suisun Bays below the confluence of Sacramento and San Joaquin Rivers near Collinsville, Solano County, and Pittsburg, Contra Costa County, together with basins draining directly into the Pacific Ocean from Lagunitas Creek Basin to Pescadero Creek Basin, both inclusive. The Area is about 125 miles long and averages 45 miles in width from east to west.

About two-thirds of the San Francisco Bay Area is mountains and foothills. Mountains along the coast separate the principal valley lands from the ocean and, except in the vicinity of Suisun Bay, these valley lands are separated from the Central Valley of California by other ranges that reach elevations of 4,344 feet at Mount St. Helena, 3,849 feet at Mount Diablo, 4,400 feet at Copernicus Peak of Mount Hamilton, and 2,604 feet at Mount Tamalpais. Fogs are frequent in the immediate coast and bay areas, principally during summer, and off-shore winds enter the valleys of the Area through depressions in the mountains nearest the ocean. Moderate snowfall for short periods at the higher elevations is not uncommon. Thunderstorms are infrequent.

STREAMS AND AREAS OF DRAINAGE BASINS

Principal streams of the Area entering San Francisco Bay from the north are Napa River and Petaluma, Sonoma, and Suisun Creeks. Kirker, Mount Diablo, San Pablo, Alameda, and Coyote Creeks enter the bay from the east and south, and Los Gatos Creek enters from the south through Guadalupe River. Lagunitas, San Pedro, San Gregorio, and Pescadero Creeks are the largest streams in the Area flowing directly into the ocean. Table 18 lists areas of drainage basins in the San Francisco Bay Area.

4—27922

TABLE 18

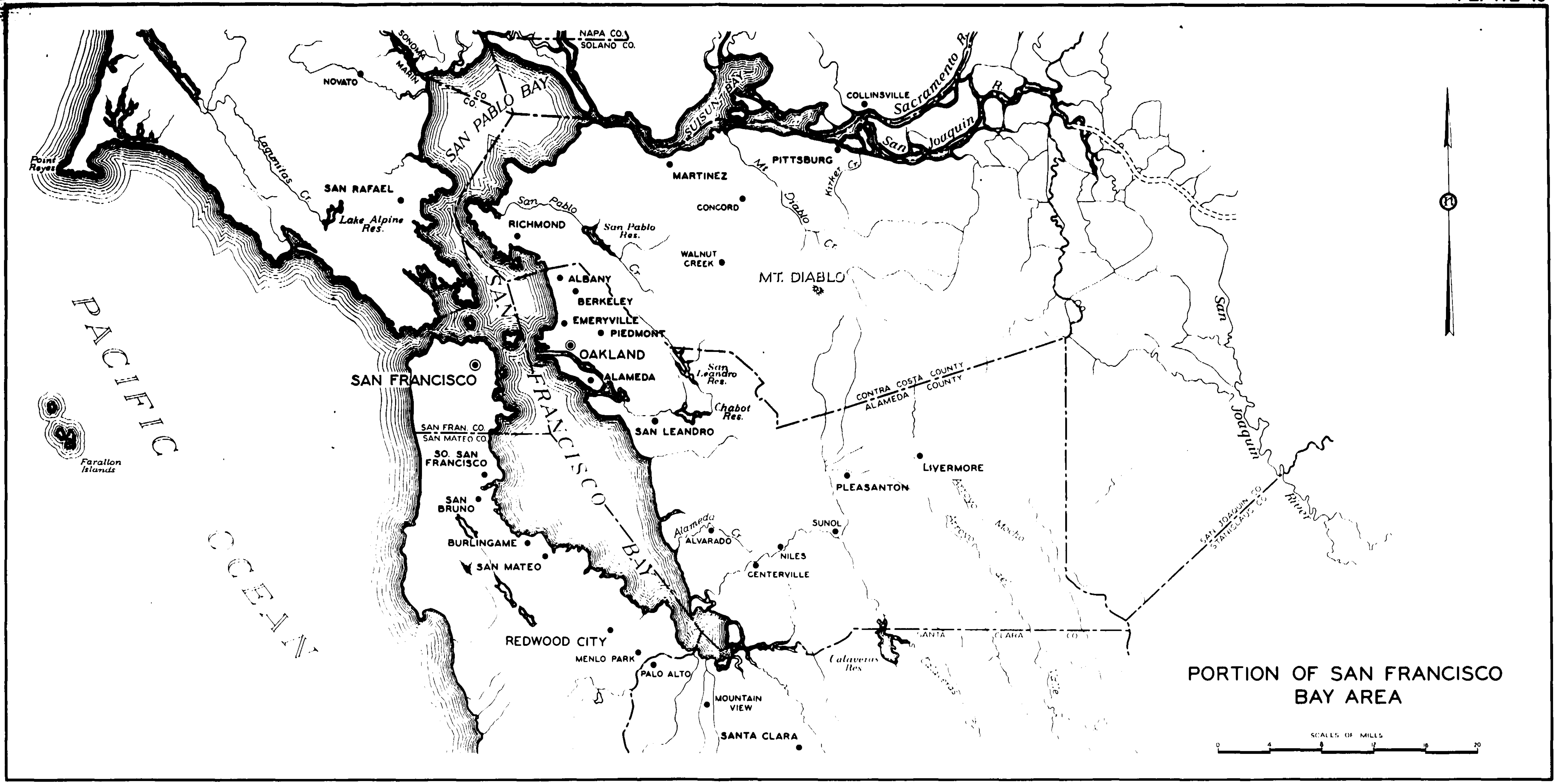
AREAS OF DRAINAGE BASINS, SAN FRANCISCO BAY AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, San Francisco Bay Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
	Lagunitas Creek Group			
1-1	Lagunitas Creek above Alpine Dam	10	0	10
1-2	Remainder of Lagunitas Creek Group	226	0	226
	Total, Lagunitas Creek Group	**236**	**0**	**236**
2	Petaluma Creek Group	**291**	**153**	**444**
	Napa River Basin			
3-1	Above gage near St. Helena	67	18	85
3-2	Conn Creek above gage near St. Helena	50	2	52
3-3	Rector Creek above Rector Dam	11	0	11
3-4	Dry Creek above gage near Yountville	17	0	17
3-5	Remainder of Napa River above gage near Napa	22	32	54
	Above gage near Napa	167	52	219
3-6	Remainder of Napa River	93	105	198
	Total, Napa River	**260**	**157**	**417**
	Suisun Creek Group			
4-1	Gordon Valley Creek above Lake Curry Dam	19	0	19
4-2	Green Valley Creek above Lake Frey Dam	3	0	3
4-3	Remainder of Suisun Creek Group	140	186	326
	Total, Suisun Creek Group	**162**	**186**	**348**
5	Mt. Diablo Creek Group	**146**	**105**	**251**
	East Bay Group			
6-1	San Pablo Creek above San Pablo Dam	32	0	32
6-2	San Leandro Creek above Chabot Dam	40	2	42
6-3	Remainder of East Bay Group	125	120	245
	Total, East Bay Group	**197**	**122**	**319**
	Alameda Creek Group			
7-1	Alameda Creek above gage near Niles	527	107	634
7-2	Remainder of Group including Niles Cone	45	66	111
	Total, Alameda Creek Group	**572**	**173**	**745**
	Coyote Creek Basin			
8-1	Above gage near Madrone	192	0	192
8-2	Remainder of Coyote Creek	101	111	212
	Total, Coyote Creek	**293**	**111**	**404**
	Guadalupe River Group			
9-1	Guadalupe River above gage at Guadalupe	13	0	13
9-2	Los Alamitos Creek above gage at Edenvale	27	7	34
9-3	Los Gatos Creek above gage at Los Gatos	41	0	41
9-4	Stevens Creek above gage near Cupertino	18	0	18
9-5	Santa Clara Valley Floor	13	143	156
9-6	Remainder of Guadalupe River Group	33	0	33
	Total, Guadalupe River Group	**145**	**150**	**295**
10	San Francisquito Creek Group	**34**	**39**	**73**
11	San Mateo Creek Group	**87**	**86**	**173**
12	Pescadero Creek Group	**251**	**11**	**262**
13	San Francisco Bay including islands	**0**	**442**	**442**
	TOTALS, SAN FRANCISCO BAY AREA	**2,674**	**1,735**	**4,409**

PLATE 10



PORTION OF SAN FRANCISCO BAY AREA

PRECIPITATION

The influence of topography on precipitation in this Area is particularly noticeable at precipitation stations lying in a general west-east line. During storms from the Pacific, precipitation south of San Francisco increases from the shore line to the crest of the coastal mountains, and decreases down the east slope to the floor of Santa Clara Valley and the inland Peninsula areas. It shows little variation across the valley and other low lands, and then increases up the west slope of the Mount Hamilton Range until it approximates that on the mountains near the coast. Precipitation over other parts of the Area is similarly affected by topography, although the east slope of Mount Tamalpais may receive more precipitation than the west slope.

Ninety-four precipitation stations in the Area have records of 10 or more seasons, an unbroken record for 100 years being available for the United States Weather Bureau station at San Francisco. At 27 stations continuous recorders have been operated. Data relating to precipitation stations and records are given in tables 19, 20, and 21. Precipitation recorded in these tables is for elevations from sea level to more than 4,000 feet. The number of stations being maintained is adequate, although a few additional recording gages on mountain slopes are desirable to make the coverage fully satisfactory.

A maximum seasonal precipitation of 88.25 inches was recorded at Kentfield, at an elevation of 65 feet in Marin County, during the season of 1889-90, and the average seasonal figure for this station for the period of record is 46.57 inches. A minimum of 3.40 inches was recorded at Orinda Park, at an elevation of 410 feet in Contra Costa County, during 1919-20. Average seasonal precipitation at this station for the period of of record is 26.89 inches.

Published Weather Bureau data on maximum rainfall intensities in the San Francisco Bay Area are listed in the following tabulation:

MAXIMUM RECORDED RAINFALL, IN INCHES IN SPECIFIED MINUTE AND HOUR PERIODS, AT SAN FRANCISCO BAY AREA PRECIPITATION STATIONS

Precipitation station and date	Minutes					Hours				
	5	10	15	30	60	2	3	6	12	24
Mt. Tamalpais	0.19	0.34	0.41	0.80	1.20	1.20	1.20	1.45	2.12	3.04
Month, Day	2/20	2/20	2/20	11/10	11/10	11/10	11/10	1/13	1/21	11/5
Year	1917	1917	1917	1901	1901	1901	1901	1909	1914	1912
S. E. Farallon Island	0.16	0.23	0.30	0.41	0.49	0.73	-------	-------	-------	2.77
Month, Day	11/19	11/19	11/19	11/19	11/19	11/19	-------	-------	-------	2/11
Year	1903	1903	1903	1903	1903	1903	-------	-------	-------	1912
San Francisco	0.33	0.51	0.65	0.83	1.07	1.29	1.36	1.70	2.83	4.67
Month, Day	11/25	11/4	11/4	3/4	3/4	9/23	3/5	1/13	12/3	1/29
Year	1926	1918	1918	1912	1912	1904	1912	1914	1915	1881
San Jose	0.18	0.27	0.34	0.50	0.85	1.11	1.39	2.14	2.72	4.56
Month, Day	3/6	11/18	11/18	1/23	1/23	9/12	1/13	12/3	1/13	1/13
Year	1911	1913	1913	1942	1942	1918	1911	1915	1911	1911

The influence of topography on precipitation in this Area is well illustrated by Table 22. Oakland is open to storms coming in from the ocean through the Golden Gate, and its precipitation is much more than at either San Jose or Livermore, which are both protected from ocean storms by mountains. Napa is also separated from the coast by mountains, and although Table 22 does not give precipitation on the coast to the west, it is substantially above that at Napa.

Table 22 also shows average monthly precipitation at four selected stations. The maximum and minimum figures bring out the wide variation in precipitation between wet, dry, and normal seasons. The bar diagrams of Plate 11, "Distribution of Precipitation at Selected Stations, San Francisco Bay Area," show graphically the monthly distribution of precipitation in maximum and minimum seasons of record. They also show monthly distribution during the season in which total seasonal precipitation was nearest to the average seasonal figure shown in Table 22.

Mean seasonal precipitation on valley and mesa lands of the San Francisco Bay Area for the period from 1897-98 to 1946-47 is estimated to have been 1,350,000 acre-feet, as shown in Table 23. Most valley land of this area borders San Francisco Bay, principally near the outlets of Napa River and Suisun Creek, and in the Santa Clara Valley. The only sizable valley area not bordering the bay is Livermore Valley on upper Alameda Creek. Precipitation is moderate and fairly uniform, ranging from 15 to 25 inches per year for most valley land in the Area.

TABLE 19

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SAN FRANCISCO BAY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
2-57	Alvarado (near)	Alameda	37° 36′ 122° 07′	3	1924-25 1940-41	B USWB	14.98	16.15	1940-41 1933-34	25.30 8.20
2-29	Berkeley	Alameda	37° 52′ 122° 16′	299	1887-88 1946-47	ABCD USWB	23.76	22.89	1889-90 1923-24	46.00 11.57
2-79	Calaveras	Alameda	37° 29′ 121° 50′	626	1914-15 1946-47	BC SFPUC	18.52	19.06	1914-15 1923-24	30.97 7.50
2-48	Hayward Union High School	Alameda	37° 40′ 122° 05′	110	1914-15 1946-47	B Private	20.03	21.26	1940-41 1917-18	36.14 9.56
2-49	Jensen Ranch	Alameda	37° 43′ 122° 00′	750	1905-06 1942-43	B Private	24.28	23.83	1940-41 1923-24	37.94 10.57
2-47	Lake Chabot	Alameda	37° 44′ 122° 07′	240	1879-80 1946-47	B EBMUD	21.84	21.26	1889-90 1919-20	40.85 10.80
2-50	Livermore	Alameda	37° 41′ 121° 44′	480	1871-72 1946-47	BCD USWB	14.62	13.93	1889-90 1876-77	28.66 6.01
2-43	Mills College	Alameda	37° 47′ 122° 11′	200	1893-94 1916-17	BC USWB	25.75	22.37	1894-95 1897-98	37.19 14.44
2-58	Niles	Alameda	37° 35′ 121° 57′	150	1871-72 1946-47	B SFPUC	18.29	17.90	1889-90 1876-77	35.91 9.34
2-42	Oakland	Alameda	37° 47′ 122° 14′	322	1874-75 1946-47	ABC USWB	23.38	22.38	1889-90 1911-12	45.38 11.58
2-77	Pleasanton Pumps	Alameda	37° 29′ 121° 54′	360	1911-12 1946-47	B SFPUC	19.90	20.56	1920-21 1923-24	33.37 7.70
2-44	San Leandro	Alameda	37° 43′ 122° 10′	48	1895-96 1922-23	BC USWB	23.49	20.00	1908-09 1897-98	29.92 12.97
2-59	Sunol	Alameda	37° 36′ 121° 53′	260	1914-15 1946-47	B SFPUC	19.05	19.90	1914-15 1923-24	31.15 8.27
2-30	Temescal Reservoir	Alameda	37° 51′ 122° 14′	450	1909-10 1933-34	B EBMUD	21.74	23.53	1926-27 1919-20	35.75 11.99
2-46	Upper San Leandro	Alameda	37° 48′ 122° 08′	490	1924-25 1946-47	BC EBMUD	26.55	28.33	1940-41 1930-31	41.60 16.25
2-18	Crockett	Contra Costa	38° 03′ 122° 13′	12	1918-19 1946-47	B USWB	16.91	16.55	1940-41 1923-24	31.04 7.44
2-34	Galinda Siding	Contra Costa	37° 59′ 122° 03′	13	1920-21 1938-39	B CWSCo.	14.92	15.97	1937-38 1923-24	25.02 6.41
2-33	Lafayette	Contra Costa	37° 53′ 122° 08′	500	1924-25 1946-47	BC EBMUD	25.95	27.11	1940-41 1930-31	40.70 15.21
2-32	Orinda Park	Contra Costa	37° 53′ 122° 12′	410	1908-09 1937-38	BC EBMUD	26.89	26.30	1937-38 1919-20	44.40 3.40
2-27	San Pablo	Contra Costa	37° 59′ 122° 21′	75	1912-13 1930-31	B SOCo.	19.43	21.38	1913-14 1919-20	33.34 9.70
2-31	San Pablo Creek Patrol House	Contra Costa	37° 54′ 122° 13′	400	1922-23 1946-47	BC EBMUD	25.96	28.25	1940-41 1923-24	42.57 11.54
2-28	San Pablo Reservoir	Contra Costa	37° 57′ 122° 16′	330	1917-18 1946-47	B EBMUD	22.79	24.90	1940-41 1919-20	41.41 10.10

TABLE 19—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SAN FRANCISCO BAY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
2-45	Valle Vista	Contra Costa	37° 49′ 122° 08′	500	1924-25 1946-47	B EBMUD	27.69	29.71	1940-41 1930-31	43.89 15.87
2-35	Walnut Creek	Contra Costa	37° 54′ 122° 02′	149	1887-88 1945-46	B USWB	19.52	19.64	1937-38 1923-24	31.47 7.10
2-36	Wilcox	Contra Costa	37° 50′ 122° 01′	750	1924-25 1934-35	B EBMUD	26.46	29.36	1926-27 1930-31	41.97 18.34
2-20	Alpine Dam	Marin	37° 56′ 122° 38′	730	1919-20 1946-47	B MMWD	46.64	50.61	1940-41 1923-24	86.65 21.59
2-25	Kentfield	Marin	37° 57′ 122° 32′	65	1888-89 1946-47	BCD USWB	46.57	45.55	1889-90 1938-39	88.25 21.98
2-21	Lagunitas Lake	Marin	37° 57′ 122° 36′	805	1909-10 1946-47	AB MMWD	42.02	46.14	1940-41 1923-24	81.16 19.99
2-17	Marin Meadows Ranch	Marin	38° 05′ 122° 30′	47	1913-14 1937-38	BC Private	22.90	25.81	1937-38 1917-18	39.56 9.20
2-22	Mt. Tamalpais	Marin	37° 56′ 122° 35′	2,375	1898-99 1944-45	ABC USWB	32.52	31.32	1941-42 1917-18	77.17 12.81
2-23	Phoenix Lake	Marin	37° 57′ 122° 34′	300	1909-10 1937-38	B MMWD	43.71	46.90	1937-38 1917-18	66.08 21.20
2-15	Point Reyes Lighthouse	Marin	38° 00′ 123° 01′	510	1879-80 1942-43	BC USWB	19.27	18.18	1889-90 1886-87	47.45 9.74
2-16	Point Reyes Station	Marin	38° 04′ 122° 49′	31	1924-25 1935-36	B USWB	30.29	33.17	1924-25 1930-31	50.06 19.26
2-24	San Rafael	Marin	37° 58′ 122° 32′	75	1875-76 1946-47	BC Private	36.26	35.04	1940-41 1938-39	67.48 16.69
2-26	Sausalito	Marin	37° 52′ 122° 29′	5	1904-05 1913-14	BC USWB	25.28	24.44	1908-09 1911-12	35.11 16.14
2-2	Calistoga	Napa	38° 35′ 122° 35′	363	1873-74 1917-18	B USWB	37.05	37.23	1889-90 1911-12	67.51 20.52
2-3	Calistoga (Southern Pacific)	Napa	38° 35′ 122° 34′	365	1895-96 1946-47	BC SPCo.	37.38	37.11	1937-38 1923-24	66.43 12.16
2-6	Lake Curry	Napa	38° 22′ 122° 08′	396	1925-26 1939-40	B Private	27.51	28.07	1939-40 1938-39	46.16 12.59
2-10	Napa	Napa	38° 18′ 122° 17′	20	1877-78 1946-47	B USWB	23.67	23.12	1889-90 1923-24	48.29 10.26
2-1	Silverado Ranch	Napa	38° 39′ 122° 36′	2,380	1927-28 1937-38	B Private	55.54	61.73	1935-36 1930-31	79.61 27.00
2-4	St. Helena	Napa	38° 30′ 122° 27′	255	1907-08 1946-47	BC USWB	32.43	32.96	1913-14 1923-24	58.94 13.59
2-5	Veterans'	Napa	38° 24′ 122° 22′	170	1913-14 1937-38	B Vets.Home	32.31	32.94	1913-14 1923-24	57.60 13.80
2-39	Lake Merced	San Francisco	37° 43′ 122° 29′	19	1901-02 1946-47	B SFPUC	21.77	21.52	1940-41 1933-34	37.78 11.89
2-38	Point Lobos	San Francisco	37° 47′ 122° 31′	250	1897-98 1910-11	BC USWB	18.98	19.01	1908-09 1897-98	25.57 11.09

TABLE 19—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SAN FRANCISCO BAY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
2-40	San Francisco	San Francisco	37° 47′ 122° 25′	52	1849-50 1946-47	ABC USWB	22.03	20.36	1861-62 1850-51	49.27 7.42
2-37	Southeast Farallon	San Francisco	37° 42′ 123° 00′	30	1891-92 1946-47	BC USWB	17.52	17.87	1894-95 1944-45	25.12 6.27
2-41	Yerba Buena Lighthouse	San Francisco	37° 49′ 122° 21′	155	1918-19 1937-38	C USWB	16.40	16.80	1937-38 1919-20	27.46 6.48
2-68	Bear Gulch Reservoir	San Mateo	37° 26′ 122° 14′	180	1919-20 1946-47	B CWSCo.	19.97	20.81	1940-41 1923-24	33.64 9.13
2-56	Crystal Springs Cottage	San Mateo	37° 30′ 122° 20′	400	1894-95 1946-47	B SFPUC	27.23	26.79	1894-95 1923-24	42.14 11.89
2-61	Half Moon Bay	San Mateo	37° 29′ 122° 26′	75	1931-32 1946-47	B Private	22.80	22.59	1940-41 1933-34	34.86 11.00
2-63	Highway Maintenance	San Mateo	37° 22′ 122° 16′	1,650	1930-31 1940-41	B Stan. Univ.	36.67	35.46	1940-41 1930-31	54.16 20.93
2-65	Jackling......	San Mateo	37° 23′ 122° 15′	380	1924-25 1940-41	B Stan. Univ.	31.94	30.66	1937-38 1933-34	46.33 18.86
2-53	Lower Crystal Springs	San Mateo	37° 32′ 122° 22′	450	1894-95 1946-47	B SFPUC	27.60	27.00	1894-95 1917-18	45.15 12.09
2-70	Menlo Park ..	San Mateo	37° 27′ 122° 10′	64	1878-79 1913-14	BC USWB	16.93	15.39	1889-90 1912-13	33.66 7.82
2-51	Pilarcitos.....	San Mateo	37° 33′ 122° 25′	620	1864-65 1946-47	BC SFPUC	44.44	37.25	1867-68 1917-18	81.06 17.17
2-64	Raynor.......	San Mateo	37° 22′ 122° 16′	1,300	1930-31 1940-41	B Stan. Univ.	37.54	36.50	1940-41 1930-31	55.30 16.76
2-67	Redwood City	San Mateo	37° 28′ 122° 14′	31	1930-31 1946-47	BD USWB	19.20	19.52	1940-41 1930-31	30.45 11.49
2-66	Rixford.......	San Mateo	37° 23′ 122° 15′	450	1884-85 1937-38	B Private	24.95	24.04	1908-09 1923-24	41.12 11.72
2-52	San Andreas Lake	San Mateo	37° 35′ 122° 24′	377	1868-69 1946-47	B SFPUC	36.59	31.84	1871-72 1917-18	82.72 15.58
2-55	San Mateo...	San Mateo	37° 34′ 122° 20′	22	1874-75 1946-47	BC USWB	21.00	19.49	1889-90 1876-77	40.82 7.34
2-60	Searsville Lake	San Mateo	37° 24′ 122° 14′	350	1925-26 1940-41	B Stan. Univ.	25.80	27.14	1937-38 1930-31	40.45 15.58
2-73	Schilling......	San Mateo	37° 23′ 122° 08′	400	1930-31 1940-41	B Stan. Univ.	31.47	30.42	1940-41 1930-31	45.92 17.30
2-82	Skyline.......	San Mateo	37° 19′ 122° 12′	2,200	1930-31 1940-41	B Stan. Univ.	37.21	35.45	1939-40 1930-31	57.50 20.93
2-54	Upper Crystal Springs	San Mateo	37° 30′ 122° 21′	300	1875-76 1946-47	B SFPUC	31.03	27.84	1889-90 1917-18	72.68 10.67
2-62	Woodside, Bear Gulch Creek	San Mateo	37° 25′ 122° 16′	600	1925-26 1946-47	B CWSCo.	34.00	37.03	1937-38 1930-31	56.61 17.67
2-81	Alameda Creek No. 9	Santa Clara	37° 22′ 121° 30′	2,000	1913-14 1926-27	B SFPUC	17.43	18.96	1913-14 1923-24	29.95 6.85

TABLE 19—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SAN FRANCISCO BAY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
2-83	Black Mountain	Santa Clara	37° 16′ 122° 12′	2,300	1930-31 1946-47	B Stan. Univ.	26.03	25.09	1931-32 1938-39	42.91 13.47
2-90	Campbell	Santa Clara	37° 18′ 121° 56′	217	1897-98 1937-38	BC USWB	15.67	14.85	1937-38 1912-13	24.03 5.29
2-86	Howell Reservoir	Santa Clara	37° 11′ 122° 01′	1,400	1915-16 1946-47	B SJWWks.	37.29	40.05	1940-41 1923-24	71.38 14.94
2-84	Lake Ranch Reservoir	Santa Clara	37° 13′ 122° 04′	1,809	1926-27 1946-47	B SJWWks.	46.42	43.83	1940-41 1938-39	74.48 25.09
2-80	Lick Observatory	Santa Clara	37° 20′ 121° 39′	4,209	1881-82 1946-47	AB Private	28.94	27.98	1883-84 1923-24	58.09 11.56
2-88	Los Gatos	Santa Clara	37° 14′ 121° 58′	500	1885-86 1946-47	B USWB	37.36	28.94	1889-90 1923-24	67.22 11.41
2-89	Los Gatos Reservoir	Santa Clara	37° 14′ 121° 57′	560	1915-16 1946-47	B SJWWks.	26.71	28.68	1940-41 1923-24	53.14 11.11
2-92	Los Gatos Summit	Santa Clara	37° 09′ 121° 58′	1,800	1922-23 1937-38	B Private	39.04	43.57	1937-38 1923-24	67.50 14.45
2-87	Madera Colorado	Santa Clara	37° 12′ 121° 59′	696	1915-16 1946-47	B SJWWks.	29.67	31.86	1937-38 1923-24	54.06 11.78
2-60	Main Station	Santa Clara	37° 20′ 121° 53′	100	1914-15 1946-47	B SJWWks.	13.18	13.61	1914-15 1923-24	22.67 5.88
2-74	Mountain View	Santa Clara	37° 24′ 122° 05′	79	1885-86 1943-44	B Private	14.96	14.08	1889-90 1912-13	31.15 6.04
2-71	Palo Alto	Santa Clara	37° 26′ 122° 10′	57	1910-11 1946-47	ABD USWB	15.48	15.93	1914-15 1923-24	26.64 7.06
2-78	San Jose	Santa Clara	37° 20′ 121° 54′	141	1874-75 1946-47	ABD USWB	14.33	13.72	1889-90 1876-77	30.30 4.83
2-76	Santa Clara	Santa Clara	37° 21′ 121° 56′	90	1881-82 1946-47	BC USWB	15.31	14.86	1889-90 1912-13	31.23 6.57
2-85	Saratoga Reservoir	Santa Clara	37° 15′ 122° 03′	577	1915-16 1946-47	B SJWWks.	29.30	31.46	1940-41 1923-24	55.48 11.01
2-91	Seven Mile Reservoir	Santa Clara	37° 15′ 121° 55′	322	1915-16 1946-47	B SJWWks.	18.43	19.79	1940-41 1923-24	33.71 7.01
2-72	Stanford Corporation Yard	Santa Clara	37° 25′ 122° 10′	118	1930-31 1940-41	B Stan. Univ.	18.59	16.81	1940-41 1930-31	27.99 9.36
2-75	Sunnyvale	Santa Clara	37° 22′ 122° 02′	97	1926-27 1941-42	B USWB	14.20	14.76	1940-41 1928-29	27.24 8.63
2-94	Williams Reservoir	Santa Clara	37° 07′ 121° 54′	1,222	1912-13 1946-47	B SJWWks.	40.70	43.79	1937-38 1917-18	73.96 19.32
2-93	Wrights	Santa Clara	37° 08′ 121° 57′	1,600	1918-19 1946-47	BCD USWB	45.91	49.43	1920-21 1923-24	86.68 16.75
2-12	Green Valley	Solano	38° 17′ 122° 10′	411	1893-94 1939-40	B Vallejo	27.45	28.74	1894-95 1938-39	50.38 15.16
2-19	Lake Herman	Solano	38° 06′ 122° 09′	75	1849-50 1946-47	B Ben.W.Co.	18.59	17.75	1861-62 1923-24	42.50 6.73

TABLE 19—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SAN FRANCISCO BAY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
3-14	Suisun	Solano	38° 14' 122° 02'	20	1871-72 1938-39	BC USWB	19.16	18.86	1889-90 1923-24	39.38 8.05
3-11	Wild Horse Valley	Solano	38° 19' 122° 11'	1,243	1924-25 1939-40	B Private	26.53	26.70	1937-38 1938-39	42.47 14.62
3-13	Willota Ranch	Solano	38° 15' 122° 07'	60	1899-00 1946-47	B Private	22.41	22.10	1940-41 1923-24	42.06 10.04
3-8	El Verano	Sonoma	38° 18' 122° 29'	104	1897-98 1928-29	BCD SPCo.	24.04	26.29	1920-21 1919-20	34.91 12.30
3-7	Petaluma	Sonoma	38° 15' 122° 38'	30	1874-75 1946-47	AB USWB	24.06	24.48	1889-90 1890-91	46.04 8.05
3-9	Sonoma	Sonoma	38° 18' 122° 28'	30	1886-87 1906-07	BC USWB	28.46	26.52	1889-90 1887-88	53.24 20.67

ABBREVIATIONS—SAN FRANCISCO BAY AREA

TYPE OF RECORD

Abbreviation	*Name*	*Abbreviation*	*Name*
A	Hourly	C	Monthly
B	Daily	D	Seasonal

SOURCE OF RECORD

Abbreviation	*Name*
Ben. W Co.	Benicia Water Co.
CWS Co.	California Water Service Co.
EBMUD	East Bay Municipal Utility District
MMWD	Marin Municipal Water District
Stan. Univ.	Stanford University
SFPUC	San Francisco Public Utilities Commission
SJW Wks.	San Jose Water Works
SO Co.	Standard Oil Co.
SP Co.	Southern Pacific Co.
USWB	United States Weather Bureau
Vallejo	City of Vallejo

TABLE 20

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, SAN FRANCISCO BAY AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
2-29*	Berkeley	Alameda	37° 52′ 122° 16′	299	Dec. 1923 June 1947	Univ. of Calif.
2-008	Hayward (near)	Alameda	37° 38′ 121° 58′	1,000	Nov. 1939 June 1947	USWB
2-011	Oakland Airport	Alameda	37° 44′ 122° 12′	7	Nov. 1940 June 1947	USWB
2-013	Upper San Leandro Filters	Alameda	37° 46′ 122° 10′	413	Jan. 1945 June 1947	EBMUD
2-014	Antioch (near)	Contra Costa	37° 56′ 121° 47′	300	Jan. 1945 June 1947	USWB
2-018	Martinez (near)	Contra Costa	37° 59′ 122° 08′	225	July 1944 June 1947	USWB
2-022	Walnut Creek (near)	Contra Costa	37° 55′ 122° 01′	220	July 1944 June 1947	USWB
2-024	Hamilton Field	Marin	38° 03′ 122° 30′	20	Jan. 1940 Sept. 1942	USAC
2-22*	Mt. Tamalpais	Marin	37° 56′ 122′ 35′	2,375	Jan. 1907 May 1920	USWB
2-025	Mt. Tamalpais (near)	Marin	37° 54′ 122° 34′	1,000	Feb. 1947 June 1947	USWB
2-026	Novato (near)	Marin	38° 07′ 122° 42′	550	Oct. 1943 June 1947	USED
2-028	Atlas Road	Napa	38° 26′ 122° 15′	1,750	Jan. 1940 June 1947	USWB
2-030	Oakville No. 1	Napa	38° 26′ 122° 25′	150	Dec. 1943 Jan. 1947	USWB
2-032	Oakville (near)	Napa	38° 24′ 122° 28′	170	May 1940 June 1947	USWB
2-034	St. Helena (near)	Napa	38° 30′ 122° 32′	1,800	Dec. 1939 June 1947	USWB
2-035	St. Helena No. 3	Napa	38° 34′ 122° 22′	1,050	Nov. 1939 June 1947	USWB
2-40*	San Francisco	San Francisco	37° 47′ 122° 25′	52	May 1906 June 1947	USWB
2-038	San Francisco Airport	San Francisco	37° 37′ 122° 23′	38	June 1944 June 1947	USWB
2-37*	South East Farallon	San Francisco	37° 42′ 123° 00′	30	Mar. 1941 June 1947	USCG
2-053	Gilroy	Santa Clara	37° 03′ 121° 27′	1,050	Sept. 1943 July 1944	USWB
2-80*	Lick Observatory	Santa Clara	37° 20′ 121° 39′	4,209	Sept. 1888 June 1947	Private
2-058	Moffett Field	Santa Clara	37° 24′ 122° 03′	40	May 1940 April 1942	USAC
2-059	Morgan Hill	Santa Clara	37° 07′ 121° 39′	225	Nov. 1945 June 1947	USWB
2-061	Mt. Madonna	Santa Clara	37° 01′ 121° 43′	1,800	Nov. 1945 June 1947	USWB
2-71*	Palo Alto	Santa Clara	37° 26′ 122° 10′	57	Nov. 1910 June 1947	City of Palo Alto
2-78*	San Jose	Santa Clara	37° 20′ 121° 54′	141	Sept. 1906 June 1947	USWB
2-065	Fairfield (near)	Solano	38° 15′ 122° 03′	15	Dec. 1944 June 1947	USWB
2-7*	Petaluma	Sonoma	38° 15′ 122° 38′	30	Jan. 1943 June 1947	USED

SOURCE OF RECORD

Abbreviation	*Name*
USWB	United States Weather Bureau
EBMUD	East Bay Municipal Utility District
USCG	United States Coast Guard
USAC	United States Army Air Corps
USED	United States Corps of Engineers

TABLE 21

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SAN FRANCISCO BAY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
2-001	Alameda	Alameda	37° 46′ 122° 15′	19	1910-13	B
2-002	Alameda Creek, 105A	Alameda	37° 38′ 121° 42′	800	1918-28	B
2-003	Centerville	Alameda	37° 33′ 122° 00′	50	1897-98	B
2-004	Dublin	Alameda	37° 42′ 121° 57′	450	1937-39	B
2-005	Eden Creek	Alameda	37° 44′ 121° 59′	1,200	1940-45	A
2-006	Hayward, Southern Pacific Co.	Alameda	37° 40′ 122° 05′	100	1897-1936	Broken record B
2-007	Hayward, Eschelson	Alameda	37° 41′ 122° 06′	100	1935-39	B
2-008	Hayward (near)	Alameda	37° 38′ 121° 58′	1,000	1939-47	A
2-009	Mt. Eden	Alameda	37° 38′ 122° 07′	16	1899-1900	B
2-010	Newark	Alameda	37° 32′ 121° 02′	25	1897-1900	B
2-011	Oakland Airport	Alameda	37° 44′ 122° 12′	7	1940-47	A
2-012	Pleasanton, Southern Pacific Co.	Alameda	37° 40′ 121° 52′	360	1897-1900	B
2-013	Upper San Leandro Filters East Bay Municipal Utility District	Alameda	37° 46′ 122° 10′	413	1945-47	A
2-014	Antioch (near)	Contra Costa	37° 56′ 121° 47′	300	1945-47	A
2-015	Chenery Filter Plant	Contra Costa	38° 00′ 122° 03′	13	1931-39	B
2-016	Diablo Post Office	Contra Costa	37° 50′ 121° 58′	500	1931-39	B
2-017	Martinez	Contra Costa	38° 01′ 122° 08′	9	1897-03 1938-39	B
2-018	Martinez (near)	Contra Costa	37° 59′ 122° 08′	225	1944-47	A
2-019	Orinda filter	Contra Costa	37° 54′ 122° 12′	360	1936-39	B
2-020	Peyton	Contra Costa	38° 02′ 122° 06′	50	1909-10	B
2-021	Rock City, Headquarters	Contra Costa	37° 51′ 121° 56′	1,700	1937-39	B
2-022	Walnut Creek (near)	Contra Costa	37° 55′ 122° 01′	220	1944-47	A
2-023	Walnut Creek No. 1	Contra Costa	37° 56′ 122° 04′	75	1897-1900	B
2-024	Hamilton Field	Marin	38° 03′ 122° 30′	20	1940-42	A
2-025	Mt. Tamalpais (near)	Marin	37° 54′ 122° 34′	1,000	1947	A
2-026	Novato (near)	Marin	38° 07′ 122° 42′	550	1943-47	A
2-027	Sausalito No. 2	Marin	37° 52′ 122° 29′	25	1910-11	B
2-028	Atlas Road	Napa	38° 26′ 122° 15′	1,750	1940-47	A
2-029	Oakville	Napa	38° 26′ 122° 25′	150	1910-12	B
2-030	Oakville No. 1	Napa	38° 26′ 122° 25′	150	1943-47	A
2-031	Oakville No. 2	Napa	38° 26′ 122° 24′	161	1940-43	B

TABLE 21—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SAN FRANCISCO BAY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
2-032	Oakville (near)	Napa	38° 24′ 122° 28′	170	1940-47	A
2-033	Pacific Union College	Napa	38° 34′ 122° 26′	1,850	1933-39	B
2-034	St. Helena (near)	Napa	38° 30′ 122° 32′	1,800	1939-47	A
2-035	St. Helena, No. 3	Napa	38° 34′ 122° 22′	1,050	1939-47	A
2-036	Sunnyside	Napa	38° 24′ 122° 15′	850	1934-39	B
2-037	Farallon Island	San Francisco	37° 42′ 123° 00′	10	1902-09	B
2-038	San Francisco Airport	San Francisco	37° 37′ 122° 23′	38	1944-47	A
2-039	Standard Oil Co.	San Francisco	37° 47′ 122° 24′	300	1918-23	B
2-040	Belmont	San Mateo	37° 31′ 122° 16′	30	1897-98	C
2-041	Fitzhugh	San Mateo	37° 22′ 122° 13′	610	1932-35	B
2-042	Kings Mountain	San Mateo	37° 24′ 122° 19′	2,400	1931-33	B
2-043	Kings Mountain Road	San Mateo	37° 26′ 122° 18′	1,600	1931-37	B
2-044	Millbrae	San Mateo	37° 36′ 122° 23′	10	1898-1900	B
2-045	Mills Estate Park	San Mateo	37° 35′ 122° 24′	200	1926-32	B
2-046	Rancho Corte Madera	San Mateo	37° 21′ 122° 14′	1,500	1933-39	B
2-047	San Mateo No. 2	San Mateo	37° 34′ 122° 20′	30	1935-38	B
2-048	Agnews	Santa Clara	37° 24′ 121° 56′	35	1897-99	B
2-049	Campbell, Hyde	Santa Clara	37° 18′ 121° 56′	192	1935-39	B
2-050	Coyote	Santa Clara	37° 13′ 121° 44′	300	1898-1900	B
2-051	Gilroy, No. 2	Santa Clara	37° 02′ 121° 35′	200	1944-45	A
2-052	Gilroy Hot Springs	Santa Clara	37° 07′ 121° 29′	1,160	1941-42	A
2-053	Gilroy Hot Springs (near)	Santa Clara	37° 03′ 121° 27′	1,000	1942-43	A
2-054	Gilroy (near)	Santa Clara	37° 02′ 121° 26′	1,200	1944-47	A
2-055	Lawrence	Santa Clara	37° 22′ 122° 00′	65	1898-1900	B
2-056	Mercury	Santa Clara	37° 13′ 121° 52′	300	1902-05	B
2-057	Milpitas	Santa Clara	37° 26′ 121° 53′	100	1937-39	B
2-058	Moffett Field	Santa Clara	37° 24′ 122° 03′	40	1940-42	A
2-059	Morgan Hill	Santa Clara	37° 07′ 121° 39′	225	1945-47	A
2-060	Morgan Hill	Santa Clara	37° 08′ 121° 39′	350	1899-1900	B
2-061	Mt. Madonna	Santa Clara	37° 01′ 121° 43′	1,800	1945-47	A
2-062	New Almaden	Santa Clara	37° 12′ 121° 49′	350	1898-1900	B

TABLE 21—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SAN FRANCISCO BAY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
2-063	Sargent	Santa Clara	36° 56′ 121° 33′	200	1897-1900	B
2-064	Stanford University	Santa Clara	37° 25′ 122° 10′	50	1897-1901	B
2-065	Fairfield (near)	Solano	38° 15′ 122° 03′	15	1940-47	A
2-066	Glashoff Ranch	Solano	38° 19′ 122° 08′	200	1938-39	B
2-067	South Vallejo	Solano	38° 06′ 122′ 15′	23	1897-99	B
2-068	Willotta Reclamation Ranch	Solano	38° 07′ 122′ 06′	10	1914-19	B
2-069	Willotta Viti Ranch	Solano	38° 15′ 122° 10′	75	1914-16	B
2-070	Glen Ellen	Sonoma	38° 22′ 122° 31′	279	1897-98	B

TYPE OF RECORD

Abbreviation	*Name*
A	Hourly
B	Daily
C	Monthly

TABLE 22

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATION IN EACH MONTH FOR THE PERIOD OF RECORD, AT FOUR STATIONS, SAN FRANCISCO BAY AREA

In Inches

Month	Livermore, Alameda County Number on Plate 3: 2-50			Oakland, Alameda County Number on Plate 3: 2-42			Napa, Napa County Number on Plate 3: 2-10			San Jose, Santa Clara County Number on Plate 3: 2-78		
	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum
July	0.01	0.40	0.00	0.02	0.18	0.00	Trace	0.20	0.00	Trace	0.09	0.00
August	0.02	0.73	0.00	0.04	1.11	0.00	0.02	0.46	0.00	0.02	0.74	0.00
September	0.29	5.72	0.00	0.39	4.50	0.00	0.37	9.79	0.00	0.26	6.33	0.00
October	0.66	3.94	0.00	1.26	7.30	0.00	1.18	5.32	0.00	0.69	4.48	0.00
November	1.48	7.23	0.00	2.60	11.11	0.00	2.44	10.35	0.00	1.36	7.39	0.00
December	2.74	11.69	0.00	4.05	13.38	0.00	4.30	12.23	0.37	2.50	10.55	0.00
January	3.00	12.60	0.22	4.79	15.35	0.90	4.92	15.22	0.39	2.83	12.38	0.10
February	2.50	6.76	0.08	4.10	12.30	0.07	4.23	12.16	0.00	2.54	7.02	0.09
March	2.24	8.85	0.00	3.46	12.16	0.04	3.32	8.87	0.02	2.39	7.75	0.00
April	1.03	6.51	0.00	1.58	8.46	0.00	1.68	11.87	0.00	1.08	4.47	0.00
May	0.50	2.66	0.00	0.84	3.93	0.00	0.83	4.04	0.00	0.50	2.69	0.00
June	0.12	1.73	0.00	0.25	3.03	0.00	0.22	2.12	0.00	0.11	2.15	0.00
SEASONAL TOTALS	14.59			23.38			23.51			14.28		

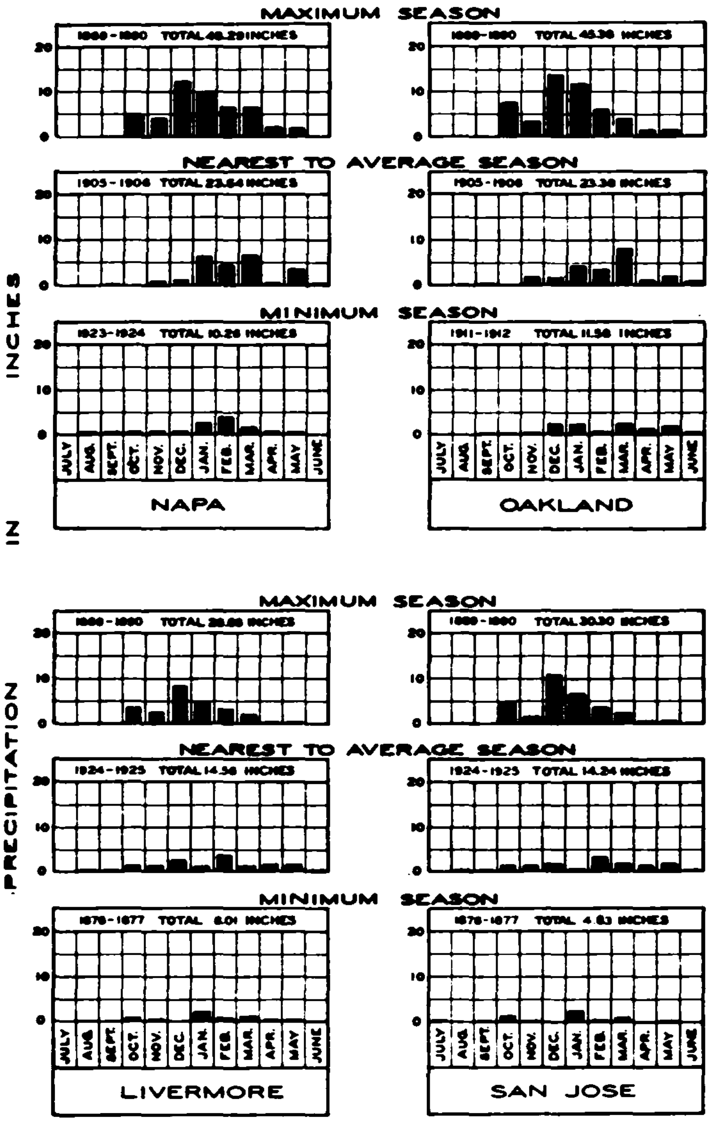
TABLE 23

ESTIMATED MEAN SEASONAL PRECIPITATION ON VALLEY AND MESA LANDS 1897-98 TO 1946-47

SAN FRANCISCO BAY AREA

Number on Plate 2	Stream or stream group basin	Precipitation in acre-feet
2	Petaluma Creek Group	196,000
	Napa River Basin	
3-1	Above gage near St. Helena	35,500
3-2	Conn Creek above gage near St. Helena	3,200
3-5	Remainder of Napa River above gage near Napa (below gages on Rector and Dry Creeks)	51,200
3-6	Remainder of Napa River	118,000
	Suisun Creek Group	
4-3	Remainder of Suisun Creek Group (less Gordon Valley Creek above Lake Curry Dam, and Green Valley Creek above Lake Frey Dam)	179,000
5	Mt. Diablo Creek Group	101,000
	East Bay Group	
6-2	San Leandro Creek above Chabot Dam	3,100
6-3	Remainder of East Bay Group (less San Pablo Creek above San Pablo Dam)	128,000
	Alameda Creek Group	
7-1	Alameda Creek above gage near Niles	91,300
7-2	Remainder of group including Niles Cone	59,800
	Coyote Creek Basin	
8-2	Remainder of Coyote Creek (below gage near Madrone)	107,000
	Guadalupe River Group	
9-1	Los Alamitos Creek above gage at Edenvale	9,000
9-5	Santa Clara valley floor	130,000
10	San Francisquito Creek Group	41,600
11	San Mateo Creek Group	87,100
12	Pescadero Creek Group	11,700
	TOTAL, SAN FRANCISCO BAY AREA	1,352,500

PLATE 11



DISTRIBUTION OF PRECIPITATION AT SELECTED STATIONS

SAN FRANCISCO BAY AREA

(San Jose Chamber of Commerce Photo)

SANTA CLARA VALLEY—SAN FRANCISCO BAY AREA

RUNOFF

Estimated mean seasonal natural runoff of the San Francisco Bay Area for the 53-year period from 1894-95 to 1946-47 is 1,245,000 acre-feet, or 1.8 percent of total surface runoff from mountain and foothill lands in the State. The minimum seasonal total of 93,000 acre-feet occurred in 1923-24, and the maximum, amounting to 3,130,000 acre-feet, in 1906-07. The 10-year period from 1923-24 to 1932-33 was the driest of record in the Area. During each season of that period, except 1926-27, runoff was less than the 53-year mean, and the average was only 49.1 percent of this long-time mean.

Runoff from the Area is derived principally from rain, since snow falls on only a small portion. Approximately half the total runoff occurs between October 1st and February 15th, and about 30 percent during the following 90 days. Monthly runoff varies from approximately 1.5 percent of the seasonal total during the period from July to November inclusive, to 28 percent in the maximum month, usually in the spring.

As of September 30, 1947, the United States Geological Survey was maintaining 14 stream gaging stations in the San Francisco Bay Area, principal stations being Coyote Creek near Madrone with a drainage area of 192 square miles, Alameda Creek near Niles with a drainage area of 634 square miles, and Napa River near St. Helena with a drainage area of 85 square miles. The only long-time records are those for Alameda and Coyote Creeks.

Stream gaging stations of the Area are listed in Table 24, together with average, maximum, and minimum seasonal runoff for stations with records of ten years or more. The 14 gaging stations maintained by the Geological Survey measure runoff from 1,216 of the 3,967 square miles of land area in the San Francisco Bay Area. These stations are supplemented by several, maintained by other agencies, which measure runoff from minor basins, each of less than 50 square miles.

Estimated mean seasonal natural runoff from the Area by basins, subbasins, and stream groups for the 53-year period from 1894-95 to 1946-47 is shown in Table 25. Of total mean seasonal natural runoff, approximately 614,000 acre-feet was estimated by the empirical formula described in Chapter III. Estimates of seasonal natural runoff of main stream and tributary basins for which there are partial records are given in Table 26.

A record of flow of Lagunitas Creek at Alpine Dam was obtained from the Marin County Municipal Water District. This record was begun in 1914-15 and covers 27 of the past 33 years. Runoff for missing seasons, and for seasons prior to commencement of the record was estimated by comparison with runoff of San Leandro Creek. Among records used in computing and estimating natural flows in the Area secured from sources other than the United States Geological Survey were the following:

Record	*Source*
Storage in Conn and Milliken reservoirs	City of Napa
Storage and diversions of runoff from Gordon Valley and Green Valley Creeks	City of Vallejo
Runoff in San Leandro and San Pablo Creeks	East Bay Municipal Utility District
Runoff and storage for Alameda and Calaveras Creeks	Public Utilities Commission, City of San Francisco
Runoff and diversions from drainage areas tributary to Santa Clara Valley	Santa Clara Valley Water Conservation District

An indication of variation in monthly flow to be expected of a typical stream in the San Francisco Bay Area appears in the following tabulation:

AVERAGE MONTHLY DISTRIBUTION OF AVERAGE SEASONAL RUNOFF, COYOTE CREEK NEAR MADRONE

(Drainage Area—192 Square Miles)

Month	Percent of seasonal average	Acre-feet
October	1.3	700
November	1.1	600
December	5.4	3,000
January	17.4	9,600
February	26.9	14,800
March	27.7	15,200
April	10.4	5,700
May	3.2	1,700
June	2.3	1,300
July	1.6	900
August	1.4	800
September	1.3	700
Totals	100.0	55,000

FLOOD FLOWS

Coyote and Alameda Creeks are the main streams in the San Francisco Bay Area. Records for Coyote Creek near Madrone extend from October, 1902, to September, 1912, and from December, 1916, to date. A maximum instantaneous discharge of about 25,000 second-feet probably occurred on March 7, 1911. Records of Alameda Creek near Niles run from October, 1916, to date, and the peak flow during this period was 13,900 second-feet on February 10, 1922.

TABLE 24

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, SAN FRANCISCO BAY AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
2-4	Napa River near St. Helena	38° 30′ 122° 26′	200	1929-32 1939-47	USGS	A					
2-5	Conn Creek near St. Helena	38° 29′ 122° 24′	180	1929-47	USGS	A	25,100	1940-41	75,370	1930-31	1,090
2-6	Dry Creek near Yountville	38° 22′ 122° 21′	90	1940-41	USGS	A					
2-7	Napa River near Napa	38° 22′ 122° 18′	90	1929-32	USGS	D					
2-8	Novato Creek near Novato	38° 07′ 122° 36′	40	1943-47	USGS	A					
2-9	Stevens Creek near Cupertino	37° 18′ 122° 04′	385	1930-47	USGS	A	9,100	1937-38	22,430	1930-31	780
2-10	Lagunita Canal at Stanford University	37° 25′ 122° 11′	150	1931-41	USGS	A					
2-11	Los Trancos Canal near Stanford University	37° 23′ 122° 11′	360	1931-41	USGS	A					
2-12	Los Trancos Canal at Stanford University	37° 24′ 122° 11′	160	1931-41	USGS	A					
2-13	San Francisquito Creek at Stanford University	37° 25′ 122° 11′	120	1931-41	USGS	A					
2-14	San Francisquito Creek at Menlo Park	37° 26′ 122° 10′	40	1934-36	USGS	A					
2-15	San Francisquito Creek at Palo Alto	37° 27′ 122° 08′	5	1931-40	USGS	A					

2-16	San Pablo Creek near San Pablo....	37° 55′ 122° 16′	250	1918-19	USGS	D					
2-17	San Pablo Creek at San Pablo.......	37° 58′ 122° 21′	10	1918-19	USGS	D					
2-17a	Pinole Creek near Pinole............	37° 58′ 122° 16′	175	1938-47	EBMUD	B					
2-17b	Lafayette Reservoir near Lafayette..	37° 53′ 122° 08′	456	1925-47	EBMUD	B	500	1937-38	1,240	1930-31	0
2-18	Laguna Creek at Coast Highway No. 1	36° 59′ 122° 10′	50	1936-37	USGS	A					
2-19	San Leandro Creek at Lake Chabot.	37° 44′ 122° 08′	250	1894-1947	EBMUD	D	15,500	1894-95	39,700	1923-24	1,100
2-20	Alamo Creek near Dublin...........	37° 42′ 121° 55′	350	1914-20	USGS	D					
2-21	Tassajero Creek near Pleasanton....	37° 42′ 121° 53′	340	1914-19 1922-29	USGS	A	1,869	1915-16	9,120	1923-24	0
2-22	Arroyo las Positas near Livermore...	37° 42′ 121° 48′	400	1912-19 1921-22	USGS	A	1,470	1915-16	9,300	1912-13	105
2-23	Arroyo de la Laguna near Pleasanton.	37° 37′ 121° 52′	250	1912-29	USGS	A	28,800	1913-14	130,000	1919-20	175
2-24	San Antonio Creek near Sunol.......	37° 34′ 121° 51′	300	1912-29	USGS	A	8,400	1915-16	26,200	1928-29	1,150
2-25	Arroyo Mocho near Livermore.......	37° 37′ 121° 41′	750	1912-29	USGS	A	2,724	1915-16	11,800	1923-24	26
2-26	Arroyo del Valle near Livermore......	37° 37′ 121° 45′	500	1912-29	USGS	A	21,100	1913-14	85,400	1923-24	5
2-27	Calaveras Creek near Sunol..........	37° 30′ 121° 49′	575	1910-29	USGS	A	36,400	1910-11	91,100	1909-10	1,560
2-28	Alameda Creek near Sunol...........	37° 30′ 121° 48′	600	1911-29	USGS	A	12,700	1915-16	30,100	1923-24	14
2-29	Alameda Creek at Sunol.............	37° 36′ 121° 54′	200	1900-29	USGS	A	96,300	1906-07	324,000	1923-24	1,850
2-30	Alameda Creek near Niles...........	37° 35′ 121° 58′	100	1916-47	USGS	A	60,000	1937-38	286,000	1930-31	1,220
2-31	Alameda Creek at Niles Dam........	37° 35′ 121° 58′	80	1891-1900	USGS	A					

TABLE 24—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, SAN FRANCISCO BAY AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
2-31a	Spring Valley Company Aqueduct near Niles	37° 38′ 121° 55′	250	1903-29	USGS	A	23,600	1926-27	53,200	1904-05	14,000
2-32	Dry Creek near Decoto	37° 35′ 122° 02′	30	1917-19	USGS	D					
2-33	Alameda Creek near Decoto	37° 35′ 122° 02′	10	1916-19	USGS	A					
2-34	Crandall Slough near Centerville	37° 34′ 122° 02′	30	1916-19	USGS	D					
2-35	San Lorenzo Creek at Hayward	37° 41′ 122° 03′	133	1940-41 1946-47	USGS	A					
2-36	Laguna Creek at Irvington	37° 32′ 121° 57′	70	1916-19	USGS	D					
2-37	San Andreas Reservoir at Dam	37° 35′ 122° 25′	460	1921-30	SFPUC	B					
2-38	Crystal Springs Reservoir at Dam	37′ 32° 122° 22′	290	1921-30	SFPUC	E					
2-39	Coyote Creek near Madrone	37° 10′ 121° 38′	420	1902-12 1916-47	USGS	A	55,300	1906-07	204,000	1923-24	900
2-40	Coyote Creek at Coyote	37° 13′ 121° 44′	250	1903-07 1916-23	USGS	A					
2-41	Laguna Seca near Coyote	37° 12′ 121° 45′	260	1918	USGS	A					
2-41a	Laguna Seca at Coyote	37° 13′ 121° 45′	250	1906-07 1916-18	USGS	D					

2-42	Coyote Creek at Ford Road County Bridge	37° 15′ 121° 48′	220	1906-07	H.L.Haehl	A					
2-43	Coyote Creek near Edenvale	37° 16′ 121° 48′	190	1916-34 1935-47	USGS	A	29,5(	1937-38	133,200	1946-47	500
2-44	Coyote Creek at San Jose	37° 21′ 121° 52′	70	1906-07 1916-17	USGS	A					
2-45	Alamitos Creek near Edenvale	37° 14′ 121° 52′	200	1930-47	USGS	A	13,8(	1937-38	44,700	1932-33	800
2-46	Guadalupe Creek at Guadalupe	37° 13′ 121° 55′	325	1930-43 1945-47	USGS	A	8,0(	1940-41	16,160	1930-31	700
2-47	Guadalupe Creek at San Jose	37° 20′ 121° 54′	80	1930-47	USGS	A	27,8(	1937-38	109,000	1932-33	300
2-48	Los Gatos Creek at Los Gatos	37° 13′ 121° 59′	360	1930-44	USGS	A	30,5(	1937-38	78,700	1930-31	1,100
2-49	Los Gatos Creek below Los Gatos	37° 14′ 121° 58′	310	1944-47	USGS	A					
2-50	Campbell Creek at Saratoga	37° 15′ 122° 02′	500	1930-47	USGS	A	7,2(	1940-41	18,300	1938-39	1,300

TYPE OF RECORD

A—Daily.
B—Monthly.
C—Seasonal.
D—Intermittent.

S(RCE OF RECORD

Abbreviation	*Name*
USGS	Unite States Geological Survey.
EBMUD	East y Municipal Utility District.
SFPUC	San F ncisco Public Utilities Commission.

TABLE 25

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, SAN FRANCISCO BAY AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
	Lagunitas Creek Group			
1-1	Lagunitas Creek above Alpine Dam	15,100		
1-2	Remainder of Lagunitas Creek Group	110,000		
2	Petaluma Creek Group			230,000
	Napa River Basin			
3-1	Above gage near St. Helena	65,400		
3-2	Conn Creek above gage near St. Helena	26,400		
3-3	Rector Creek above Rector Dam	8,400		
3-4	Dry Creek above gage near Yountville	13,500		
3-5	Remainder of Napa River above gage near Napa	15,400		
	Above gage near Napa		129,100	
3-6	Remainder of Napa River	57,200		
	Napa River at mouth			186,300
	Suisun Creek Group			
4-1	Gordon Valley Creek above Lake Curry Dam	8,100		
4-2	Green Valley Creek above Lake Frey Dam	1,700		
4-3	Remainder of Suisun Creek Group	39,000		48,800
5	Mt. Diablo Creek Group			37,300
	East Bay Group			
6-1	San Pablo Creek above San Pablo Dam	14,100		
6-2	San Leandro Creek above Chabot Dam	16,700		
6-3	Remainder of East Bay Group	37,000		67,800
	Alameda Creek Group			
7-1	Alameda Creek above gage near Niles	118,700		
7-2	Remainder of group including Niles Cone	12,000		130,700
	Coyote Creek Basin			
8-1	Above gage near Madrone	61,600		
8-2	Remainder of Coyote Creek	27,400		
	Coyote Creek at mouth			89,000
	Guadalupe River Group			
9-1	Guadalupe River above gage at Guadalupe	8,700		
9-2	Los Alamitos Creek above gage near Edenvale	16,100		
9-3	Los Gatos Creek above gage at Los Gatos	35,800		
9-4	Stevens Creek above gage near Cupertino	9,800		
9-6	Remainder of Guadalupe River Group	29,100		99,500
10	San Francisquito Creek Group			17,900
11	San Mateo Creek Group			28,100
12	Pescadero Creek Group			185,000
	TOTAL, SAN FRANCISCO BAY AREA			1,245,500

TABLE 26

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SAN FRANCISCO BAY AREA

In Acre-feet

Season Oct. 1-Sept. 30	Lagunitas Creek above Alpine Dam	Napa River near St. Helena	Conn Creek near St. Helena	Rector Creek above Rector Dam	Dry Creek near Yountville	Napa River near Napa below tributary gages
1894-95	31,600	109,000	46,600	13,100	24,100	25,500
95-96	17,700	98,900	41,000	11,700	20,900	22,700
96-97	21,800	98,900	41,000	11,700	20,900	22,700
97-98	3,600	23,800	7,200	3,300	3,500	5,700
98-99	13,100	34,700	11,200	4,300	5,400	7,800
1899-1900	11,100	64,500	25,800	7,900	12,800	14,600
00-01	13,700	70,100	26,900	8,200	13,400	15,200
01-02	14,100	98,900	41,000	11,700	20,900	22,700
02-03	18,900	81,000	31,800	9,400	16,000	18,000
03-04	27,700	166,000	82,900	22,100	44,600	43,900
1904-05	11,100	90,600	36,900	10,600	18,600	20,500
05-06	22,600	94,400	38,700	11,100	19,600	21,600
06-07	29,800	108,000	46,400	13,000	24,000	25,300
07-08	10,100	29,600	11,700	4,400	5,700	8,000
08-09	28,800	127,000	59,700	16,300	31,500	32,200
1909-10	11,200	40,900	13,800	4,900	6,700	9,000
10-11	29,700	85,600	34,000	10,000	17,300	19,200
11-12	4,200	43,000	14,500	5,100	7,000	9,300
12-13	4,600	23,000	7,100	3,200	3,400	5,700
13-14	23,600	133,000	60,800	16,600	32,100	32,700
1914-15	25,400	111,000	47,700	13,300	24,700	26,200
15-16	19,400	111,000	47,700	13,300	24,700	26,000
16-17	20,400	50,100	17,700	5,900	8,600	11,100
17-18	4,100	13,800	3,900	2,500	1,900	4,200
18-19	17,000	55,600	19,900	6,400	9,700	12,000
1919-20	4,000	4,200	700	1,600	300	2,600
20-21	12,000	84,500	33,600	9,800	16,800	19,000
21-22	12,300	41,300	14,400	4,900	7,000	9,100
22-23	13,600	49,700	17,300	5,800	8,400	10,900
23-24	3,900	4,000	600	1,600	500	2,400
1924-25	25,500	60,500	22,200	7,000	10,800	18,300
25-26	11,200	60,500	22,200	7,000	10,800	13,300
26-27	20,700	88,900	36,000	10,400	18,100	20,100
27-28	13,500	52,800	18,800	6,200	9,100	11,600
28-29	5,200	9,400	2,300	2,100	1,100	3,300
1929-30	7,900	56,800	16,600	6,500	8,100	12,300
30-31	3,600	5,100	1,100	1,100	900	2,300
31-32	10,900	40,100	15,500	5,200	7,000	8,500
32-33	6,100	16,700	4,400	3,300	2,300	4,600
33-34	5,000	26,700	5,500	3,200	2,800	6,400
1934-35	12,900	64,700	23,400	8,000	11,400	14,200
35-36	18,600	63,900	24,800	6,100	12,500	14,100
36-37	12,100	44,200	18,800	6,900	9,200	11,600
37-38	25,600	134,000	59,400	16,400	34,600	33,200
38-39	3,700	4,200	1,400	1,700	700	2,700
1939-40	23,600	112,000	45,000	13,800	23,300	26,400
40-41	29,100	153,000	75,400	18,500	36,700	38,900
41-42	26,300	118,000	53,500	14,800	27,800	27,900
42-43	19,100	61,200	23,100	11,400	11,300	13,000
43-44	10,100	30,200	10,400	6,700	5,200	7,700
1944-45	11,600	41,100	15,000	9,100	7,400	8,700
45-46	13,300	50,500	18,500	10,600	9,000	10,900
1946-47	5,000	22,000	5,700	7,100	2,800	6,000
MEAN	15,100	65,400	26,400	8,400	13,500	15,400

TABLE 26—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SAN FRANCISCO BAY AREA

In Acre-feet

Season Oct. 1-Sept. 30	Napa River near Napa	Napa River Napa Gage to mouth	Napa River at mouth	Gordon Valley Creek above Lake Curry Dam	Green Valley above Lake Frey Dam	San Pablo Creek above San Pablo Reservoir
1894-95	218,300	99,500	317,800	14,800	3,000	41,600
95-96	195,200	88,000	283,200	12,900	2,600	15,500
96-97	195,200	88,000	283,200	12,900	2,600	21,300
97-98	43,500	16,600	60,100	1,600	500	900
98-99	63,400	25,200	88,600	3,000	800	10,600
1899-1900	125,600	56,000	181,600	7,800	1,700	8,600
00-01	133,800	58,200	192,000	8,200	1,700	11,300
01-02	195,200	87,800	283,000	12,900	2,600	11,700
02-03	156,200	68,600	224,800	9,800	2,000	17,000
03-04	359,500	176,000	535,500	26,900	5,200	32,300
1904-05	177,200	78,900	256,100	11,500	2,300	8,600
05-06	185,400	83,200	268,600	12,100	2,500	22,700
06-07	216,700	98,900	315,600	14,700	2,900	37,100
07-08	59,400	26,300	85,700	3,100	800	7,600
08-09	266,700	127,000	393,700	19,100	3,800	34,800
1909-10	75,300	30,700	106,000	3,800	900	8,600
10-11	166,100	73,100	239,200	10,600	2,200	36,900
11-12	78,900	31,900	110,800	4,000	1,000	1,500
12-13	42,400	16,600	59,000	1,600	500	11,900
13-14	275,200	129,000	404,200	19,500	3,800	24,400
1914-15	222,900	102,000	324,900	15,100	3,000	32,600
15-16	222,700	102,000	324,700	15,100	3,000	26,800
16-17	93,400	38,900	132,300	5,100	1,200	11,300
17-18	26,300	10,000	36,300	500	300	1,720
18-19	103,600	43,400	147,000	5,800	1,300	12,800
1919-20	9,400	3,400	12,800	400	100	1,000
20-21	163,700	72,300	236,000	10,400	2,100	9,700
21-22	76,700	31,400	108,100	3,800	900	10,800
22-23	92,100	38,000	130,100	5,000	1,100	9,530
23-24	9,100	2,900	12,000	400	100	720
1924-25	113,800	48,200	162,000	6,600	1,400	9,290
25-26	113,800	48,200	162,000	6,600	1,400	7,710
26-27	173,500	77,300	250,800	11,200	2,300	19,100
27-28	98,500	41,500	140,000	6,100	1,300	8,920
28-29	18,200	6,700	24,900	1,900	300	2,900
1929-30	100,300	40,400	140,700	3,200	800	4,880
30-31	10,500	3,100	13,600	500	200	950
31-32	76,300	31,700	108,000	4,600	1,200	10,100
32-33	31,300	11,600	42,900	900	400	2,320
33-34	44,600	16,300	60,900	1,800	500	2,440
1934-35	121,700	51,500	173,200	5,800	1,800	8,560
35-36	121,400	52,900	174,300	7,100	1,700	14,500
36-37	90,700	41,500	132,200	5,800	1,400	16,900
37-38	277,600	129,000	406,600	17,300	3,400	30,400
38-39	10,700	4,100	14,800	800	0	1,920
1939-40	220,500	92,400	312,900	14,600	2,100	27,400
40-41	322,500	158,000	480,500	25,600	2,600	29,800
41-42	242,000	112,000	354,000	16,600	2,500	24,500
42-43	120,000	48,900	168,900	6,700	1,600	15,600
43-44	60,200	24,200	84,400	3,000	1,100	9,200
1944-45	81,300	31,400	112,700	2,700	1,200	14,100
45-46	99,500	39,500	139,000	4,100	1,400	10,500
1946-47	43,600	15,500	59,100	1,100	500	3,830
MEAN	129,100	57,200	186,300	8,100	1,700	14,100

TABLE 26—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SAN FRANCISCO BAY AREA

In Acre-feet

Season Oct. 1-Sept. 30	San Leandro Creek above Chabot Dam	Remainder of East Bay Group	Total East Bay Group	Alameda Creek near Niles	Coyote Creek near Madrone	Minor East Side Streams
1894-95	39,700	144,000	225,300	268,000	161,000	69,000
95-96	20,600	36,000	72,100	125,000	67,200	40,100
96-97	26,300	58,000	105,600	210,000	124,000	42,000
97-98	1,200	600	2,700	13,600	1,700	1,900
98-99	14,300	19,300	44,200	71,000	31,300	13,600
1899-1900	11,500	14,000	34,100	59,200	23,200	16,900
00-01	15,100	21,300	47,700	133,000	67,200	41,000
01-02	15,600	22,000	49,300	99,100	44,400	20,800
02-03	22,300	41,300	80,600	128,000	83,200	28,000
03-04	34,300	103,000	169,600	119,000	35,800	13,200
1904-05	11,500	14,000	34,100	63,600	31,800	22,000
05-06	27,300	63,300	113,300	225,000	117,000	46,300
06-07	37,300	125,000	199,400	355,000	204,000	72,400
07-08	10,100	12,000	29,700	65,900	47,200	17,400
08-09	35,900	114,000	184,700	263,000	176,000	60,000
1909-10	11,600	14,700	34,900	106,000	51,100	19,600
10-11	37,100	123,000	197,000	299,000	126,000	55,800
11-12	2,000	2,000	5,500	34,700	6,400	9,700
12-13	2,600	2,700	7,200	21,800	3,800	5,000
13-14	28,700	70,700	123,800	207,000	189,000	65,600
1914-15	34,400	105,000	172,000	213,000	121,000	47,800
15-16	30,500	80,000	137,300	270,000	153,000	59,900
16-17	15,100	21,300	47,700	109,000	70,200	35,800
17-18	1,800	2,000	5,520	36,600	13,400	32,300
18-19	19,600	32,700	65,100	123,000	47,500	16,500
1919-20	1,700	1,300	4,000	31,100	14,000	7,900
20-21	12,700	16,000	38,400	98,800	56,800	20,500
21-22	13,200	16,700	40,700	155,000	69,100	40,200
22-23	15,000	20,700	45,230	87,900	50,700	25,600
23-24	1,100	600	2,420	16,600	900	1,300
1924-25	15,100	21,300	45,690	49,200	13,200	7,700
25-26	7,800	9,300	24,810	79,000	40,300	28,100
26-27	24,400	50,000	93,500	108,000	53,300	36,200
27-28	12,900	16,000	37,820	69,000	22,500	12,800
28-29	3,600	4,000	10,500	28,700	7,300	6,300
1929-30	6,700	8,000	19,580	56,500	20,100	8,200
30-31	1,400	1,300	3,650	22,700	1,700	1,200
31-32	16,700	25,000	51,800	132,000	69,800	29,500
32-33	4,200	4,700	11,220	29,300	8,100	3,100
33-34	3,100	3,300	8,840	32,200	10,700	9,700
1934-35	11,900	14,700	35,160	72,700	32,000	17,300
35-36	22,300	41,300	78,100	136,000	54,300	25,200
36-37	19,500	32,700	69,100	150,000	75,300	32,600
37-38	34,000	101,000	165,400	319,000	156,000	55,600
38-39	3,100	4,300	9,320	24,400	7,000	4,700
1939-40	28,500	72,700	128,600	167,000	76,200	31,300
40-41	32,500	90,700	153,000	242,000	146,000	67,200
41-42	27,300	67,800	119,600	169,000	76,000	38,000
42-43	21,600	36,600	73,800	127,000	67,800	30,900
43-44	7,800	13,800	30,800	85,700	49,300	19,200
1944-45	16,600	23,400	54,100	112,000	53,300	22,800
45-46	12,300	14,800	37,600	51,900	30,100	13,500
1946-47	2,600	6,400	12,830	17,300	9,000	3,400
MEAN	16,700	37,000	67,800	118,700	61,600	27,400

TABLE 26—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SAN FRANCISCO BAY AREA

In Acre-feet

Season Oct. 1-Sept. 30	Coyote River at mouth	Guadalupe River at Guadalupe Gage	Los Alamitos Creek near Edenvale	Los Gatos Creek at Los Gatos	Stevens Creek near Cupertino	Minor West Side Streams
1894-95	230,000	22,800	47,200	88,300	25,800	82,300
95-96	107,300	14,600	29,200	60,500	16,200	51,100
96-97	166,000	10,500	20,300	44,300	11,600	35,700
97-98	3,600	1,400	400	6,300	1,500	2,200
98-99	44,900	4,500	7,300	19,500	5,000	12,800
1899-1900	40,100	6,400	11,400	27,600	7,000	20,200
00-01	108,200	15,200	30,400	62,500	16,800	53,200
01-02	65,200	6,400	11,400	27,600	7,100	20,200
02-03	111,200	6,900	12,600	29,600	7,700	22,000
03-04	49,000	4,000	6,200	17,500	4,400	10,800
1904-05	53,800	8,100	15,200	34,500	9,000	26,600
05-06	163,300	13,400	26,500	55,800	14,800	46,500
06-07	276,400	20,700	42,400	81,400	23,200	74,100
07-08	64,600	5,000	8,200	21,500	5,500	14,400
08-09	236,000	15,800	29,900	65,800	17,500	55,400
1909-10	70,700	5,700	9,800	24,400	6,200	17,100
10-11	181,800	19,100	38,900	76,300	21,300	67,900
11-12	16,100	2,500	2,800	10,800	2,700	5,700
12-13	8,800	1,000	0	4,300	1,000	700
13-14	254,600	17,100	34,600	69,200	19,100	48,900
1914-15	168,800	13,900	27,500	57,500	15,300	48,200
15-16	212,900	17,100	34,500	69,300	18,900	60,300
16-17	106,000	12,000	23,600	50,300	13,300	41,400
17-18	45,700	5,100	8,300	21,800	5,500	14,800
18-19	64,000	4,500	7,300	19,600	5,000	21,000
1919-20	21,900	3,500	5,000	15,200	3,800	14,800
20-21	77,300	5,600	9,600	24,200	6,200	17,200
21-22	109,300	14,500	28,800	59,900	16,000	50,700
22-23	76,300	8,500	15,800	36,000	9,300	27,900
23-24	2,200	1,200	0	4,900	1,300	1,400
1924-25	20,900	3,600	5,200	14,800	3,900	9,300
25-26	68,400	10,700	20,600	44,900	11,700	36,200
26-27	89,500	9,500	18,300	38,800	10,500	32,000
27-28	35,300	5,000	8,200	21,900	5,500	14,500
28-29	13,600	3,400	4,800	14,900	3,800	8,700
1929-30	28,300	3,200	7,300	13,600	3,400	8,100
30-31	2,900	700	0	2,900	800	700
31-32	99,300	8,800	17,700	31,400	6,900	29,100
32-33	11,200	2,000	900	7,300	1,800	2,000
33-34	20,400	5,200	7,000	18,000	3,700	15,000
1934-35	49,300	7,100	10,200	29,300	6,900	19,700
35-36	79,500	6,500	9,800	28,600	6,900	22,300
36-37	107,900	9,800	17,700	37,000	9,400	33,400
37-38	211,600	22,600	48,100	82,200	23,100	72,800
38-39	11,700	2,000	700	6,200	2,100	3,400
1939-40	107,500	12,700	23,900	59,700	18,500	46,900
40-41	213,200	17,200	38,700	81,400	28,300	88,800
41-42	114,000	13,100	24,500	53,900	17,800	47,100
42-43	98,700	8,300	17,900	36,300	11,900	29,000
43-44	68,500	5,400	7,200	19,000	4,200	14,200
1944-45	76,100	7,300	11,900	32,900	7,500	19,700
45-46	43,600	5,300	7,400	26,100	7,900	16,900
1946-47	12,400	2,100	1,400	9,300	3,600	4,900
MEAN	89,000	8,700	16,100	35,800	9,800	29,100

TABLE 26—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SAN FRANCISCO BAY AREA

In Acre-feet

Season Oct. 1-Sept. 30	San Francisquito Creek Group	San Mateo Creek Group
1894-95	56,300	64,600
95-96	20,100	30,900
96-97	28,100	52,700
97-98	1,000	1,900
98-99	12,300	22,900
1899-1900	9,550	18,300
00-01	13,300	24,100
01-02	13,900	25,100
02-03	22,100	35,900
03-04	43,000	63,300
1904-05	9,550	18,300
05-06	30,100	45,800
06-07	50,000	72,200
07-08	8,040	16,000
08-09	46,800	68,000
1909-10	9,800	18,500
10-11	49,800	71,500
11-12	1,500	3,100
12-13	1,750	4,300
13-14	32,600	49,100
1914-15	43,800	63,700
15-16	36,000	53,900
16-17	13,400	20,200
17-18	1,500	3,100
18-19	18,600	30,900
1919-20	1,250	1,900
20-21	10,600	20,900
21-22	10,800	20,600
22-23	13,100	24,600
23-24	1,000	1,500
1924-25	13,400	7,600
25-26	6,030	11,100
26-27	25,100	40,900
27-28	10,800	19,800
28-29	2,760	5,400
1929-30	5,030	10,700
30-31	1,500	2,100
31-32	15,400	26,700
32-33	3,830	6,700
33-34	1,590	5,000
1934-35	12,400	18,900
35-36	16,000	35,900
36-37	25,400	31,300
37-38	42,900	62,200
38-39	1,880	5,000
1939-40	31,600	48,000
40-41	39,400	58,500
41-42	30,100	49,600
42-43	21,400	34,600
43-44	6,030	12,800
1944-45	14,900	26,500
45-46	10,300	19,800
1946-47	1,750	4,000
MEAN	17,900	28,100

FLOOD FREQUENCIES

In flood-frequency studies for streams in this Area, shown on Plate 12, "Alameda Creek Flood Discharge near Niles, Coyote Creek Flood Discharge near Madrone," measured flow at the gaging stations was used except as noted in the following paragraph.

The flood-frequency study for Alameda Creek near Niles was based on records at Sunol (drainage area 620 square miles) from October, 1900, to February, 1917, and on records near Niles (drainage area 634 square miles) from February, 1917, through the season of 1946-47. However, from 1925 to 1947 the drainage area of Alameda Creek near Niles was reduced by the 100 square miles of drainage area above Calaveras Dam, owing to storage in Calavaras Reservoir, except during the following periods of spill:

February 11, 1938, to February 23, 1938 (first spill)
March 2, 1938, to March 29, 1938
February 17, 1941, to March 19, 1941
March 30, 1941, to April 18, 1941
April 11, 1945, to May 14, 1945

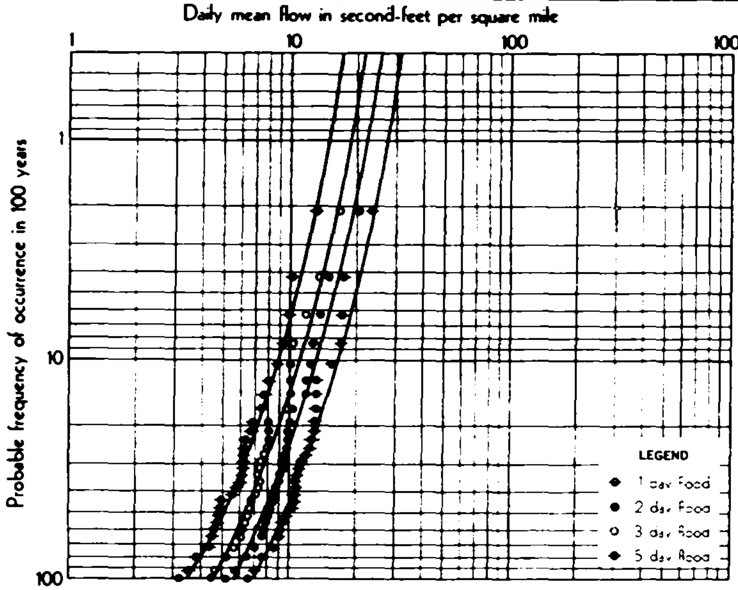
The flood-frequency study for Coyote Creek near Madrone includes corrections for regulation by Coyote Reservoir.

QUALITY OF WATER

Both surface and ground waters are utilized extensively in the San Francisco Bay Area. Surface waters are generally of good to excellent mineral quality and suitable for domestic, agricultural, and industrial uses. A few of the smaller streams, including those tributary to Napa River and Coyote Creek, have boron content near the upper limit of safe use on sensitive plants. Inorganic analyses of samples taken from 15 surface streams are reported in Table 27. They show the following general chemical characteristics: total solubles from 154 to 461 parts per million; specific electrical conductance ($K \times 10^5$ at 25° C.) from 22 to 66; elemental boron from none to 1.00 part per million; and percent sodium from 4 to 44. These are all carbonate waters. The dominant base may be either calcium, magnesium, or sodium, dependent upon types of rocks in the drainage basin. Analyses recorded in Table 27 were chosen to represent concentrations nearest to the average for the stream.

Ground waters have generally been overdrawn in San Mateo, Santa Clara, Alameda, and Contra Costa Counties, and in the southwest portion of Solano County. Pumping lifts are high in portions of the ground water basins, and in a number of wells close to the shore of San Francisco Bay overdraft has resulted in excessive salinity. Except for areas where quality has depreciated because of long-standing overdraft or intrusion of sea water, ground waters are generally of good quality and suitable for a wide variety of uses. Analyses of representative samples collected in Santa Clara Valley, as reported in Table 28, show total solubles of from 317 to 552 parts per million, specific electrical conductance ($K \times 10^5$ at 25° C.) from 45.4 to 78.8, elemental boron from none to 1.01 parts per million, and percent sodium from 14 to 76. The natural ground waters are generally of the calcium bicarbonate type, although occasionally magnesium or sodium may be the dominant base. Analyses of other ground waters in the area outside zones of contamination are also reported in Table 28.

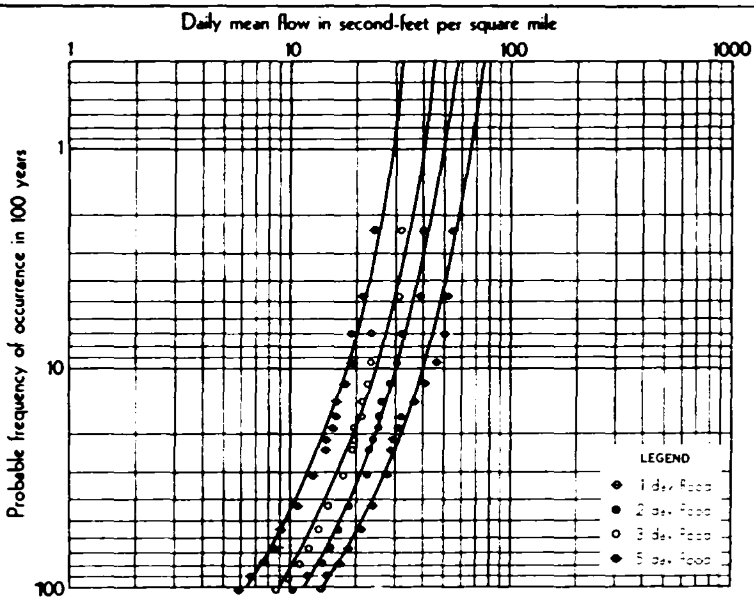
PLATE 12



ALAMEDA CREEK FLOOD DISCHARGE

NEAR NILES

AREA OF DRAINAGE BASIN 634 SQUARE MILES



COYOTE CREEK FLOOD DISCHARGE

NEAR MADRONE

AREA OF DRAINAGE BASIN 192 SQUARE MILES

TABLE 27

INORGANIC ANALYSES OF SURFACE WATERS, SAN FRANCISCO BAY AREA

Source and place of sampling	Date	Conductance ($K \times 10^6$)	Boron, ppm	Percent sodium	Reacting values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
Napa River near Napa	5/10/30	....	1.00	14	1.10 *18%*	1.56 *25%*	0.48 *7%*	2.59 *37%*	0.45 *6%*	0.10 *2%*	0.33 *5%*
Conn Creek near St. Helena	5/10/30	....	0.70	4	1.80 *16%*	3.53 *32%*	0.15 *2%*	4.51 *41%*	0.28 *3%*	0.52 *5%*	0.10 *1%*
Alameda Creek, 1 mile south of Sunol	6/22/32	22.1	0.11	12	1.16 *27%*	0.75 *17%*	0.27 *6%*	1.75 *40%*	0.20 *5%*	0.20 *5%*	....
Silver Creek, 1 mile above recorder, 7 miles southeast of San Jose	3/5/49	65.8	0.07	20	0.98 *6%*	5.83 *34%*	1.83 *10%*	6.04 *36%*	1.51 *9%*	0.67 *4%*	0.13 *1%*
Penitencia Creek at Water Conservation District diversion, 6 miles northeast of San Jose	3/5/49	36.6	0.82	42	1.30 *16%*	1.08 *13%*	1.68 *21%*	2.38 *32%*	0.59 *8%*	0.64 *9%*	0.09 *1%*
Coyote Creek at Cochran Road	2/16/49	36.6	0.22	20	1.85 *23%*	1.37 *17%*	0.85 *10%*	2.45 *30%*	0.33 *4%*	1.07 *13%*	0.21 *3%*

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Alamitos Creek at McKean Road	2/ 8/49	28.8	0.07	14	1.20 16%	.05 7%	0.56 7%	2.84 41%	0.19 3%	0.42 6%	Trace ------
Los Gatos Creek at Vasona Dam	3/ 7/49	31.0	0.05	20	1.55 22%	.27 8%	0.75 10%	2.12 31%	0.29 4%	0.90 14%	0.09 1%
San Tomas Creek at San Tomas Village	3/ 7/49	34.8	0.00	20	1.48 19%	.64 1%	0.75 10%	2.47 33%	0.46 6%	0.66 10%	0.11 1%
Guadalupe River at Water Conservation District diversion, near Guadalupe	2/ 8/49	26.1	0.12	12	1.25 20%	.52 4%	0.40 6%	2.39 39%	0.22 4%	0.48 7%	Trace ------
San Francisquito Creek at Stanford Golf Course	2/16/49	28.6	0.09	38	1.24 17%	.97 4%	1.34 19%	1.34 21%	0.64 10%	0.95 15%	0.26 4%
Arroyo Mocho at City of San Francisco gaging station	4/ 1/49	37.8	0.59	18	0.93 9%	.12 2%	0.88 9%	3.50 38%	0.32 3%	0.78 8%	0.09 1%
Arroyo del Valle at U. S. Veterans Administration Hospital, 4½ miles south of Livermore	3/ 4/49	28.4	0.39	20	1.48 20%	.48 0%	0.81 10%	2.41 30%	0.23 3%	0.78 11%	*Trace* ------
Arroyo de la Laguna at Verona Highway Bridge	3/ 4/49	59.2	0.58	40	1.81 14%	.11 6%	2.04 20%	3.43 26%	1.64 12%	1.57 12%	*Trace* ------
Alamo Creek at Division of Water Resources gaging station near Highway 50	3/ 4/49	34.5	0.23	44	1.36 15%	.16 3%	1.98 22%	1.99 25%	0.80 10%	1.01 13%	0.11 2%

TABLE 28

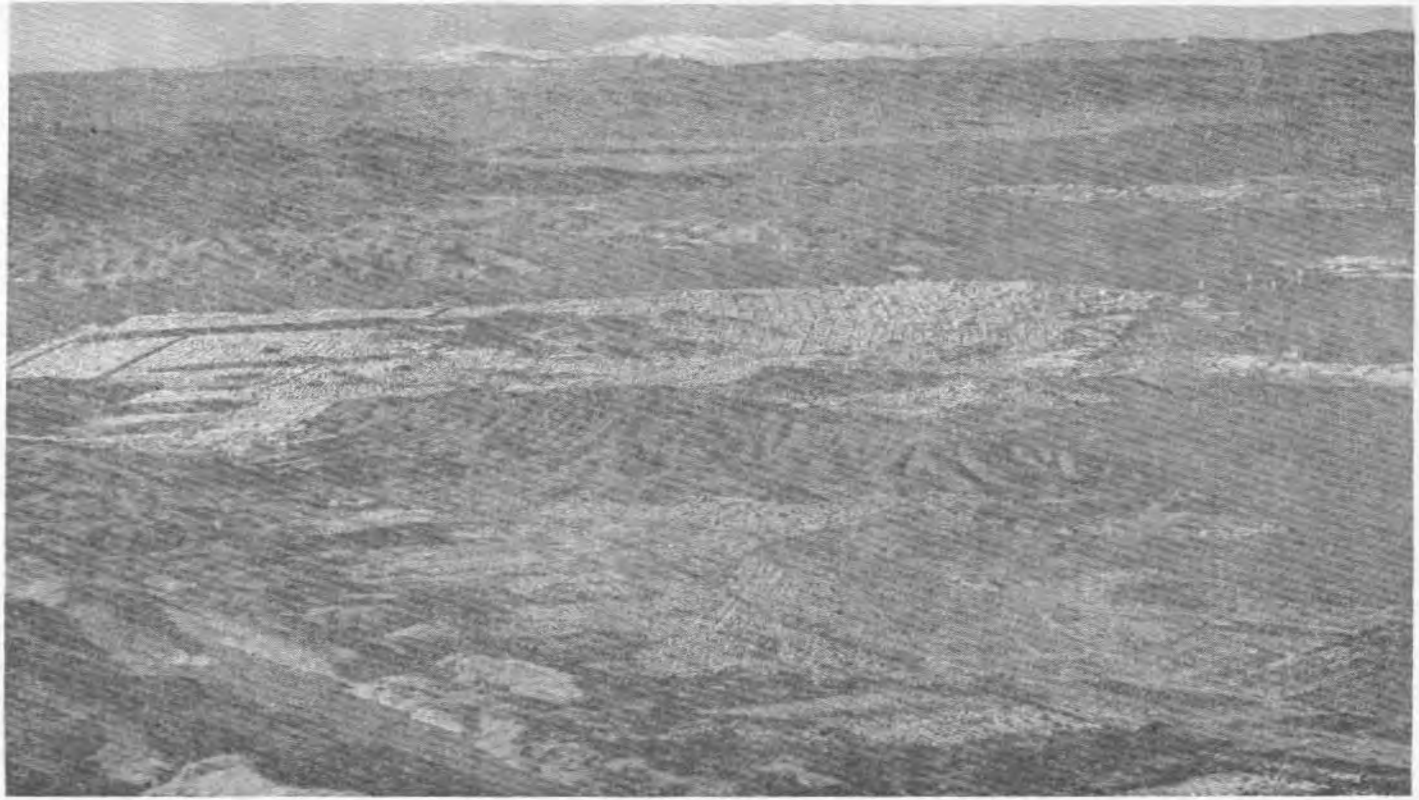
INORGANIC ANALYSES OF GROUND WATERS, SAN FRANCISCO BAY AREA

Source and location (All section designations refer to Mt. Diablo base line and meridian)	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reacting values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3 + HCO_3	Cl	SO_4	NO_3
Santa Clara Valley:											
DWR Well, 11S-4E-13-B1	7/27/49	78.8	0.42	76	1.41 7%	0.80 5%	7.30 38%	5.45 31%	2.25 13%	1.15 6%	Trace ------
DWR Well, 7S-1E-26-A2	5/27/49	61.0	0.00	18	1.44 10%	4.62 31%	1.42 9%	5.63 39%	0.70 5%	0.93 6%	0.06 ------
DWR Well, 7S-1E-15-J2	5/27/49	73.5	0.00	16	3.41 19%	4.06 23%	1.52 8%	6.33 36%	0.70 4%	1.79 10%	0.07 ------
DWR Well, 7S-1E-32-R1	7/16/49	45.4	0.15	14	2.04 19%	2.62 24%	0.84 7%	4.23 41%	0.32 3%	0.53 5%	0.10 1%
DWR Well, 6S-1E-22-E2	6/22/49	73.3	1.01	60	2.43 14%	1.03 6%	5.35 30%	5.81 33%	1.36 7%	1.54 9%	0.10 1%
DWR Well, 5S-1W-36-J1	9/20/49	56.2	0.16	22	3.66 26%	1.75 13%	1.59 11%	4.83 36%	0.76 6%	1.04 8%	Trace ------
DWR Well, 6S-1E-6-A1	6/ 8/49	56.5	0.27	74	0.88 7%	0.78 6%	4.88 37%	5.00 38%	0.60 5%	0.90 7%	Trace ------
DWR Well, 6S-1W-11-C1	6/ 2/49	63.7	0.09	34	3.00 20%	1.85 13%	2.53 17%	5.45 37%	1.31 9%	0.61 4%	Trace ------
DWR Well, 6S-1W-23-J1	6/24/49	48.1	0.00	28	2.86 24%	1.36 12%	1.66 14%	4.13 36%	0.64 5%	0.95 8%	0.06 1%

DWR Well, 7S-1W-3-G1	9/20/49	48.3	0.11	20	3.11 *27%*	1.55 *13%*	1.09 *10%*	3.79 *34%*	0.47 *4%*	1.30 *11%*	0.09 *1%*
DWR Well, 7S-2W-12-K1	9/20/49	56.5	0.17	24	2.77 *20%*	2.37 *18%*	1.62 *12%*	4.81 *37%*	1.10 *9%*	0.44 *3%*	0.14 *1%*
DWR Well, 6S-2W-15-D1	7/14/49	48.3	0.17	48	1.91 *16%*	1.24 *10%*	2.94 *24%*	4.46 *39%*	0.54 *5%*	0.65 *6%*	Trace -----
Livermore Valley:											
Livermore Water Supply, composite of 2 wells	1940	-------	-------	20	1.05 *11%*	2.87 *29%*	1.00 *10%*	3.85 *38%*	0.61 *6%*	0.58 *6%*	----- -----
Livermore Water Supply, composite of 2 wells	1940	-------	-------	34	2.25 *11%*	4.51 *22%*	3.70 *17%*	6.16 *31%*	2.11 *11%*	1.56 *8%*	----- -----
Pleasanton Water Supply, composite of 3 wells	1940	-------	-------	26	2.65 *22%*	1.89 *15%*	1.60 *13%*	4.48 *36%*	0.92 *8%*	0.79 *6%*	----- -----
Solano County:											
USDA Well in Sec. 17, T5N, R2E	4/27/31	89.1	2.42	40	3.28 *17%*	2.60 *13%*	3.73 *20%*	6.80 *36%*	2.05 *11%*	0.67 *3%*	0.01 -----
USDA Well in SW¼ Sec. 4, T5N, R2E	5/17/32	65.3	1.31	36	2.49 *19%*	1.65 *13%*	2.39 *18%*	3.95 *30%*	1.55 *12%*	0.93 *7%*	0.11 *1%*
USDA Well in SW¼ Sec. 21, T5N, R2E	5/18/32	90.9	1.06	24	4.36 *22%*	3.15 *16%*	2.34 *12%*	7.20 *37%*	1.55 *8%*	0.76 *4%*	0.29 *1%*
USDA Well in NE¼, Sec. 35, T5N, R3W	5/18/32	44.0	0.65	52	1.14 *13%*	0.98 *11%*	2.26 *26%*	3.05 *35%*	1.25 *14%*	Trace -----	0.08 *1%*
Fairfield Water Supply, composite of 2 wells	-------	-------	-------	26	2.75 *17%*	3.25 *20%*	2.10 *13%*	6.08 *38%*	1.64 *10%*	0.39 *2%*	----- -----

LIST OF ABBREVIATIONS USED IN TABLE 28

Abbreviation	*Name*
DWR	Division of Water Resources.
USDA	United States Department of Agriculture.



(*Chronicle Publishing Company Photo*)

SAN FRANCISCO BAY AND PENINSULA FROM SOUTH

Range in chemical characteristics of ground waters in Alameda Creek Basin is shown in Table 29 by a summary of analyses made in 1940 of four municipal supplies.

TABLE 29

INORGANIC ANALYSES OF GROUND WATERS FROM SUPPLIES OF FOUR MUNICIPALITIES IN ALAMEDA COUNTY

In Milligram Equivalents per Liter

Constituent	Pleasanton	Niles	Centerville	Hayward*
Calcium (Ca)	1.90	4.60	3.20	2.40
Magnesium (Mg)	2.38	2.29	2.46	1.31
Sodium (Na)	0.39	1.52	1.52	7.17
Carbonate (CO_3) + Bicarbonate (HCO_3)	3.47	6.13	4.71	5.94
Chloride (Cl)	0.68	1.63	0.87	4.11
Sulphate (SO_4)	0.52	0.65	1.60	0.83
Total anions	4.67	8.41	7.18	10.88
Percent sodium	8	18	21	66

*The Hayward well is at Alvarado near the mouth of Alameda Creek.

Bicarbonate is the principal acid radical in each of the foregoing waters. Magnesium is the dominant basic ion in the water at Pleasanton, calcium at Niles and Centerville, and sodium at Hayward. The marked increases in sodium and chloride at the Hayward well and its proximity to San Francisco Bay may indicate mild contamination from sea water intrusion.

Chemical characteristics of ground waters north of San Francisco Bay are contrasted in Table 30, which is a summary of analyses made in 1940 of water from three municipal wells. Bicarbonate is the principal anion in each of these waters. Magnesium is the principal base in the waters at Novato and Fairfield, while sodium is strongly dominant at Suisun.

TABLE 30

INORGANIC ANALYSES OF GROUND WATERS FROM THREE MUNICIPAL WELLS NORTH OF SAN FRANCISCO BAY

In Milligram Equivalents per Liter

Constituent	Novato	Fairfield	Suisun
Calcium (Ca)	1.25	2.75	1.70
Magnesium (Mg)	2.95	3.28	0.82
Sodium (Na)	0.00	2.08	8.40
Carbonate (CO_3) + Bicarbonate (HCO_3)	2.17	6.08	7.31
Chloride (Cl)	1.55	1.63	3.05
Sulphate (SO_4)	0.48	0.40	0.56
Total anions	4.20	8.11	10.92
Percent sodium	0	26	77

CHAPTER VI. CENTRAL COASTAL AREA

Both geographically and climatically, the Central Coastal Area is a transition zone between the North Coastal and San Francisco Bay Areas and the South Coastal Area.

LOCATION AND DESCRIPTION

This Area lies along the Pacific Ocean, between latitudes 34½° and 37° N., from the southern boundary of Pescadero Creek Basin, in Santa Cruz County, to the southeastern boundary of Rincon Creek Basin, in Ventura County. Inland it extends an average of about 50 miles to the crests of the coastal ranges.

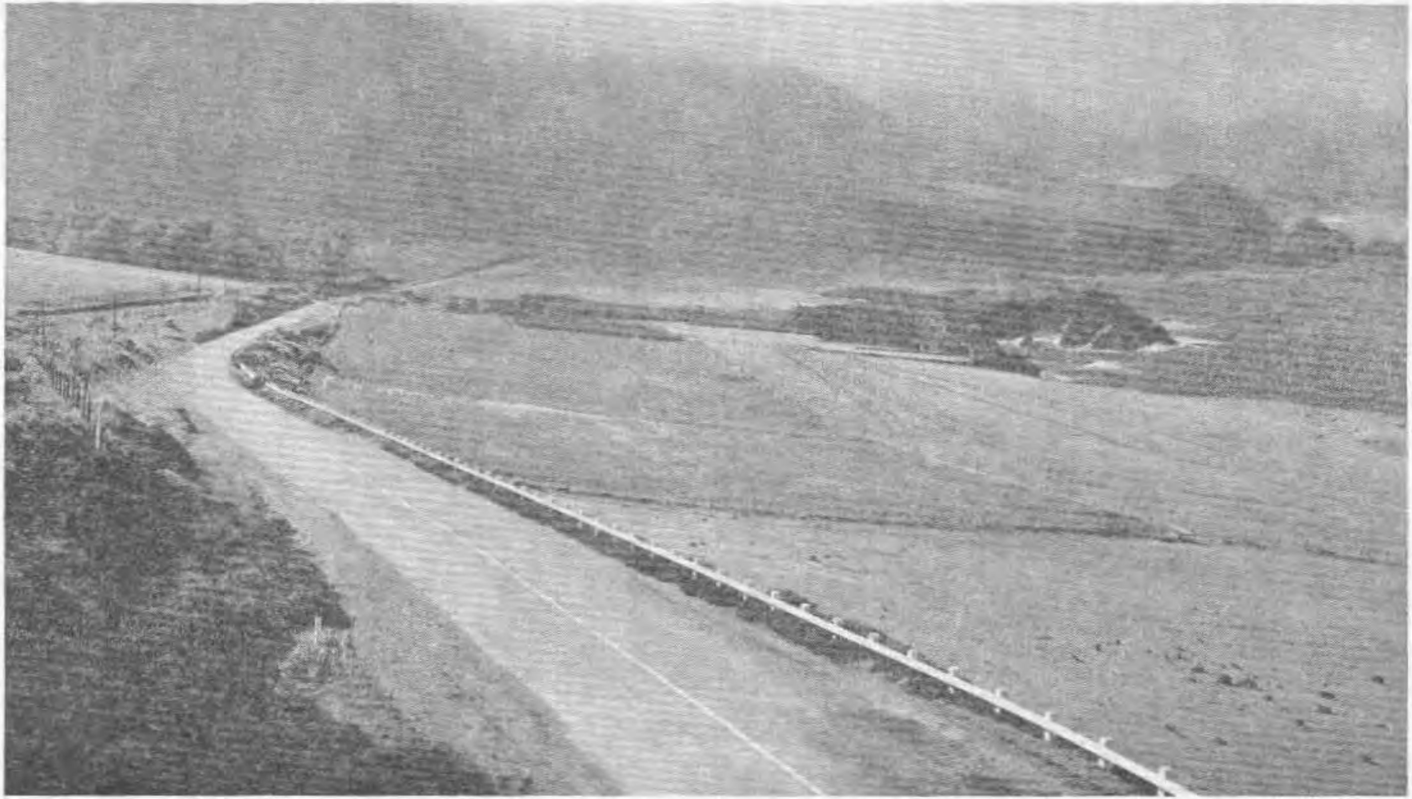
Summer fogs are common along the coastal strip. In interior valleys there is a marked contrast between summer and winter temperatures, with summer highs reaching 110° F. and winter lows occasionally falling to 16° F. Near the coast the Santa Cruz, Santa Lucia, and Santa Ynez Mountains are the main topographic features, with elevations of 3,801 feet at Loma Prieta in the Santa Cruz Mountains, 5,844 feet at Junipero Serra Peak in the Santa Lucia Range, and 6,828 feet at Big Pine Mountain in the San Rafael Range. Elevations in the Diablo Range, on the western side of basins draining interior portions of the Area, are 5,248 feet on San Benito Mountain at the head of San Benito River, and 8,750 feet on Sawmill Mountain at the head of Santa Maria River.

STREAMS AND AREAS OF DRAINAGE BASINS

Principal streams of the Central Coastal Area are Pajaro, Salinas, Santa Maria, and Santa Ynez Rivers, which drain the larger basins to the crests of the Gabilan, Diablo, San Rafael and Santa Ynez Mountains, and San Lorenzo, Carmel, and Big Sur Rivers, and Scott, Morro, San Luis Obispo, Arroyo Grande, San Antonio, and Rincon Creeks, which flow directly into the Pacific Ocean along the coastal slope. Two-fifths of the Area lies within the basin of Salinas River and its tributaries. This basin, about 170 miles long, approximately parallels the coast, from which it is separated by the Santa Lucia Range. Areas of drainage basins in the Central Coastal Area are listed in Table 31.

PRECIPITATION

Precipitation on the Central Coastal Area is moderate except in a few isolated sections, and decreases from north to south. Snow normally falls in limited amounts at higher altitudes but is rare on the valley floors. The definite influence exerted by mountain ranges on precipitation is indicated by greater density of vegetation on their western slopes. Mountains may also affect distribution of precipitation in the interior valleys. For instance, precipitation from major storms crossing Salinas Valley is substantially heavier on the west side of the valley than on the east side.



(Division of Highways Photo)

COASTAL TERRAIN—CENTRAL COASTAL AREA

TABLE 31

AREAS OF DRAINAGE BASINS, CENTRAL COASTAL AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, Central Coastal Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
1	Scott Creek Group	**139**	**10**	**149**
	San Lorenzo River Basin			
2-1	Above gage at Big Trees	109	2	111
2-2	Branciforte Creek above gage at Santa Cruz	15	2	17
2-3	Remainder of San Lorenzo River	6	3	9
	Total, San Lorenzo River	**130**	**7**	**137**
	Soquel Creek Group			
3-1	Soquel Creek above gage at Soquel	39	2	41
3-2	Remainder of Group	41	9	50
	Total, Soquel Creek Group	**80**	**11**	**91**
	Pajaro River Basin			
4-1	San Benito River above gage near Willow Creek School	246	5	251
4-2	Tres Pinos Creek above gage near Tres Pinos	195	13	208
4-3	Pacheco Creek above gage near Dunneville	143	3	146
4-4	Llagas Creek above gage near Gilroy	22	1	23
4-5	Uvas Creek above gage near Morgan Hill	30	0	30
4-6	Remainder of Pajaro River above gage near Chittenden	318	211	529
	Above gage near Chittenden	954	233	1,187
4-7	Remainder of Pajaro River	68	48	116
	Total, Pajaro River	**1,022**	**281**	**1,303**
5	Elkhorn Slough Basin	**42**	**11**	**53**
6	Moro Cojo Group	**6**	**8**	**14**
	Salinas River Basin			
7-1	Above gage at Paso Robles	304	84	388
7-2	Nacimiento River above gage near San Miguel	332	23	355
7-3	San Antonio River above gage at Pleyto	210	73	283
	Remainder of Salinas River above San Lucas damsite:			
7-4	Above Salinas valley floor	1,501	280	1,781
7-5	Salinas valley floor	0	73	73
	Above San Lucas damsite	2,347	533	2,880
7-6	Arroyo Seco above gage near Soledad	240	0	240
	Remainder of Salinas River:			
7-7	Above valley floor—East side	646	20	666
7-8	Above valley floor—West side	246	0	246
7-9	Valley floor	0	369	369
	Total, Salinas River	**3,479**	**922**	**4,401**
8	Canyon Del Rey Group	**65**	**0**	**65**
	Carmel River Basin			
9-1	Above San Clemente Dam	125	0	125
9-2	Remainder of Carmel River	124	5	129
	Total, Carmel River	**249**	**5**	**254**
10	Rocky Creek Group	**65**	**0**	**65**
11	Little Sur River Basin	**40**	**0**	**40**
12	Point Sur Group	**4**	**0**	**4**
13	Sur River Basin	**59**	**0**	**59**

TABLE 31—Continued

AREAS OF DRAINAGE BASINS, CENTRAL COASTAL AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, Central Coastal Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
	Morro Creek Group			
14-1	Steiner Creek above gage near San Luis Obispo	5	0	5
14-2	Remainder of Morro Creek Group	607	58	665
	Total, Morro Creek Group	**612**	**58**	**670**
	Arroyo Grande Basin			
15-1	Above gage at Arroyo Grande	96	6	102
15-2	Remainder of Arroyo Grande	62	26	88
	Total, Arroyo Grande Basin	**158**	**32**	**190**
	Santa Maria River Basin			
16-1	Sisquoc River above gage near Gary	431	7	438
16-2	Cuyama River above gage near Santa Maria	767	136	903
16-3	Alamo Creek above gage near Santa Maria	88	0	88
16-4	Huasna River above gage near Santa Maria	117	0	117
16-5	Remainder of Santa Maria River above gage at Guadalupe	103	69	172
	Above gage at Guadalupe	1,506	212	1,718
16-6	Remainder of Santa Maria River	39	124	163
	Total, Santa Maria River	**1,545**	**336**	**1,881**
	San Antonio Creek Group			
17-1	San Antonio Creek above gage at Harris	99	0	99
17-2	Remainder of San Antonio Creek Group	71	34	105
	Total, San Antonio Creek Group	**170**	**34**	**204**
	Santa Ynez River Basin			
18-1	Above Gibraltar Dam	216	0	216
18-2	From Gibraltar Dam to gage near Lompoc	506	67	613
	Above gage near Lompoc	722	67	789
18-3	Remainder of Santa Ynez River	47	65	112
	Total, Santa Ynez River	**769**	**132**	**901**
19	San Jose Creek Group	**342**	**35**	**377**
20	Soda Lake Basin	**171**	**255**	**426**
	TOTALS, CENTRAL COASTAL AREA	**9,147**	**2,137**	**11,284**

A maximum seasonal precipitation of 123.65 inches was recorded at Boulder Creek, at an elevation of 470 feet in Santa Cruz County, during the season of 1889-1890, while the average at this station is 49.47 inches. A minimum seasonal precipitation of 2.00 inches occurred at the San Bernardo Ranch, at an elevation of 450 feet in Monterey County, during 1897-1898, the average at this station being 11.57 inches.

At the Cold Springs precipitation station, in the Monterey Division of the Los Padres National Forest at an elevation of 3,280 feet, a storage gage is maintained by the United States Forest Service. According to records of this station, a can with capacity of 150 inches overflowed during the season of 1940-41. This was not a standard rain gage.

Eighty-three precipitation stations in the Area have records of ten or more seasons, with Salinas having the longest unbroken record, dating back to 1872. The number of stations is insufficient to cover adequately the 11,284 square miles in the Area. Forty-four stations have continuous recorders. Elevations of precipitation stations with unbroken records of 10 years or longer range from sea level to 3,790 feet. Data relating to stations and precipitation records are given in Tables 32, 33, and 34.

Maximum recorded intensities of rainfall at San Luis Obispo during specified minute and hour periods, as reported by the Weather Bureau, are presented in the following tabulation.

	Minutes					Hours				
	5	10	15	30	60	2	3	6	12	24
Precipitation in inches	0.29	0.43	0.53	0.72	1.07	1.77	2.22	3.15	4.75	5.98
Day, month	2 2	2 2	2 2	2 12	2 12	3 7	3 7	3 7	3 7	3 6
Year	1926	1926	1926	1926	1926	1911	1911	1911	1911	1911

Table 35 presents average monthly precipitation for four stations considered to be representative of the Area with respect to elevation and topographic pattern. Maximum and minimum figures are the extremes for all months during the period of record. Bar diagrams on Plate 13, "Distribution of Precipitation at Selected Stations, Central Coastal Area," show for these stations the monthly distribution of precipitation in maximum and minimum seasons of record. They also show monthly distribution during the season in which total precipitation was nearest to the average seasonal shown in Table 35.

Mean seasonal precipitation on valley and mesa lands of the Central Coastal Area for the period from 1897-98 to 1946-47 is estimated to have been 1,590,000 acre-feet, as shown in Table 36. The largest valley areas lie in lower portions of the Salinas, Santa Maria, and Santa Ynez River Basins and Soda Lake Basin. All these valley areas receive light rainfall. Moderate precipitation occurs in the somewhat smaller valley areas of Pajaro River Basin and of the upper portion of Salinas River Basin and its tributaries.

TABLE 32

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
3-73	Pattiway	Kern	34° 56′ 119° 23′	3,790	1916-17 1946-47	BCD USWB	9.92	9.27	1940-41 1933-34	19.02 3.18
3-37	Abbotts	Monterey	36° 25′ 121° 25′	1,050	1915-16 1942-43	B USWB	19.81	22.43	1926-27 1923-24	29.77 8.69
3-34	Associated Oil No. 6	Monterey	36° 16′ 121° 18′	294	1923-24 1935-36	B AOCo.	9.03	11.36	1934-35 1923-24	13.90 5.87
3-29	Associated Oil No. 7A	Monterey	36° 37′ 121° 34′	83	1923-24 1935-36	B AOCo.	9.79	12.32	1934-35 1933-34	15.44 6.12
3-26	Associated Oil	Monterey	36° 37′ 121° 52′	25	1926-27 1946-47	BD AOCo.	17.02	16.59	1940-41 1930-31	33.03 9.12
3-36	Big Sur	Monterey	36° 15′ 121° 47′	300	1914-15 1946-47	B USWB	39.30	39.60	1940-41 1923-24	77.53 18.87
3-30	Chualar	Monterey	36° 35′ 121° 33′	111	1897-98 1930-31	B Private	12.31	11.26	1906-07 1897-98	23.63 5.28
3-82	Culps	Monterey	36° 26′ 121° 48′	2,000	1914-15 1938-39	B Private	71.07	76.35	1937-38 1930-31	104.45 35.95
3-25	Del Monte	Monterey	36° 36′ 121° 52′	40	1911-12 1946-47	ABCD USWB	15.32	15.45	1940-41 1912-13	30.00 5.68
3-31	Gonzales	Monterey	36° 30′ 121° 27′	127	1899-00 1944-45	BC USWB	11.53	10.84	1906-07 1933-34	22.29 5.58
3-47	Jolon	Monterey	35° 58′ 121° 10′	960	1882-83 1924-25	BC USWB	17.37	16.52	1889-90 1897-98	36.91 5.33
3-38	King City No. 2	Monterey	36° 13′ 121° 08′	320	1886-87 1946-47	ABCD USWB	10.68	10.45	1940-41 1897-98	25.22 3.97
3-39	King City	Monterey	36° 13′ 121° 07′	333	1909-10 1946-47	B SP Mil. Co.	10.19	10.43	1940-41 1912-13	25.49 4.97
3-46	Los Burros	Monterey	35° 52′ 121° 23′	2,700	1895-96 1908-09	BC USWB	47.78	44.08	1900-01 1897-98	66.02 20.66
3-24	Monterey	Monterey	36° 36′ 121° 54′	15	1847-48 1914-15	BC USWB	16.20	16.75	1906-07 1897-98	29.80 6.95
3-48	Parkfield	Monterey	35° 56′ 120° 27′	2,800	1907-08 1946-47	B USWB	14.62	14.36	1940-41 1923-24	28.19 6.05
3-41	Priest Valley	Monterey	36° 12′ 120° 42′	2,240	1898-99 1946-47	BC USWB	19.91	19.57	1940-41 1912-13	38.17 8.66
3-43	Rancho San Lucas	Monterey	36° 03′ 121° 00′	700	1882-83 1946-47	B Private	13.42	13.78	1940-41 1893-94	32.38 4.05
3-22	Salinas	Monterey	36° 41′ 121° 40′	43	1872-73 1946-47	B SP Mil. Co.	13.75	13.59	1889-90 1876-77	27.59 4.74
3-27	Salinas	Monterey	36° 39′ 121° 39′	45	1873-74 1945-46	BC USWB	13.78	13.54	1889-90 1876-77	27.59 4.44
3-45	San Ardo	Monterey	36° 01′ 120° 54′	452	1886-87 1901-02	BC USWB	10.24	9.82	1889-90 1893-94	23.23 3.85
3-44	San Bernardo Rancho	Monterey	36° 03′ 120° 56′	450	1894-95 1946-47	BD Private	11.57	11.66	1940-41 1897-98	26.01 2.00
3-42	San Lucas	Monterey	36° 07′ 120° 56′	407	1922-23 1946-47	BD SP Mil. Co.	9.07	9.67	1940-41 1923-24	21.09 5.04

TABLE 32—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
3-32	Soledad	Monterey	36° 26′ 121° 21′	188	1874-75 1914-15	BCD USWB	9.48	8.56	1889-90 1876-77	18.94 2.65
3-33	Soledad	Monterey	36° 26′ 121° 20′	189	1928-29 1937-38	B SP Mil. Co.	9.27	9.81	1937-38 1932-33	14.44 5.42
3-28	Spreckles	Monterey	36° 37′ 121° 38′	48	1905-06 1944-45	BC USWB	13.25	12.83	1940-41 1912-13	25.58 6.50
3-40	Associated Oil No. 4	San Benito	36° 16′ 120° 50′	1,408	1923-24 1937-38	B AOCo.	13.25	15.27	1934-35 1923-24	21.08 6.54
3-35	Associated Oil No. 5	San Benito	36° 22′ 120° 59′	1,485	1923-24 1935-36	B AOCo.	15.42	18.22	1934-35 1923-24	25.40 8.93
3-20	Button Ranch	San Benito	36° 55′ 121° 23′	285	1924-25 1937-38	B Private	13.79	15.15	1937-38 1933-34	21.39 7.25
3-19	Hollister	San Benito	36° 50′ 121° 24′	284	1874-75 1946-47	B USWB	12.89	13.06	1906-07 1876-77	23.80 4.69
3-21	Rancho Quien Sabe	San Benito	36° 50′ 121° 13′	1,800	1931-32 1946-47	B Private	18.79	18.05	1937-38 1946-47	28.11 10.63
3-18	San Juan Bautista	San Benito	36° 51′ 121° 32′	160	1899-00 1937-38	B Private	15.76	15.62	1937-38 1923-24	25.86 6.78
3-23	Tres Pinos	San Benito	36° 47′ 121° 19′	512	1912-13 1946-47	B LH&GCo.	12.66	12.94	1937-38 1923-24	23.59 5.55
3-66	Arroyo Grande Canyon	San Luis Obispo	35° 12′ 120° 25′	700	1882-83 1918-19	D Private	21.67	20.89	1889-90 1897-98	48.80 7.02
3-55	Ayars Ranch	San Luis Obispo	35° 39′ 120° 48′	1,940	1921-22 1946-47	B Private	23.03	23.60	1940-41 1923-24	47.52 11.88
3-53	Cholame	San Luis Obispo	35° 41′ 120° 12′	2,050	1928-29 1944-45	B Private	11.42	10.80	1940-41 1933-34	22.01 5.35
3-59	Creston	San Luis Obispo	35° 32′ 120° 31′	1,099	1924-25 1938-39	B Private	11.33	11.53	1937-38 1938-39	17.60 6.04
3-58	Ernst Ranch	San Luis Obispo	35° 38′ 120° 37′	950	1923-24 1946-47	BD Private	10.51	10.96	1939-40 1923-24	25.94 5.62
3-54	Hatch Ranch	San Luis Obispo	35° 41′ 120° 12′	2,300	1925-26 1945-46	B Private	10.93	10.85	1940-41 1933-34	20.73 4.61
3-49	Linn Ranch	San Luis Obispo	35° 42′ 120° 43′	880	1925-26 1946-47	B Private	15.29	14.87	1940-41 1938-39	33.90 7.75
3-68	Nipomo	San Luis Obispo	35° 04′ 120° 30′	360	1920-21 1946-47	B Private	15.27	15.24	1940-41 1923-24	31.09 6.53
3-57	Paso Robles	San Luis Obispo	35° 38′ 120° 41′	800	1887-88 1946-47	B USWB	15.95	15.82	1937-38 1897-98	30.69 4.77
3-64	San Luis Obispo	San Luis Obispo	35° 16′ 120° 39′	201	1869-70 1946-47	BCD USWB	21.44	21.68	1940-41 1897-98	42.92 7.20
3-62	San Miguel	San Luis Obispo	35° 45′ 120° 42′	616	1887-88 1914-15	BC USWB	11.84	11.38	1914-15 1897-98	21.37 3.47
3-60	San Miguel	San Luis Obispo	35° 46′ 120° 42′	616	1915-16 1946-47	C SP Mil. Co.	11.44	11.71	1940-41 1923-24	26.08 5.34
3-61	San Miguel Twisselman	San Luis Obispo	35° 45′ 120° 42′	616	1919-20 1938-39	B Private	10.73	11.18	1937-38 1923-24	18.30 5.01

TABLE 32—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
3-62	Santa Margarita	San Luis Obispo	35° 23′ 120° 37′	996	1889-90 1915-16	BC USWB	28.35	27.43	1889-90 1897-98	49.79 8.44
3-63	Santa Margarita	San Luis Obispo	35° 23′ 120° 37′	995	1897-98 1937-38	BD SPCo.	23.20	23.52	1900-01 1923-24	48.82 7.97
3-65	Sinsheimer Brothers	San Luis Obispo	35° 18′ 120° 38′	220	1891-92 1946-47	B Private	22.68	22.80	1940-41 1897-98	47.79 6.60
3-67	Soda Lake	San Luis Obispo	35° 14′ 119° 53′	2,000	1925-26 1946-47	B Private	8.93	8.33	1940-41 1933-34	18.50 5.39
3-56	Templeton, Garrett	San Luis Obispo	35° 33′ 120° 42′	800	1925-26 1946-47	BC Private	18.96	18.17	1940-41 1938-39	38.79 9.33
3-60	Truesdale Ranch	San Luis Obispo	35° 38′ 120° 22′	1,130	1884-85 1938-39	B Private	9.62	9.89	1889-90 1897-98	20.21 3.06
3-61	Von Schroeder	San Luis Obispo	35° 28′ 120° 39′	900	1885-86 1915-16	BC AMWCo.	31.32	30.26	1889-90 1897-98	56.20 8.40
3-1	Pigeon Point Lighthouse	San Mateo	37° 11′ 122° 23′	150	1899-00 1936-37	BC USWB	16.98	17.49	1924-25 1912-13	32.39 7.57
3-69	Betteravia	Santa Barbara	34° 53′ 120° 31′	155	1913-14 1942-43	BC USWB	14.18	13.98	1940-41 1923-24	29.16 6.45
3-79	Gaviota	Santa Barbara	34° 28′ 120° 14′	90	1914-15 1937-38	BD SPCo.	13.82	13.70	1936-37 1923-24	21.55 6.45
3-78	Gibraltar Dam	Santa Barbara	34° 32′ 119° 41′	1,500	1916-17 1946-47	B SBWD	25.89	27.41	1940-41 1923-24	65.70 10.30
3-75	Lompoc	Santa Barbara	34° 39′ 120° 28′	96	1910-11 1946-47	BD SP Mil. Co.	14.77	14.70	1940-41 1923-24	39.58 5.96
3-74	Los Alamos	Santa Barbara	34° 44′ 120° 16′	575	1909-10 1946-47	BCD USWB	15.59	15.58	1940-41 1923-24	35.21 5.38
3-77	Pine Crest	Santa Barbara	34° 31′ 119° 42′	1,000	1898-99 1915-16	BC USWB	27.68	24.00	1910-11 1898-99	45.38 14.22
3-76	San Marcos Pass	Santa Barbara	34° 30′ 119° 50′	2,800	1897-98 1941-42	B SBWD	31.37	30.72	1940-41 1897-98	65.72 7.00
3-81	San Miguel Island	Santa Barbara	34° 03′ 120° 21′	500	1894-95 1920-21	BC USWB	14.04	13.56	1910-11 1897-98	25.49 5.65
3-80	Santa Barbara	Santa Barbara	34° 25′ 119° 43′	116	1867-68 1946-47	ABCD USWB	18.21	18.56	1940-41 1876-77	45.21 4.49
3-70	Santa Maria	Santa Barbara	34° 57′ 120° 28′	217	1885-86 1946-47	BC USWB	14.35	14.35	1940-41 1897-98	30.64 5.69
3-71	Santa Maria	Santa Barbara	34° 57′ 120° 27′	210	1913-14 1938-39	B SP Mil. Co.	12.50	12.77	1914-15 1933-34	21.14 5.75
3-72	Sisquoc Ranch	Santa Barbara	34° 51′ 120° 18′	600	1904-05 1914-15	BC USWB	20.23	16.28	1908-09 1912-13	34.52 6.44
3-10	Creekside	Santa Clara	37° 04′ 121° 42′	400	1907-08 1946-47	B Private	29.39	29.43	1913-14 1923-24	55.61 9.61
3-11	Cushing Ranch	Santa Clara	37° 02′ 121° 41′	375	1928-29 1937-38	B Private	27.79	30.21	1937-38 1930-31	46.60 14.56
3-14	Gilroy	Santa Clara	37° 00′ 121° 33′	193	1874-75 1914-15	BC USWB	20.07	19.10	1889-90 1876-77	37.75 6.53

TABLE 32—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
3-13	Gilroy, Wentz	Santa Clara	37° 00′ 121° 34′	205	1894-95 1946-47	BC Private	19.72	19.63	1940-41 1923-24	34.74 7.54
3-12	Morgan Hill, Edes	Santa Clara	37° 08′ 121° 39′	392	1924-25 1937-38	B Private	18.88	19.90	1937-38 1930-31	34.55 11.70
3-16	Aptos	Santa Cruz	36° 59′ 121° 54′	102	1885-86 1914-15	BC USWB	28.12	26.72	1889-90 1897-98	49.07 11.51
3-5	Ben Lomond	Santa Cruz	37° 05′ 122° 06′	500	1899-00 1946-47	AB USWB	55.92	49.59	1940-41 1938-39	100.18 27.67
3-2	Big Creek No. 2	Santa Cruz	37° 05′ 122° 13′	1,230	1897-98 1946-47	BC CCG&E	41.26	41.68	1940-41 1897-98	74.40 16.92
3-3	Boulder Creek	Santa Cruz	37° 08′ 122° 07′	470	1888-89 1931-32	BC USWB	49.47	50.32	1889-90 1923-24	123.65 20.15
3-4	Brookdale, Booth	Santa Cruz	37° 06′ 122° 06′	550	1924-25 1937-38	B Private	47.14	50.83	1937-38 1930-31	80.58 24.64
3-6	Felton	Santa Cruz	37° 03′ 122° 04′	275	1888-89 1937-38	BC USWB	43.95	44.21	1889-90 1917-18	100.64 19.26
3-7	Laurel	Santa Cruz	37° 07′ 121° 58′	910	1891-92 1936-37	BC USWB	49.02	48.08	1913-14 1917-18	75.24 19.32
3-15	Santa Cruz	Santa Cruz	36° 58′ 122° 01′	20	1878-79 1946-47	B USWB	27.86	28.24	1940-41 1923-24	61.62 10.85
3-9	Selleck Ranch	Santa Cruz	37° 01′ 121° 48′	297	1918-19 1946-47	B Private	29.61	32.70	1940-41 1923-24	59.30 10.90
3-8	Soquel Creek	Santa Cruz	37° 03′ 121° 56′	330	1929-30 1946-47	B Private	36.09	32.79	1940-41 1930-31	69.90 19.05
3-17	Watsonville	Santa Cruz	36° 55′ 121° 45′	23	1880-81 1946-47	BC USWB	21.02	20.82	1889-90 1923-24	44.90 8.11
3-83	Ozena	Ventura	34° 41′ 119° 20′	3,700	1904-05 1946-47	BCD USWB	14.10	13.40	1940-41 1933-34	32.60 6.01

ABBREVIATIONS—CENTRAL COASTAL AREA

TYPE OF RECORD

Abbreviation	*Name*	*Abbreviation*	*Name*
A	Hourly	C	Monthly
B	Daily	D	Seasonal

SOURCE OF RECORD

Abbreviation	*Name*
AMW Co.	Atascadero Mutual Water Co.
A O Co.	Associated Oil Co.
CCG&E	Coast Counties Gas and Electric Co.
LH&G Co.	Lathrop Hay and Grain Co.
SBWD	Santa Barbara Water Department
SP Co.	Southern Pacific Co.
SP Mil. Co.	Southern Pacific Milling Co.
USWB	United States Weather Bureau

TABLE 33

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, CENTRAL COASTAL AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
3-009	Bryson (near)	Monterey	35° 48′ 121° 05′	870	July 46 June 47	USWB
3-25*	Del Monte	Monterey	36° 36′ 121° 52′	40	July 28 June 47	USWB
3-016	Gonzales (near)	Monterey	36° 33′ 121° 18′	2,350	Nov. 43 June 47	USWB
3-38*	King City No. 2	Monterey	36° 13′ 121° 08′	320	Nov. 38 June 47	State Div. of Forestry
3-018	Lockwood (near)	Monterey	35° 58′ 121° 05′	1,104	May 40 June 47	USWB
3-022	Lucia (near)	Monterey	35° 53′ 121° 27′	375	May 41 June 47	USWB
3-025	Parkfield (near) No. 3	Monterey	35° 59′ 120° 27′	3,600	Feb. 43 June 47	USWB
3-029	Slack Creek No. 2	Monterey	36° 04′ 120° 39′	1,950	Nov. 43 June 47	USWB
3-030	Talbott Ranch	Monterey	36° 14′ 121° 29′	780	Sept. 44 June 47	USWB
3-031	Valleton (near)	Monterey	35° 53′ 120° 42′	950	Nov. 43 June 47	USWB
3-033	Buena Vista	San Benito	36° 46′ 121° 11′	1,640	July 43 June 47	USWB
3-037	Hernandez (near) No. 2	San Benito	36° 18′ 120° 42′	2,770	Dec. 39 June 47	USWB
3-038	Hollister No. 2	San Benito	36° 51′ 121° 24′	300	Nov. 38 June 47	USWB
3-043	San Benito (near)	San Benito	36° 31′ 121° 05′	1,360	Jan. 40 June 47	USWB
3-044	San Juan Bautista (near) No. 2	San Benito	36° 49′ 121° 31′	550	Nov. 43 June 47	USWB
3-047	Upper Tres Pinos	San Benito	36° 38′ 121° 02′	2,190	Jan. 40 June 47	PGE
3-053	Cholame (near)	San Luis Obispo	35° 41′ 120° 12′	1,975	May 40 June 47	USWB
3-063	Huasna	San Luis Obispo	35° 08′ 120° 24′	770	May 40 June 47	USWB
3-064	La Panza	San Luis Obispo	35° 22′ 120° 14′	1,900	May 40 June 47	USWB
3-067	Paso Robles (near)	San Luis Obispo	35° 40′ 120° 45′	1,325	Nov. 38 June 47	USWB
3-070	Pozo Guard Station	San Luis Obispo	35° 18′ 120° 23′	1,450	Feb. 43 Oct. 45	USED
3-072	San Luis Obispo	San Luis Obispo	35° 18′ 120° 40′	300	Dec. 37 June 47	Cal. St. Pol. Col
3-088	Cuyama Ranger Station	Santa Barbara	34° 52′ 119° 29′	2,750	Mar. 40 June 47	USFS
3-089	Figueroa Lookout	Santa Barbara	34° 45′ 119° 59′	4,480	Oct. 46 June 47	USFS
3-090	Figueroa Mt.	Santa Barbara	34° 44′ 120° 01′	3,150	Mar. 40 June 47	USFS
3-092	Horse Canyon	Santa Barbara	34° 37′ 119° 51′	1,550	Feb. 46 June 47	USED
3-095	Manzanita Mt.	Santa Barbara	34° 54′ 120° 05′	3,125	Nov. 46 June 47	USED
3-80*	Santa Barbara	Santa Barbara	34° 25′ 119° 43′	116	May 40 June 47	USWB
3-097	Santa Barbara Potrero	Santa Barbara	34° 47′ 119° 39′	5,200	Jan. 46 June 47	USED
3-099	Santa Maria (Hancock Field)	Santa Barbara	34° 56′ 120° 25′	234	May 40 June 47	USWB
3-0103	Santa Ynez (near)	Santa Barbara	34° 36′ 120° 05′	600	Dec. 38 June 47	USWB

TABLE 33—Continued

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, CENTRAL COASTAL AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
3-0104	Sisquoc (South Fork Camp)	Santa Barbara	34° 46′ 119° 46′	2,500	Feb. 46 June 47	USED
3-0106	Surf	Santa Barbara	34° 41′ 120° 36′	50	May 40 Feb. 47	USWB
3-0108	Wasioja	Santa Barbara	34° 57′ 119° 50′	2,500	May 40 June 47	USWB
3-0109	West Big Pine Lookout	Santa Barbara	34° 42′ 119° 40′	6,500	Oct. 46 April 47	USFS
3-0110	Curipamba	Santa Clara	36° 59′ 121° 41′	1,582	Oct. 43 Nov. 45	USWB
3-0112	Morgan Hill (near) No. 1	Santa Clara	37° 08′ 121° 48′	800	Dec. 44 June 47	USWB
3-0113	San Felipe (near)	Santa Clara	37° 02′ 121° 19′	425	Nov. 43 June 47	USWB
3-5*	Ben Lomond	Santa Cruz	37° 05′ 122° 06′	500	April 37 June 47	USWB
3-0118	Boulder Creek (near) No. 1	Santa Cruz	37° 08′ 122° 12′	2,200	May 40 June 47	USWB
3-0123	Corralitos (near)	Santa Cruz	36° 59′ 121° 49′	750	Dec. 35 June 47	USWB
3-0126	Highland Park	Santa Cruz	37° 03′ 121° 48′	1,350	Jan. 40 June 47	USWB
3-0137	Watsonville (near)	Santa Cruz	36° 53′ 121° 48′	65	Jan. 40 June 47	USWB
3-0140	Apache Camp	Ventura	34° 52′ 119° 21′	4,600	Mar. 40 June 47	USWB

SOURCE OF RECORD

Abbreviation	*Name*
USWB	United States Weather Bureau
PGE	Pacific Gas & Electric Co.
USED	United States Corps of Engineers
USFS	United States Forest Service
State Div. of Forestry	Division of Forestry, California Department of Natural Resources
Cal. St. Pol. Col.	California State Polytechnic College

TABLE 34

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
3-001	Associated Oil No. 3H	Monterey	36° 11′ 120° 43′	2,291	1923-30	B
3-002	Associated Oil No. 3 HA	Monterey	36° 14′ 120° 47′	1,770	1923-30	B
3-003	Associated Oil No. 5 H	Monterey	36° 21′ 121° 12′	239	1923-30	B
3-004	Associated Oil No. 6 H	Monterey	36° 27′ 121° 22′	166	1923-30	B
3-005	Associated Oil No. 7	Monterey	36° 31′ 121° 28′	117	1923-33	B
3-006	Associated Oil No. 8	Monterey	36° 38′ 121° 41′	41	1924-31	B
3-007	Associated Oil No. 8 H	Monterey	36° 34′ 121° 47′	390	1923-31	B
3-008	Bradley	Monterey	35° 52′ 120° 48′	500	1899-1900	B
3-009	Bryson (near)	Monterey	35° 48′ 121° 05′	870	1946-47	A
3-010	Carmel Valley	Monterey	36° 32′ 121° 50′	400	1926-31	B
3-011	Castroville	Monterey	36° 46′ 121° 46′	25	1931-39	B
3-012	Castroville	Monterey	36° 46′ 121° 47′	17	1897-1900	B
3-013	Chews Ridge	Monterey	36° 19′ 121° 34′	5,045	1940	A
3-014	Fordham Farms	Monterey	36° 12′ 121° 05′	300	1931-32	B
3-015	Fort Romie No. 1	Monterey	36° 24′ 121° 21′	200	1897-1900	B
3-016	Gonzales (near)	Monterey	36° 33′ 121° 18′	2,350	1943-47	A
3-017	Ives	Monterey	36° 55′ 121° 50′	80	1940-43	A
3-018	Lockwood (near)	Monterey	35° 58′ 121° 05′	1,104	1940-47	A
3-019	Los Burros Mine	Monterey	35° 52′ 121° 23′	2,700	1909-10	B
3-020	Los Burros	Monterey	35° 52′ 121° 23′	862	1940-41	A
3-021	Los Vaqueros	Monterey	36° 26′ 121° 36′	700	1909-10	B
3-022	Lucia (near)	Monterey	35° 53′ 121° 27′	375	1941-47	A
3-023	Pajaro	Monterey	36° 53′ 121° 45′	31	1897-99	B
3-024	Parkfield (near) No. 2	Monterey	35° 57′ 120° 25′	2,930	1940-43	A
3-025	Parkfield (near) No. 3	Monterey	35° 59′ 120° 27′	3,600	1943-47	A
3-026	Rancho Los Coches	Monterey	36° 24′ 121° 17′	200	1925-28	B
3-027	River Ranch	Monterey	36° 38′ 121° 42′	40	1925-28	B
3-028	San Lucas	Monterey	36° 08′ 121° 01′	500	1898-1900	B
3-029	Slack Creek No. 2	Monterey	36° 04′ 120° 39′	1,950	1943-47	A
3-030	Talbott Ranch	Monterey	36° 14′ 121° 29′	780	1944-47	A
3-031	Valleton (near)	Monterey	35° 53′ 120° 42′	950	1943-47	A
3-032	Associated Oil No. 4H	San Benito	36° 19′ 120° 55′	1,005	1923-30	B

TABLE 34—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
3-033	Buena Vista	San Benito	36° 46′ 121° 11′	1,640	1943-47	A
3-034	Fremont Peak	San Benito	36° 46′ 121° 29′	2,500	1940-41	A
3-035	Hernandez	San Benito	36° 22′ 120° 48′	2,500	1914-15	B
3-036	Hernandez (near)	San Benito	36° 18′ 120° 47′	4,000	1940-42	A
3-037	Hernandez (near) No. 2	San Benito	36° 18′ 120° 42′	2,770	1939-47	A
3-038	Hollister No. 2	San Benito	36° 51′ 121° 24′	300	1938-47	A
3-039	Hollister	San Benito	36° 52′ 121° 24′	300	1930-31	B
3-040	Paicines (near)	San Benito	36° 44′ 121° 22′	920	1942-47	B
3-041	Panoche Store	San Benito	36° 36′ 120° 50′	1,265	1914-15	B
3-042	Pinnacles	San Benito	36° 28′ 121° 11′	1,389	1936-38	B
3-043	San Benito (near)	San Benito	36° 31′ 121° 05′	1,360	1940-47	A
3-044	San Juan Bautista (near) No. 2	San Benito	36° 49′ 121° 31′	550	1943-47	A
3-045	Tequisquito Rancho	San Benito	36° 51′ 121° 24′	200	1899-1902 1905-06	B
3-046	Tres Pinos	San Benito	36° 47′ 121° 19′	500	1898-99	B
3-047	Upper Tres Pinos	San Benito	36° 38′ 121° 02′	2,190	1940-47	A
3-048	Atascadero (Atascadero Mutual Water Co.)	San Luis Obispo	35° 29′ 120° 40′	831	1915-17	B
3-049	Atascadero Sub Station	San Luis Obispo	35° 29′ 120° 40′	860	1934-39	B
3-050	Avila	San Luis Obispo	35° 11′ 120° 44′	115	1930-39	B
3-051	Cambria	San Luis Obispo	35° 34′ 121° 04′	100	1904-06	B
3-052	Camp No. 5	San Luis Obispo	35° 28′ 120° 41′	1,000	1914-17	B
3-053	Cholame (near)	San Luis Obispo	35° 41′ 120° 12′	1,975	1940-47	A
3-054	Corral	San Luis Obispo	35° 28′ 120° 41′	1,225	1914-15	B
3-055	Eagle	San Luis Obispo	35° 28′ 120° 38′	880	1914-16	B
3-056	Edna	San Luis Obispo	35° 12′ 120° 37′	400	1930-39	D
3-057	Ernst Ranch	San Luis Obispo	35° 39′ 120° 37′	900	1918-20	B
3-058	Estero	San Luis Obispo	35° 25′ 120° 52′	25	1929-32	B
3-059	Estrada	San Luis Obispo	35° 31′ 120° 40′	900	1914-16	B
3-060	Garcias	San Luis Obispo	35° 31′ 120° 42′	850	1914-16	B
3-061	Hepburn Well	San Luis Obispo	35° 26′ 120° 38′	1,025	1914-16	B
3-062	Hill Ranch	San Luis Obispo	35° 44′ 120° 39′	800	1897-1900	B
3-063	Huasna	San Luis Obispo	35° 08′ 120° 24′	770	1940-47	A

TABLE 34—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
3-064	La Panza	San Luis Obispo	35° 22′ 120° 14′	1,900	1940-47	A
3-065	Nipomo	San Luis Obispo	35° 02′ 120° 29′	300	1896-97	B
3-066	Oceana	San Luis Obispo	35° 06′ 120° 37′	30	1897-1900	B
3-067	Paso Robles (near)	San Luis Obispo	35° 40′ 120° 45′	1,325	1938-47	A
3-068	Paso Robles (State Forest)	San Luis Obispo	35° 37′ 120° 41′	700	1940-47	B
3-069	Point Piedras Blancas	San Luis Obispo	35° 40′ 121° 17′	50	1940-47	A
3-070	Poso Guard Station	San Luis Obispo	35° 18′ 120° 23′	1,450	1943-45	A
3-071	Sandy	San Luis Obispo	35° 30′ 120° 40′	830	1913-14	D
3-072	San Luis Obispo	San Luis Obispo	35° 18′ 120° 40′	300	1937-47	A
3-073	San Luis Obispo (State Forest)	San Luis Obispo	35° 22′ 120° 41′	1,500	1940-47	B
3-074	San Luis Obispo Substation	San Luis Obispo	35° 16′ 120° 38′	260	1935-38	B
3-075	Santa Margarita (Atascadero Mutual Water Co.)	San Luis Obispo	35° 24′ 120° 36′	1,000	1913-14	D
3-076	Santa Margarita (Union Oil Co.)	San Luis Obispo	35° 24′ 120° 37′	974	1930-39	B
3-077	Shafter	San Luis Obispo	35° 27′ 120° 41′	1,700	1914-16	B
3-078	Shandon (Standard Oil)	San Luis Obispo	35° 40′ 120° 20′	1,056	1935-38	B
3-079	Shandon (Union Oil Co.)	San Luis Obispo	35° 41′ 120° 20′	1,091	1931-39	B
3-080	Shandon (White)	San Luis Obispo	35° 42′ 120° 23′	1,900	1931-39	B
3-081	Squirrel	San Luis Obispo	35° 28′ 120° 42′	990	1914-16	B
3-082	Summit (Atascadero Mutual Water Co.)	San Luis Obispo	35° 26′ 120° 43′	1,750	1915-16	B
3-083	Summit (Union Oil Co.)	San Luis Obispo	35° 04′ 120° 31′	395	1930-33 1937-39	B
3-084	Summer Flat	San Luis Obispo	35° 26′ 120° 37′	960	1914-16	B
3-085	Tank Farm	San Luis Obispo	35° 14′ 120° 39′	118	1931-39	B
3-086	Willow Creek	San Luis Obispo	35° 36′ 120° 39′	1,200	1934-42	B
3-087	Castle Pinckey	Santa Barbara	34° 26′ 119° 48′	550	1896-98	B
3-088	Cuyama Ranger Station	Santa Barbara	34° 52′ 119° 29′	2,750	1940-47	A
3-089	Figueroa Lookout	Santa Barbara	34° 45′ 119° 59′	4,480	1946-47	A
3-090	Figueroa Mt.	Santa Barbara	34° 44′ 120° 01′	3,150	1940-47	A
3-091	Guadalupe	Santa Barbara	34° 58′ 120° 34′	85	1930-39	B
3-092	Horse Canyon	Santa Barbara	34° 37′ 119° 51′	1,550	1946-47	A
3-093	Juncal Dam	Santa Barbara	34° 29′ 119° 31′	2,200	1931-32	B
3-094	Los Olivos	Santa Barbara	34° 40′ 120° 06′	800	1896-97	B
3-095	Manzanita Mt.	Santa Barbara	34° 54′ 120° 05′	3,125	1946-47	A

TABLE 34—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
3-096	Orcutt	Santa Barbara	34° 52° 120° 27′	320	1931-39	B
3-097	Santa Barbara (Potrero)	Santa Barbara	34° 47′ 119° 39′	5,200	1946-47	A
3-098	Santa Maria (Airport)	Santa Barbara	34° 54′ 120° 27′	235	1943-45	A
3-099	Santa Maria (Hancock Field)	Santa Barbara	34° 56′ 120° 25′	234	1940-47	A
3-0100	Santa Maria (Substation)	Santa Barbara	34° 57′ 120° 27′	202	1935-39	B
3-0101	Santa Maria (Union Oil Co.)	Santa Barbara	34° 56′ 120° 24′	215	1937-39	B
3-0102	Santa Maria No. 2	Santa Barbara	34° 56′ 120° 25′	200	1940-42	A
3-0103	Santa Ynez (near)	Santa Barbara	34° 36′ 120° 05′	600	1938-47	A
3-0104	Sisquoc (South Fork Camp)	Santa Barbara	34° 46′ 119° 46′	2,500	1946-47	A
3-0105	South Portal	Santa Barbara	34° 28′ 119° 42′	1,200	1928-32	B
3-0106	Surf	Santa Barbara	34° 41′ 120° 36′	50	1940-47	A
3-0107	Surf (Standard Oil)	Santa Barbara	34° 41′ 120° 36′	50	1897-98 1932-39	B
3-0108	Wasioja	Santa Barbara	34° 57′ 119° 50′	2,500	1940-47	A
3-0109	West Big Pine Lookout	Santa Barbara	34° 42′ 119° 40′	6,500	1946-47	A
3-0110	Curipamba	Santa Clara	36° 59′ 121° 41′	1,582	1943-45	A
3-0111	Little Uvas	Santa Clara	37° 06′ 121° 45′	700	1929-39	B
3-0112	Morgan Hill (near) No. 1	Santa Clara	37° 08′ 121° 48′	800	1944-47	A
3-0113	San Felipe (near)	Santa Clara	37° 02′ 121° 19′	425	1943-47	A
3-0114	Badger Camp	Santa Cruz	37° 05′ 121° 55′	750	1938-40	B
3-0115	Bear Creek Dam Site	Santa Cruz	37° 08′ 122° 06′	600	1940-41	B
3-0116	Ben Lomond Mountain	Santa Cruz	37° 03′ 122° 06′	1,600	1921-22	B
3-0117	Bonnie Doon	Santa Cruz	37° 02′ 122° 09′	1,200	1921-22	B
3-0118	Boulder Creek (near) No. 1	Santa Cruz	37° 08′ 122° 12′	2,200	1940-47	A
3-0119	Branciforte	Santa Cruz	37° 01′ 122° 01′	500	1922	B
3-0120	Brookdale (Schmaher)	Santa Cruz	37° 06′ 122° 07′	430	1934-39	B
3-0121	Camp McQuaide	Santa Cruz	36° 54′ 121° 50′	100	1943-44	A
3-0122	Capitola	Santa Cruz	36° 59′ 121° 57′	50	1898-1900	B
3-0123	Corralitos (near)	Santa Cruz	36° 59′ 121° 49′	750	1935-47	Broken Record A
3-0124	Davenport	Santa Cruz	37° 03′ 123° 13′	25	1936-38	B
3-0125	Glenwood	Santa Cruz	37° 07′ 121° 59′	885	1898-00 1909-15	B
3-0126	Highland Park	Santa Cruz	37° 03′ 121° 48′	1,350	1940-47	A
3-0127	Hoover Ranch	Santa Cruz	37° 06′ 122° 06′	700	1923-31	B

TABLE 34—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
3-0128	Laguna Canyon	Santa Cruz	37° 01′ 122° 08′	750	1921-22	B
3-0129	Laurel (Dodge)	Santa Cruz	37° 07′ 121° 58′	1,120	1931-39	B
3-0130	Mount Madam	Santa Cruz	37° 01′ 121° 43′	1,800	1945-47	A
3-0131	Santa Cruz (Burton)	Santa Cruz	36° 58′ 122° 02′	50	1931-39	B
3-0132	Santa Cruz (City Hall)	Santa Cruz	36° 59′ 122° 02′	50	1921-22	B
3-0133	Saratoga Summit	Santa Cruz	37° 15′ 122° 07′	2,600	1936-41	B
3-0134	Soquel (Mullens)	Santa Cruz	36° 59′ 121° 57′	100	1932-38	B
3-0135	Soquel (Sheppa)	Santa Cruz	37° 00′ 121° 57′	60	1931-39	B
3-0136	Sunset Beach	Santa Cruz	36° 54′ 121° 50′	100	1945	A
3-0137	Watsonville (near)	Santa Cruz	36° 53′ 121° 48′	65	1940-47	A
3-0138	Watsonville Junction	Santa Cruz	36° 54′ 121° 45′	20	1933-39	B
3-0139	West Branch Soquel Creek	Santa Cruz	37° 04′ 121° 56′	300	1936-39	B
3-0140	Apache Camp	Ventura	34° 52′ 119° 21′	4,600	1940-47	A
3-0141	Frazier Mine	Ventura	34° 46′ 119° 03′	7,200	1896-98 1926-28	B, D

TYPE OF RECORD

Abbreviation	*Name*
A	Hourly
B	Daily
C	Monthly
D	Seasonal

TABLE 35

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATION IN EACH MONTH FOR THE PERIOD OF RECORD, AT FOUR STATIONS, CENTRAL COASTAL AREA

In Inches

Month	King City, Monterey County Number on Plate 3: 3-38			San Luis Obispo, San Luis Obispo County Number on Plate 3: 3-64			Santa Barbara, Santa Barbara County Number on Plate 3: 3-80			Santa Cruz, Santa Cruz County Number on Plate 3: 3-15		
	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum
July	Trace	0.22	0.00	Trace	0.14	0.00	0.02	0.40	0.00	0.03	0.53	0.00
August	Trace	0.22	0.00	0.03	0.91	0.00	0.03	0.70	0.00	0.03	0.73	0.00
September	0.17	2.01	0.00	0.22	3.54	0.00	0.31	7.15	0.00	0.49	6.60	0.00
October	0.38	4.17	0.00	0.87	9.19	0.00	0.74	8.65	0.00	1.40	9.50	0.00
November	0.91	6.33	0.00	1.73	12.90	0.00	1.39	9.84	0.00	2.67	10.25	0.00
December	1.81	8.07	0.00	4.02	14.39	0.00	3.38	12.67	0.00	5.32	20.38	0.30
January	2.33	8.43	0.03	4.79	18.25	0.05	4.01	17.22	Trace	5.77	19.90	0.61
February	2.26	13.79	0.00	4.25	12.04	0.00	3.84	11.96	0.00	5.21	14.74	0.25
March	1.88	8.90	0.00	3.44	12.41	0.00	2.91	11.71	0.00	4.09	11.06	0.00
April	0.61	3.62	0.00	1.46	8.78	0.00	1.16	6.13	0.00	1.85	7.66	0.00
May	0.25	1.53	0.00	0.52	4.22	0.00	0.40	2.79	0.00	0.97	5.55	0.00
June	0.05	1.00	0.00	0.13	2.26	0.00	0.09	1.62	0.00	0.23	2.48	0.00
SEASONAL TOTALS	10.65	--------	--------	21.46	--------	--------	18.28	--------	--------	28.06	--------	--------

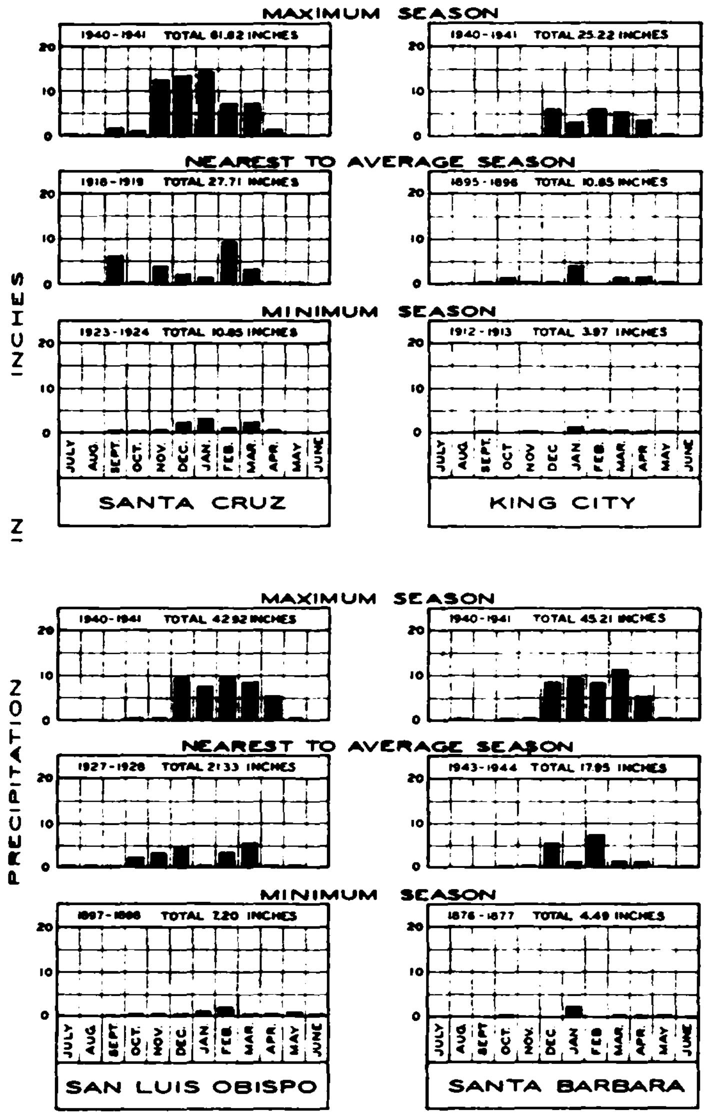
TABLE 36

ESTIMATED MEAN SEASONAL PRECIPITATION ON VALLEY AND MESA LANDS 1897-98 TO 1946-47

CENTRAL COASTAL AREA

Number on Plate 2	Stream or stream group basin	Precipitation in acre-feet
1	Scott Creek Group	12,800
	San Lorenzo River Basin	
2–1	Above gage at Big Trees	4,500
2–2	Branciforte Creek above gage at Santa Cruz	3,900
2–3	Remainder of San Lorenzo River	4,600
	Soquel Creek Group	
3–1	Soquel Creek above gage at Soquel	3,200
3–2	Remainder of Group	13,000
	Pajaro River Basin	
4–1	San Benito River above gage near Willow Creek School	4,500
4–2	Tres Pinos Creek above gage near Tres Pinos	11,800
4–3	Pacheco Creek above gage near Dunneville	2,900
4–4	Llagas Creek above gage near Gilroy	1,200
4–6	Remainder of Pajaro River above gage near Chittenden (below gage near Morgan Hill on Uvas Creek)	191,000
4–7	Remainder of Pajaro River	53,800
5	Elkhorn Slough Basin	9,400
6	Moro Cojo Group	6,400
	Salinas River Basin	
7–1	Above gage at Paso Robles	98,600
7–2	Nacimiento River above gage near San Miguel	22,100
7–3	San Antonio River above gage at Pleyto	62,300
	Remainder of Salinas River above San Lucas damsite:	
7–4	Above Salinas valley floor	164,000
7–5	Salinas valley floor	42,800
	Remainder of Salinas River (below gage near Soledad on Arroyo Seco):	
7–7	Above valley floor—East side	17,100
7–9	Valley floor	216,000
	Carmel River Basin	
9–2	Remainder of Carmel River (below San Clemente Dam)	5,300
	Morro Creek Group	
14–2	Remainder of Morro Creek Group (less Steiner Creek above gage near San Luis Obispo)	61,900
	Arroyo Grande Basin	
15–1	Above gage at Arroyo Grande	6,100
15–2	Remainder of Arroyo Grande	22,200
	Santa Maria River Basin	
16–1	Sisquoc River above gage near Gary	6,300
16–2	Cuyama River above gage near Santa Maria	87,000
16–5	Remainder of Santa Maria River above gage at Guadalupe (below gages on Alamo Creek and Huasna River)	58,900
16–6	Remainder of Santa Maria River	92,600
	San Antonio Creek Group	
17–2	Remainder of San Antonio Creek Group (less San Antonio Creek above gage at Harris)	23,600
	Santa Ynez River Basin	
18–2	From Gibraltar Dam to gage at Lompoc	57,200
18–3	Remainder of Santa Ynez River	48,500
19	San Jose Creek Group	35,500
20	Soda Lake Basin	136,000
	TOTAL, CENTRAL COASTAL AREA	1,587,000

PLATE 13



DISTRIBUTION OF PRECIPITATION AT SELECTED STATIONS

CENTRAL COASTAL AREA

RUNOFF

Estimated mean seasonal natural runoff of the Central Coastal Area for the 53-year period from 1894-95 to 1946-47 is 2,448,000 acre-feet, or 3.4 percent of total surface runoff from mountain and foothill lands within the State. The minimum seasonal runoff in the amount of 250,000 acre-feet occurred in 1923-24, and the maximum, totaling 7,490,000 acre-feet, in 1940-41. The 10-year period from 1923-24 to 1932-33 was the driest of record in the Area. Runoff during each season of that period, except 1926-27 and 1931-32, was less than the 53-year mean, and the average was only 54.5 percent of this long-time mean.

Runoff from the Central Coastal Area is derived almost entirely from rain. Approximately 80 percent of runoff occurs during the four months from January to April, and over 50 percent in February and March. Monthly runoff varies from less than 1 percent of the seasonal total during each of the months from July to October, inclusive, to almost 30 percent in the maximum month, usually in late winter.

Forty-three stream gaging stations were being maintained in the Central Coastal Area by the United States Geological Survey, as of September 30, 1947. The longest unbroken record available, that for the Arroyo Seco, began in November, 1901. Principal stations presently maintained are:

Station	*Drainage area in square miles*
Santa Ynez River near Lompoc	789
San Lorenzo River at Big Trees	111
Santa Maria River at Guadalupe	1,718
Arroyo Grande at Arroyo Grande	102
Salinas River near Spreckels	4,231
Pajaro River near Chittenden	1,187

Runoff from 8,138 of the 11,284 square miles in the Area is measured at the six principal stations. Of the other 37 stations now being maintained by the Geological Survey, 32 are upstream from the principal stations, and measure runoff of tributaries or portions of main stream drainage areas. The other five stations and several additional stations of other agencies measure runoff from minor basins. Stream gaging stations are listed in Table 37, together with average, maximum, and minimum seasonal runoff for stations with records of 10 years or longer.

Estimated mean seasonal natural runoff from the Area, by basins, subbasins, and stream groups for the 53-year period from 1894-95 to 1946-47 is set out in Table 38. Of the mean seasonal total of 2,448,000 acre-feet for the Area, 988,000 acre-feet was estimated by the empirical formula given in Chapter III. Estimates of seasonal natural runoff at main-stream and tributary gaging stations for which partial records are available appear in Table 39. Among many records from sources other than the United States Geological Survey used in computing and estimating natural flows were those for Soquel Creek obtained from the Monterey Bay Redwood Company, for Llagas Creek obtained from the South Santa Clara Valley Water Conservation District, and for Carmel River obtained from the California Water and Telephone Company.

Estimated average monthly distribution of runoff to be expected of a typical stream in the Central Coastal Area is indicated in the following tabulation:

AVERAGE MONTHLY DISTRIBUTION OF AVERAGE SEASONAL RUNOFF, ARROYO SECO NEAR SOLEDAD

(Drainage Area—240 Square Miles)

Month	Percent of seasonal average	Acre-feet
October	0.5	600
November	2.1	2,700
December	7.5	9,600
January	18.0	23,000
February	28.8	36,700
March	23.6	30,100
April	12.2	15,600
May	4.4	5,600
June	1.8	2,300
July	0.6	800
August	0.3	400
September	0.2	200
Totals	100.0	127,600

TABLE 37

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL COASTAL AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	San Lorenzo River Basin										
3-1	San Lorenzo River at Big Trees	37° 02′ 122° 03′	150	1937-47	USGS	A	115,000	1940-41	265,000	1938-39	23,000
3-2	Branciforte Creek at Santa Cruz	36° 58′ 122° 01′	16	1940-43	USGS	A					
3-3	Scott Creek near Davenport	37° 04′ 122° 14′	50	1939-41	USGS	A					
3-4	Soquel Creek at Soquel	36° 59′ 121° 57′	120	1936-38	USGS	D					
3-5	Aptos Creek at Aptos	36° 59′ 121° 54′	100	1936-37	USGS	A					
	Pajaro River Basin										
3-9	Uvas Creek near Morgan Hill	37° 04′ 121° 41′	390	1930-47	USGS	A	26,800	1937-38	68,000	1930-31	1,900
3-10	Pacheco Creek near Dunneville	36° 59′ 121° 23′	240	1940-47	USGS	A					
3-11	Pajaro River at Sargent	36° 56′ 121° 32′	110	1940-41	USGS	A					
3-12	San Benito Creek near Hernandez	36° 23′ 120° 50′	2,340	1922-24	USGS	A					
3-13	McCoy Creek near Hernandez	36° 25′ 120° 51′	2,250	1922-23	USGS	D					
3-14	San Benito Creek near Willow Creek School	36° 37′ 121° 13′	900	1939-47	USGS	A					
3-15	Tres Pinos Creek near Tres Pinos	36° 45′ 121° 17′	570	1922-23 1940-47	USGS	A					

3-16	San Benito River near Tres Pinos	36° 46′ 121° 21′	400	1922-23	USGS	D					
3-17	San Benito River near Hollister	36° 51′ 121° 25′	145	1922-24	Hollister Irr. Dist.	A					
3-18	Pajaro River near Chittenden	36° 54′ 121° 36′	82	1939-47	USGS	A					
3-19	Corralitos Creek at Corralitos	36° 59′ 121° 48′	250	1936-37	USGS	A					
3-20	Pajaro River at Watsonville	36° 54′ 121° 45′	30	1911-13	USGS	A					
	Salinas River Basin										
3-21	Salinas River near Poso	35° 18′ 120° 24′	1,350	1942-47	USGS	A					
3-22	Toro Creek near Poso	35° 20′ 120° 25′	1,310	1942-47	USGS	A					
3-23	Salinas Reservoir near Poso	35° 20′ 120° 30′	1,250	1941-47	USGS	E					
3-24	Salinas River above Pilitos Creek	35° 21′ 120° 31′	1,150	1942-47	USGS	A					
3-25	Salinas River near Santa Margarita	35° 24′ 120° 34′	960	1922 1932-47	USGS	A	34,100	1940-41	132,000	1938-39	2,700
3-26	Tassajara Creek near Santa Margarita	35° 23′ 120° 39′	1,060	1942-47	USGS	A					
3-27	Santa Margarita Creek near Santa Margarita	35° 23′ 120° 39′	1,050	1942-47	USGS	A					
*3-28	Salinas River at Eureka Bridge	35° 30′ 120° 40′	800	1913-16	Colony Holding Corp.	A					
3-29	Salinas River at Paso Robles	35° 38′ 120° 41′	670	1939-47	USGS	A					
3-30	Estrella Creek near Paso Robles	35° 39′ 120° 30′	825	1939-41	USGS	A					
3-31	Nacimiento River near Bryson	35° 47′ 121° 06′	1,000	1901	USGS	D					
3-32	Nacimiento River near Bradley	35° 45′ 120° 55′	700	1922	USGS	D					

TABLE 37—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONA RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL COASTAL REA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
3-33	Nacimiento River near San Miguel	35° 47′ 120° 47′	555	1939-47	USGS	A					
3-34	San Antonio River near Jolon	35° 57′ 121° 12′	900	1901	USGS	D					
3-35	San Antonio River at Pleyto	35° 52′ 120° 59′	720	1922 1929-47	USGS	A	73,100	1940-41	280,000	1930-31	2,000
3-36	San Lorenzo Creek at King City	36° 12′ 121° 07′	320	1942-46	USGS	A					
3-37	Arroyo Seco near Soledad	36° 17′ 121° 19′	340	1901-47	USGS	A	129,000	1940-41	380,000	1930-31	12,200
3-38	Salinas River near Spreckels	36° 38′ 121° 41′	23	1900-01 1929-47	USGS	A	454,000	1940-41	1,766,000	1930-31	1,900
	San Luis Obispo Creek Basin										
3-39	Steiner Creek near San Luis Obispo	35° 19′ 120° 41′	440	1942-47	USGS	A					
	Arroyo Grande Basin										
3-40	Arroyo Grande at Arroyo Grande	35° 07′ 120° 34′	98	1939-47	USGS	A					
	Santa Maria River Basin										
3-41	Cuyama River near Ventucopa	34° 41′ 119° 21′	3,500	1944-47	USGS	A					
3-42	Cuyama River near Santa Maria	35° 01′ 120° 17′	610	1929-47	USGS	A	18,700	1940-41	63,700	1929-30	3,000
3-43	Alamo Creek near Santa Maria	35° 01′ 120° 19′	581	1943-47	USGS	A					

3-44	Huasna River near Santa Maria	35° 01′ 120° 19′	600	1929-47	USGS	A	17,200	1940-41	68,300	1930-31	300
3-45	Sisquoc River near Sisquoc	34° 50′ 120° 10′	620	1929-33 1943-47	USGS	A					
3-46	Labrea Creek near Sisquoc	34° 51′ 120° 12′	550	1943-47	USGS	A					
3-47	Tepusquet Creek near Sisquoc	34° 52′ 120° 15′	500	1943-47	USGS	A					
3-48	Sisquoc River near Gary	34° 52′ 120° 16′	450	1941-47	USGS	A					
3-49	Santa Maria River at Guadelupe	34° 58′ 120° 34′	65	1941-47	USGS	A					
	San Antonio Creek Basin										
3-50	San Antonio Creek at Harris	34° 46′ 120° 26′	307	1941-47	USGS	A					
	Santa Ynez River Basin										
3-51	Santa Ynez River at Jameson Lake	34° 30′ 119° 30′	1,950	1930-41 1941-47	USGS	AB					
3-52	Santa Ynez River near Santa Barbara	34° 32′ 119° 41°	1,200	1903-08 1910-18 1922-41 1943-47	USGS	B					
3-53	Mono Creek at Mono Dam site	34° 32′ 119° 38′	1,200	1902-04	USGS	A					
3-54	Santa Ynez River below Gibraltar Dam	34° 32′ 119° 41′	1,200	1920-42 1942-47	USGS	B A					
3-55	Mission Tunnel near Santa Barbara	34° 29′ 119° 43′	1,000	1912-17	USGS	D					
3-56	Santa Cruz Creek near Santa Ynez	34° 35′ 120° 00′	700	1941-47	USGS	A					
3-57	Santa Ynez River near Santa Ynez	34° 35′ 120° 01′	500	1928-47	USGS	A	84,000	1940-41	475,000	1930-31	1
3-58	Santa Aqueda Creek near Santa Ynez	34° 36′ 120° 02′	520	1941-47	USGS	A					
3-59	Santa Ynez River at Solvang	34° 35′ 120° 09′	375	1928-41 1946-47	USGS	AD					
3-60	La Zaca Creek at Buellton	34° 37′ 120° 11′	340	1941-47	USGS	A					

TABLE 37—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONA RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL COASTAL REA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
3-61	Salsipuedes Creek near Lompoc	34° 35′ 120° 25′	230	1941-47	USGS	A					
3-62	Santa Ynez River near Lompoc	34° 39′ 120° 26′	80	1906-18 1925-47	USGS	A	157,00(	1940-41	652,000	1930-31	2,400
3-63	Santa Ynez River at Pine Canyon	34° 40′ 120° 30′	60	1941-46	USGS	A					
	Santa Barbara Area										
3-64	Gato Creek at mouth	34° 27′ 119° 59′	50	1890	USGS	D					
3-65	Loma Abajo River in Santa Barbara County	34° 30′ 119° 59′	1,250	1890	USGS	D					
3-66	San Jose Creek near Goleta	34° 27′ 119° 49′	120	1941-47	USGS	A					
3-67	Atascadero Creek near Goleta	34° 25′ 119° 49′	40	1941-47	USGS	A					
*3-68	Rogue Creek in Santa Barbara County	34° 30′ 120° 00′	600	1890	USGS	D					
3-69	Carpinteria Creek near Carpinteria	34° 24′ 119° 30′	150	1941-47	USGS	A					
3-70	Gobernador Creek near Carpinteria	34° 25′ 119° 31′	75	1916-23	USGS	D					

* Rough approximation.

TYPE OF RECORD

A—Daily.
B—Monthly.
D—Intermittent.
E—Reservoir contents only.

SOI :E OF RECORD

Abbreviation	*Name*
USGS	ıited States Geological Survey.
Hollister Irr. Dist.	›llister Irrigation District.

TABLE 38

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, CENTRAL COASTAL AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
1	Scott Creek Group			110,000
	San Lorenzo River Basin			
2-1	Above gage at Big Trees	104,700		
2-2	Branciforte Creek above gage at Santa Cruz	15,400		
2-3	Remainder of San Lorenzo River	5,000		
	San Lorenzo River at mouth			125,100
	Soquel Creek Group			
3-1	Soquel Creek above gage at Soquel	45,500		
3-2	Remainder of Soquel Creek Group	18,000		63,500
	Pajaro River Basin			
4-1	San Benito River above gage near Willow Creek School	30,300		
4-2	Tres Pinos Creek above gage near Tres Pinos	17,100		
4-3	Pacheco Creek above gage near Dunneville	34,000		
4-4	Llagas Creek above gage near Gilroy	16,500		
4-5	Uvas Creek above gage near Morgan Hill	26,500		
4-6	Remainder of Pajaro River above gage near Chittenden	81,800		
	Above gage near Chittenden		206,200	
	Remainder of Pajaro River	16,300		
	Pajaro River at Mouth			222,500
5	Elkhorn Slough Basin			5,500
6	Moro Cojo Group			700
	Salinas River Basin			
7-1	Above gage at Paso Robles	107,500		
7-2	Nacimiento River above gage near San Miguel	224,600		
7-3	San Antonio River above gage at Pleyto	83,700		
	Remainder of Salinas River above San Lucas	104,000		
	Above San Lucas dam site		519,800	
7-6	Arroyo Seco above gage near Soledad	131,400		
	Remainder of Salinas River:			
7-7	Above valley floor (east side)	28,800		
7-8	Above valley floor (west side)	33,800		
	Salinas River at mouth			713,800
8	Canyon Del Rey Group			28,000
	Carmel River Basin			
9-1	Above San Clemente Dam	76,300		
9-2	Remainder of Carmel River	66,000		
	Carmel River at mouth			142,300
10	Rocky Creek Group			76,000
11	Little Sur River Basin			53,000
12	Point Sur Group			3,300
13	Sur River Basin			88,000
14	Morro Creek Group			420,000

TABLE 38—Continued

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, CENTRAL COASTAL AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
	Arroyo Grande Basin			
15-1	Above gage at Arroyo Grande	23,900		
15-2	Remainder of Arroyo Grande	23,000		46,900
	Santa Maria River Basin			
16-1	Sisquoc River above gage near Gary	39,600		
16-2	Cuyama River above gage near Santa Maria	22,500		
16-3	Alamo Creek above gage near Santa Maria	4,000		
16-4	Huasna River above gage near Santa Maria	20,600		
16-5	Remainder of Santa Maria River above gage at Guadalupe	3,100		
	Above gage at Guadalupe		89,800	
16-6	Remainder of Santa Maria River	1,100		
	Santa Maria River at mouth			90,900
	San Antonio Creek Group			
17-1	San Antonio Creek above gage at Harris	3,000		
17-2	Remainder of San Antonio Creek Group	2,100		5,100
	Santa Ynez River Basin			
18-1	Above Gibraltar Dam	50,600		
18-2	From Gibraltar Dam to gage at Lompoc	107,000		
	Above gage at Lompoc		157,600	
18-3	Remainder of Santa Ynez River	1,400		
	Santa Ynez River at mouth			159,000
19	San Jose Creek Group			71,000
20	Soda Lake Basin			23,000
	TOTAL, CENTRAL COASTAL AREA			2,447,600

TABLE 39

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	San Lorenzo River at Big Trees	Branciforte Creek at Santa Cruz	Soquel Creek at Soquel	San Benito River near Willow Creek School	Tres Pinos Creek near Tres Pinos	Pacheco Creek near Dunneville
1894-95	226,000	31,800	96,700	110,000	63,300	97,100
95-96	153,000	21,700	65,900	19,800	11,100	31,100
96-97	151,000	21,300	64,500	66,500	38,700	68,000
97-98	16,500	2,300	8,200	1,800	600	3,600
98-99	62,700	8,900	27,700	5,200	2,700	13,600
1899-1900	73,200	10,400	32,000	3,500	1,900	10,500
00-01	158,000	22,400	67,900	19,800	11,100	31,100
01-02	83,600	11,800	36,100	9,000	4,600	19,000
02-03	106,000	14,900	45,200	30,000	17,300	40,300
03-04	58,300	8,200	26,100	6,500	2,900	15,000
1904-05	89,700	12,700	38,600	5,200	2,700	13,600
05-06	168,000	23,700	72,200	59,500	34,900	63,100
06-07	264,000	37,300	113,000	166,000	94,000	131,000
07-08	73,700	10,400	32,200	9,800	5,000	20,100
08-09	213,000	30,200	91,600	129,000	73,800	109,000
1909-10	80,900	11,400	35,100	11,800	6,100	22,300
10-11	215,000	30,300	92,000	69,200	40,300	69,800
11-12	30,800	43,500	14,000	2,000	800	4,700
12-13	13,200	1,900	6,600	1,800	800	4,100
13-14	230,000	32,500	98,500	147,000	83,200	119,000
1914-15	173,000	24,500	74,500	64,000	37,200	66,100
15-16	212,000	30,000	90,900	99,200	57,300	90,200
16-17	136,000	19,200	58,500	21,800	12,100	32,600
17-18	57,500	8,100	25,400	77,800	45,100	76,100
18-19	71,500	10,100	31,200	10,000	5,200	20,400
1919-20	45,100	6,400	19,900	2,500	1,500	7,000
20-21	83,600	11,800	36,100	14,000	7,700	25,100
21-22	154,000	21,700	65,700	21,200	11,700	32,000
22-23	101,000	14,200	43,400	11,200	5,900	21,900
23-24	13,200	1,900	6,600	1,800	600	3,400
1924-25	45,100	6,400	20,300	2,200	1,300	6,900
25-26	112,000	15,900	48,000	7,800	3,800	17,100
26-27	128,000	18,100	55,000	12,200	6,700	23,100
27-28	61,600	8,700	26,900	3,200	1,900	9,900
28-29	40,700	5,800	18,300	2,000	800	5,000
1929-30	45,100	6,400	20,300	3,000	1,700	8,500
30-31	11,000	1,500	5,500	1,800	600	3,600
31-32	113,000	15,900	48,200	21,800	12,100	32,600
32-33	20,400	2,900	9,700	2,000	800	5,100
33-34	57,200	8,100	25,000	2,200	1,000	5,800
1934-35	75,400	10,700	32,800	5,500	2,700	13,700
35-36	99,200	14,000	42,900	13,000	6,900	23,900
36-37	76,200	10,800	33,500	25,000	14,200	36,100
37-38	184,000	26,000	80,600	104,000	60,000	93,100
38-39	23,000	3,300	14,400	2,000	800	4,800
1939-40	173,000	37,500	81,400	24,200	18,700	37,400
40-41	265,000	21,200	107,000	91,600	52,700	85,000
41-42	158,000	17,600	57,100	28,600	10,900	29,500
42-43	119,000	16,800	48,000	20,700	13,700	41,800
43-44	48,600	6,900	35,500	16,200	6,100	19,800
1944-45	87,200	12,300	39,400	9,500	4,900	24,600
45-46	63,500	9,000	29,800	7,000	3,400	7,300
1946-47	29,200	4,100	13,300	2,100	1,200	5,300
MEAN	104,700	15,400	45,500	30,300	17,100	34,000

TABLE 39—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Llagas Creek near Gilroy	Uvas Creek near Morgan Hill	Remainder of Pajaro River above Gage near Chittenden	Pajaro River near Chittenden	Pajaro River Chittenden to mouth	Pajaro River Total
1894-95	35,000	55,000	241,000	601,400	45,100	646,500
95-96	30,900	48,500	90,600	232,000	27,600	259,600
96-97	22,000	34,600	148,000	377,800	19,300	397,100
97-98	1,500	2,400	6,600	16,500	2,100	18,600
98-99	7,400	11,700	31,400	72,000	7,700	79,700
1899-1900	12,100	19,100	32,000	79,100	11,300	90,400
00-01	31,900	50,000	92,200	236,100	28,900	265,000
01-02	12,200	19,100	46,200	110,100	11,400	121,500
02-03	13,400	21,100	85,400	207,500	12,300	219,800
03-04	9,300	27,900	32,500	94,100	6,800	100,900
1904-05	7,600	21,000	42,000	92,100	14,700	106,800
05-06	16,600	42,200	147,000	363,300	25,200	388,500
06-07	38,500	42,900	303,000	775,400	40,300	815,700
07-08	8,500	13,400	43,900	100,700	8,500	109,200
08-09	32,800	51,500	244,000	640,100	30,100	670,200
1909-10	10,300	16,100	49,600	116,200	9,800	126,000
10-11	36,800	57,900	177,000	451,000	37,000	488,000
11-12	3,100	4,900	11,500	27,000	4,100	31,100
12-13	1,000	1,500	6,600	15,800	1,500	17,300
13-14	34,700	54,500	269,000	707,400	33,000	740,400
1914-15	29,500	46,400	154,000	397,200	26,100	423,300
15-16	34,600	54,300	211,000	546,600	32,700	579,300
16-17	25,600	40,200	85,700	218,000	22,400	240,400
17-18	8,700	13,700	148,000	369,400	8,700	378,100
18-19	7,500	11,800	43,200	98,100	7,800	105,900
1919-20	5,100	8,000	18,100	42,200	5,900	48,100
20-21	10,100	15,900	54,200	127,000	9,800	136,800
21-22	30,800	48,300	92,000	236,000	27,400	263,400
22-23	17,200	26,900	57,200	140,300	15,300	155,600
23-24	1,200	1,900	5,500	14,400	1,800	16,200
1924-25	5,200	8,100	18,000	41,700	6,000	47,700
25-26	22,400	35,100	55,000	141,200	19,600	160,800
26-27	25,600	40,200	62,200	170,000	17,400	187,400
27-28	8,600	13,500	27,200	64,300	8,600	72,900
28-29	4,900	7,700	15,000	35,400	5,800	41,200
1929-30	4,300	6,800	19,700	44,000	5,200	49,200
30-31	900	1,400	6,000	14,300	1,300	15,600
31-32	17,900	32,700	76,400	193,500	15,900	209,400
32-33	1,500	5,600	8,500	23,500	2,100	25,600
33-34	9,000	10,100	21,600	49,700	8,900	58,600
1934-35	11,500	15,500	36,500	85,400	10,700	96,100
35-36	16,100	25,300	59,100	144,300	14,500	158,800
36-37	20,600	31,400	85,700	213,000	18,200	231,200
37-38	38,900	68,000	228,000	592,000	41,200	633,200
38-39	1,800	4,600	9,200	23,200	2,500	25,700
1939-40	26,500	44,500	93,500	244,800	23,100	267,900
40-41	42,500	57,500	223,000	552,300	48,700	601,000
41-42	26,600	38,800	90,200	224,600	20,900	245,500
42-43	17,200	27,800	75,000	196,200	16,000	212,200
43-44	9,100	17,300	48,700	117,200	10,300	127,500
1944-45	10,500	25,000	54,900	129,400	12,400	141,800
45-46	11,700	15,200	32,700	77,300	9,100	86,400
1946-47	6,200	10,000	20,900	45,700	9,200	54,900
MEAN	16,500	26,500	81,800	206,200	16,300	222,500

TABLE 39—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Salinas River at Paso Robles	Naciemento River near San Miguel	San Antonio River at Pleyto	Remainder of Salinas River above San Lucas Damsite	Salinas River above San Lucas Damsite	Arroyo Seco near Soledad
1894-95	181,000	430,000	178,000	210,000	999,000	280,000
95-96	158,000	368,000	147,000	183,000	856,000	222,000
96-97	130,000	272,000	97,400	135,000	634,400	159,000
97-98	31,500	46,600	5,900	9,500	93,500	20,600
98-99	79,700	133,000	31,700	45,000	289,400	68,400
1899-1900	98,800	178,000	49,500	79,900	406,200	96,700
00-01	163,000	382,000	152,000	189,000	886,000	231,000
01-02	98,400	177,000	59,200	80,300	414,900	96,500
02-03	102,000	189,000	64,900	86,700	442,600	104,000
03-04	72,000	118,000	36,300	34,500	260,800	59,900
1904-05	112,000	217,000	78,200	104,000	511,200	122,000
05-06	149,000	338,000	141,000	170,000	798,000	202,000
06-07	201,000	513,000	230,000	248,000	1,192,000	317,000
07-08	84,400	142,000	45,100	52,300	323,800	74,300
08-09	166,000	394,000	170,000	195,000	925,000	239,000
1909-10	91,400	159,000	51,300	65,700	367,400	84,600
10-11	189,000	473,000	210,000	231,000	1,103,000	291,000
11-12	51,000	78,100	23,600	16,300	169,000	37,000
12-13	22,200	33,200	2,800	6,800	65,000	14,200
13-14	177,000	427,000	187,000	211,000	1,002,000	261,000
1914-15	154,000	348,000	146,000	175,000	823,000	209,000
15-16	176,000	425,000	185,000	208,000	994,000	259,000
16-17	141,000	306,000	125,000	153,000	725,000	181,000
17-18	86,200	145,000	45,900	55,000	332,100	75,700
18-19	80,700	133,000	41,700	45,000	300,400	68,500
1919-20	67,100	107,000	32,400	23,000	229,500	52,800
20-21	92,000	158,000	50,800	65,600	366,400	83,900
21-22	158,000	364,000	154,000	180,000	856,000	219,000
22-23	116,000	224,000	81,900	109,000	530,900	127,000
23-24	27,100	39,100	13,700	7,900	87,800	16,600
1924-25	68,300	108,000	32,900	22,500	231,700	53,500
25-26	131,000	273,000	108,000	135,000	647,000	160,000
26-27	141,000	306,000	124,000	153,000	724,000	181,000
27-28	85,400	143,000	45,400	52,300	326,100	74,700
28-29	66,000	105,000	31,800	21,700	224,500	51,600
1929-30	38,800	69,500	17,500	13,200	139,000	46,800
30-31	6,800	18,200	2,000	2,000	29,000	12,200
31-32	133,000	196,000	82,000	164,000	575,000	132,000
32-33	29,900	44,500	3,800	9,200	87,400	19,500
33-34	86,000	147,000	30,800	56,200	320,000	77,400
1934-35	95,700	170,000	42,300	74,400	382,400	92,200
35-36	111,000	213,000	57,500	103,000	484,500	121,000
36-37	125,000	254,000	80,000	127,000	586,000	149,000
37-38	203,000	517,000	213,000	252,000	1,185,000	324,000
38-39	36,200	53,500	6,800	10,500	107,000	24,100
1939-40	71,200	304,000	117,000	114,000	606,200	187,000
40-41	332,000	604,000	280,000	293,000	1,509,000	380,000
41-42	99,200	254,000	91,400	146,000	590,600	169,000
42-43	212,000	297,000	91,700	113,000	713,700	133,000
43-44	72,700	164,000	45,100	68,900	350,700	88,600
1944-45	55,700	169,000	58,500	87,500	370,700	105,000
45-46	29,000	119,000	24,700	59,300	232,000	79,400
1946-47	12,800	58,000	11,900	58,300	141,000	32,000
MEAN	107,500	224,600	83,700	104,000	519,800	131,400

TABLE 39—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Eastside Tributaries below San Lucas Damsite	Westside Tributaries below San Lucas Damsite	Salinas River at mouth	Carmel River above San Clemente Dam	Arroyo Grande at Arroyo Grande	Sisquoc River near Gary
1894-95	60,000	65,000	1,404,000	155,000	52,200	93,600
95-96	50,900	57,200	1,186,100	130,000	6,200	2,600
96-97	30,800	43,300	867,500	93,100	20,600	29,900
97-98	0	0	114,100	12,100	1,100	0
98-99	5,100	15,200	378,100	40,100	3,100	0
1899-1900	12,800	25,900	541,600	56,800	4,200	0
00-01	54,400	59,100	1,230,500	136,000	43,000	72,900
01-02	12,200	26,000	549,600	57,000	5,100	0
02-03	14,300	28,200	589,100	61,400	15,000	19,900
03-04	3,000	11,500	335,200	35,300	8,100	6,600
1904-05	19,800	33,800	686,800	72,000	51,900	92,800
05-06	44,600	53,100	1,097,700	119,000	42,100	71,100
06-07	89,000	76,400	1,674,400	187,000	76,200	166,000
07-08	6,800	17,600	422,500	43,900	41,600	70,100
08-09	57,500	60,800	1,282,300	141,000	64,700	128,000
1909-10	9,100	21,500	482,600	49,900	33,100	53,200
10-11	77,400	71,100	1,542,500	172,000	63,900	126,000
11-12	0	3,100	209,100	21,900	12,000	14,800
12-13	0	0	79,200	8,400	11,300	13,300
13-14	65,400	65,300	1,393,700	154,000	64,700	128,000
1914-15	46,900	54,700	1,133,600	123,000	54,600	100,000
15-16	64,700	65,000	1,382,700	153,000	43,500	73,900
16-17	37,100	48,700	991,800	107,000	29,100	45,500
17-18	6,800	18,000	432,600	44,600	48,900	85,700
18-19	5,100	15,300	389,300	40,400	4,200	0
1919-20	400	8,100	290,800	31,200	13,000	16,400
20-21	8,700	21,300	480,300	49,500	3,100	0
21-22	50,400	56,600	1,182,000	129,000	37,200	61,600
22-23	20,700	34,600	713,200	75,000	5,100	0
23-24	0	0	104,400	9,800	1,100	0
1924-25	800	8,500	294,500	31,600	2,100	0
25-26	31,500	43,300	881,800	94,400	22,900	33,500
26-27	36,800	48,600	990,400	84,400	29,400	45,800
27-28	7,200	17,800	425,800	44,100	8,500	7,700
28-29	400	7,600	284,100	30,400	3,200	0
1929-30	5,000	22,500	213,300	27,600	2,100	0
30-31	700	4,000	45,900	7,200	800	0
31-32	81,200	80,200	868,400	77,900	32,500	51,900
32-33	0	0	106,900	11,500	5,700	1,800
33-34	10,800	18,500	426,700	45,700	7,300	4,900
1934-35	16,600	23,900	515,100	54,400	1,500	19,900
35-36	27,600	33,100	666,200	71,200	11,000	12,500
36-37	35,000	40,500	810,500	87,600	39,300	65,200
37-38	106,000	76,800	1,691,800	191,000	51,700	92,300
38-39	400	0	131,500	18,300	8,800	8,200
1939-40	47,500	49,200	889,900	98,300	9,000	2,800
40-41	132,000	87,900	2,108,900	209,000	66,500	137,000
41-42	49,400	45,300	854,300	122,000	21,500	15,700
42-43	31,600	36,200	914,500	70,300	45,700	60,500
43-44	15,400	22,700	477,400	43,600	15,500	37,800
1944-45	22,300	28,400	526,400	52,700	12,000	17,000
45-46	7,600	19,700	338,700	48,900	5,500	8,500
1946-47	8,200	19,500	200,700	13,800	3,500	2,300
MEAN	28,800	33,800	713,800	76,300	23,900	39,600

TABLE 39—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Cuyama River near Santa Maria	Alamo Creek near Santa Maria	Huasna River near Santa Maria	Remainder Santa Maria River above Guadalupe	Santa Maria River at Guadalupe	Remainder of Santa Maria River
1894-95	49,100	8,100	46,700	6,500	204,000	2,400
95-96	4,400	1,400	0	200	8,600	100
96-97	25,800	3,700	18,900	1,100	79,400	400
97-98	0	0	0	100	100	0
98-99	0	0	0	100	100	0
1899-1900	0	300	0	100	400	100
00-01	42,300	7,100	37,800	3,300	163,400	1,200
01-02	1,000	1,100	0	200	2,300	100
02-03	20,400	3,100	14,000	700	58,100	200
03-04	10,200	1,900	5,300	300	24,300	100
1904-05	49,100	8,000	46,300	6,400	202,600	2,400
05-06	41,800	6,500	37,300	3,200	159,900	1,200
06-07	68,600	12,300	74,400	25,800	347,100	9,600
07-08	41,300	6,400	36,700	3,100	157,600	1,100
08-09	59,300	10,200	60,000	14,800	272,300	5,500
1909-10	35,000	5,200	29,300	2,100	124,800	800
10-11	58,900	10,100	59,200	14,100	268,300	5,300
11-12	16,500	2,700	10,800	600	45,400	200
12-13	15,100	2,600	10,000	500	41,500	200
13-14	59,300	10,200	60,200	14,900	272,600	5,600
1914-15	51,100	8,500	49,100	7,800	216,500	2,900
15-16	42,800	7,200	38,400	3,400	165,700	1,300
16-17	33,100	4,700	26,100	1,700	111,100	600
17-18	46,700	7,500	43,500	5,100	188,500	1,900
18-19	0	300	0	100	400	0
1919-20	18,000	2,800	11,900	600	49,700	200
20-21	0	0	0	100	100	0
21-22	38,400	5,800	32,900	2,600	141,300	1,000
22-23	1,000	1,100	0	200	2,300	100
23-24	0	0	0	100	100	0
1924-25	0	0	0	100	100	0
25-26	12,600	3,900	20,800	1,200	72,000	400
26-27	17,500	4,700	26,200	1,700	95,900	600
27-28	11,200	2,000	5,800	300	27,000	100
28-29	0	0	0	100	100	0
1929-30	3,000	0	400	100	3,500	0
30-31	3,900	0	300	100	4,300	0
31-32	26,800	5,100	21,600	1,900	107,300	700
32-33	7,700	1,300	4,700	200	15,700	100
33-34	3,000	1,800	600	300	10,600	100
1934-35	9,200	3,000	7,100	700	39,900	300
35-36	9,200	2,500	18,400	500	43,100	200
36-37	43,800	6,000	38,700	2,800	156,500	100
37-38	56,100	8,000	49,400	6,300	212,100	2,400
38-39	9,200	2,100	1,300	400	21,200	100
1939-40	6,100	1,400	5,900	200	16,400	100
40-41	63,700	10,100	68,300	20,900	300,000	7,800
41-42	9,300	3,200	11,600	800	40,600	300
42-43	27,700	6,300	46,100	3,000	143,600	1,100
43-44	18,900	4,400	7,800	1,600	70,500	600
1944-45	9,900	2,900	6,900	600	37,300	200
45-46	6,900	1,300	2,900	500	20,100	200
1946-47	5,800	800	900	200	10,000	100
MEAN	22,500	4,000	20,600	3,100	89,800	1,100

TABLE 39—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Total Santa Maria River	San Antonio Creek at Harris	Santa Ynez River above Gibraltar Dam	Santa Ynez River Gibraltar to Lompoc	Santa Ynez River at Lompoc	Santa Ynez River Lompoc to mouth
1894-95	206,400	6,400	119,000	243,000	362,000	3,000
95-96	8,700	200	10,500	14,800	25,300	100
96-97	79,800	1,000	35,000	53,500	88,500	500
97-98	100	100	2,300	1,900	4,200	0
98-99	100	100	4,700	7,900	12,600	100
1899-1900	500	100	5,800	11,100	16,900	100
00-01	164,600	3,200	85,300	167,700	253,000	2,000
01-02	2,400	200	10,500	10,600	21,100	100
02-03	58,300	600	26,900	36,300	63,200	300
03-04	24,400	300	16,000	17,700	33,700	200
1904-05	205,000	6,200	118,000	240,000	358,000	3,000
05-06	161,100	3,100	82,900	161,100	244,000	1,000
06-07	356,700	25,000	236,000	507,000	743,000	12,000
07-08	158,700	3,000	81,800	157,200	239,000	1,000
08-09	277,800	14,400	170,000	375,000	545,000	7,000
1909-10	125,600	2,000	52,600	111,400	164,000	1,000
10-11	273,600	13,700	167,000	366,000	533,000	6,000
11-12	45,600	500	16,900	33,400	50,300	200
12-13	41,700	500	17,000	30,400	47,400	200
13-14	278,200	14,400	137,000	409,000	546,000	7,000
1914-15	219,400	7,500	63,500	331,500	395,000	4,000
15-16	167,000	3,300	87,600	170,400	258,000	1,000
16-17	111,700	1,600	44,500	92,500	137,000	1,000
17-18	190,400	5,000	94,200	225,800	320,000	2,000
18-19	400	100	7,000	10,000	17,000	0
1919-20	49,900	600	23,400	31,700	55,100	300
20-21	100	100	6,500	6,600	13,100	100
21-22	142,300	2,500	68,400	130,600	199,000	1,000
22-23	2,400	200	8,690	13,310	22,000	100
23-24	100	100	2,430	2,900	5,330	30
1924-25	100	100	3,100	3,600	6,700	30
25-26	72,400	1,100	47,800	53,200	101,000	1,000
26-27	96,500	1,600	52,300	88,700	141,000	1,000
27-28	27,100	300	8,570	28,830	37,400	200
28-29	100	100	3,700	11,500	15,200	0
1929-30	3,500	100	3,090	7,910	11,000	0
30-31	4,300	100	1,300	4,790	6,090	30
31-32	108,000	1,900	49,600	113,400	163,000	1,000
32-33	15,800	200	9,930	16,670	26,600	100
33-34	10,700	300	15,800	17,900	33,700	100
1934-35	40,200	700	25,400	41,700	67,100	300
35-36	43,300	500	16,900	33,900	50,800	200
36-37	156,600	2,700	81,300	138,700	220,000	1,000
37-38	214,500	6,100	125,000	237,000	362,000	2,000
38-39	21,300	400	14,400	27,900	42,300	200
1939-40	16,500	200	9,110	22,790	31,900	100
40-41	307,800	20,700	190,000	474,000	664,000	9,000
41-42	40,900	800	21,600	54,000	75,600	400
42-43	144,700	2,300	91,300	151,700	243,000	1,000
43-44	71,100	1,800	52,300	81,700	134,000	1,000
1944-45	37,500	400	21,900	43,200	65,100	300
45-46	20,300	300	25,700	29,500	55,200	200
1946-47	10,100	0	11,700	16,700	28,400	100
MEAN	90,900	3,000	50,600	107,000	157,600	1,400

TABLE 39—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Santa Ynez River at mouth
-95	365,000
-96	25,400
-97	89,000
-98	4,200
-99	12,700
-1900	17,000
-01	255,000
-02	21,200
-03	63,500
-04	33,900
-05	361,000
-06	245,000
-07	755,000
-08	240,000
-09	552,000
-10	165,000
-11	539,000
-12	50,500
-13	47,600
-14	553,000
-15	399,000
-16	259,000
-17	138,000
-18	322,000
-19	17,000
-20	55,400
-21	13,200
-22	200,000
-23	22,100
-24	5,360
1924-25	6,730
25-26	102,000
26-27	142,000
27-28	37,600
28-29	15,200
1929-30	11,000
30-31	6,120
31-32	164,000
32-33	26,700
33-34	33,800
1934-35	67,400
35-36	51,000
36-37	221,000
37-38	364,000
38-39	42,500
1939-40	32,000
40-41	673,000
41-42	76,000
42-43	244,000
43-44	135,000
1944-45	65,400
45-46	55,400
1946-47	28,500
MEAN	159,000

FLOOD FLOWS

The main streams in the Central Coastal Area for which flood flow records are available are Salinas, Santa Maria, and Santa Ynez Rivers. The most important of these is the Salinas, and the largest contributors to the Salinas are the Arroyo Seco and the San Antonio and Nacimiento Rivers, all draining the east slope of the Santa Lucia Range. A gaging station on Salinas River near Spreckels has been maintained since December, 1929. Maximum recorded instantaneous discharge at that station was 75,000 second-feet, on February 12, 1938, with a gage height of 25 feet. The maximum stage known was 26.6 feet, on March 7, 1911, as indicated at an oil pumping station opposite the gage. The gaging station on the Arroyo Seco near Soledad has a complete record from November, 1901, to date and the maximum discharge observed was approximately 22,000 second-feet on February 21, 1917. Records are available for Cuyama River near Santa Maria from December, 1929, to September, 1947. This stream is a tributary of Santa Maria River. Its maximum instantaneous discharge during this period was 17,300 second-feet on March 3, 1938. Records are available for Santa Ynez River near Lompoc from November, 1906, to September, 1918, and from April, 1925, to September, 1947. A maximum instantaneous recorded discharge of 45,000 second-feet occurred at this station on March 3, 1938, but incomplete information indicates an instantaneous discharge of 62,000 second-feet on January 9, 1907. There are years in which some or all of these streams at times carry no surface flow.

FLOOD FREQUENCIES

Measured flow at gaging stations was used in flood-frequency studies of four streams in this Area. Results of these studies are shown on Plate 14, "Arroyo Seco Flood Discharge near Soledad, Salinas River Flood Discharge near Spreckels," and on Plate 15, "Cuyama River Flood Discharge near Santa Maria, Santa Ynez River Flood Discharge near Lompoc."

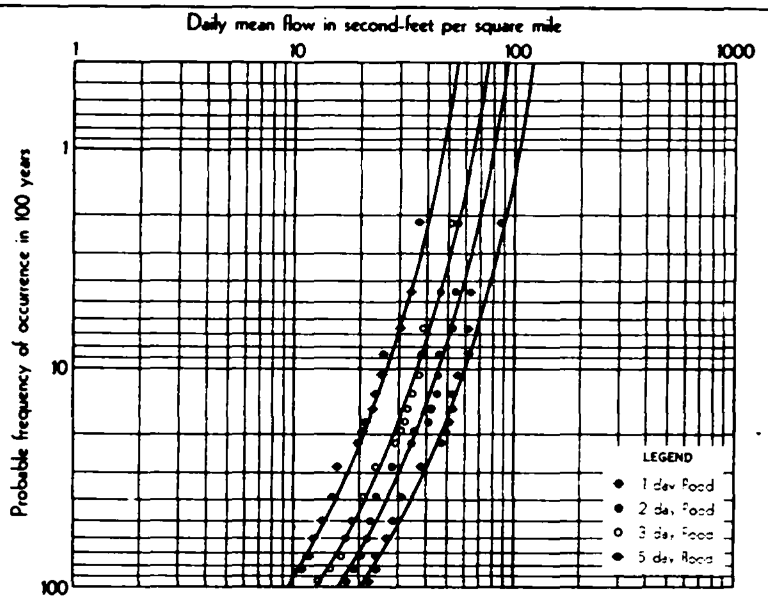
QUALITY OF WATER

Surface waters meet less than 10 percent, and ground waters more than 90 percent of present water demands for irrigation, domestic, municipal, and industrial uses in the Central Coastal Area. Quality of surface and ground waters is discussed in the following sections.

Surface Waters

Surface waters in the coastal drainage from the Santa Lucia and Gabilan Ranges and from Santa Ynez, San Rafael, and Santa Cruz Mountains, are generally of good quality, with low total salinity, low percent sodium, and low boron. They are uniformly carbonate type waters, whereas many streams draining interior basins from San Benito River to Cuyama River, inclusive, are high in sulphates. The latter streams, which flow from the interior Diablo Range, have high total salinity and chlorides, and usually contain significant amounts of boron. Inorganic analyses of water samples from streams draining the coastal mountains and from streams draining the Diablo Range are presented in Table 40.

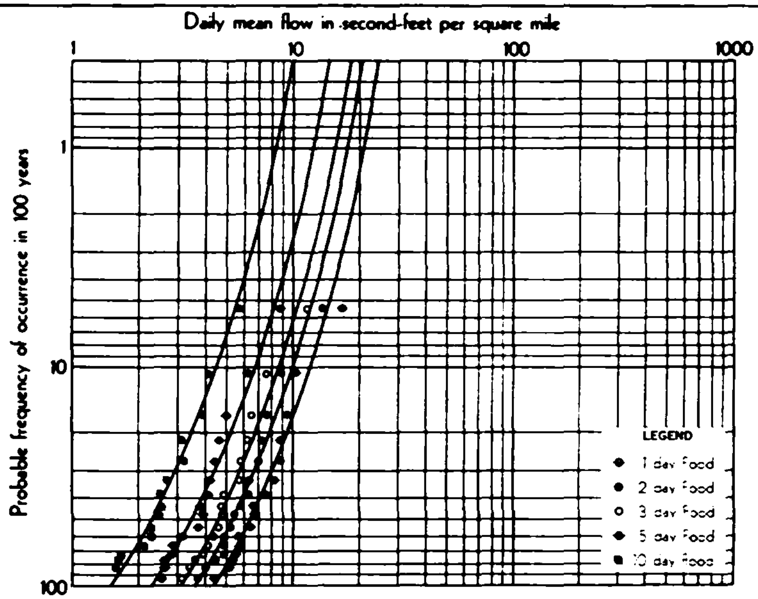
PLATE 14



ARROYO SECO FLOOD DISCHARGE

NEAR SOLEDAD

AREA OF DRAINAGE BASIN 240 SQUARE MILES

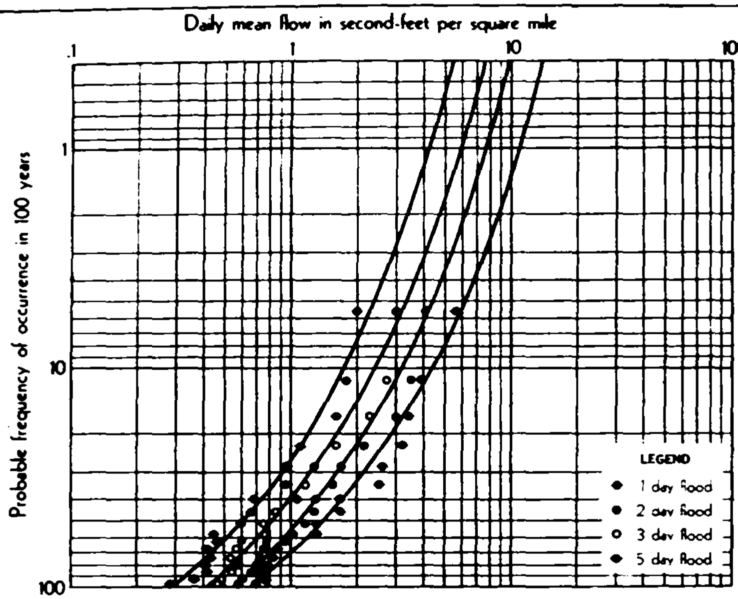


SALINAS RIVER FLOOD DISCHARGE

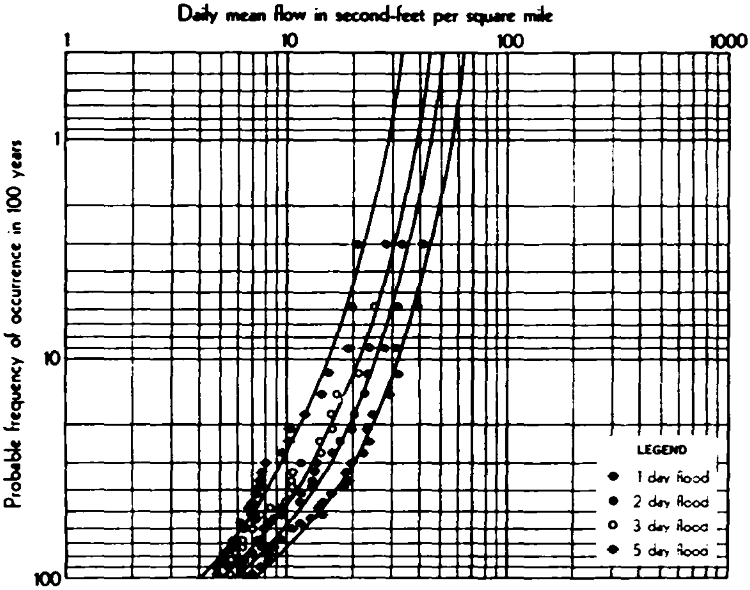
NEAR SPRECKELS

AREA OF DRAINAGE BASIN 4180 SQUARE MILES

PLATE 15



CUYAMA RIVER FLOOD DISCHARGE
NEAR SANTA MARIA
AREA OF DRAINAGE BASIN 903 SQUARE MILES



SANTA YNEZ RIVER FLOOD DISCHARGE
NEAR LOMPOC
AREA OF DRAINAGE BASIN 789 SQUARE MILES

Surface inflow to the Salinas River Basin from the Santa Lucia Range, and from that part of its drainage area above the mouth of Nacimiento River, is generally characterized by low total solubles, low boron, and low percent sodium. Bicarbonate is the principal negative ion. The good quality of the mixture of waters of Salinas, Nacimiento and San Antonio Rivers is indicated in Table 40 by analyses of two samples taken from Salinas River near San Ardo in 1941. One of these samples was taken at about the time of lowest flow for the year, and the other during the first winter flood. The analyses show total solubles ranging from 203 to 427 parts per million, and percent sodium from 22 to 32.

Surface waters in Santa Maria River include the flow of its tributaries, Cuyama and Sisquoc Rivers. Analyses of water from the Santa Maria show higher calcium sulphate than inflow from Sisquoc River, and the latter is lower in salinity than flow of either Cuyama or Santa Maria Rivers. Except during brief periods of flood flow, Cuyama and Santa Maria Rivers have total salinity close to the upper limit of safe use for sensitive crops.

Ground Waters

In this Area the principal source of underground replenishment is generally percolation of stream flow in channels of tributary streams. Overdrafts have caused local deterioration in quality of ground water in certain instances. However, except in a few minor ground water units replenished by poor surface waters, most underground waters of the Central Coastal Area are of good quality. In the lower Salinas, Pajaro, and Arroyo Grande Basins, several wells close to the coast have been abandoned in recent years because of increasing salinity. Inorganic analyses of waters in various ground water basins in the Area are given in Table 41.

The 1949 analyses of ground waters in southern Santa Clara Valley show excellent mineral quality, with low total solubles, low percent sodium, and low boron. Bicarbonate is the principal acid radical, and calcium and magnesium are rather evenly balanced as dominant bases.

Ground waters in San Benito Valley range from good to poor and unusable. Boron is generally present in moderate amounts along San Benito River, and total salinity gradually increases from south of Hollister to opposite San Juan Bautista. In the vicinity of Fairview, sulphates, boron, and percent sodium usually restrict usability of ground water for irrigation.

In chemical characteristics, the ground water in Pajaro Valley is similar to that of its principal source of recharge—drainage from the Santa Cruz Mountains and the Gabilan Range. Percolation in the channel of Pajaro River west of the San Andreas fault is small. Mineral solubles in ground waters of Pajaro Valley show marked increases in calcium and bicarbonates over ground waters in San Benito Valley, and lower content of magnesium, sodium, and boron. Chlorides are not present in significant amounts in ground waters of Pajaro Valley, except in a limited zone of marine intrusion adjacent to Monterey Bay.

Ground waters in Salinas Valley are grouped by chemical characteristics into three broad classes as to source: (1) those coming principally from Santa Lucia Range drainage, (2) those from Diablo Range drainage, and (3) those resulting from commingling of drainage from both sources. Runoff of excellent quality from the Santa Lucia Range commences earlier in the season and is better sustained than inferior quality runoff from the Diablo Range. Until about 1925, when irrigated acreage in Salinas Valley was approximately half the present, average runoff from the Santa Lucia Range occurring early in the season was sufficient to recharge fully all ground waters in Salinas Valley, except in minor deltas of east side streams south of King City. Consequently there was no remaining capacity in the ground water basins for retention of inferior quality drainage from the Diablo Range. However, heavy draft on ground waters in dry years since 1925 has increased retention of poor quality waters from the Diablo Range and resulted in enlargement of the zone of comminglement.

Ground waters recharged from drainage of the Santa Lucia Range vary in quality from excellent to good, while those recharged from commingling of drainages range from good to fair, and those recharged from Diablo Range drainage, from fair to unusable. The first eleven analyses for Salinas Valley given in Table 41 are of ground waters recharged from Santa Lucia Range drainage. The following seven are of ground waters recharged from commingling of drainages. The last six are of ground waters recharged from Diablo Range drainage. The latter are unsafe for irrigation use because of excessive salinity, excessive chlorides, or excessive boron.

Quality of ground waters in Arroyo Grande Valley, and in small basins along the coastal strip to the north in San Luis Obispo County, is generally good, except in minor areas of sea water encroachment. These are carbonate type waters, and calcium and magnesium are rather evenly balanced as the important bases.

In Santa Maria Valley the ground water is similar in quality to water of Santa Maria River, which contains a blend of high concentrations of sulphates from Cuyama River and low total solubles from Sisquoc River. Ground water in Sisquoc Valley generally reflects the good quality of water in Sisquoc River, and that in the vicinity of Lompoc is similar to water in Santa Ynez River.

All constituents in ground waters of Sisquoc and Santa Ynez Valleys are rather evenly balanced, and total salinity is moderate. Ground waters in the south coastal strip of Santa Barbara County in the vicinity of Carpinteria are calcium carbonate type, and generally low in total solubles.

TABLE 40

INORGANIC ANALYSES OF SURFACE WATERS, CENTRAL COA: AL AREA

Source and place of sampling	Date	Conductance (K x 10^6)	Boron, ppm	Percent sodium	eacting values of constituents in me/l and character formula in percent						
					(	Mg	Na	CO_3+HCO_3	Cl	SO_4	NO_3
COASTAL DRAINAGE											
San Lorenzo River at Santa Cruz	3/30/49	30.9	0.03	22	1.	0.77	0.76	1.69	0.43	1.13	Trace
					2	*12%*	*11%*	*26%*	*6%*	*18%*	------
Soquel Creek at junction of East and West Branches	3/15/49	39.2	0.08	20	2.	1.23	0.85	2.07	0.43	1.99	Trace
					2	*13%*	*10%*	*23%*	*5%*	*22%*	------
Corralitos Creek at Peterson's Ranch	3/17/49	31.1	0.00	20	2.	1.10	0.75	2.31	0.31	1.02	Trace
					2	*14%*	*10%*	*31%*	*4%*	*15%*	------
Uvas Creek at Watsonville Road	2/ 7/49	19.2	0.00	18	0.	0.98	0.42	1.58	0.20	0.44	Trace
					2	*21%*	*9%*	*36%*	*4%*	*10%*	------
Llagas Creek at Llagas Road	2/ 7/49	26.2	0.21	14	1.	1.67	0.46	2.33	0.26	0.52	Trace
					1	*26%*	*7%*	*37%*	*4%*	*9%*	------
Arroyo Seco near Soledad	5/ 1/30	--------	--------	6	2.	1.14	0.27	2.76	0.23	1.04	------
					3	*15%*	*3%*	*34%*	*3%*	*13%*	------
San Antonio River at Pleyto Bridge	10/15/31	49.1	0.03	20	2.	1.39	1.05	3.20	1.49	0.55	------
					2	*13%*	*10%*	*31%*	*14%*	*5%*	------

TABLE 40—Continued

INORGANIC ANALYSES OF SURFACE WATERS, CENTRAL COASTAL AREA

Source and place of sampling	Date	Conductance (K x 10⁵)	Boron, ppm	Percent sodium	Reacting values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
COASTAL DRAINAGE—Continued											
Salinas River at San Ardo Bridge	8/23/41	61	-------	32	2.55 *19%*	2.06 *15%*	2.22 *16%*	3.00 *22%*	1.30 *10%*	2.40 *18%*	------ ------
Salinas River at San Ardo Bridge	12/29/41	29	-------	22	1.25 *22%*	0.91 *17%*	0.61 *11%*	1.55 *27%*	0.35 *6%*	0.96 *17%*	------ ------
Arroyo Grande Creek at Arroyo Grande	11/11/32	98.3	0.12	12	5.87 *25%*	4.47 *19%*	1.50 *6%*	8.20 *33%*	3.20 *13%*	0.90 *4%*	------ ------
Sisquoc River near lower gaging station	3/ 5/43	-------	-------	20	2.90 *22%*	2.34 *18%*	1.23 *10%*	2.95 *23%*	0.24 *2%*	3.12 *25%*	------ ------
Santa Ynes River at Buellton	5/19/30	105	0.36	26	4.88 *18%*	4.96 *19%*	3.53 *13%*	6.30 *27%*	1.20 *5%*	4.22 *18%*	------ ------
DIABLO RANGE DRAINAGE											
Pacheco Creek at Lester Bridge	2/25/36	21.1	0.10	18	1.04 *22%*	0.93 *19%*	0.45 *9%*	1.69 *36%*	0.35 *8%*	0.24 *5%*	0.04 *1%*
Dos Picachos Creek at Hawkins Ranch	1/20/38	55.1	0.43	26	1.97 *16%*	2.50 *21%*	1.51 *13%*	3.99 *35%*	0.95 *8%*	0.67 *6%*	0.01 ------

Tres Pinos Creek at Boledo Park	2/25/36	34.1	0.21	24	1.34 *18%*	1.53 *20%*	0.92 *12%*	2.39 *33%*	0.57 *8%*	0.62 *8%*	0.07 *1%*
San Benito River at Paicines Intake	2/25/36	80.1	0.41	26	2.12 *12%*	1.70 *25%*	2.41 *13%*	5.48 *30%*	0.88 *5%*	2.71 *15%*	0.05 ------
Las Viboras Creek at Hawkins Ranch	10/15/31	33.7	0.11	30	1.13 *16%*	1.35 *19%*	1.02 *15%*	2.30 *32%*	0.60 *9%*	0.60 *9%*	------ ------
Cholame Creek at Shandon	4/ 9/08	------	------	64	5.50 *7%*	[illegible].20 *11%*	22.48 *32%*	5.31 *7%*	14.30 *19%*	17.20 *24%*	Trace ------
San Lorenzo Creek at King City Bridge	12/29/41	128	-------	46	3.30 *13%*	[illegible].87 *14%*	6.15 *23%*	2.65 *10%*	1.15 *4%*	9.40 *36%*	------ ------
Pancho Rico Creek at Railroad Bridge	12/29/41	231	-------	40	9.00 *19%*	[illegible].85 *11%*	9.35 *20%*	2.20 *5%*	1.65 *3%*	19.60 *42%*	------ ------
Indian Valley Creek at Douglas Ranch	4/ 8/08	-------	-------	28	6.30 *18%*	[illegible].65 *18%*	4.97 *14%*	4.33 *11%*	1.78 *5%*	13.40 *34%*	------ ------
Estrella Creek near mouth	8/23/41	218	*	62	3.95 *9%*	[illegible].95 *10%*	14.65 *31%*	4.95 *10%*	9.40 *20%*	9.50 *20%*	------ ------
Cuyama River above confluence with Sisquoc River	10/22/41	------	---	26	7.90 *21%*	[illegible].32 *16%*	5.06 *13%*	4.90 *13%*	1.94 *5%*	12.36 *32%*	Trace -----

* 0.69 ppm on May 23, 1930.

TABLE 41

INORGANIC ANALYSES OF GROUND WATERS, CENTRAL COASTAL AREA

Source and location	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Re[illegible]ing values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
South Santa Clara Valley:											
DWR Well No. 8-33, 1¾ mi. N. of Madrone	10/ 2/49	47.4	0.16	18	2.62 *22%*	2.21 *19%*	1.11 *9%*	3.91 *35%*	0.45 *4%*	1.18 *10%*	0.11 *1%*
DWR Well No. 2-15, 1¼ mi. N. of San Martin	10/ 2/49	35.4	0.09	16	1.55 *18%*	2.09 *24%*	0.74 *8%*	3.01 *38%*	0.40 *5%*	0.36 *4%*	0.24 *3%*
DWR Well No. 4-16, 2 mi. NW. of Gilroy	10/ 2/49	41.2	0.04	20	1.84 *17%*	2.37 *23%*	1.03 *10%*	3.70 *38%*	0.58 *6%*	0.30 *3%*	0.23 *3%*
DWR Well No. 7-43, 4 mi. S. of Gilroy	10/ 2/49	46.7	0.13	20	2.18 *19%*	2.44 *21%*	1.12 *10%*	3.91 *36%*	0.70 *6%*	0.74 *7%*	0.10 *1%*
DWR Well No. 7-108, 1 mi. SW. of Gilroy	11/ 4/49	44.4	0.10	22	2.30 *21%*	2.01 *18%*	1.17 *11%*	3.86 *38%*	0.44 *4%*	0.70 *7%*	0.11 *1%*
DWR Well No. 6-11, 4 mi. SE. of Gilroy	10/ 2/49	55.6	0.17	50	1.93 *14%*	1.57 *11%*	3.42 *25%*	5.09 *38%*	0.94 *7%*	0.63 *5%*	Trace ------
San Benito Valley:											
Well in SW ¼ Sec. 2, T13S, R5E, MDB&M	4/19/34	123	0.84	36	2.97 *11%*	5.40 *21%*	4.79 *18%*	5.89 *22%*	2.54 *10%*	4.87 *18%*	0.03 ------
Well in SE ¼ Sec. 28, T12S, R5E, MDB&M	11/ 6/34	128	0.80	38	2.72 *9%*	3.24 *22%*	5.63 *19%*	6.79 *24%*	2.46 *9%*	4.97 *17%*	0.04 ------

Well in SE ¼ Sec. 27, T12S, R4E, MDB&M	5/28/36	217	1.17	36	4.50	2.08	9.25	10.45	4.49	10.77	-----
					9%	*23%*	*18%*	*20%*	*9%*	*21%*	-----
Well in NW ¼ Sec. 30, T12S, R6E, MDB&M	4/20/33	253	5.83	78	1.80	3.77	19.52	7.60	15.30	2.72	Trace
					4%	*7%*	*39%*	*15%*	*30%*	*5%*	------
Well in SW ¼ Sec. 36, T11S, R5E, MDB&M	5/ 6/32	179	3.17	60	3.60	3.29	10.62	6.60	10.85	0.17	-----
					10%	*10%*	*30%*	*18%*	*31%*	*1%*	-----
Pajaro Valley:											
Well in NE ¼ Sec. 17, T12S, R2E, MDB&M	8/29/47	73.9	0.12	18	4.50	2.40	1.50	6.30	0.90	1.20	------
					27%	*14%*	*9%*	*38%*	*5%*	*7%*	------
DWR Well No. 2-70, ½ mi. SW. of Watsonville	6/30/47	61.4	0.19	20	3.70	1.60	1.30	4.30	0.80	0.90	------
					28%	*12%*	*10%*	*36%*	*7%*	*7%*	------
DWR Well No. 2-5, 1 mi. S. of Watsonville	6/30/47	73.9	0.20	26	3.70	1.70	1.90	4.60	1.00	1.10	------
					25%	*12%*	*13%*	*34%*	*8%*	*8%*	------
Salinas Valley:											
DWR Bull. No. 52A—Well No. 1-B-2, 1 mi. SW. of Castroville	7/26/44	59.9	0.07	34	1.50	2.50	2.00	3.60	1.70	0.70	------
					12%	*21%*	*17%*	*30%*	*14%*	*6%*	------
DWR Bull. No. 52A—Well No. 1-C-8, ½ mi. E. of Neponset	8/ 3/44	69.7	0.14	36	1.50	2.10	2.00	3.40	1.40	0.80	------
					13%	*19%*	*18%*	*30%*	*13%*	*7%*	------
DWR Bull. No. 52A—Well No. 2-C-59, 1/8 mi. NE. of Blanco School	9/22/44	60.6	--------	38	2.30	1.20	2.10	3.00	0.80	1.80	------
					21%	*10%*	*19%*	*27%*	*7%*	*16%*	------
DWR Bull. No. 52A—Well No. 3-C-39, ½ mi. S. of Santa Rita	7/ 6/42	49.8	0.03	28	2.67	1.02	1.43	3.97	0.91	0.15	0.04
					26%	*10%*	*14%*	*39%*	*9%*	*1%*	*1%*
DWR Bull. No. 52A—Well No. 2-D-37, 1 mi. SW. of Salinas	9/27/44	40.1	--------	0	0.70	3.30	0.00	2.50	0.50	1.00	------
					9%	*41%*	*0%*	*31%*	*6%*	*13%*	------

TABLE 41—Continued

INORGANIC ANALYSES OF GROUND WATERS, CENTRAL COASTA AREA

Source and location	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Re ing values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
Salinas Valley—Continued											
DWR Bull. No. 52A—Well No. 2-D-39, 1½ mi. SW. of Salinas	12/ 4/36	.....	...	20	2.20 23%	1.50 17%	0.90 10%	2.60 28%	1.00 11%	1.00 11%	....
DWR Bull. No. 52A—Well No. 3-D-45, 1 mi. S. of Salinas	6/16/38	...	...	18	2.60 29%	1.10 12%	0.80 9%	2.60 29%	0.60 7%	1.30 14%	....
DWR Bull. No. 52A—Well No. 4-D-75, 2½ mi. N. of Chualar	7/ 6/42	69.1	0.03	42	2.18 17%	1.57 12%	2.66 21%	2.39 19%	3.27 25%	0.15 1%	0.64 5%
DWR Bull. No. 52A—Well No. 4-E-38, 1½ mi. S. of Chualar	11/ 4/32	47.2	0.13	24	2.20 22%	1.57 16%	1.22 12%	2.60 28%	0.45 5%	1.67 17%	0.01 .....
DWR Bull. No. 52A—Well No. 7-F-12, ½ mi. E. of Soledad	8/21/41	......	0.06	74	0.70 6%	0.80 7%	3.90 37%	2.14 20%	3.01 27%	0.33 3%	....
DWR Bull. No. 52A—Well No. 7-G-22, 3 mi. NW. of Greenfield	6/10/44	55.7	0.04	52	1.50 13%	1.20 11%	3.00 26%	3.10 27%	0.80 7%	1.80 16%	....
DWR Bull. No. 52A—Well No. 5-F-19, 2 mi. S. of Gonzales	9/ 8/45	165	...	64	3.70 10%	2.90 8%	11.30 32%	5.90 16%	2.80 8%	9.20 26%	....
DWR Bull. No. 52A—Well No. 7-G-48, 3 mi. N. of Greenfield	11/ 9/45	176	......	56	5.00 16%	2.10 6%	9.00 28%	3.60 11%	4.20 13%	8.30 26%	....

DWR Bull. No. 52A—Well No. 7-G-49, 3½ mi. N. of Greenfield	4/26/44	176	0.26	56	6. 17	2.00 *5%*	10.30 *28%*	5.40 *14%*	4.10 *11%*	9.30 *25%*	------ ------
DWR Bull. No. 52A—Well No. 7-G-51, 3 mi. SE. of Soledad	9/ 8/45	182	0.18	6	12. 33	5.40 *14%*	1.10 *3%*	4.90 *13%*	4.90 *13%*	9.20 *24%*	------ ------
DWR Bull. No. 52A—Well No. 8-H-69, 2 mi. NW. of Coburn Station	9/28/29	101	0.29	30	4. 32	0.48 *3%*	2.36 *15%*	4.50 *20%*	1.80 *8%*	4.99 *22%*	------ ------
DWR Bull. No. 52A—Well No. 9-I-2, ¼ mi. S. of King City	11/ 4/32	93.5	0.32	34	3. 18	3.01 *15%*	3.20 *17%*	4.40 *23%*	1.45 *8%*	3.72 *19%*	0.09 ------
Well in SE. ¼ Sec. 8, T25S, R12E, MDB&M----------	11/12/36	162	0.42	32	5. 17	6.06 *17%*	5.76 *16%*	4.85 *13%*	5.53 *16%*	6.97 *20%*	0.29 *1%*
DWR Bull. No. 52A—Well No. 9-I-23, 2½ mi. NE. of King City	12/ 1/39	--------	4.50	48	6. 8	14.60 *18%*	19.70 *24%*	6.30 *6%*	10.10 *10%*	33.50 *34%*	------ ------
DWR Bull. No. 52A—Well No. 9-I-24, 2½ mi. NE. of King City	12/ 1/39	--------	4.50	48	8. 8	18.30 *18%*	25.20 *24%*	4.70 *5%*	12.00 *12%*	34.80 *33%*	------ ------
DWR Bull. No. 52A—Well No. 9-I-48n, ½ mi. NE. of King City	11/ 4/32	305	2.57	62	6. 12	4.80 *7%*	19.11 *31%*	4.11 *7%*	11.75 *19%*	15.22 *24%*	------ ------
DWR Bull. No. 52A—Well No. 10-I-9, 3½ mi. SW. of King City	8/ 7/41	--------	1.98	46	4. 10	6.60 *17%*	8.90 *23%*	3.90 *10%*	10.00 *26%*	5.70 *14%*	------ ------
DWR Bull. No. 52A—Well No. 12-K-1, ½ mi. E. of San Ardo	10/17/45	336	1.01	42	12. 16	10.20 *13%*	16.70 *21%*	3.60 *5%*	3.80 *6%*	32.20 *39%*	------ ------
DWR Bull. No. 52A—Well No. 12-K-13, ½ mi. N. of San Ardo	10/17/45	258	0.73	34	11. 19	8.40 *14%*	10.00 *17%*	4.60 *8%*	4.40 *7%*	21.00 *35%*	------ ------
Arroyo Grande Valley: Arroyo Grande Municipal Wells----------------------	1940	--------	--------	22	4. 21	3.94 *18%*	2.39 *11%*	6.57 *30%*	0.96 *4%*	3.40 *16%*	------ ------

TABLE 41—Continued

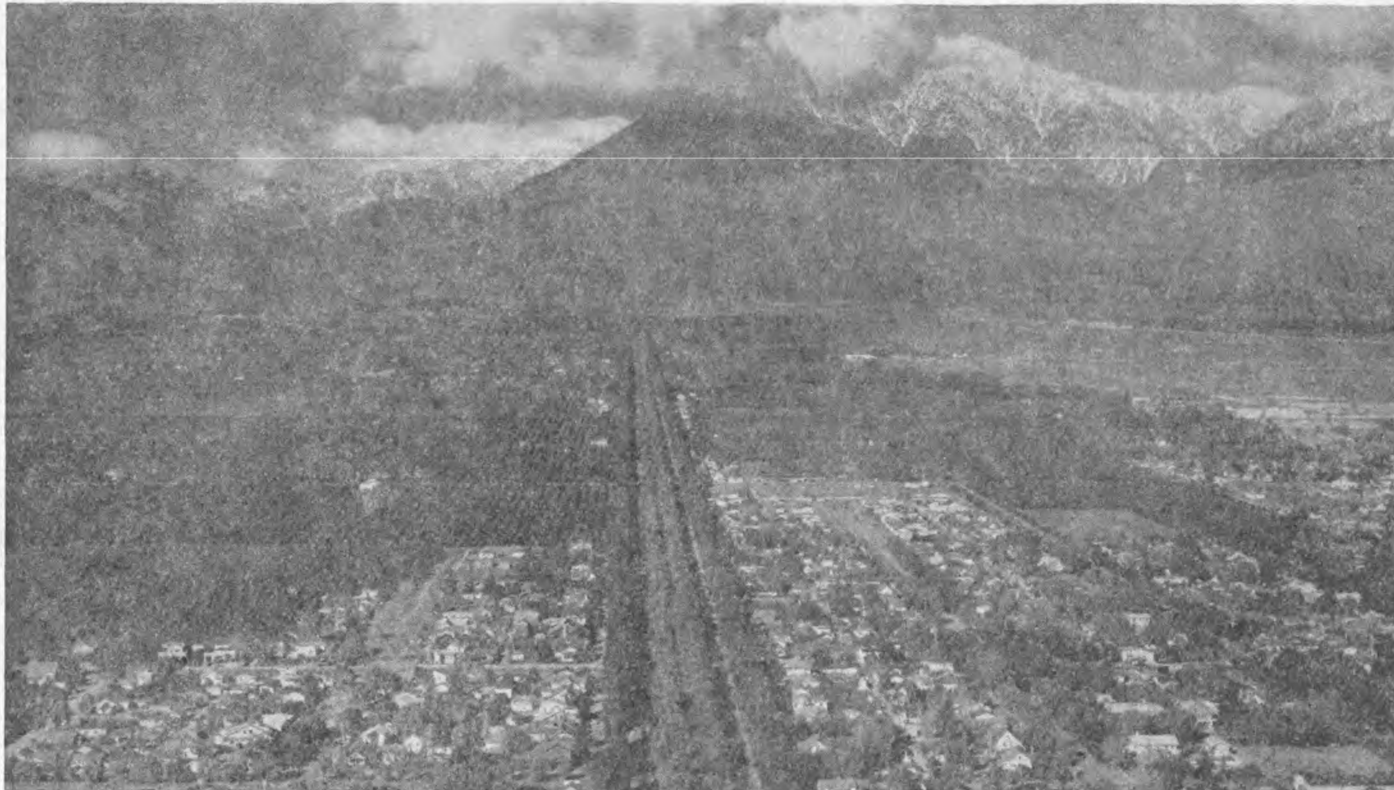
INORGANIC ANALYSES OF GROUND WATERS, CENTRAL COASTAL AREA

Source and location	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reacting values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3+HCO_3	Cl	SO_4	NO_3
Arroyo Grande Valley—Continued											
El Pismo Water District Wells	1940	-------	-------	16	3.35	3.37	1.22	5.13	1.16	1.65	------
					21%	21%	8%	32%	7%	11%	------
Shell Beach Domestic Well	7/ 5/31	149	0.30	36	5.03	5.26	5.79	7.25	5.05	3.74	------
					16%	16%	18%	23%	16%	11%	------
Cambria Municipal Well	6/ 6/35	111	0.21	14	4.84	6.00	1.89	8.26	1.63	3.13	0.01
					19%	24%	7%	31%	6%	13%	------
Santa Maria Valley:											
USGS Well No. 10/33—21F2	10/11/27	170	-------	26	7.30	5.48	4.40	3.91	1.18	11.75	0.31
					21%	16%	13%	11%	4%	34%	1%
USGS Well No. 10/34—12B1	11/ 3/27	155	-------	26	7.05	4.52	4.18	3.51	1.55	10.30	0.35
					23%	14%	13%	11%	5%	33%	1%
USGS Well No. 10/34—27H3	4/15/42	145	-------	20	6.90	5.65	2.91	3.88	1.24	10.16	------
					22%	18%	10%	13%	4%	33%	------
USGS Well No. 10/35—3N1	10/10/27	180	-------	28	7.80	5.49	5.00	4.51	3.44	9.66	0.71
					21%	15%	14%	13%	9%	26%	2%

Coastal Mountain drainage in Santa Barbara County:											
USGS Well No. 9/32—2A1	10/22/41	90	--------	22	4.00 *20%*	.68 *9%*	2.13 *11%*	4.27 *22%*	0.50 *3%*	5.02 *25%*	0.07 ------
USGS Well No. 9/34—3N3	4/15/42	32	--------	48	0.95 *15%*	.74 *1%*	1.52 *24%*	0.79 *13%*	1.46 *25%*	0.48 *8%*	0.23 *4%*
Three mi. from Ocean, W. of Lompoc	10/15/36	140	0.30	26	5.86 *19%*	.51 *8%*	4.36 *13%*	8.76 *28%*	3.68 *11%*	3.42 *10%*	0.14 *1%*
Buellton Municipal Well	1940	--------	--------	18	4.90 *23%*	.94 *8%*	2.00 *9%*	4.87 *22%*	1.97 *9%*	4.00 *19%*	------ ------
Carpinteria Municipal Well No. 1	1940	--------	--------	16	4.75 *30%*	.97 *2%*	1.22 *8%*	5.18 *33%*	0.84 *5%*	1.92 *12%*	------ ------
Carpinteria Municipal Deep Well (408 ft.)	1940	--------	--------	36	3.90 *25%*	.15 *7%*	2.78 *18%*	4.12 *30%*	0.81 *6%*	2.00 *14%*	------ ------

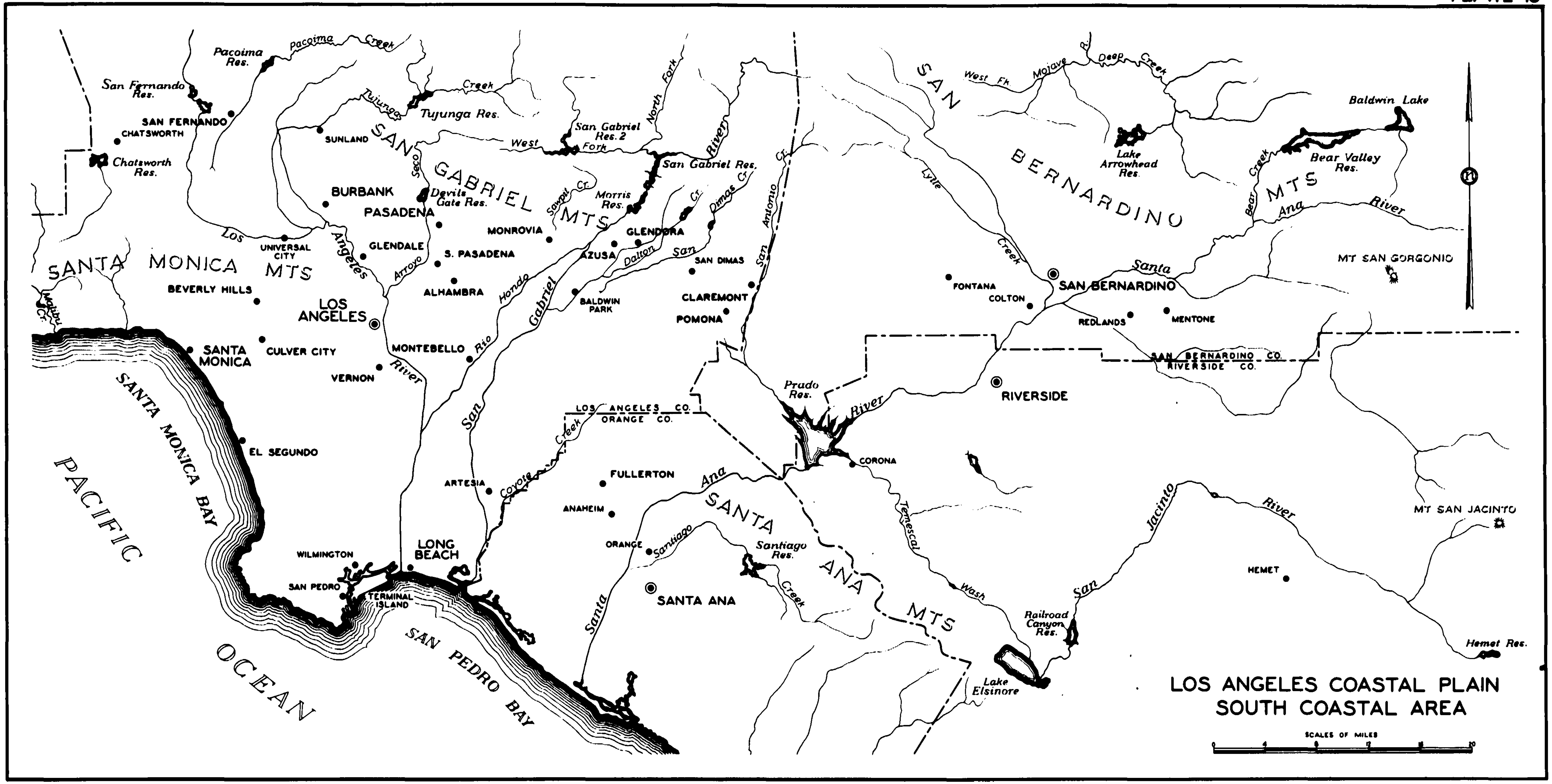
LIST OF ABBREVIATIONS USED IN TABLE 41

Abbreviation	*Name*
DWR	Division of Water Resources.
USGS	United States Geological Survey.
MDB&M	Mount Diablo Base and Meridian.



(Pacific Air Industries Photo)

UPPER SANTA ANA VALLEY—SOUTH COASTAL AREA


PACIFIC OCEAN
SANTA MONICA BAY
SAN PEDRO BAY
SANTA MONICA MTS
SAN GABRIEL MTS
SAN BERNARDINO MTS
SANTA ANA MTS
SAN FERNANDO
CHATSWORTH
Chatsworth Res.
San Fernando Res.
Pacoima Res.
Pacoima Creek
Tujunga Creek
Tujunga Res.
SUNLAND
BURBANK
PASADENA
Devils Gate Res.
GLENDALE
S. PASADENA
ALHAMBRA
MONROVIA
Morris Res.
San Gabriel Res.
San Gabriel Res. 2
West Fork
North Fork
AZUSA
GLENDORA
SAN DIMAS
CLAREMONT
POMONA
BALDWIN PARK
UNIVERSAL CITY
BEVERLY HILLS
LOS ANGELES
SANTA MONICA
CULVER CITY
VERNON
MONTEBELLO
EL SEGUNDO
ARTESIA
WILMINGTON
SAN PEDRO
TERMINAL ISLAND
LONG BEACH
Los Angeles River
Rio Hondo
San Gabriel River
Coyote Creek
LOS ANGELES CO.
ORANGE CO.
FULLERTON
ANAHEIM
ORANGE
SANTA ANA
Santa Ana River
Santiago Creek
Santiago Res.
Prado Res.
CORONA
Temescal Wash
Lake Elsinore
Railroad Canyon Res.
RIVERSIDE
FONTANA
COLTON
SAN BERNARDINO
REDLANDS
MENTONE
SAN BERNARDINO CO.
RIVERSIDE CO.
Lytle Creek
San Antonio Cr.
Dalton
San Dimas Cr.
Lake Arrowhead Res.
West Fk Mojave R.
Deep Creek
Baldwin Lake
Bear Valley Res.
Bear Creek
MT SAN GORGONIO
MT SAN JACINTO
San Jacinto River
HEMET
Hemet Res.
Malibu Cr.
LOS ANGELES COASTAL PLAIN
SOUTH COASTAL AREA
SCALES OF MILES

CHAPTER VII. SOUTH COASTAL AREA

The most populous of the seven Areas of the State is the South Coastal Area. Relative to its extent, greater expenditures have been necessary here than in any other part of California to overcome the disparity between local water resources and the heavy combined demand for urban, suburban, industrial, and agricultural uses. Furthermore, part of the supply must be imported if needs of the Area are to be fully met.

LOCATION AND DESCRIPTION

The South Coastal Area, designated Area No. 4 on Plate 2 and shown in part on Plate 16, "Los Angeles Coastal Plain of the South Coastal Area," lies between latitudes 32½° and 35° N., and extends 200 miles along the Pacific Ocean, with a maximum width of 75 miles. It comprises all basins draining into the ocean between the southeastern boundary of Rincon Creek Basin in Ventura County and the California-Mexico boundary, not including the portion of the Tia Juana Basin which lies in Mexico. The Area is separated from deserts on the north and east by the Tehachapi, San Gabriel, San Bernardino, and San Jacinto Mountains, and by the coastal ranges of San Diego County. Steep slopes and sparse chaparral-type vegetation, with some conifers at higher elevations, are characteristic features of drainage basins above valley floors as far east as San Bernardino. The higher peaks exceed 9,000 feet in elevation, and numerous ridges rise above 5,000 feet. The most prominent peaks are Mount San Antonio with elevation of 10,080 feet, Mount San Gorgonio with elevation of 11,485 feet, and Mount San Jacinto with elevation of 10,831 feet. Considering the short distance between the east and west boundaries of the Area, variations in climate and vegetation are wide. As an example, sections of the western end of Riverside County are arid with wide temperature variations, while the coast of San Diego County has a mild and equable climate which has been described as subtropical.

STREAMS AND AREAS OF DRAINAGE BASINS

Principal streams of the South Coastal Area are Santa Clara, Los Angeles, San Gabriel, Santa Ana, Santa Margarita, San Luis Rey, San Dieguito, San Diego, and Tia Juana Rivers. Shorter streams draining the coastal slope are Ventura, Sweetwater, and Otay Rivers, and San Juan and a number of other creeks. Santa Ana River Basin is the largest drainage basin, and occupies nearly one-fourth of the South Coastal Area. Table 42 lists areas of drainage basins in the Area.

TABLE 42

AREAS OF DRAINAGE BASINS, SOUTH COASTAL AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, South Coastal Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
1	Padre Juan Canyon Group	**24**	**0**	**24**
	Ventura River Basin			
2-1	Above gage near Ventura (Casitas Bridge)	162	25	187
2-2	Remainder of Ventura River	32	7	39
	Total, Ventura River	**194**	**32**	**226**
	Santa Clara River Basin			
3-1	Above river crossing of Ventura-Los Angeles County Line	587	40	627
3-2	Piru Creek above gage near Piru	429	3	432
3-3	Sespe Creek above gage near Fillmore	254	0	254
3-4	Santa Paula Creek above gage near Santa Paula	40	0	40
3-5	Remainder of Santa Clara River	145	107	252
	Total, Santa Clara River	**1,455**	**150**	**1,605**
4	Calleguas and Conejo Creek Group	**237**	**180**	**417**
	Malibu Creek Group			
5-1	Malibu Creek above gage at Crater Camp	103	0	103
5-2	Topanga Creek above mouth of Topanga Creek	20	0	20
5-3	Ballona Creek above gage at Sawtelle Blvd.	35	73	108
5-4	Remainder of Malibu Creek Group	136	22	158
	Total, Malibu Creek Group	**294**	**95**	**389**
6	West Coastal Plain Group	**32**	**145**	**177**
	Los Angeles River Basin			
7-1a	Pacoima Creek above gage near San Fernando	28	0	28
7-1b	Little Tujunga Creek above gage near San Fernando	21	0	21
7-1c	Tujunga Creek above gage near Sunland	106	0	106
7-1d	Verdugo Channel above gage at Estelle Ave.	21	2	23
7-1e	Remainder of Los Angeles River above gage above Arroyo Seco	141	192	333
7-1	Above gage above Arroyo Seco	317	194	511
7-2a	Flint Wash above gage at Berkshire Ave.	3	2	5
7-2b	Arroyo Seco above gage near Pasadena	16	0	16
7-2c	Eaton Creek above gage near Pasadena	7	0	7
7-2d	Little Santa Anita Creek above gage near Sierra Madre	2	0	2
7-2e	Santa Anita Creek above gage near Sierra Madre	11	0	11
7-2f	Sawpit Creek above gage near Monrovia	5	0	5
7-2g	Remainder of San Gabriel Mountains drainage	16	0	16
7-2h	Remainder of Los Angeles River Basin above confluence of Los Angeles River and Rio Hondo	30	130	160
	Above confluence of Los Angeles River and Rio Hondo	407	326	733
7-3	Remainder of Los Angeles River	5	84	89
	Total, Los Angeles River	**412**	**410**	**822**
	San Gabriel River Basin			
8-1	Above gage near Azusa	211	0	211
8-2a	Fish Creek above gage near Duarte	7	0	7
8-2b	Rogers Creek above gage near Azusa	6	0	6
8-2c	Little Dalton Creek above gage near Glendora	3	0	3
8-2d	Dalton Creek above gage near Glendora	8	0	8
8-2e	San Dimas Creek above gage near San Dimas	18	0	18
8-2f	San Jose Creek above gage near Whittier	42	43	85
8-2g	Remainder of San Gabriel River above Whittier Narrows	38	72	110
	Above Whittier Narrows	333	115	448
8-3a	Coyote Creek above gage near Artesia	40	70	110
8-3b	Remainder of San Gabriel River	2	24	26
	Total, San Gabriel River	**375**	**209**	**584**

TABLE 42—Continued

AREAS OF DRAINAGE BASINS, SOUTH COASTAL AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, South Coastal Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
9	Anaheim Creek Group	**21**	**151**	**172**
	Santa Ana River Basin			
10-1	Above gage near Mentone	164	25	189
10-4a	San Antonio Creek above gage near Claremont	17	0	17
10-4b	Cucamonga Creek above gage near Upland	10	0	10
10-4c	Day Creek above gage near Etiwanda	5	0	5
10-4d	Lytle Creek above gage near Fontana	43	5	48
10-4e	Lone Pine Creek above gage near Keenbrook	11	4	15
10-4f	Cajon Creek above gage near Keenbrook	25	16	41
10-4g	Devil Canyon Creek above gage near San Bernardino	6	0	6
10-4h	Waterman Creek above gage near Arrowhead Springs	5	0	5
10-4i	Strawberry Creek above gage near Arrowhead Springs	9	0	9
10-4j	City Creek above gage near Highland	20	0	20
10-4k	Plunge Creek above gage near East Highland	17	0	17
10-4l	Mill Creek above gage near Craftonville	43	0	43
10-4m	San Timoteo Creek above gage near Redlands	69	54	123
10-2	San Jacinto River above gage near San Jacinto	142	0	142
10-3	Remainder of San Jacinto River above Lake Elsinore outlet	328	288	616
	Above Lake Elsinore outlet	470	288	758
10-4n	Remainder of Santa Ana River above Prado Dam	442	505	947
	Above Prado Dam	1,356	897	2,253
10-5	Santiago Creek above gage near Villa Park	80	4	84
10-6	Remainder of Santa Ana River	46	35	81
	Total, Santa Ana River	**1,482**	**936**	**2,418**
11	Newport Bay Group	**54**	**198**	**252**
	San Juan Creek Group			
12-1	Aliso Creek above gage at El Toro	8	1	9
12-2	Trabuco Creek above gage near San Juan Capistrano	36	0	36
12-3	San Juan Creek above gage near San Juan Capistrano	110	0	110
12-4	Remainder of San Juan Group	108	11	119
	Total, San Juan Creek Group	**262**	**12**	**274**
13	Arroyo San Onofre Group	**220**	**21**	**241**
	Santa Margarita River Basin			
14-1	Temecula Creek above gage at Nigger Canyon	277	44	321
14-2	Murrieta Creek above gage at Temecula	131	96	227
14-3	Remainder of Santa Margarita River above gage at Railroad Canyon	34	11	45
	Above gage at Railroad Canyon	442	151	593
14-4	From gage at Railroad Canyon to gage near Fallbrook	50	0	50
	Above gage near Fallbrook	492	151	643
14-5	From gage near Fallbrook to gage near Deluz	65	0	65
	Above gage near Deluz	557	151	708
14-6	From gage near Deluz to gage at Ysidora	20	13	33
	Total of Santa Margarita River above gage at Ysidora	**577**	**164**	**741**
	San Luis Rey River Basin			
15-1	Above Henshaw Dam	161	45	206
15-2a	From Henshaw Dam to Escondido Ditch intake	32	0	32
	Above Escondido Ditch intake	193	45	238
15-2b	From Escondido Ditch intake to gage at Sicklers Mill near Pala	81	0	81
	Above gage at Sicklers Mill near Pala	274	45	319
15-2c	From gage at Sicklers Mill near Pala to gage at Monserate Narrows	58	0	58
	Above gage at Monserate Narrows	332	45	377

TABLE 42—Continued

AREAS OF DRAINAGE BASINS, SOUTH COASTAL AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, South Coastal Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
	San Luis Rey River Basin—Continued			
15-2d	From gage at Monserate Narrows to gage at Bonsall	85	0	85
	Above gage at Bonsall	417	45	462
15-2e	From gage at Bonsall to gage near Bonsall	56	0	56
	Above gage near Bonsall	473	45	518
15-3a	From gage near Bonsall to gage near Oceanside	30	14	44
	Above gage near Oceanside	503	59	562
15-3b	From gage near Oceanside to gage at Oceanside	1	2	3
	Total of San Luis Rey River above gage at Oceanside	**504**	**61**	**565**
16	San Marcos Creek Group	**167**	**48**	**215**
	San Dieguito River Basin			
17-1a	Santa Ysabel Creek above gage at Santa Ysabel	13	0	13
17-1b	From gage at Santa Ysabel to gage at Sutherland, near Mesa Grande	41	0	41
17-1	Above gage at Sutherland, near Mesa Grande	54	0	54
17-2a	Black Canyon Creek above gage near Mesa Grande	15	0	15
17-2b	Temescal Creek above gage near Almond	32	0	32
17-2c	Remainder of Santa Ysabel Creek above gage at Pamo	10	0	10
	Above gage at Pamo	111	0	111
17-3a	From gage at Pamo to gage near Escondido	15	2	17
	Above gage near Escondido	126	2	128
17-3b	Santa Maria Creek above gage near Ramona	35	25	60
17-3c	Guejito Creek above gage near Escondido	28	0	28
17-3d	Remainder of San Dieguito River above gage at Bernardo	54	0	54
	Above gage at Bernardo	243	27	270
17-3e	From gage at Bernardo to Hodges Dam	27	6	33
	Above Hodges Dam	270	33	303
17-4	From Hodges Dam to gage near Del Mar	24	0	24
	Total of San Dieguito River above gage near Del Mar	**294**	**33**	**327**
18	Los Penasquitos Creek Group	**138**	**40**	**178**
	San Diego River Basin			
19-1a	Boulder Creek at Cuyamaca Dam	7	5	12
19-1b	Remainder of Boulder Creek above confluence with San Diego River	22	0	22
	Above confluence with San Diego River	29	5	34
19-1c	Remainder of San Diego River above diverting dam	69	0	69
	Above diverting dam, near Lakeside	98	5	103
19-1d	South Fork of San Diego River above gage near Alpine	45	0	45
19-1e	Remainder of San Diego River above El Capitan Dam	42	0	42
19-1	Above El Capitan Dam	185	5	190
19-3a	From El Capitan Dam to gage at Lakeside	14	2	16
	Above gage at Lakeside	199	7	206
19-2	San Vicente Creek above gage near Foster	75	0	75
19-3b	Remainder of San Diego River above Old Mission Dam	69	26	95
	Above Old Mission Dam, near Santee	343	33	376
19-4a	From Old Mission Dam to Loop Dam	5	0	5
	Above Loop Dam	348	33	381
19-4b	Alvarado Creek above Murray Dam	4	0	4
19-4c	Remainder of San Diego River above gage at Old Town (San Diego)	41	9	50
	Total of San Diego River above gage at Old Town	**393**	**42**	**435**
20	San Diego Bay Group	**103**	**62**	**165**

TABLE 42—Continued

AREAS OF DRAINAGE BASINS, SOUTH COASTAL AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, South Coastal Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
	Sweetwater River Basin			
21a	Above gage near Descanso	44	0	44
21b	From gage near Descanso to gage near Dehesa	67	0	67
	Above gage near Dehesa	111	0	111
21c	From gage near Dehesa to Sweetwater Dam	70	0	70
	Total Sweetwater River above Sweetwater Dam	**181**	**0**	**181**
	Otay River Basin			
22a	Proctor Valley Creek above Upper Otay Dam	12	0	12
22b	Remainder of Otay River above Lower Otay Dam	87	0	87
	Total of Otay River above Lower Otay Dam	**99**	**0**	**99**
	Tia Juana River Basin			
23-1	Cottonwood Creek above Morena Dam (California)	97	15	112
23-2a	Pine Valley Creek above gage near Dulzura (California)	100	0	100
23-2b	Remainder of Cottonwood Creek above Barrett Dam (California)	35	0	35
	Above Barrett Dam (California)	232	15	247
	Rio Del Tecate (including Campo Creek), in Mexico	(69)	(0)	(69)
23-2c	Rio Del Tecate (including Campo Creek), in California	87	9	96
	Above confluence with Cottonwood Creek	156	9	165
23-2d	Remainder of Cottonwood Creek above Marron Dam Site No. 1 (California)	64	5	69
	Above Marron Dam Site No. 1	452	29	481
	Tia Juana River above Rodriguez Dam, in Mexico	(927)	(0)	(927)
23-3a	Tia Juana River above Rodriguez Dam, in California	6	0	6
	Remainder of Tia Juana River above gage near Nestor			
	In Mexico	(201)	(0)	(201)
23-3b	In California	17	13	30
	Total of Tia Juana River above gage near Nestor			
	In Mexico	(1,197)	(0)	(1,197)
	In California	**406**	**42**	**448**
	TOTALS, SOUTH COASTAL AREA IN CALIFORNIA	**7,924**	**3,031**	**10,955**

PRECIPITATION

The northern and central parts of California receive nearly all their precipitation from storms originating in the West and Northwest Pacific. Such storms also contribute substantially to precipitation of the South Coastal Area, but those from the southwest are also of significance. Air masses moving in from the coast are forced over high mountains bounding the Area on the north and east, at times subjecting their western slopes to heavy precipitation. However, precipitation in the Area as a whole is moderate, and almost entirely confined to winter months. Snow falls in the mountains, and at higher elevations it is sufficient to support many ski resorts. Although rare in the coastal strip, snow there occasionally has reached measurable depths. Thunderstorms seldom occur along the coast but are not uncommon in the mountains.

Precipitation records are available for 10 or more seasons at 590 stations in the South Coastal Area, and for shorter periods at an additional 390 stations. Continuous recorders are operated at 73 stations. The precipitation station at San Diego, in operation since 1850, furnishes the longest unbroken record. The stations in operation would give excellent coverage for the 10,955 square miles of the Area if they were located strategically. In some metropolitan areas there are more stations than necessary, while in mountainous and sparsely inhabited regions the coverage usually is insufficient. Data relating to precipitation stations and records are presented in Tables 43, 44, and 45.

A maximum recorded seasonal precipitation of 94.07 inches occurred at Kellys Camp, at an elevation 8,300 feet in San Bernardino County, during 1940-1941, the average for this station being 51.99 inches. At Acton, at an elevation 3,100 feet in Los Angeles County, a minimum seasonal precipitation of 2.77 inches was recorded in 1897-1898. The average for this station is 10.16 inches. Precipitation stations with unbroken records of 10 years or longer extend from sea level to elevation 8,300 feet.

High intensities often accompany heavy rains in mountains of the South Coastal Area. During 24 hours on January 16 and 17, 1916, 16.71 inches of rain were recorded at Squirrel Inn, at an elevation of 5,700 feet in San Bernardino County. On August 12, 1891, 11.50 inches fell in one hour and twenty minutes at Campo, at an elevation of 3,000 feet in San Diego County. Weather Bureau data on maximum recorded rainfall at Los Angeles and San Diego, taken from the Bureau's Technical Paper No. 2, are presented in the following tabulation.

MAXIMUM RECORDED RAINFALL, IN INCHES IN SPECIFIED MINUTE AND HOUR PERIODS, AT LOS ANGELES AND SAN DIEGO

Precipitation station and date	Minutes					Hours				
	5	10	15	30	60	2	3	6	12	24
Los Angeles	0.44	0.66	0.81	1.12	1.51	1.99	2.28	2.97	4.16	7.36
Month, day	1/14	2/18	2/18	2/18	2/18	2/18	2/18	2/18	12/31	12/31
Year	1908	1914	1914	1914	1914	1914	1914	1914	1933	1933
San Diego	0.33	0.49	0.65	0.94	1.16	2.09	2.21	2.36	2.45	3.62
Month, day	3/15	2/14	11/27	3/15	4/5	4/5	4/5	4/5	4/5	12/23
Year	1905	1927	1939	1905	1926	1926	1926	1926	1926	1940

The four precipitation stations listed in Table 46 were selected as representative of elevations and topographic patterns within the Area. Maximum and minimum precipitation figures in the table are monthly extremes during the period of record. The bar diagrams of Plate 17, "Distribution of Precipitation at Selected Stations, South Coastal Area," show graphically for these stations the monthly distribution of precipitation in the maximum and minimum seasons of record. Also shown is monthly distribution during the season in which precipitation was nearest to the average seasonal total given in Table 46.

Mean seasonal precipitation on valley and mesa lands of the South Coastal Area for the period from 1897-98 to 1946-47 is estimated to have been 2,470,000 acre-feet, as shown in Table 47. Valley lands of this Area lie chiefly in three regional groups, each of which receives light to moderate rainfall. In the northern end of the Area, in Ventura County, valley floor precipitation averages about 15 inches per season. The largest regional group of valley lands in the Area is in the basins of the Los Angeles, San Gabriel, and Santa Ana Rivers, where average precipitation ranges from about 12 inches seasonally along the coast to about 20 inches near the base of the mountains. Precipitation on valley and mesa lands of this regional group is listed in Table 47 by ground water basins, rather than by surface drainage basins as elsewhere. In San Diego County, in the southern end of the Area, valley lands are scattered along the coast and in pockets along streams draining the interior. Average seasonal valley floor precipitation in this county ranges from about 10 to about 20 inches, increasing with distance from the ocean.

TABLE 43

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-48	Acton Charities Camp No. 2	Los Angeles	34° 27′ 118° 12′	2,550	1929-30 1946-47	CD LAFC	11.54	9.36	1940-41 1933-34	22.09 4.19
4-13	Acton (Hubbard Ranch)	Los Angeles	34° 31′ 118° 15′	3,250	1899-00 1946-47	D LAFC	12.15	11.80	1940-41 1899-00	23.74 2.92
4-12	Acton, (Near Mellon)	Los Angeles	34° 30′ 118° 16′	3,100	1896-97 1946-47	BCD LAFC	10.16	10.11	1940-41 1897-98	23.10 2.77
4-242	Alhambra	Los Angeles	34° 06′ 118° 08′	497	1916-17 1927-28	D DWR	16.25	18.11	1921-22 1918-19	24.59 10.68
4-243	Alhambra (City Hall)	Los Angeles	34° 06′ 118° 08′	485	1926-27 1946-47	BCD LAFC	20.59	19.02	1940-41 1927-28	41.01 12.72
4-107	Alta Canada	Los Angeles	34° 13′ 118° 13′	1,900	1919-20 1936-37	C LAFC	23.75	25.25	1921-22 1923-24	38.60 12.08
4-128	Altadena (Allen)	Los Angeles	34° 11′ 118° 06′	1,055	1898-99 1946-47	C LAFC	23.36	23.11	1940-41 1898-99	46.33 7.58
4-126	Altadena (Barton)	Los Angeles	34° 11′ 118° 07′	1,312	1918-19 1946-47	CD LAFC	24.54	23.29	1940-41 1923-24	47.05 11.18
4-120	Altadena (Chiesa)	Los Angeles	34° 12′ 118° 09′	1,350	1926-27 1946-47	BCD LAFC & USWB	23.62	22.64	1940-41 1927-28	48.75 13.97
4-121	Altadena (Curtis)	Los Angeles	34° 11′ 118° 09′	1,184	1922-23 1946-47	BC LAFC	22.65	22.59	1940-41 1927-28	47.12 13.07
4-253	Arcadia (Forbrich)	Los Angeles	34° 07′ 118° 03′	455	1925-26 1946-47	BD LAFC	20.96	20.11	1940-41 1932-33	43.67 12.85
4-143	Arcadia Pumping Plant	Los Angeles	34° 10′ 118° 02′	611	1928-29 1946-47	CD LAFC	22.61	21.48	1940-41 1941-42	41.65 14.25
4-112	Arroyo Seco Patrol Station	Los Angeles	34° 12′ 118° 11′	1,155	1928-29 1946-47	CD LAFC	24.17	22.96	1940-41 1941-42	50.93 13.64
4-116	Arroyo Seco Ranger Station	Los Angeles	34° 13′ 118° 10′	1,220	1934-35 1946-47	BD LAFC	27.45	23.07	1940-41 1941-42	51.70 14.51
4-387	Artesia	Los Angeles	35° 52′ 118° 05′	49	1917-18 1946-47	BC OCFC & LAFC	12.86	12.56	1940-41 1924-25	31.46 6.62
4-509	Avalon	Los Angeles	33° 20′ 118° 20′	30	1910-11 1946-47	B USWB	13.11	12.83	1940-41 1923-24	28.10 4.89
4-269	Azusa Chamber of Commerce	Los Angeles	34° 08′ 117° 54′	607	1928-29 1946-47	D LAFC & USWB	21.47	20.38	1940-41 1932-33	40.12 12.48
4-272	Azusa (Griffith)	Los Angeles	34° 06′ 117° 54′	545	1894-95 1946-47	D LAFC & DWR	19.03	19.11	1940-41 1898-99	35.91 7.26
4-270	Azusa (Foothill Ranch)	Los Angeles	34° 08′ 117° 54′	615	1916-17 1946-47	CD LAFC & DWR	20.15	20.19	1940-41 1923-24	38.77 11.08
4-271	Azusa (Hibsch)	Los Angeles	34° 08′ 117° 54′	602	1927-28 1946-47	CD LAFC	20.98	20.31	1940-41 1932-33	38.36 12.94

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-262	Baldwin Park Experiment Station	Los Angeles	34° 06′ 117° 58′	387	1932-33 1946-47	BC LAFC	19.80	17.22	1940-41 1932-33	36.72 11.48
4-263	Baldwin Park No. 1 (Leach)	Los Angeles	34° 05′ 117° 58′	378	1924-25 1946-47	BCD LAFC	18.07	16.99	1940-41 1932-33	35.70 10.87
4-258	Bassett	Los Angeles	34° 03′ 118° 00′	293	1924-25 1946-47	CD LAFC	16.79	15.74	1940-41 1924-25	36.49 8.96
4-210	Bel Aire Administration Bldg.	Los Angeles	34° 05′ 118° 27′	540	1928-29 1946-47	CD LAFC	20.49	18.66	1940-41 1929-30	41.21 12.20
4-202	Bel Aire Bay Club	Los Angeles	34° 03′ 118° 04′	95	1928-29 1944-45	BD LAFC	16.52	14.68	1940-41 1932-33	33.12 10.40
4-378	Bell Chamber of Commerce	Los Angeles	33° 59′ 118° 12′	142	1928-29 1946-47	BD LAFC	15.80	14.38	1940-41 1945-46	31.62 10.32
4-69	Bell Canyon (Johnson)	Los Angeles	34° 13′ 118° 39′	930	1925-26 1944-45	CD LAFC	15.67	14.26	1940-41 1941-42	37.44 10.68
4-382	Bellflower (Bank)	Los Angeles	33° 53′ 118° 08′	68	1924-25 1936-37	B LAFC	12.32	12.53	1934-35 1924-25	21.29 7.69
4-214	Beverly Hills (City Hall)	Los Angeles	34° 04′ 118° 24′	255	1925-26 1946-47	BCD LAFC	18.04	15.74	1940-41 1927-28	37.67 10.45
4-163	Big Dalton Dam	Los Angeles	34° 10′ 117° 49′	1,575	1929-30 1946-47	CD LAFC	27.84	25.97	1940-41 1932-33	46.24 15.02
4-146	Big Santa Anita Dam	Los Angeles	34° 11′ 118° 01′	1,400	1927-28 1946-47	D LAFC	26.38	25.54	1940-41 1927-28	47.41 16.37
4-114	Big Tujunga (Edison Station)	Los Angeles	34° 18′ 118° 10′	2,445	1929-30 1946-47	CD LAFC	27.89	24.61	1940-41 1929-30	51.86 14.91
4-110	Big Tujunga Dam No. 1	Los Angeles	34° 18′ 118° 11′	2,290	1920-21 1946-47	CD LAFC	29.93	27.62	1940-41 1941-42	57.70 15.78
4-49	Blum Ranch	Los Angeles	34° 28′ 118° 09′	2,900	1931-32 1946-47	CD LAFC	11.97	9.59	1940-41 1933-34	22.38 4.82
4-10	Bouquet Canyon	Los Angeles	34° 35′ 118° 22′	3,000	1928-29 1946-47	BCD LAFC	18.02	15.19	1940-41 1929-30	31.49 9.85
4-98	Brand Estate (Glendale)	Los Angeles	34° 11′ 118° 17′	815	1928-29 1941-42	CD LAFC	18.09	15.91	1940-41 1929-30	36.05 10.96
4-100	Brand Park	Los Angeles	34° 11′ 118° 16′	1,250	1929-30 1946-47	CD LAFC	21.06	19.69	1940-41 1929-30	43.76 13.16
4-105	Briggs Terrace	Los Angeles	34° 14′ 118° 14′	2,325	1933-34 1946-47	CD LAFC	31.12	26.48	1940-41 1941-42	53.03 18.25
4-299	Brydons Ranch	Los Angeles	34° 09′ 117° 46′	1,680	1928-29 1946-47	CD LAFC	23.96	21.80	1940-41 1941-42	39.40 14.12
4-95	Burbank (City Hall)	Los Angeles	34° 11′ 118° 18′	665	1929-30 1946-47	CD LAFC	19.11	17.18	1940-41 1929-30	41.11 10.69
4-70	Calabasas (Farmer)	Los Angeles	34° 10′ 118° 38′	924	1927-28 1946-47	CD LAFC	18.06	16.76	1940-41 1928-29	41.92 10.79
4-239	California Tech	Los Angeles	34° 08′ 118° 08′	750	1931-32 1946-47	CD LAFC	23.25	20.22	1940-41 1932-33	44.27 14.70

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-157	Camp Rincon	Los Angeles	34° 14′ 117° 52′	1,530	1932-33 1946-47	CD LAFC	32.56	29.46	1940-41 1941-42	53.40 17.39
4-251	Chapman Wells	Los Angeles	34° 09′ 118° 04′	630	1926-27 1946-47	CD LAFC	22.08	21.15	1940-41 1932-33	41.28 13.66
4-91	Chappells Ranch	Los Angeles	34° 15′ 118° 22′	1,060	1925-26 1946-47	CD LAFC	18.28	15.83	1940-41 1935-36	38.20 10.75
4-286	Charter Oak	Los Angeles	34° 06′ 117° 50′	805	1925-26 1946-47	BCD LAFC	20.51	18.96	1940-41 1941-42	36.66 11.72
4-72	Chatsworth	Los Angeles	34° 15′ 118° 36′	965	1927-28 1946-47	CD LAFC & USWB	17.40	15.75	1940-41 1932-33	38.36 10.72
4-71	Chatsworth Reservoir	Los Angeles	34° 14′ 118° 37′	865	1925-26 1946-47	CD LAFC	16.27	14.67	1940-41 1941-42	36.62 10.66
4-301	Claremont	Los Angeles	34° 06′ 117° 46′	1,196	1891-92 1946-47	B USWB	18.58	18.67	1940-41 1898-99	38.35 7.85
4-309	Claremont (Bernard)	Los Angeles	34° 08′ 117° 43′	1,390	1913-14 1932-33	D LAFC & USWB	20.81	20.48	1921-22 1923-24	32.79 12.95
4-311	Claremont (Fire Station)	Los Angeles	34° 06′ 117° 43′	1,165	1927-28 1946-47	BCD LAFC	19.25	17.88	1940-41 1932-33	36.88 11.72
4-310	Claremont, (Indian Hill)	Los Angeles	34° 07′ 117° 43′	1,405	1927-28 1944-45	CD LAFC	20.70	19.64	1940-41 1941-42	39.74 12.16
4-220	Clark Estate	Los Angeles	34° 02′ 118° 19′	203	1930-31 1946-47	CD LAFC	16.60	14.45	1940-41 1932-33	32.74 10.58
4-115	Clear Creek	Los Angeles	34° 17′ 118° 10′	3,125	1927-28 1946-47	CD LAFC	32.47	30.15	1940-41 1941-42	60.60 17.81
4-123	Colby Ranch No. 1	Los Angeles	34° 18′ 118° 07′	3,500	1897-98 1946-47	BD LAFC	31.17	31.17	1921-22 1898-99	61.75 8.07
4-162	Coldbrook Camp	Los Angeles	34° 18′ 117° 50′	3,300	1922-23 1936-37	D USWB & LAFC	26.45	29.07	1936-37 1932-33	46.01 17.04
4-377	Compton (American Sugar)	Los Angeles	33° 50′ 118° 13′	30	1919-20 1942-43	BD DWR	12.95	12.47	1940-41 1924-25	28.17 5.61
4-376	Compton (Day)	Los Angeles	33° 54′ 118° 13′	68	1924-25 1946-47	BD LAFC	13.81	12.99	1940-41 1924-25	29.06 8.02
4-380	County Farm	Los Angeles	33° 56′ 118° 09′	104	1930-31 1946-47	CD LAFC	15.21	13.43	1940-41 1930-31	32.11 9.31
4-280	Covina No. 1	Los Angeles	34° 05′ 117° 52′	627	1899-00 1928-29	D DWR	18.61	19.18	1913-14 1899-00	29.63 9.98
4-275	Covina (Mathews)	Los Angeles	34° 05′ 117° 53′	527	1929-30 1941-42	CD LAFC	19.22	16.57	1940-41 1932-33	36.73 11.35
4-281	Covina (Temple)	Los Angeles	34° 06′ 117° 52′	575	1902-03 1946-47	CD LAFC	19.25	18.44	1940-41 1903-04	36.14 9.85
4-276	Covina (Thorpe)	Los Angeles	34° 04′ 117° 53′	630	1929-30 1946-47	CD LAFC	18.01	16.22	1940-41 1932-33	32.57 10.57
4-89	Cowane Ranch	Los Angeles	34° 17′ 118° 23′	1,120	1930-31 1943-44	D LAFC	20.70	16.39	1940-41 1941-42	35.71 11.44

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for--		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-196	Crags Country Club	Los Angeles	34° 06′ 118° 44′	600	1913-14 1941-42	CD LAFC	22.70	21.70	1940-41 1923-24	50.77 8.49
4-51	Crystal Lake Park (East)	Los Angeles	34° 20′ 117° 50′	5,740	1931-32 1946-47	CD LAFC	42.27	38.34	1940-41 1932-33	67.08 22.70
4-158	Crystal Lake Park (West)	Los Angeles	34° 19′ 117° 51′	5,370	1931-32 1942-43	CD LAFC	42.34	36.51	1937-38 1941-42	64.41 22.84
4-215	Culver City	Los Angeles	34° 01′ 118° 23′	65	1930-31 1946-47	CD LAFC	15.47	13.67	1940-41 1945-46	30.45 10.04
4-216	Curson (Eastside)	Los Angeles	34° 07′ 118° 21′	1,125	1928-29 1945-46	CD LAFC	19.65	17.67	1940-41 1929-30	39.21 11.21
4-155	Dalton No. 1	Los Angeles	34° 10′ 117° 54′	800	1924-25 1946-47	CD LAFC	23.18	22.37	1940-41 1924-25	43.89 12.64
4-412	Diamond Bar Ranch No. 1	Los Angeles	33° 58′ 117° 51′	710	1930-31 1945-46	CD OCFC	19.86	17.25	1940-41 1932-33	37.11 11.64
4-289	Diamond Bar Ranch No. 2	Los Angeles	34° 02′ 117° 49′	685	1920-21 1946-47	ABCD LAFC	16.92	16.44	1940-41 1923-24	32.98 10.16
4-14	Diamond Bar Ranch No. 3	Los Angeles	33° 59′ 117° 50′	765	1930-31 1946-47	CD LAFC	18.74	16.15	1940-41 1932-33	37.20 12.13
4-374	Dominguez Hill	Los Angeles	33° 52′ 118° 14′	195	1930-31 1946-47	CD LAFC	13.89	12.26	1940-41 1933-34	28.25 7.21
4-381	Downey Fire Station	Los Angeles	33° 57′ 118° 08′	118	1925-26 1946-47	D LAFC	15.64	14.19	1940-41 1935-36	34.17 10.00
4-42	Dry Canyon Reservoir	Los Angeles	34° 28′ 118° 32′	1,450	1921-22 1946-47	BCD LAFC	12.49	12.67	1940-41 1923-24	31.47 7.14
4-260	Duarte (Monrovia Citrus)	Los Angeles	34° 08′ 117° 59′	458	1932-33 1946-47	CD LAFC	22.06	19.96	1940-41 1932-33	38.31 12.85
4-391	East Whittier	Los Angeles	33° 58′ 118° 02′	215	1925-26 1946-47	BCD LAFC	16.03	14.74	1940-41 1932-33	33.73 9.83
4-113	El Mirador Ranch	Los Angeles	34° 10′ 118° 11′	1,025	1924-25 1946-47	CD LAFC	22.45	21.68	1940-41 1927-28	48.38 12.73
4-255	El Monte Chamber of Commerce	Los Angeles	34° 07′ 118° 02′	301	1923-24 1946-47	BCD LAFC	16.80	16.19	1940-41 1923-24	37.02 9.06
4-365	El Segundo (Standard Oil)	Los Angeles	33° 55′ 118° 25′	135	1928-29 1946-47	BCD LAFC	13.42	12.20	1940-41 1945-46	29.58 8.17
4-76	Encino (Adohr Dairy)	Los Angeles	34° 10′ 118° 32′	815	1923-24 1946-47	BCD LAFC	16.94	16.44	1940-41 1923-24	42.69 6.70
4-203	Encino Reservoir	Los Angeles	34° 09′ 118° 31′	1,000	1928-29 1946-47	BCD LAFC	16.66	15.16	1940-41 1935-36	39.72 8.53
4-154	Fish Canyon	Los Angeles	34° 10′ 117° 56′	1,050	1918-19 1940-41	D LAFC	26.53	26.26	1940-41 1918-19	48.73 13.67
4-109	Flintridge Fire Station	Los Angeles	34° 11′ 118° 12′	1,325	1930-31 1946-47	CD LAFC	24.79	22.89	1940-41 1941-42	51.01 14.67
4-86	Ford Craig Ranch	Los Angeles	34° 19′ 118° 25′	1,455	1929-30 1946-47	CD LAFC	21.07	18.30	1940-41 1941-42	40.49 13.89

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-338	Franklin (Mullholland)	Los Angeles	34° 08′ 117° 25′	1,175	1927-28 1946-47	CD LAFC	20.46	19.00	1940-41 1929-30	45.15 9.52
4-200	Carrapata Creek	Los Angeles	34° 07′ 118° 35′	990	1925-26 1946-47	BCD LAFC	23.26	21.39	1940-41 1927-28	51.97 14.62
4-73	Girard	Los Angeles	34° 10′ 118° 36′	892	1897-98 1946-47	BCD LAFC	16.75	16.68	1940-41 1898-99	44.16 6.05
4-74	Girard Rancho	Los Angeles	34° 10′ 118° 36′	875	1912-13 1946-47	BCD LAFC	15.55	15.04	1940-41 1923-24	36.27 7.20
4-231	Glendale	Los Angeles	34° 09′ 118° 14′	603	1927-28 1944-45	BCD LAFC	19.02	18.15	1940-41 1927-28	39.92 10.47
4-227	Glendale (Bartlett)	Los Angeles	34° 09′ 118° 16′	530	1909-10 1946-47	D LAFC	18.42	18.15	1940-41 1923-24	41.62 8.30
4-102	Glendale (Jones)	Los Angeles	34° 10′ 118° 15′	620	1926-27 1946-47	CD LAFC	18.72	17.93	1940-41 1927-28	41.92 9.52
4-277	Glendora No. 1	Los Angeles	34° 08′ 117° 52′	740	1892-93 1911-12	BC USWB	21.37	22.80	1892-93 1898-99	39.27 6.39
4-267	Glendora (Azusa Plant)	Los Angeles	34° 09′ 117° 55′	675	1930-31 1946-47	CD LAFC	22.87	21.08	1940-41 1932-33	39.88 12.55
4-287	Glendora (C. C. Warren)	Los Angeles	34° 08′ 117° 49′	965	1923-24 1946-47	CD LAFC	21.48	20.69	1940-41 1923-24	41.22 11.73
4-283	Glendora (Englewilde Ranch)	Los Angeles	34° 09′ 117° 51′	1,200	1924-25 1946-47	CD LAFC	23.85	22.44	1940-41 1924-25	42.36 13.20
4-274	Glendora (H. C. Warren)	Los Angeles	34° 09′ 117° 53′	865	1933-34 1942-43	D LAFC	26.92	22.44	1940-41 1941-42	41.37 14.44
4-278	Glendora (Irrigation Co.)	Los Angeles	34° 08′ 117° 52′	782	1929-30 1946-47	CD LAFC	21.60	20.14	1940-41 1932-33	38.75 12.33
4-279	Glendora (West)	Los Angeles	34° 08′ 117° 52′	822	1880-81 1946-47	CD LAFC	23.24	21.95	1889-90 1898-99	49.74 7.24
4-77	Granada (Pumping Plant)	Los Angeles	34° 17′ 118° 31′	1,130	1927-28 1946-47	D LAFC	18.83	17.49	1940-41 1932-33	39.86 11.85
4-222	Griffith Park (North Slope)	Los Angeles	34° 08′ 118° 18′	1,600	1930-31 1946-47	CD LAFC	21.31	18.82	1940-41 1932-33	42.87 11.41
4-225	Griffith Park (Nursery)	Los Angeles	34° 08′ 118° 17′	750	1930-31 1946-47	CD LAFC	19.28	16.36	1940-41 1932-33	36.96 11.87
4-240	Griffith Park (South Slope)	Los Angeles	34° 08′ 118° 18′	1,400	1930-31 1946-47	CD LAFC	19.26	17.02	1940-41 1930-31	39.28 13.12
4-223	Griffith Park (Tunnel)	Los Angeles	34° 07′ 118° 18′	1,100	1930-31 1946-47	CD LAFC	19.44	17.18	1940-41 1932-33	40.26 11.84
4-226	Griffith Park (Zoo)	Los Angeles	34° 08′ 118° 17′	650	1933-34 1946-47	CD LAFC	22.18	18.89	1940-41 1941-42	40.36 12.18

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum: Season	Maximum and minimum: Inches
4-99	Haines Canyon (Lower)	Los Angeles	34° 16′ 118° 16′	2,250	1918-19 1946-47	BCD LAFC	25.06	24.86	1940-41 1923-24	53.04 11.54
4-101	Haines Canyon (Upper)	Los Angeles	34° 16′ 118° 15′	3,450	1918-19 1946-47	BCD LAFC	30.57	30.33	1940-41 1923-24	61.32 13.81
4-96	Haines Rock Crusher	Los Angeles	34° 16′ 118° 17′	2,150	1933-34 1943-44	C LAFC	26.36	20.67	1940-41 1941-42	45.15 13.60
4-217	Hancock Park	Los Angeles	34° 04′ 118° 21′	177	1929-30 1946-47	BCD LAFC	16.89	15.18	1940-41 1929-30	34.73 11.13
4-221	Head Works Pumping Plant	Los Angeles	34° 09′ 118° 18′	473	1930-31 1946-47	CD LAFC	20.84	18.41	1940-41 1944-45	41.50 14.19
4-129	Henninger Flats	Los Angeles	34° 12′ 118° 05′	2,515	1929-30 1946-47	CD LAFC	30.17	28.22	1940-41 1941-42	55.18 18.85
4-234	Highland Park	Los Angeles	34° 07′ 118° 11′	622	1896-97 1946-47	BC LAFC	18.59	18.52	1940-41 1898-99	43.90 6.86
4-141	Hoegee's Camp	Los Angeles	34° 12′ 118° 02′	2,600	1925-26 1946-47	CD LAFC	43.91	42.28	1942-43 1941-42	76.62 21.27
4-219	Hollywood (City Engineer)	Los Angeles	34° 05′ 118° 20′	305	1931-32 1946-47	BCD LAFC	18.32	15.94	1940-41 1945-46	35.77 12.30
4-218	Hollywood Dam	Los Angeles	34° 07′ 118° 20′	750	1929-30 1946-47	BCD LAFC	18.27	16.42	1940-41 1929-30	37.77 11.45
4-245	Huntington Library (San Marino)	Los Angeles	34° 08′ 118° 07′	670	1920-21 1946-47	CD LAFC	20.26	19.68	1940-41 1923-24	42.60 9.73
4-375	Huntington Park	Los Angeles	33° 59′ 118° 13′	175	1928-29 1946-47	D LAFC	15.81	14.38	1940-41 1945-46	33.83 10.57
4-367	Inglewood High School	Los Angeles	33° 58′ 118° 22′	125	1919-20 1946-47	BCD LAFC	13.35	13.05	1940-41 1923-24	33.11 6.56
4-87	Kiener Ranch	Los Angeles	34° 19′ 118° 24′	1,320	1928-29 1944-45	CD LAFC	20.83	17.62	1940-41 1941-42	38.49 12.75
4-130	Kinneloa Ranch	Los Angeles	34° 11′ 118° 05′	1,380	1922-23 1946-47	CD LAFC	24.60	24.53	1940-41 1923-24	44.94 11.80
4-108	La Canada (Brigham)	Los Angeles	34° 12′ 118° 12′	1,255	1912-13 1946-47	D LAFC	23.93	23.04	1940-41 1923-24	50.70 10.43
4-159	La Cienega	Los Angeles	34° 18′ 117° 51′	4,650	1928-29 1946-47	CD LAFC	35.55	33.78	1940-41 1941-42	59.82 21.53
4-106	La Crescenta Ranger Station	Los Angeles	34° 13′ 118° 14′	1,565	1927-28 1946-47	BCD LAFC	26.54	24.01	1940-41 1927-28	47.93 13.19
4-379	Laguna Bell	Los Angeles	33° 59′ 118° 09′	140	1930-31 1946-47	BCD LAFC	16.02	14.14	1940-41 1935-36	34.80 10.24
4-246	Lamanda Park	Los Angeles	34° 09′ 118° 06′	746	1922-23 1946-47	BCD LAFC	21.49	21.43	1940-41 1923-24	45.50 9.34
4-392	La Mirada (Standard Oil)	Los Angeles	33° 53′ 118° 01′	86	1923-24 1946-47	BCD OCFC	13.80	13.30	1940-41 1924-25	33.51 6.93
4-90	Lankershim Power Plant	Los Angeles	34° 12′ 118° 23′	732	1929-30 1946-47	CD LAFC	15.62	14.04	1940-41 1935-36	35.53 9.15

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
4-302	La Verne (Leader)	Los Angeles	34° 06′ 117° 46′	1,054	1904-05 1946-47	CD LAFC & DWR	20.07	18.66	1940-41 1912-13	35.23 11.02
4-304	La Verne (Sheldon)	Los Angeles	34° 07′ 117° 45′	1,212	1908-09 1928-29	D LAFC	20.10	20.90	1913-14 1918-19	34.25 10.45
4-193	Lechuza Patrol Sta.	Los Angeles	34° 05′ 118° 53′	1,500	1933-34 1946-47	CD LAFC	25.85	22.01	1940-41 1945-46	51.36 16.42
4-393	Leeffingwell Rancho	Los Angeles	33° 56′ 118° 00′	253	1919-20 1946-47	BCD LAFC	15.10	14.36	1940-41 1923-24	30.50 8.16
4-94	Little Tujunga	Los Angeles	34° 19′ 118° 20′	1,875	1929-30 1946-47	CD LAFC	22.92	20.73	1940-41 1933-34	47.60 13.56
4-308	Live Oak Canyon	Los Angeles	34° 01′ 117° 44′	1,255	1919-20 1946-47	D LAFC	20.74	20.14	1940-41 1932-33	39.46 12.33
4-446	Long Beach	Los Angeles	33° 47′ 118° 11′	50	1907-08 1946-47	BD USWB	12.41	12.14	1940-41 1911-12	29.09 4.91
4-444	Long Beach (Alamitos Land)	Los Angeles	33° 46′ 118° 12′	30	1894-95 1945-46	BCD LAFC	12.97	12.99	1940-41 1924-25	27.87 6.30
4-445	Long Beach (City Hall)	Los Angeles	33° 46′ 118° 12′	30	1928-29 1946-47	BCD LAFC	12.75	11.61	1940-41 1933-34	24.98 6.03
4-443	Long Beach (Southern Pacific)	Los Angeles	33° 46′ 118° 12′	50	1907-08 1917-18	B SP Co.	12.18	11.52	1913-14 1911-12	19.78 4.91
4-448	Long Beach (1st & Prospect)	Los Angeles	33° 46′ 118° 08′	15	1925-26 1946-47	BCD LAFC	11.79	10.84	1940-41 1928-29	24.27 6.19
4-447	Long Beach (10th & Roswell)	Los Angeles	33° 47′ 118° 09′	15	1925-26 1946-47	BCD LAFC	13.23	12.16	1940-41 1928-29	27.03 7.36
4-442	Long Beach (16th & Chestnut)	Los Angeles	33° 47′ 118° 12′	40	1924-25 1946-47	BCD LAFC	12.39	11.66	1940-41 1924-25	27.39 5.62
4-50	Loomis Ranch (Alder Creek)	Los Angeles	34° 21′ 118° 03′	4,050	1924-25 1946-47	BCD USWB & LAFC	21.44	20.71	1940-41 1933-34	40.46 12.00
4-320	Lordsburg	Los Angeles	34° 06′ 117° 40′	1,320	1904-05 1917-18	B USWB	21.00	18.75	1906-07 1912-13	29.09 11.02
4-229	Los Angeles	Los Angeles	34° 03′ 118° 15′	338	1877-78 1946-47	B USWB	15.43	14.81	1883-84 1898-99	38.18 5.59
4-232	Los Angeles (Ducammon)	Los Angeles	34° 03′ 118° 14′	273	1872-73 1895-96	B LAFC	20.64	20.61	1889-90 1876-77	55.14 5.22
4-224	Los Angeles (Junior College)	Los Angeles	34° 05′ 118° 18′	315	1932-33 1946-47	BCD LAFC	17.93	15.59	1940-41 1932-33	35.68 11.41
4-233	Los Angeles (Edison No. 3)	Los Angeles	34° 03′ 118° 12′	325	1927-28 1946-47	D LAFC	17.24	16.01	1940-41 1927-28	34.90 11.52
4-230	Los Angeles (Water Department)	Los Angeles	34° 03′ 118° 15′	300	1929-30 1946-47	CD LAFC	16.54	14.87	1940-41 1929-30	34.59 10.17

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-125	Lowe Observatory	Los Angeles	34° 13′ 118° 07′	3,420	1896-97 1937-38	BC USWB & LAFC	26.22	26.44	1913-14 1898-99	43.45 10.72
4-205	Mandeville Canyon No. 1	Los Angeles	34° 04′ 118° 30′	470	1928-29 1941-42	CD LAFC	21.46	18.41	1940-41 1932-33	40.70 13.53
4-194	Mason Estate	Los Angeles	34° 05′ 118° 53′	1,155	1931-32 1946-47	CD LAFC	23.46	20.41	1940-41 1932-33	47.61 15.07
4-11	Mint Canyon	Los Angeles	34° 31′ 118° 21′	2,400	1930-31 1944-45	C LAFC	15.30	12.12	1940-41 1933-34	27.17 8.94
4-147	Monrovia Canyon (Lower End)	Los Angeles	34° 10′ 118° 00′	965	1917-18 1938-39	C LAFC & USWB	22.55	23.83	1936-37 1923-24	36.72 12.32
4-256	Monrovia (Chamber of Commerce)	Los Angeles	34° 09′ 118° 00′	560	1913-14 1946-47	CD LAFC	20.58	19.99	1940-41 1923-24	40.76 10.02
4-149	Monrovia Falls	Los Angeles	34° 11′ 117° 59′	1,800	1928-29 1946-47	CD LAFC	31.62	30.03	1940-41 1932-33	52.99 18.76
4-148	Monrovia (O'Conner)	Los Angeles	34° 10′ 118° 00′	694	1920-21 1946-47	CD LAFC	21.59	21.18	1940-41 1923-24	38.36 11.48
4-383	Montana Ranch	Los Angeles	33° 51′ 118° 07′	47	1915-16 1946-47	CD LAFC	13.17	12.54	1940-41 1924-25	31.13 6.21
4-156	Morris Dam	Los Angeles	34° 11′ 117° 53′	1,210	1930-31 1946-47	D LAFC & USWB	29.16	26.93	1940-41 1941-42	50.22 16.84
4-124	Mt. Lowe Tavern	Los Angeles	34° 14′ 118° 07′	4,460	1926-27 1936-37	BC USWB	28.98	30.21	1934-35 1932-33	45.91 17.56
4-208	Mt. St. Mary's College	Los Angeles	34° 05′ 118° 29′	1,025	1930-31 1946-47	CD LAFC	22.07	19.09	1940-41 1932-33	43.87 12.38
4-132	Mt. Wilson Airway	Los Angeles	34° 14′ 118° 04′	5,709	1904-05 1946-47	B USWB	34.79	33.00	1940-41 1923-24	74.02 17.45
4-133	Mt. Wilson (Power House)	Los Angeles	34° 14′ 118° 03′	5,850	1904-05 1946-47	D LAFC	34.91	33.31	1940-41 1923-24	74.00 17.29
4-168	Mouth of San Antonio Canyon	Los Angeles	34° 10′ 117° 41′	2,500	1904-05 1946-47	D LAFC	29.70	28.36	1940-41 1918-19	48.58 14.40
4-4	Munz Ranch	Los Angeles	34° 40′ 118° 25′	3,250	1927-28 1942-43	CD LAFC	21.50	19.59	1931-32 1929-30	31.66 14.42
4-43	Newhall	Los Angeles	34° 23′ 118° 32′	1,270	1877-78 1946-47	B USWB	17.61	19.01	1883-84 1898-99	42.11 5.44
4-44	Newhall (Forestry Station)	Los Angeles	34° 23′ 118° 32′	1,245	1927-28 1946-47	CD LAFC	19.87	17.98	1940-41 1927-28	44.69 10.45
4-244	Newmark	Los Angeles	34° 03′ 118° 08′	375	1930-31 1946-47	BCD LAFC	17.20	15.20	1940-41 1932-33	32.16 10.79
4-372	Ninty Sixth & Central (Edison)	Los Angeles	33° 57′ 118° 15′	121	1930-31 1946-47	BCD LAFC	14.73	13.02	1940-41 1945-46	30.99 8.42
4-92	North Hollywood	Los Angeles	34° 10′ 118° 22′	593	1906-07 1946-47	BCD LAFC	17.96	17.40	1940-41 1924-25	38.82 8.60

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-75	North Los Angeles	Los Angeles	34° 14′ 118° 33′	797	1920-21 1946-47	D LAFC	15.77	15.31	1940-41 1923-24	38.34 6.87
4-259	North Whittier (Cole Ranch)	Los Angeles	34° 00′ 118° 00′	600	1925-26 1946-47	BCD LAFC	19.28	17.49	1940-41 1932-33	36.80 12.55
4-388	Norwalk (Chamber of Commerce)	Los Angeles	33° 54′ 188° 04′	83	1926-27 1946-47	CD LAFC	14.60	13.49	1940-41 1928-29	31.26 8.12
4-111	Oakwilde	Los Angeles	34° 15′ 118° 11′	1,820	1927-28 1946-47	CD LAFC	30.00	27.86	1940-41 1941-42	55.67 15.99
4-127	Opid's Camp	Los Angeles	34° 15′ 118° 06′	4,350	1917-18 1946-47	BCD LAFC & USWB	41.66	41.76	1921-22 1923-24	89.58 21.31
4-47	Pacoima Dam	Los Angeles	34° 20′ 118° 24′	1,500	1915-16 1946-47	D LAFC	20.75	19.55	1940-41 1923-24	40.24 9.94
4-88	Pacoima (Warehouse)	Los Angeles	34° 15′ 118° 24′	955	1930-31 1946-47	CD LAFC	18.76	16.57	1940-41 1935-36	37.54 11.55
4-312	Padua Hills	Los Angeles	34° 09′ 117° 42′	1,768	1925-26 1946-47	CD LAFC	24.21	22.87	1940-41 1932-33	43.43 14.74
4-438	Palos Verdes (Office)	Los Angeles	33° 48′ 118° 23′	300	1926-27 1946-47	BD LAFC	13.00	12.01	1940-41 1928-29	26.86 8.08
4-241	Pasadena	Los Angeles	34° 08′ 118° 08′	805	1892-93 1946-47	B USWB	20.05	20.47	1940-41 1898-99	46.32 6.64
4-236	Pasadena (Bennett)	Los Angeles	34° 08′ 118° 10′	807	1872-73 1881-82	C LAFC	17.90	17.89	1873-74 1876-77	28.80 5.05
4-118	Pasadena (Chlorine Plant)	Los Angeles	34° 12′ 118° 10′	1,181	1916-17 1946-47	CD LAFC	23.63	23.68	1940-41 1923-24	51.38 10.93
4-235	Pasadena (Water Department)	Los Angeles	34° 08′ 118° 10′	800	1882-83 1902-03	C Pas. WD	19.70	18.54	1883-84 1897-98	44.93 8.92
4-3	Pine Canyon Patrol Station	Los Angeles	34° 40′ 118° 26′	3,900	1931-32 1946-47	CD LAFC	21.46	17.21	1940-41 1933-34	36.36 13.01
4-45	Placerita Canyon (Morsus Ranch)	Los Angeles	34° 23′ 118° 29′	*1,480	1928-29 1946-47	CD LAFC	23.27	20.80	1940-41 1928-29	45.54 13.48
4-437	Point Vicente	Los Angeles	33° 44′ 118° 25′	125	1926-27 1946-47	CD LAFC	11.94	11.03	1940-41 1933-34	25.32 7.26
4-306	Pomona	Los Angeles	34° 03′ 117° 45′	870	1913-14 1946-47	B USWB	19.04	18.21	1940-41 1918-19	37.23 10.58
4-307	Pomona (Frater)	Los Angeles	34° 02′ 117° 44′	778	1930-31 1946-47	CD LAFC	18.54	16.38	1940-41 1932-33	37.13 10.54
4-303	Pomona (Nichols)	Los Angeles	34° 06′ 117° 46′	860	1883-84 1924-25	C Private	20.04	19.55	1883-84 1898-99	39.86 7.77
4-305	Pomona (Southern Pacific)	Los Angeles	34° 04′ 117° 45′	862	1883-84 1946-47	CD LAFC	19.41	16.47	1883-84 1884-85	39.47 10.57
4-249	Potrero Heights	Los Angeles	34° 03′ 118° 05′	297	1926-27 1946-47	CD LAFC	18.41	16.82	1940-41 1935-36	36.93 12.68

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
4-293	Puddingstone Dam	Los Angeles	34° 06′ 117° 48′	1,030	1927-28 1946-47	CD LAFC	18.42	17.11	1940-41 1932-33	36.96 10.39
4-266	Puente (Edison)	Los Angeles	34° 01′ 117° 56′	376	1920-21 1946-47	CD LAFC	17.21	16.72	1940-41 1923-24	34.13 9.68
4-261	Puente Hills (Elliott)	Los Angeles	34° 00′ 118° 00′	360	1924-25 1946-47	CD LAFC	17.81	16.58	1940-41 1924-25	35.81 11.37
4-400	Puente Hills (Weisel Ranch)	Los Angeles	33° 57′ 117° 55′	675	1925-26 1946-47	CD OCFC	17.47	15.88	1940-41 1932-33	32.49 11.54
4-7	Radium Hot Springs	Los Angeles	34° 36′ 118° 34′	2,075	1929-30 1946-47	CD USWB & LAFC	24.19	19.76	1940-41 1941-42	43.40 14.52
4-366	Redondo	Los Angeles	33° 50′ 118° 23′	80	1918-19 1946-47	BD LAFC	11.09	11.00	1940-41 1933-34	26.48 3.97
4-384	Rivera	Los Angeles	33° 58′ 118° 06′	151	1929-30 1941-42	D LAFC	15.98	13.15	1940-41 1932-33	33.04 10.40
4-386	Rivera (Pico)	Los Angeles	33° 59′ 118° 05′	173	1926-27 1946-47	BC LAFC	16.93	15.64	1940-41 1932-33	44.30 11.21
4-93	Roscoe (Merrill)	Los Angeles	34° 14′ 118° 21′	1,000	1927-28 1946-47	CD LAFC	16.67	15.49	1940-41 1928-29	35.96 10.12
4-371	Rosecrans Ranch	Los Angeles	33° 54′ 118° 17′	64	1925-26 1944-45	CD LAFC	13.72	12.32	1940-41 1933-34	28.60 7.68
4-265	Rowland Ranch	Los Angeles	34° 00′ 117° 57′	466	1930-31 1946-47	CD LAFC	18.86	16.54	1940-41 1932-33	36.82 11.70
4-122	Rubio Canyon Water Company	Los Angeles	34° 11′ 118° 08′	1,155	1921-22 1946-47	CD LAFC	22.79	22.32	1940-41 1923-24	46.37 9.54
4-169	San Antonio Canyon (Intake)	Los Angeles	34° 13′ 117° 40′	3,850	1918-19 1928-29	D USWB	29.93	31.98	1921-22 1918-19	53.81 17.89
4-170	San Antonio Canyon (Power House)	Los Angeles	34° 13′ 117° 40′	3,250	1900-01 1936-37	D USWB	31.10	30.88	1921-22 1912-13	52.75 15.91
4-2	Sandberg	Los Angeles	34° 45′ 118° 44′	4,517	1928-29 1946-47	B USWB	14.31	12.35	1940-41 1933-34	31.24 6.87
4-46	Sand Canyon	Los Angeles	34° 23′ 118° 24′	1,900	1930-31 1941-42	C LAFC	23.69	19.97	1940-41 1941-42	37.83 14.60
4-300	San Dimas Dam	Los Angeles	34° 09′ 117° 46′	1,350	1919-20 1946-47	CD LAFC	23.92	23.11	1942-43 1932-33	37.72 13.23
4-291	San Dimas (Ferguson Ranch)	Los Angeles	34° 07′ 117° 48′	1,075	1925-26 1946-47	CD LAFC	21.05	20.01	1940-41 1932-33	38.25 12.45
4-294	San Dimas (Fire Station)	Los Angeles	34° 06′ 117° 48′	960	1927-28 1946-47	CD LAFC USWB	19.97	19.36	1940-41 1932-33	37.90 11.97
4-292	San Dimas (Harris)	Los Angeles	34° 07′ 117° 48′	1,000	1919-20 1943-44	CD LAFC	20.70	19.66	1940-41 1923-24	40.70 10.33
4-298	San Dimas (Howard)	Los Angeles	34° 07′ 117° 47′	1,075	1921-22 1946-47	D LAFC	19.39	19.23	1940-41 1923-24	37.53 11.01

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
4-295	San Dimas Mountain	Los Angeles	34° 06′ 117° 48′	960	1915-16 1938-39	D LAFC	18.68	18.84	1936-37 1930-31	31.14 10.07
4-296	San Dimas Mountain No. 1	Los Angeles	34° 06′ 117° 48′	960	1899-00 1914-15	D DWR	20.32	19.98	1913-14 1899-00	32.43 9.73
4-288	San Dimas (Orange Association)	Los Angeles	34° 06′ 117° 49′	925	1908-09 1931-32	D LAFC	18.81	19.50	1913-14 1923-24	31.57 10.43
4-166	San Dimas (Ranger Station)	Los Angeles	34° 10′ 117° 46′	1,500	1928-29 1946-47	CD LAFC	26.13	24.63	1940-41 1941-42	41.45 14.70
4-290	San Dimas (Stevens)	Los Angeles	34° 08′ 117° 48′	1,110	1928-29 1946-47	D LAFC	21.82	20.78	1940-41 1932-33	40.42 12.04
4-83	San Fernando	Los Angeles	34° 17′ 118° 27′	960	1877-78 1946-47	BC USWB	16.36	16.88	1940-41 1898-99	40.57 4.14
4-81	San Fernando (Lemon Growers)	Los Angeles	34° 16′ 118° 28′	950	1922-23 1946-47	CD LAFC & USWB	18.13	17.74	1940-41 1923-24	40.57 9.66
4-85	San Fernando (Miller Ranch)	Los Angeles	34° 15′ 118° 26′	944	1927-28 1946-47	CD LAFC	16.50	14.70	1940-41 1927-28	35.25 10.55
4-79	San Fernando Reservoir (Lower)	Los Angeles	34° 17′ 118° 29′	1,150	1928-29 1946-47	CD LAFC	18.00	16.38	1940-41 1941-42	36.58 12.41
4-9	San Francisquito Power House No. 1	Los Angeles	34° 35′ 118° 27′	2,100	1918-19 1946-47	BD LAFC	18.92	17.44	1940-41 1923-24	35.69 8.06
4-8	San Francisquito Power House No. 2	Los Angeles	34° 32′ 118° 31′	1,580	1930-31 1946-47	CD LAFC	17.99	14.59	1940-41 1941-42	35.09 11.72
4-151	San Gabriel Dam No. 2	Los Angeles	34° 15′ 117° 58′	2,335	1929-30 1946-47	CD LAFC	39.11	35.04	1940-41 1941-42	69.89 19.77
4-160	San Gabriel Forks Ranger Station	Los Angeles	34° 13′ 117° 51′	1,500	1922-23 1946-47	D LAFC	29.08	28.35	1940-41 1924-25	52.48 15.80
4-247	San Gabriel (Gleason)	Los Angeles	34° 06′ 118° 06′	490	1929-30 1946-47	CD LAFC	26.21	24.53	1940-41 1944-45	39.58 13.88
4-161	San Gabriel Intake (Edison)	Los Angeles	34° 12′ 117° 51′	1,481	1901-02 1946-47	BCD USWB & LAFC	29.15	28.67	1921-22 1923-24	57.53 15.28
4-268	San Gabriel Power House	Los Angeles	34° 09′ 117° 54′	744	1900-01 1946-47	D LAFC	23.57	22.77	1940-41 1923-24	44.82 11.57
4-164	San Gabriel River (East Fork)	Los Angeles	34° 14′ 117° 48′	1,600	1934-35 1946-47	CD LAFC	32.02	27.95	1940-41 1941-42	50.42 17.55
4-248	San Gabriel (Watts)	Los Angeles	34° 06′ 118° 06′	433	1923-24 1944-45	CD LAFC	18.81	18.38	1940-41 1923-24	38.45 8.57
4-440	San Pedro....	Los Angeles	33° 43′ 118° 17′	10	1888-89 1946-47	B USWB	10.91	10.74	1940-41 1893-94	25.18 4.59

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
4-439	San Pedro Hills (West End)	Los Angeles	33° 46′ 118° 22′	1,182	1913-14 1944-45	CD LAFC	15.10	14.35	1940-41 1933-34	31.60 9.22
4-142	Santa Anita Canyon	Los Angeles	34° 11′ 118° 02′	1,725	1927-28 1943-44	CD LAFC	26.45	24.95	1940-41 1927-28	48.21 16.14
4-145	Santa Anita Forest Station	Los Angeles	34° 12′ 118° 01′	1,700	1915-16 1946-47	CD LAFC & USWB	32.10	32.61	1921-22 1923-24	57.33 16.33
4-206	Santa Monica	Los Angeles	34° 01′ 118° 30′	110	1885-86 1946-47	BD USWB	14.34	14.34	1940-41 1923-24	32.49 6.30
4-207	Santa Monica (Sulliger)	Los Angeles	34° 01′ 118° 30′	88	1893-94 1925-26	D DWR	13.22	14.31	1906-07 1897-98	21.99 5.07
4-201	Santa Ynez Canyon	Los Angeles	34° 04′ 118° 34′	500	1925-26 1943-44	BCD LAFC	22.65	19.79	1940-41 1927-28	47.52 12.34
4-41	Saugus (Edison)	Los Angeles	34° 25′ 118° 35′	1,093	1928-29 1946-47	CD LAFC	14.62	12.98	1940-41 1935-36	34.43 7.75
4-153	Sawpit Canyon	Los Angeles	34° 11′ 117° 58′	2,000	1928-29 1946-47	CD LAFC	31.99	30.38	1940-41 1932-33	54.04 17.22
4-152	Sawpit Canyon (Deer Park)	Los Angeles	34° 12′ 117° 58′	2,725	1931-32 1946-47	CD LAFC	37.66	34.15	1940-41 1932-33	59.62 22.04
4-150	Sawpit Dam	Los Angeles	34° 11′ 117° 59′	1,375	1926-27 1946-47	CD LAFC	26.13	25.22	1940-41 1927-28	46.75 15.28
4-211	Sawtelle	Los Angeles	34° 03′ 118° 27′	232	1928-29 1946-47	BCD LAFC	17.82	16.22	1940-41 1929-30	35.58 10.94
4-195	Seminole Hot Springs	Los Angeles	34° 06′ 118° 48′	875	1928-29 1946-47	CD LAFC	22.94	20.88	1940-41 1932-33	47.61 14.47
4-82	Sepulveda (Chase)	Los Angeles	34° 14′ 118° 28′	815	1928-29 1946-47	CD LAFC	17.30	15.74	1940-41 1928-29	38.39 10.25
4-204	Sepulveda & Mulholland	Los Angeles	34° 08′ 118° 30′	1,400	1928-29 1946-47	CD LAFC	22.35	20.34	1940-41 1929-30	47.98 14.11
4-104	Shields Canyon Mouth	Los Angeles	34° 15′ 118° 14′	2,264	1915-16 1939-40	C LAFC	25.58	25.96	1937-38 1923-24	44.21 14.66
4-135	Sierra Madre	Los Angeles	34° 10′ 118° 03′	1,100	1896-97 1946-47	BC USWB	24.80	24.80	1940-41 1898-99	49.63 9.54
4-136	Sierra Madre (Blummer)	Los Angeles	34° 10′ 118° 03′	1,095	1888-89 1925-26	D DWR	24.96	25.30	1889-90 1898-99	48.86 8.28
4-137	Sierra Madre (Blummer) No. 1	Los Angeles	34° 10′ 118° 03′	1,095	1888-89 1921-22	C LAFC	25.91	25.77	1889-90 1898-99	48.86 8.28
4-134	Sierra Madre Dam	Los Angeles	34° 11′ 118° 03′	1,100	1928-29 1946-47	CD LAFC	26.47	25.15	1940-41 1941-42	48.70 16.37
4-138	Sierra Madre (Hersey)	Los Angeles	34° 10′ 118° 03′	1,170	1927-28 1940-41	CD LAFC	25.84	24.78	1940-41 1927-28	49.63 16.10
4-139	Sierra Madre (Miramonte)	Los Angeles	34° 10′ 118° 03′	985	1930-31 1946-47	CD LAFC	26.60	24.55	1940-41 1941-42	48.35 16.25
4-252	Sierra Madre (Pegler)	Los Angeles	34° 09′ 118° 03′	667	1925-26 1946-47	CD LAFC	24.74	22.44	1940-41 1927-28	43.46 14.94

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-144	Sierra Madre (Pump Plant)	Los Angeles	34° 10′ 118° 02′	700	1926-27 1946-47	CD LAFC	23.22	22.25	1940-41 1927-28	42.25 14.02
4-228	Silver Lake Reservoir	Los Angeles	34° 06′ 118° 16′	455	1930-31 1946-47	CD LAFC	17.05	15.75	1940-41 1932-33	34.78 10.90
4-103	Sister Elsie Peak	Los Angeles	34° 16′ 118° 14′	5,040	1899-00 1935-36	CD LAFC	20.02	23.27	1900-01 1923-24	35.39 10.13
4-212	Soldiers Home	Los Angeles	34° 03′ 118° 27′	355	1896-97 1946-47	BCD LAFC	14.89	14.87	1940-41 1897-98	34.20 5.53
4-256	South of Monrovia	Los Angeles	34° 08′ 118° 00′	391	1912-13 1929-30	C LAFC	17.67	18.75	1913-14 1923-24	33.43 9.66
4-237	South Pasadena (City Hall)	Los Angeles	34° 07′ 118° 09′	660	1927-28 1946-47	D LAFC	19.89	18.47	1940-41 1927-28	42.00 12.54
4-238	South Pasadena (Cooper)	Los Angeles	34° 07′ 118° 09′	657	1916-17 1929-30	CD LAFC	15.54	18.20	1921-22 1923-24	25.80 8.88
4-254	South Pasadena (Marsh)	Los Angeles	34° 06′ 118° 03′	557	1923-24 1946-47	BCD LAFC	20.18	19.45	1940-41 1923-24	43.51 8.88
4-284	State Narcotic Hospital	Los Angeles	34° 03′ 117° 51′	770	1930-31 1946-47	CD LAFC	19.48	17.25	1940-41 1941-42	36.52 11.99
4-209	Stone Canyon Dam	Los Angeles	34° 06′ 118° 27′	725	1925-26 1946-47	BCD LAFC	21.55	19.82	1940-41 1927-28	45.69 13.02
4-140	Sturtevant Camp	Los Angeles	34° 13′ 118° 02′	3,375	1927-28 1942-43	D LAFC	38.22	36.11	1940-41 1941-42	63.51 18.82
4-198	Summit Topanga	Los Angeles	34° 06′ 118° 36′	1,520	1927-28 1943-44	CD LAFC	21.58	18.90	1940-41 1935-36	44.95 13.36
4-97	Sunset Canyon	Los Angeles	34° 12′ 118° 17′	1,610	1927-28 1946-47	CD LAFC	20.83	19.25	1940-41 1927-28	45.17 10.33
4-119	Switzer's Camp	Los Angeles	34° 16′ 118° 09′	2,980	1927-28 1946-47	CD LAFC	30.67	28.42	1940-41 1927-28	57.45 17.34
4-80	Sylmar Packing Corporation	Los Angeles	34° 19′ 118° 28′	1,250	1919-20 1946-47	CD LAFC	18.03	16.91	1940-41 1923-24	38.73 9.11
4-165	Tanbark Flat	Los Angeles	34° 12′ 117° 46′	2,750	1928-29 1946-47	CD LAFC	29.68	28.27	1940-41 1941-42	48.20 16.11
4-385	Telegraph Road	Los Angeles	33° 57′ 118° 06′	144	1929-30 1946-47	BCD LAFC	15.79	14.20	1940-41 1932-33	33.89 9.72
4-199	Topanga Canyon	Los Angeles	34° 05′ 118° 36′	747	1927-28 1946-47	CD LAFC	25.67	23.84	1940-41 1927-28	54.62 14.50
4-368	Torrance (General Petroleum)	Los Angeles	33° 51′ 118° 20′	75	1929-30 1945-46	CD LAFC	14.19	12.59	1940-41 1933-34	29.30 7.91
4-370	Torrance (Edison)	Los Angeles	33° 52′ 118° 19′	57	1930-31 1945-46	CD LAFC	13.38	11.64	1940-41 1933-34	29.67 7.46
4-78	Upper San Fernando Plant No. 3	Los Angeles	34° 19′ 118° 30′	1,248	1929-30 1946-47	CD LAFC	20.67	17.94	1940-41 1929-30	42.67 12.57
4-117	U.S. Forest Service Shops	Los Angeles	34° 13′ 118° 10′	1,490	1917-18 1933-34	C LAFC	21.70	25.10	1921-22 1923-24	44.43 12.48

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
4-213	Upper Franklin Reservoir	Los Angeles	34° 07′ 118° 25′	867	1927-28 1946-47	CD LAFC	19.83	18.42	1940-41 1927-28	42.29 10.35
4-273	Valencia Heights	Los Angeles	34° 03′ 117° 54′	467	1928-29 1946-47	CD LAFC	17.54	15.73	1940-41 1932-33	35.93 10.57
4-131	Valley Forge Lodge	Los Angeles	34° 15′ 118° 04′	3,400	1922-23 1942-43	D LAFC	39.16	38.39	1940-41 1923-24	71.07 19.13
4-84	Van Nuys	Los Angeles	34° 11′ 118° 27′	695	1927-28 1946-47	CD LAFC	17.00	15.79	1940-41 1927-28	39.75 9.60
4-364	Venice	Los Angeles	33° 59′ 118° 28′	7	1928-29 1946-47	CD LAFC	15.14	13.77	1940-41 1929-30	35.00 9.78
4-14	Vincent Patrol Station	Los Angeles	34° 30′ 118° 08′	3,250	1927-28 1946-47	BCD LAFC	9.88	9.57	1940-41 1933-34	19.86 4.40
4-285	Walnut (Fruit Growers)	Los Angeles	34° 00′ 117° 51′	533	1911-12 1946-47	CD LAFC	18.49	17.27	1940-41 1918-19	35.82 9.49
4-282	Walnut (Howell)	Los Angeles	34° 00′ 117° 52′	488	1928-29 1946-47	BCD LAFC	18.43	16.76	1940-41 1932-33	37.00 11.42
4-373	Watts (Jordan)	Los Angeles	33° 57′ 118° 14′	110	1928-29 1946-47	CD LAFC	15.86	14.20	1940-41 1929-30	35.20 10.46
4-264	West Covina	Los Angeles	34° 04′ 117° 57′	358	1925-26 1946-47	BCD LAFC	18.90	17.37	1940-41 1932-33	37.80 11.21
4-369	Western Ave. (Jank)	Los Angeles	33° 57′ 118° 19′	235	1930-31 1943-44	CD LAFC	17.07	14.22	1940-41 1932-33	33.70 9.89
4-197	West Saddle Peak	Los Angeles	34° 04′ 118° 41′	890	1929-30 1943-44	BCD LAFC	25.09	21.39	1940-41 1932-33	48.55 14.57
4-390	Whittier (City Hall)	Los Angeles	33° 59′ 118° 02′	365	1927-28 1946-47	CD LAFC	15.45	14.35	1940-41 1932-33	32.85 9.96
4-250	Whittier (Narrows)	Los Angeles	34° 01′ 118° 05′	181	1924-25 1946-47	CD LAFC	16.38	15.14	1940-41 1924-25	32.52 8.96
4-389	Whittier (Southern Pacific)	Los Angeles	33° 59′ 118° 03′	242	1897-98 1936-37	BD LAFC	13.57	14.62	1914-15 1898-99	22.73 7.13
4-441	Wilmington	Los Angeles	33° 47′ 118° 16′	40	1928-29 1946-47	CD LAFC	14.14	12.87	1940-41 1930-31	28.39 8.67
4-167	Wolfskill Fall	Los Angeles	34° 10′ 117° 45′	2,400	1924-25 1936-37	D LAFC	24.69	25.32	1936-37 1927-28	34.77 15.68
4-469	Aliso	Orange	33° 43′ 117° 50′	70	1910-11 1944-45	BD OCFC	11.98	11.72	1940-41 1924-25	29.13 5.33
4-398	Anaheim	Orange	33° 51′ 117° 56′	134	1878-79 1909-10	B USWB	12.07	12.14	1883-84 1878-79	26.17 4.35
4-399	Anaheim Associated Laboratories	Orange	33° 50′ 117° 56′	135	1927-28 1946-47	BD OCFC	15.33	13.62	1940-41 1932-33	32.59 8.98
4-395	Anaheim (Jos. Carroll)	Orange	33° 50′ 117° 58′	105	1923-24 1946-47	BD OCFC	13.69	12.85	1940-41 1924-25	31.78 7.29
4-402	Anaheim (Dickel)	Orange	33° 50′ 117° 55′	150	1879-80 1920-21	D OCFC	13.15	13.05	1883-84 1897-98	25.82 5.32
4-403	Anaheim (Union Water)	Orange	33° 50′ 117° 55′	160	1926-27 1941-42	BD OCFC	15.22	13.73	1940-41 1935-36	32.88 8.53

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-404	Anaheim (Water Department)	Orange	33° 50′ 117° 55′	155	1921-22 1946-47	D OCFC	14.06	13.30	1940-41 1924-25	33.58 7.25
4-508	Bell Canyon	Orange	33° 38′ 117° 33′	1,000	1930-31 1942-43	D OCFC	21.73	19.22	1940-41 1933-34	39.47 13.34
4-297	Brea Canyon	Orange	34° 00′ 117° 48′	975	1930-31 1946-47	D OCFC	19.49	17.22	1940-41 1935-36	41.01 13.26
4-394	Buena Park	Orange	33° 52′ 118° 00′	75	1926-27 1946-47	BD OCFC	14.62	13.22	1940-41 1928-29	31.42 8.71
4-484	Camp Silverado	Orange	33° 45′ 117° 40′	2,000	1930-31 1946-47	D OCFC	27.45	24.87	1940-41 1933-34	48.73 16.11
4-499	Costa Mesa	Orange	33° 38′ 117° 55′	90	1927-28 1946-47	BC DWR	12.60	11.59	1940-41 1933-34	28.24 7.81
4-467	Dyer	Orange	33° 42′ 117° 51′	55	1922-23 1946-47	BD OCFC	12.30	11.63	1940-41 1922-23	27.34 6.61
4-472	El Modena	Orange	33° 47′ 117° 49′	245	1918-19 1938-39	BD OCFC	13.26	14.00	1937-38 1922-23	19.60 7.53
4-505	El Torro	Orange	33° 36′ 117° 42′	375	1876-77 1946-47	B OCFC	14.40	14.47	1883-84 1876-77	39.65 5.40
4-405	Fullerton	Orange	33° 52′ 117° 54′	336	1933-34 1946-47	B USWB	17.30	14.32	1940-41 1935-36	36.24 10.19
4-407	Fullerton (Desgrange)	Orange	33° 52′ 117° 53′	215	1909-10 1927-28	BD LAFC	16.80	17.68	1915-16 1924-25	26.86 10.32
4-406	Fullerton (Knowlton)	Orange	33° 52′ 117° 54′	195	1919-20 1946-47	B OCFC	15.50	15.15	1940-41 1924-25	37.80 8.67
4-397	Fullerton (Zinn Laboratory)	Orange	33′ 55° 117° 56′	320	1931-32 1946-47	BD OCFC	14.58	12.54	1940-41 1946-47	29.74 8.25
4-460	Garden Grove (Allen Brothers)	Orange	33° 47′ 117° 56′	95	1924-25 1946-47	BD OCFC	13.73	12.77	1940-41 1924-25	31.89 5.73
4-461	Garden Grove (Lumber Company)	Orange	33° 46′ 117° 56′	90	1914-15 1940-41	BD OCFC	12.73	12.35	1940-41 1924-25	28.91 5.75
4-410	G & L Pumping Station	Orange	33° 54′ 117° 52′	350	1926-27 1939-40	BD OCFC	13.69	13.21	1936-37 1932-33	21.75 7.96
4-458	Huntington Beach (City Hall)	Orange	33° 40′ 118° 00′	35	1928-29 1946-47	BD OCFC	12.62	11.32	1940-41 1933-34	28.48 7.16
4-456	Huntington Beach (Holly Sugar)	Orange	33° 41′ 118° 00′	50	1924-25 1946-47	BD OCFC	12.40	11.54	1940-41 1924-25	27.99 5.98
4-457	Huntington Beach (Union Oil)	Orange	33° 41′ 118° 00′	65	1924-25 1939-40	BD OCFC	11.37	11.37	1936-37 1924-25	20.45 5.65
4-470	Irvine No. 1	Orange	33° 40′ 117° 50′	50	1897-98 1946-47	B OCFC	12.45	12.45	1940-41 1897-98	27.40 5.26
4-502	Shady Camp (Irvine Company)	Orange	33° 38′ 117° 48′	300	1899-00 1946-47	D OCFC	14.89	14.58	1940-41 1924-25	30.58 7.52

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
4-481	Irvine County Park	Orange	33° 48′ 117° 45′	550	1919-20 1929-30	B OCFC	15.34	16.97	1921-22 1922-23	23.20 11.05
4-476	Irvine Home Ranch	Orange	33° 44′ 117° 47′	130	1897-98 1946-47	BD OCFC	12.85	12.85	1940-41 1897-98	28.90 5.82
4-475	Irvine Ranch (Harkle Road)	Orange	33° 41′ 117° 48′	100	1910-11 1946-47	BD OCFC	12.19	12.03	1940-41 1924-25	27.31 5.02
4-463	Irvine Ranch (Hog Ranch)	Orange	33° 40′ 117° 53′	60	1913-14 1922-23	B OCFC	11.63	11.28	1914-15 1922-23	18.12 6.47
4-480	Irvine Ranch (Irvine)	Orange	33° 41′ 117° 46′	200	1894-95 1946-47	B OCFC	13.49	13.44	1940-41 1924-25	28.56 5.60
4-504	Irvine Ranch (Johnson)	Orange	33° 39′ 117° 43′	350	1900-01 1946-47	BD OCFC	14.34	13.90	1940-41 1924-25	28.71 6.63
4-483	Irvine Ranch (Lambert)	Orange	33° 42′ 117° 43′	400	1926-27 1946-47	D OCFC	16.04	15.03	1940-41 1928-29	29.38 9.48
4-501	Irvine Ranch Morro	Orange	33° 41′ 117° 49′	100	1900-01 1944-45	BD OCFC	13.25	12.77	1940-41 1924-25	28.70 6.74
4-478	Jacobs	Orange	33° 47′ 117° 46′	550	1899-00 1944-45	BD OCFC	16.04	15.59	1940-41 1899-00	30.38 7.72
4-462	Kattella Substation	Orange	33° 48′ 117° 54′	140	1924-25 1946-47	BD OCFC	14.77	13.74	1940-41 1924-25	33.97 6.39
4-503	Laguna Beach	Orange	33° 32′ 117° 47′	205	1928-29 1946-47	B USWB	13.14	11.44	1936-37 1928-29	20.11 6.83
4-396	La Habra (Citrus Association)	Orange	33° 56′ 117° 57′	285	1925-26 1946-47	BD OCFC	15.39	13.99	1940-41 1928-29	31.65 9.91
4-416	La Vida Springs	Orange	33° 56′ 117° 48′	850	1930-31 1946-47	D OCFC	18.83	16.51	1940-41 1946-47	40.27 10.38
4-482	Limestone	Orange	33° 46′ 117° 43′	1,000	1917-18 1946-47	BD OCFC	17.68	17.66	1940-41 1918-19	34.95 10.51
4-450	Los Alamitos	Orange	33° 49′ 118° 04′	26	1910-11 1946-47	B SCE	11.43	11.32	1940-41 1924-25	28.25 5.97
[illegible]	Maranjal	Orange	33° 56′ 117° 52′	770	1926-27 1939-40	BD OCFC	14.29	13.57	1936-37 1932-33	21.66 8.89
4-500	Newport Beach	Orange	33° 36′ 117° 54′	8	1921-22 1946-47	BD OCFC	12.31	11.99	1940-41 1924-25	28.17 5.73
4-413	Olive	Orange	33° 50′ 117° 51′	230	1921-22 1946-47	BD OCFC	14.66	14.32	1940-41 1924-25	32.98 8.09
4-466	Orange	Orange	33° 47′ 117° 51′	200	1895-96 1946-47	BD OCFC	13.86	13.99	1940-41 1897-98	31.93 5.10
4-408	Placentia (Union Water Company)	Orange	33° 52′ 117° 53′	195	1929-30 1946-47	BD OCFC	15.90	14.29	1940-41 1935-36	35.73 9.29
4-411	Placentia (Mutual Orange Association)	Orange	33° 53′ 117° 52′	225	1927-28 1946-47	BD DWR	16.45	15.28	1940-41 1935-36	39.20 9.12
4-510	San Clemente	Orange	33° 26′ 117° 37′	280	1930-31 1944-45	B USWB	14.09	11.81	1940-41 1933-34	26.04 7.46

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-479	San Joaquin Fruit Company	Orange	33° 43′ 117° 46′	200	1919-20 1946-47	D OCFC	14.67	13.95	1940-41 1924-25	30.85 7.32
4-506	San Juan Capistrano	Orange	33° 31′ 117° 40′	150	1904-05 1946-47	BD OCFC	15.00	14.36	1940-41 1923-24	27.83 7.80
4-464	Santa Ana	Orange	33° 45′ 117° 52′	133	1888-89 1946-47	B USWB	14.03	14.16	1940-41 1893-94	34.34 6.61
4-418	Santa Ana Canyon	Orange	33° 52′ 117° 46′	325	1927-28 1942-43	D OCFC	15.11	13.20	1940-41 1941-42	28.76 9.15
4-465	Santa Ana (Hill)	Orange	33° 45′ 117° 52′	125	1908-09 1946-47	D OCFC	13.59	13.34	1940-41 1924-25	31.14 5.87
4-486	Santiago Canyon (Pleasant's Ranch)	Orange	33° 44′ 117° 39′	1,145	1894-95 1932-33	B OCFC	18.54	19.80	1894-95 1898-99	29.75 7.81
4-485	Santiago Canyon (Redman)	Orange	33° 45′ 117° 40′	1,000	1920-21 1931-32	D OCFC	19.83	21.68	1921-22 1928-29	34.50 13.38
4-449	Seal Beach	Orange	33° 45′ 118° 07′	25	1927-28 1946-47	BD OCFC	12.69	11.51	1940-41 1933-34	26.53 6.51
4-487	Silverado Canyon	Orange	33° 45′ 117° 38′	1,500	1918-19 1946-47	BD OCFC	21.60	21.60	1940-41 1918-19	39.71 12.00
4-452	Stanton	Orange	33° 48′ 118° 00′	60	1926-27 1946-47	BD OCFC	13.99	12.67	1940-41 1928-29	32.23 8.02
4-401	Stewart Pumping Station	Orange	33° 56′ 117° 55′	475	1924-25 1946-47	BD OCFC	14.92	13.87	1940-41 1924-25	32.63 8.51
4-459	Talbert	Orange	33° 42′ 117° 58′	23	1918-19 1943-44	BD OCFC	12.65	11.58	1940-41 1918-19	26.95 7.11
4-507	Trabuco Canyon	Orange	33° 39′ 117° 34′	1,250	1925-26 1946-47	BD OCFC	20.74	19.35	1940-41 1933-34	35.70 11.72
4-477	Tustin	Orange	33° 44′ 117° 47′	125	1877-78 1946-47	B USWB	13.28	12.95	1883-84 1878-79	32.65 5.75
4-474	Tustin (High School)	Orange	33° 44′ 117° 49′	120	1924-25 1946-47	D OCFC	13.99	13.01	1940-41 1924-25	31.41 6.54
4-473	Tustin (Whitson)	Orange	33° 45′ 117° 49′	110	1921-22 1933-34	D OCFC	11.87	13.34	1921-22 1924-25	17.45 7.07
4-468	Villa Park (Allen)	Orange	33° 48′ 117° 50′	285	1919-20 1946-47	BD OCFC	15.74	14.97	1940-41 1924-25	34.56 7.40
4-471	Villa Park (Orchard Association)	Orange	33° 49′ 117° 49′	290	1928-29 1946-47	BD OCFC	15.85	14.22	1940-41 1928-29	34.68 9.06
4-453	Wintersburg Ave.	Orange	33° 44′ 118° 00′	25	1906-07 1946-47	BD OCFC	12.35	12.13	1940-41 1924-25	30.39 5.67
4-454	Wintersburg (Moore)	Orange	33° 43′ 118° 00′	15	1922-23 1943-44	D OCFC	11.56	10.89	1940-41 1924-25	23.80 4.93
4-451	Wintersburg (Murdy)	Orange	33° 43′ 118° 01′	20	1925-26 1946-47	D OCFC	12.82	11.64	1940-41 1933-34	28.84 6.70
4-455	Wintersburg (Slater)	Orange	33° 43′ 118° 00′	25	1927-28 1946-47	D OCFC	12.40	9.97	1940-41 1935-36	26.69 7.52

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-415	Yorba Linda	Orange	33° 54' 117° 50'	405	1912-13 1946-47	B USWB	15.53	14.84	1940-41 1924-25	37.65 8.42
4-515	Aquanga	Riverside	33° 29' 116° 47'	3,100	1908-09 1946-47	B USWB	13.59	12.78	1940-41 1933-34	24.20 4.62
4-420	Arlington	Riverside	33° 53' 117° 37'	925	1915-16 1946-47	D DWR	10.18	10.24	1940-41 1933-34	20.53 4.45
4-435	Beaumont	Riverside	33° 55' 117° 00'	2,558	1888-89 1946-47	B USWB	19.10	19.35	1936-37 1898-99	34.00 7.48
4-436	Beaumont (near)	Riverside	33° 56' 116° 56'	2,590	1911-12 1946-47	B USWB	22.80	22.04	1936-37 1912-13	38.19 11.91
4-423	Corona	Riverside	33° 52' 117° 35'	850	1908-09 1946-47	B USWB	13.80	13.11	1940-41 1924-25	28.05 6.64
4-429	Corona (American Fruit)	Riverside	33° 50' 117° 33'	1,050	1911-12 1946-47	D DWR	13.89	13.35	1921-22 1933-34	26.72 6.91
4-424	Corona (Foothill Lemon Company No. 1)	Riverside	33° 51' 117° 35'	1,050	1930-31 1946-47	D DWR	16.94	15.19	1940-41 1933-34	31.48 8.90
4-425	Corona (Foothill Lemon Company No. 2)	Riverside	33° 50' 117° 35'	1,225	1931-32 1946-47	D DWR	19.29	16.98	1940-41 1933-34	34.17 9.91
4-422	Corona (Foothill Lemon Company No. 3)	Riverside	33° 52' 117° 36'	850	1931-32 1946-47	D DWR	16.70	14.70	1940-41 1933-34	31.27 8.52
4-428	Corona No. 1	Riverside	33° 51' 117° 33'	895	1920-21 1944-45	BD DWR	14.12	13.11	1940-41 1933-34	27.49 7.71
4-426	Corona No. 2	Riverside	33° 52' 117° 34'	680	1905-06 1946-47	BD DWR	12.80	12.19	1940-41 1933-34	27.14 6.38
4-496	Decker's Ranch	Riverside	33° 49' 116° 45'	5,550	1920-21 1937-38	B Private	37.06	37.32	1936-37 1933-34	61.20 21.37
4-488	Earl Ranch No. 2	Riverside	33° 47' 117° 30'	875	1926-27 1946-47	BD OCFC	14.73	14.25	1936-37 1933-34	26.56 7.25
4-492	Elsinore	Riverside	33° 40' 117° 19'	1,272	1887-88 1946-47	B USWB	13.32	13.32	1936-37 1899-1900	26.35 5.98
4-490	Elsinore (Sherman)	Riverside	33° 41' 117° 24'	1,300	1916-17 1946-47	BD DWR	17.34	17.48	1940-41 1918-19	36.02 8.37
4-489	Glenn Ivy	Riverside	33° 46' 117° 29'	1,100	1905-06 1946-47	BD DWR	17.13	16.54	1936-37 1924-25	34.37 8.55
4-497	Idyllwild	Riverside	33° 45' 116° 43'	5,400	1901-02 1944-45	BC USWB	27.29	28.36	1905-06 1903-04	41.66 14.95
4-498	Lake Hemet	Riverside	33° 40' 116° 41'	4,350	1896-97 1946-47	BC LHW Co.	20.01	19.98	1936-37 1933-34	34.27 6.77
4-435	March Field	Riverside	33° 54' 117° 16'	1,580	1928-29 1946-47	D DWR	10.67	9.96	1940-41 1933-34	21.62 3.53
4-491	Mockingbird Canyon	Riverside	33° 49' 117° 21'	1,700	1919-20 1935-36	D DWR	11.12	11.51	1921-22 1933-34	22.57 4.04

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-434	Moreno Mutual Water Company	Riverside	33° 58′ 117° 03′	2,210	1928-29 1946-47	BD DWR	17.26	16.87	1940-41 1933-34	25.83 8.19
4-427	Norco	Riverside	33° 57′ 117° 33′	650	1923-24 1946-47	BD DWR	12.18	11.62	1940-41 1924-25	25.72 6.98
4-421	Ontario (Impach)	Riverside	33° 59′ 117° 36′	660	1928-29 1946-47	D DWR	12.84	11.99	1940-41 1932-33	27.66 8.48
4-419	Prado	Riverside	33° 53′ 117° 39′	480	1930-31 1946-47	D OCFC	16.33	14.94	1940-41 1933-34	33.68 9.21
4-493	Railroad Canyon Dam	Riverside	33° 41′ 117° 17′	1,425	1934-35 1946-47	D DWR	12.99	11.60	1940-41 1945-46	23.84 7.29
4-431	Riverside	Riverside	33° 59′ 117° 21′	851	1881-82 1946-47	B USWB	11.42	11.53	1883-84 1882-83	22.74 2.94
4-432	Riverside Citrus Experiment Station	Riverside	33° 58′ 117° 20′	1,050	1924-25 1946-47	D DWR	11.95	11.25	1940-41 1933-34	23.01 5.11
4-430	Riverside Press	Riverside	33° 59′ 117° 22′	840	1880-81 1932-33	D DWR	11.14	11.76	1883-84 1882-83	22.54 2.94
4-494	Romoland	Riverside	33° 45′ 117° 11′	1,450	1917-18 1931-32	B DWR	10.95	11.17	1921-22 1924-25	21.62 5.36
4-495	San Jacinto	Riverside	33° 46′ 116° 58′	1,550	1886-87 1946-47	B USWB	13.47	13.54	1921-22 1933-34	25.23 6.36
4-335	Wineville	Riverside	34° 02′ 117° 31′	830	1908-09 1938-39	BD DWR	14.02	13.62	1921-22 1912-13	27.27 8.46
4-330	Alta Loma (Cherback)	San Bernardino	34° 09′ 117° 35′	1,850	1928-29 1946-47	BD DWR	24.02	22.22	1940-41 1932-33	39.45 14.54
4-328	Alta Loma (Smith)	San Bernardino	34° 08′ 117° 36′	1,540	1910-11 1946-47	B Private	20.92	20.81	1915-16 1912-13	50.55 12.80
4-172	Alta Loma (Valley View Ranch)	San Bernardino	34° 10′ 117° 37′	2,200	1913-14 1942-43	D Private & DWR	25.31	23.36	1940-41 1927-28	43.48 14.97
4-329	Alta Loma Heights (Citrus Association)	San Bernardino	34° 07′ 117° 36′	1,390	1930-31 1946-47	D DWR	22.64	20.43	1940-41 1932-33	40.66 13.29
4-184	Arrowhead Springs	San Bernardino	34° 11′ 117° 16′	2,000	1909-10 1936-37	BC USWB	22.99	23.28	1921-22 1917-18	39.49 9.72
4-177	Bennett Ranch	San Bernardino	34° 10′ 117° 27′	1,870	1923-24 1946-47	D DWR	26.85	25.71	1940-41 1932-33	46.46 15.14
4-187	Big Bear Lake Dam	San Bernardino	34° 14′ 116° 59′	6,800	1883-84 1946-47	B BBVWCo	38.40	35.44	1883-84 1895-96	92.80 11.29
4-189	Big Bear Lake (Preston)	San Bernardino	34° 15′ 116° 55′	6,800	1931-32 1941-42	D DWR	27.84	25.20	1931-32 1932-33	44.53 16.34
4-188	Big Bear Lake (Rideout)	San Bernardino	34° 15′ 116° 57′	6,800	1928-29 1942-43	D DWR	32.42	30.33	1931-32 1930-31	50.74 19.22
4-171	Camp Baldy	San Bernardino	34° 14′ 117° 39′	4,300	1919-20 1944-45	BCD USWB & LAFC	35.32	33.81	1921-22 1932-33	66.63 20.44

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-417	Carbon Canyon	San Bernardino	33° 58′ 117° 46′	1,150	1930-31 1946-47	BD OCFC	18.88	16.55	1940-41 1932-33	39.96 10.64
4-314	Chino	San Bernardino	34° 00′ 117° 42′	714	1893-94 1914-15	B USWB	15.71	16.98	1906-07 1898-99	26.36 6.28
4-313	Chino (American Sugar)	San Bernardino	34° 01′ 117° 42′	710	1906-07 1946-47	BD DWR	17.17	16.50	1940-41 1922-23	36.79 9.93
4-318	Chino (Delphey)	San Bernardino	34° 01′ 117° 41′	770	1926-27 1937-38	BD DWR	17.50	17.14	1936-37 1932-33	27.99 10.31
4-319	Chino (Edison)	San Bernardino	34° 00′ 117° 41′	670	1927-28 1946-47	BD DWR	16.85	16.34	1940-41 1932-33	37.37 10.16
4-342	Colton No. 1	San Bernardino	34° 04′ 117° 19′	975	1914-15 1946-47	BD DWR	15.64	14.93	1940-41 1933-34	28.56 8.00
4-344	Colton No. 2	San Bernardino	34° 03′ 117° 19′	940	1927-28 1946-47	BD DWR	13.93	13.30	1940-41 1933-34	28.13 7.40
4-343	Colton (Police Department)	San Bernardino	34° 04′ 117° 19′	980	1923-24 1946-47	BD DWR	15.31	14.78	1940-41 1945-46	28.79 8.32
4-358	Crafton Heights	San Bernardino	34° 03′ 117° 06′	2,000	1927-28 1946-47	D DWR	17.00	16.22	1940-41 1933-34	25.93 9.75
4-356	Craftonville	San Bernardino	34° 04′ 117° 07′	1,759	1892-93 1908-09	BC USWB	14.10	15.88	1904-05 1898-99	23.00 5.93
4-331	Cucamonga (Mission Winery)	San Bernardino	34° 06′ 117° 35′	1,210	1923-24 1946-47	BD DWR	18.08	17.31	1940-41 1932-33	32.72 11.64
4-333	Cucamonga (Thomas)	San Bernardino	34° 06′ 117° 34′	1,190	1920-21 1937-38	BD Private	17.35	17.05	1936-37 1932-33	30.07 9.16
4-182	Devils Canyon Gate	San Bernardino	34° 12′ 117° 20′	1,900	1927-28 1946-47	D DWR	25.78	24.31	1940-41 1935-36	42.49 17.72
4-181	Devil's Canyon No. 2	San Bernardino	34° 13′ 117° 20′	2,750	1927-28 1941-42	BD DWR	31.06	29.40	1940-41 1932-33	53.28 21.46
4-179	Devore	San Bernardino	34° 14′ 117° 25′	2,435	1918-19 1946-47	BD DWR	31.82	30.67	1921-22 1918-19	59.99 18.42
4-353	East Highlands (Gold Buckle Association)	San Bernardino	34° 07′ 117° 10′	1,370	1930-31 1946-47	D DWR	18.53	15.80	1940-41 1933-34	29.49 10.45
4-354	East High lands (Orange Company)	San Bernardino	34° 07′ 117° 10′	1,520	1910-11 1946-47	BD DWR	19.60	18.66	1936-37 1933-34	31.28 12.07
4-334	Etiwanda No. 2	San Bernardino	34° 08′ 117° 31′	1,425	1883-84 1946-47	BD DWR	21.37	21.37	1940-41 1898-99	39.23 8.02
4-336	Fontana	San Bernardino	34° 06′ 117° 26′	1,325	1911-12 1946-47	BD DWR & USWB	18.84	17.93	1940-41 1912-13	35.24 8.88
4-337	Fontana, (Farms Company)	San Bernardino	34° 06′ 117° 26′	1,280	1925-26 1946-47	BD DWR	17.81	16.73	1940-41 1945-46	31.11 11.04
4-339	Fontana, (Power House)	San Bernardino	34° 09′ 117° 24′	1,590	1926-27 1946-47	BD DWR	21.17	19.77	1940-41 1932-33	34.90 13.15

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-363	Forest Home	San Bernardino	34° 06′ 116° 56′	5,100	1930-31 1946-47	D DWR	34.94	33.77	1937-38 1932-33	60.35 19.07
4-175	Glen Ranch	San Bernardino	34° 15′ 117° 29′	3,256	1899-00 1915-16	D DWR	32.38	33.49	1913-14 1899-00	53.62 11.45
4-332	Guasti	San Bernardino	34° 04′ 117° 35′	975	1913-14 1946-47	BD DWR	16.77	15.66	1940-41 1918-19	31.74 8.08
4-350	Highland (Ewig)	San Bernardino	34° 08′ 117° 11′	1,435	1924-25 1946-47	BD DWR	18.86	17.16	1940-41 1933-34	30.77 11.17
4-348	Highland (Fraser)	San Bernardino	34° 08′ 117° 13′	1,340	1908-09 1946-47	BD DWR	18.58	17.78	1936-37 1912-13	30.40 11.29
4-173	Kellys Camp	San Bernardino	34° 14′ 117° 36′	8,300	1931-32 1946-47	BCD DWR & USWB	51.99	43.90	1940-41 1933-34	94.07 25.91
4-178	Lytle Creek	San Bernardino	34° 12′ 117° 26′	2,250	1905-06 1946-47	BCD USWB	35.81	33.71	1913-14 1923-24	57.98 18.15
4-180	Lytle Creek (Fontana Water)	San Bernardino	34° 12′ 117° 21′	2,300	1925-26 1946-47	D DWR	34.64	33.61	1940-41 1945-46	53.48 19.89
4-176	Lytle Creek (Ranger Station)	San Bernardino	34° 14′ 117° 29′	2,720	1930-31 1946-47	BD DWR	44.63	40.52	1937-38 1935-36	84.53 24.71
4-341	Lytle Creek (San Bernardino Water)	San Bernardino	34° 07′ 117° 21′	1,225	1946-47 1925-26	BD DWR	18.70	18.17	1940-41 1932-33	32.25 12.46
4-174	Lytle Creek (Edison)	San Bernardino	34° 14′ 117° 30′	2,800	1946-47 1927-28	D DWR	40.24	38.70	1937-38 1927-28	73.60 21.30
4-355	Mentone	San Bernardino	34° 04′ 117° 08′	1,650	1927-28 1946-47	D DWR	16.65	15.88	1936-37 1933-34	28.73 7.94
4-361	Mill Creek No. 2	San Bernardino	34° 05′ 117° 02′	2,965	1903-04 1946-47	D DWR	23.57	22.66	1936-37 1912-13	38.58 14.54
4-183	New Mark Reservoir	San Bernardino	34° 10′ 117° 19′	1,415	1927-28 1946-47	D DWR	20.55	19.12	1940-41 1930-31	37.76 13.10
4-327	Ontario (Braundle Acres)	San Bernardino	34° 03′ 117° 37′	920	1927-28 1946-47	D DWR	15.80	15.31	1940-41 1932-33	30.69 9.47
4-324	Ontario (Hamilton)	San Bernardino	34° 05′ 117° 39′	1,110	1914-15 1924-25	D DWR	17.67	17.96	1915-16 1918-19	27.58 11.88
4-325	Ontario No. 1	San Bernardino	34° 04′ 117° 39′	1,010	1927-28 1946-47	D DWR	17.51	16.97	1940-41 1932-33	33.47 10.78
4-323	Ontario No. 2	San Bernardino	34° 05′ 117° 39′	1,100	1918-19 1935-36	BD DWR	14.82	16.60	1931-32 1932-33	20.69 10.23
4-317	Ontario (West Ontario Citrus)	San Bernardino	34° 04′ 117° 41′	985	1920-21 1946-47	BD DWR	18.39	17.85	1940-41 1932-33	35.29 10.94
4-347	Roche Canyon (Atopa Ranch)	San Bernardino	34° 00′ 117° 15′	1,750	1916-17 1946-47	BD DWR	14.79	14.35	1936-37 1917-18	27.78 8.10
4-351	Redlands	San Bernardino	34° 03′ 117° 11′	1,152	1889-90 1946-47	BCD USWB	14.97	14.61	1936-37 1898-99	26.70 6.30

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-352	Redlands (Anderson)	San Bernardino	34° 03′ 117° 11′	1,480	1930-31 1946-47	D DWR	15.83	14.58	1936-37 1933-34	26.60 8.31
4-349	Redlands (Crown Jewel Groves)	San Bernardino	34° 05′ 117° 13′	1,225	1929-30 1946-47	D DWR	14.79	13.75	1936-37 1933-34	24.33 8.19
4-340	Rialto	San Bernardino	34° 07′ 117° 22′	1,250	1926-27 1937-38	D DWR	18.59	17.74	1936-37 1932-33	30.53 11.17
4-186	Running Springs	San Bernardino	34° 12′ 117° 07′	6,200	1931-32 1946-47	D DWR	44.54	41.33	1937-38 1933-34	69.28 26.26
4-345	San Bernardino	San Bernardino	34° 06′ 117° 18′	1,050	1870-71 1946-47	B USWB	16.97	17.21	1883-84 1898-99	37.51 7.49
4-346	San Bernardino (Water Department)	San Bernardino	34° 06′ 117° 17′	1,030	1929-30 1946-47	D DWR	15.18	14.11	1940-41 1933-34	29.65 7.98
4-360	Santa Ana Power House No. 1	San Bernardino	34° 08′ 117° 03′	2,765	1904-05 1946-47	D DWR	27.94	26.49	1915-16 1918-19	44.36 16.86
4-359	Santa Ana River	San Bernardino	34° 09′ 117° 03′	2,850	1904-05 1946-47	BCD USWB	27.77	26.51	1936-37 1918-19	45.50 16.86
4-357	Santa Ana (Edison No. 3)	San Bernardino	34° 06′ 117° 06′	2,060	1905-06 1946-47	D DWR	20.55	19.43	1936-37 1912-13	36.33 9.60
4-190	Seven Oaks	San Bernardino	34° 01′ 116° 55′	5,000	1910-11 1946-47	BC USWB	27.94	26.44	1921-22 1912-13	52.80 13.73
4-185	Squirrel Inn	San Bernardino	34° 14′ 117° 15′	5,700	1893-94 1946-47	BCD USWB	41.31	42.19	1915-16 1927-28	77.61 16.39
4-322	Upland (Johnson)	San Bernardino	34° 09′ 117° 39′	1,785	1891-92 1946-47	BCD USWB	22.58	22.66	1940-41 1898-99	42.40 8.37
4-321	Upland (Jordan)	San Bernardino	34° 06′ 117° 40′	1,230	1930-31 1946-47	D DWR	22.31	20.57	1940-41 1932-33	37.59 13.22
4-326	Upland (Liberty Grove)	San Bernardino	34° 08′ 117° 38′	1,605	1931-32 1946-47	D DWR	23.21	21.12	1940-41 1941-42	39.77 13.70
4-316	Upland (Ward)	San Bernardino	34° 05′ 117° 41′	1,275	1929-30 1940-41	D DWR	20.75	18.37	1940-41 1932-33	35.00 13.24
4-315	Upland (L. Wood)	San Bernardino	34° 08′ 117° 41′	1,525	1932-33 1946-47	C LAFC	21.83	20.00	1940-41 1941-42	40.85 12.83
4-362	Yucaipa (Arnett)	San Bernardino	34° 02′ 117° 02′	2,705	1920-21 1946-47	D DWR	19.54	18.66	1936-37 1933-34	35.93 10.79
4-560	Alpine	San Diego	32° 50′ 116° 46′	1,880	1935-36 1944-45	B USWB	23.30	20.53	1940-41 1935-36	37.19 18.61
4-530	Amago	San Diego	33° 17′ 116° 52′	2,715	1912-13 1943-44	B USWB	27.16	26.80	1921-22 1933-34	43.53 12.78
4-581	Barrett Dam	San Diego	32° 41′ 116° 40′	1,750	1895-96 1946-47	BCD USWB	18.35	18.49	1914-15 1933-34	35.63 8.61
4-544	Bernardo Bridge	San Diego	33° 04′ 117° 04′	370	1926-27 1946-47	B City SD	17.19	16.08	1936-37 1933-34	33.86 7.41
4-585	Bonita	San Diego	32° 38′ 117° 02′	110	1899-00 1946-47	BC USWB	11.53	11.27	1940-41 1933-34	25.70 4.04
4-592	Campo	San Diego	32° 37′ 116° 28′	3,000	1877-78 1946-47	BD USWB	19.03	18.30	1921-22 1933-34	33.41 6.49

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
4-518	Carlsbad	San Diego	33° 10′ 117° 21′	60	1922-23 1946-47	B Private	13.83	13.33	1940-41 1923-24	26.94 4.19
4-558	Chocolate Creek	San Diego	32° 53′ 116° 49′	760	1899-00 1936-37	B LMID	16.71	16.41	1915-16 1933-34	30.58 7.51
4-572	Chollas Heights	San Diego	32° 49′ 117° 04′	370	1914-15 1946-47	B City SD	12.99	12.21	1940-41 1924-25	24.02 7.97
4-584	Chula Vista	San Diego	32° 38′ 117° 06′	9	1913-14 1946-47	BCD USWB	11.30	10.70	1940-41 1933-34	25.57 3.08
4-570	Coronado No. 2	San Diego	32° 42′ 117° 10′	50	1927-28 1946-47	B SDG&E	10.67	9.80	1940-41 1933-34	23.50 4.52
4-564	Cuyamaca	San Diego	32° 59′ 116° 35′	4,677	1887-88 1946-47	BC USWB	39.32	38.96	1926-27 1893-94	66.55 15.05
4-565	Cuyamaca Dam No. 1	San Diego	32° 59′ 116° 34′	4,677	1887-88 1932-33	B Private	39.80	39.78	1889-90 1893-94	71.21 22.00
4-535	Damrons	San Diego	33° 13′ 116° 45′	2,725	1911-12 1921-22	BC USWB	33.89	32.26	1921-22 1918-19	52.22 23.16
4-516	Deadmans Hole	San Diego	33° 20′ 116° 43′	3,200	1911-12 1923-24	BC USWB	21.71	21.78	1921-22 1912-13	38.93 12.19
4-511	Deluz Canyon	San Diego	33° 27′ 117° 19′	450	1902-03 1946-47	B Private	19.30	18.85	1921-22 1903-04	40.57 8.37
4-563	Descanso (Ranger Station)	San Diego	32° 51′ 116° 37′	3,400	1896-97 1937-38	B USFS	25.24	26.80	1936-37 1898-99	46.07 11.94
4-561	Diverting Dam	San Diego	32° 58′ 116° 44′	840	1899-00 1938-39	C DWR	17.45	17.10	1921-22 1903-04	32.94 7.09
4-588	Dulzura	San Diego	32° 39′ 116° 46′	1,075	1914-15 1925-26	BC USWB	16.16	15.70	1921-22 1920-21	26.24 7.67
4-589	Dulzura (Summit)	San Diego	32° 37′ 116° 45′	1,400	1917-18 1946-47	B City SD	17.16	18.32	1936-37 1933-34	29.91 6.75
4-577	El Cajon	San Diego	32° 47′ 116° 58′	560	1875-76 1946-47	BC USWB	14.03	13.97	1940-41 1876-77	30.08 3.43
4-578	El Cajon No. 1	San Diego	32° 48′ 116° 57′	482	1882-83 1946-47	B Private	14.00	12.85	1883-84 1946-47	29.65 6.48
4-579	El Cajon Valley	San Diego	32° 46′ 116° 57′	670	1902-03 1934-35	B LMID	13.18	12.73	1915-16 1903-04	24.74 4.96
4-559	El Capitan Dam	San Diego	32° 53′ 116° 48′	613	1936-37 1946-47	B USWB	19.08	17.42	1940-41 1946-47	33.84 10.52
4-521	"E" Reservoir	San Diego	33° 13′ 117° 12′	752	1924-25 1946-47	B Vista ID	14.88	14.04	1936-37 1933-34	26.47 7.87
4-541	Escondido No. 1	San Diego	33° 09′ 117° 05′	750	1894-95 1946-47	ABD USWB	17.00	17.00	1936-37 1903-04	32.84 8.15
4-543	Escondido No. 2	San Diego	33° 07′ 117° 04′	660	1897-98 1946-47	B ELT Co.	17.25	17.25	1921-22 1897-98	31.99 7.51
4-542	Escondido No. 3	San Diego	33° 07′ 117° 05′	660	1887-88 1896-97	B Private	14.80	14.03	1889-90 1893-94	20.89 5.90
4-529	Escondido Ditch Head	San Diego	33° 16′ 116° 53′	1,986	1896-97 1932-33	B Private	22.50	23.72	1914-15 1898-99	37.30 9.53

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-528	Escondido Ditch Head No. 3	San Diego	33° 16′ 116° 54′	1,850	1930-31 1946-47	B EMW Co.	24.50	24.06	1940-41 1946-47	40.29 16.69
4-512	Fallbrook No. 1	San Diego	33° 23′ 117° 15′	700	1876-77 1946-47	BC FCGA	17.44	17.07	1883-84 1878-79	40.77 7.70
4-513	Fallbrook No. 2	San Diego	33° 23′ 117° 13′	750	1909-10 1946-47	B Private	20.09	18.95	1936-37 1912-13	36.35 10.69
4-582	Gillette Ranch	San Diego	32° 49′ 116° 38′	3,500	1919-20 1930-31	BC USWB	24.63	23.30	1921-22 1927-28	39.64 16.98
4-571	Grantville	San Diego	32° 48′ 117° 06′	100	1920-21 1937-38	B Private	13.12	12.50	1921-22 1933-34	22.62 5.85
4-576	Grossmont	San Diego	32° 46′ 117° 00′	640	1899-00 1946-47	B LMID	14.70	14.39	1940-41 1903-04	38.80 5.53
4-566	Harpers Ranch	San Diego	32° 56′ 116° 31′	4,800	1915-16 1929-30	B Private	25.85	26.03	1926-27 1927-28	41.98 11.31
4-532	Henshaw Dam	San Diego	33° 14′ 116° 46′	2,700	1911-12 1946-47	B SDCW Co	29.02	29.03	1921-22 1933-34	51.08 10.86
4-540	Hodges Dam	San Diego	33° 03′ 117° 08′	350	1919-20 1946-47	B City SD	16.40	15.83	1936-37 1933-34	32.92 8.80
4-533	Holdredge Ranch	San Diego	33° 12′ 116° 46′	3,480	1935-36 1946-47	BC LMID	37.52	35.26	1936-37 1946-47	62.16 27.34
4-551	Julian	San Diego	33° 05′ 116° 37′	4,222	1879-80 1946-47	BCD USWB	33.09	31.64	1883-84 1895-96	61.52 17.30
4-552	La Jolla	San Diego	32° 51′ 117° 16′	100	1927-28 1946-47	B SDG&E	11.19	10.28	1940-41 1933-34	21.93 4.66
4-574	La Mesa	San Diego	32° 48′ 117° 02′	539	1927-28 1946-47	BCD USWB	15.24	12.50	1940-41 1946-47	26.96 7.17
4-590	Lauterbach Ranch	San Diego	32° 37′ 116° 41′	1,200	1910-11 1930-31	B Private	17.99	16.95	1915-16 1920-21	33.11 11.20
4-556	Los Coches	San Diego	32° 50′ 116° 54′	710	1901-02 1946-47	B LMID	14.63	14.12	1940-41 1933-34	30.25 5.51
4-580	Los Padres Rancho	San Diego	32° 47′ 116° 53′	490	1901-02 1914-15	B Private	15.87	15.86	1904-05 1912-13	22.43 8.02
4-587	Lower Otay Reservoir	San Diego	32° 37′ 116° 56′	540	1906-07 1946-47	B City SD	12.47	12.03	1940-41 1933-34	24.56 3.63
4-531	Mesa Grande (Angels)	San Diego	33° 12′ 116° 47′	3,450	1912-13 1946-47	BC SDCW Co.	33.03	32.84	1936-37 1933-34	54.50 15.82
4-534	Mesa Grande (Store)	San Diego	33° 10′ 116° 46′	3,350	1905-06 1946-47	BC USWB	32.92	31.50	1915-16 1917-18	48.27 19.47
4-554	Miramar	San Diego	32° 54′ 117° 07′	660	1901-02 1946-47	B Private	14.82	14.39	1940-41 1933-34	29.75 6.31
4-583	Morena Dam	San Diego	32° 41′ 116° 33′	3,050	1896-97 1946-47	B City SD	22.36	23.22	1915-16 1933-34	39.98 10.01
4-573	Murray Dam	San Diego	32° 47′ 117° 03′	500	1913-14 1946-47	B LMID	13.11	12.31	1940-41 1933-34	23.25 5.37
4-514	Nellie	San Diego	33° 20′ 116° 53′	5,000	1901-02 1922-23	BC USWB	47.15	46.06	1905-06 1903-04	77.40 24.86

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-517	Oceanside No. 1	San Diego	33° 12′ 117° 23′	30	1892-93 1946-47	B Private	12.10	12.38	1940-41 1903-04	24.95 4.52
4-519	Oceanside No. 4	San Diego	33° 12′ 117° 20′	280	1892-93 1946-47	BC Oceanside	12.33	12.34	1940-41 1903-04	26.80 4.52
4-568	Pacific Beach	San Diego	32° 48′ 117° 14′	75	1926-27 1946-47	AB Private	11.99	10.85	1940-41 1933-34	23.88 4.02
4-657	Padre Barona Valley	San Diego	32° 56′ 116° 52′	1,375	1918-19 1928-29	B Private	17.76	18.08	1921-22 1923-24	31.56 11.06
4-567	Point Loma	San Diego	32° 43′ 117° 15′	302	1904-05 1941-42	B USWB	11.84	11.18	1940-41 1923-24	24.05 4.64
4-555	Poway	San Diego	32° 59′ 117° 04′	460	1879-80 1908-09	BC USWB	14.11	14.40	1883-84 1898-99	29.45 7.96
4-546	Ramona (Sentinel)	San Diego	33° 02′ 116° 51′	1,440	1912-13 1930-31	BC Private	18.99	19.15	1921-22 1912-13	33.80 8.79
4-547	Ramona (Verdagua)	San Diego	33° 02′ 116° 51′	1,440	1896-97 1915-16	BC USWB	18.04	18.43	1915-16 1898-99	33.18 8.05
4-545	Rockwood Ranch	San Diego	33° 06′ 116° 57′	430	1893-94 1914-15	B Private	13.04	14.40	1914-15 1903-04	24.69 5.32
4-569	San Diego	San Diego	32° 44′ 117° 10′	26	1850-51 1946-47	BCD USWB	10.08	10.36	1883-84 1876-77	25.97 3.75
4-539	San Dieguito Dam	San Diego	33° 02′ 117° 11′	250	1924-25 1946-47	B City SD	14.72	14.13	1936-37 1924-25	27.80 6.54
4-520	San Luis Rey	San Diego	33° 15′ 117° 19′	60	1901-02 1915-16	BC Private	14.50	13.85	1905-06 1903-04	23.26 6.51
4-548	Santa Ysabel (Ranch)	San Diego	33° 07′ 116° 41′	3,000	1900-01 1915-16	BCD SDCWCo	25.66	24.37	1905-06 1903-04	42.00 11.00
4-549	Santa Ysabel (Store)	San Diego	33° 06′ 116° 41′	2,983	1915-16 1946-47	BC SDCWCo	27.08	27.00	1926-27 1933-34	44.90 14.08
4-553	Scripps Pier	San Diego	32° 52′ 117° 15′	50	1924-25 1946-47	B Private	10.87	9.89	1940-41 1933-34	21.56 3.95
4-575	Sweetwater Dam	San Diego	32° 42′ 117° 01′	310	1888-89 1946-47	B SW Co.	11.44	11.36	1940-41 1933-34	26.51 4.43
4-591	Tecate	San Diego	32° 35′ 116° 38′	1,800	1914-15 1930-31	BC City SD	17.36	16.04	1915-16 1917-18	34.47 9.92
4-523	Twin Oaks	San Diego	33° 11′ 117° 09′	700	1875-76 1896-97	C Private	15.16	14.77	1883-84 1893-94	32.07 5.96
4-586	Upper Otay Dam	San Diego	32° 39′ 116° 56′	550	1917-18 1946-47	B City SD	13.50	12.59	1940-41 1933-34	27.05 4.11
4-526	Valley Center No. 1	San Diego	33° 12′ 117° 01′	1,400	1872-73 1902-03	B USWB	19.28	19.28	1883-84 1899-00	50.51 7.88
4-524	Valley Center No. 2	San Diego	33° 13′ 117° 02′	1,316	1911-12 1923-24	B Private	18.45	18.60	1921-22 1912-13	32.36 9.98
4-525	Valley Center No. 3	San Diego	33° 14′ 117° 01′	1,510	1924-25 1940-41	D Private	21.37	19.36	1936-37 1933-34	37.32 9.79
4-522	Vista Irrigation District	San Diego	33° 11′ 117° 11′	830	1931-32 1944-45	AB Vista ID	15.95	14.64	1936-37 1933-34	25.93 6.13

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
4-550	Volcan Mountain	San Diego	33° 09′ 116° 39′	4,800	1912-13 1923-24	BC USWB	32.61	32.16	1915-16 1923-24	56.51 17.83
4-537	Warner Springs	San Diego	33° 17′ 116° 38′	3,165	1906-07 1946-47	BCD USWB	17.97	17.80	1921-22 1933-34	38.23 7.21
4-536	Warner Summer Road	San Diego	33° 14′ 116° 42′	2,805	1911-12 1921-22	BC USWB	19.92	19.51	1915-16 1912-13	33.00 11.93
4-562	Willows	San Diego	32° 50′ 116° 44′	2,300	1914-15 1946-47	B Private	22.02	20.05	1915-16 1946-47	38.58 11.52
4-527	Wohlford Lake	San Diego	33° 10′ 117° 00′	1,500	1926-27 1946-47	B EW Co.	21.37	20.01	1940-41 1933-34	38.07 11.90
4-60	Aggen Ranch	Ventura	34° 16′ 119° 02′	375	1903-04 1945-46	BC Private	15.24	15.00	1940-41 1923-24	32.48 5.28
4-31	Bardsdale	Ventura	34° 22′ 118° 57′	400	1932-33 1945-46	B Private	20.32	17.45	1940-41 1932-33	39.58 11.54
4-53	Borgstroms Ranch	Ventura	34° 16′ 119° 15′	200	1921-22 1946-47	B Private	14.50	14.82	1940-41 1923-24	35.40 6.14
4-192	Broome Ranch	Ventura	34° 08′ 119° 05′	12	1911-12 1946-47	BC ACS Co.	12.38	11.62	1940-41 1933-34	31.13 7.43
4-39	Camulos Ranch Headquarters	Ventura	34° 24′ 118° 45′	730	1928-29 1946-47	B Private	17.58	14.25	1940-41 1928-29	36.30 10.33
4-22	Canada Larga	Ventura	34° 22′ 117° 14′	800	1934-35 1945-46	B Private	21.50	17.90	1940-41 1938-39	43.62 14.09
4-16	Casitas Ranch	Ventura	34° 22′ 119° 20′	400	1924-25 1946-47	BD Private	23.06	23.81	1940-41 1924-25	48.02 12.80
4-65	Conejo Ranch	Ventura	34° 11′ 118° 52′	650	1913-14 1945-46	BC Private	15.53	15.38	1940-41 1923-24	33.82 7.39
4-54	Del Mar Ranch	Ventura	34° 17′ 119° 12′	300	1924-25 1945-46	BD Private	15.86	16.82	1940-41 1924-25	41.75 7.92
4-23	Dennisons	Ventura	34° 24′ 119° 12′	1,250	1883-84 1945-46	BD Private	23.07	21.92	1883-84 1923-24	60.02 7.13
4-63	Epworth	Ventura	34° 19′ 118° 54′	800	1927-28 1945-46	BD Private	16.28	16.40	1940-41 1932-33	34.36 10.54
4-25	Ferndale	Ventura	34° 26′ 119° 05′	1,100	1930-31 1942-43	B Private	25.84	21.41	1940-41 1932-33	44.88 13.47
4-34	Fillmore	Ventura	34° 24′ 118° 54′	530	1905-06 1945-46	BD Private	19.16	19.28	1940-41 1923-24	39.71 9.68
4-33	Fillmore (Citrus Association)	Ventura	34° 24′ 118° 55′	500	1925-26 1945-46	B Private	18.62	18.60	1940-41 1929-30	38.68 10.08
4-32	Henleys	Ventura	34° 27′ 118° 56′	1,000	1906-07 1920-21	D Private	27.56	24.90	1913-14 1918-19	44.00 15.12
4-19	Kingston Reservoir	Ventura	34° 21′ 119° 17′	215	1934-35 1945-46	B VCWD	19.52	16.20	1940-41 1945-46	38.10 10.07
4-24	Krotona	Ventura	34° 26′ 119° 16′	830	1928-29 1946-47	B Private	20.10	19.97	1940-41 1929-30	45.17 11.39

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-36	Levens and Goodenough Ranch	Ventura	34° 23' 118° 50'	550	1931-32 1945-46	B Private	18.65	17.00	1940-41 1932-33	38.43 12.85
4-58	Limoneira Ranch	Ventura	34° 19' 119° 08'	335	1904-05 1946-47	BD Private	17.30	16.66	1940-41 1923-24	38.51 7.13
4-18	Matilija Canyon	Ventura	34° 29' 119° 17'	950	1902-03 1937-38	BCD Private	25.45	24.76	1913-14 1918-19	50.75 6.88
4-6	Mono Ranch	Ventura	34° 33' 119° 14'	3,210	1901-02 1936-37	BC USWB	31.72	29.73	1913-14 1903-04	58.72 14.78
4-64	Moorpark	Ventura	34° 17' 118° 53'	500	1916-17 1945-46	BCD Private	13.19	14.12	1940-41 1923-24	30.99 5.55
4-40	Newhall Ranch	Ventura	34° 23' 118° 45'	1,054	1912-13 1946-47	B Private	16.68	17.33	1940-41 1923-24	37.12 7.99
4-21	Ojai	Ventura	34° 27' 119° 15'	750	1891-92 1946-47	BD Private	20.41	20.75	1940-41 1893-94	45.18 6.96
4-56	Oxnard	Ventura	34° 11' 119° 10'	51	1898-99 1946-47	BCD USWB	14.47	14.47	1940-41 1923-24	38.17 5.77
4-29	Pine Tree Ranch	Ventura	34° 22' 119° 01'	400	1931-32 1946-47	B Private	19.24	17.33	1940-41 1932-33	38.73 11.13
4-38	Piru (Citrus Association)	Ventura	34° 25' 118° 48'	700	1926-27 1946-47	BC Private	18.14	17.93	1940-41 1927-28	38.47 11.08
4-35	Pole Creek Canyon	Ventura	34° 25' 118° 53'	1,600	1888-89 1936-37	B Private	21.00	21.34	1889-90 1897-98	38.88 5.75
4-191	Port Hueneme Lighthouse	Ventura	34° 09' 119° 13'	10	1891-92 1946-47	B Private	13.81	13.79	1940-41 1897-98	32.99 3.93
4-37	Proctor & Lutheridge Ranch	Ventura	34° 25' 118° 49'	640	1932-33 1945-46	B Private	19.20	17.35	1940-41 1932-33	37.77 11.09
4-26	Rancho La Cuesta	Ventura	34° 25' 119° 05'	900	1930-31 1946-47	B Private	23.11	21.93	1940-41 1932-33	45.44 12.47
4-17	Rancho Matilija	Ventura	34° 26' 119° 19'	650	1925-26 1945-46	BD Private	21.95	21.85	1940-41 1929-30	44.51 12.47
4-30	Rancho Sespe	Ventura	34° 23' 118° 58'	430	1906-07 1946-47	BCD Private	19.31	18.67	1940-41 1923-24	38.60 8.90
4-27	Santa Paula	Ventura	34° 21' 119° 04'	275	1897-98 1946-47	BC BI Co.	17.50	17.50	1940-41 1897-98	38.11 5.91
4-28	Santa Paula (County Farm Advisor)	Ventura	34° 21' 119° 04'	290	1931-32 1946-47	B CFA	17.40	16.48	1940-41 1932-33	35.54 9.91
4-62	Santa Rosa Valley No. 1	Ventura	34° 14' 118° 57'	275	1929-30 1946-47	BCD Private	13.79	12.47	1940-41 1933-34	29.12 9.81
4-57	Saticoy (Walnut Association)	Ventura	34° 17' 119° 09'	150	1924-25 1937-38	B Private	14.37	14.55	1936-37 1927-28	22.98 7.57
4-15	Selby Ranch	Ventura	34° 25' 119° 22'	750	1921-22 1945-46	BD Private	21.64	21.86	1940-41 1924-25	51.20 8.00
4-68	Simi Valley	Ventura	34° 16' 118° 40'	1,100	1931-32 1945-46	B Private	20.20	18.52	1940-41 1941-42	40.46 11.80

TABLE 43—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
4-61	Snyder Ranch	Ventura....	34° 16′ 119° 00′	300	1892-93 1945-46	BCD Private	14.20	14.28	1940-41 1897-98	32.83 4.26
4-59	Springville Ranch	Ventura....	34° 12′ 119° 04′	60	1902-03 1946-47	BC ACS Co.	13.77	13.52	1940-41 1923-24	33.41 5.52
4-66	Tapo Mutual Water Company	Ventura....	34° 18′ 118° 44′	1,080	1923-24 1945-46	BD TMW Co.	15.20	15.02	1940-41 1923-24	34.83 6.45
4-24	Upper Ojai No. 2	Ventura....	34° 26′ 119° 08′	1,560	1922-23 1945-46	BD Private	22.53	23.41	1940-41 1923-24	50.81 8.11
4-5	Upper Sespe Creek	Ventura....	34° 36′ 119° 19′	4,000	1927-28 1946-47	BCD Private	25.12	25.34	1940-41 1932-33	60.63 13.58
4-52	Ventura.......	Ventura....	34° 16′ 119° 17′	43	1873-74 1946-47	B USWB	15.58	15.59	1940-41 1876-77	36.71 5.22
4-55	West Saticoy	Ventura....	34° 17′ 119° 10′	200	1893-94 1911-12	B USWB	14.21	14.98	1908-09 1897-98	25.32 5.25
4-67	Wolf Ranch ..	Ventura....	34° 17′ 118° 43′	980	1913-14 1945-46	BCD Private	14.43	13.80	1940-41 1923-24	35.18 5.36

ABBREVIATIONS—SOUTH COASTAL AREA

TYPE OF RECORD

Abbreviation	*Name*	*Abbreviation*	*Name*
A	Hourly	C	Monthly
B	Daily	D	Seasonal

SOURCE OF RECORD

Abbreviation	*Name*
ACS Co.	American Crystal Sugar Co.
BBVW Co.	Big Bear Valley Water Co.
BI Co.	Blanchard Investment Co.
City SD	City of San Diego
CFA	County Farm Adviser
DWR	State Division of Water Resources
ELT Co.	Escondido Land and Town Co.
EMW Co.	Escondido Mutual Water Co.
EW Co.	Escondido Water Co.
FCGA	Fallbrook Citrus Growers Association
LAFC	Los Angeles County Flood Control District
LHW Co.	Lake Hemet Water Co.
LMID	La Mesa, Lemongrove, and Spring Valley Irrigation District
Oceanside	City of Oceanside
OCFC	Orange County Flood Control District
Pas. WD	Pasadena Water Department
SCE	Southern California Edison Co.
SDCW Co.	San Diego County Water Company
SDG&E	San Diego Gas and Electric Co.
SP Co.	Southern Pacific Co.
SW Co.	Sweetwater Water Co.
TMW Co.	Tapo Mutual Water Co.
USFS	United States Forest Service
USWB	United States Weather Bureau
Vista ID	Vista Irrigation District
VCWD	Ventura City Water Department

TABLE 44

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, SOUTH COASTAL AREA
(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
4-12*	Acton (near Mellon)	Los Angeles	34° 30′ 118° 16′	3,100	Nov. 1930 June 1947	LAFCD
4-210*	Bel Air Administration Bldg.	Los Angeles	34° 05′ 118° 27′	540	Sept. 1940 June 1947	USWB
4-007	Bell Canyon (Platt Ranch)	Los Angeles	34° 12′ 118° 39′	995	Jan. 1946 June 1947	USED
4-010	Birmingham General Hospital	Los Angeles	34° 11′ 118° 30′	722	Nov. 1945 June 1947	USED
4-012	Burbank Airport	Los Angeles	34° 12′ 118° 22′	710	Aug. 1940 June 1947	USWB
4-71*	Chatsworth Reservoir	Los Angeles	34° 14′ 118° 37′	865	Oct. 1945 June 1947	USWB
4-027	Diamond Bar Horse Camp	Los Angeles	33° 59′ 117° 50′	750	Jan. 1943 May 1947	USED
4-044	Hansen Dam	Los Angeles	34° 16′ 118° 23′	1,005	Feb. 1943 June 1947	USED
4-193*	Lechuza Patrol Station	Los Angeles	34° 05′ 118° 53′	1,500	Nov. 1934 June 1947	LAFCD
4-055	Little Tujunga (Gold Creek)	Los Angeles	34° 19′ 118° 18′	2,700	Jan. 1943 June 1947	USED
4-229*	Los Angeles	Los Angeles	34° 03′ 118° 15′	338	Feb. 1897 June 1947	USWB
4-075	Magic Mountain	Los Angeles	34° 24′ 118° 17′	4,450	Mar. 1947 June 1947	USED
4-132*	Mt. Wilson Airway	Los Angeles	34° 14′ 118° 04′	5,709	Mar. 1932 June 1947	LAFCD
4-083	Newhall Airport	Los Angeles	34° 24′ 118° 33′	1,190	Aug. 1940 June 1947	CAA
4-127*	Opids Camp	Los Angeles	34° 15′ 118° 06′	4,350	Oct. 1940 June 1947	LAFCD
4-089	Pacific Colony	Los Angeles	34° 03′ 117° 49′	700	Feb. 1947 June 1947	LAFCD
4-2*	Sandberg	Los Angeles	34° 45′ 118° 44′	4,517	Mar. 1940 June 1947	USWB
4-165*	San Dimas-Tanbark Flat	Los Angeles	34° 12′ 117° 46′	2,750	Jan. 1929 June 1947	USFS
4-0108	San Fernando Powerhouse No. 3	Los Angeles	34° 19′ 118° 30′	1,248	Nov. 1945 June 1947	USED
4-0112	San Gabriel Dam, No. 1	Los Angeles	34° 12′ 117° 51′	1,470	Nov. 1937 June 1947	LAFCD
4-0116	Santa Fe Dam	Los Angeles	34° 07′ 117° 58′	427	Nov. 1945 June 1947	USED
4-0117	Santa Susana Mountain	Los Angeles	34° 19′ 118° 33′	2,367	Sept. 1940 June 1947	LAFCD
4-0123	Signal Hill	Los Angeles	33° 48′ 118° 10′	115	Mar. 1937 June 1947	LAFCD
4-0133	Tujunga Mill Creek	Los Angeles	34° 23′ 118° 05′	4,600	Jan. 1943 May 1947	USED
4-0144	Brea Dam	Orange	33° 53′ 117° 56′	275	Jan. 1943 May 1947	USED
4-0146	El Modena	Orange	33° 48′ 117° 47′	464	Oct. 1937 June 1947	USWB
4-0149	Fullerton Dam	Orange	33° 54′ 117° 53′	260	Jan. 1943 May 1947	USED
4-0158	Laguna Beach No. 2	Orange	33° 33′ 117° 47′	115	June 1940 June 1947	USWB
4-0161	Orange Co. Reservoir	Orange	33° 56′ 117° 53′	600	Jan. 1943 June 1947	USED
4-506*	San Juan Capistrano	Orange	33° 31′ 117° 40′	150	Dec. 1939 June 1947	USWB
4-0167	Santiago Dam	Orange	33° 47′ 117° 43′	1,025	Dec. 1937 June 1947	USED

TABLE 44—Continued

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, SOUTH COASTAL AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
4-0168	Silverado Ranger Station	Orange	33° 45′ 117° 40′	1,100	Jan. 1943 June 1947	USED
4-0179	Trabuco Oaks	Orange	33° 39′ 117° 35′	1,050	Oct. 1939 June 1947	USWB
4-436*	Beaumont (near)	Riverside	33° 56′ 116° 56′	2,590	April 1940 June 1947	USWB
4-0189	Elsinore (near)	Riverside	33° 38′ 117° 16′	1,450	Dec. 1939 June 1947	USWB
4-0195	Hemet Reservoir	Riverside	33° 40′ 116° 41′	4,400	Oct. 1939 June 1947	USWB
4-497*	Idyllwild	Riverside	33° 45′ 116° 43′	5,400	Oct. 1939 June 1940	USWB
4-0198	Prado Dam	Riverside	33° 53′ 117° 38′	570	Aug. 1940 June 1947	USED
4-432*	Riverside (near)	Riverside	33° 58′ 117° 20′	1,050	Oct. 1932 June 1947	US Cit. Ex. Sta.
4-0201	San Jacinto No. 2	Riverside	33° 47′ 116° 58′	1,550	Dec. 1938 June 1947	State Div. of F'stry.
4-0203	Winchester	Riverside	33° 42′ 117° 05′	1,470	Aug. 1940 Jan. 1947	USWB
4-0205	Big Bear Lake (near)	San Bernardino	34° 14′ 116° 58′	6,800	Mar. 1940 June 1947	USWB
4-0207	Cajon (near)	San Bernardino	34° 23′ 117° 35′	4,838	Oct. 1939 June 1947	USWB
4-0209	Camp Angelus	San Bernardino	34° 09′ 116° 59′	5,800	Oct. 1939 June 1947	USWB
4-171*	Camp Baldy	San Bernardino	34° 14′ 117° 39′	4,300	Nov. 1927 June 1945	LAFCD
4-0211	City Creek (CCC Camp)	San Bernardino	34° 11′ 117° 11′	2,700	Oct. 1939 Jan. 1941	USWB
4-0216	Devil Canyon	San Bernardino	34° 12′ 117° 20′	2,781	Oct. 1940 Mar. 1944	Cal. F'rst &Rng. Ex. Sta.
4-0220	Etiwanda (near)	San Bernardino	34° 08′ 117° 31′	1,425	Feb. 1943 June 1947	USWB
4-0228	Glen Ranch	San Bernardino	34° 15′ 117° 29′	3,248	Dec. 1942 June 1947	USWB
4-0234	Lytle Creek, Foothill Blvd.	San Bernardino	34° 07′ 117° 20′	1,160	Nov. 1946 June 1947	USWB
4-0249	Redlands (near)	San Bernardino	34° 03′ 117° 10′	1,600	Jan. 1940 July 1941	USWB
4-0250	Running Springs (near)	San Bernardino	34° 12′ 117° 05′	6,000	Oct. 1939 June 1947	St. Div. of Hwys.
4-0254	Santa Ana No. 3	San Bernardino	34° 06′ 117° 06′	1,980	April 1939 June 1947	SCE
4-0266	Upper Lytle Creek	San Bernardino	34° 16′ 117° 30′	3,800	Oct. 1939 Dec. 1942	USWB
4-0267	Upper Mill Creek	San Bernardino	34° 05′ 116° 55′	5,700	Oct. 1939 May 1947	USWB
4-0292	Escondido (near) No. 1	San Diego	33° 09′ 117° 05′	750	Feb. 1941 June 1947	USWB
4-0294	Fallbrook (near)	San Diego	33° 20′ 117° 15′	610	Jan. 1940 June 1947	USWB
4-532*	Henshaw Dam	San Diego	33° 14′ 116° 46′	2,700	July 1941 June 1947	Vista Ir. Dist.
4-0302	Julian (near)	San Diego	33° 04′ 116° 38′	4,000	Mar. 1940 June 1947	USWB
4-527*	Lake Wohlford	San Diego	33° 10′ 117° 00′	1,500	Dec. 1944 June 1947	USWB
4-587*	Lower Otay Reservoir	San Diego	32° 37′ 116° 56′	540	Dec. 1941 June 1947	USWB

TABLE 44—Continued

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, SOUTH COASTAL AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
4-0318	Morena Dam (near)	San Diego	32° 41′ 116° 32′	3,000	Dec. 1938 Jan. 1940	USWB
4-0323	Oceanside (near)	San Diego	33° 14′ 117° 25′	18	Dec. 1941 June 1947	CAA
4-0326	Palomar Mt	San Diego	33° 21′ 116° 51′	5,598	July 1938 June 1947	Cal. Inst. Tech.
4-569*	San Diego	San Diego	32° 44′ 117° 10′	26	Dec. 1896 June 1947	USWB
4-0347	Vallecito	San Diego	32° 58′ 116° 20′	2,000	Dec. 1942 July 1945	USWB
4-0351	Warner Springs	San Diego	33° 17′ 116° 38′	3,165	Feb. 1941 June 1947	USWB
4-0360	Chuchupate	Ventura	34° 48′ 119° 00′	5,250	Jan. 1941 June 1947	USFS
4-0373	Potrero Seco	Ventura	34° 38′ 119° 26′	4,850	Jan. 1946 June 1947	USED
4-0374	San Nicolas Is	Ventura	33° 14′ 119° 28′	135	Sept. 1940 June 1947	US Navy
4-0382	Somis (near) No. 1	Ventura	34° 16′ 119° 01′	400	Jan. 1940 Dec. 1943	USWB
4-0388	Wheeler Springs (near) No. 1	Ventura	34° 39′ 119° 18′	850	Mar. 1940 June 1947	USWB
4-090	Wheeler Springs (near) No. 3	Ventura	34° 36′ 119° 20′	4,150	Sept. 1941 June 1947	USWB

SOURCE OF RECORD

Abbreviation	*Name*
Cal. Inst. Tech.	California Institute of Technology
Cal. F'rst & Rng. Ex.	California Forest and Ranger Experiment Station
LAFCD	Los Angeles County Flood Control District
State Div. of F'stry	State Division of Forestry
St. Div. of Hwys.	State Division of Highways
SCE	Southern California Edison Company
USED	United States Corps of Engineers
CAA	Civil Aeronautics Administration Airway Communication Station
USWB	United States Weather Bureau
Vista Ir. Dist.	Vista Irrigation District

TABLE 45

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-001	Alhambra (Southern Pacific Co.)	Los Angeles	34° 05′ 118° 08′	450	1898-1900	B
4-002	Alosta	Los Angeles	34° 08′ 117° 52′	740	1881-85	B
4-003	Alta Canyada	Los Angeles	34° 13′ 118° 13′	1,765	1929-34	B
4-004	Arcadia (Southern Pacific Co.)	Los Angeles	34° 08′ 118° 01′	450	1899-1900	B
4-005	Arroyo Sequis	Los Angeles	34° 04′ 118° 52′	1,155	1932-39	B
4-006	Baldwin Hills	Los Angeles	34° 00′ 118° 23′	392	1944	B
4-007	Bell Canyon (Platt Ranch)	Los Angeles	34° 12′ 118° 39′	995	1946-47	A
4-008	Bell (Calif. Forest & Range Exp. Sta.)	Los Angeles	34° 42′ 117° 47′	3,600	1933-38	B
4-009	Ben Mar Hills	Los Angeles	34° 12′ 118° 20′	617	1927-30	B
4-010	Birmingham General Hospital	Los Angeles	34° 11′ 118° 30′	722	1945-47	B
4-011	Bouquet Canyon	Los Angeles	34° 35′ 118° 22′	3,000	1930-32	B
4-012	Burbank Airport	Los Angeles	34° 12′ 118° 22′	710	1940-47	A
4-013	Cahuenga Park	Los Angeles	34° 09′ 118° 28′	785	1927-36	B
4-014	Cal Tech	Los Angeles	34° 08′ 118° 08′	763	1944	A
4-015	Camp Rincon	Los Angeles	34° 14′ 117° 51′	1,500	1916-18	B
4-016	Charlton Flats	Los Angeles	34° 18′ 118° 00′	5,500	1944	A
4-017	Chatsworth Patrol Station	Los Angeles	34° 17′ 118° 36′	1,245	1944	A
4-018	Cherry Summit	Los Angeles	34° 36′ 118° 24′	2,995	1932-39	B
4-019	Chevy Chase	Los Angeles	34° 10′ 118° 12′	1,035	1928-30	B
4-020	Chilao	Los Angeles	34° 20′ 118° 00′	5 300	1927-29	B
4-021	Clark's ½ Way House	Los Angeles	34° 11′ 118° 02′	1,600	1943-45	C
4-022	Colby Ranch No. 2	Los Angeles	34° 18′ 118° 07′	2,950	1928-37	B
4-023	Compton (Southern Pacific Co.)	Los Angeles	33° 54′ 118° 13′	70	1898-1900	B
4-024	Covina (H. H. Snodgrass)	Los Angeles	34° 05′ 117° 53′	545	1934-38	B
4-025	Covina (Southern Pacific Co.)	Los Angeles	34° 05′ 117° 53′	550	1897-1900	B
4-026	Curson Canyon (Lower Ridge)	Los Angeles	34° 07′ 118° 21′	1,044	1928-32	B
4-027	Diamond Bar Horse Camp	Los Angeles	33° 59′ 117° 50′	750	1943-47	A
4-028	Double Eagle Ranch	Los Angeles	34° 36′ 118° 29′	3,100	1927-30	B
4-029	Downey (Jordon)	Los Angeles	33° 57′ 118° 08′	127	1935-38	B
4-030	Duarte (Southern Pacific Co.)	Los Angeles	34° 08′ 117° 58′	550	1898-1900	B
4-031	East Pine Flat	Los Angeles	34° 20′ 117° 50′	5,725	1938-39	B
4-032	East Whittier (Menden Hall)	Los Angeles	33° 57′ 118° 01′	266	1925-32	B

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-033	Elizabeth Lake Canyon	Los Angeles	34° 35′ 118° 33′	1,125	1931-39	B
4-034	El Monte Fire Station	Los Angeles	34° 05′ 118° 02′	301	1944	A
4-035	El Sereno	Los Angeles	34° 05′ 118° 11′	553	1944	A
4-036	El Sereno (Morgan)	Los Angeles	34° 05′ 118° 11′	500	1934-37	B
4-037	Escondido Patrol Station	Los Angeles	34° 03′ 118° 47′	1,025	1927-29	B
4-038	Fish Canyon	Los Angeles	34° 10′ 117° 56′	800	1917-23	B
4-039	Florence	Los Angeles	33° 58′ 118° 14′	153	1897-1900	B
4-040	Follows Camp	Los Angeles	34° 14′ 117° 49′	1,804	1896-1900	B
4-041	Foresters Sanitarium	Los Angeles	34° 20′ 118° 27′	1,450	1917-19	B
4-042	Glendora	Los Angeles	34° 08′ 117° 52′	740	1896-1900 1910-13	B
4-043	Granada	Los Angeles	34° 16′ 118° 31′	1,130	1929-33	B
4-044	Hansen Dam	Los Angeles	34° 16′ 118° 23′	1,005	1943-47	A
4-045	Hansen Ranch	Los Angeles	34° 17′ 118° 12′	2,050	1916-24	B
4-046	Hawthorne	Los Angeles	33° 54′ 118° 21′	73	1927-32	B
4-047	Henninger Flat (Peavy)	Los Angeles	34° 12′ 118° 05′	2,600	1905-08	B
4-048	Hollywood City Engineer	Los Angeles	34° 06′ 118° 19′	385	1928-30	B
4-049	Honor Camp No. 4	Los Angeles	34° 15′ 117° 45′	2,000	1944	A
4-050	Hynes-Hayden	Los Angeles	33° 53′ 118° 10′	70	1934-38	B
4-051	Lankershim	Los Angeles	34° 10′ 118° 23′	625	1898-1900	B
4-052	LaVerne	Los Angeles	34° 06′ 117° 46′	1,100	1919-20	B
4-053	Lemon	Los Angeles	34° 00′ 117° 52′	500	1898-1900	B
4-054	Littlelands	Los Angeles	34° 16′ 118° 17′	2,200	1915-17	B
4-055	Little Tujunga (Gold Creek)	Los Angeles	34° 19′ 118° 18′	2,700	1943-47	A
4-056	Live Oak Canyon "B"	Los Angeles	34° 08′ 117° 45′	1,435	1931-39	B
4-057	Long Beach (7th & Calif. St.)	Los Angeles	33° 47′ 118° 11′	60	1925-29	B
4-058	Long Beach (8th & Cedar)	Los Angeles	33° 47′ 118° 12′	40	1925-28	B
4-059	Long Beach (37th & Gaita)	Los Angeles	33° 49′ 118° 11′	70	1932-38	B
4-060	Long Beach (54th & Lime)	Los Angeles	33° 51′ 118° 11′	50	1927-28	B
4-061	Long Beach (South & Lemon)	Los Angeles	33° 52′ 118° 11′	50	1932-38	B
4-062	Long Beach (Louise & Locust)	Los Angeles	33° 51′ 118° 11′	50	1925-31	B
4-063	Long Beach (60th & Rose)	Los Angeles	34° 21′ 118° 03′	50	1931-32	B

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-064	Loomis Ranch	Los Angeles	34° 21′ 118° 03′	3,550	1938-46	C
4-065	Los Angeles (Casey)	Los Angeles	34° 04′ 118° 18′	238	1935-38	B
4-066	L. A. Flood Control Office No. 2	Los Angeles	34° 03′ 118° 16′	300	1937-38	B
4-067	L. A. Flood Control Office No. 7	Los Angeles	34° 03′ 118° 15′	300	1932-37	B
4-068	Los Angeles Examiner	Los Angeles	34° 02′ 118° 15′	250	1934-36	B
4-069	Los Angeles (Morrill)	Los Angeles	34° 02′ 118° 22′	93	1931-33	B
4-070	Los Angeles (Southern Pacific Co.)	Los Angeles	34° 03′ 118° 14′	334	1878-82	B
4-071	Los Angeles (W. 80th St.)	Los Angeles	33° 58′ 118° 18′	173	1930-38	B
4-072	Lower Haines Canyon	Los Angeles	34° 17′ 118° 15′	2,520	1918-21	B
4-073	Mandeville Canyon (San Vincente Point)	Los Angeles	34° 08′ 118° 31′	1,600	1928-34	B
4-074	Mandeville Canyon No. 4	Los Angeles	34° 06′ 118° 30′	1,050	1930-34	B
4-075	Magic Mt.	Los Angeles	34° 24′ 118° 17′	4,450	1947	A
4-076	May Canyon	Los Angeles	34° 19′ 118° 26′	1,800	1918-26	B
4-077	Mira Monte Pumping Plant	Los Angeles	34° 10′ 118° 03′	985	1943-46	C
4-078	Monroe	Los Angeles	34° 42′ 117° 48′	3,200	1934-38	B
4-079	Monte	Los Angeles	34° 04′ 118° 02′	300	1898-1900	B
4-080	Montebello (Chamber of Commerce)	Los Angeles	34° 01′ 118° 07′	192	1924-28	B
4-081	Montebello (Cotton)	Los Angeles	34° 00′ 118° 06′	205	1933-37	B
4-082	Montebello (Smith)	Los Angeles	34° 01′ 118° 07′	192	1928-34	B
4-083	Newhall Airport	Los Angeles	34° 24′ 118° 33′	1,190	1940-47	A
4-084	North Hollywood Observatory	Los Angeles	34° 10′ 118° 24′	630	1936-38	B
4-085	North Whittier Heights	Los Angeles	34° 00′ 117° 59′	500	1934-38	B
4-086	Norwalk	Los Angeles	33° 55′ 118° 05′	100	1898-1900	B
4-087	O'Melveny Camp	Los Angeles	34° 11′ 117° 52′	1,500	1918-21	B
4-088	Orcut Ranch	Los Angeles	34° 20′ 118° 37′	2,300	1928-30	B
4-089	Pacific Colony	Los Angeles	34° 03′ 117° 49′	700	1944-47	A
4-090	Palmdale (Schoeller)	Los Angeles	34° 35′ 118° 07′	2,648	1932-39	B
4-091	Palmdale (near)	Los Angeles	34° 38′ 118° 05′	2,536	1940-47	A
4-092	Palms	Los Angeles	34° 02′ 118° 24′	92	1930-34	B
4-093	Palos Verdes	Los Angeles	33° 48′ 118° 23′	450	1926-32	B
4-094	Palos Verdes Golf Club	Los Angeles	33° 48′ 118° 22′	500	1936-38	B
4-095	Palos Verdes Ranch	Los Angeles	33° 45′ 118° 21′	300	1929-31	B

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-096	Pinchot	Los Angeles	34° 38′ 118° 27′	4,000	1910-11	B
4-097	Pomona (near)	Los Angeles	34° 03′ 117° 45′	860	1897-1902	B
4-098	Port Los Angeles	Los Angeles	33° 47′ 118° 14′	25	1898-99	B
4-099	Puente (Southern Pacific Co.)	Los Angeles	34° 01′ 117° 57′	323	1898-99	B
4-0100	Ralston's Bouquet Canyon	Los Angeles	34° 35′ 118° 19′	3,600	1932-39	B
4-0101	Ravenna	Los Angeles	34° 26′ 118° 13′	2,260	1897-99	B
4-0102	Red Rock Canyon Trail	Los Angeles	34° 06′ 118° 37′	1,960	1936-37	B
4-0103	Rialto (near)	Los Angeles	34° 12′ 117° 26′	2,250	1906-11 1917-18	B
4-0104	San Antonio Intake	Los Angeles	34° 13′ 117° 40′	4,400	1917-21 1930-32	B
4-0105	Sandberg	Los Angeles	34° 45′ 118° 44′	4,517	1940-47	A
4-0106	San Dimas (Southern Pacific Co.)	Los Angeles	34° 06′ 117° 49′	908	1899-1900	B
4-0107	San Dimas	Los Angeles	34° 12′ 117° 46′	2,750	1940-45	A
4-0108	San Fernando Power House No. 3	Los Angeles	34° 19′ 118° 30′	1,248	1944-47 Broken Record	A
4-0109	San Fernando Valley	Los Angeles	34° 12′ 118° 24′	727	1927-31	B
4-0110	San Gabriel (Southern Pacific Co.)	Los Angeles	34° 06′ 118° 06′	452	1897-1900	B
4-0111	San Gabriel River (North Fork)	Los Angeles	34° 15′ 117° 51′	1,790	1934-38	B
4-0112	San Gabriel Dam No. 1	Los Angeles	34° 12′ 117° 51′	1,470	1937-39 1940-47	A, B
4-0113	San Gabriel Fish Hatchery	Los Angeles	34° 15′ 117° 52′	1,600	1932-33	B
4-0114	San Jose Hills	Los Angeles	34° 03′ 117° 51′	1,052	1928-29	B
4-0115	Santa Anita Fern Lodge	Los Angeles	34° 13′ 118° 01′	2,055	1938-39	B
4-0116	Santa Fe Dam	Los Angeles	34° 07′ 117° 58′	427	1945-47	A
4-0117	Santa Susana Mountain	Los Angeles	34° 19′ 118° 33′	2,367	1940-47	A
4-0118	Saugus No. 2	Los Angeles	34° 25′ 118° 33′	1,200	1914-18	B
4-0119	Saugus (near)	Los Angeles	34° 24′ 118° 33′	1,190	1940-44	A
4-0120	Sepulveda Dam	Los Angeles	34° 10′ 118° 28′	680	1946-47	A
4-0121	Shorb	Los Angeles	34° 05′ 118° 09′	470	1898-99	B
4-0122	Sierra Alta Ranch	Los Angeles	34° 21′ 117° 39′	6,400	1917-20	B
4-0123	Signal Hill	Los Angeles	33° 48′ 118° 10′	115	1940-47	A
4-0124	Spadra	Los Angeles	34° 03′ 117° 49′	705	1897-99	B
4-0125	Sparr Heights	Los Angeles	34° 12′ 118° 14′	1,015	1929-31	B
4-0126	Spunky Summit	Los Angeles	34° 37′ 118° 24′	3,500	1932-39	B
4-0127	Stanley Miller Mine	Los Angeles	34° 17′ 117° 45′	2,800	1918-21 1930-31	B

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
-0128	Tejon Ranger Station	Los Angeles	34° 48′ 118° 52′	4,100	1927-31	B
-0129	Toll House (Mt. Wilson)	Los Angeles	34° 11′ 118° 06′	1,275	1917-20	B
-0130	Topanga Ranger Station	Los Angeles	34° 05′ 118° 36′	747	1938-39	B
-0131	Tropico	Los Angeles	34° 07′ 118° 16′	428	1897-99	B
-0132	Tujunga Canyon Terrace	Los Angeles	34° 23′ 118° 11′	5,900	1920-21	B
-0133	Tujunga Mill Creek	Los Angeles	34° 23′ 118° 05′	4,600	1943-47	A
-0134	Twin Lakes Park	Los Angeles	34° 18′ 118° 37′	1,550	1932-38	B
-0135	Two Canyon Ranch	Los Angeles	34° 14′ 117° 51′	1,550	1919-21	B
-0136	University (Southern Pacific Co.)	Los Angeles	34° 01′ 118° 17′	200	1898-99	B
-0137	Upper East Fork	Los Angeles	34° 12′ 117° 44′	2,600	1934-38	B
-0138	Vaughn Ranch	Los Angeles	34° 06′ 118° 52′	1,630	1930-32	B
-0139	Venice	Los Angeles	33° 59′ 118° 28′	85	1916-18	B
-0140	Wabash	Los Angeles	34° 03′ 118° 12′	325	1937-38	B
-0141	Whittier News	Los Angeles	33° 59′ 118° 02′	400	1925-29	B
-0142	Wilmington (Southern Pacific Co.)	Los Angeles	33° 46′ 118° 16′	10	1898-1902	B
-0143	Aliso Canyon	Orange	33° 41′ 117° 37′	1,260	1931-32	B
-0144	Brea Dam	Orange	33° 53′ 117° 56′	275	1943-47	B
-0145	Buena Park	Orange	33° 52′ 117° 59′	100	1898-1900	B
-0146	El Modena	Orange	33° 48′ 117° 47′	464	1937-47	B
-0147	El Toro Camp	Orange	33° 38′ 117° 41′	500	1936-38	B
-0148	El Toro Cemetery	Orange	33° 39′ 117° 41′	500	1936-38	B
-0149	Fullerton Dam	Orange	33° 54′ 117° 53′	260	1943-47	A
-0150	Fullerton Evaporation Station	Orange	33° 52′ 117° 59′	90	1934-39 1944	C
-0151	Fullerton (Hegar)	Orange	33° 54′ 117° 56′	300	1926-31	B
-0152	Fullerton (M. C. Royer No. 1)	Orange	33° 53′ 117° 55′	200	1932-38	B
-0153	Fullerton (M. C. Royer No. 2)	Orange	33° 51′ 117° 55′	150	1931-38	B
-0154	Heil Ave. Evaporation Station	Orange	33° 43′ 118° 02′	25	1934-38	C
-0155	Hole Pumping Station	Orange	33° 56′ 117° 55′	350	1933-37	B
-0156	Irvine Ranch (Coast)	Orange	33° 36′ 117° 53′	50	1929-33	B
-0157	Irvine Ranch (Tract No. 706)	Orange	33° 39′ 117° 53′	100	1931-32	B
-0158	Laguna Beach, No. 2	Orange	33° 33′ 117° 47′	115	1940-47	A
-0159	Lambert	Orange	33° 42′ 117° 43′	500	1928-32	B

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-0160	McPherson	Orange	33° 47′ 117° 49′	280	1898-99	B
4-0161	Orange County Reservoir	Orange	33° 56′ 117° 53′	600	1943-47	A
4-0162	Ranch House	Orange	33° 43′ 117° 48′	125	1898-99	B
4-0163	San Juan Capistrano Mission	Orange	33° 30′ 117° 40′	105	1930-33	B
4-0164	Santa Ana Evaporation Station	Orange	33° 45′ 117° 56′	90	1929-32	B
4-0165	Santa Ana No. 1	Orange	33° 45′ 117° 52′	133	1897-1903 1928-29	B
4-0166	Santiago Dam (Irvine Co.)	Orange	33° 47′ 117° 43′	1,025	1932-38	B
4-0167	Santiago Dam (U. S. Engineer Department)	Orange	33° 47′ 117° 43′	1,025	1937-47	A
4-0168	Silverado Ranger Station	Orange	33° 45′ 117° 40′	1,100	1943-47	A
4-0169	Sunny Hills Ranch (Laboratory)	Orange	33° 54′ 117° 58′	300	1936-38	B
4-0170	Sunny Hills Ranch (Lemon Mesa)	Orange	33° 53′ 117° 57′	200	1936-38	B
4-0171	Sunny Hills Ranch (Red Tank)	Orange	33° 54′ 117° 56′	300	1936-38	B
4-0172	Sunny Hills Ranch (Santa Fe)	Orange	33° 53′ 117° 57′	100	1936-38	B
4-0173	Sunny Hills Ranch (Viejo)	Orange	33° 54′ 117° 56′	300	1936-38	B
4-0174	Tidewell Oaks	Orange	33° 57′ 117° 47′	1,000	1927-35	B
4-0175	Trabuco Cabin Grounds	Orange	33° 41′ 117° 31′	2,000	1930-32	B
4-0176	Trabuco Canyon (Refractory Materials Co.)	Orange	33° 40′ 117° 41′	600	1934-38	B
4-0177	Trabuco Canyon (Soil Conservation Service)	Orange	33° 38′ 117° 40′	600	1937-38	B
4-0178	Trabuco Oaks	Orange	33° 40′ 117° 35′	1,000	1931-38	B
4-0179	Trabuco Oaks	Orange	33° 39′ 117° 35′	1,050	1939-47	A
4-0180	Tustin (Central Lemon Association)	Orange	33° 45′ 117° 49′	100	1925-28	B
4-0181	Tustin (Shaffer)	Orange	33° 45′ 117° 49′	110	1927-32	B
4-0182	Tustin (Southern Pacific Co.)	Orange	33° 45′ 117° 49′	100	1898-99	B
4-0183	Arlington (American Beet Sugar Co.)	Riverside	33° 53′ 117° 28′	900	1916-21	B
4-0184	Cahuilla	Riverside	33° 33′ 116° 45′	3,800	1919-20	B
4-0185	Chino (Thomas)	Riverside	34° 00′ 117° 39′	695	1929-32	B
4-0186	Corona (Am. Fruit Growers "E-37")	Riverside	33° 50′ 117° 34′	1,200	1933-37	B
4-0187	Corona (near)	Riverside	33° 51′ 117° 34′	680	1940-41	A
4-0188	El Casco	Riverside	33° 57′ 116° 48′	2,700	1898-1900	B
4-0189	Elsinore (near)	Riverside	33° 38′ 117° 16′	1,450	1939-47	A
4-0190	Foothill Lemon Co. No. 4	Riverside	33° 51′ 117° 32′	900	1932-35	B

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-0191	Foothill Lemon Co. No. 5	Riverside	33° 52′ 117° 35′	700	1936-37	B
4-0192	Freydos No. 1	Riverside	34° 00′ 117° 29′	760	1929-32	B
4-0193	Freydos No. 2	Riverside	34° 00′ 117° 33′	700	1932-37	B
4-0194	Hemet	Riverside	33° 45′ 116° 58′	1,600	1928-30	B
4-0195	Hemet Reservoir	Riverside	33° 40′ 116° 41′	4,400	1939-47	A
4-0196	March Field	Riverside	33° 54′ 117° 15′	1,528	1940-43 1943-47	A, B
4-0197	Potrero Canyon	Riverside	33° 58′ 116° 50′	2,500	1920-21	B
4-0198	Prado Dam	Riverside	33° 53′ 117° 38′	570	1940-47	A
4-0199	Prado (Turner)	Riverside	33° 53′ 117° 38′	550	1928-34	B
4-0200	Rubidoux Laboratory	Riverside	33° 59′ 117° 23′	800	1934-37	B
4-0201	San Jacinto No. 2	Riverside	33° 47′ 116° 58′	1,550	1938-47	A
4-0202	San Juan Hot Springs	Riverside	33° 35′ 117° 28′	700	1931-34	B
4-0203	Winchester	Riverside	33° 42′ 117° 05′	1,470	1940-47	A
4-0204	Alto Loma No. 1	San Bernardino	34° 07′ 117° 37′	1,400	1926-28	B
4-0205	Big Bear Lake (near)	San Bernardino	34° 14′ 116° 58′	6,800	1938-47	A
4-0206	Cajon Camp	San Bernardino	34° 18′ 117° 27′	3,000	1934-36	B
4-0207	Cajon (near)	San Bernardino	34° 23′ 117° 35′	4,838	1939-47	A
4-0208	Cajon Summit	San Bernardino	34° 21′ 117° 27′	4,301	1935	B
4-0209	Camp Angelus	San Bernardino	34° 09′ 116° 59′	5,800	1939-47	A
4-0210	Chino (Delphey No. 2)	San Bernardino	34° 01′ 117° 42′	750	1936-37	B
4-0211	City Creek (CCC Camp)	San Bernardino	34° 11′ 117° 11′	2,700	1939-41	A
4-0212	Cucamonga No. 1	San Bernardino	34° 06′ 117° 05′	1,130	1898-1900	B
4-0213	Cucamonga Water Co.	San Bernardino	34° 07′ 117° 36′	1,250	1935-37	B
4-0214	Del Rosa	San Bernardino	34° 10′ 117° 15′	1,435	1944	A
4-0215	Del Rosa Heights	San Bernardino	34° 10′ 117° 15′	1,600	1928-31	D
4-0216	Devil Canyon	San Bernardino	34° 12′ 117° 20′	2,781	1940-44	A
4-0217	Devil Canyon Shaft	San Bernardino	34° 11′ 117° 20′	1,530	1927-30	B
4-0218	Devil Canyon Panorama Point	San Bernardino	34° 14′ 117° 19′	3,500	1934-37	B
4-0219	Etiwanda	San Bernardino	34° 09′ 117° 31′	1,600	1893-96	B
4-0220	Etiwanda (near)	San Bernardino	34° 08′ 117° 31′	1,425	1943-47	A
4-0221	Etiwanda (Moore)	San Bernardino	34° 09′ 117° 27′	1,620	1927-32	B
4-0222	Filirea Reservoir Site	San Bernardino	34° 10′ 116° 58′	4,230	1895-1902	B

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-0223	Foothill Irrigation Co.	San Bernardino	34° 09′ 117° 34′	1,600	1931-35	B
4-0224	Forest Home Lodge	San Bernardino	34° 05′ 116° 56′	5,200	1931-34	B
4-0225	Fredalba	San Bernardino	34° 12′ 117° 08′	5,500	1909-12 1919-20	B
4-0226	Green Valley Toll House	San Bernardino	34° 15′ 117° 04′	6,970	1893-95	B
4-0227	Glen Ranch	San Bernardino	34° 16′ 117° 29′	4,000	1909-16	B
4-0228	Glen Ranch	San Bernardino	34° 15′ 117° 29′	3,248	1942-47	A
4-0229	Heaps Peak	San Bernardino	34° 14′ 117° 08′	6,200	1894-96	B
4-0230	Hunsaker Flat	San Bernardino	34° 12′ 117° 07′	6,200	1894-95	B
4-0231	Huston Flat	San Bernardino	34° 14′ 117° 17′	4,500	1894-96	B
4-0232	Kuffles	San Bernardino	34° 14′ 117° 11′	5,520	1893-96	B
4-0233	Lower Lytle Creek	San Bernardino	34° 11′ 117° 27′	2,200	1940-41	A
4-0234	Lytle Creek (Foothill Blvd.)	San Bernardino	34° 07′ 117° 20′	1,160	1946-47	A
4-0235	Mill Creek A	San Bernardino	34° 05′ 116° 54′	5,000	1931-35	B
4-0236	Mill Creek Ranger Station	San Bernardino	34° 06′ 117° 01′	3,400	1925-32 1936-37	B
4-0237	Muscoy Ranch No. 1	San Bernardino	34° 08′ 117° 20′	1,250	1929-30	B
4-0238	Muscoy Ranch No. 2	San Bernardino	34° 10′ 117° 20′	1,500	1928-37	B
4-0239	Muscoy Ranch No. 3	San Bernardino	34° 12′ 117° 22′	1,800	1928-32	B
4-0240	Muscoy Ranch No. 4	San Bernardino	34° 14′ 117° 21′	2,300	1929-30	B
4-0241	Muscoy Ranch No. 5	San Bernardino	34° 14′ 117° 26′	2,300	1930-32	B
4-0242	Muscoy Ranch No. 6	San Bernardino	34° 15′ 117° 28′	2,300	1929-30	B
4-0243	Muscoy Ranch Road Camp	San Bernardino	34° 15′ 117° 27′	2,300	1930-32	B
4-0244	Muscoy Ranch Ross Place	San Bernardino	34° 13′ 117° 23′	1,950	1930-32	B
4-0245	Ontario (Taylor No. 2)	San Bernardino	34° 03′ 117° 39′	1,025	1929-30	B
4-0246	Padre Vineyard Co.	San Bernardino	34° 09′ 117° 35′	2,000	1934-37	B
4-0247	Pine Knot	San Bernardino	34° 14′ 116° 55′	6,900	1930-31	B
4-0248	Ranger Station	San Bernardino	34° 10′ 117° 15′	1,600	1935-37	B
4-0249	Redlands (near)	San Bernardino	34° 03′ 117° 10′	1,600	1940-41	A
4-0250	Running Springs (near)	San Bernardino	34° 12′ 117° 05′	6,000	1939-47	A
4-0251	Running Springs No. 1	San Bernardino	34° 12′ 117° 08′	6,230	1931-37	B
4-0252	San Bernardino (near)	San Bernardino	34° 08′ 117° 17′	1,172	1932-39	B
4-0253	San Bernardino No. 2	San Bernardino	34° 06′ 117° 18′	1,050	1930-32	B
4-0254	Santa Ana No. 3	San Bernardino	34° 06′ 117° 06′	1,980	1939-47	A

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-0255	Seeley Flat	San Bernardino	34° 15′ 117° 19′	4,400	1918-19	B
4-0256	Shattuck's Mill	San Bernardino	34° 15′ 117° 20′	4,700	1904-05	B
4-0257	Snow Crest Camp	San Bernardino	34° 16′ 117° 38′	6,500	1931-32 1942-43	C
4-0258	Summit (Daly)	San Bernardino	34° 14′ 117° 13′	5,700	1894-96	B
4-0259	Talmadge	San Bernardino	34° 15′ 117° 12′	5,100	1894-1900	B
4-0260	Tres Hermanos No. 3	San Bernardino	33° 58′ 117° 48′	800	1943-44	A
4-0261	Tunnel No. 2	San Bernardino	34° 16′ 117° 14′	4,890	1893-96	B
4-0262	Tunnel C	San Bernardino	34° 17′ 117° 13′	4,940	1895-96	B
4-0263	Upland No. 1	San Bernardino	34° 06′ 117° 39′	1,750	1905-07 1910-11	B
4-0264	Upland No. 2	San Bernardino	34° 06′ 117° 39′	1,220	1925-28	B
4-0265	Upland No. 3	San Bernardino	34° 09′ 117° 39′	1,750	1926-28	B
4-0266	Upper Lytle Creek	San Bernardino	34° 16′ 117° 30′	3,800	1939-42	A
4-0267	Upper Mill Creek	San Bernardino	34° 05′ 116° 55′	5,700	1939-47	A
4-0268	Upper Toll Gate	San Bernardino	34° 14′ 117° 17′	4,980	1894-96	B
4-0269	Allen Ranch	San Diego	32° 47′ 116° 53′	500	1901-09	C
4-0270	Alpine Heights	San Diego	32° 49′ 116° 45′	20	1915-17	B
4-0271	Barrett Post Office	San Diego	32° 37′ 116° 42′	875	1914-18	C
4-0272	Bonita No. 2	San Diego	32° 39′ 117° 02′	100	1913-21	B, C
4-0273	Buckman Springs	San Diego	32° 46′ 116° 30′	3,400	1912-16	B
4-0274	Campbells Ranch	San Diego	32° 37′ 116° 28′	2,575	1914-22	C
4-0275	Camp Denny	San Diego	32° 48′ 116° 45′	1,450	1929-33	B
4-0276	Campo Pachard	San Diego	32° 37′ 116° 28′	2,700	1913-14	B, C
4-0277	Campo No. 2	San Diego	32° 37′ 116° 30′	3,000	1926-34	B
4-0278	Campo No. 3	San Diego	32° 36′ 116° 28′	3,000	1934-39	B
4-0279	Carroll Dam Site	San Diego	33° 04′ 117° 07′	250	1914-17	B
4-0280	Casebere Ranch	San Diego	32° 44′ 116° 30′	3,100	1915-17	B
4-0281	Chihuahua Mt.	San Diego	33° 21′ 116° 39′	4,200	1912-16	B, C
4-0282	Chula Vista (Carpenter)	San Diego	32° 39′ 117° 05′	75	1913-22	C
4-0283	Coronado No. 1	San Diego	32° 41′ 117° 11′	20	1897-99	B
4-0284	Cuyamaca (East)	San Diego	33° 00′ 116° 34′	4,600	1913-19	B, C
4-0285	Cuyamaca No. 2	San Diego	32° 59′ 116° 34′	4,600	1909-10	B

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-0286	Debesa	San Diego	32° 47′ 116° 51′	580	1913-16	B, C
4-0287	Descanso Valley	San Diego	32° 51′ 116° 37′	3,500	1913-16	B, D
4-0288	Dewey	San Diego	32° 38′ 116° 28′	2,700	1898-1900	B
4-0289	Eagle's Nest	San Diego	33° 17′ 116° 36′	4,500	1912-16	B
4-0290	El Cajon No. 2	San Diego	32° 48′ 116° 58′	400	1926-34	B
4-0291	El Cajon No. 3	San Diego	32° 47′ 116° 57′	560	1914-17	B
4-0292	Escondido (near) No. 1	San Diego	33° 09′ 117° 05′	750	1941-47	A
4-0293	Escondido No. 4	San Diego	33° 07′ 117° 05′	650	1927-34	B
4-0294	Fallbrook (near)	San Diego	33° 20′ 117° 15′	610	1938-47	A
4-0295	Grigby's Ranch	San Diego	32° 37′ 116° 29′	2,690	1913-22	B, C
4-0296	Harvey Ranch	San Diego	32° 38′ 116° 55′	600	1918-21	B
4-0297	Hauser Creek	San Diego	32° 40′ 116° 34′	2,000	1915-23	B, C
4-0298	Hook's Ranch	San Diego	32° 45′ 116° 30′	3,200	1914-22	B, C
4-0299	Hot Springs Mt.	San Diego	33° 19′ 116° 35′	6,400	1913-15	B
4-0300	Hurlburds Ranch	San Diego	33° 53′ 116° 38′	3,500	1889-96	C, D
4-0301	Jamul Ranch	San Diego	32° 41′ 116° 51′	800	1911-17	B, C
4-0302	Julian (near)	San Diego	33° 04′ 116° 38′	4,000	1940-47	A
4-0303	Kelly Ranch	San Diego	33° 09′ 117° 17′	50	1938-39	B
4-0304	Kitchen Valley	San Diego	32° 49′ 116° 27′	5,250	1914-15	B, C
4-0305	Lakeside	San Diego	32° 51′ 117° 55′	500	1909-15	B, C
4-0306	La Mesa No. 1	San Diego	32° 46′ 117° 01′	550	1898-1900	B
4-0307	La Mesa No. 2	San Diego	32° 46′ 117° 01′	550	1926-34	B, C
4-0308	La Mesa No. 3	San Diego	32° 46′ 117° 01′	560	1936-39	B
4-0309	La Posta	San Diego	32° 43′ 116° 26′	3,300	1915-21	B, C
4-0310	La Presa	San Diego	32° 42′ 117° 00′	300	1914-17	B, C
4-0311	Lockwood Mesa	San Diego	32° 59′ 117° 15′	200	1929-33	B
4-0312	Loveland Dam	San Diego	32° 47′ 116° 48′	1,400	1943-47	C
4-0313	Lyon Peak	San Diego	32° 42′ 116° 46′	3,755	1914-17	C
4-0314	Marron Valley	San Diego	32° 34′ 116° 47′	550	1914-22	B, C
4-0315	Matagual	San Diego	33° 12′ 116° 40′	3,200	1912-15	C
4-0316	Mendenhall Valley	San Diego	33° 20′ 116° 51′	4,500	1912-16	B, C

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-0317	Monkey Hill	San Diego	33° 14′ 116° 44′	2,700	1912-17	B
4-0318	Morena Dam (near)	San Diego	32° 41′ 116° 32′	3,000	1938-47	A
4-0319	Mt. Palomar Observatory	San Diego	32° 21′ 116° 51′	5,600	1938-39	B
4-0320	Nobles Mine	San Diego	32° 52′ 116° 30′	4,200	1913-15 1917-18	C
4-0321	Oak Grove	San Diego	33° 24′ 116° 48′	2,751	1909-22 broken	B, C
4-0322	Oceanside Airport	San Diego	33° 14′ 117° 25′	18	1942-47	A
4-0323	Oceanside (near)	San Diego	33° 14′ 117° 25′	18	1941-47	A
4-0324	Oceanside No. 3	San Diego	33° 12′ 117° 23′	60	1927-34	B
4-0325	Otay	San Diego	33° 05′ 117° 05′	90	1909-15	C
4-0326	Palomar Mt	San Diego	33° 21′ 116° 51′	5,598	1938-47	A
4-0327	Pamo	San Diego	33° 08′ 116° 51′	1,050	1911-13	C
4-0328	Pine Hills Hotel	San Diego	33° 03′ 116° 38′	4,100	1913-16	B
4-0329	Pine Mt	San Diego	33° 12′ 116° 53′	2,500	1910-12	C
4-0330	Pine Valley	San Diego	32° 51′ 116° 33′	4,000	1899-04	B
4-0331	Pueblo Farm	San Diego	32° 52′ 117° 15′	100	1914-15	C
4-0332	Puerta La Cruz	San Diego	33° 17′ 116° 43′	2,772	1912-18	B
4-0333	Ramona (Green)	San Diego	33° 02′ 116° 53′	1,440	1927-33	B
4-0334	Ramona No. 3	San Diego	33° 03′ 116° 52′	1,450	1940-42	C
4-0335	Ramona No. 4	San Diego	33° 03′ 116° 52′	1,450	1942-45	C
4-0336	Rancho Remolino	San Diego	33° 00′ 117° 50′	1,500	1943-45	C
4-0337	Rancho Santa Fe	San Diego	33° 01′ 117° 12′	250	1932-34	B
4-0338	Rincon of Warner Ranch	San Diego	33° 18′ 116° 45′	3,500	1913-16	B
4-0339	Rose Glen	San Diego	33° 05′ 116° 48′	2,300	1912-16	B
4-0340	Santa Fe Ranch	San Diego	33° 00′ 117° 13′	60	1912-15	C
4-0341	Santa Maria Dam Site	San Diego	33° 03′ 116° 57′	1,400	1914-16	B
4-0342	Santa Ysabel-Warner Divide	San Diego	33° 10′ 116° 41′	3,200	1913-16	B
4-0343	Schilling	San Diego	33° 00′ 116° 36′	5,000	1912-19	B
4-0344	Skye Valley	San Diego	32° 43′ 116° 38′	2,700	1912-20	B, C
4-0345	Tecarte Dam	San Diego	32° 34′ 116° 45′	900	1896-99	B
4-0346	Telegraph Canyon	San Diego	32° 38′ 117° 03′	150	1919-21	B
4-0347	Vallecito	San Diego	32° 58′ 116° 20′	2,000	1942-45	A

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-0348	Vallecito (near)	San Diego	32° 58′ 116° 25′	1,700	1941-42	A
4-0349	Viejas Vista	San Diego	32° 52′ 116° 42′	2,400	1926-28	B
4-0350	Warner Ranch House	San Diego	33° 14′ 116° 40′	300	1912-16	B
4-0351	Warner Springs	San Diego	33° 17′ 116° 38′	3,165	1941-47	A
4-0352	Winetka Valley	San Diego	32° 39′ 116° 44′	2,500	1914-19	C
4-0353	Witch Creek	San Diego	33° 05′ 116° 43′	2,800	1909-16	B, C
4-0354	Bagnall Ranch	Ventura	34° 22′ 119° 04′	400	1931-32	B
4-0355	Brea Canyon	Ventura	34° 18′ 118° 47′	1,000	1932-38	B
4-0356	Buck Creek Dam Site	Ventura	34° 41′ 118° 51′	2,900	1932-35	B
4-0357	Buena Ventura Springs	Ventura	34° 29′ 119° 20′	1,100	1929-34	B
4-0358	Camulos Ranch Hill No. 5	Ventura	34° 25′ 118° 46′	1,000	1928-32	B
4-0359	Castaic	Ventura	34° 30′ 118° 37′	1,150	1932-37	B
4-0360	Chuchupate	Ventura	34° 48′ 119° 00′	5,250	1941-47	A
4-0361	Conejo Ranch No. 2	Ventura	34° 12′ 118° 51′	800	1930-36	B
4-0362	East Santa Susana	Ventura	34° 15′ 118° 39′	1,200	1932-38	B
4-0363	Edwards Ranch	Ventura	34° 25′ 118° 49′	650	1928-32	B, C
4-0364	Hopper Mt.	Ventura	34° 24′ 118° 52′	4,000	1931-34	B, C
4-0365	Hueneme	Ventura	34° 10′ 119° 12′	25	1896-99	B
4-0366	Lake Sherwood	Ventura	34° 09′ 118° 51′	900	1913-16	B
4-0367	Los Posas Tract No. 59	Ventura	34° 18′ 119° 00′	900	1931-32	B
4-0368	Montalvo	Ventura	34° 15′ 119° 12′	100	1897-98	B
4-0369	Mt. Frazier	Ventura	34° 47′ 118° 58′	8,000	1897-99	B
4-0370	Mutah Flat	Ventura	34° 38′ 119° 03′	4,800	1893-1902	B, D
4-0371	Newhall Ranch (McGuire)	Ventura	34° 23′ 118° 45′	1,500	1927-28	C
4-0372	Nordhoff	Ventura	34° 27′ 119° 15′	750	1897-99 1904-06	B
4-0373	Potrero Seco	Ventura	34° 38′ 119° 26′	4,850	1946-47	A
4-0374	San Nicolas Island	Ventura	33° 14′ 119° 28′	135	1940-46	B
4-0375	Santa Ana Valley	Ventura	34° 25′ 119° 21′	700	1926-31	C
4-0376	Santa Rosa Valley No. 2	Ventura	34° 15′ 118° 54′	200	1930-33	B
4-0377	Santa Susana School House	Ventura	34° 16′ 118° 43′	960	1943-46	B
4-0378	Saticoy (Edwards)	Ventura	34° 18′ 119° 08′	150	1928-32	B

TABLE 45—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, SOUTH COASTAL AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
4-0379	Slaybacks Ranch	Ventura	34° 31′ 118° 46′	1,400	1931-32	C
4-0380	Sneddens Ranch	Ventura	34° 44′ 119° 03′	4,900	1897-99	B
4-0381	Somis (Berylwood Investment Co.)	Ventura	34° 16′ 119° 00′	300	1929-32	B
4-0382	Somis (near) No. 1	Ventura	34° 16′ 119° 01′	400	1940-43	A
4-0383	So. Mountain Santa Paula	Ventura	34° 21′ 119° 02′	700	1931-33	B
4-0384	Tapo Citrus Association	Ventura	34° 17′ 118° 43′	1,020	1938-45	B
4-0385	The Pines	Ventura	34° 28′ 119° 10′	3,000	1928-32	B
4-0386	Torrey Lease	Ventura	34° 22′ 118° 47′	1,900	1931-37	B
4-0387	Ventura County Water District No. 1	Ventura	34° 18′ 118° 53′	720	1943-46	B
4-0388	Wheeler Springs (near) No. 1	Ventura	34° 39′ 119° 18′	850	1940-47	A
4-0389	Wheeler Springs (near) No. 2	Ventura	34° 37′ 119° 22′	4,160	1940-41	A
4-0390	Wheeler Springs (near) No. 3	Ventura	34° 36′ 119° 20′	4,150	1941-47	A

TYPE OF RECORD

Abbreviation	*Name*
A	Hourly
B	Daily
C	Monthly
D	Seasonal

TABLE 46

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATIO IN EACH MONTH FOR THE PERIOD OF RECORD, AT FOUR STATIONS, SOUTH COASTAL EA

In Inches

Month	Los Angeles, Los Angeles County Number on Plate 3: 4-229			San Bernardino, San Bernardino County Number on Plate 3: 4-345			Sa uyamaca, Nu)iego County ier on Plate 3: 4-564			San Diego, San Diego County Number on Plate 3: 4-569		
	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum	Averag monthl	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum
July	0.01	0.24	0.00	0.03	0.42	0.00	0.42	3.24	0.00	0.05	1.29	0.00
August	0.03	0.61	0.00	0.17	2.16	0.00	0.64	3.24	0.00	0.09	1.95	0.00
September	0.21	5.67	0.00	0.22	2.37	0.00	0.63	8.06	0.00	0.11	2.58	0.00
October	0.64	6.96	0.00	0.80	4.63	0.00	1.81	5.92	0.00	0.47	4.63	0.00
November	1.15	6.53	0.00	1.29	7.50	0.00	2.83	11.97	0.00	0.90	4.93	0.00
December	2.90	15.80	0.00	2.89	10.85	0.00	6.21	25.98	0.00	2.04	9.26	0.00
January	2.96	13.30	0.02	3.20	15.51	0.00	6.62	36.50	0.00	1.55	7.56	0.00
February	3.32	13.37	0.00	3.37	12.20	0.00	7.99	34.70	0.02	2.09	9.05	0.00
March	2.75	12.36	0.00	2.89	10.10	0.06	6.97	22.41	0.00	1.55	7.88	0.00
April	1.03	7.53	0.00	1.44	9.35	0.00	3.30	13.22	0.00	0.70	5.37	Trace
May	0.36	3.57	0.00	0.57	3.34	0.00	1.61	8.80	0.00	0.30	2.54	0.00
June	0.07	1.39	0.00	0.09	1.02	0.00	0.26	3.01	0.00	0.06	0.68	0.00
SEASONAL TOTALS	15.43	--------	--------	16.96	--------	--------	39.29	--------	--------	9.91	--------	--------

TABLE 47

ESTIMATED MEAN SEASONAL PRECIPITATION ON VALLEY AND MESA LANDS 1897-98 TO 1946-47

SOUTH COASTAL AREA

umber on 'late 2	Stream or stream group basin	Precipitation in acre-feet
	Ventura River Basin	
2–1	Above gage near Ventura (Casitas Bridge)	29,300
2–2	Remainder of Ventura River	6,300
	Santa Clara River Basin	
3–1	Above river crossing of Ventura-Los Angeles County line	32,000
3–2	Piru Creek above gage near Piru	2,700
3–5	Remainder of Santa Clara River (below gages on Sespe and Santa Paula Creeks)	97,000
4	Calleguas and Conejo Creek Group	134,000
	San Fernando Valley Group	
	San Fernando Vally Area	172,000
	Verdugo Basin	8,400
	San Gabriel Valley Group	
	Raymond Basin Area	45,100
	Glendora Basin	6,100
	Way Hill Basin	2,900
	San Dimas Basin	8,000
	Foothill Basin	2,200
	Puente Basin	19,500
	Spadra Basin	6,500
	Central San Gabriel Area	122,000
	Coastal Plain Group	
	West Coastal Plain	106,000
	Lower Los Angeles and San Gabriel Rivers	
	Non-pressure area	97,300
	Pressure area	127,000
	La Habra Basin	32,600
	Santa Ana River Basin	
	Upper Santa Ana Valley	
	San Timoteo Group	97,800
	Bunker Hill Group	114,000
	Riverside Group	83,600
	Chino Group	268,000
	San Jacinto River Group	
	San Jacinto Basin	170,000
	Elsinore Basin	18,800
	Lower Santa Ana Valley	
	Santa Ana Forebay Area	121,000
	Santa Ana Pressure Area	113,000
	San Juan Creek Group	
12–1	Aliso Creek above gage at El Toro	800
12–4	Remainder of San Juan Group (below gages on Trabuco Creek and San Juan Creek)	8,200
13	Arroyo San Onofre Group	13,400
	Santa Margarita River Basin	
14–1	Temecula Creek above gage at Nigger Canyon	37,500
14–2	Murrieta Creek above gage at Temecula	76,800
14–3	Remainder of Santa Margarita River above gage at Railroad Canyon	10,000
14–6	From gage near Delux to gage at Ysidora	10,400

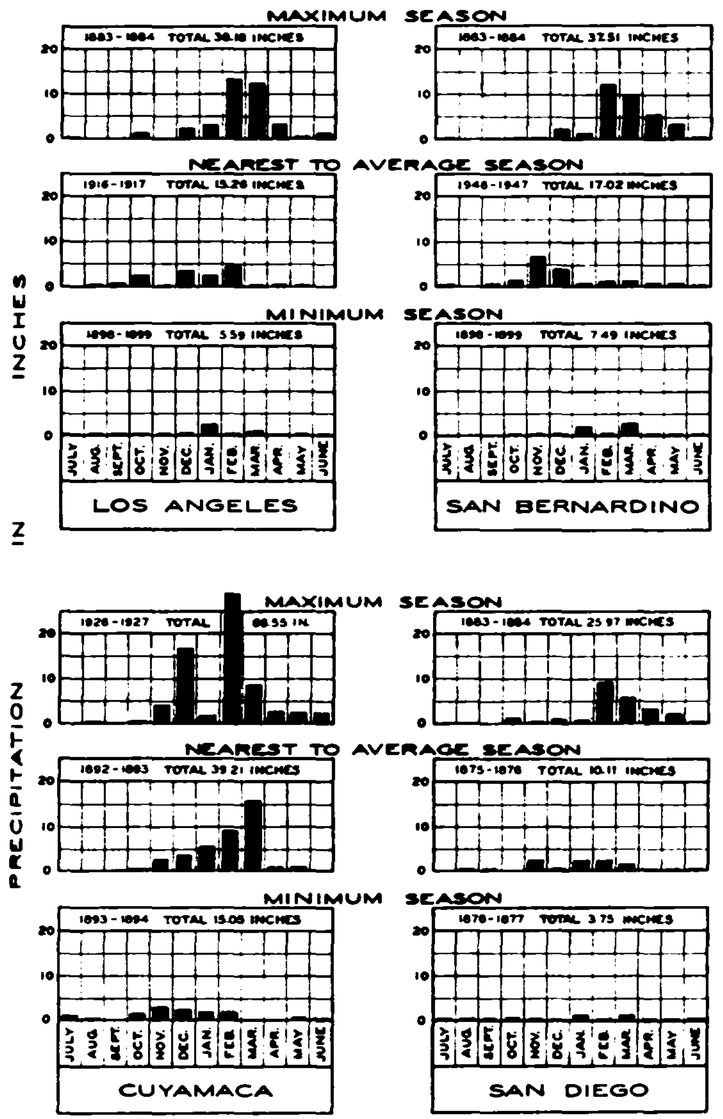
TABLE 47—Continued

ESTIMATED MEAN SEASONAL PRECIPITATION ON VALLEY AND MESA LANDS 1897-98 TO 1946-47

SOUTH COASTAL AREA

Number on Plate 2	Stream or stream group basin	Precipitation in acre-feet
	San Luis Rey River Basin	
15-1	Above Henshaw Dam	50,400
15-3a	From gage near Bonsall to gage near Oceanside	9,700
15-3b	From gage near Oceanside to gage at Oceanside	1,300
16	San Marcos Creek Group	35,800
	San Dieguito River Basin	
17-3a	From gage at Pamo to gage near Escondido	1,800
17-3b	Santa Maria Creek above gage near Ramona	24,000
17-3e	From gage at Bernardo to Hodges Dam	5,100
18	Los Penasquitos Creek Group	27,700
	San Diego River Basin	
19-1a	Boulder Creek at Cuyamaca Dam	8,500
19-3a	From El Capitan Dam to gage at Lakeside	1,700
19-3b	Remainder of San Diego River above Old Mission Dam (below gage on San Vicente Creek)	19,400
19-4c	Remainder of San Diego River above gage at Old Town (San Diego) (below Loop Dam, and below Murray Dam on Alvarado Creek)	5,700
20	San Diego Bay Group	36,400
	Tia Juana River Basin	
23-1	Cottonwood Creek above Morena Dam (California)	18,400
23-2c	Rio Del Tecate (including Campo Creek) in California	9,100
23-2d	Remainder of Cottonwood Creek above Marron Dam Site No. 1 (below Barrett Dam) (California)	5,100
	Remainder of Tia Juana River above gage near Nestor (below Rodrigues Dam)	
23-3b	In California	8,300
	TOTAL—SOUTH COASTAL AREA	2,468,600

PLATE 17



DISTRIBUTION OF PRECIPITATION AT SELECTED STATIONS

SOUTH COASTAL AREA

RUNOFF

Estimated mean seasonal natural runoff of the South Coastal Area for the 53-year period from 1894-95 to 1946-47 is 1,227,000 acre-feet, or 1.7 percent of surface runoff of the State. The minimum seasonal runoff of 120,000 acre-feet occurred in 1898-99, and the maximum, totaling 4,480,000 acre-feet in 1915-16. The 10-year period from 1895-96 to 1904-05 was the driest of record in the Area. Runoff during each season of this period, except 1904-05, was less than the 53-year mean, and the average was only 43.2 percent of this long-time mean.

Runoff from the South Coastal Area is derived largely from rainfall and is usually erratic. All streams are practically dry in summer, except in those reaches where rising water occurs. Seasonal runoff has varied from less than 10 percent to over 365 percent of the long-time mean. Long periods in which seasonal runoff will average above the long-time mean may be followed by similar periods in which it is below average. Sometimes there are shorter series of extremely dry years. Approximately 70 percent of total seasonal runoff occurs during the four months from January to April, inclusive. Runoff varies from approximately 2 percent of the seasonal total during each of the months from August to November, to about 25 percent in the maximum month, usually in the spring.

Oldest runoff records for the Area are computed inflows into Cuyamaca and Sweetwater reservoirs in San Diego County, both of which were begun by local companies in the season of 1887-88. Monthly estimates of inflow for the entire period of record are available for Sweetwater Reservoir, and for Cuyamaca Reservoir since the season of 1892-93. The next oldest runoff record in San Diego County is for San Diego River at the diverting dam upstream from El Capitan Reservoir. Estimates of waste over this dam, and of amounts diverted in the Cuyamaca Flume were begun in January, 1899.

Runoff measurements were made by the Geological Survey on Santa Ana River and canals near Mentone from July, 1896, to December, 1898, and the record there is unbroken since January, 1902. A record of runoff of San Gabriel River near Azusa was maintained by the same agency intermittently from May, 1894, to September, 1895, after which the record is unbroken.

Runoff records are available for 142 stream gaging stations in the South Coastal Area. For 94 of these stations the records cover 10 or more years, although there are some lapses in some of the records. At some stations the records are for only one year. Table 48 lists gaging stations and gives average seasonal runoff for the period of record, and maximun and minimum measured seasonal runoff at most stations for which records are for 10 years or longer, as well as at several stations with shorter records.

Gaging stations listed in the following tabulation are of most value in estimating the available water supply of the area. These stations are on the larger streams at or near the points where foothills meet the valley floor, or near the point of discharge to the ocean.

Stream gaging station	*Drainage area in square miles*
Ventura River near Ventura	187
Santa Clara River and tributaries	749
Los Angeles River and tributaries	224
San Gabriel River and tributaries	253
Santa Ana River and tributaries	548
San Jacinto River near San Jacinto	142
San Juan Creek Group	155
Santa Margarita River at Railroad Canyon	593
San Luis Rey River at Oceanside	565
San Dieguito River at Lake Hodges	303
San Diego River in Mission Gorge	376
Sweetwater River at Sweetwater Dam	181
Otay River at Savage Dam	99
Tia Juana River near Nestor (in United States)	448
TOTAL	4,823

Certain mean seasonal runoff figures determined in the current investigation for streams in the South Coastal Area differ slightly from corresponding runoff figures published in Division of Water Resources Bulletin No. 53, "South Coastal Basin Investigation—Overdraft on Ground Water Basins," published in 1947. In the previous investigation, mean seasonal runoff over the entire long-time period was directly estimated for the concerned stations, while in the current investigation runoff was estimated for each season of the long-time period and the mean then taken.

Estimated long-time mean seasonal natural runoff from the Area for the 53-year period from 1894-95 to 1946-47 is given in Table 49. For those stations for which complete or partial records are available, the mean runoff shown is the mean of estimated seasonal natural flow for the 53-year period. For basins for which records are not available, directly derived estimates of long-time mean runoff are given. Estimates of seasonal natural runoff from main stream and tributary basins, presented in Table 50, were made in accordance with principles outlined in Chapter III, for all drainage basins where records of sufficient length were available to make acceptable correlations.

In estimating flow of Santa Clara River at the Ventura-Los Angeles County line, of Malibu Creek at Crater Camp, and of Coyote Creek near Artesia, precipitation records were used in the correlations, since that procedure appeared to give the most reliable results. The record of Sespe Creek, tributary of Santa Clara River, was extended by a weighted correlation between measured discharges of Santa Ynez and San Gabriel Rivers, and precipitation records in the vicinity of the Santa Clara River watershed. Estimates of runoff from drainage basins for which runoff records were not available were made in Ventura, Los Angeles, and Orange counties by means of an average precipitation-runoff curve developed for such areas, and in San Diego County by means of the empirical formula described in Chapter III. Estimated mean seasonal runoff from unmeasured drainage basins in the Area was 249,000 acre-feet, and that based on records was 978,000 acre-feet.

An indication of variation in monthly flow to be expected of a typical stream in the South Coastal Area is shown in the following tabulation:

AVERAGE MONTHLY DISTRIBUTION OF AVERAGE SEASONAL RUNOFF, SAN GABRIEL RIVER NEAR AZUSA

(Drainage Area—211 Square Miles)

Month	Percent of seasonal average	Acre-feet
October	1.7	2,100
November	2.4	2,900
December	6.5	7,800
January	12.0	14,400
February	17.5	21,000
March	25.8	31,000
April	14.4	17,300
May	8.5	10,200
June	4.7	5,700
July	2.9	3,500
August	2.0	2,400
September	1.6	1,900
Totals	100.0	120,200

TABLE 48

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASO L RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, SOUTH COASTA AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Averag perio of recor acre-f	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
4-1	Matilija Creek at Matilija	34° 29′ 119° 18′	950	1927-47	USGS	A	26,0	1940-41	125,300	1930-31	1,950
4-2	Matilija Creek, North Fork, at Matilija	34° 29′ 119° 18′	1,050	1928-32 1933-47	Ventura County	A	7,0	1940-41	31,300	1930-31	700
4-3	Coyote Creek near Ventura	34° 21′ 119° 19′	240	1927-32 1933-47	USGS	A	10,9	1940-41	50,900	1930-31	500
4-4	Ventura River near Ventura	34° 21′ 119° 18′	210	1911-14 1929-47	USGS	A	55,0	1940-41	256,300	1930-31	270
4-5	Santa Clara River near Saugus	34° 26′ 118° 35′	1,030	1929-47	LA Co F C D	A	13,6	1943-44	49,800	1932-33	490
4-6	Piru Creek near Piru	34° 26′ 118° 46′	780	1911-13 1927-47	USGS	A	50,4	1940-41	226,300	1929-30	8,580
4-7	Hopper Creek near Piru	34° 24′ 118° 41′	590	1930-32 1933-36 1937-47	Ventura County	A	4,7	1940-41	15,400	1939-40	800
4-8	Sespe Creek at Bradfield's Camp	34° 30′ 118° 57′	1,350	1915-27	USGS	A	64,6	1921-22	203,000	1923-24	4,760
4-9	Sespe Creek at Sespe	34° 24′ 118° 55′	440	1911-13 1927-34	USGS	A	39,6	1912-13	87,700	1930-31	14,300
4-10	Sespe Creek near Fillmore	34° 27′ 118° 56′	590	1934-47	USGS	A	112,1	1940-41	371,700	1939-40	27,900
4-11	Santa Paula Creek near Santa Paula (at Diversion Dam)	34° 24′ 119° 05′	650	1912-13 1927-47	USGS	A	15,8	1940-41	57,700	1927-28	1,330
4-12	Santa Clara River near Montalvo	34° 15′ 119° 12′	60	1927-32	DWR	A	41,9	1931-32	133,000	1929-30	15,500

TABLE 48—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
4-13	Dume Creek at Roosevelt Highway	34° 01′ 118° 49′	10	1930-37 1938-47	LA Co F C D	A	1,04(	1940-41	6,800	1944-45	20
4-14	Malibu Creek at Crater Camp near Calabasas	34° 05′ 118° 42′	430	1931-47	LA Co F C D	A	17,40(	1940-41	73,200	1935-36	2,310
4-15	Topanga Creek near Topanga Beach	34° 04′ 118° 35′	260	1930-38 1939-47	LA Co F C D	A	4,90(	1940-41	18,900	1930-31	710
4-16	Ballona Creek near Culver City	34° 00′ 118° 24′	11	1928-47	LA Co F C D	A	26,70(	1940-41	67,400	1935-36	13,500
4-17	Pacoima Creek near San Fernando (below Dam)	34° 20′ 118° 24′	1,650	1916-47	LA Co F C D	A	7,82(	1921-22	38,700	1923-24	540
4-18	Tujunga Creek near Sunland (above Gold Canyon)	34° 18′ 118° 16′	1,580	1916-47	LA Co F C D	A	23,83(	1921-22	103,000	1930-31	3,070
4-19	Little Tujunga Creek near San Fernando (at Foothill Blvd.)	34° 16′ 118° 22′	1,067	1928-47	LA Co F C D	A	2,40(	1940-41	10,600	1928-29 1929-30	0 0
4-20	Verdugo Channel at Estelle Avenue	34° 09′ 118° 16′	465	1928-33 1935-47	LA Co F C D	A	2,62(	1940-41	7,370	1930-31	150
4-21	Los Angeles River above Arroyo Seco	34° 05′ 118° 14′	293	1929-47	LA Co F C D	A	48,70(	1940-41	165,000	1929-30	1,660
4-22	Arroyo Seco near Pasadena	34° 13′ 118° 11′	1,400	1914-47	USGS	A	7,26(	1921-22	25,500	1923-24	850
4-23	Los Angeles River at Long Beach (Pacific Coast Hwy.)	33° 47′ 118° 12′	2	1928-47	LA Co F C D	A	118,00(	1937-38	408,000	1929-30	12,310
4-24	Domingues Channel near Long Beach	33° 50′ 118° 15′	0	1928-34 1940-47	LA Co F C D	A	8,96(	1943-44	19,020	1930-31	1,460
4-25	Eaton Creek near Pasadena	34° 12′ 118° 06′	1,230	1918-47	USGS	A	2,01(	1921-22	11,980	1923-24	100

4-26	Little Santa Anita Creek near Sierra Madre	34° 11′ 118° 03′	2,200	1916-47	USGS	A	7	1940-41	2,680	1923-24 1924-25	90 90
4-27	Santa Anita Creek near Sierra Madre..	34° 12′ 118° 01′	1,475	1916-47	USGS	A	4,6	1921-22 1942-43	16,600	1924-25	690
4-28	Sawpit Creek near Monrovia........	34° 10′ 117° 59′	1,100	1916-47	USGS	A	2,0	1937-38	6,180	1929-30	610
4-29	Fish Creek near Duarte............	34° 10′ 117° 55′	1,000	1916 1917-47	USGS	A	3,3	1942-43	10,700	1923-24	340
4-30	Rogers Creek near Azusa...........	34° 10′ 117° 54′	800	1916-47	USGS	A	2,4	1942-43	9,290	1923-24	150
4-31	San Gabriel River near Azusa.......	34° 10′ 117° 53′	870	1894- 1947	USGS LA Co F C D	A	84,4	1921-22	365,000	1898-99	120
4-32	Little Dalton Creek near Glendora..	34° 10′ 117° 50′	1,330	1929-47	LA Co F C D	A	7	1937-38	2,660	1930-31	30
4-33	Dalton Creek near Glendora........	34° 09′ 117° 50′	1,125	1919-47	USGS	A	9	1937-38	3,680	1924-25	3
4-34	San Dimas Creek near San Dimas...	34° 09′ 117° 47′	1,245	1916-47	USGS	A	3,6	1921-22	14,000	1930-31	510
4-35	San Jose Creek near Whittier.......	34° 01′ 118° 02′	230	1923-27 1929-47	DWR LA Co F C D	A	7,0	1940-41	22,700	1924-25	40
4-36	San Gabriel River at Beverly Blvd. (below Whittier Narrows)	34° 00′ 118° 04′	175	1928-47	LA Co F C D	A	42,0	1942-43	209,600	1930-31	2,490
4-37	Rio Hondo at Mission Bridge Whittier Narrows	34° 05′ 118° 04′	194	1928-47	LA Co F C D	A	47,6	1937-38	209,300	1929-30	13,430
4-38	Mission Creek at Whittier Narrows near Montebello	34° 02′ 118° 04′	193	1929-47	LA Co F C D	A	14,1	1943-44	18,850	1933-34	9,030
4-39	San Gabriel River at Long Beach....	33° 49′ 118° 05′	17	1928-47	LA Co F C D	A	25,8	1942-43	175,100	1927-31	0
4-40	Coyote Creek at Del Amo Street near Artesia	33° 51′ 118° 09′	29	1930-47	LA Co F C D	A	6,3	1940-41	29,500	1932-33	460
4-41	San Antonio Creek near Upland.....	34° 13′ 117° 40′	3,190	1901-17	USGS	A	18,3	1913-14	25,500	1901-02	5,050
4-42	San Antonio Creek near Claremont above Edison Power Plant	34° 13′ 117° 40′	3,400	1917-47	USGS	A	8,2	1937-38	40,100	1924-25	380
4-43	Cucamonga Creek near Upland.....	34° 10′ 117° 38′	2,550	1928-47	USGS	A	6,8	1937-38	18,200	1930-31	2,140

TABLE 48—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
4-44	Day Creek near Etiwanda	34° 11′ 117° 32′	2,940	1929-47	USGS	A	3,810	1937-38	12,130	1932-33	1,260
4-45	Lytle Creek near Fontana	34° 12′ 117° 27′	2,200	1918-21 1922-47	USGS Fontana Water Company	A	7,180	1937-38	68,220	1918-19 1923-24	0 0
4-46	Lone Pine Creek near Keenbrook	34° 15′ 117° 28′	2,630	1919-38	USGS	A	1,180	1937-38	8,220	1927-28	130
4-47	Cajon Creek near Keenbrook	34° 16′ 117° 28′	2,630	1919-47	USGS	A	7,590	1937-38	24,700	1927-28	1,720
4-48	Devil Canyon Creek near San Bernardino	34° 12′ 117° 20′	1,800	1911-12 1913-14 1919-47	USGS	A	1,520	1921-22	6,950	1932-33	100
4-49	Waterman Canyon Creek near Arrowhead Springs	34° 12′ 117° 17′	2,125	1911-14 1919-47	USGS	A	2,220	1921-22	6,420	1932-33	530
4-50	Strawberry Creek near Arrowhead Springs	34° 11′ 117° 16′	1,650	1919-47	USGS	A	3,700	1921-22	11,000	1932-33	1,050
4-51	City Creek near Highland	34° 09′ 117° 11′	1,550	1919-47	USGS	A	6,740	1921-22	21,000	1932-33	1,440
4-52	Plunge Creek near East Highlands	34° 07′ 117° 09′	1,625	1919-47	USGS	A	4,900	1921-22	17,700	1924-25	450
4-53	Santa Ana River near Mentone	34° 07′ 117° 06′	1,900	1896-01 1905-47	USGS	A	26,380	1937-38	134,700	1932-33	1,430
4-54	Mill Creek near Craftonville	34° 05′ 117° 02′	2,950	1919-38	USGS	A	15,780	1937-38	65,440	1942-25	0

4-55	San Timoteo Creek near Redlands	34° 02′ 117° 13′	1,260	1926-41 1942-47	USGS	A	1,470	926-27	7,580	1933-34	90
4-56	Warm Creek near Colton	34° 04′ 117° 19′	970	1920-47	USGS	A	39,290	921-22	81,400	1935-36	9,840
4-57	San Jacinto River near San Jacinto	33° 44′ 116° 50′	1,980	1920-47	USGS	A	17,430	936-37	94,440	1933-34	820
4-58	San Jacinto River near Elsinore	33° 40′ 117° 18′	1,270	1916-47	USGS	A	16,520	915-16	130,000	1920-21	0
4-59	Temescal Creek near Corona	33° 51′ 117° 31′	730	1929-47	USGS	A	3,950	937-38	27,000	1929-30 1932-36	0 0
4-60	Santa Ana River near Prado	33° 52′ 117° 40′	400	1919-40	USGS DWR	A	105,340	921-22	305,000	1935-36	51,600
4-61	Santa Ana River below Prado Dam	33° 53′ 117° 39′	450	1940-47	USGS	A	111,430	940-41	174,400	1941-42	77,920
4-62	Santiago Creek near Villa Park	33° 49′ 117° 47′	420	1920-47	USGS	A	6,710	940-41	34,140	1924-25	15
4-63	Santa Ana River at Santa Ana	33° 45′ 117° 54′	80	1923-47	USGS	A	19,300	937-38	128,600	1930-31	0
4-64	Irvine Ranch Drainage Canal near Tustin	33° 41′ 117° 50′	25	1930-47	O C F C D	A	3,730	936-37	12,450	1941-42	380
4-65	Aliso Creek at El Toro	33° 37′ 117° 41′	440	1930-47	O C F C D	A	710	940-41	2,540	1930-31	20
4-66	Trabuco Creek near San Juan Capistrano	33° 32′ 117° 40′	200	1930-47	O C F C D	A	5,140	936-37	25,200	1930-31	40
4-67	San Juan Creek near San Juan Capistrano	33° 31′ 117° 38′	150	1928-47	USGS	A	12,000	940-41	50,100	1928-29	190
	Santa Margarita Basin										
4-70	Temecula Creek at Nigger Canyon	33° 30′ 116° 59′	1,350	1923-47	USGS	A	10,900	926-27	40,500	1933-34	1,800
4-71	Temecula Creek near Temecula	33° 27′ 117° 10′	975	1904-05	USGS	D					
4-72	Murietta Creek at Temecula	33° 29′ 117° 09′	1,050	1930-47	USGS	A	9,900	937-38	31,500	1933-34	400
4-73	Temecula Creek at Railroad Canyon	33° 28′ 117° 09′	950	1923-47	USGS	A	21,000	926-27	73,400	1924-25	4,500
4-74	Santa Margarita River near Fallbrook	33° 25′ 117° 15′	290	1924-47	USGS	A	27,400	937-38	91,100	1928-29	4,800

TABLE 48—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Santa Margarita Basin—Continued										
4-75	Santa Margarita River near Delus Station	33° 21′ 117° 20′	140	1925-26	USGS	D					
4-76	O'Neil Ditch near Ysidora	33° 20′ 117° 20′	100	1930-47	USGS	A	2,300	1933-34	2,490	1939-40	1,080
4-77	Santa Margarita River at Ysidora	33° 15′ 117° 23′	15	1923-29 1930-47	USGS	A	34,000	1937-38	122,000	1924-25	800
	San Luis Rey River Basin										
4-78	San Luis Rey River, West Fork, near Nellie	33° 20′ 116° 48′	4,000	1920-21	USGS	A					
4-79	San Luis Rey River, West Fork, near Warner Springs	33° 18′ 116° 46′	2,900	1913-16	USGS	AD					
4-80	San Luis Rey River near Warner Springs	33° 18′ 116° 42′	2,900	1913-16	USGS	A					
4-81	Agua Caliente Creek near Warner Springs	33° 17′ 116° 39′	3,100	1913-15	USGS	D					
4-82	Canada Verde near Warner Springs	33° 16′ 116° 37′	3,100	1913-15	USGS	D					
4-83	Matagual Creek near Warner Springs	33° 13′ 116° 40′	3,000	1912-16	USGS	A					
4-84	Susanna Creek near Warner Springs	33° 14′ 116° 44′	2,700	1913-16	USGS	A					
4-85	Carriso Creek near Warner Springs	33° 14′ 116° 44′	2,700	1913-16	USGS	D					

4-86	San Luis Rey River at Lake Henshaw	33° 14′ 116° 47′	2,727	1905-06 1911-47	USGS	AB	33,200	19 -16	102,000	1933-34	3,700
4-87	San Luis Rey River near Nellie	33° 16′ 116° 54′	1,600	1915-16 1922-24	USGS	D					
4-88	San Luis Rey River at Diversion Flume	33° 17′ 116° 51′	3,200	1894-99	USGS	AD					
4-89	Escondido Mutual Water Co. Canal near Nellie	33° 16′ 116° 54′	1,610	1896-1905 1922-29	USGS	AB					
4-90	Rincon Indian Reservation Ditch near Valley Center	33° 22′ 117° 04′	420	1912	USGS	D					
4-91	Pauma Creek at Pauma Indian Reservation	33° 20′ 116° 59′	1,200	1920-21	USGS	A					
4-92	Pauma Creek near Nellie	33° 20′ 117° 00′	800	1920-21	USGS	A					
4-93	San Luis Rey River near Pala	33° 31′ 117° 02′	500	1906-14 1944-47	USGS	A	38,000	19 -06	106,302	1946-47	300
4-94	San Luis Rey River below Pala Diversion Dam	33° 31′ 117° 03′	500	1944	USGS	D					
4-95	Pala Indian Reservation Canal at Pala	33° 22′ 117° 04′	490	1912-13	USGS	D					
4-96	San Luis Rey River near Pala	33° 21′ 117° 03′	445	1912	USGS	D					
4-97	San Luis Rey River at Monserate Narrows	33° 20′ 117° 08′	290	1935-41 1947	USGS	A					
4-98	San Luis Rey River at Bonsall	33° 17′ 117° 14′	140	1912-16	USGS	A					
4-99	San Luis Rey River near Bonsall	33° 15′ 117° 15′	120	1916-18 1929-47	USGS	A	27,500	19 -37	110,000	1933-34	2,500
4-100	San Luis Rey Ditch near San Luis Rey	33° 15′ 117° 17′	90	1913	USGS	D					
4-101	San Luis Rey River at Oceanside	33° 13′ 117° 23′	20	1912-16 1929-42	USGS	A	27,300	19 -37	103,100	1930-31 1933-34	0 0
	San Dieguito River Basin										
102	Santa Ysabel Creek near Santa Ysabel	33° 08′ 116° 40′	2,950	1913-15 1946	USGS	A					

TABLE 48—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONA RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL EA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	San Dieguito River Basin—Continued										
4-103	Santa Ysabel Creek near Mesa Grande	33° 07′ 116° 48′	1,700	1912-28 1936-47	USGS	AB	22,200	1915-16	95,200	1920-21	3,200
4-104	Black Canyon Creek near Mesa Grande	33° 08′ 116° 48′	2,000	1913-24	USGS	AD					
4-105	Temescal Creek near Almond	33° 07′ 116° 51′	950	1913-15	USGS	D					
4-106	Santa Ysabel Creek near Ramona	33° 06′ 116° 51′	850	1912-23 1943-47	USGS	A	29,800	1915-16	149,000	1920-21	4,100
4-107	Santa Ysabel Creek near Escondido	33° 05′ 116° 56′	490	1905-12	USGS	A					
4-108	East San Pasqual Ditch near Escondido	33° 05′ 116° 56′	470	1912-14	USGS	A					
4-109	Guejito Creek near San Pasqual	33° 07′ 116° 57′	475	1946-47	USGS	A					
4-110	Guejito Creek near Escondido	33° 06′ 116° 58′	450	1915-17	USGS	AD					
4-111	Guejito Creek at San Pasqual	33° 05′ 116° 58′	425	1946-47	USGS	A					
4-112	Santa Maria Creek near Ramona	33° 03′ 116° 57′	1,250	1912-20	USGS	A					
4-113	West San Pasqual Ditch near Escondido	33° 05′ 116° 58′	400	1912-15	USGS	D					
4-114	San Dieguito River near San Pasqual	33° 04′ 117° 02′	350	1946-47	USGS	A					

4-115	San Dieguito River at Bernardo	33° 04′ 117° 04′	300	1912-16	USGS	D					
4-116	San Dieguito River at Lake Hodges	33° 03′ 117° 07′	315	1916-47	USGS	B	39,700	15-16	310,000	1920-21	1,500
	San Diego River Basin										
4-118	Boulder Creek at Cuyamaca Reservoir	32° 59′ 116° 35′	4,630	1912-26 1935-47	USGS	A	6,200	36-37	14,200	1913-14	900
4-119	Boulder Creek at Mouth near Lakeside	32° 59′ 116° 44′	900	1912-16 1919-26	USGS	A	6,200	21-22	18,100	1913-14	2,200
4-120	San Diego River at Diverting Dam near Lakeside	32° 58′ 116° 44′	850	1912-16	USGS	D					
4-121	Flume Cuyamaca Water Co. at Diverting Dam near Lakeside	32° 58′ 116° 44′	800	1912-24	USGS	A	5,700	18-19	7,200	1916-17	3,800
4-122	Flume Cuyamaca Water Co. near Lakeside	32° 51′ 116° 53′	670	1907-25	USGS	A	5,600	21-22	8,900	1912-13	3,300
4-123	South Fork Flume near Alpine	32° 54′ 116° 46′	700	1913-15	USGS	D					
4-124	San Diego River, South Fork, near Alpine	32° 54′ 116° 46′	690	1913-15	USGS	D					
4-125	San Diego River at El Capitan Dam	32° 53′ 116° 49′	750	1936-47	USGS	B					
4-126	San Diego River at Lakeside	32° 52′ 116° 55′	430	1905-16	USGS	A					
4-127	San Vicente Creek near Foster	32° 55′ 116° 55′	520	1941-43	USGS	D					
4-128	San Vicente Creek at Foster, San Vicente Dam	32° 55′ 116° 56′	650	1915 1936-47	USGS	A B					
4-129	San Diego River near Santee	32° 49′ 117° 03′	205	1912-47	USGS	A	26,400	21-22	168,000	1923-24 1924-25	0 0
4-130	San Diego River near San Diego	32° 47′ 117° 10′	55	1914-15	USGS	D					
4-131	San Diego River at San Diego	32° 46′ 117° 13′	10	1912, 1916	USGS	D					

TABLE 48—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Sweetwater River Basin										
4-132	Sweetwater River near Descanso	32° 50′ 116° 37′	3,380	1905-27	USGS	A	8,100	1921-22	33,300	1920-21	1,300
4-133	Sweetwater River at Loveland Dam	32° 47′ 116° 48′	1,350	1944-47	USGS	B					
4-134	Sweetwater River near Dehesa	32° 46′ 116° 48′	930	1913-16	USGS	A					
4-135	Sweetwater River at Sweetwater Dam	32° 41′ 117° 01′	241	1887-1947	USGS	B	17,200	1915-16	160,000	1901-02	0
	Otay River Basin										
4-136	Otay River at Savage Dam	32° 37′ 116° 56′	347	1936-47	USGS	B					
4-137	Jamul Creek near Jamul	32° 38′ 116° 53′	500	1940-47	USGS	A					
	Tia Juana River Basin										
4-138	Campo Creek near Campo	32° 35′ 116° 32′	2,150	1936-47	USGS	A					

4-139	Pine Valley Creek near Jamul....	32° 42′ 116° 40′	1,550	1906-07	USGS	AD					
4-140	Cottonwood Creek at Morena Dam	32° 41′ 116° 33′	3,045	1911-36 1936-47	USGS	A B	19,4	1915-16	79,200	1924-25	3,600
4-141	Cottonwood Creek near Dulsura..	32° 41′ 116° 40′	1,600	1906-15 1917-47	USGS	A B	13,2	1940-41	51,800	1920-21	1,000
4-142	Dulsura Conduit near Dulsura....	32° 37′ 116° 46′	1,440	1909-15 1940-47	USGS	A	12,6	1946-47	27,500	1913-14	2,800
4-143	Cottonwood Creek above Tecate Creek	32° 34′ 116° 46′	560	1936-47	USGS	A	13,2	1940-41	67,300	1946-47	100
4-144	Tia Juana River near Dulsura....	32° 34′ 116° 46′	550	1936-47	USGS	A	21,5	1940-41	98,200	1946-47	400
4-145	Tia Juana River near Nestor......	32° 33′ 117° 05′	18	1914-15 1936-47	USGS	A	64,5	1940-41	335,000	1946-47	2,900

TYPE OF RECORD

A—Daily.
B—Monthly.
C—Seasonal.
D—Intermittent.
E—Reservoir contents only.

S RCE OF RECORD

Abbreviation	*Name*
USGS	Un d States Geological Survey.
LA Co. FCD	Lo ngeles County Flood Control District.
DWR	Di on of Water Resources.
O Co. FCD	Or re County Flood Control District.

TABLE 49

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, SOUTH COASTAL AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
1	Padre Juan Canyon Group			8,200
	Ventura River Basin			
2-1	Above gage near Ventura	62,100		
2-2	Remainder of Ventura River	5,700		
	Ventura River at mouth			67,800
	Santa Clara River Basin			
3-1	Above Ventura County boundary	27,700		
3-2	Piru Creek above gage near Piru	53,700		
3-3	Sespe Creek above gage near Sespe	93,900		
3-4	Santa Paula Creek above gage near Santa Paula	16,700		
3-5	Remainder of Santa Clara River	24,400		
	Santa Clara River at mouth			216,400
4	Calleguas and Conejo Creek Group			15,200
	Malibu Creek Group			
5-1	Malibu Creek above gage at Crater Camp	12,000		
5-2	Topanga Creek above mouth of Topanga Creek	3,300		
5-3	Ballona Creek above gage at Sawtelle Boulevard	3,600		
5-4	Remainder of Malibu Creek Group	14,700		33,600
6	West Coastal Plain Group			2,000
	Los Angeles River Basin			
7-1a	Pacoima Creek above gage near San Fernando	8,000		
7-1b	Little Tujunga Creek above gage near San Fernando	1,970		
7-1c	Tujunga Creek above gage near Sunland	24,000		
7-1d	Verdugo Channel above gage at Estelle Avenue	2,200		
7-1e	Minor streams above valley floor	13,430		
7-1	Above gage above Arroyo Seco		49,600	
7-2a	Flint Wash above gage at Berkshire Avenue	690		
7-2b	Arroyo Seco above gage near Pasadena	7,290		
7-2c	Eaton Creek above gage near Pasadena	3,290		
7-2d	Little Santa Anita Creek above gage near Sierra Madre	740		
7-2e	Santa Anita Creek above gage near Sierra Madre	4,920		
7-2f	Sawpit Creek above gage near Monrovia	2,090		
7-2g	Remainder of San Gabriel Mountains drainage	3,660		
7-2h	Remainder of Los Angeles River Basin above confluence of Los Angeles River and Rio Hondo	3,020		
	Above confluence of Los Angeles River and Rio Hondo		75,300	
7-3	Remainder of Los Angeles River	700		
	Los Angeles River at mouth			76,000
	San Gabriel River Basin			
8-1	Above gage near Azusa	122,000		
8-2a	Fish Creek above gage near Durate	3,410		
8-2b	Rogers Creek above gage near Azusa	2,460		
8-2c	Little Dalton Creek above gage near Glendora	730		
8-2d	Dalton Creek above gage near Glendora	1,300		
8-2e	San Dimas Creek above gage near San Dimas	3,870		
8-2f	San Jose Creek above gage near Whittier	6,460		
8-2g	Remainder of San Gabriel River above Whittier Narrows	2,070		
	Above Whittier Narrows		142,300	
8-3a	Coyote Creek above gage near Artesia	5,660		
8-3b	Remainder of San Gabriel River	200		
	San Gabriel River at mouth			148,160

TABLE 49—Continued

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, SOUTH COASTAL AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
9	Anaheim Creek Group			1,800
	Santa Ana River Basin			
10-1	Above gage near Mentone	70,600		
10-4a	San Antonio Creek qbove gage near Claremont	17,500		
10-4b	Cucamonga Creek above gage near Upland	6,190		
10-4c	Day Creek above gage near Etiwanda	4,440		
10-4d	Lytle Creek above gage near Fontana	34,200		
10-4e	Lone Pine Creek above gage near Keenbrook	1,150		
10-4f	Cajon Creek above gage near Keenbrook	7,260		
10-4g	Devil Canyon Creek above gage near San Bernardino	2,390		
10-4h	Waterman Creek above gage near Arrowhead Springs	2,100		
10-4i	Strawberry Creek above gage near Arrowhead Springs	4,060		
10-4j	City Creek above gage near Highland	9,000		
10-4k	Plunge Creek above gage near East Highland	6,620		
10-4l	Mill Creek above gage near Craftonville	30,100		
10-4m	San Timoteo Creek above gage near Redlands	1,490	197,100	
10-2	San Jacinto River above gage near San Jacinto	28,900		
10-3	Remainder of San Jacinto River above Lake Elsinore outlet	21,300		
	Above Lake Elsinore outlet		50,200	
10-4n	Remainder of Santa Ana River above Prado Dam	59,000		
	Above Prado Dam		306,300	
10-5	Santiago Creek above gage near Villa Park	12,000		
10-6	Remainder of Santa Ana River	3,700		
	Santa Ana River at mouth			322,000
11	Newport Bay Group			4,300
	San Juan Creek Group			
12-1	Aliso Creek above gage at El Toro	500		
12-2	Trabuco Creek above gage near San Juan Capistrano	3,300		
12-3	San Juan Creek above gage near San Juan Capistrano	8,700		
12-4	Remainder of San Juan Creek Group	3,900		16,400
13	Arroyo San Onofre Group			22,500
	Santa Margarita River Basin			
14-1	Temecula Creek above gage at Nigger Canyon	11,800		
14-2	Murrieta Creek above gage at Temecula	8,670		
14-3	Remainder of Santa Margarita River above gage at Railroad Canyon	2,830		
	Above gage at Railroad Canyon		23,300	
14-4	From gage at Railroad Canyon to gage near Fallbrook	4,700		
	Above gage near Fallbrook		28,000	
	From gage near Fallbrook to gage at Ysidora	9,100		
	Santa Margarita River at mouth			37,100
	San Luis Rey River Basin			
15-1	Above Henshaw Dam	29,900		
	From Henshaw Dam to gage near Bonsall	28,900		
	Above gage near Bonsall		58,800	
15-3a	From gage near Bonsall to gage at Oceanside	3,400		
	San Luis Rey River at mouth			62,200
16	San Marcos Creek Group			12,500
	San Dieguito River Basin			
	Above Hodges Dam	40,000		
17-4	From Hodges Dam to gage near Del Mar	5,000		
	San Dieguito River at mouth			45,000

TABLE 49—Continued

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, SOUTH COASTAL AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
18	Los Penasquitos Creek Group			10,300
	San Diego River Basin			
19-1a	Boulder Creek above Cuyamaca Dam	4,730		
	Remainder of San Diego River above El Capitan Dam	30,370		
19-1	Above El Capitan Dam		35,100	
19-2	San Vicente Creek above gage near Foster	7,520		
	Remainder of San Diego River above Santee Dam	9,580		
	Above Santee Dam		52,200	
19-4c	Remainder of San Diego River above gage at Old Town (San Diego)	2,400		
	San Diego River at mouth			54,600
20	San Diego Bay group			5,200
	Sweetwater River Basin			
21	Sweetwater River above Sweetwater Dam	17,700		17,700
	Otay River Basin			
22	Otay River above Lower Otay Dam	8,900		8,900
	Tia Juana River Basin			
23-1	Cottonwood Creek above Morena Dam	12,400		
	Remainder of Cottonwood Creek above Barrett Dam	14,700		
	Above Barrett Dam		27,100	
	Remainder of Tia Juana River Basin between Barrett Dam and international boundary	11,900		
	Tia Juana River in California			39,000
	TOTAL, SOUTH COASTAL AREA IN CALIFORNIA			1,226,860

TABLE 50

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Ventura River near Ventura	Santa Clara River at County Line	Piru Creek near Piru	Sespe Creek near Sespe	Santa Paula Creek near Santa Paula	Malibu Creek near Crater Camp
1894-95	29,900	22,400	28,000	53,000	8,720	11,000
95-96	6,000	16,500	7,800	19,000	3,100	400
96-97	52,700	23,200	45,800	82,000	13,100	8,700
97-98	200	14,400	900	5,000	640	100
98-99	200	12,500	900	5,000	640	200
1899-1900	1,900	10,700	4,700	13,000	1,990	400
00-01	29,000	14,100	26,800	51,000	8,240	8,700
01-02	13,800	9,300	14,300	31,000	5,010	1,500
02-03	43,000	13,200	38,000	69,000	11,100	26,100
03-04	6,000	7,600	7,800	19,000	3,100	300
1904-05	172,000	45,600	138,000	233,000	43,600	23,500
05-06	80,800	12,300	68,700	118,000	18,700	21,100
06-07	200,000	109,000	162,000	270,000	50,000	34,400
07-08	37,600	12,200	34,100	62,000	10,000	4,900
08-09	196,000	20,400	159,000	265,000	41,300	22,500
1909-10	56,000	16,900	47,500	85,000	13,500	4,100
10-11	167,000	24,400	136,000	228,000	42,800	17,400
11-12	22,600	18,800	25,900	48,300	7,960	500
12-13	30,500	16,400	49,700	87,700	11,400	1,100
13-14	232,000	92,000	186,000	310,000	57,000	35,700
1914-15	80,800	38,800	68,700	118,000	18,700	21,600
15-16	102,000	25,000	83,800	144,000	35,800	23,500
16-17	46,400	25,000	40,600	73,000	11,800	11,400
17-18	141,000	27,400	116,000	196,000	30,600	12,400
18-19	11,600	19,800	13,000	29,000	4,700	4,500
1919-20	20,600	18,200	20,700	41,000	6,770	700
20-21	15,000	24,200	16,400	33,000	5,570	3,600
21-22	184,000	58,600	150,000	250,000	39,000	20,200
22-23	31,000	21,800	19,900	40,000	6,600	700
23-24	3,700	17,900	3,000	10,000	1,390	100
1924-25	1,700	15,500	3,900	11,000	1,670	200
25-26	72,900	31,000	61,800	108,000	17,000	14,300
26-27	70,500	33,300	59,600	104,000	21,000	17,400
27-28	5,610	19,600	9,850	19,500	3,500	400
28-29	5,130	17,500	9,230	18,500	3,680	1,100
1929-30	6,220	14,500	9,050	18,000	3,150	1,000
30-31	2,120	14,200	12,200	16,900	3,590	5,400
31-32	60,500	24,200	52,200	83,000	20,200	14,700
32-33	18,900	14,600	10,400	32,600	7,800	9,160
33-34	31,000	14,000	16,700	52,500	11,900	12,400
1934-35	43,200	20,200	33,900	85,000	13,100	6,220
35-36	28,200	12,700	14,300	52,400	13,800	2,310
36-37	112,000	35,600	69,700	171,000	32,100	23,900
37-38	194,000	38,900	129,000	239,000	44,600	34,100
38-39	23,300	17,700	38,200	46,200	8,860	4,630
1939-40	15,300	14,100	19,400	32,500	5,650	6,100
40-41	260,000	146,000	226,000	376,000	58,100	73,200
41-42	26,100	17,300	32,200	42,200	7,500	1,800
42-43	141,000	63,000	102,000	171,000	40,100	47,600
43-44	79,600	43,100	125,000	143,000	22,800	30,200
1944-45	35,300	25,600	34,400	54,400	12,400	4,240
45-46	29,100	23,000	32,300	64,400	11,400	3,800
1946-47	17,400	19,900	28,400	45,300	7,590	3,820
MEAN	62,100	27,700	53,700	93,900	16,700	12,000

TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Topanga Creek near Topanga Beach	Pacoima Creek near San Fernando	Little Tujunga Creek near San Fernando	Tujunga Creek near Sunland	Verdugo Wash at Estelle Avenue	Flint Wash at Berkshire Avenue
1894-95	2,850	10,800	2,120	31,700	2,960	1,070
95-96	100	340	20	3,440	130	40
96-97	2,250	3,700	400	12,400	1,190	470
97-98	30	250	0	2,700	90	10
98-99	50	30	0	650	0	0
1899-1900	100	30	0	860	0	0
00-01	2,250	4,070	420	13,500	1,300	510
01-02	390	170	0	2,150	40	10
02-03	6,760	4,600	490	14,900	1,430	580
03-04	80	310	0	3,000	110	50
1904-05	6,080	8,140	1,310	24,300	2,280	940
05-06	5,460	15,600	3,790	44,700	4,080	1,420
06-07	8,910	31,500	6,860	88,200	8,130	2,230
07-08	1,270	4,720	510	15,200	1,500	380
08-09	5,830	10,800	2,140	31,700	2,960	1,070
1909-10	1,060	7,780	1,210	23,600	2,240	790
10-11	4,500	20,000	5,670	57,000	5,240	1,710
11-12	130	4,770	530	15,200	1,520	380
12-13	280	1,910	230	7,530	600	200
13-14	9,240	21,100	6,140	59,900	5,510	1,850
1914-15	5,590	8,820	1,480	26,400	2,460	750
15-16	6,080	20,700	5,970	59,000	5,420	1,750
16-17	2,950	8,400	910	18,000	1,750	480
17-18	3,210	4,800	1,060	22,200	2,080	750
18-19	1,160	1,150	190	5,730	430	120
1919-20	180	9,800	610	16,600	1,590	650
20-21	930	7,290	340	10,500	960	330
21-22	5,230	38,700	13,800	103,000	9,470	2,650
22-23	180	7,870	470	14,700	1,410	370
23-24	30	540	20	3,670	180	10
1924-25	50	940	20	3,700	180	80
25-26	3,700	7,790	850	19,500	1,860	480
26-27	4,500	5,720	1,020	21,400	2,020	990
27-28	100	590	110	4,840	290	30
28-29	280	1,080	0	4,130	220	90
1929-30	670	700	0	4,350	270	80
30-31	710	980	60	3,230	140	160
31-32	3,590	8,570	1,870	18,500	710	370
32-33	2,240	1,830	510	7,410	300	470
33-34	6,420	2,250	820	7,490	630	960
1934-35	1,360	5,150	450	16,100	1,570	260
35-36	1,490	3,030	930	6,010	460	260
36-37	6,620	16,100	4,760	37,500	3,430	670
37-38	15,300	25,700	8,960	82,200	5,450	1,860
38-39	1,200	3,520	500	14,400	1,420	310
1939-40	2,080	3,260	900	11,100	1,430	250
40-41	18,900	26,300	10,600	79,200	7,370	2,380
41-42	540	1,870	200	10,100	2,160	170
42-43	8,720	20,700	7,380	75,600	8,690	2,410
43-44	7,000	15,300	5,840	58,500	5,040	860
1944-45	1,090	4,870	550	18,400	2,010	370
45-46	1,400	4,570	580	16,300	1,930	470
1946-47	990	4,350	710	19,100	1,940	870
MEAN	3,300	8,000	1,970	24,000	2,200	690

TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Arroyo Seco near Pasadena	Eaton Creek near Pasadena	Little Santa Anita Creek near Sierra Madre	Santa Anita Creek near Sierra Madre	Sawpit Creek near Monrovia	San Gabriel River near Azusa
1894–95	11,200	4,800	1,020	7,340	2,060	179,000
95–96	820	640	90	810	770	27,100
96–97	5,150	2,400	470	3,520	1,200	90,900
97–98	660	550	60	620	520	23,000
98–99	160	190	10	210	260	9,620
1899–1900	250	260	20	260	320	12,100
00–01	5,570	2,550	500	3,780	1,260	96,200
01–02	660	550	60	620	520	23,800
02–03	6,210	2,800	560	4,200	1,350	106,000
03–04	1,020	720	100	900	800	28,700
1904–05	9,860	4,280	890	6,500	1,870	160,000
05–06	14,700	7,220	1,460	9,610	3,400	232,000
06–07	23,100	9,770	2,530	15,600	6,130	350,000
07–08	4,270	2,010	380	2,940	1,800	77,500
08–09	11,200	4,800	1,020	7,340	2,720	180,000
1909–10	8,450	3,700	760	5,610	2,800	139,000
10–11	17,500	7,360	1,840	11,600	4,910	273,000
11–12	4,260	2,000	380	2,940	1,800	77,100
12–13	2,430	1,290	230	1,790	1,070	50,300
13–14	19,000	8,030	2,040	12,700	3,170	296,000
1914–15	8,660	3,520	720	5,290	2,680	132,000
15–16	16,900	7,550	1,900	11,900	5,020	279,000
16–17	5,580	2,420	680	4,070	2,560	92,000
17–18	5,620	3,520	560	3,740	2,040	132,000
18–19	1,530	690	150	890	990	38,900
1919–20	3,640	1,980	350	2,400	1,260	117,000
20–21	3,160	1,830	470	2,560	1,160	70,500
21–22	25,400	13,300	2,540	16,600	4,310	410,000
22–23	3,180	1,900	320	2,440	1,570	75,900
23–24	850	640	90	710	790	27,900
1924–25	1,060	640	90	690	1,200	23,700
25–26	6,170	3,310	590	4,350	3,430	111,000
26–27	6,780	3,060	880	5,180	3,280	129,000
27–28	1,260	1,020	120	1,010	960	32,600
28–29	1,380	850	120	1,210	790	35,800
1929–30	1,600	970	150	1,280	620	46,200
30–31	1,450	860	100	990	630	31,800
31–32	5,290	2,400	440	4,010	1,540	129,000
32–33	2,740	1,340	230	1,770	830	46,600
33–34	2,950	1,670	420	2,520	1,160	52,000
1934–35	9,010	2,570	600	4,480	1,300	127,000
35–36	3,610	1,790	390	2,920	1,470	53,700
36–37	11,900	5,340	1,340	9,820	3,090	218,000
37–38	21,900	8,100	2,640	15,500	6,180	353,000
38–39	4,690	1,870	260	2,680	1,940	67,200
1939–40	3,960	1,840	360	2,690	1,390	58,600
40–41	25,200	10,300	2,680	14,100	4,380	325,000
41–42	2,480	1,370	320	1,830	1,490	51,000
42–43	21,300	9,040	2,630	16,600	5,650	283,000
43–44	13,700	5,320	1,040	6,790	3,050	193,000
1944–45	5,820	2,640	600	3,520	2,110	95,800
45–46	4,970	1,980	440	3,100	1,630	101,000
1946–47	5,910	2,770	680	4,280	1,680	109,000
MEAN	7,290	3,290	740	4,920	2,090	122,000

TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Fish Creek near Duarte	Rogers Creek near Azusa	Little Dalton Creek near Glendora	Dalton Creek near Glendora	San Dimas Creek near San Dimas	San Jose Creek near Whittier
1894-95	5,000	3,580	1,170	2,100	5,200	9,540
95-96	720	180	20	30	550	260
96-97	2,470	1,550	470	790	2,970	4,260
97-98	620	130	10	20	420	90
98-99	230	0	0	0	0	0
1899-1900	290	0	0	0	70	0
00-01	2,650	1,690	520	890	2,150	4,520
01-02	620	130	10	20	420	90
02-03	2,930	1,920	590	1,030	2,450	5,110
03-04	780	220	30	50	600	430
1904-05	4,420	3,140	1,020	1,810	4,470	8,430
05-06	6,420	4,790	1,590	2,860	8,490	12,800
06-07	9,700	7,490	2,520	4,590	13,100	19,900
07-08	2,100	1,250	360	600	2,450	3,410
08-09	5,000	3,580	1,170	2,100	5,200	9,540
1909-10	3,840	2,660	860	1,500	4,890	7,070
10-11	7,570	5,730	1,920	3,470	10,100	15,300
11-12	2,100	1,250	360	600	2,450	3,410
12-13	1,360	640	150	210	1,100	1,700
13-14	8,200	6,230	2,100	3,800	9,580	16,700
1914-15	3,640	2,500	800	1,400	4,580	6,730
15-16	7,740	5,870	1,970	3,560	10,300	15,600
16-17	2,500	1,570	480	810	3,010	4,260
17-18	2,960	2,140	800	1,400	2,690	6,730
18-19	650	320	80	110	1,020	1,020
1919-20	2,160	1,470	680	1,340	2,860	5,880
20-21	1,670	1,070	320	990	3,010	2,900
21-22	8,980	8,370	3,010	5,530	14,000	23,900
22-23	1,510	1,040	350	540	3,080	3,320
23-24	340	150	20	30	930	60
1924-25	1,230	790	10	20	630	40
25-26	5,170	3,930	630	870	2,630	4,700
26-27	5,070	4,060	780	1,740	4,400	15,600
27-28	860	400	40	90	650	580
28-29	1,040	460	50	110	790	680
1929-30	1,070	530	90	120	840	820
30-31	890	260	30	60	530	530
31-32	3,560	2,460	470	990	2,980	4,030
32-33	1,340	650	80	140	820	1,070
33-34	2,440	1,890	480	770	1,500	7,610
1934-35	3,080	1,870	510	820	2,050	3,860
35-36	3,280	1,420	480	520	1,550	1,390
36-37	6,770	5,180	1,530	2,860	7,390	9,600
37-38	9,520	7,560	2,810	4,600	13,200	15,400
38-39	1,750	1,020	320	390	2,340	3,440
1939-40	1,570	810	230	290	1,730	3,020
40-41	9,340	7,610	2,030	3,800	10,400	22,700
41-42	1,030	480	200	250	1,640	3,930
42-43	10,700	9,290	2,000	4,070	10,900	20,500
43-44	4,200	3,100	950	1,480	6,150	11,900
1944-45	2,580	1,840	820	1,080	4,400	7,010
45-46	2,310	1,670	560	740	2,840	5,750
1946-47	2,910	2,230	440	630	2,750	5,100
MEAN	3,410	2,460	730	1,300	3,870	6,460

TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Coyote Creek near Artesia	Santa Ana River near Mentone	San Antonio Creek near Claremont	Cucamonga Creek near Upland	Day Creek near Etiwanda	Lytle Creek near Fontana
1894-95	7,200	154,000	25,200	8,800	6,400	47,600
95-96	250	25,000	5,900	2,030	1,520	16,700
96-97	5,000	65,000	14,500	4,920	3,700	21,000
97-98	200	28,800	5,200	1,760	1,340	14,800
98-99	150	16,000	2,800	930	740	7,100
1899-1900	180	16,500	3,000	1,010	760	8,100
00-01	4,800	47,400	15,200	5,170	3,880	19,300
01-02	420	23,400	5,050	1,720	1,290	15,000
02-03	6,900	67,900	16,400	5,570	4,180	20,800
03-04	300	24,600	6,340	2,130	1,600	15,700
1904-05	8,600	61,400	22,900	7,950	5,840	35,000
05-06	11,000	123,000	35,800	13,200	9,150	61,500
06-07	17,000	165,000	33,800	12,400	8,660	102,000
07-08	1,650	60,100	11,800	4,030	3,030	27,400
08-09	9,200	85,700	28,400	10,100	7,270	47,600
1909-10	3,750	86,800	20,400	7,030	5,190	41,700
10-11	11,300	102,000	18,100	6,180	4,620	72,900
11-12	1,550	43,800	11,300	3,850	2,900	27,400
12-13	2,100	33,200	7,150	2,430	1,830	19,300
13-14	17,000	94,200	25,500	8,960	6,500	69,000
1914-15	6,200	138,000	20,200	6,970	5,170	34,000
15-16	13,800	280,000	37,400	14,000	9,610	80,400
16-17	4,100	71,000	14,900	5,060	3,790	23,700
17-18	4,300	84,200	17,700	6,080	4,530	27,800
)	450	39,700	7,470	2,530	1,920	17,800
)	3,200	80,500	18,100	6,200	4,620	26,500
l	2,600	53,700	13,700	4,580	3,510	21,100
2	21,200	193,000	53,300	20,900	14,300	105,000
3	1,200	60,600	14,700	5,060	3,790	25,000
4	150	38,900	7,390	2,530	1,920	15,700
5	180	29,800	5,390	1,820	1,390	10,600
5	5,650	49,300	15,000	5,090	3,830	15,700
7	12,500	112,000	22,200	7,700	5,660	33,800
3	650	18,800	8,370	2,860	2,140	16,800
)	600	26,100	7,530	2,530	1,920	12,800
)	700	34,700	9,570	2,700	1,870	15,200
l	570	21,700	8,530	2,140	1,380	13,300
2	2,690	85,900	20,700	6,390	3,110	28,800
3	460	26,100	8,120	2,770	1,750	17,600
4	3,890	21,700	6,570	2,800	1,400	13,200
5	3,850	46,200	19,300	5,070	3,320	27,800
5	1,150	36,800	10,500	3,590	2,400	20,900
7	13,700	151,000	30,900	10,900	7,120	51,400
3	15,100	193,000	47,100	18,200	13,400	104,000
)	4,250	59,100	11,700	4,560	4,260	26,200
)	3,190	41,600	14,900	4,480	3,590	25,800
l	29,500	105,000	38,800	14,600	9,910	74,200
2	1,560	42,300	10,500	3,650	3,690	27,000
3	12,100	76,900	32,100	12,200	8,210	65,300
4	12,100	52,200	26,000	9,120	6,580	48,800
5	3,800	64,200	19,100	8,160	6,170	32,200
5	3,540	49,400	15,100	5,780	4,580	30,800
7	2,460	34,200	17,100	6,970	4,360	33,200
EAN	5,660	70,600	17,500	6,190	4,440	34,200

TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Lone Pine Creek near Keenbrook	Cajon Creek near Keenbrook	Devil Canyon Creek near San Bernardino	Waterman Creek near Arrowhead Springs	Strawberry Creek near Arrowhead Springs	City Creek near Highland
1894-95	2,480	10,400	3,340	3,040	8,660	19,000
95-96	100	3,200	530	400	1,420	3,160
96-97	520	4,180	1,890	1,680	3,640	8,000
97-98	140	1,230	670	510	1,620	3,560
98-99	60	570	360	270	920	2,020
1899-1900	60	610	370	280	920	2,020
00-01	290	4,510	1,950	1,760	2,660	5,800
01-02	100	1,190	650	500	1,300	2,920
02-03	540	5,000	2,120	1,930	3,780	8,300
03-04	100	1,480	800	630	1,390	3,000
1904-05	450	8,110	3,000	2,750	3,430	7,550
05-06	1,600	18,400	5,070	4,400	6,920	15,200
06-07	2,850	17,500	4,740	4,150	9,260	20,400
07-08	430	6,150	1,520	1,340	3,360	7,350
08-09	840	10,900	3,840	3,460	4,810	10,600
1909-10	850	10,500	2,660	2,440	4,860	10,700
10-11	1,150	9,340	2,350	2,150	5,680	12,500
11-12	260	3,280	1,450	1,280	2,440	5,380
12-13	160	1,720	910	1,390	1,870	4,150
13-14	4,000	11,100	4,980	6,020	5,300	11,700
1914-15	2,000	10,400	2,630	2,410	7,760	17,100
15-16	7,360	19,400	5,390	4,620	15,800	34,600
16-17	580	7,660	1,910	1,720	4,010	8,800
17-18	810	5,660	2,310	2,110	4,750	10,500
18-19	210	1,840	950	780	2,220	4,900
1919-20	750	5,740	2,360	2,150	4,510	9,880
20-21	380	3,130	1,780	1,840	3,170	6,600
21-22	3,810	22,700	8,410	6,420	11,000	23,800
22-23	2,090	4,620	1,910	2,230	3,680	7,470
23-24	770	2,880	950	780	1,600	4,360
1924-25	370	2,100	690	560	1,430	3,570
25-26	300	3,450	1,930	1,160	2,520	12,600
26-27	330	5,110	2,900	2,040	3,620	12,100
27-28	130	1,720	1,070	640	1,310	3,150
28-29	140	2,150	1,300	1,110	1,660	3,600
1929-30	320	4,460	1,380	1,180	1,840	3,470
30-31	190	2,160	930	800	1,100	2,720
31-32	1,120	10,700	2,540	2,180	3,100	8,210
32-33	470	4,540	660	530	1,270	2,700
33-34	560	3,530	870	750	1,360	2,460
1934-35	660	6,350	1,160	1,490	2,530	5,960
35-36	300	2,210	1,140	920	2,070	4,760
36-37	1,050	9,730	4,260	4,140	7,070	18,700
37-38	8,220	24,700	7,820	5,920	10,200	22,600
38-39	640	6,150	1,980	2,000	4,070	5,950
1939-40	550	4,800	1,510	1,440	3,190	6,170
40-41	2,550	17,700	5,070	5,110	10,000	18,700
41-42	580	4,680	1,710	1,400	2,630	4,620
42-43	3,200	21,900	4,720	4,070	7,700	15,300
43-44	1,420	12,900	3,350	2,390	4,220	8,220
1944-45	740	5,970	3,340	2,760	4,310	9,030
45-46	820	7,890	1,930	1,310	2,480	5,330
1946-47	790	6,620	2,570	1,810	2,580	5,880
MEAN	1,150	7,260	2,390	2,100	4,060	9,000

TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Plunge Creek near East Highland	Mill Creek near Craftonville	San Timoteo Creek near Redlands	San Jacinto River near San Jacinto	Santiago Creek near Villa Park	Aliso Creek at El Toro
1894-95	14,600	62,300	3,260	37,500	25,200	1,100
95-96	2,450	13,800	540	11,900	500	0
96-97	6,130	26,900	1,370	29,200	5,500	140
97-98	2,760	15,000	10	11,200	800	0
98-99	1,540	10,700	0	8,920	200	0
1899-1900	1,540	10,700	380	11,300	200	0
00-01	4,520	21,000	0	24,300	2,500	10
01-02	2,180	13,300	0	14,400	500	0
02-03	6,400	27,900	10	28,000	5,900	150
03-04	2,340	13,800	340	11,800	500	0
1904-05	5,800	25,600	7,250	37,700	4,700	100
05-06	11,700	49,400	2,930	47,700	17,500	740
06-07	15,600	67,000	1,760	41,500	27,900	1,300
07-08	5,700	25,100	1,480	19,900	4,400	80
08-09	8,140	34,400	750	29,100	9,400	320
1909-10	8,220	34,700	910	23,000	9,600	340
10-11	9,630	40,400	280	26,100	12,900	500
11-12	4,150	19,800	300	23,000	2,200	10
12-13	3,180	16,300	50	16,300	1,200	0
13-14	8,960	37,800	4,800	41,300	11,200	420
1914-15	13,100	55,500	2,320	59,000	21,300	930
15-16	26,700	116,000	5,430	124,000	59,000	2,800
16-17	6,730	29,000	80	24,100	6,400	180
17-18	8,040	34,000	2,610	13,400	9,000	310
18-19	3,750	18,500	50	15,100	1,600	0
1919-20	7,160	31,600	80	33,700	8,300	270
20-21	4,180	23,900	0	13,700	5,780	140
21-22	18,400	78,200	7,460	74,400	35,600	1,640
22-23	3,730	26,200	320	20,600	5,330	130
23-24	1,700	17,500	170	9,490	2,080	10
1924-25	1,200	12,200	430	7,760	930	0
25-26	5,650	21,900	4,400	28,000	10,900	400
26-27	7,170	38,500	7,580	108,000	33,900	1,550
27-28	1,540	13,800	310	6,990	4,710	100
28-29	2,780	13,300	180	10,200	3,450	30
1929-30	3,350	18,200	260	17,800	5,370	130
30-31	2,300	13,100	100	6,170	2,770	20
31-32	7,500	33,100	920	45,600	13,200	566
32-33	1,900	14,800	220	7,780	5,130	170
33-34	2,640	10,800	90	3,220	4,930	160
1934-35	5,210	19,100	670	10,500	6,440	630
35-36	4,980	20,100	580	15,400	4,930	350
36-37	14,900	61,200	4,600	111,000	43,400	2,240
37-38	15,900	79,100	5,250	66,500	41,000	1,610
38-39	3,980	24,900	240	17,100	8,350	440
1939-40	5,020	19,200	670	14,800	7,770	250
40-41	12,900	41,900	1,980	64,700	53,700	2,540
41-42	3,140	22,000	20	15,600	4,630	30
42-43	9,540	30,900	3,270	32,300	37,800	1,910
43-44	5,130	22,600	490	18,100	17,400	610
1944-45	6,540	26,600	810	26,000	15,500	360
45-46	4,500	21,700	630	11,100	7,560	110
1946-47	4,140	18,000	470	6,660	6,490	160
MEAN	6,620	30,100	1,490	28,900	12,000	500

TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Trabuco Creek near San Juan Capistrano	San Juan Creek near San Juan Capistrano	Temecula Creek at Nigger Canyon	Murietta Creek at Temecula	Temecula Creek at Railroad Canyon	Santa Margarita River near Fallbrook
1894-95	8,000	18,900	44,400	28,700	82,700	105,000
95-96	0	0	2,400	3,200	6,600	6,200
96-97	370	1,900	6,300	4,100	11,700	12,700
97-98	0	0	2,000	3,000	6,000	5,500
98-99	0	0	1,700	3,200	6,000	5,200
1899-1900	0	0	1,700	3,200	6,000	5,200
00-01	70	200	4,100	3,500	8,800	8,900
01-02	0	0	2,900	3,300	7,300	6,900
02-03	400	2,200	3,900	3,500	8,500	8,600
03-04	0	0	2,200	3,100	6,300	5,800
1904-05	200	1,300	9,900	4,700	16,100	18,600
05-06	4,600	11,600	27,600	13,100	45,100	56,100
06-07	9,200	21,800	20,200	8,800	31,900	38,900
07-08	200	1,200	6,100	3,700	11,000	12,000
08-09	1,200	4,700	11,600	4,800	18,000	21,700
1909-10	1,400	5,000	10,900	5,100	17,700	20,600
10-11	2,600	7,600	7,700	4,400	13,600	15,100
11-12	40	100	4,300	3,900	9,500	9,300
12-13	0	0	1,900	3,800	6,900	6,500
13-14	1,900	6,300	7,700	4,200	13,300	14,800
1914-15	6,300	15,200	24,200	24,500	56,800	71,200
15-16	23,000	56,000	80,600	60,300	161,000	206,000
16-17	480	2,500	10,400	5,500	17,700	20,300
17-18	1,100	4,500	8,500	4,100	13,900	15,500
18-19	0	100	2,900	3,800	7,900	7,900
1919-20	900	4,000	8,200	4,300	13,900	15,500
20-21	400	2,200	2,400	2,900	6,300	5,800
21-22	12,600	29,900	43,200	20,600	70,700	89,100
22-23	300	1,900	5,100	4,400	11,000	12,000
23-24	40	100	5,310	3,200	9,510	9,300
1924-25	0	0	3,520	3,800	8,580	8,370
25-26	1,800	6,000	8,930	2,800	12,600	15,600
26-27	11,900	28,000	40,500	26,400	75,800	87,500
27-28	220	1,400	3,350	3,400	7,930	8,460
28-29	70	190	4,660	2,000	7,390	7,290
1929-30	330	3,260	6,020	2,200	8,970	9,940
30-31	40	500	2,130	2,700	5,770	5,720
31-32	3,320	15,500	17,300	15,700	33,000	37,600
32-33	110	1,260	4,160	990	7,430	7,830
33-34	80	1,320	1,810	420	5,520	5,800
1934-35	410	1,390	4,270	2,020	7,220	8,280
35-36	390	1,950	3,930	2,390	7,520	7,810
36-37	25,200	45,100	36,700	22,400	61,300	78,800
37-38	13,200	38,100	31,900	31,500	72,800	91,900
38-39	1,730	5,320	8,400	4,990	16,500	20,200
1939-40	1,650	7,020	6,470	6,420	15,100	18,100
40-41	23,400	50,100	25,000	31,300	60,500	84,300
41-42	340	2,560	10,300	1,520	15,000	17,700
42-43	9,320	29,400	13,600	31,300	49,500	59,900
43-44	3,670	12,300	7,820	7,480	19,800	23,600
1944-45	4,100	9,230	7,230	4,700	14,600	17,300
45-46	170	2,150	4,890	2,830	12,500	13,300
1946-47	370	1,340	3,070	1,300	9,640	10,700
MEAN	3,300	8,700	11,800	8,670	23,300	28,000

TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Santa Margarita River near Ysidora	San Luis Rey River at Lake Henshaw	San Luis Rey River near Bonsall	San Luis Rey River at Oceanside	San Dieguito River at Sutherland Damsite	San Dieguito River at Pamo Damsite
1894-95	145,000	105,000	195,000	207,000	55,300	88,500
95-96	1,200	5,700	10,600	11,300	3,000	4,800
96-97	18,500	18,600	34,600	36,800	9,800	15,700
97-98	400	4,100	7,600	8,100	2,200	3,520
98-99	400	3,000	5,600	6,000	1,600	2,560
1899-1900	400	2,800	5,200	5,500	1,500	2,400
00-01	11,800	11,500	21,400	22,600	6,000	9,600
01-02	2,800	7,100	13,200	14,100	3,800	6,080
02-03	11,000	10,500	19,600	20,800	5,600	8,960
03-04	400	4,770	8,970	8,970	2,600	4,160
1904-05	26,400	28,200	52,500	55,300	14,900	23,800
05-06	77,700	68,200	127,000	135,000	33,700	54,600
06-07	54,100	52,800	98,400	104,000	19,100	30,900
07-08	17,800	17,600	32,800	34,400	6,000	9,730
08-09	30,400	32,700	60,900	64,200	25,100	40,800
1909-10	29,200	31,000	57,700	60,800	18,100	29,400
10-11	22,100	22,500	41,900	44,000	11,900	19,000
11-12	13,000	12,800	22,000	23,600	8,690	14,100
12-13	1,600	5,910	11,400	11,400	4,520	5,780
13-14	21,300	22,600	41,500	43,700	10,500	19,800
1914-15	98,700	60,400	148,000	154,000	31,100	49,800
15-16	284,000	182,000	336,000	355,000	95,200	149,000
16-17	28,800	29,500	57,200	60,800	13,700	24,300
17-18	22,500	24,400	42,700	47,500	7,360	12,400
18-19	8,700	7,320	17,000	17,500	4,810	5,870
1919-20	22,500	23,400	43,700	46,000	12,500	17,600
20-21	400	5,120	8,660	8,660	3,170	4,070
21-22	123,000	102,000	173,000	193,000	47,200	79,700
22-23	17,800	13,800	32,000	32,300	9,560	15,800
23-24	5,690	6,520	16,200	18,700	2,740	4,390
1924-25	4,860	4,570	8,470	8,470	3,470	5,550
25-26	18,800	19,400	36,100	37,600	15,300	24,500
26-27	93,600	85,900	160,000	169,000	49,500	79,300
27-28	6,980	8,240	17,100	17,400	3,620	5,800
28-29	3,820	12,200	20,600	21,400	4,890	7,820
1929-30	14,200	17,500	30,100	31,900	8,010	12,800
30-31	7,000	6,950	11,200	11,200	3,090	4,950
31-32	44,300	48,600	102,000	109,000	31,300	50,000
32-33	9,660	12,000	22,600	23,400	7,600	12,200
33-34	8,400	3,710	6,540	6,950	1,180	1,880
1934-35	14,800	8,780	20,200	21,200	4,640	7,420
35-36	14,100	12,000	21,500	22,900	6,330	10,100
36-37	120,000	89,600	209,000	217,000	47,600	76,100
37-38	126,000	72,300	155,000	162,000	29,600	47,400
38-39	26,400	25,900	53,000	55,800	10,800	17,400
1939-40	23,700	18,700	39,300	41,400	6,980	11,200
40-41	121,000	70,400	163,000	171,000	43,000	68,800
41-42	20,500	30,600	61,600	64,900	9,120	14,600
42-43	82,900	38,100	82,800	87,000	18,000	28,800
43-44	39,900	25,700	50,000	52,800	12,900	19,400
1944-45	29,800	23,700	45,500	48,200	9,630	14,400
45-46	22,700	20,400	40,600	42,800	7,170	10,500
1946-47	16,500	9,240	18,900	19,900	2,490	3,710
MEAN	37,100	29,900	58,800	62,200	15,200	24,400

TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	San Dieguito River at Lake Hodges	Boulder Creek at Cuyamaca Reservoir	San Diego River at El Capitan Dam	San Vicente Creek at San Vicente Dam	San Diego River near Santee	Sweetwater River at Sweetwater Dam
1894-95	163,000	10,700	102,000	30,300	168,000	73,400
95-96	3,650	1,210	4,900	0	4,900	1,300
96-97	19,300	3,470	16,800	2,200	21,000	6,900
97-98	1,650	680	2,480	0	2,480	0
98-99	850	500	1,850	0	1,850	250
1899-1900	460	140	980	0	980	0
00-01	10,400	2,670	8,250	200	8,650	830
01-02	5,260	2,060	7,200	200	7,500	0
02-03	9,300	2,090	12,600	1,400	15,400	0
03-04	2,850	420	1,270	0	1,270	0
1904-05	32,800	5,830	35,800	7,100	50,400	13,800
05-06	80,100	10,600	82,000	14,000	111,000	35,000
06-07	42,900	7,220	49,700	10,600	71,800	30,000
07-08	9,530	2,120	18,800	2,800	24,300	4,140
08-09	58,500	6,400	45,600	6,100	58,100	16,000
1909-10	40,400	4,830	26,400	3,600	33,700	9,600
10-11	24,100	2,460	16,700	1,600	19,700	3,160
11-12	16,400	3,390	18,700	2,400	23,300	5,000
12-13	2,070	2,740	9,800	500	10,600	920
13-14	21,500	2,380	19,500	3,100	25,600	3,530
1914-15	73,600	8,990	67,400	17,600	108,000	27,100
15-16	310,000	18,000	200,000	66,300	352,000	161,000
16-17	32,000	3,730	28,200	5,300	40,600	15,300
17-18	25,600	3,330	23,000	3,400	31,000	10,200
18-19	3,430	2,600	10,000	500	10,800	4,050
1919-20	14,500	6,410	36,900	2,520	42,500	15,000
20-21	1,490	2,230	7,090	0	7,090	1,810
21-22	118,000	12,000	121,000	36,300	202,000	62,000
22-23	16,100	3,460	21,400	390	22,300	9,110
23-24	4,750	2,300	8,730	40	8,770	2,820
1924-25	1,730	1,610	8,710	80	8,790	1,140
25-26	34,300	3,850	24,500	5,510	36,100	14,400
26-27	157,000	12,400	118,000	32,700	185,000	121,000
27-28	8,900	2,350	11,600	280	11,900	3,950
28-29	8,500	3,140	14,000	510	15,200	3,570
1929-30	15,500	3,180	16,500	1,440	19,200	4,600
30-31	4,810	1,560	5,570	500	9,770	1,420
31-32	71,300	9,640	67,900	16,700	104,000	25,900
32-33	17,300	3,970	20,700	1,820	26,900	6,970
33-34	1,550	1,140	5,140	0	11,500	1,090
1934-35	8,520	3,280	15,800	1,400	25,600	3,810
35-36	11,100	4,650	19,100	1,700	28,800	3,950
36-37	163,000	14,200	100,000	28,800	167,000	62,100
37-38	91,600	13,200	69,300	16,100	105,000	31,200
38-39	40,100	5,500	33,800	7,600	53,600	11,100
1939-40	18,100	1,780	19,000	1,700	27,400	4,900
40-41	179,000	13,800	170,000	38,200	246,000	67,600
41-42	39,600	2,490	25,600	2,130	34,700	10,400
42-43	46,700	3,420	35,500	7,830	51,400	14,100
43-44	22,200	2,860	29,700	6,340	45,800	15,300
1944-45	17,800	4,400	22,700	3,330	31,100	10,100
45-46	16,400	2,360	14,600	4,570	25,200	7,250
1946-47	1,510	880	6,030	1,000	13,400	2,120
MEAN	40,000	4,730	35,100	7,520	52,200	17,700

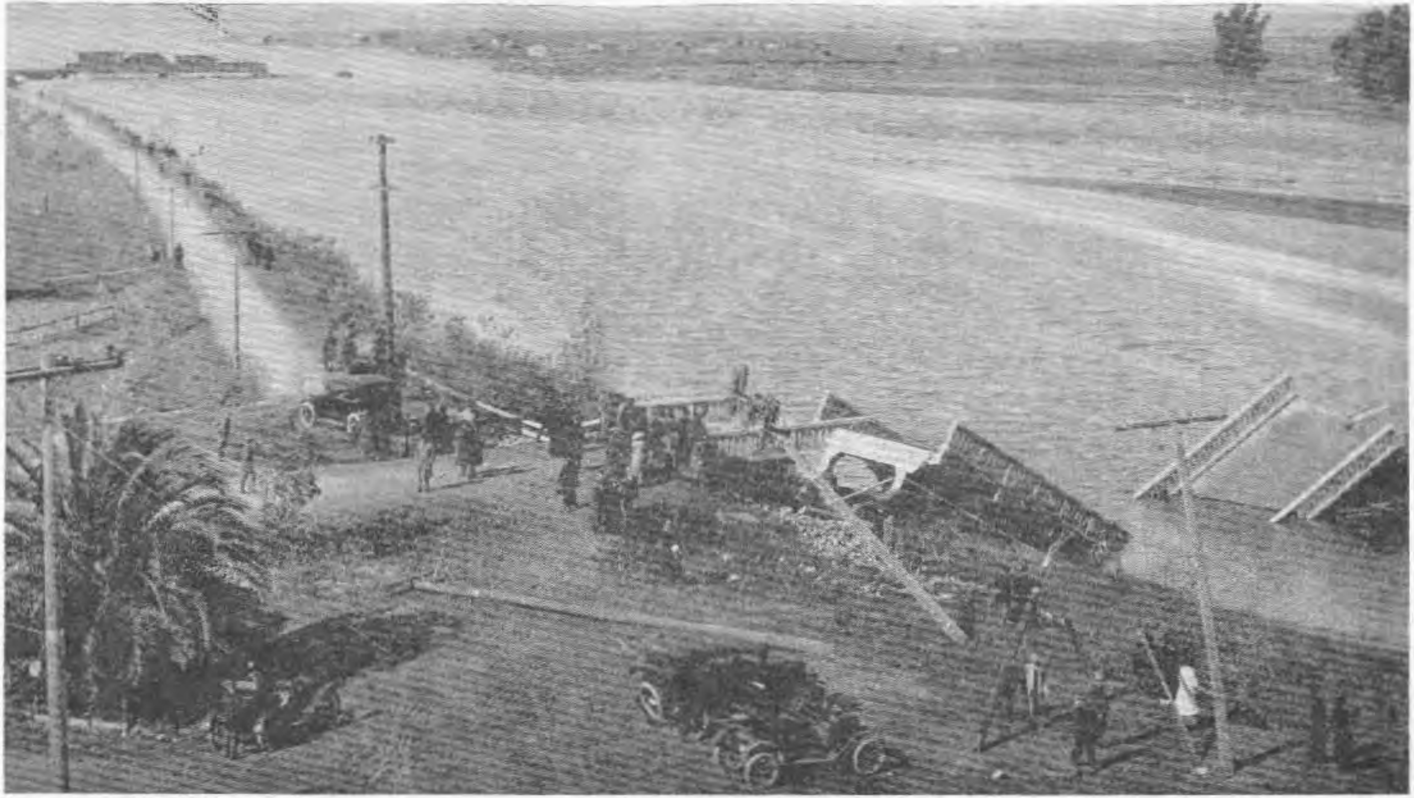
TABLE 50—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, SOUTH COASTAL AREA

In Acre-feet

Season Oct. 1-Sept. 30	Otay River at Savage Dam	Cottonwood Creek at Morena Dam	Cottonwood Creek above Barrett Dam*	Tia Juana River at Marron Damsite
1894-95	30,200	36,600	83,700	120,000
95-96	800	1,900	4,400	6,300
96-97	4,200	6,700	15,300	21,900
97-98	0	900	2,100	3,000
98-99	100	700	1,600	2,300
1899-1900	0	200	500	720
00-01	500	3,700	8,500	12,200
01-02	0	2,600	6,000	8,600
02-03	0	2,700	6,200	8,900
03-04	0	600	1,300	1,860
1904-05	11,200	11,900	27,200	39,000
05-06	16,200	24,900	56,900	81,500
06-07	6,760	18,200	41,700	59,700
07-08	1,150	4,520	10,300	14,800
08-09	5,000	13,500	30,800	44,200
1909-10	7,150	6,320	14,500	20,700
10-11	1,230	3,090	6,920	9,920
11-12	4,910	4,140	9,580	13,700
12-13	1,570	1,750	3,130	4,480
13-14	2,500	3,680	8,130	11,700
1914-15	10,900	15,000	26,100	51,700
15-16	54,400	75,300	172,000	247,000
16-17	8,700	15,700	35,900	51,500
17-18	2,700	8,970	16,600	23,800
18-19	2,300	4,100	9,120	13,100
1919-20	9,100	12,100	31,700	45,400
20-21	400	3,140	6,070	8,700
21-22	27,400	42,100	96,500	138,000
22-23	3,900	10,700	20,000	28,700
23-24	1,750	4,130	9,690	13,200
1924-25	720	2,070	5,900	8,450
25-26	2,700	3,570	10,600	15,200
26-27	42,700	65,600	136,000	195,000
27-28	190	6,730	10,600	15,100
28-29	460	2,660	11,500	16,400
1929-30	3,550	3,130	8,120	11,600
30-31	2,380	1,890	3,470	4,970
31-32	20,400	13,900	34,200	49,000
32-33	2,800	3,680	9,300	13,300
33-34	1,390	2,430	5,170	7,400
1934-35	8,310	6,280	11,700	16,700
35-36	2,280	3,710	8,170	11,700
36-37	33,100	43,500	103,000	134,000
37-38	20,400	27,100	53,300	74,500
38-39	7,400	15,300	28,400	40,300
1939-40	3,200	8,200	13,800	16,600
40-41	65,000	47,100	98,900	162,000
41-42	3,400	8,700	17,200	27,900
42-43	7,980	13,100	27,400	37,200
43-44	12,600	16,800	30,300	44,300
1944-45	7,080	11,800	24,500	30,900
45-46	5,440	9,910	18,300	23,900
1946-47	1,340	2,530	6,070	6,450
MEAN	8,900	12,400	27,100	39,000

* Subject to revision upon completion of current studies of spill at Barrett Dam by International Boundary Commission.



(From Union Title Insurance and Trust Company Historical Collection)

FLOOD DAMAGE ALONG SAN DIEGO RIVER—1916

FLOOD FLOWS

Because of steep slopes and sparse vegetation in a number of drainage basins of the South Coastal Area, runoff from heavy rains may at times cause serious soil erosion. As a result, newly eroded material and stream channel accumulations pass rapidly from the higher elevations to be deposited on flat basin lands below. During flood flows the streams are prone to cut new channels and meander through new territory, building up wide detrital cones, unless artificially stabilized.

Information about floods in South Coastal Area streams begins with Father Crespi's Diary of the first land expedition of the Spaniards from San Diego to San Francisco Bay and return in 1769-70. The diarist noted evidence of "great" floods in Los Angeles River. Later records of the padres tell of damage to San Gabriel Mission fields in the low lands along San Gabriel River in 1772, and to Mission properties at San Diego in 1780 and 1821, and at Ventura in 1832.

A chronological summary of floods in the southern part of the State is given in United States Geological Survey Water Supply Paper 844. Owing to lack of records it is difficult to determine the magnitude of most early floods. That 1824-25 "was probably the greatest for many years, causing the (Los Angeles) river to break eastward into San Pedro Bay." This flood also changed the course of Santa Ana River into the ocean.

The flood of 1861-62 has been termed the "Noachian deluge of California floods." Preceding storms drenched the entire West Coast. The following quotation from Water Supply Paper 844 describes its impact on South Coastal streams:

> "During the flood period in 1862 the entire valley area from Los Angeles to the ocean, both toward San Pedro and toward Ballona, was a great lake. The Los Angeles River in the City of Los Angeles extended from Alameda Street to the bluff on the Pico Heights side. A little below Vernon * * * the river split, and part of it went through Los Cienagas grant into Ballona Creek.
>
> "During the same flood the San Gabriel River overflowed its banks, broke from its course east of El Monte, and started a new channel to the west of El Monte, taking about the same course as later taken in 1867 to form what was then known as New River.
>
> "In San Bernardino, Riverside, and Orange Counties, the Santa Ana River became a raging torrent. * * * The prosperous colonies along the banks of the river were completely inundated, and vineyards, orchards, and grain fields were transformed into a barren waste.
>
> "Flood waters * * * on the Ventura River are reported to have spread from the bluff on the Taylor Ranch to the hills east of Ventura Avenue, thus attaining a width of about 4,000 feet. Many houses were submerged and several destroyed. Parts of the old Mission waterworks, which brought water to Ventura, were destroyed."

The flood of 1867-68 caused extensive damage along San Gabriel River. The river cut a new channel and several thousand acres of land and a newly established settlement were washed away. During the same flood a portion of Ventura was submerged.

The flood of 1884 is given rank among major floods. All bridges across Los Angeles River except one were washed out and several people drowned. San Fernando Valley was flooded from the site of Chatsworth to that of Glendale and in many places the Southern Pacific railroad was washed out. The Santa Ana River cut a new channel and discharged into the ocean about three miles southeast of its former outlet. In San Diego County the flood was described as very severe, and it was in this year that the railroad through Temecula Canyon was destroyed. There was a bad flood on Ventura River. The flood of 1889 is described as comparable in magnitude to that of 1884.

The last general floods of great magnitude in the South Coastal Area occurred in 1938. However, there were other major floods in the area in the interim between that flood and earlier floods mentioned. These occurred in 1909 on Santa Ana River and tributaries, in 1911 on Ventura River, in 1914 and 1916 in many parts of the Area and particularly in 1916 in San Diego County, and in 1934 in La Canada Valley. All main rivers of the Area from the Ventura to the San Diego were affected by storms that brought the floods of 1938. Damages were higher than in any preceding recorded flood.

Maximum recorded instantaneous flood flows at representative stream gaging stations in the South Coastal Area are given in the following tabulation:

	Maximum recorded instantaneous discharge	
Stream and station	*Date*	*Second-feet*
Ventura River near Ventura	March 2, 1938	39,200
Piru Creek near Piru	March 2, 1938	35,600
Sespe Creek near Fillmore	March 2, 1938	56,000
Santa Paula Creek near Santa Paula	March 2, 1938	13,500
Pacoima Creek near San Fernando	March 3, 1938	2,440
Tujunga Creek near Sunland	March 2, 1938	50,000
Arroyo Seco near Pasadena	March 2, 1938	8,620
Eaton Creek near Pasadena	March 2, 1938	2,400
Little Santa Anita Creek near Sierra Madre	March 2, 1938	536
Santa Anita Creek near Sierra Madre	March 2, 1938	5,200
Sawpit Creek near Monrovia	April 7, 1926	2,000
Fish Creek near Duarte	April 4, 1925	2,180
Rogers Creek near Azusa	April 7, 1926	2,600
San Gabriel River near Azusa	March 2, 1938	65,700
Dalton Creek near Glendora	March 2, 1938	850
San Dimas Creek near San Dimas	March 2, 1938	5,000
San Jose Creek near Whittier	January 1, 1934	13,100
San Antonio Creek near Claremont	March 2, 1938	21,400
Lytle Creek near Fontana	March 2, 1938	25,200
Cajon Creek near Keenbrook	March 2, 1938	14,500
Devil Canyon Creek near San Bernardino	March 2, 1938	3,320
Waterman Canyon Creek near Arrowhead Springs	March 2, 1938	2,350
Strawberry Creek near Arrowhead Springs	March 2, 1938	3,360
City Creek near Highland	March 2, 1938	6,900
Plunge Creek near East Highland	March 2, 1938	5,340
Santa Ana River near Mentone	March 2, 1938	52,300
San Timoteo Creek near Redlands	March 2, 1938	7,460
San Jacinto River near San Jacinto	February 16, 1927	45,000
Temecula Creek at Nigger Canyon	February 16, 1927	17,100
Temecula Creek at Railroad Canyon	February 16, 1927	25,000
Santa Margarita River near Fallbrook	February 16, 1927	33,100
Santa Margarita River at Ysidora	February 16, 1927	33,600
San Luis Rey River at Lake Henshaw	January 27, 1916	58,600
San Luis Rey River between Lake Henshaw and Bonsall	March 3, 1938	18,100
Santa Ysabel Creek near Mesa Grande	January 27, 1916	21,000
San Dieguito River at Hodges Dam	January 27, 1916	72,100

FLOOD FREQUENCIES

Flood-frequency studies for the South Coastal Area. shown on Plates 18 to 37, were based on measured flow at gaging stations named, except when necessary to correct for upstream storages or diversions. Streams for which such corrections were necessary, and locations of stream gaging stations and of upstream storages or diversions involved, are indicated in the following tabulation:

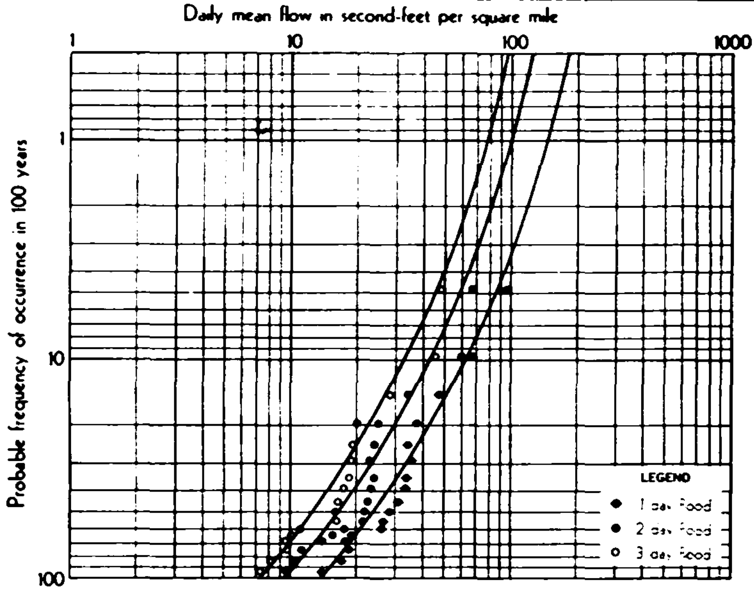
Stream	*Location of gaging station*	*Upstream storage or diversion*
Pacoima Creek	Near San Fernando	Pacoima Reservoir
Tujunga Creek	Near Sunland	Big Tujunga Reservoir
San Antonio Creek	Near Claremont	Southern California Edison Company Conduit
Sawpit Creek	Near Monrovia	Sawpit Reservoir Monrovia Pipe Line
San Gabriel River	Near Azusa	San Gabriel Reservoir No. 1 San Gabriel Reservoir No. 2 Morris Reservoir
Dalton Creek	Near Glendora	Big Dalton Reservoir
San Dimas Creek	Near San Dimas	San Dimas Reservoir
Lytle Creek	Near Fontana	Fontana Pipe Line
Santa Ana River	Near Mentone	Southern California Edison Company Conduit Greenspot Pipe Line
San Luis Rey River	At Lake Henshaw	Lake Henshaw
San Dieguito River	At Hodges Dam	Hodges Reservoir
San Diego River	Near Santee	El Capitan Reservoir San Vicente Reservoir
Cottonwood Creek	At Barrett Dam	Morena Reservoir Barrett Reservoir

There are breaks in the stream flow record of Santa Ana River near Mentone from January 18, 1916, to February 10, 1916, and from February 15, 1927, to April 26, 1927. Floods which occurred during these periods were estimated from flow of San Gabriel River near Azusa.

The flood-frequency study for San Luis Rey River between Lake Henshaw and Bonsall, shown on Plate 34, considered only floods produced by the drainage area between the two stations. Their magnitudes were determined by subtracting flow near Mesa Grande from that at or near Bonsall. Lake Henshaw, on the upper San Luis Rey, has never filled and for this reason correction of measured flow near Bonsall has not been necessary. The study on the San Luis Rey included floods at both stations "at Bonsall," and "near Bonsall." Before these floods were combined the discharge at each station was reduced to second-feet per square mile.

Floods in San Diego River near Santee during January, 1916, were estimated from flow in that stream at San Diego.

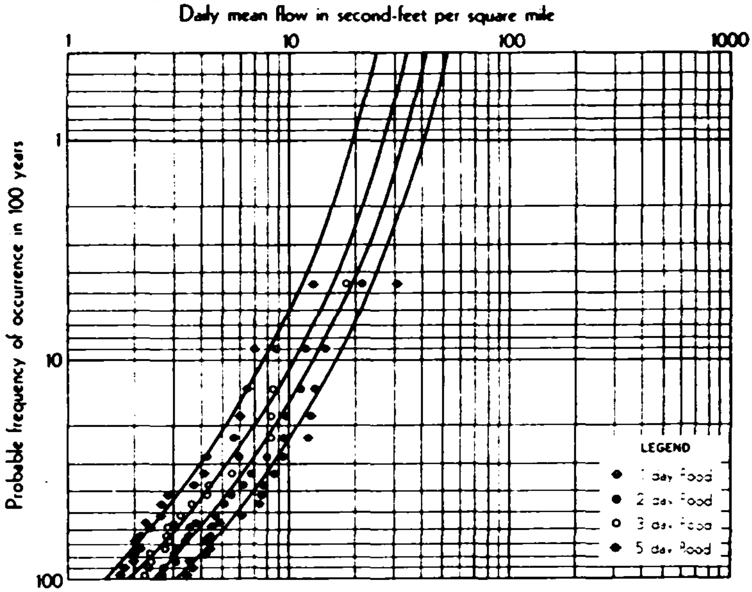
PLATE 18



VENTURA RIVER FLOOD DISCHARGE

NEAR VENTURA

AREA OF DRAINAGE BASIN 187 SQUARE MILES

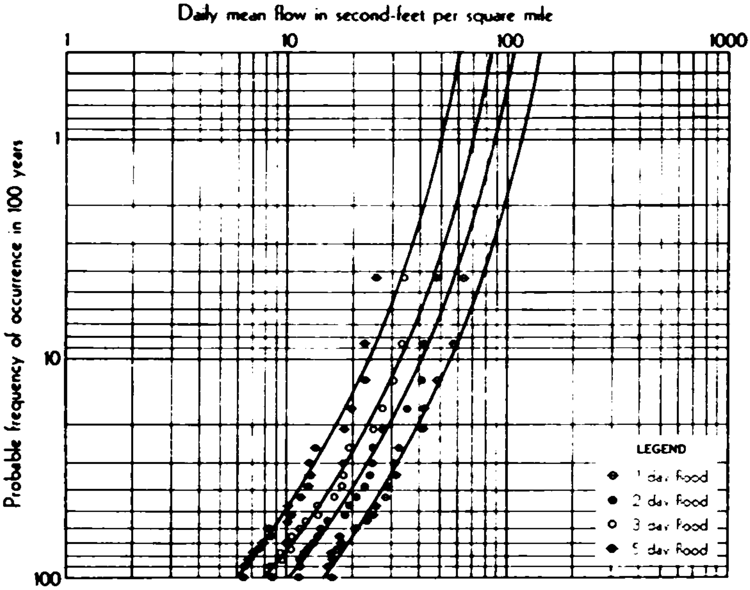


PIRU CREEK FLOOD DISCHARGE

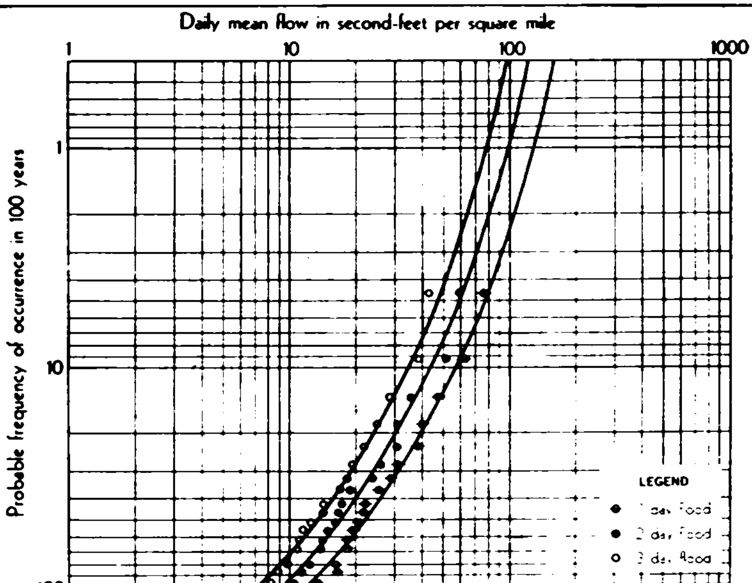
NEAR PIRU

AREA OF DRAINAGE BASIN 432 SQUARE MILES

PLATE 19

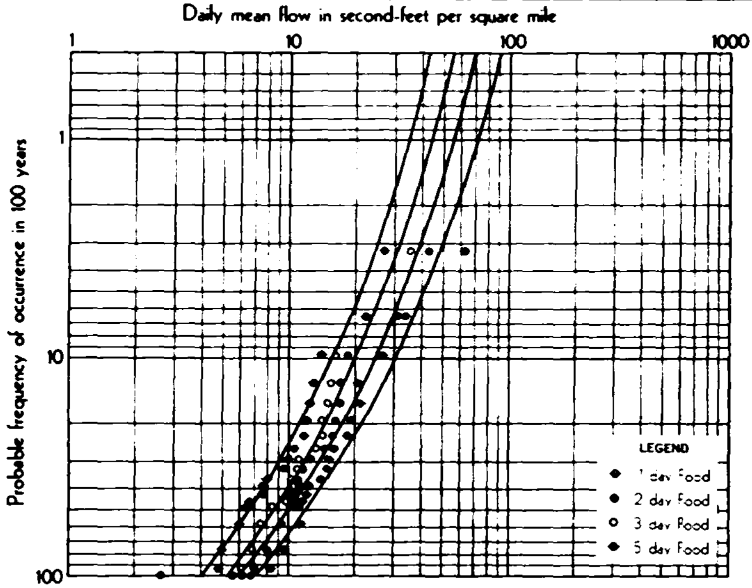


SESPE CREEK FLOOD DISCHARGE
NEAR FILLMORE
AREA OF DRAINAGE BASIN 254 SQUARE MILES

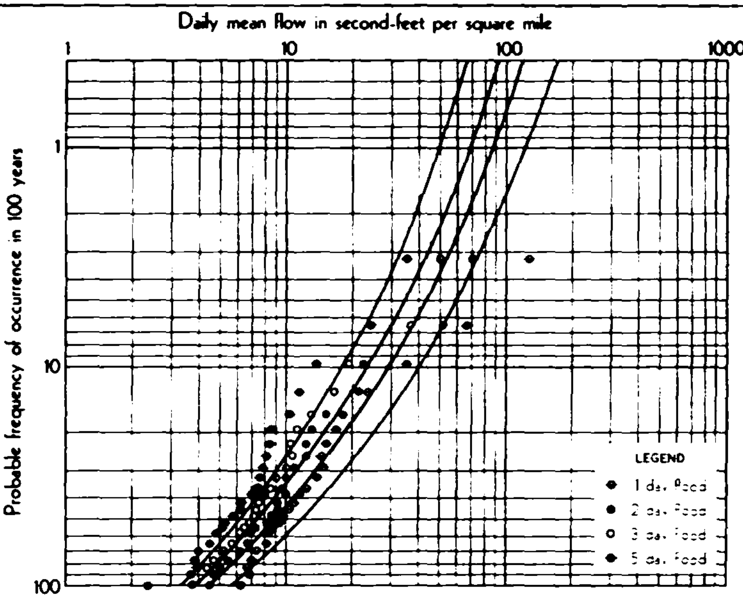


SANTA PAULA CREEK FLOOD DISCHARGE
NEAR SANTA PAULA

PLATE 20

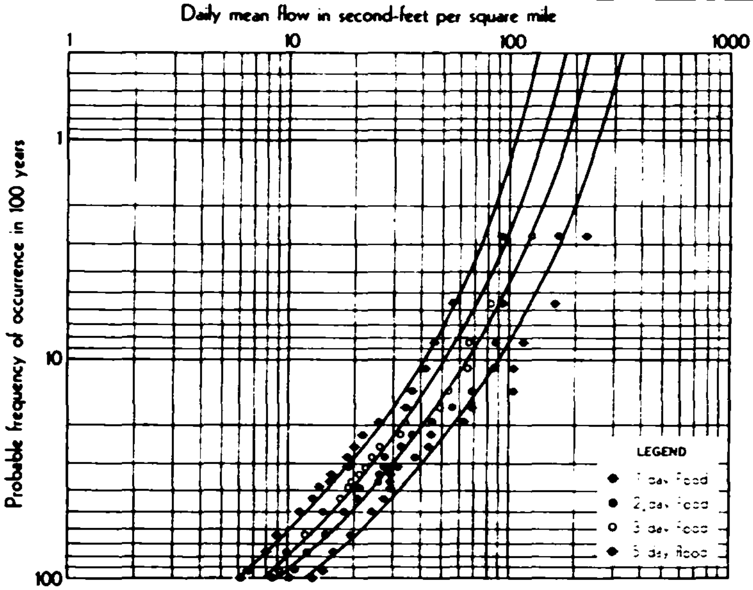


PACOIMA CREEK FLOOD DISCHARGE
NEAR SAN FERNANDO
AREA OF DRAINAGE BASIN 28 SQUARE MILES



TUJUNGA CREEK FLOOD DISCHARGE
NEAR SUNLAND
AREA OF DRAINAGE BASIN 106 SQUARE MILES

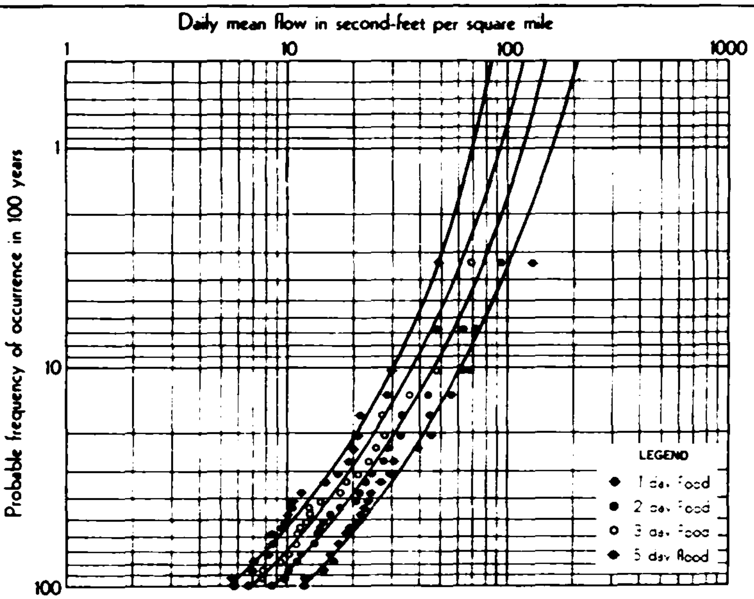
PLATE 21



ARROYO SECO FLOOD DISCHARGE

NEAR PASADENA

AREA OF DRAINAGE BASIN 16 SQUARE MILES

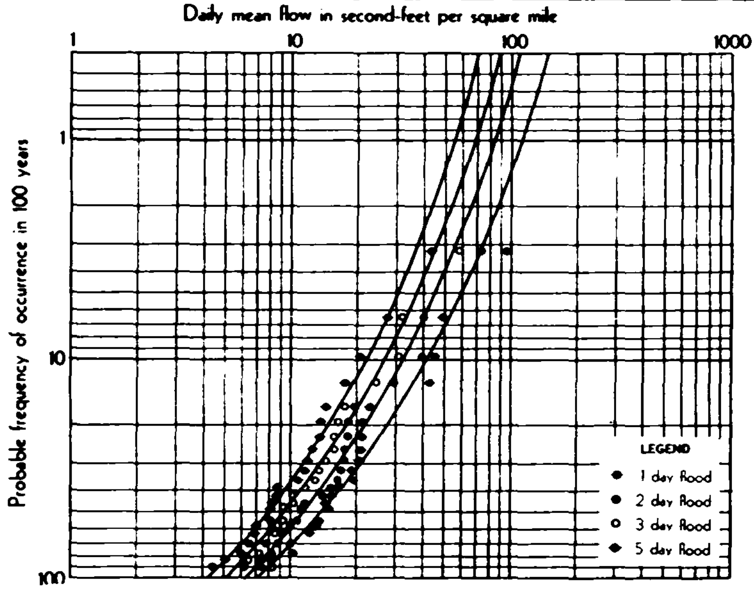


EATON CREEK FLOOD DISCHARGE

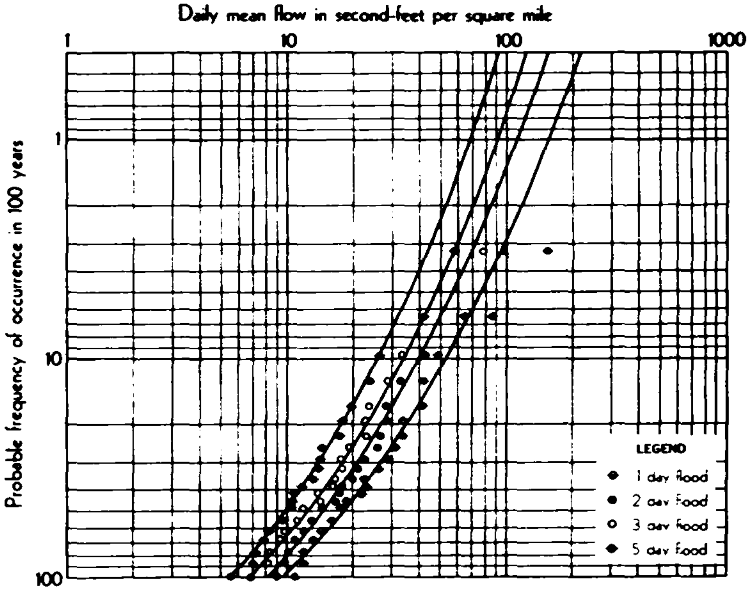
NEAR PASADENA

AREA OF DRAINAGE BASIN 6 5 SQUARE MILES

PLATE 22

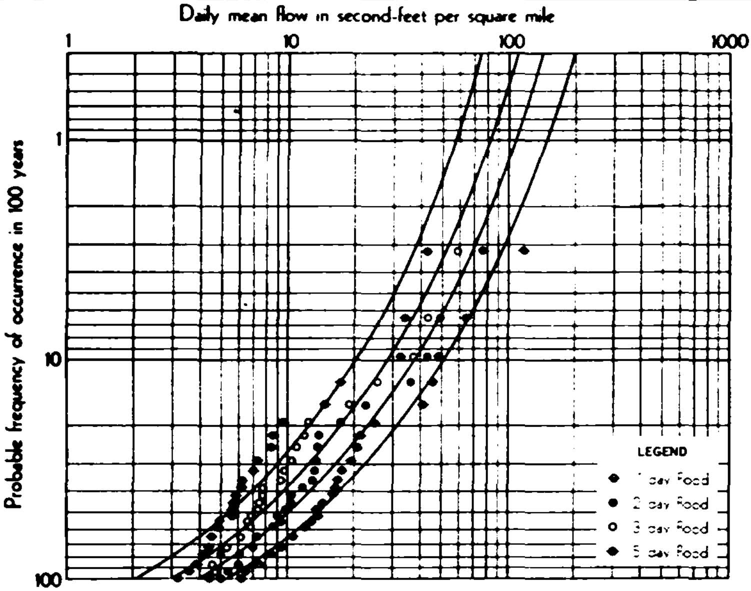


LITTLE SANTA ANITA CREEK FLOOD DISCHARGE
NEAR SIERRA MADRE
AREA OF DRAINAGE BASIN 9 SQUARE MILES



SANTA ANITA CREEK FLOOD DISCHARGE
NEAR SIERRA MADRE
AREA OF DRAINAGE BASIN 11 SQUARE MILES

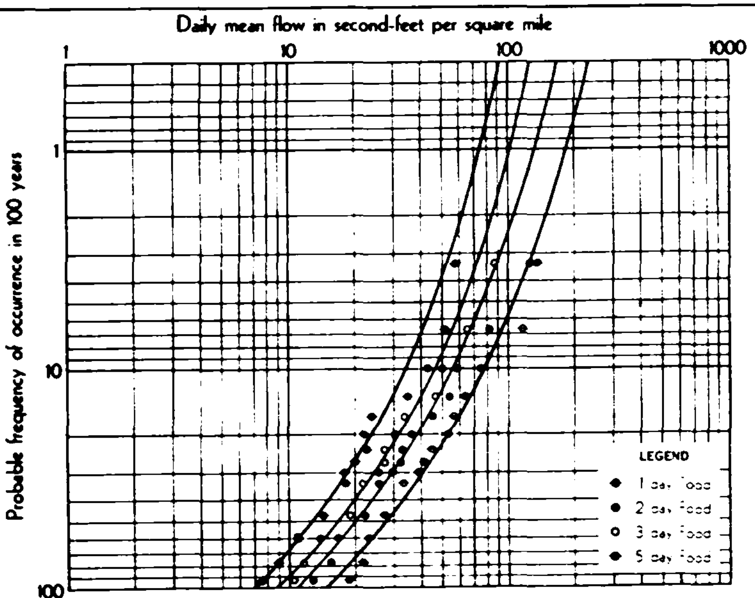
PLATE 23



SAWPIT CREEK FLOOD DISCHARGE

NEAR MONROVIA

AREA OF DRAINAGE BASIN 5.3 SQUARE MILES

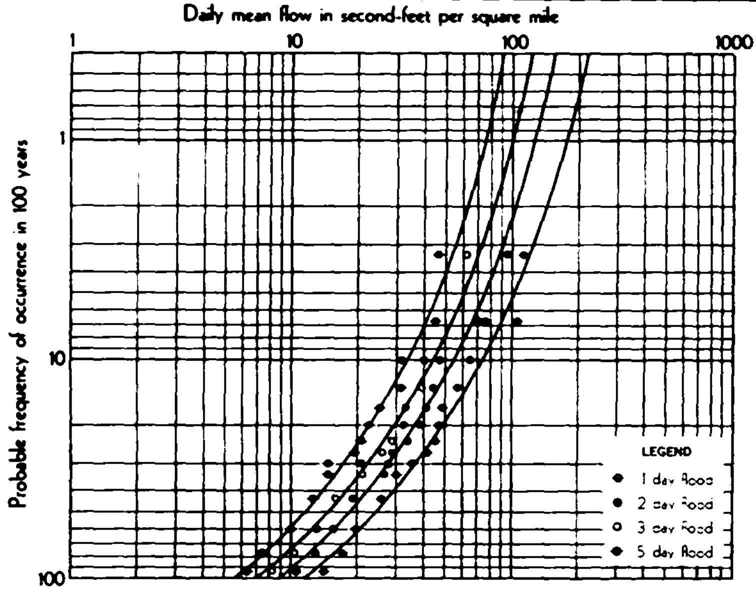


FISH CREEK FLOOD DISCHARGE

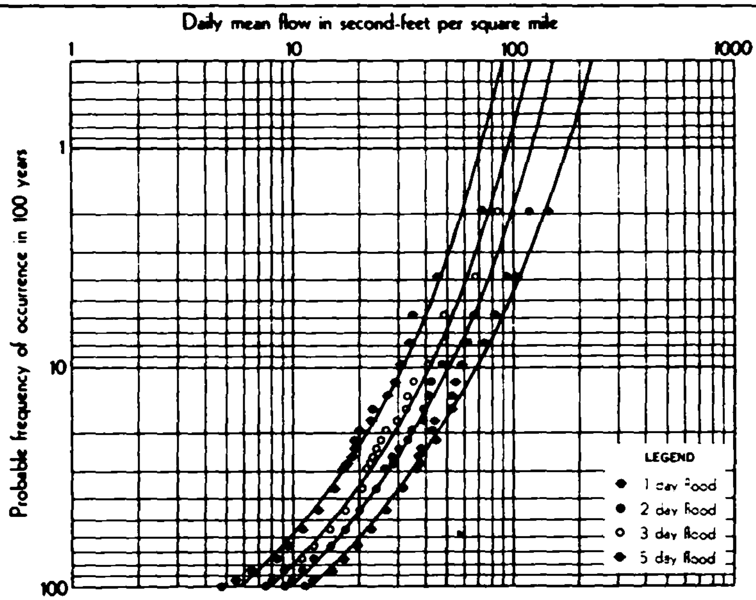
NEAR DUARTE

AREA OF DRAINAGE BASIN 6.5 SQUARE MILES

PLATE 24

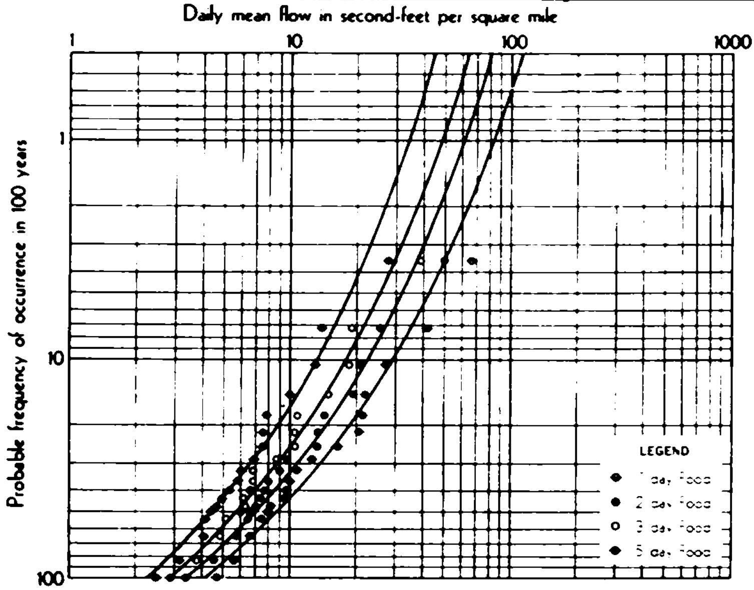


ROGERS CREEK FLOOD DISCHARGE
NEAR AZUSA
AREA OF DRAINAGE BASIN 6.4 SQUARE MILES

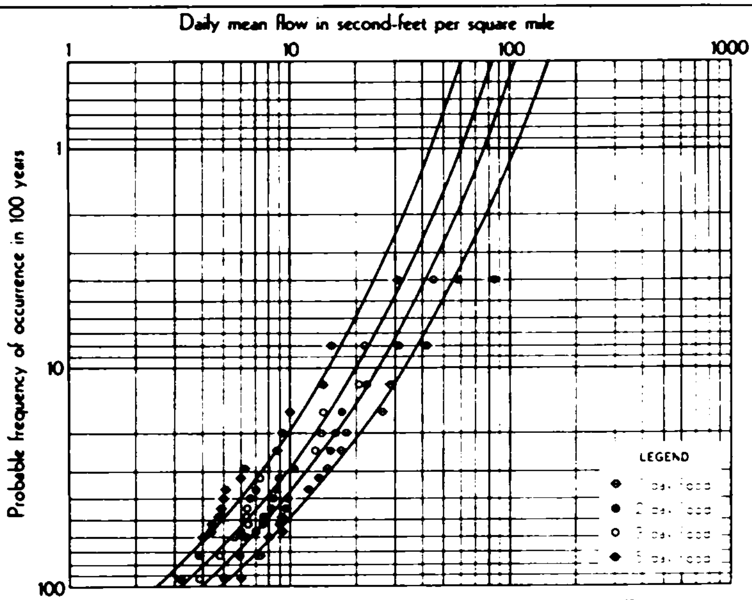


SAN GABRIEL RIVER FLOOD DISCHARGE
NEAR AZUSA
AREA OF DRAINAGE BASIN 211 SQUARE MILES

PLATE 25

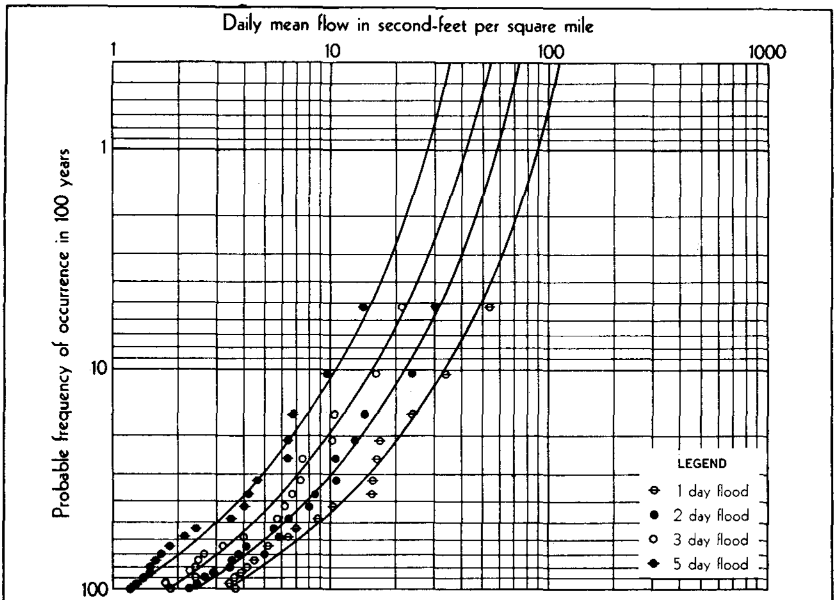


DALTON CREEK FLOOD DISCHARGE
NEAR GLENDORA
AREA OF DRAINAGE BASIN 7.5 SQUARE MILES



SAN DIMAS CREEK FLOOD DISCHARGE
NEAR SAN DIMAS
AREA OF DRAINAGE BASIN [illegible] SQUARE MILES

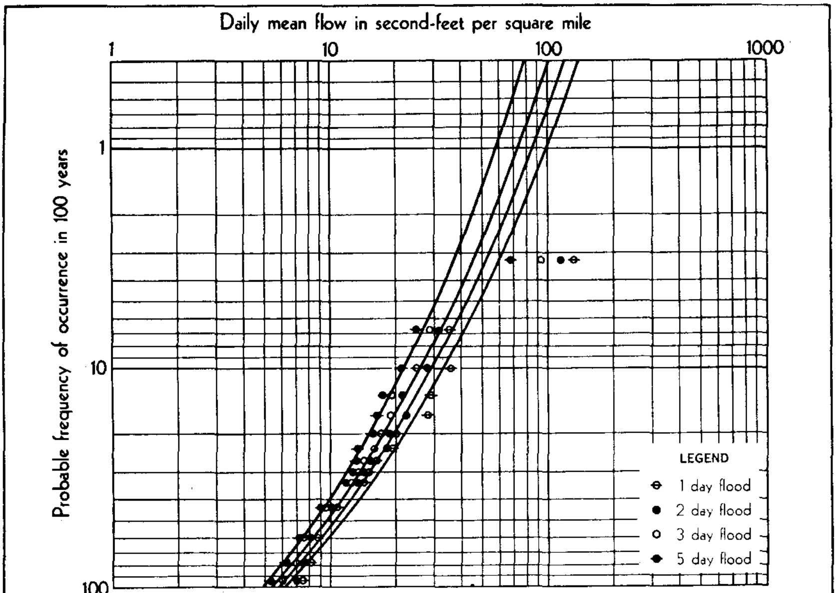
PLATE 26



SAN JOSE CREEK FLOOD DISCHARGE

NEAR WHITTIER

AREA OF DRAINAGE BASIN 85 SQUARE MILES

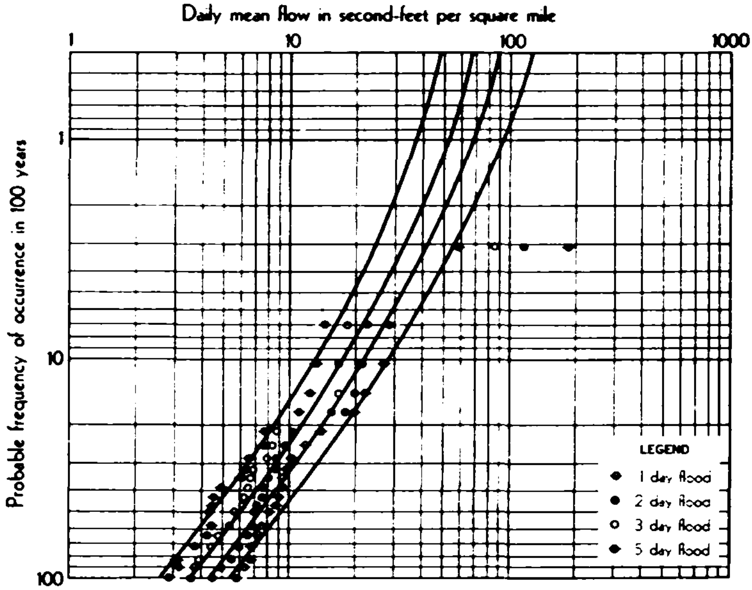


SAN ANTONIO CREEK FLOOD DISCHARGE

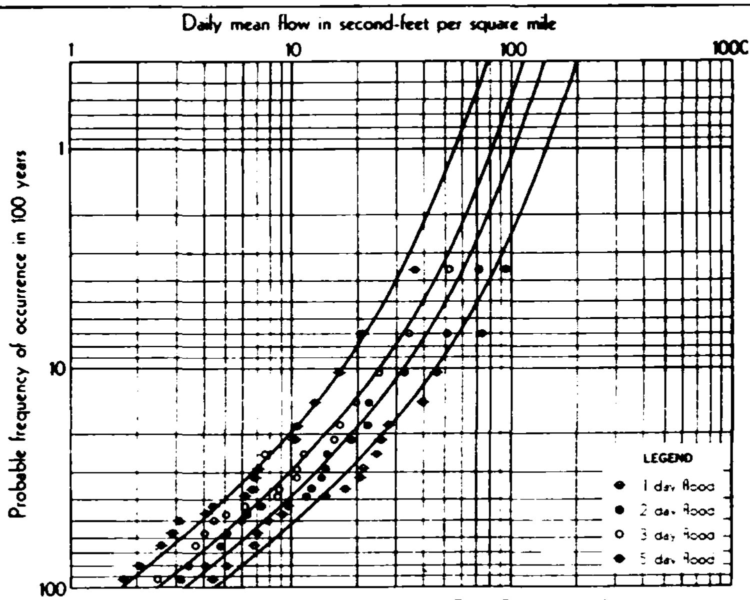
NEAR CLAREMONT

AREA OF DRAINAGE BASIN 17 SQUARE MILES

PLATE 27

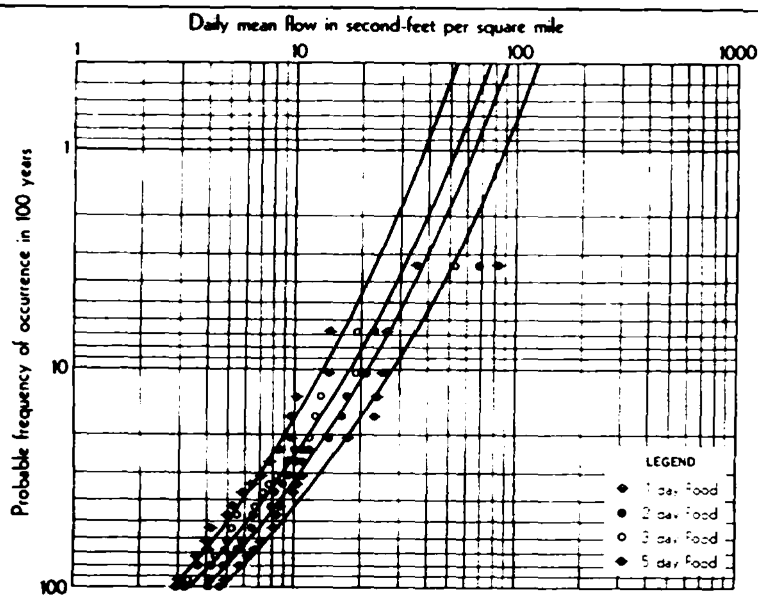


LYTLE CREEK FLOOD DISCHARGE
NEAR FONTANA
AREA OF DRAINAGE BASIN 48 SQUARE MILES

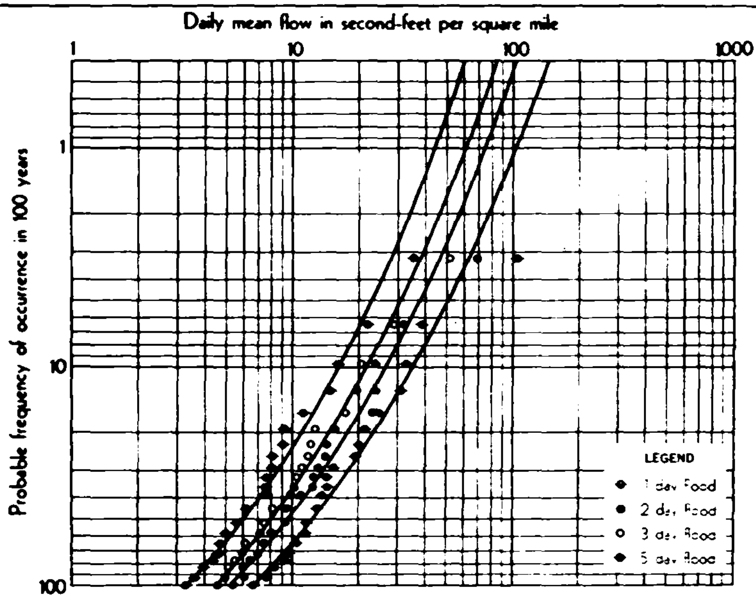


CAJON CREEK FLOOD DISCHARGE
NEAR KEENBROOK
AREA OF DRAINAGE BASIN 41 SQUARE MILES

PLATE 28

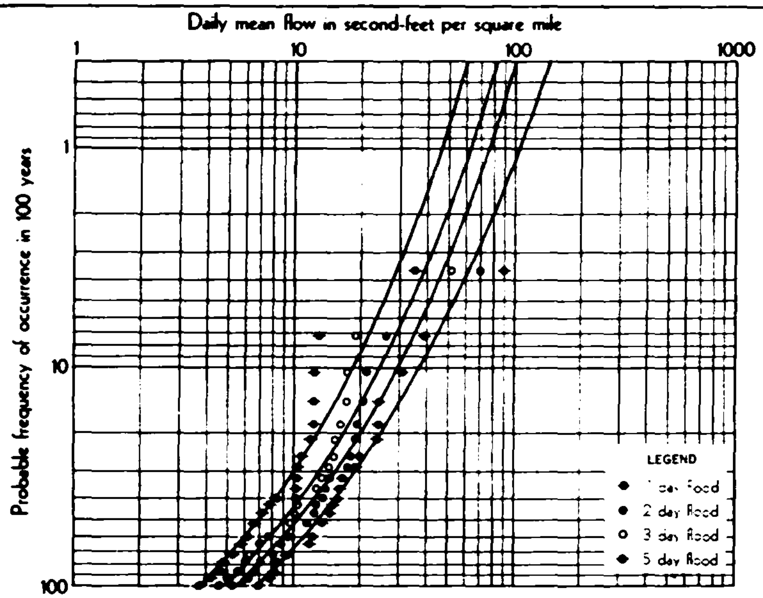


DEVIL CANYON CREEK FLOOD DISCHARGE
NEAR SAN BERNARDINO
AREA OF DRAINAGE BASIN 6.2 SQUARE MILES

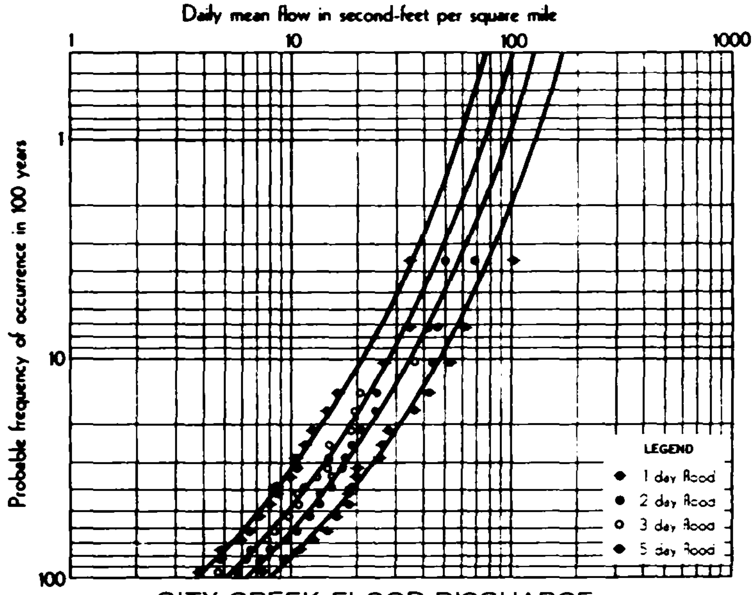


WATERMAN CREEK FLOOD DISCHARGE
NEAR ARROWHEAD SPRINGS
AREA OF DRAINAGE BASIN 4.6 SQUARE MILES

PLATE 29

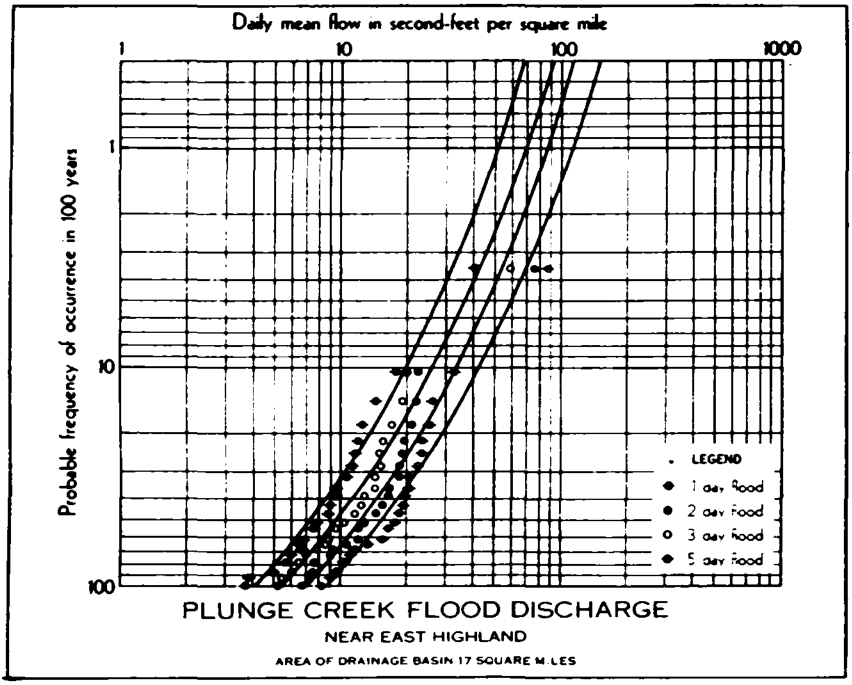


STRAWBERRY CREEK FLOOD DISCHARGE
NEAR ARROWHEAD SPRINGS
AREA OF DRAINAGE BASIN 8 6 SQUARE MILES

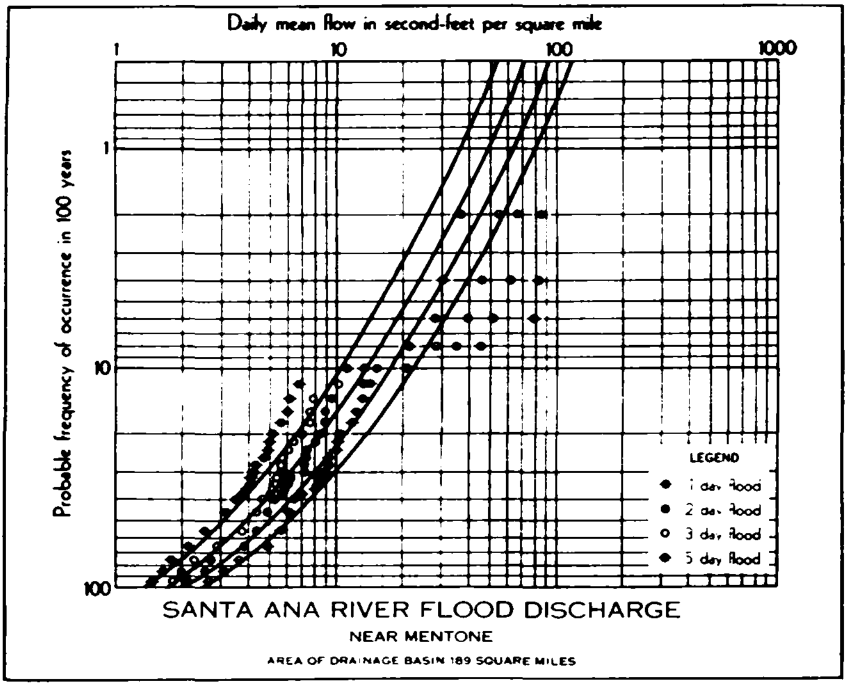


CITY CREEK FLOOD DISCHARGE
NEAR HIGHLAND
AREA OF DRAINAGE BASIN 20 SQUARE MILES

PLATE 30

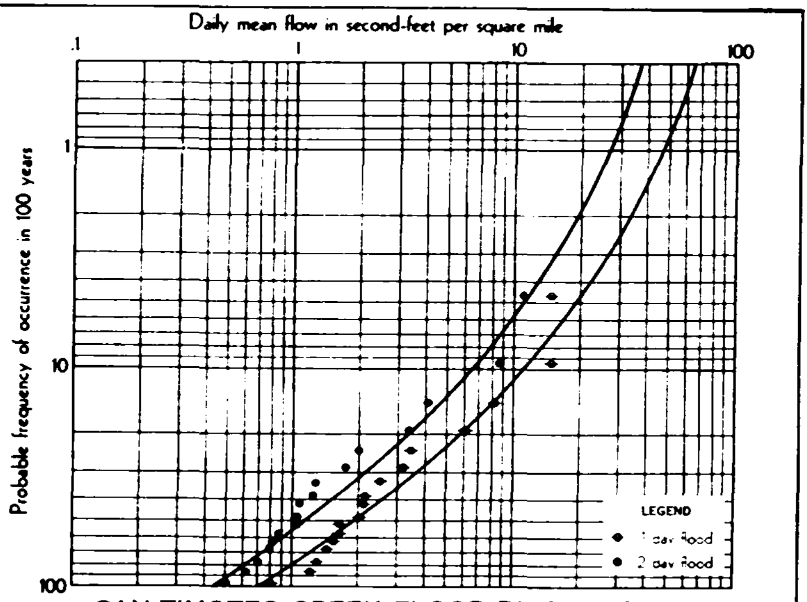


Daily mean flow in second-feet per square mile
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
1 day flood
2 day flood
3 day flood
5 day flood
PLUNGE CREEK FLOOD DISCHARGE
NEAR EAST HIGHLAND
AREA OF DRAINAGE BASIN 17 SQUARE MILES



Daily mean flow in second-feet per square mile
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
1 day flood
2 day flood
3 day flood
5 day flood
SANTA ANA RIVER FLOOD DISCHARGE
NEAR MENTONE
AREA OF DRAINAGE BASIN 189 SQUARE MILES

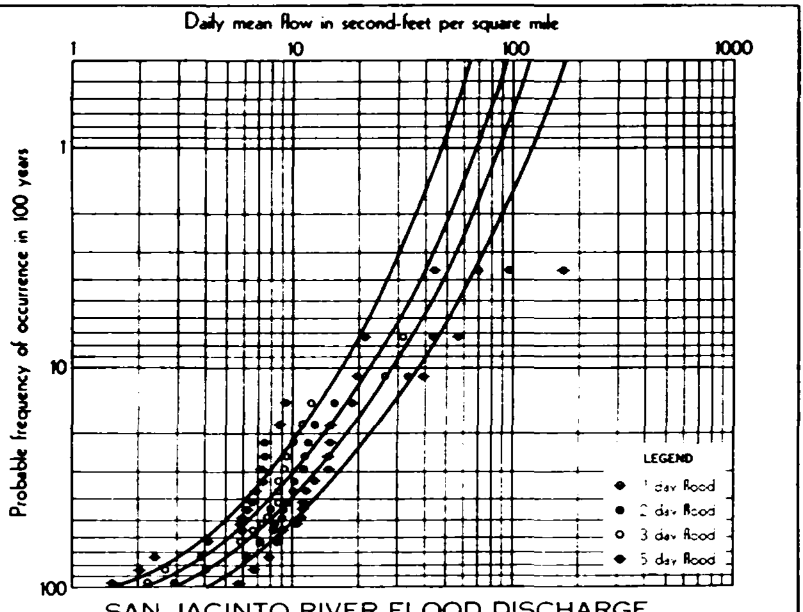
PLATE 31



SAN TIMOTEO CREEK FLOOD DISCHARGE

NEAR REDLANDS

AREA OF DRAINAGE BASIN 123 SQUARE MILES

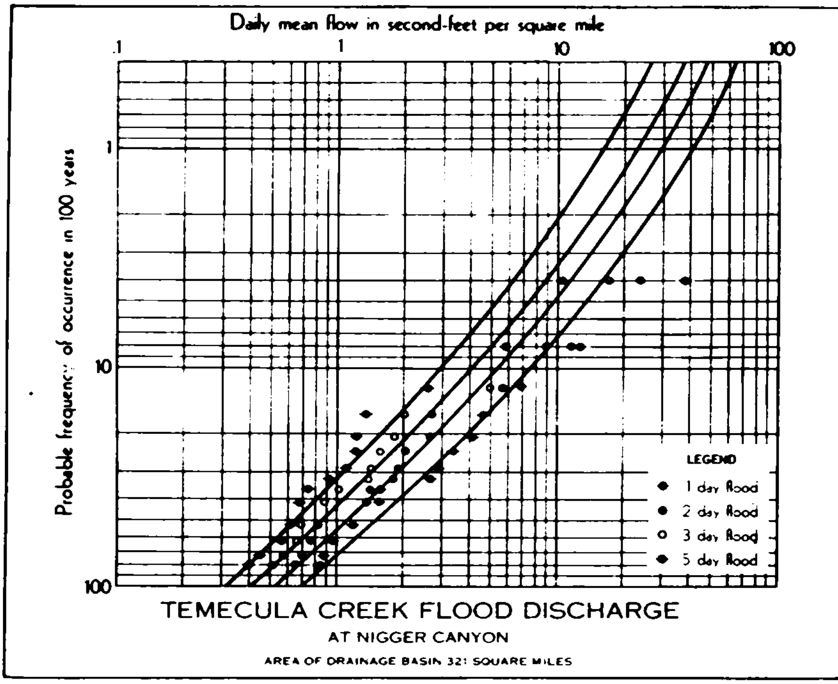


SAN JACINTO RIVER FLOOD DISCHARGE

NEAR SAN JACINTO

AREA OF DRAINAGE BASIN 142 SQUARE MILES

PLATE 32


Daily mean flow in second-feet per square mile
.1
1
10
100
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
1 day flood
2 day flood
3 day flood
5 day flood
TEMECULA CREEK FLOOD DISCHARGE
AT NIGGER CANYON
AREA OF DRAINAGE BASIN 321 SQUARE MILES

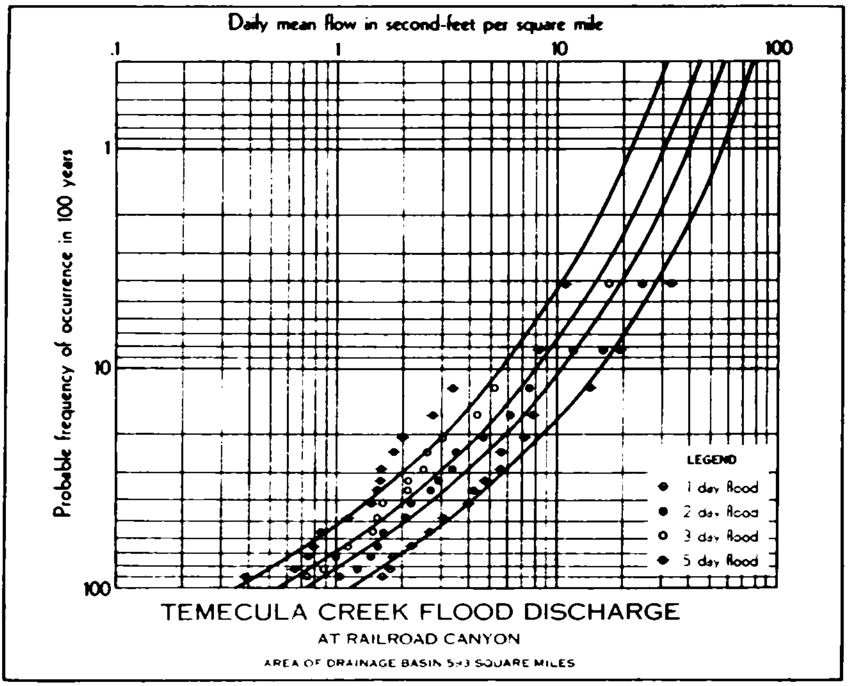
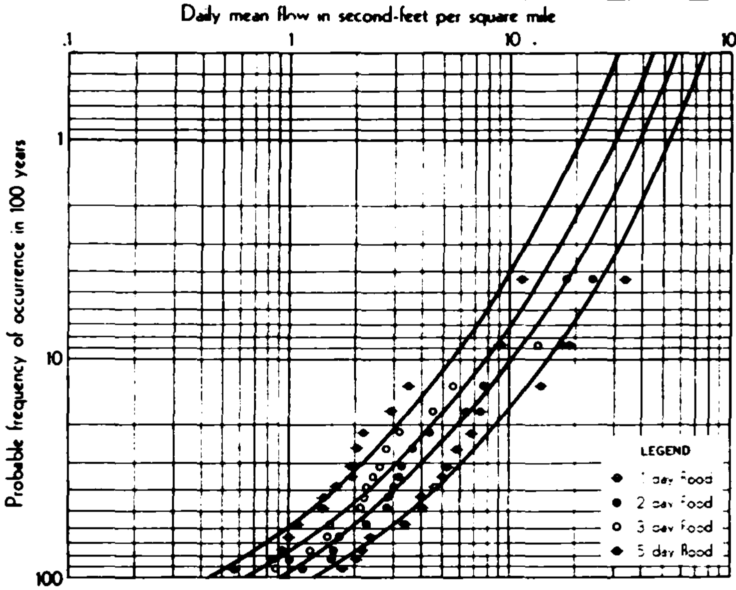

Daily mean flow in second-feet per square mile
.1
1
10
100
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
1 day flood
2 day flood
3 day flood
5 day flood
TEMECULA CREEK FLOOD DISCHARGE
AT RAILROAD CANYON
AREA OF DRAINAGE BASIN 593 SQUARE MILES

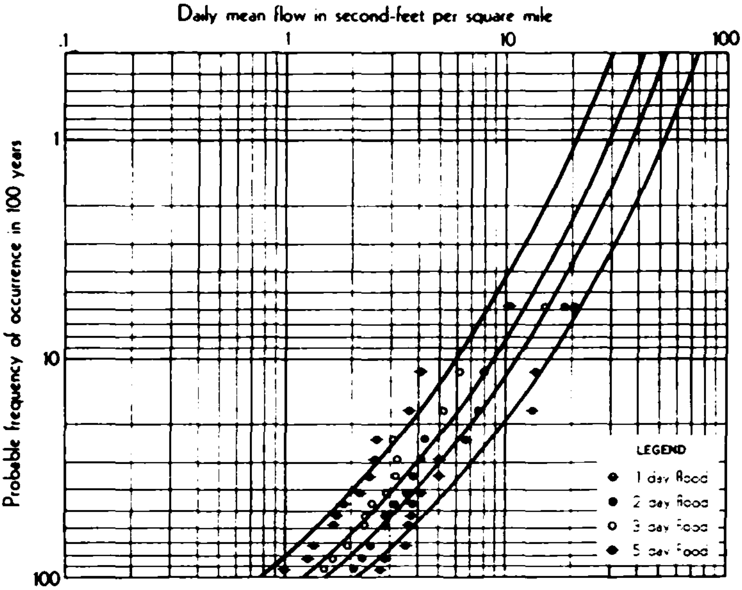
PLATE 33



SANTA MARGARITA RIVER FLOOD DISCHARGE

NEAR FALLBROOK

AREA OF DRAINAGE BASIN 643 SQUARE MILES

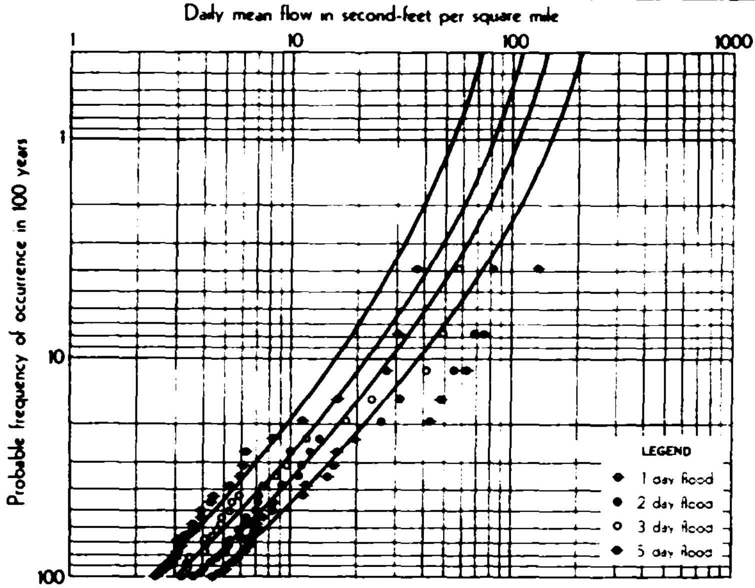


SANTA MARGARITA RIVER FLOOD DISCHARGE

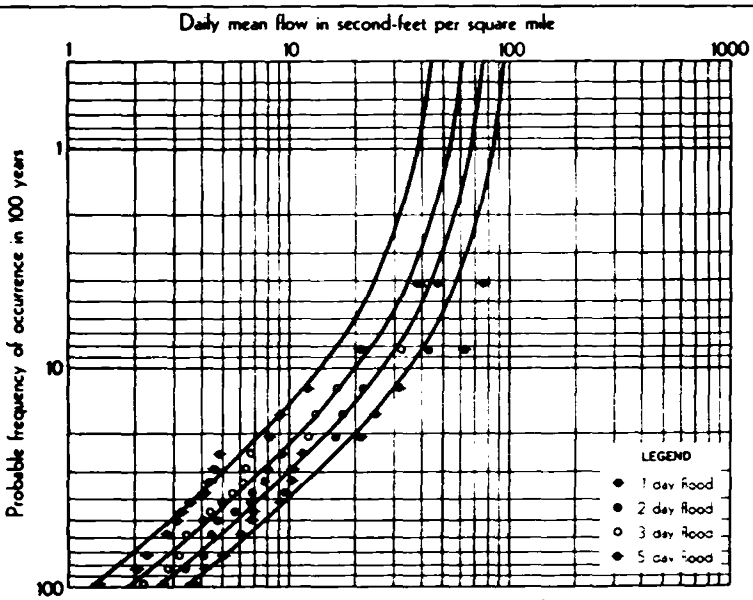
AT YSIDORA

AREA OF DRAINAGE BASIN 741 SQUARE MILES

PLATE 34

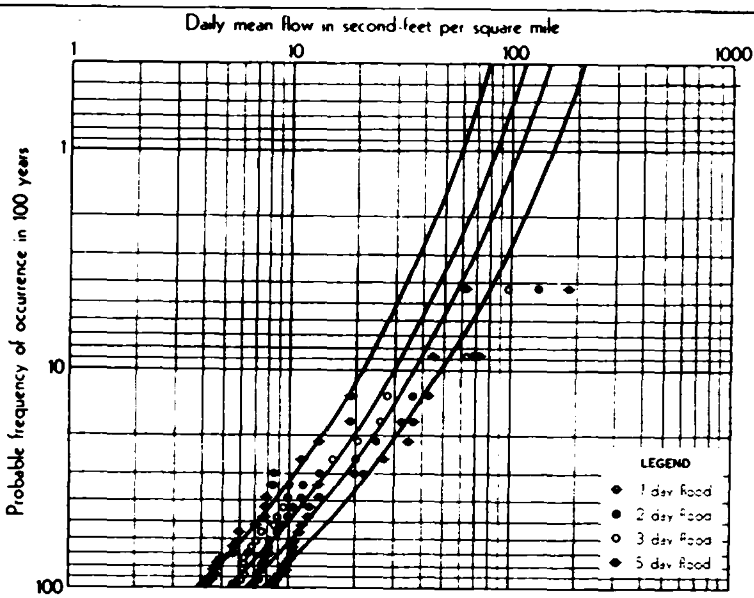


SAN LUIS REY RIVER FLOOD DISCHARGE
AT LAKE HENSHAW
AREA OF DRAINAGE BASIN 206 SQUARE MILES

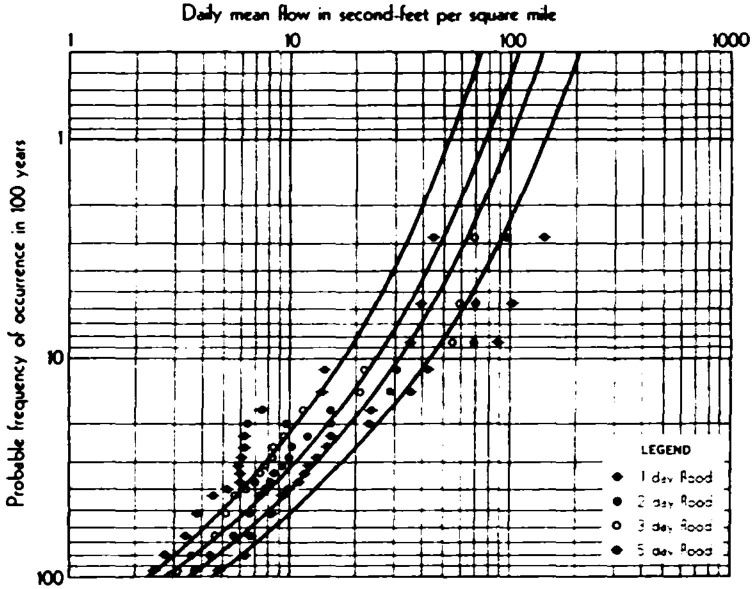


SAN LUIS REY RIVER FLOOD DISCHARGE
BETWEEN LAKE HENSHAW AND BONSALL
AREA OF DRAINAGE BASIN 312 SQUARE MILES

PLATE 35

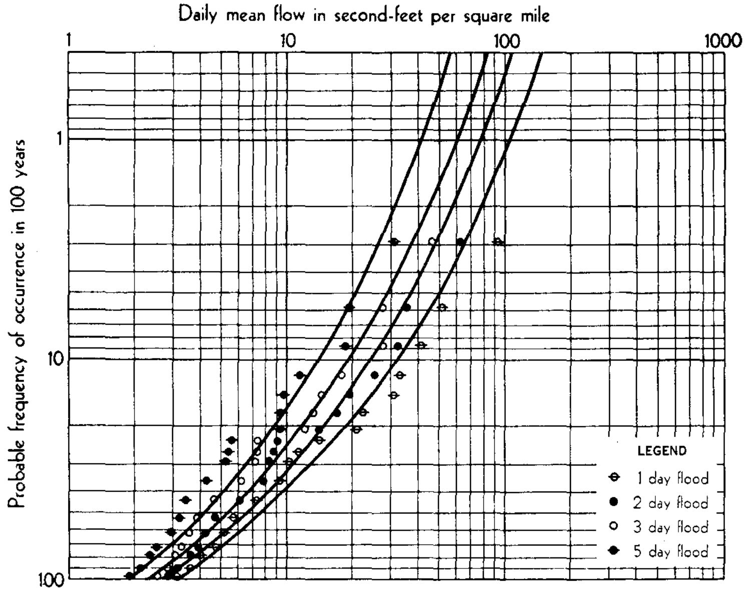


SANTA YSABEL CREEK FLOOD DISCHARGE
NEAR MESA GRANDE
AREA OF DRAINAGE BASIN 54 SQUARE MILES



SAN DIEGUITO RIVER FLOOD DISCHARGE
AT HODGES DAM
AREA OF DRAINAGE BASIN 303 SQUARE MILES

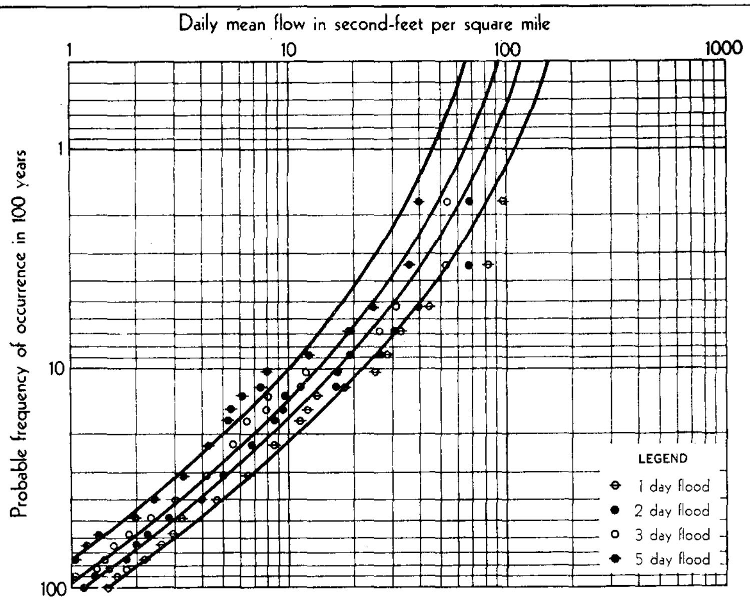
PLATE 36



SAN DIEGO RIVER FLOOD DISCHARGE

IN MISSION GORGE NEAR SANTEE

AREA OF DRAINAGE BASIN 376 SQUARE MILES

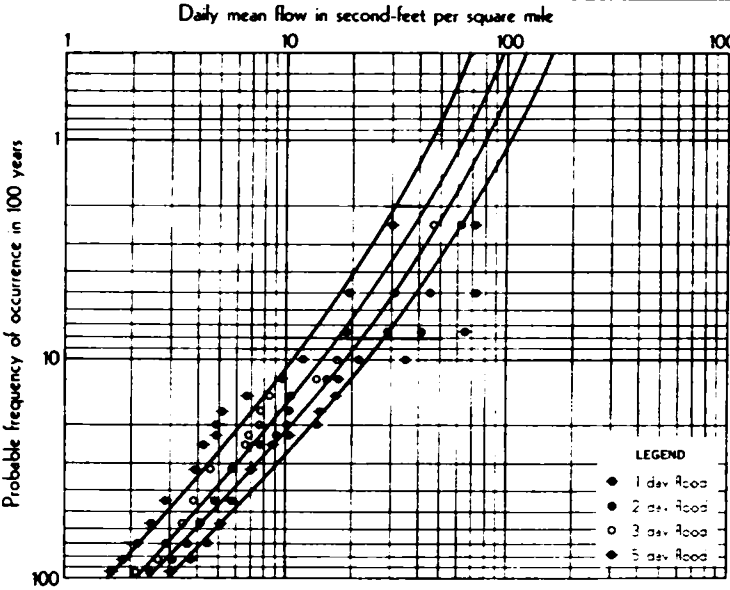


SWEETWATER RIVER FLOOD DISCHARGE

AT SWEETWATER DAM

AREA OF DRAINAGE BASIN 181 SQUARE MILES

PLATE 37



COTTONWOOD CREEK FLOOD DISCHARGE
AT BARRETT DAM
AREA OF DRAINAGE BASIN 250 SQUARE MILES

QUALITY OF WATER

Natural surface and ground waters in the South Coastal Area are generally of low salinity and of good to excellent quality for irrigation. However, total salinity and boron in concentrations potentially harmful to sensitive crop plants occur in several places in Ventura County and San Jacinto Valley.

Surface Waters

Waters of Piru and Sespe Creeks, tributary to Santa Clara River, have boron content generally too high for safe use on all but the more tolerant crops. Waters of Piru Creek are high also in sulphates, and those in Sespe Creek are relatively high in chlorides, although within limits of tolerance for irrigation. Certain hot springs and other tributaries of Santa Clara and Ventura Rivers produce water of poor quality for irrigation, since they carry abnormal concentrations of boron and have high salinity. On the other hand, water of low salinity and suitable for a wide variety of beneficial uses comes from the upper, granitic-rock watersheds of Los Angeles, San Gabriel, and Santa Ana Rivers. All major stream systems in the Area, except Santa Clara and Ventura Rivers, have carbonate type waters. Relatively small amounts of water draining from minor basins in hills within the central portions of the Los Angeles, San Gabriel and Santa Ana River Basins have moderate salinity, largely sulphates or chlorides. Analyses of representative surface waters of the South Coastal Area are listed in Table 51.

Ground Waters

Quality characteristics of surface waters of the South Coastal Area are reflected in ground water basins which these surface waters supply. Ground waters adjacent to the granitic mountains of the Area are remarkably low in mineral solubles, whereas those near the central inter-basin hills have significantly higher concentrations. Table 52 presents analyses of representative ground waters in the Area.

Ground waters in the Santa Clara and Ventura River Basins are similar to surface waters in those basins. In Ventura River Basin, boron content and salinity are low in Ojai Valley, higher in Ventura Valley above Foster Park, and generally excessive in lower Ventura Valley. In Santa Clara River Basin, ground waters of the Oxnard Plain and of Montalvo and Santa Paula Basins are of intermediate salinity, and boron ranges around 0.5 part per million. Ground waters in Fillmore and Piru Basins have somewhat higher salinity and boron content than those on the Oxnard Plain. This is contrary to the usual progressive increase of salinity in a downstream direction.

Total salinity of ground waters in San Jacinto Valley varies materially, and is generally higher than in most other ground water basins in the South Coastal Area.

In the central coastal plain, between the high mountains and the ocean, there are numerous hills from which runoff has a somewhat higher salinity than runoff from the higher granitic-rock mountains. Since the amount of this runoff is small, it has only a local influence on ground waters. This local influence is found along the low divide between the Riverside and Temescal ground water basins, below the Puente Hills and along the foot of the Santa Ana Mountains, on both sides of the Santa Monica Mountains, and in the vicinity of Baldwin, Montebello, and Coyote Hills. Total solubles, boron, and percent sodium are low in uncontaminated waters in pressure areas (zones of confined ground water) on the coastal plains of Los Angeles and Orange Counties. However, these high quality waters are subject to contamination from adjacent sea water, from overlying perched water of poor quality, and from wastes from oil fields and industries.

Ground water basins in San Diego County are relatively small. They are narrow and shallow in the uplands, and near the ocean the usable underground storage is limited by threat of sea water intrusion. The last ten analyses in Table 51 are indicative of the quality of uncontaminated ground waters in basins in San Diego County north of Tia Juana River. Low flow of the Tia Juana includes return water from irrigation in Mexico below Rodriguez Reservoir, and seepage from that reservoir. Quality of ground water in Tia Juana Valley in California varies widely from place to place, due in part to salts leached from the soil through heavy applications of water in Mexico and retained in various amounts in California.

TABLE 51

INORGANIC ANALYSES OF SURFACE WATERS, SOUTH COASTAL ARI

Source and place of sampling	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reactin		ralues of constituents in mo/l and aracter formula in percent				
					Ca	M	Na	CO_3+HCO_3	Cl	SO_4	NO_3
VENTURA COUNTY											
Upper Reaches											
Matilija Creek above Matilija Springs	2/17/31	110	1.38	24	6.15	2.	2.96	4.10	1.49	6.50	......
					26%	*12*	*12%*	*17%*	*6%*	*27%*	......
Ventura River at Seper's Ranch	2/17/31	108	1.22	26	5.85	2.	3.00	3.90	1.43	6.43	......
					25%	*12*	*13%*	*17%*	*6%*	*27%*	......
Santa Clara River at Newhall Ranch Bridge	2/19/29	107	0.48	22	5.00	4.	2.52	4.04	1.15	6.50	......
					21%	*18*	*11%*	*17%*	*5%*	*28%*	......
Santa Clara River at Bardsdale Bridge	2/ 5/29	118	1.31	16	6.65	4.	2.09	4.00	0.99	8.67	......
					24%	*18*	*8%*	*15%*	*3%*	*32%*	......
San Francisquito Creek above Clearwater Creek	4/18/29	69.8	0.16	0	3.25	4.	......	5.02	0.73	1.66	......
					22%	*28*	*0*	*34%*	*5%*	*11%*	......
Piru Creek above Piru Irrigation Co. diversion	3/ 4/31	139	1.57	30	6.60	4.	4.92	4.59	1.30	9.98	......
					21%	*14*	*15%*	*14%*	*4%*	*32%*	......
Sespe Creek at Highway Bridge	4/ 3/30	83.1	0.79	36	4.40	1.	3.05	3.00	0.79	4.99	......
					25%	*7*	*18%*	*17%*	*4%*	*29%*	......
Santa Paula Creek at Telegraph Road	2/ 4/31	96.3	0.22	38	4.35	2.	3.96	1.56	0.45	8.63	......
					20%	*11*	*19%*	*7%*	*2%*	*41%*	......

TABLE 51—Continued

INORGANIC ANALYSES OF SURFACE WATERS, SOUTH COASTAL REA

Source and place of sampling	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Re ing values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
VENTURA COUNTY—Continued											
Lower Reaches											
Ventura River near Foster Park	5/ 7/31	111	0.47	26	6.75 *26%*	.95 *1%*	3.47 *13%*	5.04 *19%*	1.60 *6%*	6.54 *25%*	---- ----
Santa Clara River at Turner Ditch diversion	4/ 7/31	170	0.77	27	8.70 *22%*	.57 *4%*	5.39 *14%*	4.95 *12%*	1.74 *5%*	13.00 *33%*	---- ----
LOS ANGELES, ORANGE, RIVERSIDE, and SAN BERNARDINO COUNTIES											
Upper Reaches											
Pacoima Creek, 2,000 ft. below Pacoima Dam	2/15/32	33.3	0.06	16	2.00 *27%*	.07 *5%*	0.61 *8%*	2.39 *35%*	0.11 *2%*	0.89 *13%*	0.03 ----
Los Angeles River S. of Van Nuys	12/14/31	15.9	0.17	34	0.65 *19%*	.49 *4%*	0.61 *17%*	0.95 *28%*	0.19 *6%*	0.43 *13%*	0.11 *3%*
Big Tujunga Creek NE. of Sunland	12/14/31	53.7	0.51	28	2.80 *23%*	.56 *3%*	1.65 *14%*	4.25 *35%*	0.37 *3%*	1.35 *11%*	0.10 *1%*
Arroyo Seco, NW. of Pasadena	12/14/31	44.8	0.28	18	2.55 *26%*	.48 *5%*	0.87 *9%*	3.76 *39%*	0.31 *3%*	0.81 *8%*	---- ----
Fish Creek, NE. of Duarte	3/15/32	35.4	0.02	14	2.40 *28%*	.31 *5%*	0.56 *7%*	3.44 *43%*	0.16 *2%*	0.35 *5%*	---- ----

Big Dalton Creek, NE. of Glendora	2/15/32	40.3	0.04	18	2.65 *26%*	1 *1*	5 ›	0.86 *9%*	3.34 *38%*	0.36 *4%*	0.71 *8%*	Trace -----
San Dimas Creek, NE. of San Dimas	4/15/32	53.7	0.14	18	2.90 *23%*	2 *1*	l ›	1.08 *9%*	4.75 *40%*	0.36 *3%*	0.84 *7%*	----- -----
San Antonio Creek, 4 mi. above mouth	11/15/46	25.5	0.00	2	2.27 *38%*	0 *1*	5 ›	0.03 *1%*	2.60 *46%*	----- *0*	0.28 *4%*	Trace -----
Cucamonga Creek, 6 mi. N. of Upland	3/17/32	26.6	0.06	12	1.95 *31%*	0 *1*	2 ›	0.38 *6%*	2.56 *44%*	0.07 *1%*	0.28 *5%*	----- -----
Santa Ana River near Mentone	1/20/47	19.6	0.00	28	1.22 *26%*	0 *1*	5 ›	0.65 *14%*	1.88 *42%*	0.10 *3%*	0.23 *5%*	Trace -----
San Jacinto River near San Jacinto	June 1930	-		24	1.10 *30%*	0	3 ›	0.43 *12%*	1.57 *33%*	0.19 *4%*	0.62 *13%*	----- -----
Lower Reaches												
Los Angeles River, under Aliso Street Bridge	1/20/33	51.9	0.13	28	2.85 *25%*	1 *1*	3 ›	1.61 *14%*	2.14 *21%*	0.96 *9%*	2.00 *19%*	0.11 *1%*
Los Angeles River at Atlantic Blvd.	4/11/32	102	0.42	50	3.75 *17%*	1	) ›	5.39 *25%*	5.44 *25%*	2.95 *13%*	2.64 *12%*	----- -----
Coyote Creek at Orangethorpe Ave. Bridge	3/ 2/ 32	294	2.43	72	3.95 *7%*	4	) ›	21.17 *36%*	5.85 *10%*	20.95 *36%*	1.70 *3%*	0.38 *1%*
San Gabriel River at Ocean Ave. Bridge	3/ 2/32	300	1.80	72	4.05 *7%*	4	3 ›	21.60 *36%*	5.81 *10%*	16.50 *29%*	6.00 *11%*	----- -----
Santa Ana River at Yorba Blvd. Bridge	1/20/47	74.8	0.00	32	4.30 *24%*	1 *1*	3 ›	2.70 *16%*	4.67 *28%*	1.67 *10%*	1.98 *11%*	0.11 *1%*
SAN DIEGO COUNTY												
Barrett Reservoir	Averages of analyses for	--------	--------	48	1.75 *13%*	1 *1*	3 ›	3.34 *24%*	4.31 *34%*	1.46 *12%*	0.54 *4%*	----- -----

TABLE 51—Continued

INORGANIC ANALYSES OF SURFACE WATERS, SOUTH COASTAL AREA

Source and place of sampling	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reacting values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
SAN DIEGO COUNTY—Continued											
Chollas Reservoir	the calendar year 1947-1948	-------	-------	50	1.3	1.72	3.04	2.34	1.91	0.56	------
					11%	14%	25%	24%	20%	6%	------
El Capitan Reservoir	-------	-------	-------	32	1.9	1.47	1.65	3.54	1.04	0.56	------
					19%	15%	16%	34%	10%	6%	------
Hodges Reservoir	-------	-------	-------	50	1.9	1.88	3.74	4.13	2.56	0.60	------
					13%	12%	25%	28%	18%	4%	------
Lower Otay	-------	-------	-------	52	1.4	1.72	3.30	3.77	1.66	0.52	------
					11%	13%	26%	31%	14%	5%	------
Morena Reservoir	-------	-------	-------	48	1.5	2.13	3.47	4.32	1.40	0.54	------
					11%	15%	24%	35%	11%	4%	------
Murray Reservoir	-------	-------	-------	38	1.8	1.39	2.04	3.27	1.12	0.68	------
					18%	13%	19%	32%	11%	7%	------
San Dieguito Reservoir	-------	-------	-------	48	1.9	1.88	3.69	3.81	2.73	0.66	------
					13%	13%	24%	26%	19%	5%	------
San Vicente Reservoir	-------	-------	-------	44	1.6	1.22	2.34	2.80	2.19	0.25	------
					16%	12%	22%	27%	21%	2%	------
San Luis Rey River N¼ Cor. Sec. 22, T10S, R2E, SBB&M	Aug. 1949	-------	-------	46	1.5	0.60	1.86	2.80	0.47	0.67	------
					19%	8%	23%	36%	6%	8%	------

TABLE 52

INORGANIC ANALYSES OF GROUND WATERS, SOUTH COASTAL AREA

Source and location	Date	Conductance (K x 10⁵)	Boron, ppm	Percent sodium	Reacting cl lues of constituents in me/l and actor formula in percent						
					Ca	Mg	Na	CO_3+HCO_3	Cl	SO_4	NO_3
ntura County											
Ventura River Basin											
Ojai Valley											
DWR Well No. 8-L-2, 1½ mi. SE. of Ojai	5/18/33	-------	0.04	4	5.00	2.86	0.30	4.40	0.33	3.43	-----
					30%	*18%*	*2%*	*27%*	*2%*	*21%*	-----
Ojai Valley											
DWR Well No. 8-L-5, 2½ mi. E. of Ojai	5/17/33	-------	0.02	14	4.85	1.88	1.09	3.67	0.53	3.16	-----
					31%	*12%*	*7%*	*26%*	*3%*	*21%*	-----
Ojai Valley											
DWR Well No. 8-L-38, 3½ mi. NE. of Ojai	5/18/33	-------	0.03	12	5.00	2.04	1.04	3.93	0.39	3.77	-----
					31%	*13%*	*6%*	*24%*	*2%*	*24%*	-----
Upper Ventura Valley											
DWR Well No. 5-M-2, 4½ mi. SW. of Ojai	5/18/33	-------	0.56	22	5.90	2.62	2.30	4.00	1.12	5.70	-----
					27%	*12%*	*11%*	*18%*	*6%*	*26%*	-----
Upper Ventura Valley											
DWR Well No. 5-M-6, 4 mi. W. of Ojai	7/17/31	132	0.38	24	8.10	3.36	3.78	4.95	1.21	8.83	-----
					27%	*11%*	*12%*	*17%*	*4%*	*29%*	-----
Upper Ventura Valley											
DWR Well No. 5-O-1, 6 mi. N. of Ventura	5/18/33	-------	0.46	20	7.45	3.19	2.65	5.06	1.52	6.70	-----
					28%	*12%*	*10%*	*19%*	*6%*	*25%*	-----
Lower Ventura Valley											
DWR Well No. 5-R-1, ½ mi. NW. of Ventura	5/ 7/31	331	1.19	44	12.70	6.63	5.39	6.44	17.46	11.20	-----
					18%	*10%*	*22%*	*9%*	*25%*	*16%*	-----
Lower Ventura Valley											
DWR Well No. 6-Q-1, 1 mi. N. of Ventura	5/ 7/31	501	1.34	40	22.15	9.59	0.30	5.93	35.49	10.62	-----
					21%	*9%*	*20%*	*5%*	*34%*	*11%*	-----

TABLE 52—Continued

INORGANIC ANALYSES OF GROUND WATERS, SOUTH COASTAL AREA

Source and location	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Rea ng values of constituents in me/l and character formula in percent: Ca	Mg	Na	CO_3 + HCO_3	Cl	SO_4	NO_3
Ventura County—Continued											
Santa Clara River Basin											
Piru Basin DWR Well No. 18-N-5, 2 mi. E. of Fillmore	9/30/31		0.72	24	6.90 *23%*	.50 *5%*	3.44 *12%*	4.50 *15%*	1.01 *3%*	9.47 *32%*	- - -
Piru Basin DWR Well No. 18-N-15, 2 mi. E. of Fillmore	5/12/32	--	0.70	22	6.60 *23%*	.34 *5%*	3.26 *12%*	3.85 *14%*	0.98 *3%*	9.33 *33%*	
Piru Basin DWR Well No. 19-N-16, 2 mi. SW. of Piru	6/18/29	152	1.41	18	8.70 *25%*	.41 *3%*	3.17 *9%*	4.91 *14%*	1.07 *3%*	11.38 *33%*	- - - - - -
Fillmore Basin DWR Well No. 13-O-5, 1½ mi. E. of Santa Paula	3/18/29	120	0.51	20	6.50 *25%*	.85 *5%*	2.78 *10%*	4.43 *17%*	0.99 *4%*	7.71 *29%*	- -
Fillmore Basin DWR Well No. 14-O-5, 2½ mi. E. of Santa Paula	7/13/31	121	0.63	24	6.85 *25%*	.61 *3%*	3.17 *12%*	4.46 *16%*	0.96 *4%*	8.15 *30%*	- - - - - -
Fillmore Basin DWR Well No. 14-O-6, 4½ mi. E. of Santa Paula	3/ 4/30	116	0.81	30	6.15 *24%*	.95 *1%*	3.79 *15%*	4.80 *18%*	1.21 *5%*	6.88 *27%*	- - - - - - -
Santa Paula Basin DWR Well No. 11-P-1, 3 mi. W. of Santa Paula	7/13/31	108	0.40	22	6.35 *26%*	.03 *3%*	2.73 *11%*	5.27 *22%*	0.90 *4%*	5.91 *24%*	- - - -
Santa Paula Basin DWR Well No. 12-O-1, ½ mi. W. of Santa Paula	4/22/29	112	0.23	44	5.25 *20%*	.96 *3%*	5.65 *22%*	5.00 *20%*	0.99 *4%*	6.81 *26%*	- - - - - - - -

Santa Paula Basin DWR Well No. 12-O-6, ½ mi. W. of Santa Paula	4/10/33	109	0.43	28	6.20 *26%*	2. *1(*	3.39 *14%*	5.03 *21%*	0.90 *4%*	5.98 *25%*	---- ----
Montalvo Basin DWR Well No. 8-S-8, 1 mi. S. of Montalvo	4/ 3/31	145	0.56	34	7.50 *23%*	3. *1(*	5.65 *17%*	4.75 *14%*	1.49 *5%*	10.27 *31%*	--- ---
Montalvo Basin DWR Well No. 8-S-9, ½ mi. W. of Montalvo	4/ 4/31	161	0.51	30	8.40 *23%*	4. *12*	5.52 *15%*	5.51 *15%*	2.30 *6%*	10.35 *29%*	--- ----
Montalvo Basin DWR Well No. 9-S-14, 3 mi. N. of Oxnard	4/16/31	138	0.56	24	7.50 *24%*	4. *14*	3.57 *12%*	4.49 *15%*	1.43 *5%*	9.54 *30%*	--- ---
Oxnard Plains DWR Well No. 6-S-1, 3 mi. W. of Montalvo	4/ 3/31	160	0.51	36	7.90 *22%*	3. *1(*	6.47 *18%*	6.09 *17%*	1.88 *5%*	9.83 *28%*	---- ---
Oxnard Plains DWR Well No. 7-S-4, 2 mi. SW. of Montalvo	3/ 9/33		0.45	32	8.00 *23%*	4. *11*	5.65 *16%*	4.75 *13%*	2.14 *6%*	10.83 *31%*	---- ----
Oxnard Plains DWR Well No. 7-T-1, 4½ mi. W. of Oxnard	4/29/31	109	0.50	36	4.45 *20%*	2. *12*	4.26 *18%*	3.29 *14%*	1.15 *5%*	6.98 *31%*	---- ----
Oxnard Plains DWR Well No. 7-U-2, 3½ mi. W. of Oxnard	4/ 3/31	122	0.64	30	6.35 *24%*	2. *11*	4.13 *15%*	3.80 *14%*	0.99 *4%*	8.62 *32%*	---- ----
Oxnard Plains DWR Well No. 8-U-6, 3 mi. SW. of Oxnard	4/ 4/31	124	0.57	32	6.20 *22%*	3. *1?*	4.43 *16%*	4.34 *15%*	1.21 *4%*	8.54 *31%*	-- ---
Angeles, Orange, Riverside and San Bernardino ounties											
pper Valley Areas											
San Fernando Valley DWR Well No. A-3b-B-6, 1½ mi. N. of San Fernando	6/23/32	42.6	0.07	26	2.30 *26%*	0. *11*	1.08 *13%*	3.34 *38%*	0.33 *4%*	0.58 *7%*	0.10 *1%*
San Fernando Valley DWR Well No. A-24a-C-5, 7 mi. NW. of San Fernando	6/24/32	43.2	0.07	24	2.40 *26%*	1. *12*	1.08 *12%*	3.39 *38%*	0.30 *3%*	0.79 *9%*	0.03 ----

TABLE 52—Continued

INORGANIC ANALYSES OF GROUND WATERS, SOUTH COASTAL A[illegible]A

Source and location	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reac[illegible] values of constituents in me/l and character formula in percent						
					Ca	[illegible]g	Na	CO_3+HCO_3	Cl	SO_4	NO_3
Los Angeles, Orange, Riverside and San Bernardino Counties—Continued											
Upper Valley Areas—Continued											
San Fernando Valley DWR Well No. A-50b-D-9, 3½ mi. SE. of Sunland	8/20/37	32.5	0.12	22	1.65 *24%*	[illegible]7 [illegible]%	0.78 *11%*	2.74 *40%*	0.23 *3%*	0.40 *6%*	0.06 *1%*
San Fernando Valley DWR Well No. A-84-F-E-7, 4 mi. W. of Burbank	8/21/37	42.4	0.10	20	2.95 *33%*	[illegible]5 [illegible]%	0.87 *10%*	3.18 *36%*	0.39 *4%*	0.58 *7%*	0.31 *3%*
San Fernando Valley DWR Well No. A-31a-D-6, 4 mi. S. of San Fernando	8/20/37	46.1	0.22	20	2.55 *27%*	[illegible]3 [illegible]%	1.00 *10%*	3.61 *34%*	0.28 *3%*	1.30 *12%*	0.08 *1%*
San Fernando Valley DWR Well No. A-97L-F-9, 1 mi. S. of Glendale	8/21/37	48.2	0.12	26	2.20 *23%*	[illegible]9 [illegible]%	1.26 *13%*	3.44 *34%*	0.70 *7%*	0.58 *6%*	0.31 *3%*
Upper San Gabriel Valley DWR Well No. C-22-F-11, ½ mi. N. of Pasadena	10/23/31	27.0	0.27	22	1.20 *22%*	[illegible]0 [illegible]%	0.65 *11%*	2.04 *35%*	0.33 *6%*	0.41 *7%*	0.13 *2%*
Upper San Gabriel Valley DWR Well No. C-37-E-11, 1 mi. W. of Altadena	10/23/31	23.9	0.02	32	1.10 *22%*	[illegible]7 [illegible]%	0.82 *16%*	1.95 *41%*	0.19 *4%*	0.08 *2%*	0.15 *3%*
Upper San Gabriel Valley DWR Well No. C-39-E-12, 4 mi. NE. of Pasadena	10/23/31	27.1	0.25	22	1.50 *24%*	[illegible]0 [illegible]%	0.69 *11%*	2.30 *42%*	0.20 *4%*	0.17 *3%*	0.06 *1%*
Upper San Gabriel Valley DWR Well No. C-87-F-13, 2 mi. W. of Arcadia	9/ 2/31	34.0	0.30	18	1.85 *27%*	[illegible]8 [illegible]%	0.65 *9%*	3.09 *43%*	0.20 *3%*	0.25 *4%*	0.03 ------

Upper San Gabriel Valley DWR Well No. C-214-G-13, 1½ mi. NE. of Temple City	9/ 2/31	42.6	0.22	20	2.25 24%	1.4 16%	0.91 10%	3.44 40%	0.39 5%	0.29 3%	0.20 2%
Upper San Gabriel Valley DWR Well No. C-268L-I-13, 4 mi. S. of El Monte	10/13/31	34.8	0.05	12	2.40 31%	0.9 13%	0.43 6%	3.14 41%	0.11 2%	0.50 7%	0.03 ------
Upper San Gabriel Valley DWR Well No. C-338-G-16, ½ mi. E. of Covina	9/26/31	40.3	0.08	22	1.95 23%	1.3 16%	0.95 11%	2.80 35%	0.39 5%	0.45 6%	0.35 4%
Upper Santa Ana Valley DWR Well No. D-759C-I-20, 1 mi. S. of Chino	3/29/48	26.3	0.00	18	2.02 30%	0.7 11%	0.61 9%	2.80 43%	0.04 1%	0.38 6%	Trace ------
Upper Santa Ana Valley DWR Well No. D-707-F-21, 2 mi. N. of Upland	3/21/47	29.8	0.00	26	2.16 28%	0.6 9%	1.05 13%	3.41 43%	0.10 1%	0.39 5%	0.05 1%
Upper Santa Ana Valley DWR Well No. D-910c-I-22, 6 mi. E. of Chino	2/11/47	33.1	0.00	22	2.08 27%	0.9 12%	0.89 11%	3.18 41%	0.17 2%	0.32 5%	0.17 2%
Upper Santa Ana Valley DWR Well No. D-1062-G-25, 4 mi. SW. of Rialto	5/26/47	25.6	0.10	14	2.17 33%	0.6 10%	0.42 7%	2.60 43%	0.07 2%	0.33 5%	0.03 ------
Upper Santa Ana Valley DWR Well No. D-1189a-F-26, 3½ mi. N. of Rialto	9/ 2/32	29.3	0.07	16	2.15 33%	0.5 9%	0.52 8%	2.75 44%	0.06 1%	0.35 5%	Trace ------
Upper Santa Ana Valley DWR Well No. E-10-E-27, 5 mi. N. of San Bernardino	9/ 1/32	35.6	0.08	10	2.55 34%	0.8 11%	0.43 5%	3.34 43%	0.25 3%	0.25 3%	0.03 1%
Upper Santa Ana Valley DWR Well No. E-48-G-28, 2½ mi. E. of San Bernardino	9/21/32	29.8	0.04	22	1.60 27%	0.7 12%	0.65 11%	2.19 39%	0.14 3%	0.27 5%	0.18 3%
Upper Santa Ana Valley DWR Well No. E-134-G-32, 4½ mi. NW. of Yucaipa	8/ 4/32	32.2	0.01	14	2.10 30%	0.9 13%	0.52 7%	2.70 42%	0.11 2%	0.43 6%	------ ------

TABLE 52—Continued

INORGANIC ANALYSES OF GROUND WATERS, SOUTH COASTAL AR

Source and location	Date	Conductance (K x 10⁵)	Boron, ppm	Percent sodium	Reactin alues of constituents in me/l and racter formula in percent: Ca	M	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
os Angeles, Orange, Riverside and San Bernardino Counties—Continued											
Near Central Inter-Basin Hills											
East of Santa Ana Mountains DWR Well No. E-277b-M-22, 3 mi. SW. of Corona	11/20/31	131		16	5.65 *21%*	5. *21*	2.17 *8%*	4.14 *15%*	1.01 *4%*	8.47 *31%*	--- ---
East of Santa Ana Mountains DWR Well No. E-296-M-23, 4 mi. SE. of Corona	10/ 5/31	109		30	5.85 *25%*	2. *10*	3.35 *15%*	4.60 *20%*	1.49 *6%*	5.44 *24%*	--- ---
Northeast of Puente Hills DWR Well No. D-780a-K-20, 5 mi. S. of Chino	2/23/31	104	0.14	28	5.50 *24%*	2. *12*	3.13 *14%*	5.50 *25%*	1.60 *7%*	3.87 *17%*	0.18 *1%*
Northeast of Puente Hills DWR Well No. D-783a-K-21, 5 mi. W. of Norco	9/13/31	134	-	48	4.35 *15%*	3	6.73 *24%*	9.70 *34%*	1.01 *4%*	3.64 *12%*	--- -----
South of Verdugo Mountains DWR Well No. A-96e-F-9, 1½ mi. W. of Glendale	6/13/32	81.9	0.33	28	4.35 *25%*		2.52 *14%*	3.85 *23%*	0.95 *6%*	3.60 *20%*	0.12 *1%*
South of Verdugo Mountains DWR Well No. A-96a-F-9, 1½ mi. W. of Glendale	6/13/32	65.6	0.25	28	3.35 *25%*		2.00 *14%*	3.55 *25%*	0.70 *5%*	2.62 *19%*	0.13 *1%*
East of Baldwin Hills DWR Well No. B-16-1-8, 3½ mi. NE. of Inglewood	10/ 2/31	190	0.14	18	11.35 *28%*	5	3.56 *9%*	6.14 *16%*	10.00 *26%*	2.93 *7%*	0.10 *1%*

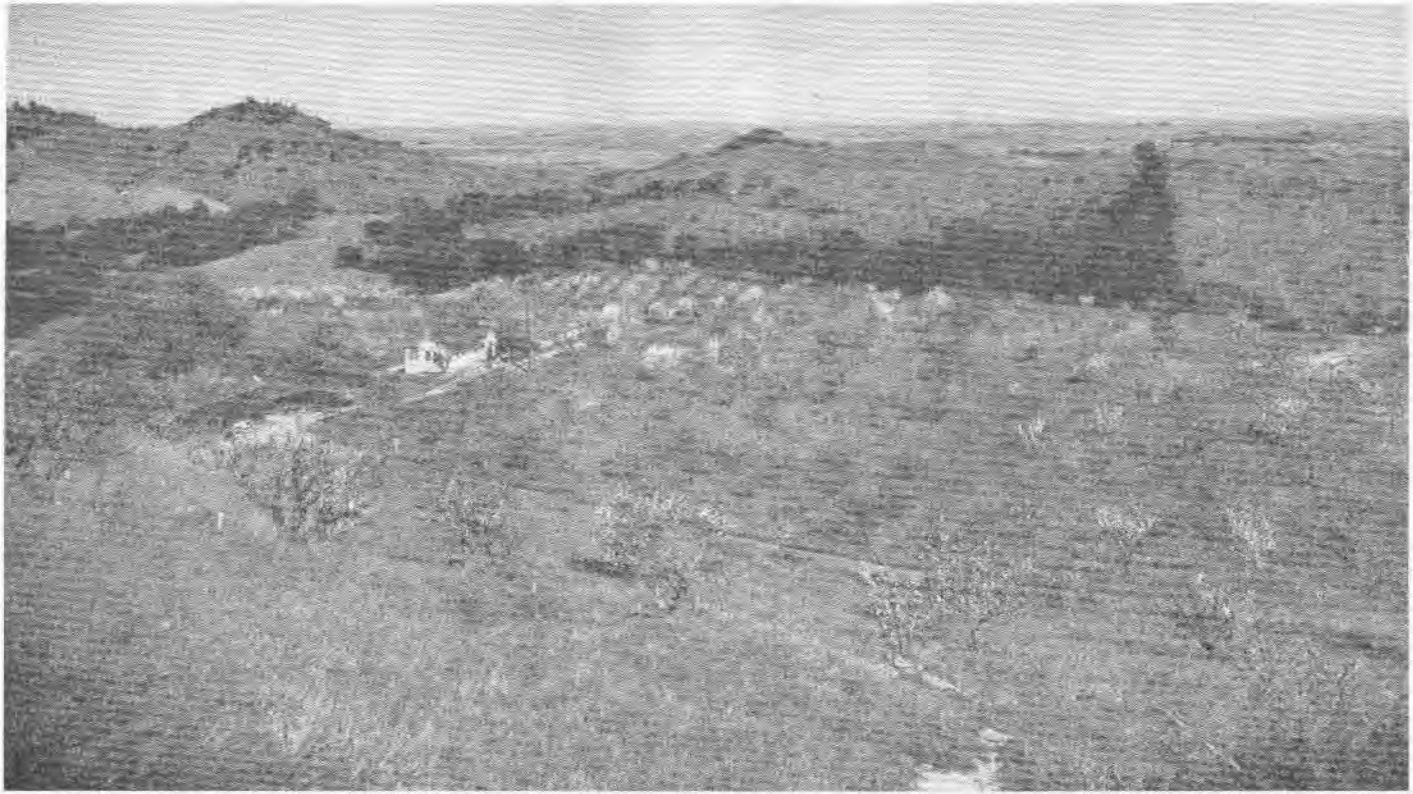
East of Baldwin Hills DWR Well No. B-16c-I-8, 4 mi. N. of Inglewood	5/10/28			26	5.80 *26%*	7 %	2.96 *13%*	4.45 *19%*	3.69 *16%*	3.42 *15%*	------ ------
West of Baldwin Hills DWR Well No. B-12n-I-7, 1 mi. NE. of Culver City	10/ 2/31	102	0.31	52	2.70 *12%*	2 %	5.73 *26%*	6.90 *34%*	2.47 *13%*	0.50 *3%*	------ ------
Riverside Basin DWR Well No. E-175-K-24, 1 mi. SW. of Arlington	11/ 6/47	108.7	0.20	48	4.68 *19%*	8 %	5.65 *24%*	5.11 *21%*	4.35 *18%*	1.80 *7%*	0.86 *4%*
Riverside Basin DWR Well No. E-183-K-25, 1½ mi. SE. of Arlington	7/22/47	76.9	0.50	32	3.10 *20%*	9 %	2.53 *16%*	4.08 *26%*	2.09 *13%*	1.32 *8%*	0.43 *3%*
Riverside Basin DWR Well No. E-188-K-25, 1½ mi. E. of Arlington	7/22/47	178.7	0.50	42	6.06 *17%*	7 %	7.72 *21%*	6.47 *18%*	6.60 *18%*	3.40 *9%*	1.86 *5%*
Riverside Basin DWR Well No. E-201-I-26, 5½ mi. NE. of Riverside	7/31/47	106.4	0.00	32	5.04 *24%*	6 %	3.34 *16%*	4.38 *22%*	4.33 *21%*	1.00 *4%*	0.71 *3%*
Coastal Plain DWR Well No. C-910w-O-13, 2½ mi. E. of Seal Beach	9/12/39	47.0		26	2.65 *28%*	2 %	1.34 *13%*	3.39 *38%*	0.42 *4%*	0.77 *8%*	
DWR Well No. C-995Z-P-14, 4 mi. SE. of Seal Beach	5/ 6/48	41.1	0.00	26	2.55 *28%*	2 %	1.22 *13%*	3.60 *36%*	0.60 *6%*	0.75 *8%*	----
DWR Well No. C-995L-P-13, 4½ mi. NW. of Huntington Beach	5/ 6/48	37.5	0.05	30	2.32 *26%*	5 %	1.25 *15%*	3.54 *39%*	0.32 *4%*	0.70 *7%*	----
DWR Well No. C-992a-P-14, 2 mi. S. of Westminster	7/ 9/48	42.0	0.04	36	2.28 *24%*	3 %	1.70 *18%*	3.63 *38%*	0.41 *4%*	0.75 *8%*	----
DWR Well No. C-1257v-Q-14, 1½ mi. NE. of Huntington Beach	5/ 7/48	42.2	0.00	30	2.74 *28%*	5 %	1.55 *15%*	3.62 *35%*	0.74 *7%*	0.79 *8%*	Trace ----

TABLE 52—Continued

INORGANIC ANALYSES OF GROUND WATERS, SOUTH COASTAL EA

Source and location	Date	Conductance ($K \times 10^6$)	Boron, ppm	Percent sodium	Rea ig values of constituents in me/l and character formula in percent						
					Ca	Ig	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
Los Angeles, Orange, Riverside and San Bernardino Counties—Continued											
Coastal Plain—Continued											
DWR Well No. C-1262a-Q-15, 1½ mi. E. of Huntington Beach	1/24/47	37.9	0.00	32	2.19	91	1.55	3.30	0.30	0.63	Trace
					24%	%	*16%*	*39%*	*3%*	*8%*	------
DWR Well No. C-927c-N-14, 2 mi. N. of Westminster	7/ 9/48	54.7	0.02	26	3.22	07	1.40	4.24	0.76	1.06	Trace
					28%	%	*13%*	*35%*	*6%*	*9%*	------
DWR Well No. C-912d-O-13, 2 mi. S. of Los Alamitos	7/ 8/48	40.3	0.00	36	2.24	57	1.46	3.35	0.35	0.75	------
					26%	%	*18%*	*37%*	*4%*	*9%*	------
DWR Well No. C-1202g-P-15, 2 mi. SE. of Westminster	5/21/48	45.5	0.00	28	3.03	00	1.51	4.01	0.56	0.93	0.07
					27%	%	*14%*	*36%*	*5%*	*9%*	------
San Diego County											
San Luis Rey Basin											
Well near N¼ Cor. Sec. 22, T10S, R2E, SBB&M	1946	45	--------	58	1.30	06	3.26	3.56	1.41	0.65	------
					12%	%	*29%*	*32%*	*12%*	*6%*	------
Lat. 33° 20.84′ by Long. 117° 13.11′	9/27/48	86	--------	48	1.55	45	4.44	2.89	4.51	1.29	------
					8%	%	*24%*	*17%*	*26%*	*7%*	------

Lat. 33° 21.7′ by Long. 117° 12.38′	2/14/48	56	--------	50	1.43 *12.5%*	1. *12. %*	2.91 *25%*	2.35 *25%*	1.86 *20%*	0.48 *5%*	------ ------
Lat. 33° 24.64′ by Long. 117° 14.6′	8/25/48	98	--------	50	3.51 *16%*	1. [illegible]	5.30 *25%*	4.45 *21%*	3.10 *15%*	2.82 *14%*	------ ------
San Diego Basin											
El Monte No. 7—Lat. 32° 52.11′ by Long. 116° 53.58′	1/27/47	51	--------	36	2.45 *19%*	1. *1[illegible]*	2.26 *18%*	3.56 *28%*	1.89 *15%*	0.92 *7%*	------ ------
El Monte No. 4—Lat. 32° 52.11′ by Long. 116° 53.58′	1/27/47	46	--------	46	1.70 *16%*	1. *1[illegible]*	2.57 *23%*	2.92 *27%*	1.75 *16%*	0.81 *7%*	------ ------
Mellville Well—Lat. 32° 52.10′ by Long. 116° 53.67′	1/27/47	49	--------	42	2.00 *17%*	1. *1[illegible]*	2.52 *21%*	3.15 *26%*	1.75 *15%*	1.02 *9%*	------ ------
Riverview No. 3—Lat. 32° 51.33′ by Long. 116° 56.22′	1/22/48	74	--------	44	2.94 *16%*	2. *1[illegible]*	3.87 *22%*	3.61 *20%*	3.50 *20%*	1.75 *10%*	------ ------
San Dieguito Basin											
San Diego City Well No. 3, below Pasqual Valley	3/30/48	51	--------	38	2.15 *18%*	1. *1[illegible]*	2.31 *19%*	3.92 *33%*	1.27 *10%*	0.81 *7%*	------ ------
Sweetwater Valley											
Well at Wheeler Lane	6/ 7/45	71	--------	44	2.85 *15%*	2. *1[illegible]*	4.07 *22%*	3.79 *20%*	4.64 *25%*	0.87 *5%*	------ ------



SACRAMENTO VALLEY

CHAPTER VIII. CENTRAL VALLEY AREA

In size and economic importance the Central Valley Area might well termed the "Great Basin" of California. About 38 percent of the ıd surface and about 44 percent of the valley and mesa lands of the ate are within this Area. In its mountains and foothills are forest, neral, range, and recreational resources that combine with its ample ıter resources and extensive valley farmlands to give the Area its high ace in the economy of California and the Nation.

LOCATION AND DESCRIPTION

The Central Valley Area, designated Area No. 5 on Plate 2, comises all stream basins that drain into Sacramento and San Joaquin ılleys upstream from the point of discharge of the Sacramento River to Suisun Bay between Collinsville, Solano County, and Pittsburg, ntra Costa County. The Area extends from the eastern end of the ılifornia-Oregon line southward to the Tehachapi Mountains, and from ests of the coastal ranges on the west to the crest of the Sierra Nevada the east. It averages 120 miles in width, is more than 500 miles in ıgth, and lies between latitudes 42° and 35° N. The northern portion ıbraces the watersheds of Sacramento River and its tributaries up to d including Goose Lake, which extends across the Oregon-California ıe. The southern portion includes watersheds of San Joaquin River and tributaries, and all basins that at one time drained into the San aquin, such as Tulare Lake and Buena Vista Lake Basins, and drainage the north slope of the Tehachapi Mountains.

A wide range of topography is found in this Area—from the higher gged peaks of the Sierra Nevada and the southern portion of the Casde Range, to the low tule lands of the Sacramento-San Joaquin Delta. ount Shasta, with an elevation of 14,161 feet, dominates the mountains the north, and Mount Whitney, whose elevation is 14,496 feet, the ountains on the south. From the Feather River southward, the Sierra evada extend for nearly 400 miles, with much of the crest line reaching itudes up to 12,000 feet or more.

Variations in climate parallel these variations in topography. parated from the ocean by the coastal ranges, climate of the main valley the Central Valley Area is in significant contrast with that of interior d coastal valleys of the North Coastal, San Francisco Bay, and Central astal Areas that lie opposite it on the west. Maximum summer temratures are higher and high temperatures last longer in the Central ılley. The climatic contrast is even greater between the main valleys d the high mountains of the Central Valley Area.

STREAMS AND AREAS OF DRAINAGE BASINS

Principal streams of the Central Valley Area are Sacramento River d its main tributaries. In order from the north these include McCloud, t, Feather, Yuba, Bear, and American Rivers which flow from the

Sierra Nevada, and Cottonwood, Stony, Cache, and Putah Creeks which drain the coastal ranges west of the Sacramento Valley. San Joaquin River flows into the Sacramento from the south and its principal tributaries, the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, and Merced Rivers, are all from the Sierra Nevada. Kings, Kaweah, Tule, and Kern Rivers also drain from the Sierra Nevada but into Tulare Lake, rather than northward into San Joaquin River. A portion of the flood flow of Kings River is tributary to San Joaquin River, by way of Fresno Slough, and in times past during periods of flood Tulare Lake has overflowed into San Joaquin River. No large streams enter San Joaquin Valley from the coastal ranges. Areas of drainage basins in the Central Valley Area are listed in Table 53.

PRECIPITATION

It is difficult to generalize regarding precipitation of the Central Valley Area in terms of "light," "moderate," or "heavy." Storms sweeping in from the ocean over the coastal ranges and across the Central Valley are influenced by changes in elevation. As elevation is gained on the west slope of the coastal ranges precipitation increases. Inversely, it diminishes down the east slope. In general, little variation is registered as storms pass eastward across the Central Valley floor, but as they ascend the west slope of the Sierra Nevada precipitation again increases, reaching the maximum as the crest is approached. Then, as storms pass over the crest and down the east side, it again decreases.

Heavy snowfall is a winter feature of the Sierra Nevada at elevations above about 3,000 feet in the northern portions and above about 4,000 feet in the south. Its depths are exceeded in few parts of the United States. In March, 1907, and again in 1911, 308 inches of snow was measured at Donner Summit. During the seasons of 1880 and 1890, as estimated from records of marks at stations on the transcontinental railroad crossing the Sierra Nevada, the fall was 370 inches. These figures are given for snow depths at time of measurement. Accretions during a season have exceeded 800 inches at Tamarack, at an elevation of 8,000 feet in Alpine County. The Cascade Range on the Olympic Peninsula in Washington is the only area in the United States to record greater depths. Snow in measurable quantities on floors of the Sacramento and San Joaquin Valleys is rare.

Two hundred and ninety-nine precipitation stations with records of 10 years or more are being maintained in the Central Valley Area. They are listed in Table 54, together with mean, maximum and minimum seasonal precipitation. These stations are at elevations ranging from sea level to 8,000 feet. The longest record is for the station at Sacramento, which is unbroken since 1849. Precipitation stations in the Central Valley Area with continuous recorders are listed in Table 55. Stations with records of less than ten years are listed in Table 56.

Precipitation in the Area decreases progressively from north to south. Mean seasonal rainfall on the floor of Sacramento Valley between the Sacramento-San Joaquin Delta and Red Bluff varies in general from 15 inches to 25 inches. On the San Joaquin Valley floor, which is bounded by a seasonal isohyet of 15 inches, minimum seasonal precipitation of less than five inches may occur in the Tulare Lake and Buena Vista Lake sections. A minimum seasonal total of 0.57 inch was recorded at Rio

TABLE 53

AREAS OF DRAINAGE BASINS, CENTRAL VALLEY AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, Central Valley Area, Including Goose Lake Basin")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
1	Goose Lake Basin in California	**97**	**315**	**412**
	Sacramento River Basin			
	Pit River			
2-1	Above gage near Canby	653	777	1,430
2-2	From gage near Canby to gage near Ydalpom	2,426	1,490	3,916
	Above gage near Ydalpom	3,079	2,267	5,346
2-3	McCloud River above gage at Baird	571	114	685
2-4	Remainder of Sacramento River above Shasta Dam	610	8	618
	Above Shasta Dam	4,260	2,389	6,649
2-5	West side tributaries, Shasta Dam to gage near Red Bluff	893	429	1,322
2-6	East side tributaries, Shasta Dam to gage near Red Bluff	940	347	1,287
	Above gage near Red Bluff	6,093	3,165	9,258
	Minor Streams above valley floor (west side)			
2-7	From gage near Red Bluff to Stony Creek drainage	533	0	533
2-8	From Stony Creek drainage to Cache Creek drainage	478	65	543
2-9	From Cache Creek drainage to mouth of Sacramento River	143	0	143
2-10	Stony Creek above mouth of canyon	611	99	710
	Cache Creek			
2-11	Above gage near Lower Lake	322	170	492
2-12	From gage near Lower Lake to gage near Capay	487	73	560
2-13	From gage near Capay to gage at Yolo	30	68	98
	Above gage at Yolo	839	311	1,150
2-14	Putah Creek (including Berryessa Valley) above gage near Winters	488	89	577
	Minor Streams above valley floor (east side)			
2-15	From gage near Red Bluff to Feather River drainage	1,054	0	1,054
2-16	From Feather River drainage to American River drainage	613	0	613
	Feather River, North Fork			
2-17	Above gage near Prattville	285	222	507
2-18	Indian Creek above gage near Crescent Mills	610	136	746
2-19	Remainder of North Fork above gage at Big Bar	651	41	692
	Above gage at Big Bar	1,546	399	1,945
	Feather River, Middle Fork			
2-20	Above gage near Clio	414	285	699
2-21	From gage near Clio to gage at Bidwell Bar	653	1	654
	Above gage at Bidwell Bar	1,067	286	1,353
	Feather River			
2-22	Remainder of Feather River above gage near Oroville	311	2	313
	Above gage near Oroville	2,924	687	3,611
2-23	Yuba River above gage at Smartville	1,194	0	1,194
2-24	Bear River above gage near Wheatland	278	17	295
	American River			
2-25	North Fork above gage near Colfax	343	0	343
2-26	Middle Fork above gage near Auburn	619	0	619
2-27	South Fork above gage at Coloma	632	0	632
2-28	Remainder of American River above gage at Fair Oaks	307	20	327
	Above gage at Fair Oaks	1,901	20	1,921
	Sacramento River above valley floor	17,149	4,453	21,602
2-29	Sacramento valley floor	0	4,946	4,946
	Total, Sacramento River	**17,149**	**9,399**	**26,548**

TABLE 53—Continued

AREAS OF DRAINAGE BASINS, CENTRAL VALLEY AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, Central Valley Area, Including Goose Lake Basin")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
	San Joaquin River Basin—area tributary to Tulare Lake			
	Minor streams above valley floor (east side)			
3-1	Including Grapevine Creek to Kern River drainage	876	28	904
3-2	From Kern River drainage to Tule River drainage	793	0	793
3-3	From Tule River drainage to San Joaquin River drainage	576	28	604
3-4	Kern River above gage near Bakersfield	2,335	85	2,420
3-5	Tule River above Pioneer Ditch diversion	369	21	390
3-6	Kaweah River above gage near Three Rivers	520	0	520
3-7	Kings River above gage at Piedra	1,694	0	1,694
	Above valley floor (east side) tributary to Tulare Lake	7,163	162	7,325
3-8	Above valley floor (west side) tributary to Tulare Lake	1,582	0	1,582
3-9	Valley floor, tributary to Tulare Lake	0	7,611	7,611
	Total, area tributary to Tulare Lake	**8,745**	**7,773**	**16,518**
	San Joaquin River Basin—area tributary to San Joaquin River			
	Minor streams above valley floor (east side)			
3-10	From San Joaquin River drainage to Stanislaus River drainage	1,053	56	1,109
3-11	San Joaquin River above Friant Dam	1,633	0	1,633
3-12	Fresno River above gage near Daulton	266	4	270
3-13	Chowchilla River above gage at Buchanan Damsite	238	0	238
3-14	Merced River above gage at Exchequer	1,035	0	1,035
3-15	Tuolumne River above gage near La Grange	1,540	0	1,540
3-16	Stanislaus River above gage near Knight's Ferry	983	0	983
	Above valley floor (east side) tributary to San Joaquin River	6,748	60	6,808
3-17	Above valley floor (west side) tributary to San Joaquin River	1,245	65	1,310
3-18	Valley floor, tributary to San Joaquin River	0	3,674	3,674
	Total area tributary to San Joaquin River	**7,993**	**3,799**	**11,792**
	San Joaquin River Basin—Area tributary to Delta			
	Minor streams above valley floor (east side)			
3-19	From Stanislaus River drainage to American River drainage	662	0	662
3-20	Calaveras River above gage at Jenny Lind	395	0	395
3-21	Mokelumne River above gage near Clements	626	4	630
3-22	Cosumnes River above gage at Michigan Bar	537	0	537
	Above valley floor (east side San Joaquin Valley) tributary to Delta	2,220	4	2,224
3-23	Above valley floor (west side San Joaquin Valley) tributary to Delta	170	0	170
3-24	San Joaquin valley floor tributary to Delta	0	1,760	1,760
	Total, area (San Joaquin River Basin) tributary to Delta	**2,390**	**1,764**	**4,154**
	Total, San Joaquin River Basin	19,128	13,336	32,464
	TOTALS, CENTRAL VALLEY AREA, INCLUDING GOOSE LAKE BASIN IN CALIFORNIA	**36,374**	**23,050**	**59,424**

avo, at an elevation of 314 feet in Kern County, in 1928-29. The aver- e seasonal figure for that station is 4.35 inches. At other extreme, the ximum recorded seasonal precipitation in the Central Valley Area 165.05 inches. This was recorded at La Porte, at an elevation of 5,000 t in Plumas County, in 1910-11. The average seasonal figure at this tion is 70.81 inches. Obviously, with such a wide variation in precipi- ion the 299 stations maintained are insufficient coverage for the 424 square miles in the Area.

Data on maximum recorded rainfall intensities at Red Bluff, Sacra- nto, and Fresno, as published by the United States Weather Bureau, given in the following tabulation:

MAXIMUM RECORDED RAINFALL, IN INCHES IN SPECIFIED MINUTE AND HOUR PERIODS, AT RED BLUFF, SACRAMENTO, AND FRESNO

Precipitation station and date	Minutes					Hours				
	5	10	15	30	60	2	3	6	12	24
Bluff	0.48	0.73	0.76	1.21	2.14	3.73	4.53	5.50	5.94	6.12
onth, day	6/23	6/23	6/23	9/14	9/14	9/13	9/13	9/13	9/13	9/13
ar	1923	1923	1923	1918	1918	1918	1918	1918	1918	1918
mento*	0.39	0.62	0.75	0.97	1.65	2.62	2.72			7.24
onth, day	4/7	4/7	4/7	4/7	4/7	4/7	4/7			4/20
ar	1935	1935	1935	1935	1935	1935	1935			1880
o	0.48	0.65	0.88	1.22	1.36	1.70	1.70	1.70	2.07	2.86
onth, day	2/24	2/24	6/14	6/14	6/14	4/8	4/8	4/8	10/6	11/16
ar	1941	1941	1939	1939	1939	1926	1926	1926	1904	1900

* 4.58 inches in eight hours January 11, 1879; 6.35 inches in 16 hours, April 21, 1880.

Monthly distribution of precipitation at 19 Central Valley Area tions considered representative in elevation and topographic environ- at is shown by Table 57. Maximum and minimum precipitation figures wn are monthly extremes during the period of record. They emphasize wide variation as between wet, dry, and normal seasons. Plates 38 and "Distribution of Precipitation at Selected Stations, Central Valley ea," show graphically for eight of these stations the monthly distribu- of precipitation in maximum and minimum seasons of record. They show monthly distribution during the season in which precipitation nearest to the average seasonal total shown in Table 57.

Mean seasonal precipitation on valley and mesa lands of the Central lley Area for the period from 1897-98 to 1946-47 is estimated to have n 17,900,000 acre-feet, as shown in Table 58. Over three-fourths of the ley land of this Area is in the low-lying floor of the Sacramento and Joaquin Valleys. Valley floor precipitation ranges from a light five hes seasonally at the southern end of the Central Valley, to a moderate inches at the northern end. Most of the remaining valley land lies in h plateau regions in the northeasterly portion of the Area, where pre- tation ranges from about 15 inches to about 25 inches seasonally.

TABLE 54

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
5-137	Tamarack	Alpine	38° 37′ 119° 57′	8,000	1900-01 1946-47	BC USWB	48.70	47.33	1906-07 1925-26	93.99 23.50
5-124	Twin Lakes	Alpine	38° 42′ 120° 03′	7,920	1919-20 1946-47	B PGE	42.31	45.80	1937-38 1923-24	74.82 23.39
5-142	Dry Town	Amador	38° 27′ 120° 51′	790	1891-92 1905-06	BC USWB	29.99	22.80	1894-95 1897-98	39.94 16.35
5-145	Electra	Amador	38° 20′ 120° 40′	699	1904-05 1946-47	BC USWB	30.20	31.45	1906-07 1923-24	50.97 15.04
5-141	Ione	Amador	38° 21′ 120° 56′	287	1878-79 1946-47	BC USWB	20.84	21.22	1936-37 1923-24	34.99 10.50
5-144	Jackson (near)	Amador	38° 24′ 120° 43′	1,900	1893-94 1902-03	BC USWB	34.74	25.11	1894-95 1897-98	50.10 19.53
5-143	Kennedy Mine	Amador	38° 21′ 120° 46′	1,500	1892-93 1946-47	BC USWB	29.95	28.45	1894-95 1923-24	54.07 13.26
5-147	Mill Creek No. 1	Amador	38° 27′ 120° 30′	2,400	1907-08 1930-31	BC USWB	42.04	47.00	1910-11 1923-24	66.37 19.79
5-135	Oleta	Amador	38° 30′ 120° 45′	1,510	1891-92 1901-02	BC USWB	35.93	26.11	1894-95 1897-98	53.24 20.12
5-136	Salt Springs	Amador	38° 30′ 120° 12′	3,660	1928-29 1946-47	B PGE	42.28	45.48	1937-38 1930-31	60.35 26.09
5-148	Tiger Creek	Amador	38° 27′ 120° 29′	2,341	1931-32 1946-47	AB USWB	46.01	46.91	1937-38 1932-33	62.16 28.41
5-69	Biggs	Butte	39° 25′ 121° 43′	98	1899-00 1915-16	B USWB	22.19	21.04	1913-14 1911-12	21.20 12.29
5-47	Centerville Powerhouse	Butte	39° 47′ 121° 40′	490	1914-15 1946-47	BC USWB	41.15	40.46	1940-41 1923-24	70.79 20.54
5-46	Chico	Butte	39° 42′ 121° 49′	189	1871-72 1946-47	BC USWB	24.38	25.13	1940-41 1887-88	45.79 12.97
5-34	De Sabla	Butte	39° 52′ 121° 35′	2,700	1904-05 1946-47	BC USWB	60.89	59.59	1940-41 1923-24	99.06 26.84
5-60	Durham	Butte	39° 38′ 121° 48′	160	1895-96 1919-20	BC USWB	24.60	24.70	1913-14 1911-12	35.44 15.30
5-63	Forbestown	Butte	39° 32′ 121° 17′	2,800	1920-21 1937-38	B Private	62.09	65.38	1937-38 1923-24	105.35 29.67
5-70	Gridley	Butte	39° 22′ 121° 42′	97	1884-85 1946-47	BC USWB	24.58	24.00	1889-90 1897-98	47.00 12.34
5-27	Inskip	Butte	40° 00′ 121° 32′	4,818	1907-08 1946-47	ABC USWB	71.61	71.92	1937-38 1923-24	124.11 32.36
5-51	Intake	Butte	39° 43′ 121° 28′	920	1921-22 1937-38	BC PGE	47.75	50.46	1937-38 1923-24	74.33 23.13
5-49	Lake Wilenor	Butte	39° 46′ 121° 32′	1,970	1931-32 1945-46	B T&TMID	53.67	48.55	1940-41 1938-39	83.85 29.85
5-50	Las Plumas	Butte	39° 40′ 121° 29′	569	1914-15 1946-47	B USWB	45.43	45.89	1940-41 1923-24	77.50 20.72
5-59	Llano Seco Rancho	Butte	39° 36′ 121° 57′	206	1917-18 1939-40	B Private	17.91	18.96	1937-38 1923-24	31.28 9.94

TABLE 54—Continued

AN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
						Period of record	1897-1947	Season	Inches
Magalia	Butte	39° 47′ 121° 35′	2,321	1904-05 1917-18	BC USWB	81.80	78.10	1908-09 1917-18	122.51 37.11
Oroville	Butte	39° 31′ 121° 33′	250	1884-85 1946-47	B USWB	27.36	27.27	1889-90 1930-31	49.64 14.71
Oroville (River Station)	Butte	39° 32′ 121° 34′	273	1908-09 1946-47	B USWB	26.53	27.16	1913-14 1911-12	43.42 14.31
Palermo	Butte	39° 26′ 121° 33′	213	1891-92 1913-14	BC USWB	17.53	23.29	1904-05 1897-98	32.77 10.94
Phelan Parrot	Butte	39° 45′ 121° 58′	130	1924-25 1946-47	B Private	20.04	20.49	1937-38 1932-33	34.93 12.97
Serriterre	Butte	39° 25′ 121° 28′	629	1920-21 1946-47	BCD USWB	29.10	29.76	1940-41 1923-24	44.08 15.79
Stanwood	Butte	39° 43′ 121° 23′	2,140	1903-04 1919-20	BC USWB	64.83	63.30	1906-07 1911-12	97.78 32.32
Stirling City	Butte	39° 54′ 121° 31′	3,525	1903-04 1945-46	BC USWB	75.03	65.44	1906-07 1917-18	125.20 36.76
West Branch	Butte	39° 50′ 121° 39′	3,216	1907-08 1943-44	BC USWB	68.79	68.03	1908-09 1923-24	115.35 23.13
Angels Camp No. 2	Calaveras	38° 04′ 120° 32′	1,500	1908-09 1946-47	BC USWB	29.75	30.96	1910-11 1923-24	50.35 12.86
Calaveras Big Trees	Calaveras	38° 17′ 120° 18′	4,702	1929-30 1946-47	B Private	53.01	54.05	1937-38 1930-31	77.02 33.06
Camp Pardee	Calaveras	38° 14′ 120° 50′	658	1929-30 1946-47	AB EBMUD	20.40	20.24	1935-36 1932-33	29.97 12.67
Fricot City	Calaveras	38° 11′ 120° 32′	1,900	1918-19 1937-38	ABC USWB	26.79	28.85	1937-38 1923-24	41.41 14.64
Jenny Lind	Calaveras	38° 06′ 120° 52′	300	1907-08 1946-47	BC USWB	17.81	19.31	1935-36 1923-24	28.87 8.81
Lancha Plana	Calaveras	38° 15′ 120° 51′	670	1926-27 1946-47	B USWB	20.47	20.87	1935-36 1932-33	29.92 12.72
Letora Ranch	Calaveras	30° 12′ 120° 28′	1,600	1927-28 1940-41	B Private	33.50	34.21	1937-38 1930-31	53.76 19.28
Milton	Calaveras	38° 02′ 120° 51′	660	1888-89 1946-47	BC USWB	20.71	20.02	1894-95 1923-24	32.31 10.47
Mokelumne Hill	Calaveras	38° 18′ 120° 42′	1,550	1882-83 1946-47	BC USWB	30.65	29.75	1889-90 1923-24	54.59 13.33
Murphy's	Calaveras	38° 08′ 120° 28′	2,201	1868-69 1883-84	C Private	30.99	30.10	1875-76 1876-77	44.76 15.18
San Andreas	Calaveras	38° 11′ 120° 41′	996	1924-25 1946-47	BC USWB	26.09	26.76	1935-36 1923-24	38.76 15.68
Valley Springs	Calaveras	38° 11′ 120° 50′	673	1888-89 1937-38	BC USWB	22.98	21.55	1889-90 1923-24	38.15 10.08
Wallace	Calaveras	38° 11′ 120° 58′	200	1926-27 1946-47	B USWB	18.89	18.93	1935-36 1930-31	27.30 10.32
West Point	Calaveras	38° 25′ 120° 32′	2,736	1894-95 1946-47	BC USWB	39.31	38.73	1894-95 1923-24	50.91 16.84

TABLE 54—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
5-82	Colusa	Colusa	39° 13′ 122° 00′	60	1871-72 1946-47	BC USWB	16.01	15.89	1940-41 1938-39	31.65 6.78
5-68	East Park	Colusa	39° 22′ 122° 30′	1,205	1911-12 1946-47	BC USWB	17.79	17.92	1940-41 1938-39	42.43 5.64
5-67	Stonyford Ranger Station	Colusa	39° 22′ 122° 32′	1,200	1918-19 1945-46	B R. Sta.	23.03	23.45	1940-41 1938-39	48.64 6.96
5-96	Williams	Colusa	39° 09′ 122° 09′	90	1849-50 1935-36	D CFA	20.23	16.78	1861-62 1850-51	44.27 7.42
-166	Antioch	Contra Costa	38° 01′ 121° 49′	46	1879-80 1946-47	B USWB	12.55	12.28	1889-90 1897-98	24.57 5.30
-165	Los Medanos	Contra Costa	38° 01′ 121° 51′	40	1914-15 1930-31	B SO Co.	11.26	11.99	1918-19 1923-24	17.29 5.64
-110	Georgetown	El Dorado	38° 55′ 120° 50′	2,060	1872-73 1946-47	ABC USWB	55.56	50.97	1889-90 1938-39	95.27 29.62
-111	Pilot Creek	El Dorado	38° 55′ 120° 41′	4,000	1894-95 1913-14	BC USWB	69.21	64.87	1903-04 1897-98	95.54 37.46
-123	Placerville	El Dorado	38° 43′ 120° 47′	1,925	1874-75 1946-47	BC USWB	41.01	38.55	1889-90 1923-24	78.23 20.13
-122	Shingle Springs	El Dorado	38° 40′ 120° 56′	1,415	1849-50 1911-12	BC USWB	34.47	30.04	1861-62 1897-98	79.24 14.60
-263	Associated Oil No. 1	Fresno	36° 09′ 120° 24′	825	1923-24 1935-36	B AO Co.	6.36	7.10	1934-35 1923-24	10.64 3.74
-262	Associated Oil No. 2	Fresno	36° 05′ 120° 29′	1,343	1923-24 1937-38	B AO Co.	9.88	9.95	1934-35 1923-24	14.60 4.35
-261	Associated Oil No. 3	Fresno	36° 09′ 120° 38′	1,850	1923-24 1936-37	B AO Co.	16.69	18.00	1934-35 1923-24	26.00 8.00
-250	Associated Oil No. 6	Fresno	36° 12′ 120° 24′	800	1923-24 1946-47	AB AO Co.	6.05	6.42	1940-41 1927-28	19.20 2.42
-220	Auberry	Fresno	37° 06′ 119° 29′	2,050	1915-16 1946-47	BD USWB	24.38	24.37	1937-38 1923-24	45.02 13.64
-229	Balch Powerhouse	Fresno	36° 53′ 119° 07′	1,750	1926-27 1946-47	B PGE	28.71	27.95	1937-38 1933-34	45.90 16.31
-217	Big Creek Powerhouse No. 1	Fresno	37° 14′ 119° 13′	4,928	1915-16 1946-47	B USWB	30.60	31.25	1937-38 1923-24	53.68 15.86
-222	Cliff Camp	Fresno	37° 00′ 119° 00′	6,150	1922-23 1946-47	BD USWB	37.13	36.15	1937-38 1923-24	63.31 16.26
-228	Clovis	Fresno	36° 52′ 119° 42′	400	1917-18 1946-47	BD USWB	12.29	12.70	1937-38 1923-24	23.48 5.92
-264	Coalinga	Fresno	36° 09′ 120° 21′	663	1912-13 1946-47	B USWB	7.06	6.25	1940-41 1912-13	14.83 3.42
-251	Coalinga (Standard Oil)	Fresno	36° 14′ 120° 17′	800	1912-13 1930-31	B SO Co.	6.01	6.59	1914-15 1927-28	11.69 2.75
-221	Dinky Meadow	Fresno	37° 03′ 119° 10′	5,440	1922-23 1934-35	B USWB	34.18	35.72	1934-35 1923-24	45.36 17.73

TABLE 54—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

P	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
5-	Firebaugh	Fresno	36° 51′ 120° 27′	175	1873-74 1946-47	BC USWB	7.74	8.45	1885-86 1876-77	18.84 2.24
5-	Fresno	Fresno	36° 44′ 119° 49′	277	1878-79 1946-47	ABC USWB	9.42	9.41	1940-41 1933-34	17.03 4.43
5-	Friant	Fresno	36° 59′ 119° 42′	380	1897-98 1946-47	ABC USWB	13.16	13.16	1934-35 1907-08	21.66 7.53
5-	Helm	Fresno	36° 32′ 120° 08′	185	1929-30 1942-43	B USWB	7.76	6.91	1940-41 1929-30	14.22 4.31
5-	Huntington Lake	Fresno	37° 13′ 119° 14′	7,020	1915-16 1946-47	AB USWB	30.09	30.62	1937-38 1923-24	43.55 14.49
5-	Kingsburg	Fresno	36° 31′ 119° 33′	309	1879-80 1931-32	BC USWB	8.59	8.69	1883-84 1881-82	15.85 4.74
5-	Mendota (near)	Fresno	36° 47′ 120° 22′	166	1894-95 1946-47	AB USWB	6.46	7.51	1900-01 1897-98	10.85 4.15
5-	Mendota (Standard Oil)	Fresno	36° 45′ 120° 22′	177	1913-14 1930-31	B SO Co.	6.22	6.68	1914-15 1925-26	10.36 4.07
5-	Mercey Hot Springs	Fresno	36° 45′ 120° 52′	1,200	1932-33 1942-43	B USWB	9.12	7.72	1940-41 1932-33	15.21 4.41
5-	Orange Cove	Fresno	36° 36′ 119° 18′	431	1931-32 1946-47	BCD USWB	14.37	13.40	1940-41 1933-34	21.91 6.82
5-	Piedra	Fresno	36° 48′ 119° 22′	510	1918-19 1946-47	B USWB	16.79	16.94	1937-38 1923-24	28.37 7.46
5-	Reedley	Fresno	36° 35′ 119° 25′	347	1899-00 1922-23	BC USWB	12.44	11.72	1904-05 1911-12	18.12 7.01
5-	Sanger	Fresno	36° 42′ 119° 33′	371	1889-90 1914-15	BC USWB	10.90	10.36	1905-06 1890-91	17.79 6.23
5-	Selma	Fresno	36° 34′ 119° 37′	311	1886-87 1914-15	BC USWB	9.13	8.98	1905-06 1897-98	15.23 3.96
5-	Westhaven	Fresno	36° 13′ 119° 59′	285	1926-27 1946-47	B USWB	7.01	6.89	1940-41 1927-28	14.65 4.17
5	Fruto	Glenn	39° 35′ 122° 27′	624	1888-89 1910-11	BC USWB	21.58	19.86	1889-90 1897-98	38.04 8.32
5	Hamilton City	Glenn	39° 45′ 122° 00′	800	1927-28 1946-47	B USWB	16.78	18.81	1941-42 1932-33	28.12 9.47
5	Monroeville	Glenn	39° 38′ 122° 00′	130	1908-09 1926-27	B USWB	17.79	17.14	1913-14 1923-24	29.92 9.33
5	Orland	Glenn	39° 45′ 122° 12′	254	1883-84 1946-47	BC USWB	17.95	17.97	1940-41 1897-98	41.44 7.89
5	Saint John	Glenn	39° 42′ 122° 01′	143	1912-13 1946-47	BC USWB	19.25	20.68	1940-41 1923-24	40.60 9.42
5	Stony Gorge Reservoir	Glenn	39° 35′ 122° 33′	800	1927-28 1946-47	ABC USWB	18.94	18.38	1940-41 1938-39	45.96 7.43
5	Willows	Glenn	39° 31′ 122° 12′	136	1879-80 1946-47	BC USWB	16.78	16.97	1940-41 1897-98	40.50 6.58
5-	Antelope Valley	Kern	35° 43′ 120° 10′	1,205	1911-12 1941-42	BCD USWB	9.31	9.47	1940-41 1923-24	20.00 3.79

TABLE 54—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
5-292	Arvin	Kern	35° 12′ 118° 49′	445	1936-37 1945-46	BC Private	9.14	7.28	1940-41 1945-46	15.30 5.23
5-287	Bakersfield	Kern	35° 25′ 119° 03′	489	1886-87 1946-47	ABC USWB	6.07	6.22	1940-41 1933-34	11.61 2.26
5-294	Bear Valley	Kern	35° 10′ 118° 38′	4,400	1900-01 1945-46	BC USWB	19.95	19.30	1942-43 1917-18	33.24 9.06
5-284	Button Willow	Kern	35° 25′ 119° 27′	270	1928-29 1937-38	B UOCo.	4.31	3.99	1936-37 1933-34	7.00 1.93
5-293	Caliente	Kern	35° 17′ 118° 38′	1,290	1876-77 1942-43	BC USWB	11.85	11.81	1942-43 1878-79	21.28 3.16
5-299	Cummings Valley	Kern	35° 07′ 118° 36′	3,700	1931-32 1945-46	B USWB	17.03	15.00	1940-41 1933-34	25.82 3.86
5-274	Delano	Kern	35° 47′ 119° 15′	319	1876-77 1909-10	BC USWB	6.44	7.90	1883-84 1879-80	11.52 1.41
5-289	Edison	Kern	35° 23′ 118° 43′	2,500	1904-05 1945-46	B USWB	11.04	10.53	1905-06 1933-34	22.92 4.78
5-276	Glennville (near)	Kern	35° 44′ 118° 40′	3,270	1909-10 1946-47	AB USWB	20.36	19.61	1942-43 1933-34	32.00 10.15
5-283	Isabella	Kern	35° 39′ 118° 27′	2,500	1897-98 1909-10	BC USWB	10.62	10.72	1908-09 1897-98	23.60 4.47
5-278	Junction	Kern	35° 38′ 119° 58′	703	1927-28 1946-47	AB Private	5.86	5.55	1936-37 1933-34	9.66 2.60
5-295	Keene	Kern	35° 13′ 118° 33′	2,705	1877-78 1909-10	BC USWB	13.86	16.96	1883-84 1878-79	24.25 5.22
5-249	Kern Canyon	Kern	35° 26′ 118° 48′	700	1916-17 1946-47	B PGE	8.56	8.27	1940-41 1933-34	14.72 3.51
5-277	Kernville	Kern	35° 43′ 118° 26′	2,565	1894-95 1946-47	BC USWB	10.16	10.02	1908-09 1923-24	21.22 3.21
5-291	Lakeside Ranch	Kern	35° 11′ 119° 07′	293	1901-02 1928-29	C Private	5.26	5.54	1914-15 1903-04	8.61 3.18
5-279	Lost Hills	Kern	35° 36′ 119° 41′	285	1913-14 1946-47	AB USWB	5.98	5.47	1940-41 1928-29	10.90 3.49
5-297	Maricopa	Kern	35° 04′ 119° 24′	640	1911-12 1946-47	BC USWB	5.80	5.67	1913-14 1933-34	10.40 1.06
5-286	Middlewater	Kern	35° 29′ 119° 17′	803	1911-12 1946-47	BC USWB	5.32	5.14	1914-15 1933-34	10.30 1.00
5-290	Midway (Standard Oil)	Kern	35° 10′ 119° 28′	900	1912-13 1930-31	BD SOCo.	5.19	5.39	1914-15 1922-23	8.46 2.53
5-296	Midway (Union Oil)	Kern	35° 09′ 119° 29′	1,070	1930-31 1946-47	B UOCo.	5.50	4.80	1942-43 1933-34	10.69 1.35
5-273	Pond	Kern	35° 43′ 119° 20′	290	1915-16 1930-31	B SOCo.	5.56	6.26	1926-27 1923-24	7.90 3.21
5-285	Rio Bravo	Kern	35° 23′ 119° 18′	314	1924-25 1946-47	AB UOCo.	4.35	4.04	1940-41 1928-29	9.65 0.57
5-301	San Emigdio	Kern	34° 59′ 119° 11′	1,450	1901-02 1946-47	AB KCLCo.	8.87	8.52	1914-15 1933-34	16.10 1.83

TABLE 54—Continued

AN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
Tehachapi	Kern	35° 08′ 118° 27′	3,960	1877-78 1946-47	AB USWB	11.01	10.77	1885-86 1898-99	20.89 3.70
Tejon Rancho	Kern	35° 02′ 118° 45′	1,425	1893-94 1946-47	B USWB	11.73	11.59	1934-35 1933-34	21.35 3.97
U. S. Cotton Field	Kern	35° 32′ 119° 18′	390	1922-23 1946-47	AB Private	6.18	5.95	1940-41 1933-34	11.45 2.86
Wait	Kern	35° 26′ 119° 03′	475	1912-13 1930-31	B SOCo.	5.85	6.17	1914-15 1923-24	10.70 3.38
Wasco	Kern	35° 36′ 119° 21′	336	1899-00 1946-47	B USWB	6.45	6.31	1914-15 1923-24	13.50 3.25
Corcoran	Kings	36° 06′ 119° 33′	200	1912-13 1946-47	AB USWB	6.53	7.01	1914-15 1923-24	10.76 3.78
Dudley	Kings	35° 50′ 120° 03′	685	1912-13 1938-39	BC USWB	6.74	6.48	1936-37 1928-29	12.31 2.98
Hanford	Kings	36° 19′ 119° 38′	249	1899-00 1946-47	BCD USWB	8.54	8.42	1940-41 1933-34	14.33 3.27
Lemoore	Kings	36° 18′ 119° 47′	227	1879-80 1946-47	AB Private	9.91	9.33	1885-86 1897-98	17.31 2.90
Clear Lake	Lake	38° 57′ 122° 38′	1,350	1911-12 1946-47	B USWB	22.87	22.53	1940-41 1917-18	48.65 12.19
Helen Mine	Lake	38° 44′ 122° 42′	2,760	1900-01 1921-22	B USWB	86.30	82.73	1908-09 1919-20	126.29 45.23
Hobergs	Lake	38° 50′ 122° 44′	3,350	1930-31 1946-47	B USWB	58.22	59.04	1937-38 1930-31	112.50 32.10
Kelseyville	Lake	38° 59′ 122° 50′	1,390	1932-33 1946-47	B USWB	23.43	22.02	1940-41 1938-39	39.49 11.77
Kono Tayee	Lake	39° 00′ 122° 48′	1,350	1874-75 1903-04	BC USWB	23.10	24.04	1877-78 1876-77	37.33 12.08
Lakeport	Lake	39° 03′ 122° 55′	1,450	1901-02 1946-47	B USWB	28.22	27.90	1940-41 1923-24	47.17 14.09
Lundquist	Lake	38° 45′ 122° 37′	1,150	1923-24 1937-38	B Private	42.77	46.01	1937-38 1923-24	81.66 19.75
Upper Lake	Lake	39° 11′ 122° 55′	1,343	1886-87 1946-47	BC USWB	30.28	29.79	1940-41 1886-87	58.05 14.80
Bieber	Lassen	41° 07′ 121° 08′	4,169	1930-31 1946-47	AB USWB	16.92	16.37	1937-38 1938-39	28.32 9.10
Madeline	Lassen	41° 03′ 120° 28′	5,280	1908-09 1932-33	ABC USWB	13.63	12.78	1913-14 1932-33	31.70 4.06
Westwood	Lassen	40° 18′ 121° 00′	5,080	1921-22 1946-47	ABC USWB	24.29	24.25	1937-38 1938-39	35.36 11.54
Borden	Madera	36° 56′ 120° 01′	274	1875-76 1894-95	C USWB	8.74	8.85	1885-86 1876-77	18.27 3.52
Chowchilla	Madera	37° 05′ 120° 27′	150	1887-88 1937-38	B Private	9.73	9.84	1889-90 1923-24	16.11 4.23
Crane Valley Dam	Madera	37° 17′ 119° 31′	3,500	1903-04 1946-47	BC PGE	40.68	40.09	1937-38 1923-24	69.39 18.37

TABLE 54—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
5-225	Madera	Madera	36° 58′ 120° 02′	296	1899-00 1946-47	B USWB	10.01	9.87	1940-41 1923-24	19.77 5.49
5-215	North Fork	Madera	37° 14′ 119° 30′	3,000	1904-05 1945-46	ABC USWB	34.35	32.96	1937-38 1923-24	60.59 14.99
5-224	Storey	Madera	36° 58′ 120° 04′	296	1899-00 1926-27	BD USWB	9.15	9.10	1915-16 1923-24	15.24 5.49
5-191	Dudley's	Mariposa	37° 45′ 120° 06′	3,000	1909-10 1946-47	BC USWB	37.33	36.63	1910-11 1923-24	57.18 18.41
5-203	Hornitos	Mariposa	37° 30′ 120° 14′	950	1923-24 1946-47	AB Private	17.56	17.75	1934-35 1923-24	26.98 9.25
5-204	Mariposa	Mariposa	37° 30′ 119° 58′	1,800	1894-95 1946-47	BCD USWB	29.27	29.06	1910-11 1923-24	46.81 12.90
5-209	Summerdale	Mariposa	37° 29′ 119° 38′	5,270	1896-97 1911-12	BC USWB	55.12	56.70	1900-01 1897-98	85.46 29.34
5-193	Yosemite	Mariposa	37° 45′ 119° 35′	3,985	1904-05 1946-47	ABC USWB	34.54	33.97	1937-38 1923-24	58.64 14.77
5-212	Athlone	Merced	37° 12′ 120° 21′	205	1886-87 1896-97	BC USWB	11.54	12.74	1889-90 1887-88	19.07 6.81
5-213	La Grande	Merced	37° 14′ 120° 14′	255	1899-00 1946-47	BCD USWB	12.63	12.43	1940-41 1907-08	20.81 4.87
5-208	Livingston	Merced	37° 23′ 120° 43′	130	1918-19 1937-38	B Private	10.99	10.94	1937-38 1923-24	18.10 5.00
5-218	Los Banos	Merced	37° 04′ 120° 50′	120	1873-74 1946-47	BC USWB	8.31	8.61	1940-41 1876-77	14.80 1.60
5-211	Merced	Merced	37° 19′ 120° 29′	170	1872-73 1946-47	AB USWB	11.29	11.68	1883-84 1876-77	22.08 3.20
5-202	Merced Falls	Merced	37° 32′ 120° 20′	351	1907-08 1946-47	BC USWB	15.27	15.16	1934-35 1923-24	22.45 8.20
5-201	Snelling	Merced	37° 31′ 120° 26′	259	1882-83 1937-38	B Private	14.81	14.62	1889-90 1912-13	29.99 7.27
5-1	Alturas	Modoc	41° 29′ 120° 32′	4,346	1904-05 1946-47	AB USWB	12.51	12.19	1937-38 1938-39	19.52 7.54
5-5	Jess Valley	Modoc	41° 14′ 120° 19′	5,400	1930-31 1945-46	B USWB	16.90	16.77	1937-38 1930-31	24.44 9.56
5-125	Aetna Springs	Napa	38° 39′ 122° 29′	860	1924-25 1938-39	B Private	32.18	33.38	1937-38 1938-39	58.02 5.91
5-126	Monticello	Napa	38° 36′ 122° 13′	350	1913-14 1946-47	B Private	21.78	21.12	1940-41 1923-24	41.67 6.30
5-78	Bowman Dam	Nevada	39° 27′ 120° 39′	5,347	1871-72 1946-47	ABC USWB	69.13	66.50	1903-04 1887-88	142.07 29.40
5-86	Deer Creek	Nevada	39° 18′ 120° 50′	3,700	1907-08 1946-47	BC USWB	65.11	67.46	1937-38 1923-24	103.98 28.89
5-80	Fordyce Dam	Nevada	39° 23′ 120° 30′	6,500	1894-95 1928-29	ABC USWB	67.10	64.47	1894-95 1923-24	116.52 35.78
5-83	Grass Valley	Nevada	39° 13′ 121° 03′	2,690	1872-73 1946-47	BCD USWB	52.10	52.62	1889-90 1923-24	89.82 24.55

TABLE 54—Continued

AN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

te	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
9	Lake Spaulding	Nevada	39° 20′ 120° 39′	5,075	1894-95 1946-47	BCD USWB	66.33	65.31	1903-04 1923-24	102.56 34.39
4	Nevada City	Nevada	39° 16′ 121° 01′	2,570	1863-64 1946-47	BCD USWB	51.63	48.74	1867-68 1863-64	115.26 17.28
7	North Bloomfield	Nevada	39° 22′ 120° 54′	3,160	1870-71 1943-44	BC USWB	50.11	51.11	1906-07 1923-24	77.84 21.47
2	Soda Springs	Nevada	39° 19′ 120° 23′	6,752	1930-31 1946-47	AB USWB	47.96	48.96	1937-38 1930-31	67.91 26.23
0	Auburn	Placer	38° 55′ 121° 05′	1,363	1871-72 1946-47	BC USWB	33.45	33.12	1906-07 1911-12	56.73 12.63
9	Blue Canyon	Placer	39° 17′ 120° 42′	5,283	1899-00 1946-47	AB USWB	58.39	57.60	1906-07 1923-24	100.47 28.04
91	Cisco	Placer	39° 18′ 120° 33′	5,939	1870-71 1915-16	BC USWB	51.31	47.22	1889-90 1874-75	97.63 28.19
99	Colfax	Placer	39° 06′ 120° 58′	2,421	1870-71 1946-47	BC USWB	46.34	46.22	1889-90 1923-24	89.80 20.44
88	Drum Forebay	Placer	39° 16′ 120° 46′	4,563	1916-17 1939-40	B PGE	52.16	55.56	1937-38 1923-24	90.86 25.56
90	Emigrant Gap	Placer	39° 18′ 120° 39′	5,220	1870-71 1944-45	ABC USWB	52.54	52.52	1906-07 1874-75	94.30 17.35
85	Gold Run	Placer	39° 10′ 120° 53′	3,222	1899-00 1918-19	BC USWB	51.09	48.65	1903-04 1907-08	77.55 28.06
00	Iowa Hill	Placer	39° 05′ 120° 50′	2,825	1879-80 1909-10	BC USWB	52.54	48.93	1889-90 1897-98	91.04 29.47
08	Newcastle	Placer	38° 52′ 121° 08′	970	1891-92 1938-39	BC USWB	32.14	28.38	1906-07 1938-39	48.05 16.63
20	Rocklin	Placer	38° 48′ 121° 15′	239	1870-71 1946-47	BC USWB	22.39	23.14	1906-07 1923-24	38.63 10.42
19	Roseville High School	Placer	38° 45′ 121° 17′	160	1926-27 1946-47	B Private	17.53	17.12	1940-41 1938-39	24.88 10.78
3	Summit	Placer	39° 19′ 120° 20′	7,017	1871-72 1925-26	BC USWB	45.59	45.36	1879-80 1923-24	80.10 20.76
7	Towle	Placer	39° 12′ 120° 48′	3,704	1889-90 1919-20	BC USWB	59.32	59.12	1913-14 1897-98	85.86 33.29
7	Buck's Lake	Plumas	39° 54′ 121° 12′	5,000	1930-31 1946-47	ABC PGE	64.04	69.57	1940-41 1930-31	95.70 28.36
1	Canyon Dam	Plumas	40° 11′ 121° 12′	4,570	1907-08 1946-47	BCD USWB	35.08	36.14	1937-38 1923-24	64.59 14.52
7	Caribou	Plumas	40° 05′ 121° 09′	3,000	1922-23 1945-46	BC PGE	37.93	40.26	1937-38 1923-24	66.84 14.55
0	Chester	Plumas	40° 19′ 121° 13′	4,550	1910-11 1946-47	B USWB	29.02	28.73	1940-41 1923-24	48.91 12.98
8	Edmonton	Plumas	39° 54′ 121° 06′	4,750	1877-78 1904-05	BC USWB	73.25	74.12	1889-90 1897-98	139.15 42.04
9	Feather River	Plumas	39° 58′ 120° 56′	3,480	1913-14 1937-38	B Private	30.28	32.67	1913-14 1930-31	50.96 15.76

TABLE 54—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
5-40	Feather River (Calif. Forestry)	Plumas	39° 58′ 120° 56′	3,480	1913-14 1946-47	BC F&RESB	31.51	32.94	1913-14 1930-31	50.96 15.76
5-29	Greenville	Plumas	40° 08′ 120° 57′	3,600	1894-95 1945-46	BC USWB	42.80	37.77	1906-07 1911-12	67.34 22.61
5-53	La Porte	Plumas	39° 41′ 120° 59′	5,000	1894-95 1932-33	BC USWB	70.81	72.68	1910-11 1923-24	165.05 29.52
5-54	Portola	Plumas	39° 48′ 120° 28′	5,000	1915-16 1946-47	AB USWB	17.16	18.02	1937-38 1923-24	29.44 6.17
5-22	Prattville	Plumas	40° 13′ 121° 10′	4,600	1923-24 1946-47	BC PGE	34.12	36.23	1937-38 1923-24	59.71 14.24
5-41	Quincy	Plumas	39° 56′ 120° 55′	3,409	1895-96 1945-46	BC USWB	39.66	39.22	1906-07 1911-12	73.22 20.25
5-36	Storrie	Plumas	39° 54′ 121° 20′	1,760	1929-30 1946-47	BC PGE	64.61	63.93	1937-38 1938-39	103.02 36.65
5-30	Veramont	Plumas	40° 06′ 120° 50′	3,500	1920-21 1945-46	B PGE	31.77	33.01	1937-38 1923-24	52.43 14.54
5-132	Brighton	Sacramento	38° 33′ 121° 26′	53	1877-78 1898-99	BC USWB	16.59	13.48	1889-90 1881-82	28.44 9.22
5-133	Florin	Sacramento	38° 30′ 121° 24′	42	1925-26 1946-47	AB Private	17.08	16.71	1940-41 1938-39	26.92 9.99
5-134	Folsom	Sacramento	38° 39′ 121° 10′	252	1871-72 1946-47	BC USWB	23.91	23.70	1889-90 1876-77	43.31 10.19
5-150	Galt	Sacramento	38° 15′ 121° 18′	49	1878-79 1932-33	BC USWB	17.72	17.65	1889-90 1923-24	33.60 8.75
5-121	Represa	Sacramento	38° 41′ 121° 10′	305	1893-94 1944-45	BC USWB	24.31	23.94	1906-07 1923-24	43.12 11.54
5-131	Sacramento	Sacramento	38° 35′ 121° 30′	69	1849-50 1946-47	ABC USWB	18.08	16.37	1852-53 1850-51	36.35 4.71
5-244	Idria	San Benito	36° 25′ 120° 40′	3,000	1918-19 1946-47	BC USWB	15.26	15.64	1940-41 1919-20	35.74 6.46
5-171	Bellota	San Joaquin	38° 03′ 121° 00′	130	1911-12 1928-29	BC USWB	17.38	18.59	1913-14 1923-24	25.02 9.57
5-149	Benson's Ferry	San Joaquin	38° 14′ 121° 23′	17	1913-14 1946-47	BC USWB	14.97	15.20	1913-14 1923-24	24.71 8.36
5-151	Elliott	San Joaquin	38° 15′ 121° 12′	85	1926-27 1946-47	B USWB	16.35	16.65	1940-41 1930-31	23.76 10.06
5-177	Farmington	San Joaquin	37° 55′ 120° 59′	111	1877-78 1946-47	BC USWB	15.46	15.21	1889-90 1911-12	24.83 7.93
5-188	Lathrop	San Joaquin	37° 48′ 121° 19′	27	1897-98 1946-47	BC USWB	10.94	11.43	1940-41 1897-98	16.49 3.96
5-152	Lockeford	San Joaquin	38° 10′ 121° 09′	106	1926-27 1946-47	AB Private	15.94	16.24	1936-37 1930-31	23.04 9.96
5-169	Lodi	San Joaquin	38° 08′ 121° 16′	50	1888-89 1946-47	BC USWB	17.75	15.06	1889-90 1897-98	33.45 9.30

TABLE 54—Continued

AN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

	e	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
								Period of record	1897-1947	Season	Inches
5	0	Lodi No. 2	San Joaquin	38° 08′ 121° 16′	50	1912-13 1928-29	BC USWB	15.75	16.61	1915-16 1912-13	22.22 8.23
5	6	Stockton	San Joaquin	37° 57′ 121° 19′	15	1867-68 1946-47	ABC USWB	14.12	14.10	1906-07 1923-24	22.49 6.81
5	7	Tracy	San Joaquin	37° 44′ 121° 27′	54	1879-80 1944-45	BC USWB	9.67	9.55	1889-90 1916-17	21.92 4.59
5	8	Willms	San Joaquin	38° 08′ 121° 17′	45	1920-21 1937-38	B Private	16.91	18.15	1937-38 1930-31	22.88 11.12
	6	Big Bend	Shasta	41° 01′ 121° 55′	2,000	1927-28 1937-38	B Private	60.98	65.70	1937-38 1930-31	101.39 36.14
	2	Churn Creek	Shasta	40° 40′ 122° 25′	900	1915-16 1926-27	BC USWB	26.35	28.73	1920-21 1923-24	37.83 13.99
	0	Delta	Shasta	40° 56′ 122° 56′	1,138	1882-83 1920-21	BC USWB	63.72	63.59	1889-90 1887-88	124.47 25.50
	7	Fall River Mill	Shasta	41° 01′ 121° 28′	3,340	1923-24 1946-47	B USWB	18.48	18.82	1937-38 1938-39	30.08 10.42
	5	Hat Creek	Shasta	40° 46′ 121° 30′	3,400	1921-22 1946-47	B USWB	17.25	17.72	1942-43 1923-24	27.00 9.54
	3	Kennett	Shasta	40° 44′ 122° 24′	661	1907-08 1941-42	BC USWB	61.72	64.18	1940-41 1923-24	112.76 19.47
	4	Kilare Forebay	Shasta	40° 40′ 121° 51′	3,840	1921-22 1937-38	B PGE	38.38	43.94	1937-38 1923-24	61.37 21.87
	1	Montgomery Creek	Shasta	40° 51′ 121° 56′	2,180	1908-09 1918-19	BC USWB	54.08	53.58	1908-09 1916-17	73.35 36.90
	7	Redding	Shasta	40° 35′ 122° 24′	718	1875-76 1946-47	ABC USWB	37.79	37.76	1940-41 1897-98	68.87 15.66
	5	Shasta	Shasta	40° 36′ 122° 29′	1,049	1895-96 1911-12	BC USWB	53.80	50.91	1903-04 1897-98	78.60 25.37
	3	Volta	Shasta	40° 26′ 121° 52′	2,200	1919-20 1946-47	ABC USWB	31.93	31.43	1940-41 1938-39	51.21 18.28
	4	Downieville	Sierra	39° 34′ 120° 50′	2,460	1908-09 1946-47	AB USWB	59.36	60.30	1913-14 1923-24	85.15 25.78
	5	Sierraville	Sierra	39° 35′ 120° 22′	4,975	1909-10 1946-47	ABC USWB	23.39	24.23	1913-14 1923-24	43.80 8.23
	3	Dunsmuir	Siskiyou	41° 13′ 122° 16′	2,285	1889-90 1937-38	BC USWB	51.13	49.87	1889-90 1919-20	119.02 18.87
	4	McCloud	Siskiyou	41° 15′ 122° 08′	3,270	1910-11 1946-47	AB USWB	46.02	48.25	1940-41 1923-24	87.30 16.27
	2	Mt. Shasta	Siskiyou	41° 19′ 122° 19′	3,550	1888-89 1946-47	ABC USWB	34.75	34.44	1889-90 1923-24	73.47 13.85
5	9	Dixon	Solano	38° 27′ 121° 50′	79	1924-25 1946-47	A Private	17.28	17.56	1940-41 1938-39	35.11 7.07
5	7	Rio Vista	Solano	38° 09′ 121° 41′	22	1893-94 1946-47	BC USWB	17.24	16.98	1940-41 1923-24	27.34 8.10

TABLE 54—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
5-138	Vacaville	Solano	38° 21′ 122° 00′	175	1880-81 1946-47	BC USWB	25.47	24.24	1889-90 1938-39	50.06 9.90
5-206	Crows Landing	Stanislaus	37° 24′ 121° 06′	115	1899-00 1928-29	BD WSID	10.17	9.88	1906-07 1923-24	17.91 4.66
5-196	Denair	Stanislaus	37° 33′ 120° 47′	126	1899-00 1946-47	BC USWB	10.99	10.79	1937-38 1916-17	18.66 4.80
5-198	Hickman	Stanislaus	37° 37′ 121° 45′	165	1914-15 1925-26	B MID	11.67	12.27	1921-22 1923-24	16.58 5.12
5-200	La Grange	Stanislaus	37° 39′ 120° 28′	298	1868-69 1931-32	B USWB	16.44	17.10	1889-90 1876-77	30.34 5.74
5-195	Modesto	Stanislaus	37° 39′ 121° 00′	90	1871-72 1946-47	B USWB	11.02	11.37	1906-07 1912-13	19.04 3.58
5-190	Montepellier	Stanislaus	37° 33′ 120° 42′	225	1903-04 1926-27	B Private	12.51	13.66	1905-06 1923-24	18.95 5.49
5-210	Newman	Stanislaus	37° 19′ 121° 02′	91	1889-90 1946-47	BCD USWB	10.35	10.02	1889-90 1923-24	23.67 4.16
5-178	Oakdale	Stanislaus	37° 51′ 120° 53′	215	1880-81 1942-43	BC USWB	14.00	13.86	1906-07 1912-13	22.62 6.42
5-205	Patterson	Stanislaus	37° 28′ 121° 08′	100	1912-13 1930-31	B SOCo.	9.60	9.84	1914-15 1923-24	15.21 3.86
5-207	Turlock	Stanislaus	37° 29′ 120° 49′	105	1893-94 1943-44	BC USWB	11.98	11.83	1906-07 1897-98	17.38 5.38
5-197	Waterford	Stanislaus	37° 38′ 120° 45′	160	1903-04 1928-29	B Private	12.95	14.03	1906-07 1923-24	18.92 4.91
5-194	Westley	Stanislaus	37° 33′ 121° 12′	90	1889-90 1917-18	BC USWB	10.68	10.53	1913-14 1912-13	17.23 3.96
5-107	Nicolaus	Sutter	38° 54′ 121° 35′	46	1912-13 1946-47	BCD USWB	17.77	18.32	1940-41 1912-13	32.46 7.07
5-106	Robbins	Sutter	38° 52′ 121° 43′	20	1922-23 1940-41	BC SBCo.	17.18	16.81	1940-41 1930-31	31.93 9.51
5-31	Corning Observer	Tehama	39° 50′ 122° 08′	275	1880-81 1946-47	AB Private	21.06	20.18	1940-41 1897-98	46.34 9.11
5-26	Los Molinos	Tehama	40° 01′ 122° 06′	215	1924-25 1945-46	B Private	20.33	22.07	1937-38 1932-33	31.83 12.52
5-19	Mineral	Tehama	40° 21′ 121° 36′	4,850	1929-30 1946-47	A USWB	48.78	49.95	1937-38 1938-39	84.57 23.75
5-24	Red Bluff	Tehama	40° 09′ 122° 15′	341	1877-78 1946-47	ABC USWB	23.96	23.09	1877-78 1919-20	53.26 11.27
5-25	Tehama	Tehama	40° 02′ 121° 08′	220	1871-72 1915-16	AB USWB	20.21	19.21	1892-93 1874-75	51.98 5.95
5-32	Vina-Stanford	Tehama	39° 56′ 122° 03′	150	1916-17 1944-45	B Private	21.36	22.83	1940-41 1923-24	46.80 9.84
5-270	Angiola	Tulare	35° 59′ 119° 29′	208	1899-00 1945-46	BC USWB	7.47	7.28	1940-41 1902-03	12.50 3.15

TABLE 54—Continued

AN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

e	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
5 8	Ash Mountain	Tulare	36° 29′ 118° 50′	1,600	1925-26 1946-47	BC USWB	26.56	25.36	1937-38 1933-34	41.17 13.18
5 1	Dinuba	Tulare	36° 33′ 119° 23′	333	1909-10 1944-45	BC USWB	11.09	11.76	1934-35 1923-24	17.55 5.12
5 3	Giant Forest	Tulare	36° 34′ 118° 46′	6,360	1921-22 1946-47	ABC USWB	42.61	40.77	1937-38 1923-24	65.70 21.88
5 5	Goshen	Tulare	36° 21′ 119° 26′	286	1879-80 1899-00	BC USWB	7.83	7.62	1883-84 1897-98	12.46 2.79
5 7	Hill's Orchard	Tulare	36° 01′ 118° 57′	700	1924-25 1946-47	B Private	10.89	10.73	1936-37 1933-34	19.03 5.90
5 2	Hot Springs	Tulare	35° 33′ 118° 40′	3,300	1907-08 1934-35	BC USWB	23.24	24.40	1908-09 1933-34	38.59 12.88
5 8	Lemon Cove	Tulare	36° 23′ 119° 01′	600	1899-00 1946-47	BCD USWB	14.59	14.40	1905-06 1923-24	27.58 6.24
5 8	Lindsay	Tulare	36° 13′ 119° 06′	384	1914-15 1946-47	BCD USWB	11.01	10.87	1940-41 1923-24	18.06 4.94
5 9	Milo	Tulare	36° 13′ 118° 49′	1,600	1898-99 1921-22	BC USWB	22.21	21.84	1905-06 1911-12	42.06 13.65
5 5	Porterville	Tulare	36° 03′ 119° 01′	464	1889-90 1946-47	BC USWB	10.39	10.50	1905-06 1923-24	17.90 5.27
5 5	Sierra Vista Ranch	Tulare	35° 48′ 119° 11′	404	1926-27 1946-47	B Private	8.11	7.74	1940-41 1946-47	14.13 3.78
5 0	Springville	Tulare	36° 12′ 118° 39′	4,050	1908-09 1946-47	B PGE	36.34	35.70	1915-16 1912-13	62.65 14.29
5 3	Springville Ranger Station	Tulare	36° 08′ 118° 48′	1,050	1924-25 1946-47	AB USWB	16.92	17.03	1936-37 1933-34	29.17 9.02
5 1	Terra Bella	Tulare	35° 58′ 119° 03′	490	1924-25 1946-47	AB Private	8.85	8.45	1937-38 1929-30	14.49 4.74
5 7	Three Rivers	Tulare	36° 28′ 118° 51′	1,190	1909-10 1946-47	ABC USWB	20.08	20.14	1937-38 1923-24	32.05 8.19
5 5	Tulare	Tulare	36° 12′ 119° 21′	289	1874-75 1920-21	BC USWB	8.35	9.13	1905-06 1878-79	14.78 3.07
5 5	Tulare (near)	Tulare	36° 12′ 119° 22′	274	1893-94 1908-09	BC USWB	9.13	8.92	1905-06 1897-98	13.97 5.13
5 7	Visalia	Tulare	36° 19′ 119° 18′	334	1877-78 1946-47	BCD USWB	9.87	9.72	1937-38 1878-79	16.60 3.95
5 2	Crockers	Tuolumne	37° 48′ 119° 54′	4,452	1896-97 1909-10	BC USWB	55.08	49.27	1905-06 1897-98	83.54 31.37
5 4	Early Intake	Tuolumne	37° 52′ 119° 58′	2,356	1925-26 1946-47	B SFPUC	32.81	33.65	1937-38 1930-31	52.39 21.09
5 3	Groveland	Tuolumne	37° 50′ 120° 13′	1,400	1929-30 1944-45	BC USWB	35.63	35.65	1937-38 1930-31	57.23 20.76
5 8	Hetch Hetchy	Tuolumne	37° 56′ 119° 47′	4,050	1911-12 1946-47	ABC USWB	33.09	34.93	1937-38 1923-24	55.62 17.03

TABLE 54—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
5-182	Jacksonville	Tuolumne	37° 51′ 120° 22′	700	1907-08 1916-17	BC USWB	26.98	26.47	1910-11 1907-08	37.49 15.31
5-180	Jamestown	Tuolumne	37° 57′ 120° 55′	1,471	1903-04 1914-15	B USWB	33.68	30.16	1906-07 1912-13	48.49 17.49
5-185	Lake Eleanor	Tuolumne	37° 57′ 119° 53′	4,650	1910-11 1946-47	BC USWB	41.44	42.99	1937-38 1923-24	64.61 20.83
5-179	Melones	Tuolumne	37° 58′ 120° 31′	741	1907-08 1926-27	BC USWB	27.56	29.42	1908-09 1923-24	43.57 13.06
5-189	Moccasin	Tuolumne	37° 49′ 120° 18′	950	1935-36 1946-47	BC PGE	29.14	26.65	1937-38 1946-47	41.20 18.71
5-190	Priest	Tuolumne	37° 49′ 120° 16′	2,245	1928-29 1946-47	B SFPUC	26.60	26.70	1937-38 1930-31	40.25 16.57
5-162	Sand Bar	Tuolumne	38° 11′ 120° 09′	2,700	1922-23 1938-39	B PGE	37.73	41.28	1937-38 1923-24	65.00 17.93
5-181	Sonora	Tuolumne	37° 58′ 120° 24′	1,825	1887-88 1946-47	BC USWB	32.90	32.00	1889-90 1923-24	67.39 13.67
5-163	Spring Gap	Tuolumne	38° 11′ 120° 06′	4,875	1922-23 1939-40	B PGE	41.40	44.48	1939-40 1923-24	76.88 22.39
5-164	Strawberry Dam	Tuolumne	38° 11′ 119° 59′	5,620	1922-23 1946-47	B PGE	37.49	39.19	1937-38 1923-24	70.42 17.94
5-114	Brooks	Yolo	38° 44′ 122° 09′	350	1921-22 1946-47	ABC USWB	20.35	20.15	1940-41 1923-24	44.86 9.61
5-115	Capay	Yolo	38° 42′ 122° 07′	300	1889-90 1946-47	AB Private	22.67	21.95	1940-41 1919-20	47.31 9.92
5-140	Clarksburg	Yolo	38° 25′ 121° 32′	14	1936-37 1946-47	BC USWB	17.94	14.81	1940-41 1938-39	28.41 9.20
5-130	Davis	Yolo	38° 33′ 121° 45′	54	1878-79 1946-47	ABC USWB	16.84	16.29	1889-90 1929-30	37.41 3.90
5-105	Dunnigan	Yolo	38° 53′ 121° 58′	65	1877-78 1946-47	BC USWB	19.46	18.13	1889-90 1911-12	37.45 8.45
5-116	Esparto	Yolo	38° 42′ 122° 01′	192	1915-16 1937-38	B Private	16.45	17.78	1937-38 1930-31	28.25 8.31
5-104	Guinda	Yolo	38° 50′ 122° 12′	350	1893-94 1937-38	B Private	20.58	20.94	1913-14 1923-24	36.90 9.92
5-118	Knights Landing	Yolo	38° 48′ 121° 43′	35	1878-79 1946-47	BC USWB	17.29	16.83	1889-90 1938-39	33.29 6.64
5-129	Stites Ranch	Yolo	38° 38′ 121° 57′	70	1898-99 1937-38	B Private	17.84	17.76	1913-14 1912-13	30.61 8.58
5-127	West Winters	Yolo	38° 31′ 122° 02′	150	1907-08 1938-39	B Private	19.68	20.95	1913-14 1912-13	37.03 7.37
5-128	Winters	Yolo	38° 31′ 121° 58′	140	1921-22 1937-38	B Private	17.57	19.06	1937-38 1923-24	28.94 8.32
5-117	Woodland	Yolo	38° 41′ 121° 46′	63	1873-74 1946-47	BC USWB	17.10	16.37	1940-41 1897-98	33.52 6.43

TABLE 54—Continued

EAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

(For Explanatory Notes, See End of Table)

o. n ate	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
76	Camptonville	Yuba......	39° 27′ 121° 03′	2,850	1907-08 1946-47	ABC USWB	61.86	64.17	1908-09 1923-24	108.30 30.13
75	Chute Camp (Head Dam)	Yuba......	39° 24′ 121° 09′	1,250	1907-08 1939-40	BC USWB	52.54	54.74	1937-38 1923-24	78.17 23.87
73	Colgate......	Yuba......	39° 20′ 121° 11′	700	1907-08 1946-47	BC USWB	39.17	39.92	1940-41 1923-24	56.61 18.51
74	Dobbins......	Yuba......	39° 22′ 121° 10′	1,650	1904-05 1945-46	BC USWB	40.84	41.03	1906-07 1923-24	64.28 20.13
07	Marysville....	Yuba......	39° 08′ 121° 24′	61	1871-72 1946-47	B USWB	19.89	20.68	1889-90 1884-85	38.91 8.15
08	Wheatland...	Yuba......	39° 01′ 121° 25′	84	1887-88 1944-45	BC USWB	22.08	20.84	1889-90 1887-88	33.69 11.07

ABBREVIATIONS—CENTRAL VALLEY AREA

TYPE OF RECORD

Abbreviation	*Name*	*Abbreviation*	*Name*
A	Hourly	C	Monthly
B	Daily	D	Seasonal

SOURCE OF RECORD

Abbreviation	*Name*
AO Co.	Associated Oil Co.
CFA	County Farm Adviser.
EBMUD	East Bay Municipal Utility District
F&RESB	Forest and Range Experiment Station, Berkeley
KCL Co.	Kern County Land Co.
MID	Modesto Irrigation District
PGE	Pacific Gas and Electric Co.
R Sta.	Ranger Station
SB Co.	Sutter Basin Co.
SFPUC	San Francisco Public Utilities Commission
SO Co.	Standard Oil Co.
T&TMID	Thermalito and Table Mountain Irrigation District
UO Co.	Union Oil Co.
USWB	United States Weather Bureau
WSID	West Stanislaus Irrigation District

TABLE 55

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, CENTRAL VALLEY AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
5-004	Fiddletown (near)	Amador	38° 31′ 120° 41′	2,000	Dec. 1937 June 1947	USWB
5-148*	Tiger Creek	Amador	38° 27′ 120° 29′	2,341	Dec. 1940 June 1947	PGE
5-006	Brush Creek	Butte	39° 41′ 121° 20′	3,500	Sept. 1941 June 1947	USWB
5-011	Chico (near)	Butte	39° 42′ 121° 48′	189	June 1942 June 1947	USWB
5-27*	Inskip	Butte	40° 00′ 121° 32′	4,818	Oct. 1940 June 1947	USWB
5-014	Oroville (near)	Butte	39° 31′ 121° 34′	400	Jan. 1940 June 1947	State Div. of For.
5-020	Calaveras Ranger Station	Calaveras	38° 12′ 120° 22′	3,343	Jan. 1944 June 1947	USFS
5-154*	Camp Pardee	Calaveras	38° 14′ 120° 50′	658	Oct. 1941 June 1947	EBMUD
5-159*	Fricot City	Calaveras	38° 11′ 120° 32′	1,900	Oct. 1926 June 1938	USWB
5-024	Arbuckle	Colusa	39° 01′ 122° 04′	150	Aug. 1940 Mar. 1945	USWB
5-030	Williams Airport	Colusa	39° 06′ 122° 09′	129	April 1945 June 1947	CAA
5-033	Camino (near)	El Dorado	38° 45′ 120° 39′	3,100	Sept. 1933 Oct. 1946	USWB
5-110*	Georgetown	El Dorado	38° 55′ 120° 50′	2,060	Dec. 1937 June 1947	USWB
5-037	Grizzly Flats	El Dorado	38° 38′ 120° 32′	3,900	Oct. 1940 June 1947	USWB
5-039	Kyburz (near)	El Dorado	38° 48′ 120° 08′	5,800	Aug. 1941 June 1947	USWB
5-040	Mt. Danaher	El Dorado	38° 45′ 120° 41′	3,408	Dec. 1946 June 1947	State Div. of For.
5-043	Placerville (near)	El Dorado	38° 44′ 120° 52′	2,550	Dec. 1935 June 1947	SCS
5-052	Big Creek No. 2	Fresno	36° 55′ 119° 15′	1,070	Jan. 1940 May 1946	USWB
5-053	Coalinga (near)	Fresno	36° 08′ 120° 20′	663	Jan. 1940 June 1947	Union Oil Co.
5-055	Dunlap	Fresno	36° 44′ 119° 06′	1,950	Mar. 1940 June 1947	USWB
5-058	Florence Lake	Fresno	37° 16′ 118° 58′	7,350	Sept. 1940 June 1947	USWB
5-233*	Fresno	Fresno	36° 44′ 119° 49′	277	1929 June 1947	USWB
5-227*	Friant	Fresno	36° 59′ 119° 42′	380	1938 June 1947	USWB
5-060	Grant Grove	Fresno	36° 46′ 118° 58′	6,660	Dec. 1942 June 1947	NPS
5-061	Horshoe Bend	Fresno	36° 49′ 118° 50′	3,250	April 1940 July 1941	USFS
5-216*	Huntington Lake	Fresno	37° 13′ 119° 14′	7,020	Aug. 1942 June 1947	S. Calif. Ed. Co.
5-231*	Mendota (near)	Fresno	36° 47′ 120° 22′	168	Jan. 1941 June 1947	USWB
5-068	Teakettle Creek	Fresno	36° 57′ 119° 02′	7,100	Oct. 1940 July 1942	USWB
5-071	Stony Gorge Reservoir	Glenn	39° 35′ 122° 32′	800	April 1946 June 1947	USBR
5-287*	Bakersfield	Kern	35° 25′ 119° 03′	489	Oct. 1940 June 1947	USWB
5-276*	Glennville (near)	Kern	35° 44′ 118° 40′	3,270	April 1940 June 1947	USWB

TABLE 55—Continued

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, CENTRAL VALLEY AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
5-080	Loraine	Kern	35° 18′ 118° 26′	3,000	Aug. 1941 June 1947	USWB
5-279*	Lost Hills	Kern	35° 36′ 119° 41′	285	Mar. 1940 June 1947	State Div. of For.
5-084	Piute	Kern	35° 22′ 118° 23′	3,750	April 1940 Aug. 1941	USWB
5-087	Taft	Kern	35° 08′ 119° 28′	1,025	May 1940 June 1947	USWB
5-300*	Tehachapi	Kern	35° 08′ 118° 27′	3,960	Aug. 1940 June 1947	USWB
5-088	Weldon	Kern	35° 40′ 118° 17′	2,650	Aug. 1940 June 1947	USWB
5-265*	Corcoran	Kings	36° 06′ 119° 33′	200	April 1940 June 1947	USWB
5-093	Clear Lake Park	Lake	38° 59′ 122° 41′	1,300	Mar. 1940 June 1947	USWB
5-8*	Bieber	Lassen	41° 07′ 121° 08′	4,169	April 1940 June 1947	USWB
5-0105	Madeline No. 2	Lassen	41° 03′ 120° 28′	5,314	Oct. 1940 Oct. 1945	USWB
5-23*	Westwood	Lassen	40° 18′ 121° 00′	5,080	Jan 1941 June 1947	USWB
5-0106	Bass Lake	Madera	37° 18′ 119° 33′	3,300	Jan. 1940 May 1946	USFS
5-215*	North Fork	Madera	37° 14′ 119° 30′	3,000	Nov. 1930 Mar. 1946	USFS
5-0113	Cathay (near)	Mariposa	37° 24′ 120° 04′	1,425	April 1940 June 1947	USWB
5-0118	Wawona No. 2	Mariposa	37° 33′ 119° 39′	4,100	Sept. 1940 June 1947	NPS
5-193*	Yosemite	Mariposa	37° 45′ 119° 35′	3,985	Sept. 1940 June 1947	NPS
5-211*	Merced	Merced	37° 19′ 120° 29′	170	Nov. 1938 June 1947	USWB
5-0122	San Joaquin Experimental Range	Merced	37° 05′ 119° 44′	100	Dec. 1934 June 1947	USWB
5-0123	Stayton Mine	Merced	36° 55′ 121° 14′	3,020	Dec. 1939 June 1947	USWB
5-1*	Alturas	Modoc	41° 29′ 120° 32′	4,346	April 1940 June 1947	USFS
5-0124	Day	Modoc	41° 13′ 121° 23′	3,800	Oct. 1940 June 1947	USWB
5-78*	Bowman Dam	Nevada	39° 27′ 120° 39′	5,347	Jan. 1940 June 1947	Nev. Irr. Dist.
5-0133	Nevada City (near) No. 2	Nevada	39° 16′ 121° 01′	2,850	Aug. 1940 June 1947	USWB
5-0135	Snow Laboratory	Nevada	39° 20′ 120° 22′	6,902	Nov. 1946 June 1947	USWB
5-92*	Soda Springs	Nevada	39° 19′ 120° 23′	6,752	Oct. 1940 June 1947	USWB
5-89*	Blue Canyon	Placer	39° 17′ 120° 42′	5,283	April 1945 June 1947	USWB
5-90*	Emigrant Gap	Placer	39° 18′ 120° 39′	5,220	Oct. 1941 April 1945	USWB
5-0138	Michigan Bluff	Placer	39° 02′ 120° 45′	3,200	Sept. 1940 June 1947	USWB
5-37*	Buck's Lake	Plumas	39° 54′ 121° 12′	5,000	Oct. 1941 June 1947	PGE
5-54*	Portola	Plumas	39° 48′ 120° 28′	5,000	Sept. 1940 June 1947	USWB

TABLE 55—Continued

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, CENTRAL VALLEY AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
5-131*	Sacramento	Sacramento	38° 35′ 121° 30′	69	June 1905 June 1947	USWB
5-0154	Sacramento (Airport)	Sacramento	38° 31′ 121° 30′	25	Mar. 1939 June 1947	USWB
5-176*	Stockton	San Joaquin	37° 57′ 121° 19′	15	Dec. 1938 June 1947	USWB
5-0167	Tracy (near)	San Joaquin	37° 50′ 121° 27′	13	April 1940 June 1947	USWB
5-0171	Hat Creek (near)	Shasta	40° 48′ 121° 31′	3,360	April 1940 June 1947	U.S. Bur. of Ent.
5-0175	Montgomery Creek (near)	Shasta	40° 49′ 121° 57′	2,180	Oct. 1940 June 1947	USWB
5-17*	Redding	Shasta	40° 35′ 122° 24′	718	Jan. 1940 June 1947	USWB
5-0180	Shasta Dam	Shasta	40° 43′ 122° 25′	785	Jan. 1939 June 1947	USBR
5-0181	Vollmers	Shasta	40° 57′ 122° 26′	1,332	Sept. 1937 June 1947	USWB
5-18*	Volta	Shasta	40° 27′ 121° 52′	2,200	Oct. 1940 June 1947	PGE
5-64*	Downieville	Sierra	39° 34′ 120° 50′	2,460	Sept. 1940 June 1947	USFS
5-65*	Sierraville	Sierra	39° 35′ 120° 22′	4,975	Nov. 1940 June 1947	USFS
5-4*	McCloud	Siskiyou	41° 15′ 122° 08′	3,270	May 1940 June 1947	USWB
5-2*	Mount Shasta	Siskiyou	41° 19′ 122° 19′	3,550	Sept. 1940 June 1947	USWB
5-0190	Vacaville (near)	Solano	38° 25′ 122° 01′	450	Dec. 1935 Dec. 1942	SCS
5-0192	Modesto No. 2	Stanislaus	37° 37′ 121° 01′	92	Mar. 1942 June 1947	USWB
5-0201	Beegum	Tehama	40° 21′ 122° 51′	1,283	Jan. 1940 June 1947	USWB
5-19*	Mineral	Tehama	40° 21′ 121° 36′	4,850	Sept. 1940 June 1947	NPS
5-24*	Red Bluff	Tehama	40° 09′ 122° 15′	341	Dec. 1939 June 1947	USWB
5-0207	Badger	Tulare	36° 38′ 119° 01′	3,000	Mar. 1940 June 1947	USWB
5-0208	California Hot Springs	Tulare	35° 54′ 118° 41′	3,000	Mar. 1940 June 1947	USFS
5-0209	Camp Wishon	Tulare	36° 13′ 118° 40′	4,200	Mar. 1940 June 1947	USWB
5-0213	Exeter (near)	Tulare	36° 21′ 119° 05′	435	Dec. 1938 June 1940	USWB
5-243*	Giant Forest	Tulare	36° 34′ 118° 46′	6,360	Sept. 1940 June 1947	NPS
5-268*	Springville Ranger Station	Tulare	36° 08′ 118° 48′	1,050	Mar. 1940 June 1947	USFS
5-247*	Three Rivers	Tulare	36° 28′ 118° 51′	1,190	Sept. 1940 June 1947	State Div. of For.
5-0221	Groveland No. 2	Tuolumne	37° 50′ 120° 13′	2,800	Sept. 1941 June 1947	USWB
5-186*	Hetch Hetchy	Tuolumne	37° 56′ 119° 47′	4,050	Sept. 1940 June 1947	SFPUC
5-0222	Long Barn	Tuolumne	38° 11′ 120° 01′	5,200	Oct. 1940 June 1947	Cal. For. Range Exp. Station

TABLE 55—Continued

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, CENTRAL VALLEY AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
5-114*	Brooks	Yolo	38° 44′ 122° 09′	350	Mar. 1941 June 1947	USWB
5-130*	Davis	Yolo	38° 33′ 121° 45′	54	April 1926 June 1947	Univ. of Calif.
5-76*	Camptonville	Yuba	39° 27′ 121° 03′	2,850	Dec. 1937 June 1947	USFS
5-0233	Wheatland (near)	Yuba	39° 02′ 121° 24′	113	Aug. 1940 June 1947	USWB

SOURCE OF RECORD

Abbreviation	*Name*
USWB	United States Weather Bureau
PGE	Pacific Gas & Electric Co.
EBMUD	East Bay Municipal Utility District
USFS	United States Forest Service
USBR	United States Bureau of Reclamation
SCS	Soil Conservation Service
NPS	National Park Service
State Div. of For.	Division of Forestry, California Department of Natural Resources
CAA	Civil Aeronautics Administration Airway Communication Station
S. Calif. Ed. Co.	Southern California Edison Company
Nev. Irr. Dist.	Nevada Irrigation District
U. S. Bur. of Ent.	United States Bureau of Entomology
SFPUC	San Francisco Public Utilities Commission
Cal. For. Range Exp. Station	California Forest and Range Experiment Station
Univ. of Calif.	University of California

TABLE 56

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL VALLEY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
5-001	Blue Lakes	Alpine	38° 37′ 119° 56′	8,000	1938-43	C
5-002	Tamarack	Alpine	38° 37′ 119° 57′	8,060	1905-17	Broken record B
5-003	Child Ranch	Amador	38° 14′ 120° 59′	120	1932-38	B
5-004	Fiddletown (near)	Amador	38° 31′ 120° 41′	2,000	1937-47	A
5-005	Abertine	Butte	40° 04′ 121° 27′	5,700	1910-12	B
5-006	Brush Creek (Ranger Station)	Butte	39° 41′ 121° 20′	3,500	1935-39 1941-47	B, A
5-007	Butte Creek House	Butte	40° 06′ 121° 25′	5,600	1909-11	B
5-008	Cherokee	Butte	39° 38′ 121° 33′	900	1881-85	B
5-009	Chico Army Flying School	Butte	39° 49′ 121° 51′	200	1942-45	A
5-010	Chico (M & T Inc.)	Butte	39° 42′ 121° 56′	150	1937-41	B
5-011	Chico (near)	Butte	39° 42′ 121° 48′	189	1909-16 1942-47	B, A
5-012	Dodgeland	Butte	39° 33′ 121° 53′	100	1919-23	B
5-013	Oroville (McDermott)	Butte	39° 30′ 121° 33′	205	1880-82	B
5-014	Oroville (near)	Butte	39° 31′ 121° 34′	400	1940-47	A
5-015	Oroville (State Forestry)	Butte	39° 31′ 121° 34′	200	1940-47	B
5-016	Pulga	Butte	39° 49′ 121° 28′	1,430	1929-30	B
5-017	Thermalito	Butte	39° 31′ 121° 36′	200	1898-1901	B
5-018	Angels Camp No. 1	Calaveras	38° 04′ 120° 32′	1,400	1900-09	C
5-019	Calaveras Big Trees No. 2	Calaveras	38° 17′ 120° 18′	4,700	1940-47	A
5-020	Calaveras Ranger Station	Calaveras	38° 12′ 120° 22′	3,343	1915-47	Broken record B, A
5-021	Mitchell Mill	Calaveras	38° 22′ 120° 26′	2,800	1914-17	B
5-022	North Hill Vineyard	Calaveras	38° 02′ 120° 51′	600	1897-1903	B
5-023	Valley Springs No. 1	Calaveras	38° 11′ 120° 50′	673	1897-1911	Broken record B
5-024	Arbuckle	Colusa	39° 01′ 122° 04′	150	1940-45	A
5-025	Fouts Spring	Colusa	39° 21′ 122° 40′	1,560	1907-13	B
5-026	Grand Island	Colusa	39° 04′ 121° 52′	50	1896-1902	B
5-027	Princeton	Colusa	39° 24′ 122° 00′	67	1880-82	B
5-028	Stonyford-Rice	Colusa	39° 22′ 122° 32′	1,240	1936-39	B
5-029	Wilkins Slough	Colusa	39° 01′ 121° 50′	35	1939-41	B
5-030	Williams Airport	Colusa	39° 06′ 122° 09′	129	1940-47	Broken record A
5-031	Brentwood	Contra Costa	37° 56′ 121° 42′	80	1897-1900	B

TABLE 56—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL VALLEY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
5-032	Byron	Contra Costa	37° 52′ 121° 38′	33	1897-1906	B
5-033	Camino (near)	El Dorado	38° 45′ 120° 39′	3,100	1940-46	A
5-034	El Dorado	El Dorado	38° 43′ 120° 49′	1,600	1897-1905	B
5-035	El Dorado Power House	El Dorado	38° 47′ 120° 38′	1,900	1935-39	B
5-036	Georgetown Ranger Station	El Dorado	38° 55′ 120° 48′	3,004	1939-40	B
5-037	Grizzly Flats	El Dorado	38° 38′ 120° 32′	3,900	1940-47	A
5-038	Kyburz	El Dorado	38° 47′ 120° 18′	4,080	1940-47	Broken record A
5-039	Kyburz (near)	El Dorado	38° 48′ 120° 08′	5,800	1941-47	A
5-040	Mt. Danaher	El Dorado	38° 45′ 120° 41′	3,408	1946-47	A
5-041	Phillips	El Dorado	38° 49′ 120° 04′	7,000	1929-33	B
5-042	Pino Grande	El Dorado	38° 52′ 120° 38′	4,200	1903-05	B
5-043	Placerville (near)	El Dorado	38° 44′ 120° 52′	2,550	1940-47	A
5-044	Placerville Forest Genetics	El Dorado	38° 44′ 120° 44′	2,760	1929-37	B
5-045	Rasor's Lodge	El Dorado	38° 56′ 120° 45′	3,000	1929-37	B
5-046	Shingle Springs No. 2	El Dorado	38° 40′ 120° 56′	1,415	1897-1912	Broken record B
5-047	Tallac	El Dorado	38° 56′ 120° 03′	6,230	1910-14	D
5-048	Alcade	Fresno	36° 06′ 120° 27′	1,000	1894-99	C
5-049	Associated Oil No. 2H	Fresno	36° 07′ 120° 34′	1,500	1923-29	B
5-050	Associated Oil A	Fresno	36° 17′ 120° 20′	1,200	1923-31	B
5-051	Barton's Resort	Fresno	36° 49′ 118° 53′	3,600	1941-42	A
5-052	Big Creek No. 2	Fresno	36° 55′ 119° 15′	1,070	1940-46	A
5-053	Coalinga (near)	Fresno	36° 08′ 120° 20′	663	1940-47	A
5-054	Coalinga Pump	Fresno	36° 11′ 120° 21′	800	1938-39	B
5-055	Dunlap	Fresno	36° 44′ 119° 06′	1,950	1940-47	A
5-056	Dunlap (near)	Fresno	36° 44′ 119° 06′	2,100	1911-16	B
5-057	Firebaugh (near)	Fresno	36° 51′ 120° 29′	170	1940-41	A
5-058	Florence Lake	Fresno	37° 16′ 118° 58′	7,350	1940-47	A
5-059	General Grant National Park	Fresno	36° 46′ 118° 58′	6,660	1939-41	B
5-060	Grant Grove	Fresno	36° 46′ 118° 58′	6,660	1942-47	A
5-061	Horseshoe Bend	Fresno	36° 49′ 118° 50′	3,250	1940-41	A
5-062	Hume No. 1	Fresno	36° 48′ 118° 55′	5,300	1913-17	B
5-063	Hume No. 2	Fresno	36° 48′ 118° 55′	5,300	1930-31	B

TABLE 56—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL VALLEY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
5-064	Kingsburg	Fresno	36° 31′ 119° 33′	301	1929-33	B
5-065	McMullin	Fresno	36° 39′ 119° 58′	225	1897-98	B
5-066	Orange Cove	Fresno	36° 37′ 119° 19′	431	1932-39	B
5-067	Stevenson Creek	Fresno	37° 10′ 119° 20′	4,250	1916-18	B
5-068	Teakettle Creek	Fresno	36° 57′ 119° 02′	7,100	1940-42	A
5-069	Westhaven	Fresno	36° 14′ 120° 00′	285	1926-39	Broken record B
5-070	Mills Orchard	Glenn	39° 44′ 122° 02′	240	1937-39	B
5-071	Stony Gorge Reservoir	Glenn	39° 35′ 122° 32′	800	1946-47	A
5-072	Carneras	Kern	35° 32′ 119° 48′	729	1931-39	B
5-073	DiGiorgio Farm	Kern	35° 15′ 118° 51′	450	1938-39	B
5-074	Famosa	Kern	35° 37′ 119° 12′	400	1896-98	B
5-075	Fort Tejon	Kern	34° 53′ 118° 55′	3,245	1896-1900	B
5-076	Calloway Canal	Kern	35° 29′ 119° 10′	400	1896-99	B
5-077	Girard No. 2	Kern	35° 11′ 118° 30′	3,400	1889-95	C
5-078	Glenville (near, No. 2)	Kern	35° 44′ 118° 41′	3,540	1940-47	A
5-079	Keene Ranger Station	Kern	35° 13′ 118° 34′	2,500	1944-46	B
5-080	Loraine	Kern	35° 18′ 118° 26′	3,000	1941-47	A
5-081	McClung Ranch	Kern	35° 21′ 119° 11′	350	1879-82	B
5-082	McKittrick	Kern	35° 19′ 119° 39′	1,005	1930-39	B
5-083	Mt. Breckenridge	Kern	35° 27′ 118° 35′	7,500	1896-97	B
5-084	Piute	Kern	35° 22′ 118° 23′	3,750	1940-41	A
5-085	Rio Bravo	Kern	35° 23′ 119° 18′	314	1880-82	B
5-086	Sunset (Union Oil Co.)	Kern	35° 06′ 119° 23′	639	1931-39	B
5-087	Taft	Kern	35° 08′ 119° 28′	1,025	1940-47	A
5-088	Weldon	Kern	35° 40′ 118° 17′	2,650	1940-47	A
5-089	Kettleman	Kings	36° 00′ 119° 57′	300	1929-32	B
5-090	Tar Canyon	Kings	35° 59′ 120° 09′	826	1931-39	B
5-091	Cellier Place	Lake	38° 47′ 122° 42′	1,950	1937-39	B
5-092	Clear Lake Park	Lake	38° 58′ 122° 40′	1,350	1923-28	B
5-093	Clear Lake Park	Lake	38° 59′ 122° 41′	1,300	1940-47	A
5-094	Harbin Hot Springs	Lake	38° 47′ 122° 39′	1,950	1933-39	B

TABLE 56—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL VALLEY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
5-095	Hopland (near, No. 1)	Lake	39° 01′ 123° 00′	2,500	1944-47	A
5-096	Lindblooms	Lake	38° 45′ 122° 38′	1,100	1922-31	B
5-097	Middletown	Lake	38° 45′ 122° 37′	1,105	1896-98 1941-47	B
5-098	North Lakeport	Lake	39° 03′ 122° 55′	1,450	1909-13 1917-18	B
5-099	Ruppert	Lake	39° 10′ 122° 41′	2,092	1933-39	B
5-0100	Simons Ranch	Lake	38° 47′ 122° 44′	2,500	1938-39	B
5-0101	Sulphur Banks	Lake	39° 00′ 122° 40′	1,350	1917-23	B
5-0102	Twin Valley	Lake	39° 00′ 122° 50′	2,200	1916-18	B
5-0103	Upper Lake No. 1	Lake	39° 10′ 122° 55′	1,343	1897-02 1910-11	B
5-0104	Upper Lake No. 2	Lake	39° 10′ 122° 55′	1,343	1925-29 1935-39	B, D
5-0105	Madeline No. 2	Lassen	41° 03′ 120° 28′	5,314	1930-33 1940-45	A, B
5-0106	Bass Lake	Madera	37° 18′ 119° 33′	3,300	1940-46	A
5-0107	Berenda	Madera	37° 02′ 120° 10′	256	1897- 1900	B
5-0108	Buchanan	Madera	37° 12′ 120° 00′	450	1879-82	B
5-0109	Minturn	Madera	37° 08′ 120° 16′	240	1898- 1900	B
5-0110	Raymond	Madera	37° 13′ 119° 55′	950	1898-99	B
5-0111	Vignola Ranch	Madera	37° 11′ 120° 00′	440	1933-38	B
5-0112	San Rafael No. 2	Marin	37° 58′ 122° 32′	50	1903-04	B
5-0113	Cathay (near)	Mariposa	37° 24′ 120° 04′	1,425	1940-47	A
5-0114	Exchequer	Mariposa	37° 35′ 120° 16′	490	1935-39	B
5-0115	Fish Camp	Mariposa	37° 29′ 119° 38′	5,000	1929-33	B
5-0116	Kinsley	Mariposa	37° 42′ 119° 59′	2,800	1914-17	B
5-0117	Wawona	Mariposa	37° 33′ 119° 41′	3,960	1936-39	B
5-0118	Wawona No. 2	Mariposa	37° 33′ 119° 39′	4,100	1940-47	A
5-0119	Central Point	Merced	37° 04′ 120° 53′	117	1879- 1886	B
5-0120	Livingston No. 1	Merced	37° 23′ 120° 43′	130	1897-99	B
5-0121	Los Banos Valley	Merced	36° 52′ 120° 55′	862	1932-39	B
5-0122	San Joaquin Experimental Range	Merced	37° 05′ 119° 44′	100	1940-47	A
5-0123	Stayton Mine	Merced	36° 55′ 121° 14′	3,020	1939-47	A
5-0124	Day	Modoc	41° 13′ 121° 23′	3,800	1940-47	A
5-0125	Triangle Station	Modoc	41° 41′ 120° 49′	5,000	1929-32	B

TABLE 56—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL VALLEY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
0126	Calistoga	Napa	38° 35′ 122° 35′	363	1931-35	B
0127	Calistoga (Williams)	Napa	38° 35′ 122° 35′	455	1929-39	B
0128	Hardin Ranch	Napa	38° 35′ 122° 21′	800	1936-38	B
0129	Monticello (near)	Napa	38° 38′ 122° 16′	340	1936-38	B
0130	Boca	Nevada	39° 23′ 120° 06′	5,531	1897-1937	Broken record B
0131	Floriston	Nevada	39° 24′ 120° 01′	5,300	1898-1900	B
0132	Hobart Mills	Nevada	32° 24′ 120° 11′	5,900	1910-15	D
0133	Nevada City (near No. 2)	Nevada	39° 16′ 121° 01′	2,850	1940-47	A
0134	North San Juan	Nevada	39° 22′ 121° 06′	2,130	1897-03	B
0135	Snow Laboratory	Nevada	39° 20′ 120° 22′	6,902	1946-47	A
0136	Lincoln	Placer	38° 53′ 121° 17′	200	1898-1900	B
0137	McKinney	Placer	39° 04′ 120° 09′	6,225	1913-15 1916-18	B, D
0138	Michigan Bluff	Placer	39° 02′ 120° 45′	3,200	1940-47	A
0139	Newcastle (Lamiman)	Placer	38° 52′ 121° 08′	970	1936-39	B
0140	Norden	Placer	39° 19′ 120° 21′	7,017	1926-32	B
0141	Werner Ranch	Placer	38° 52′ 121° 06′	1,100	1934-39	B
0142	Wirebridge	Placer	38° 49′ 121° 06′	565	1897-1901	B
0143	Beckwith	Plumas	39° 50′ 120° 23′	5,005	1908-09	B
0144	Butte Valley	Plumas	40° 07′ 121° 09′	4,020	1910-13	B
0145	Johnsville	Plumas	39° 46′ 120° 46′	6,500	1907-09	C
0146	La Porte No. 2	Plumas	39° 41′ 120° 59′	5,000	1932-36	B
0147	Meadow Valley No. 2	Plumas	39° 55′ 121° 04′	4,000	1902-04 1915-18	B
0148	Prattville No. 1	Plumas	40° 13′ 121° 10′	4,400	1910-12	B
0149	Smiths Point	Plumas	40° 01′ 121° 14′	2,500	1929-30	B
0150	Vinton	Plumas	39° 48′ 120° 11′	5,000	1941-47	B
0151	Clay (Bolton)	Sacramento	38° 20′ 121° 09′	123	1936-39	B
0152	Elk Grove	Sacramento	38° 24′ 121° 21′	50	1897-1900	B
0153	Orangevale	Sacramento	38° 41′ 121° 11′	250	1897-98	B
0154	Sacramento (Airport)	Sacramento	38° 31′ 121° 30′	25	1939-47	A
0155	Sacramento (Logan)	Sacramento	38° 35′ 121° 30′	25	1861-62 1880-81	B
0156	Sacramento Olive Farm	Sacramento	38° 38′ 121° 15′	100	1896-97	B

TABLE 56—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL VALLEY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
5-0157	Twin Cities	Sacramento	38° 18′ 121° 18′	45	1830-32	B
5-0158	Callow Ranch	San Joaquin	38° 13′ 121° 08′	125	1931-39	B
5-0159	Clements	San Joaquin	38° 12′ 121° 06′	120	1933-38	C
5-0160	King Island	San Joaquin	38° 04′ 121° 25′	5	1930-36	B
5-0161	Lind Airport	San Joaquin	38° 12′ 121° 17′	60	1936-38	B
5-0162	Linden (Davis)	San Joaquin	38° 02′ 121° 07′	80	1929-30	B
5-0163	Lodi No. 3	San Joaquin	38° 08′ 121° 16′	50	1926-31	B
5-0164	Manteca	San Joaquin	37° 48′ 121° 13′	42	1935-39	B
5-0165	Round Timbers	San Joaquin	38° 07′ 121° 03′	180	1929-30	B
5-0166	Spreckels Sugar Co	San Joaquin	37° 47′ 121° 12′	46	1930-39	B
-0167	Tracy (near)	San Joaquin	37° 50′ 121° 27′	13	1940-47	A
-0168	Victor (Clancy Ranch)	San Joaquin	38° 10′ 121° 12′	80	1929-31	B
-0169	Anderson (near)	Shasta	40° 27′ 122° 18′	432	1909-10	B
-0170	Gilman Ranch	Shasta	40° 27′ 122° 16′	234	1934-39	B
-0171	Hat Creek (near)	Shasta	40° 48′ 121° 31′	3,360	1940-47	A
-0172	Knob	Shasta	40° 24′ 122° 59′	3,800	1909-11	B
-0173	Macumber	Shasta	40° 32′ 121° 44′	4,000	1921-30	B
-0174	Montgomery Creek No. 2	Shasta	40° 50′ 121° 55′	2,500	1932-38	B
-0175	Montgomery Creek (near)	Shasta	40° 49′ 121° 57′	2,180	1940-47	A
-0176	Olinda	Shasta	40° 26′ 122° 24′	650	1916-18	B
-0177	Pittville	Shasta	41° 03′ 121° 20′	3,400	1909-10	B
-0178	Pit No. 5	Shasta	40° 59′ 121° 59′	1,700	1945-47	B
-0179	St. Vrain Ranch	Shasta	40° 36′ 121° 59′	1,600	1924-28	B
-0180	Shasta Dam	Shasta	40° 43′ 122° 25′	785	1939-47	A
-0181	Vollmers	Shasta	40° 57′ 122° 26′	1,332	1937-47	A
-0182	Carvin Mine	Sierra	39° 38′ 120° 34′	5,516	1929-34	B
-0183	Loydton	Sierra	39° 40′ 120° 15′	4,946	1940-47	B
-0184	Scales	Sierra	39° 36′ 120° 59′	4,300	1936-39	B
-0185	Mt. Shasta Airway	Siskiyou	41° 25′ 122° 20′	5,100	1940-44	Broken record A, B
-0186	Yreka (Pyle)	Siskiyou	41° 44′ 122° 38′	2,635	1897-01	B
-0187	Boyce & Boyce Orchard	Solano	38° 32′ 121° 55′	125	1934-39	B

TABLE 56—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL VALLEY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
5-0188	Elmira	Solano	38° 21′ 121° 55′	75	1897-01	B
5-0189	Udel Ranch	Solano	38° 27′ 121° 58′	138	1934-39	B
5-0190	Vacaville (near)	Solano	38° 25′ 122° 01′	450	1935-42	A
5-0191	El Solyo Ranch	Stanislaus	37° 38′ 121° 13′	40	1938-39	B
5-0192	Modesto No. 2	Stanislaus	37° 37′ 121° 01′	92	1942-47	A
5-0193	Patterson Pump Station No. 2	Stanislaus	37° 18′ 121° 06′	100	1911-14	B
5-0194	Turlock (Southern Pacific Co.)	Stanislaus	37° 29′ 120° 51′	106	1897-99	B
5-0195	Bremer	Sutter	39° 08′ 121° 37′	60	1935-39	B
5-0196	Hinsdale	Sutter	39° 01′ 121° 47′	30	1940-41	B
5-0197	Karnak	Sutter	38° 47′ 121° 40′	20	1940-41	B
5-0198	Noah Ranch	Sutter	39° 03′ 121° 50′	40	1939-40	B
5-0199	Wheatland	Sutter	39° 01′ 121° 25′	85	1934-38	B
5-0200	Yuba City	Sutter	39° 08′ 121° 37′	60	1897-02	B
5-0201	Beegum	Tehama	40° 21′ 122° 51′	1,283	1940-47	A
5-0202	Los Molinos	Tehama	40° 01′ 122° 06′	215	1942-46	B
5-0203	Paskenta	Tehama	39° 53′ 122° 32′	720	1937-43	B
5-0204	Rosewood	Tehama	40° 17′ 122° 33′	865	1897-04	B
5-0205	Vina	Tehama	39° 56′ 122° 04′	213	1897-1900	B
5-0206	Anada	Trinity	40° 17′ 122° 20′	2,700	1899-1900	B
5-0207	Badger	Tulare	36° 38′ 119° 01′	3,000	1940-47	A Broken Record
5-0208	California Hot Springs	Tulare	35° 53′ 118° 41′	3,000	1935-47	B, A
5-0209	Camp Wishon	Tulare	36° 13′ 118° 40′	4,200	1940-47	A
5-0210	Deer Creek Ranger Station	Tulare	35° 53′ 118° 40′	3,000	1932-39	B
5-0211	Dinuba	Tulare	36° 33′ 119° 23′	333	1912-15 1936-38	B
5-0212	Exeter	Tulare	36° 18′ 119° 08′	390	1897-1900	B
5-0213	Exeter (near)	Tulare	36° 21′ 119° 05′	435	1938-47	A
5-0214	Johnsondale	Tulare	35° 58′ 118° 31′	4,700	1937-42	B
5-0215	Mountain Home No. 1	Tulare	36° 10′ 118° 48′	6,680	1897-98 1907-11	B
5-0216	Success	Tulare	36° 05′ 118° 53′	800	1927-28	B
5-0217	Tulare (Southern Pacific Co.)	Tulare	36° 12′ 119° 21′	289	1915-21	C
5-0218	Windy Springs	Tulare	36° 02′ 118° 06′	6,500	1929-35	B

TABLE 56—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, CENTRAL VALLEY AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
5-0219	Confidence (Hiatt Ranch)	Tuolumne	38° 03′ 120° 12′	4,000	1929-34	B
5-0220	Groveland No. 1	Tuolumne	37° 51′ 120° 14′	1,400	1908-17	B
5-0221	Groveland No. 2	Tuolumne	37° 50′ 120° 13′	2,800	1940-47	A
5-0222	Long Barn	Tuolumne	38° 11′ 120° 01′	5,200	1940-47	A
5-0223	Long Camp	Tuolumne	38° 05′ 120° 08′	5,000	1909-12	B
5-0224	Mather	Tuolumne	37° 53′ 119° 51′	4,520	1929-33	B
5-0225	Penstock Camp	Tuolumne	38° 10′ 120° 06′	3,750	1909-11	B
5-0226	Phoenix Dam	Tuolumne	38° 00′ 120° 20′	2,500	1909-12	B
5-0227	Relief	Tuolumne	38° 17′ 119° 44′	7,300	1930-37	B
5-0228	Dunnigan (Davis)	Yolo	38° 53′ 121° 58′	70	1931-38	B
5-0229	Winters	Yolo	38° 31′ 121° 58′	136	1897-02	B
5-0230	Winters (near)	Yolo	38° 32′ 121° 58′	150	1896-97	B
5-0231	Camp Pioneer	Yuba	39° 38′ 120° 35′	5,675	1937-38	B
5-0232	Challenge	Yuba	39° 29′ 121° 13′	2,700	1938-39	B
5-0233	Wheatland (near)	Yuba	39° 02′ 121° 24′	113	1940-47	A

TYPE OF RECORD

Abbreviation	*Name*
A	Hourly
B	Daily
C	Monthly
D	Seasonal

TABLE 57

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATION I H MONTH FOR THE PERIOD OF RECORD, AT 19 STATIONS, CENTRAL VALLEY AREA

In Inches

Month	Fall River Mills, Shasta County Number on Plate 3: 5-70			Red Bluff, Tehama County Number on Plate 3: 5-24			Quincy, Plumas County Number on Plate 3: 5-41			N Nu	, City, County Plate 3: 4		Lakeport, Lake County Number on Plate 3: 5-94		
	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Avera month	xi- m	Minimum	Average monthly	Maximum	Minimum
July	0.22	1.94	0.00	0.03	0.68	0.00	0.10	1.08	0.00	0.0	71	0.00	0.02	0.44	0.00
August	0.12	0.84	0.00	0.04	0.60	0.00	0.13	9.18	0.00	0.0	75	0.00	0.01	0.24	0.00
September	0.51	2.16	0.00	0.04	7.46	0.00	1.06	6.27	0.00	0.6	03	0.00	0.34	2.52	0.00
October	1.38	3.62	0.04	1.33	8.41	0.00	2.40	11.88	0.00	2.4	05	0.00	1.37	5.19	0.00
November	2.24	5.93	0.00	2.74	17.05	0.00	4.69	15.85	0.00	5.6	55	0.00	3.15	10.31	0.00
December	2.61	6.56	0.37	4.42	12.85	0.52	6.12	17.08	1.21	9.4	95	0.00	5.43	12.67	0.66
January	2.40	5.81	0.57	4.53	20.71	0.51	7.44	35.17	0.52	9.7	98	Trace	6.11	23.48	0.17
February	3.05	6.77	0.30	3.83	16.66	0.01	6.65	22.10	Trace	8.5	29	0.49	5.45	13.37	0.11
March	2.19	7.03	0.05	3.11	12.84	Trace	5.76	30.15	0.20	7.9	62	0.08	3.67	12.72	0.09
April	1.67	6.52	0.19	1.71	7.05	0.03	2.66	11.03	Trace	4.2	54	0.19	1.71	5.78	0.00
May	1.27	2.52	0.06	1.10	3.11	0.00	1.91	6.91	0.00	2.1	83	0.00	0.79	4.63	0.00
June	0.77	2.27	0.00	0.46	2.61	0.00	0.80	3.55	0.00	0.6	36	0.00	0.28	2.03	0.00
SEASONAL TOTALS	18.39			23.94			39.72			51.6			28.33		

TABLE 57—Continued

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATION IN E… MONTH FOR THE PERIOD OF RECORD, AT 19 STATIONS, CENTRAL VALLEY AREA

In Inches

Month	Sacramento, Sacramento County Number on Plate 3: 5-131			Kennedy Mine, Amador County Number on Plate 3: 5-143			Stockton, San Joaquin County Number on Plate 3: 5-176			So… …a, Tuolum… County Number… Plate 3: 5-… …1			Newman, Stanislaus County Number on Plate 3: 5-210		
	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum	Average monthly	M… …i-n	Mini-mum	Average monthly	Maxi-mum	Mini-mum
July	0.02	0.63	0.00	0.01	0.25	0.00	Trace	0.14	0.00	0.01	…40	0.00	0.01	0.18	0.00
August	0.01	0.20	0.00	0.01	0.23	0.00	0.01	0.19	0.00	0.02	…31	0.00	0.01	0.43	0.00
September	0.23	3.58	0.00	0.53	4.05	0.00	0.23	3.68	0.00	0.40	…34	0.00	0.20	3.04	0.00
October	0.78	6.02	0.00	1.53	8.18	0.00	0.64	3.59	0.00	1.73	…90	0.00	0.49	4.28	0.00
November	1.84	11.34	0.00	3.17	10.71	0.00	1.44	6.08	0.00	3.16	1…29	0.00	0.99	4.45	0.00
December	3.76	13.40	0.00	4.59	16.44	0.24	2.66	11.49	0.00	5.30	1…25	0.12	1.90	5.91	0.00
January	3.72	15.04	0.15	5.55	20.68	0.60	2.88	11.32	0.31	6.23	2…30	0.51	2.09	6.79	0.16
February	3.02	9.25	0.04	5.37	17.19	0.13	2.46	7.34	0.00	6.00	1…30	0.00	1.77	4.98	0.00
March	2.72	10.00	0.04	4.91	16.72	0.27	2.11	7.29	0.00	5.80	1…09	0.31	1.73	7.27	0.00
April	1.46	14.20	Trace	2.46	11.20	0.02	1.05	6.28	0.00	2.53	…16	0.00	0.70	3.60	0.00
May	0.71	3.25	0.00	1.34	5.64	0.00	0.58	4.84	0.00	1.43	…78	0.00	0.39	1.94	0.00
June	0.12	1.45	0.00	0.35	2.89	0.00	0.11	1.27	0.00	0.31	…06	0.00	0.05	0.52	0.00
SEASONAL TOTALS	18.39	------	------	29.82	------	------	14.17	------	------	32.92	------	------	10.33	------	------

TABLE 57—Continued

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATION IN [illegible]CH MONTH FOR THE PERIOD OF RECORD, AT 19 STATIONS, CENTRAL VALLEY AREA

In Inches

Month	Merced, Merced County Number on Plate 3: 5-211			North Fork, Madera County Number on Plate 3: 5-215			Firebaugh, Fresno County Number on Plate 3: 5-223			F[illegible]no, Fres[illegible] County Numbe[illegible]n Plate 3: [illegible]33			Lemon Cove, Tulare County Number on Plate 3: 5-240		
	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	[illegible]xi-[illegible]m	Minimum	Average monthly	Maximum	Minimum
July	0.01	0.24	0.00	0.04	0.69	0.00	Trace	0.14	0.00	0.01	.33	0.00	0.01	0.22	0.00
August	0.02	0.53	0.00	0.05	1.10	0.00	Trace	0.18	0.00	0.01	.15	0.00	0.02	0.55	0.00
September	0.17	1.80	0.00	0.53	6.59	0.00	0.08	0.79	0.00	0.17	.78	0.00	0.16	2.43	0.00
October	0.40	2.99	0.00	1.50	4.61	0.00	0.38	1.73	0.00	0.59	.21	0.00	0.69	3.47	0.00
November	1.20	5.83	0.00	2.55	10.00	0.00	0.87	9.91	0.00	0.88	.92	0.00	1.22	5.85	0.00
December	1.81	5.59	0.00	5.44	15.90	0.80	1.23	3.72	0.00	1.57	.24	0.01	2.08	6.14	0.00
January	2.25	7.99	0.27	6.93	23.98	0.54	1.66	4.85	0.18	1.71	.89	0.00	2.65	8.87	0.25
February	1.89	6.77	0.00	6.66	19.76	0.27	1.30	4.31	0.00	1.56	.04	0.00	2.96	15.20	Trace
March	1.85	6.62	0.00	5.84	19.38	0.21	1.22	3.70	0.00	1.58	.19	Trace	2.56	9.82	0.09
April	0.99	5.60	0.00	2.62	8.25	0.10	0.72	2.47	0.00	0.89	.93	0.00	1.44	5.77	0.00
May	0.48	2.47	0.00	1.31	2.14	0.00	0.24	2.26	0.00	0.5	.80	0.00	0.70	3.21	0.00
June	0.11	1.73	0.00	0.26	2.46	0.00	0.09	1.41	0.00	0.1	.66	0.00	0.14	1.56	0.00
SEASONAL TOTALS	11.27	......	......	33.73	......	......	7.79	......	......	9.4	......	......	14.63	......	......

TABLE 57—Continued

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATION IN EACH IONTH FOR THE PERIOD OF RECORD, AT 19 STATIONS, CENTRAL VALLEY AREA

In Inches

Month	Coalinga, Fresno County Number on Plate 3: 5-264			Angiola, Tulare County Number on Plate 3: 5-270			Bakersfiel Kern Coun Number on Pl 3: 5-287			Tejon Rancho, Kern County Number on Plate 3: 5-298		
	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum	Average monthly	Maxi-mum	Mini-mum
uly	0.06	1.22	0.00	0.01	0.41	0.00	0.02	0.43	0.00	0.02	1.00	0.00
ugust	Trace	0.07	0.00	0.01	0.13	0.00	0.01	0.16	0.00	0.02	0.45	0.00
eptember	0.06	0.39	0.00	0.15	1.83	0.00	0.71	1.15	0.00	0.10	0.91	0.00
ctober	0.26	1.01	0.00	0.36	2.46	0.00	0.37	2.04	0.00	0.59	2.33	0.00
ovember	0,48	2.73	0.00	0.56	2.63	0.00	0.48	2.50	0.00	1.20	4.48	0.00
ecember	1.25	3.81	0.00	1.14	3.48	0.00	0.90	2.98	0.00	1.68	4.58	0.00
anuary	1.32	5.53	Trace	1.45	4.49	0.11	1.09	3.84	0.18	1.88	5.33	0.10
ebruary	1.64	5.60	0.00	1.43	4.42	0.00	1.02	2.90	0.00	2.05	5.28	0.20
arch	1.12	3.47	0.05	1.32	3.88	0.00	1.07	4.61	0.00	2.14	6.87	Trace
pril	0.54	3.14	0.00	0.65	2.47	0.00	0.58	2.99	0.00	1.42	4.53	0.00
ay	0.24	1.28	0.00	0.33	2.03	0.00	0.34	2.39	0.00	0.60	2.45	0.00
une	0.00	1.17	0.00	0.05	0.94	0.00	0.07	0.75	0.00	0.12	2.00	0.00
SEASONAL TOTALS	7.06			7.46			6.06			11.82		

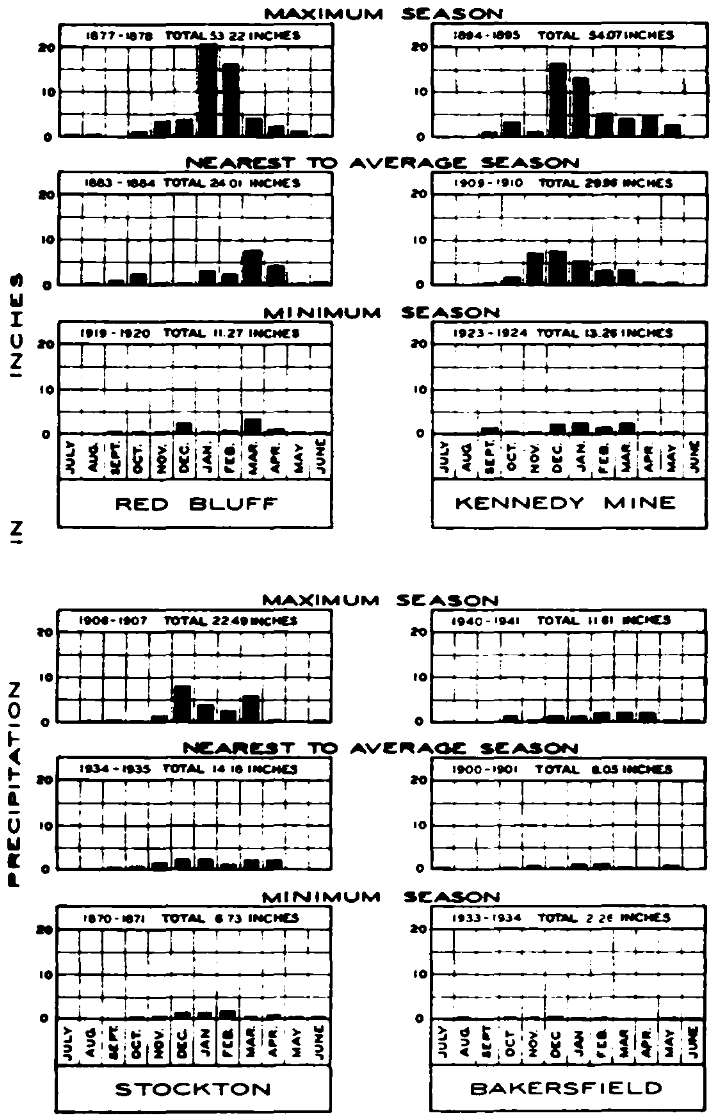
TABLE 58

ESTIMATED MEAN SEASONAL PRECIPITATION ON VALLEY AND MESA LANDS 1897-98 TO 1946-47

CENTRAL VALLEY AREA

Number on Plate 2	Stream or stream group basin	Precipitation in acre-feet
1	Goose Lake Basin	235,000
	Sacramento River Basin	
	Pit River	
2-1	Above gage near Canby	568,000
2-2	From gage near Canby to gage near Ydalpom	1,987,000
2-3	McCloud River above gage at Baird	314,000
2-4	Remainder of Sacramento River above Shasta Dam	14,100
2-5	West side tributaries, Shasta Dam to gage near Red Bluff	670,000
2-6	East side tributaries, Shasta Dam to gage near Red Bluff	679,000
	Minor Streams above Valley Floor (west side)	
2-8	From Stony Creek drainage to Cache Creek drainage	65,900
2-10	Stony Creek above mouth of canyon	118,000
	Cache Creek	
2-11	Above gage near Lower Lake	263,000
2-12	From gage near Lower Lake to gage near Capay	109,000
2-13	From gage near Capay to gage at Yolo	65,300
2-14	Putah Creek (including Berryessa Valley) above gage near Winters	157,000
	Feather River, North Fork	
2-17	Above gage near Prattville	419,000
2-18	Indian Creek above gage near Crescent Mills	154,000
2-19	Remainder of North Fork above gage at Big Bar	78,700
	Feather River, Middle Fork	
2-20	Above gage near Clio	271,000
2-21	From gage near Clio to gage at Bidwell Bar	1,300
	Feather River	
2-22	Remainder of Feather River above gage near Oroville	3,200
2-24	Bear River above gage near Wheatland	20,900
	American River	
2-28	Remainder of American River above gage at Fair Oaks (below gages on North, Middle, and South Forks)	23,500
2-29	Sacramento valley floor	5,038,000
	San Joaquin River Basin—Area tributary to Tulare Lake	
	Minor streams above valley floor (east side)	
3-1	Including Grapevine Creek to Kern River drainage	25,400
3-3	From Tule River drainage to San Joaquin River drainage	20,900
3-4	Kern River above gage near Bakersfield	40,800
3-5	Tule River above Pioneer Ditch diversion	17,900
3-9	Valley floor, tributary to Tulare Lake	3,048,000
	San Joaquin River Basin—Area tributary to San Joaquin River	
	Minor streams above valley floor (east side)	
3-10	From San Joaquin River drainage to Stanislaus River drainage	47,800
3-12	Fresno River above gage near Daulton	3,200
3-17	Above valley floor (west side) tributary to San Jaoquin River	34,700
3-18	Valley floor, tributary to San Joaquin River	2,048,000
	San Joaquin River Basin—Area tributary to Delta	
3-21	Mokelumne River above gage near Clements	3,700
2-24	San Joaquin valley floor tributary to Delta	1,380,000
	TOTAL, CENTRAL VALLEY AREA	17,925,300

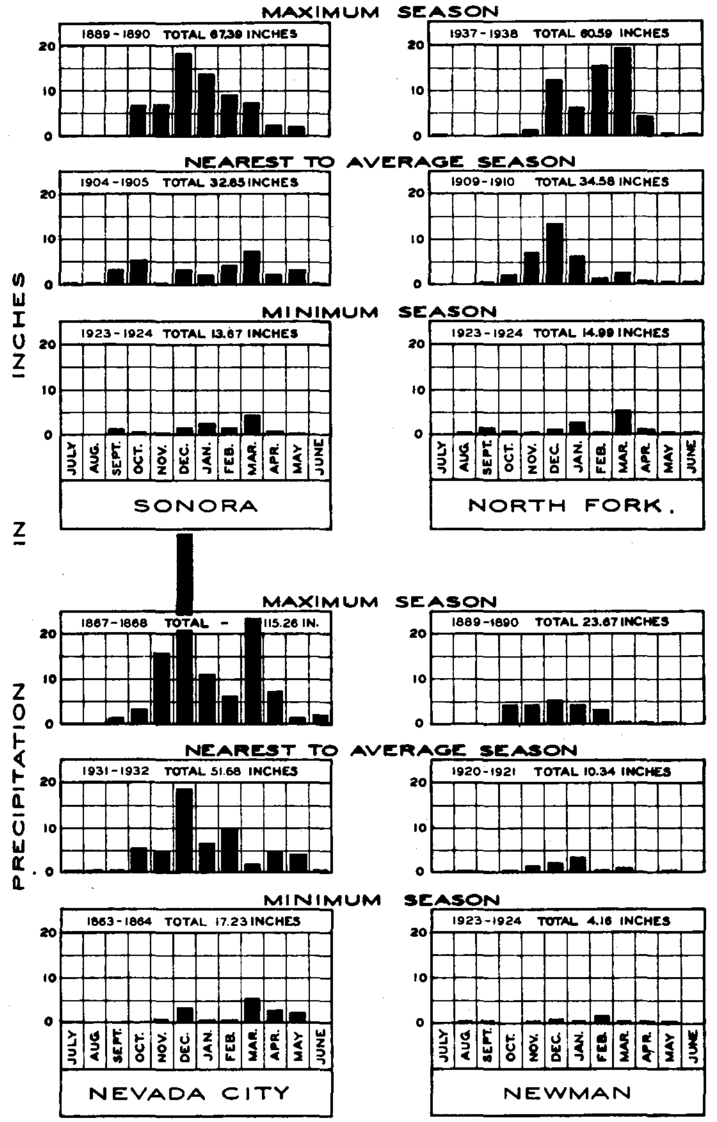
PLATE 38



DISTRIBUTION OF PRECIPITATION AT SELECTED STATIONS

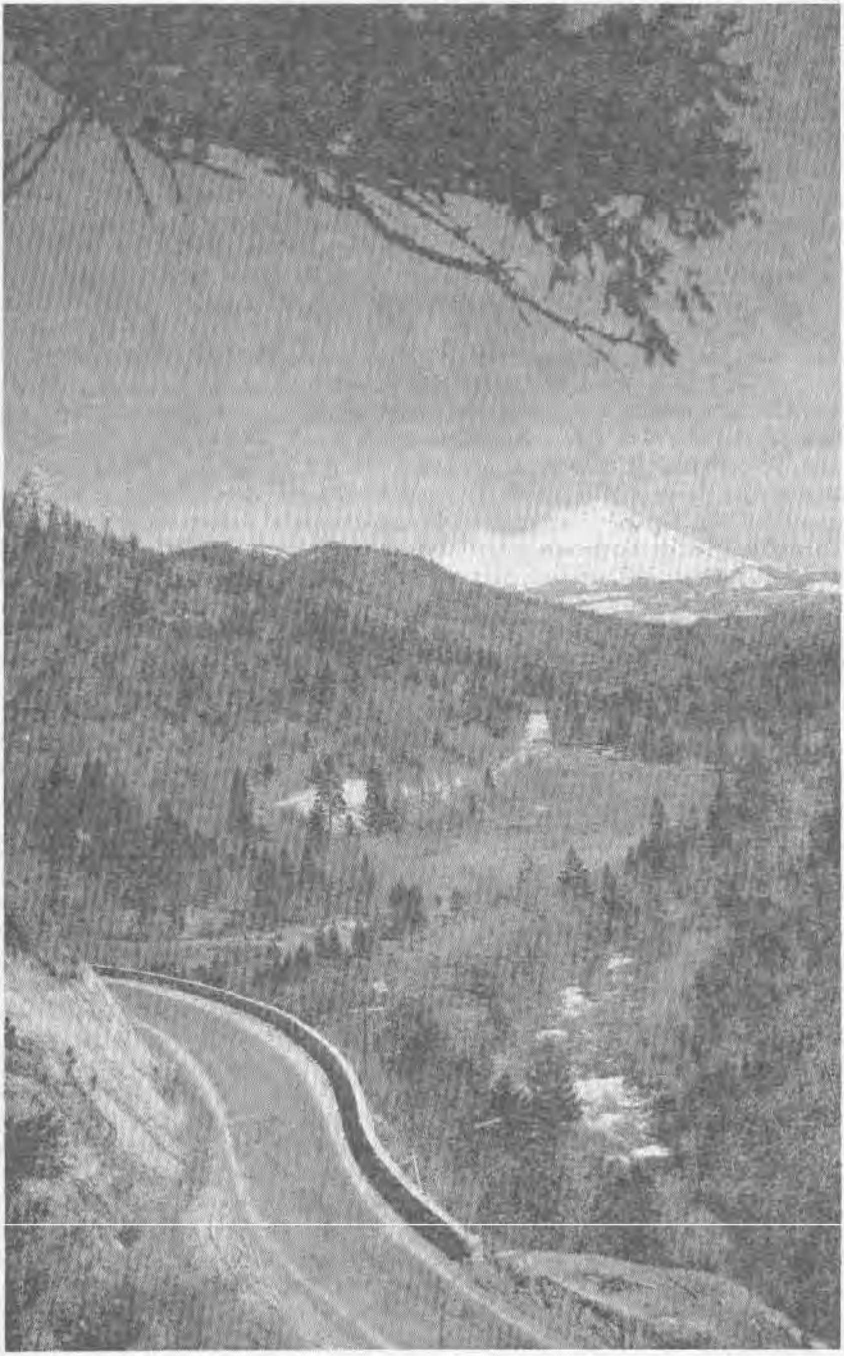
CENTRAL VALLEY AREA

PLATE 39



DISTRIBUTION OF PRECIPITATION AT SELECTED STATIONS

CENTRAL VALLEY AREA



(Division of Highways Photo)

MOUNT SHASTA AND UPPER SACRAMENTO RIVER

RUNOFF

Estimated mean seasonal natural runoff of the Central Valley Area for the 53 years from 1894-95 to 1946-47 is 33,636,000 acre-feet, or 47.5 percent of total surface runoff from mountain and foothill lands in the State. The minimum seasonal flow of 9,280,000 acre-feet occurred in 1923-24, and the maximum, totalling 63,300,000 acre-feet, in 1906-07. The 10-year period from 1923-24 to 1932-33 was the driest of record in this Area. Runoff during each of those 10 years, except 1926-27, was less than the 53-year mean, and the average was only 66.3 percent of this long-time mean.

Runoff from drainage basins of the Central Valley Area is derived largely from snow. Consequently, the major portion of seasonal runoff comes during late spring and early summer months from March to June, inclusive. For Sacramento River the runoff during these months is 42.8 percent of the seasonal total, for American River, 65.4 percent, and for Kings River, 71.8 percent. Minimum runoff comes from August to October, inclusive, flow for this period being 9.7 percent of total seasonal runoff for Sacramento River, 2.1 percent for the American, and 5.5 percent for the Kings. Sacramento River drains a region of porous lava formation, with large underground storage capacity. Summer flow of the Sacramento is therefore better sustained than is that of other streams in the Area.

An indication of variation in monthly flow of Central Valley Area streams, and of the percentage of seasonal runoff that comes during each month, is given by data for Sacramento River at Red Bluff, American River at Fair Oaks and Kings River at Piedra listed in Table 59.

The first records of stream flow in the Central Valley Area were obtained by Wm. Ham. Hall, State Engineer from 1878 to 1884. The only stream gaging station then maintained in the Sacramento River Basin was at Collinsville, at the mouth of the Sacramento. In the San Joaquin River Basin 20 gaging stations were maintained, most of them at the base of the foothills. All stations established by State Engineer Hall were discontinued after 1884, when the office of State Engineer was abolished. As of September 30, 1947, records from 96 stations were published by the United States Geological Survey in the Sacramento River Basin and 105 in the San Joaquin River Basin.

The first gaging station established in the Sacramento River Basin by the Geological Survey was installed at Jellys Ferry on Sacramento River near Red Bluff in 1895. In 1902 this station was moved downstream to Iron Canyon, where it has since been maintained. The oldest station in the San Joaquin River Basin for which an unbroken record is available was established on Kern River near Bakersfield in 1893 by the Kern County Canal and Water Company, and is known as the "First Point of Measurement." It is still maintained by that company and affiliated companies and the Buena Vista Water Storage District, and the runoff record is published by the Geological Survey. A number of stream gaging stations established in the Area from time to time have been discontinued, but records so obtained are frequently of value in determining runoff characteristics of concerned streams. Some gaging stations are being maintained on canals and streams by private agencies, and by public agencies other than the Geological Survey.

Gaging stations listed in the following tabulation are the principal stations presently operated in the Area, and are those of most value in estimating the available water supply of the Central Valley Area.

Stream gaging station	*Drainage area in square miles*
Sacramento Valley Streams	
Sacramento River near Red Bluff	9,258
Feather River near Oroville	3,611
Yuba River at Narrows Dam	1,100
Bear River near Wheatland	295
American River at Fair Oaks	1,921
Minor stream basins	3,460
Subtotal	19,655
San Joaquin Valley Streams	
Kern River near Bakersfield	2,420
Tule River near Porterville	266
South Fork Tule River near Success	106
Kaweah River near Three Rivers	520
Kings River at Piedra	1,694
San Joaquin River below Friant	1,675
Fresno River near Daulton	270
Chowchilla River at Buchanan Dam Site	238
Merced River at Exchequer	1,035
Tuolumne River near La Grange	1,540
Stanislaus River below Melones Powerhouse	898
Calaveras River at Jenny Lind	395
Mokelumne River near Clements	630
Cosumnes River at Michigan Bar	537
Minor stream basins	592
Subtotal	12,816
TOTAL	32,471

Runoff from remaining mountain and foothill lands in the Area—1,959 square miles in the Sacramento River Basin and 6,443 square miles in the San Joaquin River Basin—is not now being measured. Most unmeasured runoff entering the San Joaquin Valley originates in the coastal ranges.

The name, location, and elevation of each gaging station in the Central Valley Area for which records of runoff are available, with the period, source, and type of record, are presented in Table 60.

Estimated long-time mean seasonal natural runoff from the Central Valley Area for the 53 years from 1894-95 to 1946-47 is given in Table 61. For those stations for which complete or partial records are available, mean runoff indicated is the mean of estimated seasonal natural flow. For streams or basins for which there are no records, directly derived estimates of long-time mean runoff are given. Estimated mean seasonal runoff from unmeasured drainage basins in the Area was 1,450,000 acre-feet, and that based on records was 32,190,000 acre-feet.

Estimates of natural flow set out in Table 61 were made in accordance with principles outlined in Chapter III. Estimates of seasonal runoff were made for minor basins in the Sacramento River drainage basin between Shasta Dam and Red Bluff. For other minor basins in the Sacramento River Basin, and for minor streams on the east side of the San Joaquin Valley, only 53-year mean seasonal runoff is given, this having been estimated by comparing records on minor and principal streams for simultaneous periods. Estimates of mean seasonal runoff for minor drainage areas on the west side of the San Joaquin Valley were derived by establishing the relationship between mean precipitation and runoff in that part of the Area. An estimate of mean seasonal runoff for the Sacramento Valley floor was made by correlating recorded inflows at various points with average precipitation on the valley floor.

Estimated natural runoff for the seasons from 1894-95 to 1946-47, from main stream and tributary basins for which there are complete or partial records, is given in Table 62.

TABLE 59

AVERAGE MONTHLY DISTRIBUTION OF AVERAGE SEASONAL RUNOFF FOR THREE CENTRAL VALLEY STREAMS

Month	Sacramento River at Red Bluff		American River at Fair Oaks		Kings River at Piedra	
	Monthly runoff in acre-feet	Percent of seasonal total	Monthly runoff in acre-feet	Percent of seasonal total	Monthly runoff in acre-feet	Percent of seasonal total
October	280,000	3.3	20,000	0.9	22,000	1.3
November	450,000	5.4	60,000	2.2	25,000	1.5
December	700,000	8.4	130,000	4.9	37,000	2.2
January	1,110,000	13.2	270,000	9.9	64,000	3.8
February	1,380,000	16.4	330,000	12.5	81,000	4.8
March	1,330,000	15.8	420,000	15.6	127,000	7.5
April	1,040,000	12.4	490,000	18.1	225,000	13.3
May	740,000	8.8	540,000	20.0	443,000	26.2
June	490,000	5.8	310,000	11.7	419,000	24.8
July	340,000	4.1	80,000	3.0	176,000	10.4
August	280,000	3.3	20,000	0.7	51,000	3.0
September	260,000	3.1	10,000	0.5	20,000	1.2
Totals	8,400,000	100.0	2,680,000	100.0	1,690,000	100.0

TABLE 60

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

Number on plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Sacramento River Basin										
5-1	Sacramento River at Castella	41° 09′ 122° 19′	1,950	1910-22	USGS	A					
5-2	Sacramento River at Delta	40° 56′ 122° 25′	1,075	1944-47	USGS	A					
5-3	Sacramento River at Antler	40′ 53′ 122° 23′	934	1910-11 1919-41	USGS	A	779,000	19[illegible]38	1,645,000	1923-24	192,000
	Goose Lake Basin										
5-4	New Pine Creek below Schroeders	42° 00′ 120° 19′	5,000	1932-43	DWRWA	D					
5-5	Cottonwood Creek above all diversions	41° 57′ 120° 16′	5,600	1932-47	DWRWA	D					
5-6	Davis Creek below Forks	41° 44′ 120° 16′	5,900	1930-43	DWRWA	D					
5-7	Linville Creek below old powerhouse	41° 42′ 120° 16′	5,800	1939-47	DWRWA	D					
	Pit River Basin										
5-8	Franklin Creek above Erhman Creek	41° 42′ 120° 20′	5,030	1933-43	DWRWA	D					
5-9	Joseph Creek below Wilson Ranch	41° 37′ 120° 20′	5,200	1939-47	DWRWA	D					
5-10	Thoms Creek at Hwy. Crossing	41° 33′ 120° 20′	5,000	1939-47	DWRWA	D					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL R[illegible]OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AR[illegible]

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								S[illegible]son	Acre-feet	Season	Acre-feet
	Pit River Basin—Continued										
5-11	Pit River, North Fork, below Thoms Creek	41° 35′ 120° 25′	4,640	1939-47	DWRWA	D					
5-12	Parker Creek at Fogarty Ranch	41° 29′ 120° 24′	4,725	1934-47	DWRWA	D					
5-13	Gleason Creek at Jones Ranch	41° 32′ 120° 22′	5,200	1940-47	DWRWA	D					
5-14	Parker Creek above Hwy. 395 near mouth	41° 31′ 120° 27′	4,575	1939-43	DWRWA	D					
5-15	Parker Creek near Alturas	41° 31′ 120° 28′	4,555	1930-31	USGS	A					
5-16	Pit River, North Fork, near Alturas	41° 30′ 120° 29′	4,550	1929-31	USGS	D					
5-17	Pit River, North Fork, at Alturas	41° 29′ 120° 32′	4,500	1941-47 1928-31	USGS	DA					
5-18	West Valley Creek at Lower End of West Valley	41° 07′ 120° 22′	5,100	1931-32	DWRWA	D					
5-19	West Valley Reservoir near Likely	41° 12′ 120° 22′	5,000	1924-31	DWRWA	D					
5-20	Pit River, South Fork, below Jess Valley	41° 14′ 120° 20′	4,900	1929-32	DWRWA	D					
5-21	Pit River, South Fork, at Jess Valley	41° 14′ 120° 20′	4,900	1928-31	USGS	D					
5-22	Pit River, South Fork, near Likely	41° 14′ 120° 25′	4,580	1904-05 1928-47	USGS	A	49,272	1[illegible]-38	82,800	1930-31	19,800

-23	West Valley Creek near Likely	41° 13′ 120° 27′	4,586	1904-05 1928-31	USGS	DA					
-24	Crooks Canyon Creek near Likely	41° 16′ 120° 34′	4,575	1929-31	USGS	D					
-25	Fitzhugh Creek near Likely	41° 22′ 120° 30′	4,580	1928-31	USGS	A					
-26	Pit River, South Fork, at Jones Lane	41° 26′ 120° 32′	4,560	1929-32	DWRWA	D					
-27	Pine Creek near Alturas	41° 26′ 120° 24′	4,850	1918-31	USGS	A	13,392	192 21	17,900	1930-31	5,900
-28	Pit River at Alturas	41° 28′ 120° 34′	4,500	1928-31	USGS	A					
-29	Pit River near Canby	41° 24′ 120° 55′	4,300	1904-05 1929-30 1931-47	USGS	A	144,000	193 38	435,000	1933-34	16,200
-30	Pit River at Gouger Neck	41° 15′ 121° 08′	4,175	1930	DWRWA	D					
-31	Pit River near Lookout	41° 15′ 121° 08′	4,175	1929-31	USGS	A					
-32	Ash Creek at Ash Valley	41° 07′ 120° 45′	5,200	1928-31	USGS	A					
-33	Rush Creek near Adin	41° 16′ 120° 53′	2,550	1930	USGS	D					
-34	Ash Creek near Adin	41° 13′ 120° 55′	4,300	1937-47	DWRWA	D					
-35	Ash Creek at Adin	41° 12′ 120° 57′	4,210	1904-05 1928-32	USGS	A					
-36	Willow Creek near Knudson	41° 05′ 120° 54′	4,395	1929-31 1932-47	DWRWA	D					
-37	Widow Valley Creek near Lookout	41° 12′ 121° 12′	5,200	1929-31	USGS	A					
-38	Pit River near Bieber	41° 01′ 121° 09′	4,050	1904-08 1913-14 1921-26	USGS	D					
-39	Horse Creek at Little Valley near Pittville	40° 53′ 121° 10′	4,180	1928-31	USGS	A					
-40	McArthur Drainage Canal at McArthur	41° 03′ 121° 23′	3,350	1923-32	PGE USGS	D					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL R[illegible]OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARE[illegible]

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								S[illegible]son	Acre-feet	Season	Acre-feet
	Pit River Basin—Continued										
5-41	Bear Creek near Dana	41° 10′ 121° 34′	4,000	1921-26	PGE USGS	D D					
5-42	Fall River near Glenburn	41° 03′ 121° 28′	3,380	1922	USGS	D					
5-43	Fall River at Fall River Mills	41° 00′ 121° 26′	3,300	1912-13 1921-22	PGE USGS	A					
5-44	Pit River at Fall River Mills	41° 00′ 121° 26′	3,230	1921-45	USGS	A	329,000	1[illegible]-22	1,370,000	1930-31	76,000
5-45	Lost Creek near Bald Mountain	40° 45′ 121° 23′	3,900	1930	USGS	A					
5-46	Hat Creek near Hat Creek	40° 41′ 121° 25′	4,300	1926-46	USGS	A	86,200	1[illegible]-38	108,000	1929-30	37,900
5-47	Hat Creek at Browns Ranch	40° 44′ 121° 26′	3,800	1926	USGS	D					
5-48	Hat Creek at Hawkins Ranch	40° 44′ 121° 26′	3,760	1911-13	USGS	A					
5-49	Hat Creek at Wilcox Ranch	40° 45′ 121° 28′	3,670	1922	USGS	A					
5-50	Hat Creek at Hat Creek	40° 48′ 121° 30′	3,290	1910-17	USGS	D					
5-51	Rising River near Cassel	40° 55′ 121° 32′	3,180	1911-13 1921-22	USGS	A					
5-52	Hat Creek above No. 2 Power Plant	40° 56′ 121° 32′	3,100	1931-32	USGS	D					

5-53	Hat Creek at Carbon	40° 58′ 121° 33′	2,720	1921-22	PGE USGS	D					
5-54	Burney Creek above Burney	40° 48′ 121° 43′	4,090	1921-22	USGS	A					
5-55	Burney Creek at Haynes Ranch	40° 51′ 121° 43′	3,280	1927-29	DWRWA	D					
5-56	Burney Creek near Burney	40° 52′ 121° 40′	3,190	1911-13 1921-22	USGS	D					
5-57	Burney Creek at Burney Falls	41° 01′ 121° 39′	2,700	1921-22	USGS	A					
5-58	Pit River near Pecks Bridge	41° 01′ 121° 40′	2,690	1922-24	USGS	A					
5-59	Pit River at Lindsay Flat	40° 59′ 121° 45′	2,440	1922-27	USGS	A					
5-60	Pit River No. 3 Powerhouse Discharge at Lindsay Flat	40° 59′ 121° 45′	2,440	1927-39	USGS	A					
5-61	Pit River below Pit No. 4 Dam	40° 59′ 121° 47′	2,345	1927-47	USGS	A	1,878,000	19-38	2,942,000	1933-34	1,230,000
5-62	Pit River at Big Bend	41° 01′ 121° 55′	1,674	1910-47	USGS	A	2,084,000	19-38	3,328,000	1944-45	120,200
5-63	Kosk Creek near Henderson	41° 04′ 121° 55′	1,800	1910-16	USGS	A					
5-64	Pit River above Hatchet Creek	40° 56′ 122° 00′	1,280	1925-35	USGS	A					
5-65	Montgomery Creek at Montgomery Creek	40° 50′ 121° 55′	2,125	1911-13	USGS	A					
5-66	Pit River near Montgomery Creek	40° 51′ 121° 59′	1,075	1944-47	USGS	A					
5-67	Squaw Creek above Shasta Reservoir	40° 51′ 122° 07′	1,170	1944-47	USGS	A					
5-68	Squaw Creek at Ydalpom	40° 46′ 122° 13′	800	1911-13	USGS	D					
5-69	Pit River near Ydalpom	40° 46′ 122° 14′	735	1910-43	USGS	A	2,923,000	19-38	4,984,000	1930-31	1,560,000
5-70	Elk Creek near McCloud	41° 16′ 122° 04′	3,325	1927-32	USGS	A					
5-71	McCloud River near McCloud	41° 11′ 122° 04′	2,750	1931-47	USGS	A	605,000	19-42	855,000	1932-33	438,000

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Pit River Basin—Continued										
5-72	McCloud River above Shasta Res.	40° 57′ 122° 13′	1,060	1945-47	USGS	A					
5-73	McCloud River near Gregory	40° 54′ 122° 14′	950	1902-08	USGS	A					
5-74	McCloud River at Baird	40° 47′ 122° 18′	700	1910-43	USGS	A	1,279,000	19[illegible]41	2,205,000	1930-31	632,000
	Sacramento River Basin										
5-75	Sacramento River at Kennett	40° 44′ 122° 24′	618	1925-42	USGS	A	5,109,000	19[illegible]38	9,427,000	1930-31	2,530,000
5-76	Sacramento River at Keswick (Upstream)	40° 37′ 122° 27′	490	1938-42	USGS	A					
5-77	Sacramento River at Keswick (Downstream)	40° 37′ 122° 27′	495	1938-47	USGS	A					
5-78	Clear Creek near Shasta	40° 38′ 122° 33′	1,085	1911-13	USGS	A					
5-79	Clear Creek near Igo	40° 31′ 122° 31′	700	1940-47	USGS	A					
5-80	Little Cow Creek at Palo Cedro	40° 34′ 122° 13′	490	1911-14	USGS	A					
5-81	Oak Run Creek near Round Mountain	40° 43′ 121° 57′	2,620	1927-32	DWRWA	D					
5-82	Clover Creek at Fern Bridge	40° 42′ 121° 55′	2,650	1930-32	DWRWA	D					

5-83	Clover Creek at Millville	40° 33′ 122° 11′	500	1911-14	USGS	A					
5-84	Cow Creek at Millville	40° 33′ 122° 11′	490	1911-14	USGS	A					
5-85	Bear Creek near Millville	40° 30′ 122° 09′	500	1911-14	USGS	A					
5-86	Sacramento River at Balls Ferry	40° 25′ 122° 12′	360	1945-47	USBR	A					
5-87	Battle Creek near Cottonwood	40° 24′ 122° 08′	420	1940-47	USGS	A					
5-88	Cottonwood Creek, North Fork, near Ono	40° 31′ 122° 41′	2,050	1919	USGS	D					
5-89	Moon Creek near Ono	40° 30′ 122° 42′	1,980	1919	USGS	D					
5-90	Cottonwood Creek, North Fork, at Ono	40° 29′ 122° 38′	780	1907-13	USGS	A					
5-91	Cottonwood Creek near Cottonwood	40° 24′ 122° 13′	370	1940-47	USGS	A					
5-92	Sacramento River at Jellys Ferry	40° 19′ 122° 11′	310	1895-1902	USGS	A					
5-93	Sacramento River near Red Bluff	40° 14′ 122° 11′	250	1902-47	USGS	A	8,102,000	19 04	15,900,000	1923-24	2,970,000
5-94	Sacramento River at Red Bluff	40° 12′ 122° 14′	240	1894-96	USGS	C					
5-95	Antelope Creek near Red Bluff	40° 12′ 122° 07′	340	1940-47	USGS	A					
5-96	Mill Creek near Mineral	40° 21′ 121° 31′	4,900	1928-32	USGS	A					
5-97	Mill Creek near Los Molinos	40° 03′ 122° 01′	420	1909-13 1928-47	USGS	A	197,000	19 38	410,100	1930-31	87,500
5-98	Elder Creek near Henleyville	40° 02′ 122° 15′	310	1930-41	USGS	A	69,700	19 41	274,700	1938-39	8,650
5-99	Thomas Creek at Paskenta	39° 52′ 122° 33′	900	1920-47	USGS	A	178,000	19 38	446,200	1923-24	32,500
-100	Deer Creek at Deer Creek Meadows	40° 16′ 121° 27′	4,500	1928-32	USGS	A					
-101	Deer Creek at Polk Springs	40° 07′ 121° 40′	2,250	1928-31	USGS	AC					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RU… …FF FOR STATION…
WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

…um-ber on …late 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Se……n	Acre-foot	Season	Acre-feet
	Sacramento River Basin—Continued										
·102	Deer Creek near Vina	40° 01′ 121° 56′	480	1911-15 1920-37 1939-47	USGS	A	209,000	14	399,000	1930-31	73,600
·103	Sacramento River at Vina Bridge	39° 55′ 122° 05′	190	1945-47	USBR	A					
·104	Sacramento River at Hamilton City	39° 45′ 122° 00′	130	1945-47	USBR	A					
·105	Chico Creek near Chico	39° 46′ 121° 46′	298	1930-47	USGS	A	97,000	38	231,800	1930-31	24,000
·106	Grindstone Creek near Elk Creek	39° 41′ 122° 32′	790	1935-37 1939-40	USGS	A					
·107	Stony Creek near Stonyford	39° 22′ 122° 33′	1,360	1913-14 1918-20 1921-34	USGS	A	99,200	14	252,000	1923-24	26,700
·108	Little Stony Creek near Ladoga	39° 25′ 122° 35′	1,200	1908-34	USGS	A	42,000	09	163,000	1923-24	3,270
·109	Stony Creek above Stony Gorge Reservoir	39° 30′ 122° 31′	850	1933-41	USGS	A					
·110	Stony Creek near Elk Creek	39° 36′ 122° 32′	800	1919-34	USGS	A	138,000	27	334,000	1923-24	27,200
·111	Stony Creek near Fruto	39° 41′ 122° 30′	600	1901-12	USGS	A	531,000	09	894,000	1911-12	104,000
·112	Stony Creek near Orland	39° 47′ 122° 21′	420	1920-34	USGS	A	231,000	27	550,000	1923-24	31,200

5-113	Stony Creek at Simpson Bridge	39° 47′ 122° 21′	420	1920-21 1928-38	USBR	D					
5-114	Stony Creek near Hamilton City	39° 45′ 122° 06′	187	1941-47	USGS	A					
5-115	Stony Creek at St. John	39° 41′ 121° 59′	135	1906-47	USWB	D					
5-116	Sacramento River at Ords Ferry	39° 38′ 122° 00′	120	1921-27 1937-47	DWRWS	D A					
5-117	Sacramento River at Butte City	39° 28′ 122° 00′	90	1921-39 1940-47	DWRWS	D					
5-118	Sacramento River at Gordon Pump	39° 21′ 122° 01′	60	1922-47	DWRWS	D					
5-119	Moulton Weir to Butte Basin	39° 21′ 122° 01′	58	1935-47	DWRWS	D					
5-120	Colusa Weir to Butte Basin	39° 15′ 122° 00′	50	1935-47	DWRWS	D					
5-121	Sacramento River at Colusa	39° 13′ 122° 00′	48	1921-39 1940-47	USGS & DWRWS	DA					
5-122	Butte Creek near Chico	39° 44′ 121° 42′	350	1930-47	USGS	A	279,000	37-38	550,000	1930-31	90,700
5-123	Butte Slough to Sacramento River	39° 11′ 121° 56′		1936-47	DWRWS	DA					
5-124	Butte Slough to Sutter By-pass	39° 09′ 121° 50′		1934-47	DWRWS	DA					
5-125	Sutter By-pass at State Pumping Plant No. 3	39° 07′ 121° 50′		1924-47	DWRWS	D					
5-126	Wadsworth Canal to Sutter By-pass	39° 09′ 121° 44′		1929-47	DWRWS	D					
5-127	Sutter By-pass East Borrow Pit	38° 55′ 121° 37′		1930-45	DWRWS	D					
5-128	Sutter By-pass West Borrow Pit	38° 49′ 121° 40′		1930-42	DWRWS	D					
5-129	Sutter By-pass Recl. Dist. 1500 Pumping Plant	38° 47′ 121° 39′		1930-47	DWRWS	D					
5-130	Sacramento River at Meridian	39° 09′ 121° 55′	38	1915-47	DWRWS	D					
5-131	Sacramento River at Recl. Dist. 70 Pump	39° 04′ 121° 52′	32	1925-47	DWRWS	D					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL [illegible]NOFF FOR STATIONS
WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AR[illegible]

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-fee[illegible]	Maximum		Minimum	
								[illegible]ason	Acre-feet	Season	Acre-feet
	Sacramento River Basin—Continued										
5-132	Sacramento River at Tisdale Weir	39° 01′ 121° 49′	30	1935-47	DWRWS	D					
5-133	Sacramento River at Tisdale	39° 01′ 121° 49′	30	1925-47	DWRWS	D					
5-134	Sacramento River below Wilkins Slough	39° 01′ 121° 49′	29	1931-39 1940-47	USGS	DA					
5-135	Sacramento River near Rough and Ready Bend	38° 48′ 121° 43′	28	1937-47	DWRWS	D					
5-136	Sacramento River at Knights Landing Ridge Cut	38° 48′ 121° 43′		1941-43	USGS	A					
5-137	Sacramento River at Knights Landing Ridge Cut	38° 48′ 121° 43′		1933-47	DWRWS	D					
5-138	Colusa Trough at Colusa-Williams Highway	39° 19′ 122° 03′		1924-47	DWRWS	D					
5-139	Colusa Trough at College City	39° 01′ 121° 58′		1946-47	DWRWS	D					
5-140	Colusa Basin Drainage at Knights Landing	38° 48′ 121° 43′		1924-47	DWRWS	D					
5-141	Sycamore Slough at Colusa Basin Drain	38° 48′ 121° 43′		1941-47	DWRWS	D					
5-142	Sacramento River at Knights Landing	38° 48′ 121° 43′	25	1921-39 1940-47	USGS	DA					

	Feather River Basin										
5-143	Mountain Meadows Reservoir near Prattville	40° 17′ 121° 02′	4,490	1931-47	PGE	E					
5-144	Feather River, North Fork, above Prattville	40° 10′ 121° 05′	4,400	1905-07	USGS	AB					
5-145	Feather River, North Fork, below Prattville	40° 10′ 121° 06′	4,380	1905-47	USGS	A	639,000	1906-07	1,230,000	1926-27	308,000
5-146	Hamilton Branch near Prattville	40° 10′ 121° 05′	4,375	1905-07	USGS	A					
5-147	Almanor-Butt Creek Tunnel near Prattville	40° 12′ 121° 12′	4,300	1940-46	USGS	A					
5-148	Butt Creek above Almanor-Butt Tunnel	40° 12′ 121° 12′	4,300	1936-47	USGS	A	47,600	1937-38	92,160	1938-39	24,980
5-149	Butt Creek below Almanor-Butt Tunnel	40° 10′ 121° 11′	4,200	1938-47	USGS	A	528,400	1942-43	642,600	1946-47	371,200
5-150	Caribou Penstock Butt Valley Reservoir	40° 08′ 121° 10′	4,200	1939	PGE	A					
5-151	Butt Creek at Butt Valley	40° 07′ 121° 08′	4,100	1905-21	USGS	A	80,500	1906-07	128,00	1919-20	30,400
5-152	Butt Creek near Caribou	40° 07′ 121° 08′	4,000	1937-47	PGE	A	15,700	1942-43	21,550	1946-47	13,290
5-153	Indian Creek near Crescent Mills	40° 05′ 120° 56′	3,500	1906-09 1911-18 1930-47	USGS	A	377,000	1937-38	948,200	1930-31	68,200
5-154	Spanish Creek at Keddie	40° 00′ 120° 57′	3,250	1911-47	USGS	A	180,000	1937-38	408,000	1923-24	48,000
5-155	Grizzly Forebay near Storrie	39° 56′ 121° 18′	1,800	1930-47	PGE	D					
5-156	Bucks Creek Reservoir near Bucks Ranch	39° 54′ 121° 12′	5,000	1928-47	USGS	E					
5-157	Grizzly Creek at Diversion Dam	39° 52′ 121° 14′	4,900	1932-38 1940-47	USGS	A					
5-158	Three Lakes near Bucks Ranch	39° 55′ 121° 15′	4,000	1930-47	PGE	D					
5-159	Bucks Creek Power House at Storrie	39° 55′ 121° 17′	3,100	1935-39	PGE	A					
5-160	Grizzly Creek near Storrie	39° 52′ 121° 14′	4,900	1929-32 1933-44	USGS	A	20,300	1937-38	36,530	1938-39	7,700

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL NOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AI

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								ason	Acre-feet	Season	Acre-feet
	Feather River Basin—Continued										
5-161	Bucks Creek Tunnel at Outlet	39° 52′ 121° 14′	4,800	1934-36 1937-47	USGS	A	91,700	7-38	165,500	1938-39	47,770
5-162	Feather River, North Fork, at Big Bar	39° 48′ 121° 27′	1,320	1911-30 1932-37 1939-47	USGS	A	1,956,000	0-41	3,202,000	1923-24	802,000
5-163	Wilenor Canal near Yankee Hill	39° 42′ 121° 30′	2,000	1929-47	PGE	D					
5-164	Feather River, North Fork, at Big Bend	39° 43′ 121° 28′	866	1905-10	USGS	A					
5-165	Hendricks Canal near Nimshew	39° 55′ 121° 31′	3,500	1936-47	PGE	B	42,460	8-39	70,860	1936-37	15,211
5-166	Miocene Canal BW24 at Head	39° 48′ 121° 29′	3,000	1929-47	PGE	A	29,194	4-45	35,703	1936-37	19,422
5-167	Miocene Canal BW26 near Yankee Hill	39° 43′ 121° 30′	2,000	1930	PGE	A					
5-168	Concow Creek near Yankee Hill	39° 46′ 121° 32′	1,850	1927-47	USGS	A	19,600	0-41	34,390	1930-31	No flow
5-169	Spring Valley Ditch near Yankee Hill	39° 46′ 121° 32′	1,840	1927-47	USGS	A	7,600	5-46	9,620	1940-41	5,670
5-170	Feather River, West Branch, near Yankee Hill	39° 42′ 121° 34′	1,100	1930-47	USGS	A	239,000	7-38	561,500	1930-31	40,200
5-171	Last Chance Creek near Vinton	39° 52′ 120° 09′	5,100	1937-45	DWRWA	D					
5-172	Smith Neck Creek at Bear Valley Road Crossing	39° 37′ 120° 12′	6,000	1937-47	DWRWA	D					

5-173	Smith Neck Creek at Loyalton	39° 41′ 120° 16′	4,910	1937-47	DWRWA	D					
5-174	Little Truckee Ditch at Summit	39° 31′ 120° 16′	6,700	1937-47	DWRWA	D					
5-175	Webber Creek near Sierraville	39° 34′ 120° 22′	5,000	1937-47	DWRWA	D					
5-176	Hamlin Creek near Sierraville	39° 34′ 120° 25′	5,100	1937-43	DWRWA	D					
5-177	Miller Creek near Sierraville	39° 36′ 120° 24′	4,950	1937-47	DWRWA	D					
5-178	Grizzly Creek near Portola	39° 53′ 120° 28′	5,600	1925-32	USGS	A					
5-179	Grizzly Creek near Beckwith	39° 51′ 120° 26′	5,150	1906	USGS	D					
5-180	Feather River, Middle Fork, near Clio	39° 45′ 120° 36′	4,350	1925-47	USGS	A	183,000	1(-38	520,200	1930-31	47,200
5-181	Feather River, Middle Fork, near Sloat	39° 51′ 120° 43′	4,150	1910-28	USGS	A	356,000	1(-14	906,000	1923-24	68,400
5-182	Feather River, Middle Fork, below Sloat	39° 52′ 120° 46′	4,050	1940-47	USGS	A					
5-183	Feather River, Middle Fork, near Nelson Point	39° 51′ 120° 53′	3,860	1923-32	USGS	A					
5-184	Feather River, South Fork, near La Porte	39° 44′ 121° 00′	4,930	1927-33	USGS	A					
5-185	Lost Creek below Lost Creek Dam	39° 35′ 121° 08′	3,090	1947	USBR	A					
5-186	Lost Creek near Clipper Mills	39° 34′ 121° 09′	3,050	1927-41	USGS	A	46,300	1(-38	120,800	1930-31	4,910
5-187	Forbestown Ditch near Clipper Mills	39° 34′ 121° 09′	3,100	1927-41	USGS	A	15,000	1(-31	16,900	1931-32	11,700
5-188	Palermo Canal at Enterprise	39° 32′ 121° 21′	600	1911-47	USGS	A	13,700	1(-44	17,580	1932-33	7,660
5-189	Feather River, South Fork, at Enterprise	39° 32′ 121° 21′	550	1911-47	USGS	A	217,000	1(-38	491,400	1923-24	42,700
5-190	Feather River, Middle Fork, at Bidwell Bar	39° 33′ 121° 26′	290	1911-47	USGS	A	1,295,000	1(-38	2,981,000	1923-24	308,000
5-191	Feather River near Oroville	39° 32′ 121° 29′	182	1934-47	USGS	A	4,208,000	1(-38	8,175,000	1938-39	1,773,000

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RU[illegible]FF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARE[illegible]

Num-ber on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Se[illegible]on	Acre-feet	Season	Acre-feet
	Feather River Basin—Continued										
-192	Feather River at Oroville	39° 31′ 121° 33′	140	1902-34	USGS	A	4,201,000	19[illegible] 07	9,340,000	1923-24	1,180,000
-193	Feather River near Gridley	39° 22′ 121° 39′	70	1944-47	DWRWS	D					
-194	Feather River at Yuba City	39° 10′ 121° 37′	65	1944-47	DWRWS	D					
	Yuba River Basin										
-195	Yuba River, North Fork, near Sierra City	39° 34′ 120° 40′	4,100	1911-13 1923-44	USGS	A	167,000	19[illegible] 38	302,700	1930-31	65,000
-196	Yuba River, North Fork of North Fork, at Downieville	39° 34′ 120° 50′	2,800	1910-26	USGS	A	150,400	19[illegible] 21	290,000	1923-24	46,500
-197	Yuba River, North Fork, at Goodyear Bar	39° 33′ 120° 53′	2,650	1910-31	USGS	A	426,200	19[illegible] 14	753,000	1923-24	144,000
-198	Rock Creek at Goodyear Bar	39° 33′ 120° 53′	2,680	1910-33	USGS	A	17,800	19[illegible] 14	31,200	1923-24	3,500
-199	Goodyear Creek at Goodyear Bar	39° 33′ 120° 53′	2,650	1910-33	USGS	A	26,500	19[illegible] 21	45,800	1923-24	6,600
-200	Yuba River, North Fork, below Goodyear Bar	39° 32′ 120° 56′	2,450	1930-37 1938-47	USGS	A	515,000	19[illegible] 42	786,200	1930-31	148,000
-201	Bullards Bar Reservoir, North Fork, Yuba River	39° 25′ 121° 08′	1,450	1936-39	PGE	E					
-202	Yuba River, North Fork, below Bullards Bar Dam	39° 23′ 121° 09′	1,250	1941	USGS	A					

-203	Yuba River, North Fork, near North San Juan	39° 23′ 121° 09′	1,250	1900	USGS	B						
-204	Yuba River, North Fork, at Colgate Diversion Dam	39° 23′ 121° 09′	1,250	1940-47	USGS	A						
-205	Yuba River, Middle Fork, at Milton	39° 31′ 120° 35′	5,700	1925-33 1936-47	USGS	A	73,800	19:	27	117,000	1928-29	600
-206	Yuba River, Middle Fork, above Oregon Creek	39° 23′ 121° 05′	1,450	1941-47	USGS	A						
-207	Oregon Creek near North San Juan	39° 24′ 121° 05′	1,500	1910-47	USGS	A	53,600	19:	21	114,000	1930-31	11,900
-208	Yuba River, Middle Fork, near North San Juan	39° 23′ 121° 06′	1,400	1910-41	USGS	A	334,000	19:	27	600,000	1930-31	65,500
-209	Canyon Creek above Jackson Creek	39° 27′ 120° 37′	5,600	1926-30	USGS	A						
-210	Jackson Creek at Mouth	39° 27′ 120° 37′	5,595	1926-30	USGS	A						
-211	Milton-Bowman Tunnel at Outlet	39° 28′ 120° 37′	5,600	1928-30 1931-47	USGS	A	52,100	19:	30	70,300	1938-39	30,000
-212	Bowman-Spaulding Canal at Intake	39° 27′ 120° 39′	5,400	1927-47	USGS	A	105,000	19·	41	123,800	1931-32	62,400
-213	Canyon Creek below Bowman Lake	39° 26′ 120° 40′	5,100	1927-47	USGS	A	23,300	19·	42	63,900	1930-31	600
-214	Yuba River, South Fork, near Cisco	39° 19′ 120° 33′	5,500	1942-47	USGS & USBR	A						
-215	Drum Canal near Lake Spaulding	39° 18′ 120° 40′	4,400	1930-47	PGE	B	255,794	19·	45	319,920	1931-32	168,805
-216	Spaulding Spillway at Lake Spaulding	39° 20′ 120° 39′	5,100	1941-47	PGE	B						
-217	South Yuba Canal at Lake Spaulding	39° 20′ 120° 39′	5,000	1930-47	PGE	B	59,781	19·	45	81,830	1940-41	45,916
-218	South Yuba Canal at Deer Creek Power House	39° 17′ 120° 48′	4,500	1930-47	PGE	B	47,843	19·	45	69,720	1931-32	35,283
-219	Yuba River, South Fork, at Langs Crossing	39° 19′ 120° 40′	4,480	1933-47	PGE	D						
-220	Yuba River, South Fork, near Washington	39° 22′ 120° 46′	2,750	1942-47	USGS	A						
-221	Yuba River, South Fork, at Jones Bar Bridge	39° 18′ 121° 07′	1,050	1940-47	USGS	A						

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RU OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARE

Num-ber on Plate 2	Stream and location of gaging station	Latitude and longitude	Approx-imate eleva-tion, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Se on	Acre-feet	Season	Acre-feet
	Yuba River Basin—Continued										
-222	Yuba River at Narrows Dam	39° 14′ 121° 16′	527	1941-47	USGS	A					
-223	Cascade Ditch at head	39° 17′ 120° 51′	3,100	1930-47	NID	B	31,357	19 33	35,745	1942-43	25,884
-224	Snow Mountain Ditch at head	39° 17′ 120° 54′	3,250	1930-47	NID	B	5,091	19 32	6,459	1939-40	3,523
-225	D.S. Canal at head	39° 16′ 120° 57′	2,800	1930-47	NID	B	16,644	19 43	25,005	1935-36	11,050
-226	Excelsior Ditch at head	39° 19′ 121° 04′	1,400	1931-47	NID	A	28,791	19 46	46,636	1931-32	12,892
-227	Deer Creek near Smartville	39° 13′ 121° 16′	500	1935-47	USGS	A	115,000	19 42	161,400	1938-39	23,400
-228	Yuba River at Smartville	39° 13′ 121° 18′	265	1903-41	USGS	A	2,129,000	19 07	4,560,000	1923-24	443,000
-229	Yuba River at Parks Bar Bridge	39° 13′ 121° 20′	250	1900							
-230	French Dry Creek near Browns-ville	39° 24′ 121° 15′	2,000	1946-47	USBR	A					
-231	French Dry Creek at Virginia Ranch	39° 20′ 121° 19′	950	1946-47	USBR	A					
-232	Browns Valley Canal above Col-gate Power House	39° 15′ 121° 24′		1930-47	PGE	A	19,261	19 33	23,484	1937-38	16,893
-233	Yuba River at Marysville	39° 09′ 121° 35′	75	1939-47	USGS	A					

	Feather River Basin										
5-234	Feather River below Shanghai Bend	39° 03′ 121° 37′	62	1944-47	DWRWS	D					
	Bear River Basin										
5-235	Bear River near Colfax	39° 07′ 120° 58′	1,950	1912-17	USGS	A					
5-236	Bear River near Auburn	39° 01′ 121° 05′	1,300	1922, 25, 28, 29, 33 1940-47	USGS	D A					
5-237	Bear River at Van Trent	39° 03′ 121° 18′	175	1904-28	USGS	AB	335,000	1906-07	726,000	1923-24	23,200
5-238	Bear River near Wheatland	39° 00′ 121° 25′	85	1928-47	USGS	A	308,000	1937-38	575,000	1932-33	50,600
5-239	Boardman Canal near Intake	39° 17′ 120° 42′	4,750	1930-47	PGE	B	13,327	1935-36	25,760	1937-38	7,450
5-240	Lake Valley Canal near Emigrant Gap	39° 18′ 120° 39′	5,680	1930-47	PGE	B	7,701	1933-34	11,263	1930-31	3,411
5-241	Drum Canal below Drum Forebay	39° 15′ 120° 45′	4,300	1930-47	PGE	B	114,348	1930-31	20,539	1940-41	3,371
5-242	Bear River Canal near Colfax	39° 07′ 120° 58′	1,950	1912-47	PGE	B	222,802	1943-44	276,696	1930-31	87,402
5-243	Gold Hill Canal below Combie Dam	39° 00′ 121° 03′	1,450	1930-47	NID	A	13,970	1946-47	29,316	1930-31	8,028
5-244	Feather River at Nicolaus	38° 54′ 121° 35′	47	1921-42 1943-47	USGS	DA					
	Cache and Yolo Basins										
5-245	Cache Creek, North Fork, near Lower Lake	39° 01′ 122° 33′	1,035	1930-47	USGS	A	125,000	1937-38	360,000	1930-31	15,100
5-246	Cache Creek at Lower Lake	38° 55′ 122° 37′	1,300	1901-15	USGS	B	347,900	1908-09	720,000	1914-15	6,200
5-247	Cache Creek near Lower Lake	38° 55′ 122° 34′	1,280	1944-47	USGS	A					
5-248	Cache Creek near Capay	38° 44′ 122° 06′	240	1942-47	USGS	A					
5-249	Cache Creek at Yolo	38° 43′ 121° 48′	60	1903-47	USGS	A	377,000	1940-41	1,429,000	1930-31	3,720

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL INOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY A A

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Cache and Yolo Basins—Continued										
5-250	Yolo By-Pass near Woodland	38° 41′ 121° 39′	20	1940-47	USGS	A					
5-251	Yolo By-Pass at mouth of Sacramento By-Pass	38° 36′ 121° 35′	15	1930-39	DWRWS	D					
5-252	Putah Creek near Guenoc	38° 46′ 122° 31′	913	1904-06 1930-47	USGS	A	137,000	40-41	320,900	1930-31	23,500
5-253	Putah Creek near Winters	38° 31′ 122° 05′	160	1930-47	USGS	A	343,000	40-41	1,004,000	1930-31	34,800
5-254	Putah Creek at Winters	38° 31′ 121° 58′	90	1905-31	USGS	A	370,300	13-14	895,000	1929-30	30,000
5-255	Sacramento Slough at Sacramento River	38° 47′ 121° 38′	15	1924-47	DWRWS	D					
5-256	Recl. Dist. 1001 Drain at Cross-Canal	38° 47′ 121° 35′	25	1940-47	DWRWS	D					
5-257	Sacramento River at Verona	38° 47′ 121° 36′	25	1927-28 1929-47	USGS	DA	12,033,000	37-38	22,060,000	1930-31	4,550,000
5-258	Conaway Drain near Elkhorn Ferry	38° 41′ 121° 38′	15	1924-27	DWRWS	D					
2-259	Sacramento By-Pass at Yolo By-Pass	38° 36′ 121° 33′	20	1940-47	DWRWS	D					
5-260	Second Bannon Slough near Sacramento	38° 37′ 121° 32′	15	1925-47	DWRWS	D					
5-261	Back Borrow Pit at mouth of American River	38° 37′ 121° 29′	15	1926-35	DWRWS	D					
5-262	Recl. Dist. 1000 No. 3 Pumping Plant 6.8 miles above Sacramento	38° 37′ 121° 37′	15	1924-47	DWRWS	D					

	American River Basin										
5-263	Lake Valley Canal at intake	39° 18′ 120° 36′	5,790	1930-37	PGE	B					
5-264	American River, North Fork, near Colfax	39° 02′ 120° 54′	897	1911-41	USGS	A	468,000	37-38	933,200	1923-24	110,000
5-265	American River, North Fork, at North Fork Dam	38° 56′ 121° 00′	715	1941-47	USGS	A					
5-266	Rubicon River at Rubicon Springs	39° 01′ 120° 15′	6,061	1910-14	USGS	A					
5-267	Little Rubicon River near Rubicon Springs	39° 00′ 120° 15′	6,350	1911	USGS	D					
5-268	Gerle Creek near Rubicon Springs	39° 00′ 120° 19′	6,310	1910-14	USGS	A					
5-269	Little South Fork Ditch at Sawmill	38° 57′ 120° 24′	5,200	1910-13	USGS	D					
5-270	Rubicon River, Little South Fork, at Sawmill	38° 57′ 120° 24′	5,200	1910-14	USGS	A					
5-271	Rubicon River, Little South Fork, below Gerle Creek	38° 57′ 120° 24′	4,935	1910-14	USGS	A					
5-278	Rubicon River, Little South Fork, at mouth	38° 58′ 120° 28′	4,790	1909-11 1909-14	USGS	A					
5-279	Rubicon River near Georgetown	38° 58′ 120° 29′	3,950	1943-47	USGS	A					
5-280	Pilot Creek near Quintette	38° 55′ 120° 38′	3,950	1910-14	USGS	A					
5-281	Pilot Creek Ditch near Quintette	38° 55′ 120° 38′	3,945	1910-14	USGS	A					
5-282	American River, Middle Fork, near Auburn	38° 55′ 121° 00′	568	1911-47	USGS	A	987,000	13-14	1,900,000	1923-24	229,000
5-283	South Canal near Newcastle	38° 52′ 121° 07′	925	1930-47	PGE	B	139,757	41-42	168,703	1934-35	87,690
5-284	American River, North Fork, at Rattlesnake Bridge	38° 49′ 121° 06′	343	1930-37 1938-47	USGS	A	1,688,000	41-42	2,572,000	1930-31	414,000
5-285	Echo Lake Conduit near Vade	38° 50′ 120° 02′	7,500	1923-47	PGE USGS	D					
5-286	Medley Lakes Outlet near Vade	38° 51′ 120° 08′	8,100	1922-47	PGE USGS	A	12,200	41-42	18,200	1930-31	6,300

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL INOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AR

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								ason	Acre-feet	Season	Acre-feet
	American River Basin—Continued										
5-287	American River, South Fork, at Kyburz	38° 46′ 120° 18′	4,034	1906-07 1923-24	USGS	A					
5-288	Twin Lakes Outlet near Kirkwood	38° 42′ 120° 03′	7,900	1922-47	USGS	A	24,100	37-38	40,800	1923-24	8,200
5-289	Twin Lakes Spillway near Kirkwood	38° 42′ 120° 04′	7,900	1925-47	USGS	A					
5-290	Silver Lake near Kirkwood	38° 40′ 120° 08′	7,200	1922-47	USGS	A	23,500	37-38	42,300	1930-31	6,400
5-291	Seepage from Silver Lake near Silver Lake Dam	38° 40′ 120° 07′	7,200	1929-45	USGS PGE	A	2,751	29-30	3,800	1931-32	1,600
5-292	American River, Silver Fork of South Fork, near Kyburz	38° 45′ 120° 17′	4,850	1924-44	USGS	A	148,000	37-38	284,000	1930-31	60,400
5-293	American River, South Fork, below Silver Fork	38° 46′ 120° 19′	3,940	1906	USGS	D					
5-294	American River, South Fork, near Kyburz	38° 46′ 120° 19′	4,030	1907 1922-47	USGS PGE	A	269,000	37-38	412,800	1930-31	33,400
5-295	El Dorado Canal near Kyburz	38° 46′ 120° 19′	4,100	1922-47	PGE USGS	A	73,800	41-42	90,000	1922-23	27,500
5-296	Alder Creek near Whitehall	38° 45′ 120° 22′	4,000	1922-47	USGS PGE	A	24,300	37-38	49,300	1923-24	2,900
5-297	Plum Creek near Riverton	38° 45′ 120° 26′	4,100	1922-39	USGS	A	5,600	37-38	13,500	1923-24	900
5-298	Silver Creek at Union Valley	38° 52′ 120° 26′	4,530	1924-47	USGS	A	143,000	37-38	239,900	1930-31	48,300

5-299	Silver Creek, South Fork, near Ice House	38° 49′ 120° 22′	5,300	1922 1924-47	USGS	A	51,000	5-36 2-43	75,700	1930-31	18,300
5-300	Silver Creek near Placerville	38° 47′ 120° 35′	2,250	1921-47	USGS	A	279,000	7-38	509,800	1923-24	82,800
5-301	American River, South Fork, below Silver Creek	38° 47′ 120° 37′	1,950	1923	USGS	D					
5-302	American River Flume near Camino	38° 46′ 120° 42′	1,710	1922-47	USGS PGE	A	78,200	4-45	668,000	1932-33	46,500
5-303	American River, South Fork, near Camino	38° 46′ 120° 42′	1,640	1922-47	PGE	A	637,000	7-38	1,089,000	1923-24	117,000
5-304	Finnon Reservoir Outlet near Placerville	38° 48′ 120° 46′	2,450	1922-37	USGS	A	2,300	5-36	4,400	1930-31	900
5-305	American River, South Fork, near Placerville	38° 46′ 120° 49′	1,548	1911-20	USGS	A					
5-306	American River, South Fork, at Coloma	38° 48′ 120° 53′	730	1929-41	USGS	A	698,000	7-38	1,330,000	1930-31	219,000
5-307	Webber Creek near Salmon Falls	38° 45′ 121° 00′	675	1943-47	USBR USGS	A					
5-308	Lower Greeley Canal near Rattlesnake Bridge	38° 51′ 121° 06′	750	1930-47	PGE	B	1,704	3-34	2,328	1942-43	1,033
5-309	American River at Fair Oaks	38° 38′ 121° 16′	72	1904-47	USGS	A	2,677,000	0-11	6,480,000	1923-24	530,000
5-310	American River at Sacramento	38° 34′ 121° 25′	18	1921 1934-42 1943-47	USGS DWRWS	DA					
5-311	Sacramento River at Sacramento	38° 35′ 121° 30′	15	1904-5, 1921, 1924-47	USGS DWRWS	A					
5-312	Sacramento River at Collinsville	38° 04′ 121° 51′	0	1878-85	USGS	B					
	San Joaquin River Basin										
5-313	Iron Creek at mouth	37° 37′ 119° 13′	7,100	1923	USGS	D					
5-314	San Joaquin River, North Fork, below Iron Creek	37° 37′ 119° 14′	6,800	1920-28	USGS	A					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL JNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY A A

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of reco acre-	Maximum		Minimum	
								eason	Acre-feet	Season	Acre-feet
	San Joaquin River Basin—Continued										
5-315	San Joaquin River, Middle Fork, at Miller Bridge	37° 31′ 119° 12′	4,600	1921-28	USGS	A					
5-316	Granite Creek, Middle Fork, near Cattle Mountain	37° 32′ 119° 16′	7,200	1922-23	USGS	A					
5-317	Granite Creek, East Fork, near Cattle Mountain	37° 33′ 119° 16′	7,300	1922-25	USGS	B					
5-318	Granite Creek, West Fork, near Timber Knob	37° 32′ 119° 17′	7,000	1922-25	USGS	B					
5-319	Granite Creek near Cattle Mountain	37° 31′ 119° 15′	6,700	1921-28	USGS	A					
5-320	Bear Creek at Diversion Dam	37° 20′ 118° 58′	7,350	1916-20 1935-47	USGS	D					
5-321	Bear Creek Conduit near Vermilion Valley	37° 20′ 118° 58′	7,400	1928-47	SCE USGS	A	44,	41-42	60,000	1929-30	32,300
5-322	Bear Creek near Vermilion Valley	37° 20′ 118° 58′	7,400	1921-47	SCE USGS	A	63,	37-38	120,700	1923-24	21,200
5-323	Mono Creek near Vermilion Valley	37° 22′ 118° 59′	7,400	1921-47	USGS	A	108,	37-38	194,200	1923-24	38,300
5-324	Mono Creek Conduit near Vermilion Valley	37° 22′ 118° 59′	7,400	1928-45	SCE USGS	A	69,	42-43	91,270	1940-41	52,310
5-325	Ward Tunnel at intake	37° 17′ 118° 58′	7,350	1925-47	USGS	A	190,	45-46	291,000	1930-31	85,200
5-326	San Joaquin River, South Fork, near Florence Lake	37° 16′ 118° 58′	7,200	1921-47	USGS	A	215,	37-38	219,200	1943-44	314

5-327	San Joaquin River, South Fork, near Hoffman Meadow	37° 25′ 119° 08′	5,100	1921-28	USGS	A					
5-328	Jackass Creek near Jackass Meadow	37° 29′ 119° 18′	7,000	1921-28	USGS	D					
5-329	Jackass Creek near Fullers Meadows	37° 23′ 119° 19′	3,500	1924-25	USGS	D					
5-330	Jackass Creek, West Fork, near Fullers Meadows	37° 23′ 119° 19′	3,500	1924-25	USGS	D					
5-331	Chiquito Creek near Mugler Meadows	37° 28′ 119° 23′	5,800	1924-25	USGS	D					
5-332	Chiquito Creek near Arnold Meadow	37° 25′ 119° 23′	4,800	1921-28	USGS	A					
5-333	San Joaquin River above Big Creek	37° 15′ 119° 19′	2,500	1922-47	USGS	A	977,000	37-38	2,274,000	1930-31	260,000
5-334	San Joaquin River near Shaver	37° 12′ 119° 20′	2,150	1912-21	SCE USGS	D					
5-335	Big Creek above Huntington Dam	37° 15′ 119° 13′	6,950	1913-27	SCE	A	99,935	25-26	241,559	1923-24	27,150
5-336	Ward Tunnel at outlet	37° 16′ 119° 12′	7,000	1927-47	USGS	A	319,000	45-46	445,200	1930-31	154,000
5-337	Huntington Shaver Conduit at intake	37° 13′ 119° 12′	6,950	1928-47	USGS	A	130,834	44-45	212,600	1938-39	24,882
5-339	Big Creek near Big Creek	37° 14′ 119° 13′	7,100	1910-15	USGS	A					
5-340	Big Creek below Huntington Lake	37° 13′ 119° 13′	6,600	1925-47	USGS	A	1,096	44-45	2,970	1930-31	256
5-341	Big Creek above Pitman Creek	37° 13′ 119° 14′	5,500	1914-21	SCE	A					
5-342	Pitman Creek Shaft below Tamarack Creek	37° 12′ 119° 12′	7,100	1937-40 1943-47	USGS	A					
5-343	Pitman Creek near Tamarack Mountain	37° 12′ 119° 12′	7,100	1937-47	USGS	D					
5-344	Pitman Creek below Tamarack Creek	37° 12′ 119° 12′	7,100	1927-47	USGS	A	28,200	37-38	63,500	1930-31	6,140
5-345	Pitman Creek near mouth	37° 12′ 119° 14′	5,000	1913-21	SCE	A					
5-346	Pitman Creek at Big Creek	37° 12′ 119° 13′	5,000	1910-15 1922-40	USGS	A					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL INOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AI A

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	San Joaquin River Basin—Continued										
5-347	Big Creek Powerhouse Discharge at Plant No. 1	37° 12′ 119° 14′	5,000	1913-21	SCE & USGS	A					
5-348	Big Creek Dam Spill at Dam No. 4	37° 12′ 119° 15′	4,800	1913-21	SCE						
5-349	Big Creek Powerhouse Discharge at Plant No. 2a	37° 12′ 119° 18′	3,200	1939	SCE	A					
5-350	Big Creek Powerhouse Discharge at Plant No. 2	37° 12′ 119° 19′	3,000	1914-21	SCE	A					
5-351	Big Creek near mouth	37° 13′ 119° 20′	2,600	1923-31	USGS	A					
5-352	Big Creek Powerhouse Discharge at Plant No. 8	37° 13′ 119° 20′	2,248	1923-29	SCE	A					
5-353	Huntington-Shaver Conduit at outlet	37° 10′ 119° 14′	6,680	1928-47	USGS	A	149,00	44-45	248,800	1933-34	13,500
5-354	Southern California Edison Co. Flume at Shaver	37° 09′ 119° 18′	5,270	1922-26 1931-36	USGS	A •					
5-355	Fresno Lumber Co. Upper Flume at Shaver	37° 09′ 119° 18′	5,225	1915-20	USGS	D					
5-356	Fresno Lumber Co. Lower Flume at Shaver	37° 09′ 119° 18′	5,225	1916-19	USGS	A					
5-357	Stevenson Creek near Shaver	37° 09′ 119° 18′	5,000	1916-20 1922-47	USGS	A	5,64	16-17	44,900	1930-31	130
5-358	Big Creek Plant No. 3	37° 00′ 119° 23′	1,450	1939	SCE	A					

359	South Fork Ditch near North Fork	37° 18′ 119° 30′	3,500	1910 1913	USGS	D					
360	Willow Creek, North Fork, near North Fork	37° 18′ 119° 32′	3,500	1910-11	USGS	D					
361	PGE Conduit No. 3 near Crane Valley Reservoir	37° 17′ 119° 32′	3,300	1940-47	USGS	A					
362	Willow Creek, North Fork, below Crane Valley Reservoir	37° 17′ 119° 32′	3,200	1940-47	USGS	A					
363	Willow Creek, South Fork, near North Fork	37° 13′ 119° 30′	2,500	1910-15	USGS	A					
364	San Joaquin River near North Fork	37° 19′ 119° 33′	3,310	1910-11	PGE USGS	D					
365	Whiskey Creek near North Fork	37° 14′ 119° 27′	3,650	1910-15	USGS	A					
366	Cascadel Creek near North Fork	37° 14′ 119° 27′	3,700	1910-11	USGS	A					
367	San Joaquin River, North Fork, near North Fork	37° 09′ 119° 30′	1,000	1910-14	USGS	A					
368	San Joaquin River at intake Powerhouse No. 6	37° 05′ 119° 33′	970	1910-20	S.J.Lt. & Pwr.	A	1,095,670	191 11	1,924,491	1911-12	524,484
369	Kerckhoff Powerhouse Discharge at Kerckhoff Powerhouse	37° 06′ 119° 33′	800	1938-39	USGS	A					
370	San Joaquin River below Kerckhoff Powerhouse	37° 05′ 119° 34′	560	1936-37 1942-47	USGS	A					
371	Big Sandy Creek near Auberry	37° 03′ 119° 32′	425	1936-38 1942-47	USGS	A					
372	San Joaquin River near Auberry	37° 05′ 119° 34′	610	1931-35 1938-47	USGS	AD					
373	Fine Gold Creek near Friant	37° 03′ 119° 39′	680	1936-47	USGS	A	33,100	193 38	107,800	1938-39	6,740
374	San Joaquin River near Friant	37° 01′ 119° 42′	315	1907-38	USGS	A	1,694,000	193 38	3,592,000	1923-24	507,000
375	Cottonwood Creek near Friant	37° 00′ 119° 43′	355	1937-47	USGS	A	8,401	193 38	41,999	1945-46	218
376	San Joaquin River below Friant	36° 59′ 119° 43′	294	1938-47	USGS	A					
377	Little Dry Creek near Friant	36° 56′ 119° 41′	357	1937-47	USGS	A	9,459	193 38	34,006	1945-46	975

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL R[illegible] OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARE[illegible]

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								S[illegible]ion	Acre-feet	Season	Acre-feet
	San Joaquin River Basin—Continued										
5-378	Stony Creek near Friant	36° 56′ 119° 44′	375	1936-42	DWR	D					
5-379	San Joaquin River near Herndon	36° 51′ 119° 55′	226	1936-38 1946-47	DWR USBR PGE	A					
5-380	San Joaquin River at Hamptonville	36° 51′ 119° 56′	225	1878-84	USGS	B					
5-381	San Joaquin River at Herndon	36° 51′ 119° 56′	225	1891-1909	USGS	B					
5-382	San Joaquin River below Skaggs Bridge	36° 50′ 120° 05′	208	1926-35	DWR, SCE	A	1,318,196	1[illegible]-32	2,986,850	1930-31	606,273
5-383	Gravelly Ford Canal at intake	36° 49′ 120° 09′	185	1920-43	M & L	A	48,557	1[illegible]-38	110,324	1933-34	376
5-384	Gravelly Ford Waste at Gravelly Ford Farm	36° 48′ 120° 11′	180	1925-26	M & L	D					
5-385	Aliso Canal at head	36° 48′ 120° 13′	180	1906-47	M & L	A	47,835	1[illegible]-07	129,023	1923-24	0
5-386	Browns Slough at head	36° 47′ 120° 15′	170	1906-30	M & L	B	25,737	1[illegible]-07	91,804	1929-30	0
5-387	Chowchilla Canal at head	36° 47′ 120° 17′	170	1926-39	M & L	A					
5-388	Chowchilla Canal at 2d point	36° 51′ 120° 19′	160	1930-41	M & L	A	35,209	1[illegible]-33	45,187	1930-31	24,081
5-389	Chowchilla Canal at boundary	36° 55′ 120° 20′	155	1913-28	M & L	A	15,809	1[illegible]-28	28,889	1914-15	7,162

390	Columbia Canal at head	36° 47′ 120° 18′	165	1906-43	M & L	A	47,374	191 11	100,760	1937-38	25,889
391	Lone Willow Slough at head	36° 46′ 120° 17′	170	1907-41 1943	M & L	A	100,172	19 23	124,000	1940-41	59,519
392	San Joaquin River at Whitehouse	36° 46′ 120° 17′	170	1901-41 1943	M & L	A	1,669,258	19 07	3,115,000	1923-24	483,000
393	Los Gatos Creek near Coalinga	36° 13′ 120° 27′	1,000	1931-41 1945-47	USGS USBR	A					
394	West Branch Big Canal below Sand Ridge	35° 51′ 119° 41′	210	1942-47	USBR	A					
395	East Branch Canal below Sand Ridge	35° 51′ 119° 41′	210	1942-47	USBR	A					
396	Goose Lake Slough below Sand Ridge	35° 50′ 119° 38′	205	1942-47	USBR	B					
397	Goose Lake Slough below Lost Hills Road	35° 48′ 119° 37′	225	1942-44	USBR	BA					
398	Hart Station Main Drain below Lost Hills Road	35° 37′ 119° 39′	225	1944-47	USBR	A					
399	San Emigdio Creek at San Emigdio Ranch	34° 59′ 119° 11′	1,600	1894-95	USGS	B					
400	Tejon House Creek at Tejon Ranch House	35° 02′ 118° 44′	1,400	1895-96	USGS	D					
401	Caliente Creek near Caliente	35° 18′ 118° 39′	1,210	1932 1942	USBR USGS	D					
402	Caliente Creek near Bena	35° 20′ 118° 44′	875	1943-46	USBR	A					
403	Walker Basin Creek near Bena	35° 20′ 118° 45′	850	1945	USBR	D					
404	Walker Basin Creek near Havilah	35° 23′ 118° 33′	3,230	1911-12	USGS	D					
405	Walker Basin Creek below State Highway No. 466	35° 19′ 118° 46′	825	1943-44	USBR	A					
	Kern River Basin										
406	Kern River No. 3 Canal near Kernville	35° 54′ 118° 28′	3,590	1921-47	USGS	A	273,000	19 38	337,200	1923-24	154,000

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL R[illegible]OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARE[illegible]

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								S[illegible]son	Acre-feet	Season	Acre-feet
	Kern River Basin—Continued										
5-407	Kern River near Kernville	35° 56′ 118° 29′	3,550	1912-47	USGS	A	525,000	1[illegible]-16	1,170,000	1923-24	8,750
5-408	Kern River and Kern River No. 3 Canal near Kernville	35° 54′ 118° 28′	3,590	1921-47	USGS	A					
5-409	Salmon Creek near Kernville	35° 54′ 118° 27′	3,000	1922-23	USGS	A					
5-410	Kern River at Kernville	35° 42′ 118° 26′	2,500	1905-11	USGS	A					
5-411	Kern River Power Co. Canal at Kernville	35° 42′ 118° 26′	2,550	1910-14	USGS	A					
5-412	Borel Canal at Tilley Creek	35° 42′ 118° 27′	2,570	1910-14 1925-47	USGS	A	264,000	1[illegible]-38	332,300	1930-31	156,000
5-413	Kern River at Isabella	35° 40′ 118° 28′	2,490	1910-12 1925-35	USGS	A	418,000	1[illegible]-11	838,000	1930-31	178,000
5-414	Kern River, South Fork, near Onyx	35° 44′ 118° 10′	2,900	1911-14 1919-42	USGS	A	81,100	1[illegible]-41	235,800	1930-31	13,300
5-415	Lowell Ditch near Onyx	35° 44′ 118° 11′	3,000	1929-33	USGS	A					
5-416	Thomas Creek near Onyx	35° 44′ 118° 10′	2,920	1929-33	USGS	A					
5-417	Kern River, South Fork, at Isabella	35° 40′ 118° 28′	2,484	1910-13 1929-47	USGS	DA	84,000	1[illegible]-41	223,600	1930-31	5,910
5-418	Kern River below Isabella Dam Site	35° 39′ 118° 29′	2,400	1945-47	USGS	A					

5-419	Erskine Creek near Bodfish	35° 33′ 118° 24′	4,000	1911-12	USGS	D					
5-420	Kern River at Borel	35° 35′ 118° 31′	2,550	1905-18	SCE	A	387,663	15-16	715,824	1912-13	156,351
5-421	Kern River at Kern River No. 1 Headworks	35° 32′ 118° 40′	1,910	1909-17 1920	SCE	A					
5-422	Kern Canyon Powerhouse Discharge at Kern Canyon Powerhouse	35° 28′ 118° 47′	1,900	1939	SCE	A					
5-423	Kern River at Powerhouse No. 1	35° 28′ 118° 47′	800	1908-19 1936-44	SCE	DA	891,286	10-11	1,364,986	1918-19	468,176
5-424	Kern River above Kern Canyon Powerhouse	35° 26′ 118° 48′	685	1931-47	SCE USGS	A	511,000	37-38	946,300	1946-47	119,000
5-425	Kern River at Rio Bravo Ranch	35° 25′ 118° 50′	580	1878-84	USGS	B					
5-427	Kern River near Bakersfield	35° 26′ 118° 57′	470	1893- 1947	USGS	A	710,000	15-16	2,460,000	1930-31	184,000
	Tulare Lake Basin										
5-428	Poso Creek near Bakersfield	35° 32′ 118° 57′	625	1939-45	USBR USGS	AD					
5-428A	Poso Creek at Porterville Road Bridge	35° 33′ 119° 05′	525	1943-47	USBR	A					
5-428B	Poso Creek near Famoso	35° 36′ 119° 14′	425	1943-47	USGS	A					
5-428C	Poso Creek at Famoso	35° 36′ 119° 14′	425	1944-47	USBR USGS	D					
5-429	White River near Hot Springs	35° 50′ 118° 36′	5,200	1911-13	USGS	D					
5-430	White River near Ducor	35° 49′ 118° 56′	680	1944-47	USBR USGS	A					
5-431	White River at Upper Station	35° 49′ 118° 56′	680	1944	USBR	A					
5-432	White River South of Ducor	35° 52′ 119° 03′	500	1943-47	USBR	A					
5-433	White River at Friant-Kern Canal	35° 50′ 119° 09′	400	1943-47	USBR	A					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, SOUTH COASTAL AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Tulare Lake Basin—Continued										
5-434	Deer Creek at Hot Springs	35° 53′ 118° 41′	3,100	1910-35	USGS	A	5,075	14-15	8,890	1933-34	1,920
5-435	Tyler Creek near Hot Springs	35° 54′ 118° 38′	3,750	1911-13	USGS	D					
5-436	Deer Creek at Terra Bella Irr. Dist. Station	35° 57′ 118° 50′	940	1919-43	Irvin H. Althouse	A	24,2	42-43	99,245	1923-24	4,634
5-437	Deer Creek above Deer Creek Ditch	36° 00′ 118° 58′	525	1944	USBR	A					
5-438	Deer Creek at Highway No. 65	35° 58′ 119° 02′	445	1943-47	USBR	A					
5-439	Deer Creek at Friant-Kern Canal Crossing	35° 57′ 119° 05′	400	1943-47	USBR	A					
5-440	Deer Creek below Highway 99	35° 55′ 119° 18′	260	1945-47	USBR	A					
5-441	Bear Creek near Springville	36° 12′ 118° 46′	2,000	1911-16	USGS	A					
5-442	PGE Conduit near Springville	36° 12′ 118° 39′	4,000	1939-47	USGS	A					
5-443	North Fork of Middle Fork, Tule River near Springville	36° 11′ 118° 42′	2,850	1909-12 1939-47	USGS	A	30,0	42-43	76,600	1946-47	4,650
5-444	South Fork of Middle Fork, Tule River near Springville	36° 09′ 118° 42′	2,550	1909-12	USGS	A					
5-445	Tule River near Porterville	36° 05′ 118° 55′	580	1901-47	USGS	A	106,0	05-06	340,000	1930-31	13,900

5-446	Tule River, South Fork, near Porterville	36° 02′ 118° 47′	1,110	1910-25 1927-32	USGS	A	35,150	1	5-16	87,000	1930-31	5,400
5-447	Tule River, South Fork, near Success	36° 03′ 118° 51′	750	1930-47	USGS	A	33,300	1	2-43	94,920	1930-31	3,750
5-448	Tule River at Porterville	36° 03′ 118° 55′	550	1878-84	USGS	B						
5-449	Tule River at Worth Bridge	36° 03′ 118° 56′	750	1944-47	USBR	A						
5-450	Porter Slough below Porterville	36° 03′ 118° 58′	500	1942-47	USBR	A						
5-451	Porter Slough below Porter Slough Ditch	36° 04′ 119° 02′	448	1943-44 1946	USBR	A						
5-452	Porter Slough at Highway No. 99	36° 07′ 119° 20′	270	1944-47	USBR	A						
5-453	Tule River below Poplar Bridge	36° 06′ 119° 00′	450	1942-44	USBR	A						
5-454	Tule River above Little Pioneer Ditch	36° 05′ 119° 07′	375	1942-47	USBR	A						
5-455	Tule River at Elk Bayou Avenue	36° 04′ 119° 24′	242	1942-43	USBR	B						
5-456	Lewis Creek East of Lindsay	36° 12′ 119° 03′	420	1944	USBR	A						
5-457	Tule River near Corcoran	36° 03′ 119° 32′	200	1942-47	USBR	A						
5-458	Packwood Creek above Lakeland Canal	36° 07′ 119° 31′	220	1943	USBR	A						
	Kaweah River Basin											
5-459	Kaweah River, North Fork, near Kaweah	36° 33′ 118° 54′	1,800	1913	USGS	D						
5-460	Kaweah River, North Fork, at Kaweah	36° 29′ 118° 55′	1,080	1910-47	USGS	A	73,100	1	7-38	196,400	1923-24	11,400
5-461	Kaweah River, Marble Fork, near Ranger	36° 35′ 118° 47′	5,150	1913	USGS	D						
5-462	Kaweah River, Middle Fork, near Hammond	36° 31′ 118° 46′	2,700	1913	USGS	D						

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL UNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY A A

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								eason	Acre-feet	Season	Acre-feet
	Kaweah River Basin—Continued										
5-463	Kaweah River, Middle Fork, at Kaweah No. 2 Headworks	36° 29′ 118° 50′	1,300	1916-19	SCE	D					
5-464	Kaweah River, East Fork, at Diversion Dam of Kaweah No. 1	36° 27′ 118° 47′	2,500	1916-20	SCE	D					
5-465	Kaweah River, South Fork, near Three Rivers	36° 23′ 118° 51′	1,500	1911-24	USGS	A	49,200	15-16	118,000	1923-24	13,200
5-466	Kaweah River at Three Rivers	36° 24′ 118° 57′	620	1903-47	USGS	A	416,000	05-06	1,100,000	1923-24	102,000
5-467	Horse Creek at Highway 198 near mouth	36° 24′ 118° 58′	610	1943-44	USBR	A					
5-468	Greasy Creek near mouth	36° 25′ 119° 00′	520	1943-44	USBR	A					
5-469	Limekiln Creek near Lemon Cove	36° 25′ 119° 01′	505	1943-47	USBR	A					
5-470	Limekiln Creek near mouth	36° 25′ 119° 01′	505	1943-47	USBR	A					
5-471	Foothill Ditch above McKay Point	36° 25′ 119° 01′	490	1917-47	KSJA	A	4,522	32-33	5,666	1943-44	3,843
5-472	Lindsay Strathmore Irr. Dist. Canal at Main Canal pumping lift	36° 15′ 119° 05′	450	1918-47	KSJA	BC	17,567	41-42	18,977	1932-33	14,016
5-473	Lewis Creek near Lindsay	36° 11′ 119° 00′	550	1944 1939-40	USBR DWR	D					
5-474	Kaweah River at Watchumna Hill	36° 24′ 119° 01′	485	1878-84	USGS	B					

175	Watchumna Ditch above McKay Point	36° 24′ 119° 02′	465	1917 1920-47	KSJA	A	35,381	194	1	70,358	1930-31	12,578
177	Tulare Irr. Dist. Canal Diversion through Watchumna Ditch	36° 24′ 119° 08′	410	1938-47	KSJA	A	30,382	193	8	100,800	1946-47	5,616
178	Tulare Irr. Dist. Canal below McKay Point	36° 22′ 119° 10′	385	1917-18 1924-47	KSJA	A	18,305	194	1	37,033	1933-34	1,192
179	Kaweah River at McKay Point	36° 30′ 119° 02′	450	1918-47	USGS	A	357,600	193	8	866,700	1923-24	80,100
181	St. Johns Branch, Kaweah River at McKay Point	36° 23′ 119° 02′	445	1916-47	KSJA	A	167,926	193	7	335,401	1923-24	33,741
182	Longs Canal near McKay Point	36° 23′ 119° 04′	440	1917-47 ex. 1923, 28-30	KSJA	A	4,621	193	5	8,321	1946-47	952
183	Lanes Slough near Woodlake	36° 23′ 119° 07′	405	1917-21	KSJA	A						
184	Ketchum Ditch near Woodlake	36° 23′ 119° 07′	405	1917-47 ex. 1919, 21-23	KSJA	A	18,995	193	8	30,644	1927-28	3,091
185	Packwood Canal near Ivanhoe	36° 22′ 119° 10′	390	1917 1924-47	KSJA	A	13,246	194	5	31,910	1933-34 1938-39	0 0
186	St. Johns River below Packwood Canal	36° 21′ 119° 10′	375	1941-43	USBR	B						
187	St. Johns River above Cutler Park	36° 21′ 119° 13′	360	1941-43	USBR	B						
188	Mathews Ditch near Visalia	36° 21′ 119° 14′	350	1917-47 ex. 1918, 19, 23	KSJA	A	4,907	193	6	6,834	1930-31	1,810
189	Barton Cut near Visalia	36° 21′ 119° 15′	345	1917-45 ex. 1919, 21-23, 1936	KSJA	DA	4,633	193	7	6,455	1933-34	1,133
190	Jennings Ditch near Visalia	36° 21′ 119° 16′	340	1917-47	KSJA	A	5,158	193	7	10,144	1930-31	1,286
191	Uphill Ditch near Visalia	36° 21′ 119° 16′	340	1917-47 ex. 1919, 23	KSJA	A	6,485	193	7	10,477	1930-31	1,205

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RU OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL COASTAL ARE

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Kaweah River Basin—Continued										
-492	Modoc Ditch near Visalia	36° 21′ 119° 17′	330	1917-47 ex. 1919, 22, 23	KSJA	A	10,524	19[illegible]-32	19,017	1933-34	1,500
-493	Cottonwood Creek above Elderwood	36° 32′ 119° 08′	600	1945-46	USBR	B					
-494	Cottonwood Creek at Redbanks	35° 25′ 119° 09′	420	1942-46	USBR	A					
-495	Cottonwood Creek at Monson Ave.	36° 27′ 119° 20′	308	1942-43	USBR	B					
-496	Cross Creek below Highway 99	36° 24′ 119° 27′	270	1942-43	USBR	B					
-497	Lakeside Ditch near Hanford	36° 21′ 119° 32′	250	1917-47	KSJA	A	38,007	19[illegible]-38	75,831	1923-24	0
-498	Kaweah Branch at McKay Point	36° 23′ 119° 02′	450	1916-47	KSJA	A	173,345	19[illegible]-37	355,718	1923-24	46,323
-499	Hamilton Ditch below McKay Point	36° 22′ 119° 05′	425	1920-30	H. H. Holley, Visalia	AD					
-500	Consolidated Peoples Ditch Co. near McKay Point	36° 22′ 119° 07′	405	1917-47	KSJA	A	70,978	19[illegible]-37	122,553	1923-24	22,484
-501	Elk Bayou near Rankin Field	36° 10′ 119° 16′	280	1942-47	USBR	AB					
-502	Elk Bayou East of Elk Bayou Ave.	36° 07′ 119° 22′	245	1942-47	USBR	B					

503	Yokohl Creek below Foothill Ditch	36° 20′ 119° 05′	458	1944	USBR	A					
504	Yokohl Creek near Friant-Kern Canal	36° 21′ 119° 07′	415	1943-47	USBR	A					
505	Deep Creek near McKay Point	36° 21′ 119° 09′	385	1917-47	KSJA	A	33,260	193 38	97,354	1933-34	1,783
506	Cameron Creek above Lakeland Canal	36° 09′ 119° 31′	220	1943	USBR	B					
507	Deep Creek Cut below McKay Point	36° 20′ 119° 10′	385	1927-33 1936-47	KSJA	A	5,154	193 38	24,222	1938-39	379
508	Crocker Cut near McKay Point	36° 21′ 119° 10′	385	1918, 1925-30, 1932, 33, 1935-47	KSJA	A	27,567	193 37	58,725	1927-28	1,676
509	Tulare Irrig. Dist. Canal below Crocker Cut	36° 20′ 119° 12′	360	1938-39	DWR	D					
510	Tulare Irrig. Dist. Canal near McKay Point	36° 21′ 119° 11′	370	1918-20 1924-47	KSJA	A	16,380	193 38	36,414	1933-34	1,192
511	Fleming Ditch near Visalia	36° 21′ 119° 12′	370	1918-47	KSJA	A	2,260	192 21	3,530	1923-24	804
512	Packwood Creek near Visalia	36° 20′ 119° 13′	350	1918-47 ex. 1923	KSJA	A	10,060	193 37	31,458	1924, 30, 31, 34, 39	0
513	K.D.W.C.D. No. 3 Feeder Ditch near Visalia	36° 15′ 119° 27′	267	1943-47	USBR	B					
514	K.D.W.C.D. No. 6 Feeder Ditch near Visalia	36° 15′ 119° 27′	276	1944-47	USBR	B					
515	Oakes Ditch near Visalia	36° 20′ 119° 19′	350	1918, 1920-22 1924-37 1940-47	KSJA	A	2,532	194 42	4,940	1930-31	605
516	Evans Ditch near Visalia	36° 20′ 119° 15′	340	1917, 1920-47	KSJA	A	8,483	194 42	13,059	1923-24	2,321
517	Watson Ditch near Visalia	36° 20′ 119° 15′	340	1918 1920-47	KSJA	A	8,086	194 42	12,242	1923-24	2,321
518	Mill Creek near Visalia	36° 20′ 119° 15′	338	1917-47 ex. 1919, 1923	KSJA	A	11,072	193 38	43,770	1930-31	918

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL R[illegible] OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARE[illegible]

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								S[illegible]ion	Acre-feet	Season	Acre-feet
	Kaweah River Basin—Continued										
5-519	K.D.W.C.D. No. 4 Feeder Ditch near Visalia	36° 18′ 119° 26′	273	1943-47	USBR	B					
5-520	Mill Creek above Section 8 Diversion	36° 17′ 119° 30′	250	1943	USBR	B					
5-521	Lindsay Strathmore Irr. Dist. at Kaweah Booster Pump	36° 22′ 119° 07′	405	1928-47	KSJA	B	10,665	1[illegible]-41	14,017	1946-47	10,289
5-522	Sand Creek East of Orange Cove	36° 38′ 119° 15′	490	1943-47	USGS	A					
	Kings River Basin										
5-523	Kings River below Meadowbrok	37° 05′ 118° 52′	8,150	1921-35	USGS	D					
5-524	Helms Creek at Sand Meadow	37° 06′ 118° 58′	8,000	1922-35	USGS	AD					
5-525	Kings River, North Fork, near Cliff Camp	37° 00′ 118° 59′	6,150	1921-47	USGS	A	256,000	1[illegible]-38	542,000	1923-24	58,200
5-526	Rancheria Creek near Smith Meadow	36° 57′ 118° 58′	6,400	1924-35	USGS	AD					
5-527	Kings River, North Fork, below Rancheria Creek	36° 56′ 119° 00′	4,150	1927-47	USGS	A	288,000	1[illegible]-41	453,400	1930-31	92,500
5-528	Dinkey Creek at Dinkey Meadow	37° 03′ 119° 09′	5,440	1921-35	USGS	A	56,500	1[illegible]-35	104,400	1923-24	18,600
5-529	Deer Creek below East Fork	37° 00′ 119° 04′	6,700	1923-35	USGS	AD					

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530	Kings River above Dinkey Creek	36° 54′ 119° 07′	1,240	1919-30	USGS	A	280,000	19[illegible]22	467,000	1923-24	73,800
531	Dinkey Creek at mouth	36° 55′ 119° 08′	1,310	1920-37	USGS	A	130,000	19[illegible]22	224,000	1923-24	38,800
532	Kings River near Hume	36° 51′ 118° 54′	2,100	1921-36	USGS	A	762,000	19[illegible]22	1,330,000	1923-24	268,000
533	Kings River above North Fork	36° 52′ 119° 07′	1,020	1927-28 1931-47	USGS	A	1,073,000	19[illegible]38	1,970,000	1933-34	439,000
534	Big Creek near Toll House	37° 02′ 119° 14′	3,325	1911-12	USGS	D					
535	Rush Creek near Ockenden	37° 02′ 119° 17′	4,410	1910-13	USGS	D					
536	Kings River at Suspension Bridge	36° 53′ 119° 15′	770	1895	USGS	D					
537	Kings River at Piedra	36° 49′ 119° 23′	500	1895- 1947	USGS	A	1,688,000	19[illegible]06	3,900,000	1923-24	392,000
538	Alta Canal near Piedra	36° 48′ 119° 24′	500	1920-47	KRWM	A	150,767	19[illegible]32	257,068	1930-31	26,039
539	Kings River at Slate Point	36° 48′ 119° 24′	485	1878-84	USGS	B					
540	Gould Canal near Sanger	36° 48′ 119° 26′	440	1920-47	KRWM	A	122,058	19[illegible]32	156,262	1923-24	45,717
541	Fresno Canal near Sanger	36° 46′ 119° 27′	435	1920-47	KRWM	A	305,562	19[illegible]32	416,880	1923-24	134,763
542	Consolidated Canal near Sanger	36° 46′ 119° 27′	435	1920-47	KRWM	A	209,000	19[illegible]37	421,883	1923-24	18,983
543	Short Ditch near Sanger	36° 45′ 119° 27′	420	1928-47	KRWM	A	328	19[illegible]30	742	1932-33	115
544	Phillips Ditch near Sanger	36° 45′ 119° 27′	420	1928-47	KRWM	A	821	19[illegible]30	1,870	1937-38	487
545	Carmelita Ditch near Sanger	36° 45′ 119° 27′	410	1928-47	KRWM	D					
546	Jacobi Ditch near Sanger	36° 44′ 119° 29′	385	1928-47	KRWM	D					
547	Fink Ditch near Sanger	36° 43′ 119° 28′	385	1927-47	KRWM	D					
548	Turner Ditch near Sanger	36° 43′ 119° 29′	385	1928-38	KRWM	D					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL I NOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARI

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Kings River Basin—Continued										
5-549	China Slough Ditch near Sanger	36° 40′ 119° 27′	380	1927-47	KRWM	D					
5-550	McLaughlin Ditch near Sanger	36° 43′ 119° 30′	365	1928-47	KRWM	D					
5-551	Hanke Ditch near Sanger	36° 43′ 119° 29′	365	1926-47	KRWM	D					
5-552	Byrd Ditch near Sanger	36° 42′ 119° 29′	360	1927-47	KRWM	D					
5-553	Mitchell Ditch near Sanger	36° 42′ 119° 29′	350	1928-31 1934-47	KRWM	D					
5-554	Cameron Ditch near Sanger	36° 43′ 119° 29′	350	1928-47	KRWM	D					
5-555	Farms No. 1 Ditch near Sanger	36° 43′ 119° 28′	390	1928-38	KRWM	D					
5-556	Farms No. 2 Ditch near Sanger	36° 43′ 119° 28′	390	1931-38	KRWM	D					
5-557	Farms No. 3 Ditch near Sanger	36° 43′ 119° 27′	390	1928-36	KRWM	D					
5-558	Harris Slough near Sanger	36° 42′ 119° 31′	345	1927-47	KRWM	D					
5-559	Jack Ditch near Sanger	36° 42′ 119° 29′	370	1923-25 1928-47	KRWM	D					
5-560	Kings River at Reedley Narrows	36° 39′ 119° 29′	298	1920-47	KRWM	D					

-561	Wahtoke Creek near Campbell Mountain	36° 42′ 119° 23′	430	1945-47	USBR	B						
-562	Banks Ditch Wasteway	36° 25′ 119° 28′	278	1942-43	USBR	B						
-563	Kings River at Kingsburg	36° 30′ 119° 32′	280	1904	USGS	B						
-564	Emigrant Canal near Kingsburg	36° 29′ 119° 35′	280	1920-27 1932-33	KRWM	A						
-565	Lakeland Canal near Kingsburg	36° 29′ 119° 32′	275	1920-27 1932-47	KRWM	A	12,935	19:	36	33,530	1946-47	2,206
-566	Peoples Canal near Kingsburg	36° 29′ 119° 32′	275	1920-47	KRWM	A	145,644	19:	36	207,639	1930-31	62,790
-567	Kings River below Peoples Weir	36° 29′ 119° 32′	272	1920-47	KRWM	D						
-568	Liberty Canal near Laton	36° 26′ 119° 40′	255	1920-30 1932-47	KRWM	A	8,105	19:	40	16,097	1923-24	0
-569	Last Chance Canal near Hanford	36° 25′ 119° 40′	255	1920-47	KRWM	A	59,355	19:	32	103,662	1930-31	12,785
-570	A Canal near Laton	36° 26′ 119° 40′	255	1920-47	KRWM	A	2,835	19·	46	7,132	1923-24	726
-571	Murphy Slough near Laton	36° 26′ 119° 40′	250	1918-30	KRWM	A						
-572	Turner-Riverdale Canal near Riverdale	36° 27′ 119° 49′	220	1920-30 1933-36	KRWM	D						
-573	Big Mill Race Canal near Riverdale	36° 27′ 119° 49′	215	1920-30 1932-36	KRWM	D						
-574	Little Mill Race Canal near Riverdale	36° 27′ 119° 49′	220	1920-30 1932-36	KRWM	D						
-575	Reed Canal near Riverdale	36° 28′ 119° 54′	190	1920-30	KRWM	D						
-576	Grant Canal near Laton	36° 26′ 119° 40′	240	1920-47	KRWM	A	37,258	19:	32	62,625	1930-31	6,216
-577	Lemoore Canal near Lemoore	36° 25′ 119° 43′	240	1920-47	KRWM	A	90,345	19:	32	139,025	1930-31	31,274
-578	Kings River below Lemoore Weir	36° 26′ 119° 43′	235	1933-47	KRWM	A	509,594	19:	38	1,723,940	1938-39	33,008
-579	Island Canal near Lemoore	36° 23′ 119° 47′	225	1920-30 1931-47	KRWM	A	13,161	19:	32	22,549	1923-24	3,004

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL R[illegible]OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARE[illegible]

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								S[illegible]son	Acre-feet	Season	Acre-feet
	Kings River Basin—Continued										
5-580	Kings River in Green Slough	36° 21′ 119° 49′	220	1921-30	KRWM	A					
5-581	Kings River in Clarks Fork	36° 20′ 119° 53′	220	1932-47	KRWM	A	115,736	1[illegible]7-38	493,214	1943-44	4,254
5-582	Kings River in Sand Slough	36° 23′ 119° 52′	217	1934-47	KRWM	A	76,876	1[illegible]7-38	351,344	1946-47	1,666
5-583	Kings River in Faull Slough	36° 17′ 119° 52′	212	1932-33	KRWM	D					
5-584	Kings River in San Jose Slough	36° 21′ 119° 54′	210	1921-30	KRWM	A					
5-585	Summit Lake Canal near Riverdale	36° 23′ 119° 53′	205	1919-30 32-33,36, 1940-47	KRWM	A	1,444	1[illegible]4-45	4,202	1919-20	251
5-586	Calamity Canal near Riverdale	36° 24′ 119° 56′	205	1921, 23, 25	KRWM	A					
5-587	Empire East Side Canal near Stratford	36° 14′ 119° 52′	200	1920-27	KRWM	A					
5-588	Blakely Canal near Stratford	36° 11′ 119° 50′	200	1920-27 1932-33	KRWM	AD					
5-589	Kings River below Empire Weir No. 2	36° 11′ 119° 50′	200	1930-32	KRWM	A					
5-590	Empire West Side Canal near Stratford	36° 14′ 119° 52′	200	1920-27	KRWM	A					
5-591	Tulare Lake Canal near Stratford	36° 11′ 119° 49′	190	1921-40	KRWM	A					

5-592	Crescent Canal near Riverdale	36° 24′ 119° 56′	205	1918-30 1932-47	KRWM	A	15,937	1	6-37	42,224	1929-30	1,914
5-593	Hite Canal near Burrel	36° 27′ 120° 02′	200	1921-22	KRWM	D						
5-594	Stinson Canal near Burrel	36° 28′ 119° 59′	200	1920-29 1932-47	KRWM	A	10,461	1	3-44	18,540	1923-24	0
5-595	Kings River at Elkhorn Grade near Burrel	36° 30′ 120° 00′	200	1918-30	KRWM	A	90,685	1	1-22	522,767	1928, 29, 1930	0
5-596	Cuthbert-Burrel Canal near Burrel	36° 28′ 119° 59′	195	1920-26 1932	KRWM	AD						
5-597	Kings River in Fresno Slough and By-pass	36° 35′ 120° 12′	175	1927, 32 1935-47	KRWM	A	238,595	1	7-38	861,578	1946-47	7,053
5-598	James Main Canal near San Joaquin	36° 34′ 120° 06′	180	1920-27 1932-47	KRWM	A	11,120	1	5-46	25,430	1928, 29, 1930	0
5-599	Beta Main Canal near San Joaquin	36° 34′ 120° 10′	170	1920-27 1932-47	KRWM	A	10,000	1	4-45	24,174	1924, 28, 29, 30	0
5-600	Jap Canal near San Joaquin	36° 35′ 120° 10′	170	1918-20	KRWM	D						
5-601	Carmichael Slough near San Joaquin	36° 37′ 120° 10′	168	1918	KRWM	D						
5-602	Dog Creek near Academy	36° 53′ 119° 33′	493	1940-43 1947	USGS DWR	D						
5-603	Dry Creek near Academy	36° 53′ 119° 33′	500	1940-45 1947	USGS DWR	D						
5-604	Fresno Slough By-Pass East of Tranquility	36° 39′ 120° 11′	160	1945-46	Kings River Water Assoc.	D						
	San Joaquin River Basin											
5-605	San Joaquin River above Mendota Dam	36° 47′ 120° 22′	155	1928-29	M & L	E						
5-606	Firebaugh Canal at head	36° 47′ 120° 22′	155	1927-41 1943	M & L	A	41,554	1	2-43	64,845	1926-27	7,729
5-607	Outside Canal below Beaver Dam	36° 47′ 120° 23′	155	1930-41 1943	M & L	A	150,452	1	0-31	87,209	1935-36	181,767
5-608	Outside Canal at 2nd Point	36° 47′ 120° 23′	155	1921-22	M & L	A						

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL [illegible]OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AR[illegible]

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								[illegible]son	Acre-feet	Season	Acre-feet
	San Joaquin River Basin—Continued										
5-609	Outside Canal near Mendota	36° 48′ 120° 25′	150	1904-06 1917-30	M & L	A	117,012	1 4-05	157,188	1923-24	68,311
5-610	Outside Canal at Firebaugh	36° 51′ 120° 20′	155	1905-06	M & L	A					
5-611	Outside Canal above Oro Loma Road	36° 54′ 120° 37′	155	1924-30	M & L	D					
5-612	Panoche Creek near Panoche	36° 36′ 120° 45′	1,000	1923	USGS	D					
5-613	Silver Creek near Panoche	36° 35′ 120° 41′	1,150	1923	USGS	D					
5-614	Main Canal at head	36° 47′ 120° 22′	151	1906-15 1926-43	M & L	A	285,415	1 4-15	474,361	1933-34	120,455
5-615	Poso Canal at head	36° 52′ 120° 27′	145	1906-07 1929-34	M & L	A					
5-616	Poso Canal at Firebaugh	36° 52′ 120° 27′	140	1905-06	M & L	D					
5-617	Poso Canal at Temple Slough	37° 00′ 120° 30′	100	1938-43	SJC Co.	A					
5-618	Main Canal below Firebaugh Highway	36° 51′ 120° 27′	145	1905-06 1917-22 1926-30	M & L	A					
5-619	Helm Canal at head	36° 47′ 120° 22′	151	1907-43	SJC Co.	A	150,98[illegible]	2-23	216,317	1933-34	48,870
5-620	Helm Ditch at head	36° 47′ 120° 22′	151	1921-22, 28, 30	M & L	D					

5-621	Helm Canal at Firebaugh	36° 52′ 120° 27′	150	1919-22 1929-33	M & L	A					
5-622	Agatha Canal at head	36° 56′ 120° 42′	130	1929-32	M & L	A					
5-623	Laguna Canal at head	36′ 55° 120° 35′	140	1929-30	M & L	A					
5-624	Colony Canal at head	36° 55′ 120° 32′	150	1928-37 ex. 1935	M & L	A					
5-624A	Gable Ditch at head	36° 57′ 120° 42′	140	1930-36	M & L	D					
5-625	Parallel Canal at Camp No. 13	36° 57′ 120° 46′	130	1929-30	M & L	D					
5-626	Camp 13 Slough at head	36° 56′ 120° 43′	136	1928-29	M & L	A					
5-627	Main Canal at Camp No. 13	36° 57′ 120° 46′	130	1929-30	M & L	D					
5-628	San Luis Canal Diversion near Dos Palos	36° 59′ 120° 30′	115	1918-43 ex. 25, 26, 42	M & L	A	197,302	1[illegible]-23	340,899	1930-31	107,719
5-629	San Joaquin River near Mendota	36° 49′ 120° 23′	142	1939-47	USGS	A					
5-630	Blythe Canal at head	36° 59′ 120° 30′	122	1928	M & L	D					
5-631	Temple Slough at head	36° 59′ 120° 30′	118	1918-43	M & L	D					
5-632	San Joaquin River near Dos Palos	36° 59′ 120° 30′	116	1940-47	USGS	A					
5-633	San Joaquin River above Temple Slough	37° 00′ 120° 30′	100	1928-34	M & L	A					
5-634	San Joaquin River below Temple Slough	36° 59′ 120° 30′	100	1928-34	M & L	A					
5-635	Fresno River, North Fork, near Sugar Pine	37° 26′ 119° 37′	4,500	1910-11	USGS	D					
5-636	Nelder Creek near Fresno Flats	37° 22′ 119° 37′	2,950	1910-12	USGS	D					
5-637	Fresno River near Knowles	37° 14′ 119° 46′	1,140	1911-13 1915-47	USGS	A	59,300	1[illegible]-38	186,700	1930-31	6,150

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL INOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AI

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Averag period of record acre-fe	Maximum		Minimum	
								eason	Acre-feet	Season	Acre-feet
	San Joaquin River Basin—Continued										
5-638	Fresno River near Daulton	37° 06′ 119° 53′	385	1941-47	USGS	A					
5-639	Fresno River at Adobe Ranch	37° 05′ 119° 53′	385	1938-43	USBR	A					
5-640	Fresno River at Foothills	37° 00′ 120° 00′	300	1878-84	USGS	D					
5-642	M.C.I.C. Canal near Madera	36° 59′ 120° 02′	280	1946-47	USBR	D					
5-643	Fresno River near Madera	36° 59′ 120° 02′	280	1914-23	DWR	D					
5-644	Fresno River near Madera	36° 59′ 120° 12′	200	1939-42	USBR	D					
5-645	Berenda Slough at Johnson Road	37° 01′ 120° 20′	172	1940-42	USBR	A					
5-646	Ash Creek at Tylor Road	37° 01′ 120° 20′	155	1940-42	USBR	D					
5-647	Mariposa Slough at Potters South Line	37° 07′ 120° 35′	107	1939-47	USBR	A					
5-648	Mariposa Slough above San Joaquin River	37° 12′ 120° 44′	76	1941	USBR	D					
5-649	Chowchilla River at Buchanan Dam Site	37° 13′ 120° 00′	407	1921-23 1930-47	USGS	A	82,5	37-38	258,900	1930-31	3,050
5-650	Chowchilla River at Foothills near Buchanan	37° 13′ 120° 00′	410	1878-84	USGS	B					

5-650A	Chowchilla River near Chowchilla	37° 07′ 120° 20′	200	1937-42	DWR	D
5-651	Chamberlain Slough at head	37° 06′ 120° 35′	103	1938-44	USBR	A
5-652	San Joaquin River near El Nido	37° 07′ 120° 35′	100	1940-47	DWR USGS USBR	A
5-653	Chamberlain Slough near El Nido	37° 07′ 120° 35′	100	1939-47	USGS	A
5-654	Mariposa Slough below McNamara Headgate	37° 11′ 120° 40′	90	1940-47	USBR	A
5-655	Mariposa Slough below Big Sand Spillway	37° 11′ 120° 41′	57	1922-28 1930-44	M & L	D
5-656	Salt Slough near Los Banos	37° 09′ 120° 49′	80	1940-47	USGS	A
5-657	Sand Slough above East Side Canal	37° 10′ 120° 41′	86	1940-44	USBR	A
5-658	East Side Canal at head	37° 11′ 120° 41′	90	1939-47	USBR	A
5-659	Little Sand Slough below East Side Canal	37° 11′ 120° 41′	87	1939-44	USBR	A
5-660	San Joaquin River at Delta Bridge	37° 08′ 120° 42′	95	1935-37 1941-47	DWRWS	D
5-661	San Joaquin River at Turner Island Bridge	37° 09′ 120° 42′	85	1937-47	DWR USBR	A
5-662	Deadman Creek at Merced Irrig. Dist. East Boundary	37° 13′ 120° 12′	270	1941-42	USBR	D
5-663	Dutchman Creek at Merced Irrig. Dist. Boundary	37° 13′ 120° 12′	260	1941-42	USBR	D
5-664	Deadman Creek near Lone Tree School	37° 12′ 120° 35′	100	1941-43	USBR	A
5-665	Deep Slough below Three Bridges	37° 12′ 120° 42′	83	1940-45	USBR	A
5-666	Duck Slough at Merced Irrig. Dist. West Boundary	37° 12′ 120° 40′	92	1932-47	USBR	A
5-667	Mariposa Creek at Foothills	37° 17′ 120° 09′	385	1878-84	USGS	B

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL I NOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARI

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	San Joaquin River Basin—Continued										
5-668	Mariposa Creek near Merced Irrig. Dist. East Boundary	37° 16′ 120° 11′	315	1942	USBR	D					
5-669	Mariposa Creek near Merced Irrig. Dist. East Boundary	37° 16′ 120° 12′	310	1942	USBR	A					
5-670	Owens Creek at Merced Irrig. Dist. East Boundary	37° 17′ 120° 15′	270	1940-42	USBR	A					
5-671	Miles Creek at Merced Irrig. Dist. East Boundary	37° 19′ 120° 15′	275	1942	USBR	A					
5-672	Owens Creek below Bloss Diversion	37° 13′ 120° 41′	91	1940-47	USBR	A					
5-673	Owens Creek below Mariposa Spillgate	37° 13′ 120° 42′	81	1940-44	USBR	A					
5-674	Bear Creek at Merced Irrig. Dist. East Boundary	37° 20′ 120° 19′	210	1942	USBR	A					
5-675	Bear Creek at Merced Irrig. Dist. West Boundary	37° 15′ 120° 39′	100	1943-46	USBR	D					
5-676	Bear Creek below East Side Canal	37° 15′ 120° 43′	84	1940-44	USBR	A					
5-677	Bear Creek above San Joaquin River	37° 16′ 120° 48′	64	1940-47	USBR	A					
5-678	Mud Slough at Gustine-Stevinson Highway	37° 17′ 120° 57′	55	1937-46	USBR DWRWS	A					
5-679	Los Banos Creek at Trent	37° 05′ 120° 53′	105	1928-29	SJC Co.	A					

5-680	Las Garzas Creek near Gustine	37° 13′ 121° 00′	100	1928-29	M&L	A					
5-681	San Joaquin at Fremont Ford Bridge	37° 19′ 120° 55′	57	1936-47	DWRWS	A					
	Merced River Basin										
5-682	Merced River above Illilouette Creek	37° 44′ 119° 33′	4,100	1915	USGS	D					
5-683	Illilouette Creek near Yosemite	37° 44′ 119° 33′	4,100	1915	USGS	D					
5-684	Merced River at Happy Isles Bridge	37° 44′ 119° 33′	4,000	1915-47	USGS	A	245,000	1[illegible]-38	461,700	1923-24	85,400
5-685	Tenaya Creek near Yosemite	37° 45′ 119° 33′	4,000	1904-09 1912-47	USGS	A	75,300	1[illegible]-38	129,800	1930-31	23,900
5-686	Merced River at Yosemite	37° 45′ 119° 36′	4,035	1912-16	USGS	B					
5-687	Yosemite Creek at Yosemite	37° 45′ 119° 36′	4,030	1904-09 1912-26	USGS	AD					
5-688	Merced River at Pohono Bridge	37° 43′ 119° 40′	3,870	1916-47	USGS	A	425,000	1[illegible]-38	849,300	1930-31	145,000
5-689	Merced River, South Fork, near Wawona	37° 32′ 119° 40′	4,000	1910-22	USGS	D					
5-690	Big Creek near Wawona	37° 29′ 119° 38′	4,970	1911	USGS	D					
5-691	Merced River at Kittridge	37° 39′ 120° 11′	750	1922-47	USGS	A	908,000	1[illegible]-38	1,987,000	1930-31	173,300
5-692	Merced River at Exchequer	37° 35′ 120° 17′	400	1915-47	USGS	A	900,000	1[illegible]-38	1,982,000	1923-24	252,000
5-693	Merced River near Merced Falls	37° 31′ 120° 17′	385	1901-13 1923-26	USGS	D					
5-694	Merced River at Merced Falls	37° 31′ 120° 20′	350	1895- 1912	USGS	AD					
5-695	Merced River below Snelling	37° 28′ 120° 30′	190	1931-38 1939-47	USGS	DA					
5-696	Merced River at Cressey Bridge	37° 24′ 120° 44′	80	1941-47	DWRWS	A					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Merced River Basin—Continued										
5-697	Merced River near Livingston	37° 23′ 120° 47′	82	1921 1922-44	USGS	A	572,000	1[illegible]-38	1,090,000	1930-31	69,800
5-698	Merced River near Stevinson	37° 22′ 120° 56′	56	1940-47	USGS	A					
5-699	Merced River Slough near Newman	37° 22′ 120° 58′	68	1941-47	USBR USGS	D					
5-700	Merced River near Newman	37° 21′ 120° 58′	65	1912	USGS	D					
5-701	Merced River at Miliken Bridge	37° 21′ 120° 58′	55	1921	USGS	D					
5-702	Merced River at Hills Ferry-Road Bridge	37° 21′ 120° 57′	50	1931-47	DWRWS USBR	D					
	San Joaquin River Basin										
5-703	Orestimba Creek near Newman	37° 19′ 121° 07′	190	1932-47	USGS	A	13,500	1[illegible]-41	60,040	1938-39	269
5-704	San Joaquin River near Newman	37° 21′ 120° 58′	51	1912-47	USGS	A	1,814,000	1[illegible]-38	6,257,000	1930-31	142,000
5-705	San Joaquin River at Grayson	37° 34′ 121° 09′	30	1931-35 1936-47	MID DWRWS	A D					
	Tuolumne River Basin										
5-706	Falls Creek near Hetch Hetchy	37° 58′ 119° 46′	5,600	1915-47	USGS	A	101,000	1[illegible]-38	170,100	1923-24	39,100

5-707	Tuolumne River at Hetch Hetchy Cabin	37° 57′ 119° 45′	3,600	1910-16	USGS	A					
5-708	Tuolumne River at Hetch Hetchy Dam Site	37° 57′ 119° 47′	3,600	1910-15	USGS	A					
5-709	Hetch Hetchy Reservoir at Hetch Hetchy	37° 57′ 119° 47′	3,600	1923-47	USGS	E					
5-710	Tuolumne River near Hetch Hetchy	37° 56′ 119° 48′	3,450	1914-47	USGS	A	712,000	1 7-38	1,126,000	1923-24	374,000
5-711	San Francisco Tunnel Diversion near Hetch Hetchy	37° 52′ 119° 57′	2,356	1932-46	SF PUC	B					
5-712	Eleanor Creek at Eleanor Trail Crossing	37° 59′ 119° 53′	4,600	1901	USGS	D					
5-713	Eleanor Creek near Hetch Hetchy	37° 58′ 119° 53′	4,600	1901 1909-47	USGS	A	159,300	1 0-11	280,000	1923-24	62,500
5-714	Cherry Creek near Hetch Hetchy	38° 00′ 119° 54′	4,500	1910-47	USGS	A	265,700	1 7-38	453,500	1923-24	97,700
5-715	Cherry Creek at Eleanor Trail Crossing	37° 59′ 119° 53′	4,480	1901	USGS	D					
5-716	Jawbone Creek near Tuolumne	37° 54′ 120° 00′	3,400	1910-14	USGS	D					
5-717	Corral Creek near Groveland	37° 54′ 120° 01′	3,300	1910-13	USGS	D					
5-718	Tuolumne River, Middle Fork, near Mather	37° 51′ 119° 52′	4,500	1924-29 1930-33	USGS	A					
5-719	Tuolumne River, Middle Fork, at Oakland Recreation Camp	37° 50′ 120° 00′	2,800	1916-47	USGS	A	52,500	1 7-38	133,000	1930-31	12,300
5-720	Tuolumne River, South Fork, at Italian Flat	37° 49′ 119° 55′	3,800	1924-33	USGS	A					
5-721	Tuolumne River, South Fork, near Sequoia	37° 49′ 119° 56′	3,580	1914-18	USGS	AB					
5-722	Golden Rock Ditch near Sequoia	37° 48′ 119° 58′	3,550	1914 1915	USGS	D					
5-723	Tuolumne River, South Fork, near Oakland Recreation Camp	37° 49′ 120° 00′	2,800	1923-47	USGS	A	66,900	1 7-38	184,000	1930-31	15,900
5-724	Tuolumne River, South Fork, near Buck Meadows	37° 50′ 120° 03′	1,810	1916-21	USGS	A					
5-725	Tuolumne River near Buck Meadows	37° 50′ 120° 04′	1,375	1907-09 1910-36	USGS	A	943,200	1 3-14	2,100,100	1933-34	212,000

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL I IOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY ARI

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								ison	Acre-feet	Season	Acre-feet
	Tuolumne River Basin—Continued										
5-726	Indian Creek near Tuolumne	37° 57′ 120° 04′	3,100	1911	USGS	D					
5-727	Clavey Creek near Tuolumne	37° 57′ 120° 04′	2,700	1910-13	USGS	D					
5-728	Big Creek near Groveland	37° 51′ 120° 12′	2,520	1931-33	USGS	A					
5-729	Tuolumne River, North Fork, near Tuolumne	37° 57′ 120° 13′	1,800	1911	USGS	D					
5-730	Hunter Creek near Tuolumne	37° 56′ 120° 09′	3,040	1910-12	USGS	D					
5-731	Moccasin Power Plant Discharge near Hetch Hetchy	37° 48′ 120° 18′	1,100	1936-47	SFPUC	B					
5-732	Tuolumne River near Jacksonville	37° 50′ 120° 22′	620	1923-34	USGS	A	1,201,500	1 6-27	2,010,000	1930-31	462,000
5-734	Woods Creek near Jacksonville	37° 51′ 120° 29′	645	1925-47	USGS	A	44,700	1 7-38	116,400	1930-31	6,560
5-735	Sierra & San Francisco Power Co. Canal near La Grange	37° 40′ 120° 26′	500	1908-26	USGS	AB	32,600	1 1-22	45,400	1923-24	1,800
5-736	Tuolumne River above La Grange Dam	37° 43′ 120° 28′	330	1915-47	USGS	A	1,864,000	1 7-38	3,153,000	1923-24	751,000
5-737	Modesto Canal near La Grange	37° 40′ 120° 27′	272	1903-47	USGS	A	266,000	1 4-45	392,800	1904-05	85,200
5-738	Turlock Canal near La Grange	37° 40′ 120° 26′	205	1898-1947	USGS	A	374,000	1 3-44	618,300	1898-99	8,790

5-739	Tuolumne River near La Grange..	37° 40′ 120° 27′	300	1895- 1917	USGS	AB	2,057,900	1[illegible]-07	3,700,000	1911-12	594,000
5-740	Tuolumne River at La Grange Bridge	37° 40′ 120° 27′	180	1937-47	DWRWS TID	A	1,080,324	1[illegible]-38	2,491,440	1946-47	307,473
5-741	Tuolumne River at Roberts Ferry Bridge	37° 38′ 120° 37′	122	1931-47	DWRWS MID	D A					
5-742	Tuolumne River at Hickman-Waterford Bridge	37° 38′ 120° 45′	92	1932-47	DWRWS MID	D A					
5-743	Dry Creek at old Waterford Bridge	37° 39′ 120° 45′	125	1942-43	DWRWS MID	A					
5-744	Dry Creek near Modesto..........	37° 38′ 120° 59′	30	1931-47	DWRWS MID	D A					
5-745	Tuolumne River at Modesto......	37° 38′ 120° 59′	51	1878-84 1891-97 1943-47	USGS DWRWS	DA					
5-746	Tuolumne River at Tuolumne City.	37° 36′ 121° 08′	32	1931-47	DWRWS MID	D A	1,356,609	1[illegible]-38	2,744,032	1946-47	510,563
	San Joaquin River Basin										
5-747	San Joaquin River at Hetch Hetchy Aqueduct Crossing	37° 38′ 121° 13′	25	1936-47	SFPUC	A					
	Stanislaus River Basin										
5-748	Lake Alpine Reservoir near Camp Tamarack	38° 28′ 120° 00′	7,300	1929-47	PGE	E					
5-749	Union Reservoir near Camp Tamarack	38° 26′ 120° 00′	6,816	1929-47	PGE	E					
5-750	Utica Reservoir near Camp Tamarack	38° 26′ 120° 00′	6,750	1929-47	PGE	E					
5-751	Spicer Reservoir on North Fork Stanislaus River	38° 24′ 119° 59′	6,500	1929-47	PGE	E					
5-752	Stanislaus River, North Fork, near Avery	38° 14′ 120° 17′	3,400	1914-22 1928-47	USGS	A	306,000	1[illegible]-38	548,100	1930-31	94,100
5-753	Utica Gold Mining Co. Canal near Avery	38° 14′ 120° 18′	3,300	1915-21	USGS	AB					
5-754	Relief Creek near Baker Station...	38° 17′ 119° 44′	6,800	1910-18	USGS	A					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL NOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AI

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								ason	Acre-feet	Season	Acre-feet
	Stanislaus River Basin—Continued										
5-755	Stanislaus River, Middle Fork, at Kennedy Meadows	38° 18′ 119° 45′	6,450	1938-47	USGS	A					
5-756	Stanislaus River, Middle Fork, at Sand Bar Flat	38° 11′ 120° 09′	2,650	1905-47	USGS	A	502,000	6-07	929,000	1923-24	147,000
5-757	Stanislaus Tunnel at outlet	38° 09′ 120° 22′	2,800	1937-47	USGS	A	215,800	1-42	267,400	1937-38	125,600
5-758	Knight Creek near Jupiter	38° 07′ 120° 22′	1,800	1910-13	USGS	D					
5-759	Rose Creek near Jupiter	38° 06′ 120° 22′	1,400	1910-13	USGS	D					
5-760	Stanislaus River, South Fork, at Strawberry	38° 12′ 120° 01′	5,350	1911-17 1938-47	USGS	A	99,100	3-14	157,000	1938-39	45,370
5-761	Philadelphia Canal near Strawberry	38° 11′ 120° 03′	4,800	1939-47	USGS	A					
5-762	Tuolumne Canal near Long Barn	38° 05′ 120° 11′	4,100	1937-47	USGS	A					
5-763	Stanislaus River, South Fork, near Long Barn	38° 05′ 120° 11′	4,100	1937-47	USGS	A					
5-764	Stanislaus River, South Fork, near Columbia	38° 04′ 120° 20′	1,600	1910-12	USGS	D					
5-765	Stanislaus River above Melones Power House	37° 57′ 120° 32′	500	1932, 35 38, 39, 1941-47	USGS	A					
5-766	Stanislaus River below Melones Power House	37° 57′ 120° 32′	500	1931-47	USGS	A	1,103,00	7-38	2,008,000	1933-34	404,000

5-767	Stanislaus River near Knights Ferry	37° 53′ 120° 36′	350	1915-32	USGS	A	924,500	1 5-16	1,410,000	1923-24	250,000
5-768	South San Joaquin Canal near Knights Ferry	37° 51′ 120° 38′	345	1914-47	USGS	A	266,000	1 4-45	320,500	1923-24	166,000
5-769	Oakdale Canal near Knights Ferry	37° 51′ 120° 38′	350	1914-47	USGS	A	88,000	1 4-45	130,600	1913-14	29,600
5-770	Stanislaus River at Knights Ferry	37° 49′ 120° 40′	158	1903-14	USGS	A	1,722,500	1 3-07	2,730,000	1912-13	494,000
5-771	Stanislaus River at Orange Blossom Bridge	37° 48′ 120° 46′	125	1931-41 1941-47	DWRWS OID	D					
5-722	Stanislaus River at Oakdale	37° 47′ 120° 52′	95	1895-1901	USGS	D					
5-773	Stanislaus River at Riverbank	37° 47′ 120° 57′	95	1941-47	DWRWS SSJID	D					
5-774	Stanislaus River at Ripon	37° 44′ 121° 07′	30	1940-47	USGS DWR	A					
5-775	Stanislaus River at Bret Harte Pump	37° 42′ 121° 12′	20	1940-46	USBR DWRWS MID	D					
5-776	Stanislaus River at Elliott Ranch	37° 41′ 121° 12′	20	1931	DWRWS	D					
5-777	Stanislaus River at Hatmark Ranch	37° 41′ 121° 12′	20	1932-37 1937-40	DWRWS	D A					
5-778	Stanislaus River near mouth	37° 41′ 121° 13′	18	1946	DWRWS MID	D					
	San Joaquin River Basin—										
5-779	San Joaquin River near Vernalis	37° 41′ 121° 16′	8	1922-47	USGS	A	3,905,000	1 7-38	10,840,000	1928-29	488,700
5-780	San Joaquin River at Lathrop	37° 47′ 121° 18′	0	1921	USGS	D					
5-781	San Joaquin River near Lathrop	37° 47′ 121° 17′	0	1922	USGS	D					
5-782	San Joaquin River, Southern Pacific R. R. Bridge, near Lathrop	37° 47′ 121° 18′	0	1922	USGS	D					
5-783	San Joaquin River at Brandt Bridge	37° 52′ 121° 19′	0	1922	USGS	D					
5-784	Littlejohns Creek at Farmington	37° 56′ 120° 59′	100	1926	USGS	D					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Calaveras River Basin										
5-785	Cosgrove Creek near Valley Springs	38° 09′ 120° 50′	580	1929-47	USGS	A	5,500	1 5-36	13,100	1930-31	300
5-786	Calaveras River at Jenny Lind	38° 05′ 120° 52′	220	1907-47	USGS	A	182,000	1 0-11	675,000	1930-31	13,400
5-787	Calaveras River near Bellota	38° 04′ 120° 58′	180	1878-84	USGS	B					
5-788	Calaveras River near Stockton	37° 58′ 121° 08′	25	1926	USGS	A					
5-789	Stockton Diverting Canal at Stockton	37° 59′ 121° 17′	21	1944-47	USGS	A					
5-790	Bear Creek near Clements	38° 11′ 121° 06′	135	1927	USGS	A					
5-791	Bear Creek near Lockford	38° 09′ 121° 08′	90	1933-47	USGS	AB					
	Mokelumne River Basin										
5-792	Upper Blue Lake near Carson Pass	38° 38′ 119° 57′	8,100	1929-47	PGE	E					
5-793	Lower Blue Lake near Carson Pass	38° 36′ 119° 56′	8,000	1929-47	PGE	E					
5-794	Twin Lakes near Carson Pass	38° 38′ 119° 57′	8,500	1929-47	PGE	E					
5-795	Meadow Lakes near Carson Pass	38° 39′ 119° 57′	7,700	1929-47	PGE	E					

5-796	Tiger Creek Powerhouse Conduit below Salt Springs Dam	38° 30′ 120° 13′	3,700	1931-47	USGS	A	182,000	1 9-40	226,200	1931-32	112,000
5-797	Mokelumne River, North Fork, below Salt Springs Dam	38° 29′ 120° 13′	3,600	1926-47	USGS	A	167,000	1 7-38	371,400	1946-47	11,100
5-798	Cold Creek near Mokelumne Peak	38° 31′ 120° 13′	6,000	1927-47	USGS	A	42,000	1 7-38	70,900	1930-31	17,700
5-799	Bear River Reservoir near Pardoe Camp	38° 33′ 120° 13′	5,800	1929-47	PGE	E					
5-800	Bear River at Pardoe Camp......	38° 32′ 120° 15′	5,650	1927-47	USGS	A	71,700	1 7-38	123,900	1930-31	30,100
5-801	Mokelumne River, North Fork, near West Point	38° 28′ 120° 22′	3,025	1917-18 1924-32	USGS	A					
5-802	Mokelumne River, North Fork, above Tiger Creek	38° 27′ 120° 30′	2,950	1931-33 1936-47	USGS	A	315,000	1 7-38	664,700	1933-34	46,200
5-803	Mokelumne River, North Fork, near Electra	38° 25′ 120° 33′	2,025	1933-35 1939-47	USGS	A	524,500	1 7-38	886,900	1933-34	201,200
5-804	Mokelumne River, Middle Fork, at West Point	38° 23′ 120° 32′	2,500	1911-47	USGS	A	39,800	1 7-38	94,900	1930-31	4,900
5-805	Mokelumne River, Licking Fork, near Railroad Flat	38° 21′ 120° 23′	3,500	1912 1915-17	USGS	D					
5-806	Mokelumne River, South Fork, near Railroad Flat	38° 20′ 120° 26′	2,600	1911-34	USGS	A	32,800	1 3-14	64,500	1930-31	4,800
5-807	Mokelumne River, South Fork, near West Point	38° 22′ 120° 33′	2,000	1933-47	USGS	A	59,700	1 7-38	124,800	1933-34	13,800
5-808	Upper Standard Canal near West Point	38° 22′ 120° 39′	2,400	1929-47	PGE	B	73,330	1 6-47	88,160	1934-35	61,750
5-809	Lower Standard Canal near West Point	38° 22′ 120° 39′	2,400	1929-47	PGE	B	31,273	1 5-46	38,125	1930-31	23,745
5-810	Mokelumne River at Electra......	38° 20′ 120° 40′	800	1901 1903-04	USGS	A					
5-811	Mokelumne River near Mokelumne Hill	38° 19′ 120° 43′	650	1927-47	USGS	A	637,000	1 7-38	1,204,000	1930-31	183,000
5-812	East Bay Municipal Utility Dist. Aqueduct near Valley Springs	38° 15′ 120° 50′	675	1929-33	USGS	A					
5-813	Mokelumne River at Lancha Plana	38° 13′ 120° 53′	160	1926-47	USGS	A	599,000	1 7-38	1,183,000	1930-31	191,000
5-814	Camanche Creek near Camanche..	38° 13′ 120° 58′	130	1933-34	USGS	D					

TABLE 60—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL NOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, CENTRAL VALLEY AR

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								ıson	Acre-feet	Season	Acre-feet
	Mokelumne River Basin—Continued										
5-815	Rabbit Creek near Camanche	38° 14′ 120° 59′	120	1932-34	USGS	D					
5-816	Mokelumne River at Lone Star Mill	38° 13′ 120° 54′	190	1878-84	USGS	B					
5-817	Murphy Creek near Clements	38° 14′ 121° 02′	95	1932-34	USGS	D					
5-818	Mokelumne River near Clements	38° 12′ 121° 05′	70	1904-47	USGS	A	603,000	1 6-07	1,720,000	1923-24	182,000
5-819	Mokelumne River near Victor	38° 09′ 121° 11′	50	1927-30	USGS	A					
5-820	Mokelumne River at Lodi	38° 09′ 121° 16′	35	1891-95	USGS	A					
5-821	Woodbridge Canal at Woodbridge	38° 09′ 121° 18′	32	1926-47	USGS	A	85,400	1 5-46	121,600	1927-28	35,700
5-822	Mokelumne River at Woodbridge	38° 09′ 121° 18′	15	1924-47	USGS	A	486,000	1 7-38	1,091,000	1930-31	97,200
5-823	Mokelumne River near Thornton	38° 12′ 121° 23′	10	1926-31	USGS	A					
5-824	Sutter Creek near Volcano	38° 26′ 120° 39′	2,000	1924-27	USGS	A					
5-825	Sutter Creek near Sutter Creek	38° 23′ 120° 47′	1,150	1922-41	USGS	A	22,800	1 2-23	57,300	1930-31	4,000
5-826	Amador Ditch near Electra	38° 22′ 120° 47′	1,500	1929-47	PGE	B	8,600	1 6-37	10,634	1942-43	6,825
5-827	Dry Creek near Ione	38° 18′ 121° 02′	150	1912 1925-32	USGS	A					

5-828	Goose Creek near Elliott	38° 15′ 121° 08′	110	1927-33	USGS	A					
5-829	Dry Creek near Galt	38° 15′ 121° 13′	60	1926-47	USGS EBMUD USBR	A	71,100	1[illegible]-38	203,000	1930-31	1,700
5-830	Camp Creek near Sly Park	38° 41′ 120° 22′	5,300	1924	USGS	A					
5-831	Sly Park Creek at Sly Park	38° 44′ 120° 32′	3,450	1906	USGS	D					
5-832	Camp Creek near Pleasant Valley	38° 40′ 120° 40′	2,800	1924	USGS	D					
5-833	Cosumnes River, North Fork, near Pleasant Valley	38° 39′ 120° 40′	1,800	1924	USGS	D					
5-834	Cosumnes River, North Fork, near El Dorado	38° 36′ 120° 51′	910	1911-41	USGS	A	141,900	1[illegible]-38	290,200	1923-24	22,500
5-835	Cosumnes River, Middle Fork, near Fair Play	38° 38′ 120° 42′	1,690	1913	USGS	D					
5-836	Cosumnes River at Michigan Bar	38° 30′ 121° 03′	190	1907-47	USGS	A	197,000	1[illegible]-11	874,000	1923-24	40,400
5-837	Cosumnes River at McConnell	38° 22′ 121° 21′	32	1942-47	USGS USBR	A					
5-838	Hadselville Creek at Clay	38° 20′ 121° 10′	93	1930-31	USGS	A					
5-839	Laguna Creek at McKensie Road	38° 19′ 121° 18′	35	1943-47	DWR USBR	A					

TYPE OF RECORD

A—Daily.
B—Monthly.
C—Seasonal.
D—Intermittent.
E—[illegible]servoir contents only.

SOURCE OF RECORD

Abbreviation	*Name*
USBR	United States Bureau of Reclamation.
USGS	United States Geological Survey.
DWRWA	Division of Water Resources Water Rights Adjudication.
DWR	Division of Water Resources.
DWRWS	Division of Water Resources Water Supervision.
PGE	Pacific Gas & Electric Company.
KSJA	Kaweah and St. Johns Water Association.
SJC Co.	San Joaquin Canal Company.
SFPUC	San Francisco Public Utilities Commission.
MCIC	Madera Canal & Irrigation Co.
KDWCD	Kaweah [illegible]lta Water Conservation District.
M&L	Miller & [illegible]x.
USWB	United S[illegible]es Weather Bureau.
NID	Nevada I[illegible]gation District.
SCE	Southern [illegible]alifornia Edison Co.
SJ Lt. & Pwr.	San Joaq[illegible]n Light and Power Corporation.
KRWM	Kings Ri[illegible]r Water Master.
MID	Modesto [illegible]igation District.
SSJID	South Sa[illegible]oaquin Irrigation District.
TID	Turlock I[illegible]igation District.
OID	Oakdale [illegible]igation District.

TABLE 61

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, CENTRAL VALLEY AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
1	Goose Lake Basin		67,900	
	Sacramento River Basin			
2-1	Pit River above gage near Canby	256,000		
2-2	From gage near Canby to gage near Ydalpom	3,170,000		
	Above gage near Ydalpom		3,426,000	
2-3	McCloud River above gage at Baird	1,403,000		
2-4	Remainder of Sacramento River above Shasta Dam	900,000		
	Above Shasta Dam		5,729,000	
2-5	West side tributaries, Shasta Dam to gage near Red Bluff	1,083,000		
2-6	East side tributaries, Shasta Dam to gage near Red Bluff	1,283,000		
	Valley floor runoff, Shasta Dam to gage near Red Bluff	375,000		
	Above gage near Red Bluff		8,470,000	
	Minor Streams above valley floor (west side)			
2-7	From gage near Red Bluff to Stony Creek drainage	408,000		
2-8	From Stony Creek drainage to Cache Creek drainage	128,000		
2-9	From Cache Creek drainage to mouth of Sacramento River	22,000		
2-10	Stony Creek above mouth of canyon	467,000		
2-11	Cache Creek above gage near Lower Lake	247,000		
2-12	Cache Creek from gage near Lower Lake to gage near Capay	237,000		
2-14	Putah Creek above gage near Winters	396,000		
	Minor Streams above valley floor (east side)			
2-15	From gage near Red Bluff to Feather River drainage	1,179,800		
2-16	From Feather River drainage to American River drainage	305,000		
2-29	Sacramento valley floor	321,000		
	Total minor streams		3,710,800	
	Feather River			
2-17	North Fork of Feather River above gage near Prattville	742,000		
	Middle Fork of Feather River above gage at Bidwell Bar	1,568,000		
2-22	Remainder of Feather River above gage near Oroville	2,286,000		
	Above gage at Oroville		4,596,000	
2-23	Yuba River above gage at Smartville	2,415,000	2,415,000	
2-24	Bear River above gage near Wheatland	356,000	356,000	
	American River			
2-25	North Fork of American River above gage near Colfax	584,000		
2-26	Middle Fork of American River above gage near Auburn	1,178,000		
	Remainder of American River above gage at Fair Oaks	1,012,000		
	Above gage at Fair Oaks		2,774,000	
	Sacramento River at Sacramento			22,389,700

TABLE 61—Continued

STIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING UNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, CENTRAL VALLEY AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
	San Joaquin River Basin			
	Tulare Lake tributary area			
	Minor Streams above valley floor (east side)			
3-1	Including Grapevine Creek to Kern River drainage	71,200		
3-2	From Kern River drainage to Tule River drainage	84,700		
3-3	From Tule River drainage to San Joaquin River drainage	84,200		
3-4	Kern River above gage near Bakersfield	736,000		
3-5	Tule River above Porterville	140,000		
3-6	Kaweah River above gage near Three Rivers	416,000		
3-7	Kings River above gage at Piedra	1,715,000		
	East side San Joaquin Valley above valley floor tributary to Tulare Lake		3,247,100	
3-8	West side San Joaquin Valley above valley floor tributary to Tulare Lake	66,400		
	Tulare Lake tributary area			3,313,500
	San Joaquin River tributary area			
3-10	Minor streams above valley floor from San Joaquin River drainage to Stanislaus River drainage	180,000		
3-11	San Joaquin River above Friant Dam	1,816,000		
3-12	Fresno River above gage near Daulton	103,000		
3-13	Chowchilla River above gage at Buchanan dam site	91,300		
3-14	Merced River above gage at Exchequer	1,027,000		
3-15	Tuolumne River above gage near LaGrange	1,900,000		
3-16	Stanislaus River above gage near Knights Ferry	1,210,000		
	East side San Joaquin Valley above valley floor tributary to San Joaquin River		6,327,300	
3-17	West side San Joaquin Valley above valley floor tributary to San Joaquin River	58,500		
	San Joaquin River tributary area			6,385,800
	Delta tributary area			
3-19	Minor streams above valley floor from Stanislaus River drainage to American River drainage	185,000		
3-20	Calaveras River above gage at Jenny Lind	199,000		
3-21	Mokelumne River above gage near Clements	780,000		
3-22	Cosumnes River above gage at Michigan Bar	374,000		
	East side San Joaquin Valley above valley floor tributary to Delta		1,538,000	
3-23	West side San Joaquin Valley above valley floor tributary to Delta	9,500		
	Delta tributary area			1,547,500
	TOTAL, CENTRAL VALLEY AREA			33,636,500

TABLE 62

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL VALLEY AREA

In Acre-feet

Season Oct. 1-Sept. 30	Pit River near Canby	Pit River near Ydalpom	McCloud River at Baird	Sacramento River above Shasta Dam	Sacramento River Shasta Dam to Red Bluff	Sacramento River near Red Bluff
1894-95	393,000	4,692,000	2,036,000	7,837,000	4,463,000	12,300,000
95-96	360,000	4,556,000	1,908,000	7,247,000	4,104,000	11,351,000
96-97	326,000	4,109,000	1,758,000	6,858,000	3,529,000	10,387,000
97-98	145,000	2,553,000	969,000	3,871,000	1,267,000	5,138,000
98-99	168,000	2,822,000	1,073,000	4,340,000	1,640,000	5,980,000
1899-1900	269,000	3,530,000	1,450,000	5,896,000	2,815,000	8,711,000
00-01	280,000	3,602,000	1,497,000	6,073,000	2,950,000	9,023,000
01-02	360,000	4,269,000	1,393,000	7,122,000	4,257,000	11,379,000
02-03	313,000	3,846,000	1,621,000	6,586,000	3,356,000	9,942,000
03-04	539,000	5,824,000	2,490,000	9,523,000	6,581,000	16,104,000
1904-05	240,000	4,278,000	1,805,000	7,038,000	3,744,000	10,782,000
05-06	347,000	4,538,000	1,865,000	7,259,000	4,033,000	11,292,000
06-07	450,000	5,223,000	2,188,000	8,486,000	5,395,000	13,881,000
07-08	250,000	3,364,000	1,381,000	5,494,000	2,422,000	7,916,000
08-09	520,000	5,121,000	2,116,000	8,605,000	5,966,000	14,571,000
1909-10	373,000	3,709,000	1,531,000	6,156,000	2,953,000	9,109,000
10-11	418,000	4,241,000	1,666,000	6,668,000	3,440,000	10,108,000
11-12	288,000	3,027,000	1,257,000	4,726,000	1,848,000	6,574,000
12-13	247,000	3,220,000	1,268,000	5,001,000	2,043,000	7,044,000
13-14	393,000	4,885,000	2,054,000	8,361,000	5,355,000	13,716,000
1914-15	164,000	3,999,000	2,047,000	7,849,000	4,719,000	12,568,000
15-16	180,000	4,281,000	1,936,000	6,924,000	3,755,000	10,679,000
16-17	400,000	3,736,000	1,246,000	5,039,000	2,095,000	7,134,000
17-18	138,000	2,877,000	1,032,000	4,028,000	1,413,000	5,441,000
18-19	201,000	3,413,000	1,190,000	5,389,000	2,435,000	7,824,000
1919-20	110,000	2,369,000	801,000	3,294,000	923,000	4,217,000
20-21	380,000	4,262,000	1,808,000	7,396,000	4,080,000	11,476,000
21-22	186,000	3,341,000	1,181,000	4,796,000	1,870,000	6,666,000
22-23	125,000	2,508,000	927,000	3,994,000	1,353,000	5,347,000
23-24	80,000	1,872,000	645,000	2,691,000	603,000	3,294,000
1924-25	213,000	2,978,000	1,324,000	5,427,000	2,651,000	8,078,000
25-26	80,000	2,315,000	921,000	3,921,000	1,753,000	5,674,000
26-27	382,000	3,794,000	1,791,000	7,222,000	3,749,000	10,971,000
27-28	256,000	3,027,000	1,239,000	5,331,000	2,303,000	7,634,000
28-29	114,000	2,042,000	774,000	3,400,000	999,000	4,399,000
1929-30	139,000	2,475,000	1,008,000	4,390,000	1,704,000	6,094,000
30-31	39,000	1,641,000	632,000	2,614,000	708,000	3,322,000
31-32	240,000	2,483,000	789,000	3,885,000	1,197,000	5,082,000
32-33	120,000	2,138,000	837,000	3,663,000	928,000	4,591,000
33-34	44,000	1,903,000	846,000	3,391,000	1,111,000	4,502,000
1934-35	216,000	3,109,000	1,037,000	5,086,000	2,407,000	7,493,000
35-36	262,000	2,879,000	1,062,000	4,794,000	2,281,000	7,075,000
36-37	190,000	2,411,000	954,000	4,242,000	1,737,000	5,979,000
37-38	571,000	5,227,000	2,181,000	9,665,000	5,012,000	14,677,000
38-39	124,000	2,092,000	934,000	3,588,000	782,000	4,370,000
1939-40	206,000	3,671,000	1,790,000	7,088,000	3,405,000	10,493,000
40-41	267,000	4,207,000	2,206,000	8,794,000	5,520,000	14,314,000
41-42	345,000	4,152,000	1,887,000	7,726,000	3,535,000	11,261,000
42-43	410,000	3,826,000	1,349,000	6,086,000	2,417,000	8,503,000
43-44	148,000	2,602,000	950,000	3,804,000	871,000	4,675,000
1944-45	262,000	2,947,000	1,230,000	4,959,000	1,682,000	6,641,000
45-46	206,000	3,305,000	1,443,000	5,953,000	2,103,000	8,056,000
1946-47	110,000	2,312,000	1,018,000	4,044,000	1,030,000	5,074,000
MEAN	256,000	3,426,000	1,403,000	5,729,000	2,741,000	8,470,000

TABLE 62—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL VALLEY AREA

In Acre-feet

Season Oct. 1-Sept. 30	North Fork Feather River near Prattville	Middle Fork Feather River at Bidwell Bar	Feather River at Oroville	Yuba River at Smartville	Bear River at Wheatland	North Fork American River near Colfax
94-95	953,000	2,335,000	7,093,000	3,946,000	841,000	1,015,000
95-96	1,092,000	2,516,000	7,786,000	2,620,000	560,000	742,000
96-97	830,000	1,822,000	5,440,000	3,310,000	399,000	740,000
97-98	522,000	732,000	2,304,000	1,305,000	129,000	232,000
98-99	584,000	924,000	2,872,000	2,128,000	251,000	468,000
99-1900	951,000	2,270,000	6,788,000	3,061,000	388,000	753,000
00-01	912,000	2,089,000	6,281,000	2,871,000	425,000	745,000
01-02	723,000	1,506,000	4,048,000	2,694,000	351,000	615,000
02-03	705,000	1,500,000	4,555,000	2,438,000	338,000	618,000
03-04	1,205,000	3,009,000	9,451,000	4,190,000	678,000	1,084,000
04-05	702,000	1,524,000	4,606,000	2,489,000	374,000	413,000
05-06	931,000	2,251,000	6,833,000	3,721,000	618,000	1,026,000
06-07	1,231,000	3,046,000	9,504,000	4,544,000	782,000	1,234,000
07-08	696,000	1,197,000	3,651,000	1,691,000	246,000	300,000
08-09	989,000	2,410,000	7,527,000	3,968,000	575,000	974,000
09-10	761,000	1,529,000	4,651,000	2,756,000	316,000	732,000
10-11	1,000,000	2,313,000	7,136,000	3,606,000	567,000	1,231,000
11-12	531,000	720,000	2,276,000	1,209,000	152,000	252,000
12-13	592,000	952,000	2,785,000	1,492,000	177,000	328,000
13-14	1,025,000	2,548,000	6,928,000	3,061,000	502,000	841,000
14-15	932,000	1,773,000	5,422,000	2,690,000	430,000	684,000
15-16	959,000	2,193,000	6,156,000	3,300,000	605,000	767,000
16-17	840,000	1,657,000	4,637,000	2,530,000	361,000	603,000
17-18	623,000	899,000	2,684,000	1,348,000	147,000	306,000
18-19	670,000	1,267,000	3,621,000	1,976,000	318,000	471,000
19-20	520,000	782,000	2,231,000	1,298,000	145,000	269,000
20-21	884,000	2,017,000	5,940,000	3,168,000	486,000	648,000
21-22	793,000	1,880,000	5,040,000	2,972,000	436,000	670,000
22-23	582,000	1,177,000	3,112,000	2,073,000	363,000	544,000
23-24	398,000	403,000	1,317,000	603,000	66,000	110,000
24-25	550,000	1,110,000	3,114,000	2,123,000	268,000	524,000
25-26	552,000	1,041,000	3,126,000	1,606,000	243,000	295,000
26-27	789,000	2,132,000	5,679,000	3,542,000	523,000	782,000
27-28	622,000	1,498,000	4,142,000	2,435,000	329,000	511,000
28-29	461,000	642,000	1,910,000	1,097,000	124,000	234,000
29-30	638,000	1,445,000	3,984,000	1,817,000	205,000	376,000
30-31	404,000	485,000	1,485,000	641,000	64,000	141,000
31-32	537,000	1,302,000	3,351,000	2,114,000	254,000	532,000
32-33	444,000	678,000	1,986,000	1,078,000	124,000	261,000
33-34	430,000	696,000	2,071,000	988,000	122,000	231,000
34-35	658,000	1,505,000	4,253,000	2,240,000	344,000	544,000
35-36	647,000	1,554,000	4,328,000	2,589,000	423,000	701,000
36-37	576,000	1,104,000	3,175,000	1,858,000	328,000	469,000
37-38	1,244,000	3,087,000	8,547,000	4,034,000	552,000	941,000
38-39	499,000	610,000	1,912,000	907,000	123,000	202,000
39-40	810,000	1,996,000	5,672,000	2,860,000	406,000	686,000
40-41	984,000	2,156,000	6,516,000	3,209,000	483,000	711,000
41-42	974,000	2,225,000	6,662,000	3,407,000	502,000	855,000
42-43	889,000	2,014,000	5,638,000	3,133,000	464,000	781,000
43-44	504,000	907,000	2,830,000	1,395,000	191,000	318,000
44-45	643,000	1,357,000	3,767,000	2,112,000	289,000	524,000
45-46	709,000	1,481,000	4,185,000	2,401,000	323,000	610,000
46-47	530,000	858,000	2,579,000	1,365,000	170,000	305,000
MEAN	742,000	1,568,000	4,596,000	2,415,000	356,000	584,000

TABLE 62—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL VALLEY AREA

In Acre-feet

Season Oct. 1-Sept. 30	Middle Fork American River near Auburn	American River at Fair Oaks	Stony Creek above Canyon Mouth	Cache Creek near Capay*	Putah Creek near Winters	Kern River near Bakersfield
1894-95	1,963,000	5,182,000	1,315,000	1,366,000	908,000	1,039,000
95-96	1,577,000	3,564,000	571,000	792,000	576,000	643,000
96-97	1,690,000	3,064,000	408,000	536,000	506,000	904,000
97-98	467,000	938,000	86,900	6,500	17,000	300,000
98-99	970,000	1,854,000	217,000	76,400	216,000	343,000
1899-1900	1,502,000	3,297,000	348,000	311,000	506,000	332,000
00-01	1,501,000	3,396,000	371,000	484,000	489,000	892,000
01-02	1,246,000	2,592,000	894,000	727,000	698,000	585 000
02-03	1,238,000	2,515,000	726,000	475,000	356,000	572,000
03-04	2,297,000	5,390,000	1,032,000	1,006,000	663,000	484,000
1904-05	803,000	2,174,000	618,000	647,000	820,000	564,000
05-06	2,144,000	4,838,000	684,000	820,000	583,000	1,859,000
06-07	2,575,000	5,786,000	1,072,000	1,059,000	691,000	1,175,000
07-08	582,000	1,526,000	350,000	282,000	200,000	540,000
08-09	2,082,000	4,624,000	1,316,000	1,358,000	882,000	1,781,000
1909-10	1,527,000	3,614,000	363,000	245,000	228,000	758,000
10-11	2,512,000	5,554,000	712,000	582,000	487,000	1,024,000
11-12	566,000	1,338,000	65,600	8,700	57,300	435,000
12-13	824,000	1,513,000	148,000	162,000	134,000	371,000
13-14	1,908,000	4,045,000	1,073,000	1,291,000	896,000	1,115,000
1914-15	1,811,000	3,154,000	816,000	1,095,000	711,000	681,000
15-16	1,546,000	3,940,000	538,000	784,000	710,000	1,962,000
16-17	1,172,000	2,923,000	284,000	280,000	286,000	892,000
17-18	627,000	1,503,000	148,000	64,000	90,700	530,000
18-19	917,000	2,229,000	266,000	280,000	318,000	548,000
1919-20	618,000	1,467,000	69,400	—28,100	45,000	606,000
20-21	1,267,000	3,204,000	641,000	736,000	513,000	533,000
21-22	1,284,000	3,279,000	259,000	208,000	232,000	862,000
22-23	1,140,000	2,751,000	221,000	214,000	280,000	538,000
23-24	233,000	543,000	42,800	—70,300	41,200	202,000
1924-25	1,013,000	2,717,000	509,000	513,000	352,000	481,000
25-26	544,000	1,386,000	307,000	320,000	350,000	354,000
26-27	1,482,000	3,652,000	637,000	830,000	547,000	816,000
27-28	1,016,000	2,521,000	377,000	399,000	304,000	351,000
28-29	491,000	1,147,000	102,000	15,300	68,900	342,000
1929-30	719,000	1,652,000	248,000	291,000	325,000	360,000
30-31	283,000	716,000	90,200	—60,200	34,200	195,000
31-32	1,070,000	2,595,000	232,000	185,000	203,000	749,000
32-33	500,000	1,270,000	135,000	53,700	97,100	456,000
33-34	439,000	1,124,000	195,000	122,000	148,000	244,000
1934-35	1,061,000	2,581,000	336,000	414,000	355,000	485,000
35-36	1,358,000	3,393,000	356,000	465,000	349,000	803,000
36-37	908,000	2,328,000	229,000	273,000	283,000	1,244,000
37-38	1,779,000	4,507,000	1,012,000	1,352,000	857,000	1,388,000
38-39	419,000	1,040,000	114,000	—4,000	45,200	510,000
1939-40	1,401,000	3,403,000	614,000	785,000	679,000	794,000
40-41	1,196,000	3,142,000	1,292,000	1,554,000	1,007,000	1,389,000
41-42	1,520,000	3,914,000	776,000	1,015,000	718,000	829,000
42-43	1,458,000	3,875,000	453,000	474,000	322,000	1,235,000
43-44	557,000	1,462,000	215,000	141,000	181,000	646,000
1944-45	994,000	2,514,000	262,000	229,000	209,000	893,000
45-46	1,098,000	2,866,000	404,000	405,000	264,000	905,000
1946-47	556,000	1,417,000	202,000	74,600	132,000	466,000
MEAN	1,178,000	2,774,000	467,000	484,000	396,000	736,000

* Does not include Clear Lake evaporation.

TABLE 62—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL VALLEY AREA

In Acre-feet

Season Oct. 1-Sept. 30	Tule River above Porterville	Kaweah River near Three Rivers	Kings River at Piedra	San Joaquin River above Friant Dam	Fresno River near Daulton	Chowchilla River at Buchanan Damsite
1894-95	222,000	733,000	3,042,000	2,790,000	359,000	305,000
95-96	120,000	340,000	1,536,000	1,986,000	92,200	86,300
96-97	177,000	445,000	1,948,000	2,220,000	135,000	128,000
97-98	51,700	223,000	881,000	922,000	26,100	17,800
98-99	49,800	307,000	1,278,000	1,270,000	56,400	49,500
1899-1900	44,700	317,000	1,307,000	1,344,000	75,700	69,800
00-01	160,000	697,000	2,956,000	3,004,000	180,000	165,000
01-02	139,000	344,000	1,505,000	1,585,000	57,800	50,800
02-03	147,000	413,000	1,640,000	1,716,000	81,200	74,900
03-04	94,500	375,000	1,688,000	1,768,000	116,000	110,000
1904-05	106,000	345,000	1,450,000	1,526,000	72,900	67,300
05-06	487,000	1,104,000	3,900,000	4,086,000	272,000	240,000
06-07	212,000	600,000	2,731,000	2,878,000	299,000	259,000
07-08	110,000	256,000	997,000	1,164,000	33,000	25,400
08-09	398,000	802,000	2,796,000	2,904,000	166,000	155,000
1909-10	158,000	409,000	1,779,000	2,042,000	97,700	95,200
10-11	150,000	546,000	2,827,000	3,588,000	297,000	265,000
11-12	67,000	207,000	968,000	1,038,000	50,400	24,800
12-13	39,500	221,000	942,000	908,000	26,900	18,400
13-14	170,000	487,000	2,548,000	2,890,000	154,000	146,000
1914-15	143,000	370,000	1,817,000	1,965,000	103,000	97,700
15-16	349,000	762,000	3,042,000	2,777,000	210,000	155,000
16-17	181,000	471,000	1,893,000	1,952,000	117,000	104,000
17-18	52,600	228,000	1,364,000	1,472,000	69,000	62,200
18-19	78,500	259,000	1,203,000	1,303,000	60,000	43,200
1919-20	115,000	350,000	1,405,000	1,320,000	57,300	44,400
20-21	93,500	348,000	1,532,000	1,602,000	81,000	87,600
21-22	144,000	461,000	2,198,000	2,358,000	136,000	108,000
22-23	106,000	363,000	1,556,000	1,660,000	118,000	68,400
23-24	25,600	102,000	392,000	446,000	19,300	5,100
1924-25	94,200	326,000	1,290,000	1,445,000	62,100	73,600
25-26	51,200	219,000	1,037,000	1,170,000	40,700	34,900
26-27	135,000	484,000	1,984,000	2,009,000	96,600	97,700
27-28	50,400	203,000	971,000	1,168,000	58,600	50,100
28-29	57,100	223,000	849,000	873,000	23,400	22,200
1929-30	48,100	217,000	863,000	880,000	26,900	24,800
30-31	20,600	114,000	466,000	489,000	9,000	3,000
31-32	136,000	519,000	2,084,000	2,062,000	111,000	110,000
32-33	82,800	283,000	1,181,000	1,116,000	31,500	17,700
33-34	22,800	131,000	659,000	706,000	14,500	11,200
1934-35	92,800	358,000	1,621,000	1,935,000	92,400	99,400
35-36	166,000	487,000	1,876,000	1,868,000	100,000	119,000
36-37	291,000	677,000	2,341,000	2,222,000	132,000	136,000
37-38	341,000	871,000	3,274,000	3,705,000	299,000	259,000
38-39	84,400	247,000	974,000	946,000	35,100	24,000
1939-40	200,000	513,000	1,790,000	1,889,000	107,000	101,000
40-41	233,000	642,000	2,543,000	2,654,000	175,000	158,000
41-42	138,000	491,000	2,005,000	2,265,000	100,000	90,000
42-43	340,000	671,000	2,027,000	2,070,000	103,000	102,000
43-44	106,000	315,000	1,168,000	1,281,000	42,800	32,800
1944-45	197,000	551,000	2,062,000	2,142,000	99,700	85,900
45-46	96,300	356,000	1,612,000	1,742,000	41,900	39,500
1946-47	56,700	265,000	1,107,000	1,138,000	26,800	20,400
MEAN	140,000	416,000	1,715,000	1,816,000	103,000	91,300

TABLE 62—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, CENTRAL VALLEY AREA

In Acre-feet

Season Oct. 1-Sept. 30	Merced River at Exchequer	Tuolumne River near La Grange	Stanislaus River near Knights Ferry	Calaveras River at Jenny Lind	Mokelumne River near Clements	Cosumnes River at Michigan Bar
1894–95	2,378,000	2,798,000	2,682,000	470,000	1,449,000	820,000
95–96	1,008,000	1,913,000	1,391,000	194,000	790,000	333,000
96–97	1,311,000	2,414,000	1,420,000	339,000	1,025,000	546,000
97–98	444,000	917,000	406,000	44,100	360,000	144,000
98–99	742,000	1,432,000	828,000	218,000	582,000	251,000
1899–1900	899,000	1,776,000	944,000	91,600	733,000	392,000
00–01	1,554,000	2,922,000	1,825,000	234,000	1,209,000	723,000
01–02	753,000	1,589,000	945,000	135,000	646,000	270,000
02–03	944,000	1,879,000	1,102,000	235,000	794,000	367,000
03–04	1,187,000	2,440,000	1,826,000	378,000	1,338,000	494,000
1904–05	883,000	1,631,000	958,000	136,000	665,000	272,000
05–06	2,005,000	3,615,000	2,278,000	428,000	1,374,000	653,000
06–07	2,121,000	3,747,000	2,811,000	708,000	1,737,000	848,000
07–08	526,000	1,047,000	637,000	72,700	480,000	144,000
08–09	1,480,000	2,677,000	1,926,000	392,000	1,177,000	636,000
1909–10	1,066,000	2,114,000	1,406,000	195,000	919,000	463,000
10–11	2,115,000	3,424,000	2,357,000	675,000	1,533,000	876,000
11–12	515,000	1,061,000	600,000	63,000	401,000	139,000
12–13	440,000	1,081,000	594,000	31,400	438,000	127,000
13–14	1,415,000	2,627,000	1,801,000	273,000	1,087,000	548,000
1914–15	1,105,000	2,075,000	1,301,000	266,000	837,000	408,000
15–16	1,459,000	2,360,000	1,668,000	344,000	1,042,000	572,000
16–17	1,126,000	2,223,000	1,377,000	348,000	877,000	416,000
17–18	831,000	1,462,000	828,000	212,000	527,000	224,000
18–19	682,000	1,350,000	768,000	97,300	596,000	259,000
1919–20	687,000	1,345,000	743,000	83,200	469,000	171,000
20–21	1,014,000	2,023,000	1,262,000	222,000	875,000	407,000
21–22	1,420,000	2,475,000	1,430,000	220,000	925,000	426,000
22–23	942,000	1,786,000	1,130,000	181,000	710,000	438,000
23–24	252,000	552,000	261,000	23,700	187,000	40,400
1924–25	910,000	1,951,000	1,224,000	159,000	835,000	381,000
25–26	610,000	1,123,000	606,000	65,300	375,000	148,000
26–27	1,084,000	2,050,000	1,364,000	181,000	896,000	452,000
27–28	737,000	1,525,000	950,000	130,000	640,000	315,000
28–29	486,000	979,000	517,000	41,000	342,000	115,000
1929–30	513,000	1,149,000	732,000	66,500	467,000	165,000
30–31	262,000	607,000	315,000	13,400	212,000	45,900
31–32	1,113,000	2,113,000	1,354,000	139,000	764,000	314,000
32–33	516,000	1,107,000	613,000	32,400	412,000	113,000
33–34	360,000	817,000	445,000	57,600	302,000	122,000
1934–35	1,170,000	2,104,000	1,258,000	150,000	736,000	369,000
35–36	1,154,000	2,165,000	1,411,000	286,000	935,000	523,000
36–37	1,213,000	1,998,000	1,179,000	232,000	742,000	400,000
37–38	2,081,000	3,432,000	2,184,000	372,000	1,308,000	683,000
38–39	477,000	989,000	540,000	33,300	347,000	92,200
1939–40	1,092,000	2,218,000	1,470,000	208,000	903,000	502,000
40–41	1,462,000	2,494,000	1,407,000	202,000	873,000	402,000
41–42	1,287,000	2,362,000	1,541,000	200,000	1,012,000	510,000
42–43	1,289,000	2,376,000	1,645,000	276,000	1,054,000	660,000
43–44	684,000	1,312,000	700,000	77,400	460,000	188,000
1944–45	1,098,000	2,093,000	1,327,000	154,000	799,000	357,000
45–46	942,000	1,878,000	1,217,000	117,000	761,000	390,000
1946–47	567,000	1,099,000	652,000	49,100	404,000	145,000
MEAN	1,027,000	1,900,000	1,210,000	199,000	780,000	374,000

(*Division of Highways Photo*)

BREAK IN SACRAMENTO RIVER LEVEE DURING 1936 FLOOD

FLOOD FLOWS

Histories of early settlements in Sacramento Valley mention a great flood in 1805 which is supposed to have covered the entire valley except the Sutter Buttes. It is related that thousands of Indians were drowned. Stories handed down by Indians and trappers tell of another flood of large but indeterminate magnitude in 1825. There are reliable accounts of devastation that year in the south, but the authenticity of Indian legends regarding devastion in the north is questionable.

The Forty-Niners met their first flood in 1849-50, when the Sacramento Valley was partially inundated. It is reported that small mountain streams became raging torrents, and that the larger rivers generally flooded wide stretches of the valley floor. According to one early writer, "The valley of the Sacramento was like an inland sea, and the city of Sacramento became a second Venice," and "instead of gondolas, the honest miners navigated the submerged streets in wagon-boxes, bakers' troughs, crockery crates, and on rafts made of whiskey-kegs."

Descriptions of the floods of 1861-62, by Thomas Rowlandson, are contained in Bancroft's "Hand-Book Almanac for the Pacific States, 1863." Following these floods, the author toured the West Coast from Mexico to the Canadian border. He states that there were three heavy storms between December 9, 1861, and January 10, 1862, extending the full length of the Pacific Coast. Each was preceded by a heavy snowfall that reached to the valley floors. According to William H. Brewer's description of these floods in "Up and Down in California in 1860-1864," the "great central valley" of the State was under water—"a region 250 to 300 miles long and an average of at least 20 miles wide, a district of 5,000 or 6,000 square miles, or probably three to three and a half million acres." Thousands of farms, he stated, were entirely under water, with cattle starving and drowning.

In January, 1862, the American River rose to a height probably not since equalled. Many bridges were destroyed, isolating whole communities, and at Folsom a flour mill was washed away taking with it a wire suspension bridge. The attested high water mark of this flood, made on an old stone stable on the left bank of American River 1.5 miles above Folsom, indicates that the flood crest would have registered 39.3 feet on the present gage at Folsom, or 7 feet higher than the crest of March, 1928.

After the flood of 1861-62, it was estimated that more than one-fourth of all taxable property in the State had been destroyed, and the State Treasurer thought the tax list would be cut one-third. This was the greatest and most disastrous general flood in California of which there is authentic record, and there is much interesting and reliable information available regarding it. Some of the local newspapers, notably the "Sacramento Union" and the "Alta California," carried day-by-day accounts of its progress.

There have been many damaging floods in the Central Valley Area since 1861-62. One of the greater of these was in 1907 when an estimated 300,000 acres of reclaimed land in the Sacramento-San Joaquin Delta was submerged owing to the breaking of many levees. During four days from March 18th to 21st the mean flow from the Sacramento and San Joaquin River watersheds was about 732,000 second-feet. Floods in 1909 were comparable in runoff and disaster to any known up to that time, and conditions were again critical in 1911. Records at gaging stations on many streams show maximum peak flows during 1928. A large flood in the Area occurred in 1937, during which year all important streams in the Central Valley from San Joaquin River north were in flood.

Major floods occurred during November and December 1950 on streams of the Central Valley Area from the Yuba south to the Kern, resulting in many instances in stages unprecedented during the periods of record. Preliminary estimates of peak flows of these 1950 floods at certain stations were available at date of publication of this bulletin, and where applicable have been included in the following tabulation showing maximum recorded instantaneous flood flows at representative stream gaging stations in the Central Valley Area.

	Maximum recorded instantaneous discharge	
Stream and station	*Date*	*Second-feet*
Hat Creek near Hat Creek	December 11, 1937	2,500
Pit River at Big Bend	December 12, 1937	34,200
McCloud River at Baird	February 28, 1940	50,000
Sacramento River at Shasta Dam	February 28, 1940	182,000
Sacramento River near Red Bluff	February 28, 1940	291,000
Deer Creek near Vina	December 10, 1937	23,800
Stony Creek above Stony Gorge Reservoir	December 10, 1937	20,800
North Fork Feather River near Prattville	March 19, 1907	10,000
Indian Creek near Crescent Mills	February 28, 1940	14,000
North Fork Feather River at Big Bar	December 11, 1937	66,900
South Fork Feather River at Enterprise	December 10, 1937	17,300
Middle Fork Feather River at Bidwell Bar	December 11, 1937	93,000
Feather River near Oroville	March 19, 1907	230,000
North Fork Yuba River below Goodyear Bar	December 11, 1937	26,000
Rock Creek at Goodyear Bar	March 25, 1928	1,600
Goodyear Creek at Goodyear Bar	March 25, 1928	1,800
Oregon Creek near North San Juan	March 25, 1928	4,000
Middle Fork Yuba River near North San Juan	March 25, 1928	26,000
Yuba River at Smartville	March 26, 1928	120,000
Bear River near Wheatland	January 21, 1943	31,300
North Fork Cache Creek near Lower Lake	February 28, 1940	20,000
Cache Creek at Yolo	February 28, 1940	38,700
Putah Creek near Winters	February 27, 1940	70,000
North Fork American River at North Fork Dam	January 21, 1943	42,600
Middle Fork American River near Auburn	March 25, 1928	62,000
Silver Fork American River near Kyburz	December 11, 1937	5,450
South Fork American River near Kyburz	December 11, 1937	9,700
Alder Creek near Whitehall	March 25, 1928	1,760
Silver Creek at Union Valley	December 11, 1937	8,560
South Fork Silver Creek near Icehouse	December 11, 1937	2,200
Silver Creek near Placerville	December 11, 1937	14,600
South Fork American River near Camino	December 11, 1937	34,400

Stream and station	Maximum recorded instantaneous discharge — Date	Second-feet
American River at Fair Oaks	November 21, 1950	169,000*
San Joaquin River above Big Creek	December 11, 1937	52,500
San Joaquin River near Friant	December 11, 1937	77,200
Kern River near Kernville	January 17, 1916	9,690
South Fork Kern River near Onyx	March 2, 1938	3,450
Kern River near Bakersfield	November 19, 1950	45,000*
Tule River near Porterville	March 9, 1943	15,500
South Fork Tule River near Success	March 9, 1943	6,210
North Fork Kaweah River near Kaweah	December 11, 1937	8,290
Kaweah River near Three Rivers	November 19, 1950	45,000*
North Fork Kings River near Cliff Camp	December 11, 1937	14,000
Kings River at Piedra	November 19, 1950	110,000*
Fresno River near Knowles	March 12, 1938	7,630
Chowchilla River at Buchanan Dam Site	March 2, 1938	18,900
Merced River at Happy Isles Bridge near Yosemite	December 11, 1937	10,600
Tenaya Creek near Yosemite	December 11, 1937	5,550
Merced River at Pohono Bridge near Yosemite	December 11, 1937	22,000
Merced River at Kittridge	December 11, 1937	59,000
Orestimba Creek near Newman	January 21, 1943	4,900
Falls Creek near Hetch Hetchy	December 11, 1937	6,300
Tuolumne River near Hetch Hetchy	June 1, 1943	12,900
Eleanor Creek near Hetch Hetchy	December 11, 1937	10,500
Cherry Creek near Hetch Hetchy	December 11, 1937	18,100
Middle Tuolumne River at Oakland Recreation Camp	December 11, 1937	2,910
South Fork Tuolumne River near Oakland Recreation Camp	December 11, 1937	6,950
Tuolumne River near Buck Meadow	January 14, 1909	27,200
Woods Creek near Jacksonville	February 9, 1938	13,500
Tuolumne River above La Grange Dam near La Grange	January 31, 1911	60,300
North Fork Stanislaus River near Avery	December 11, 1937	17,700
Middle Fork Stanislaus River at Sand Bar Flat near Avery	December 11, 1937	26,500
Stanislaus River below Melones Powerhouse	November 21, 1950	45,000*
Calaveras River at Jenny Lind	January 31, 1911	69,600
North Fork Mokelumne River below Salt Springs Dam	March 25, 1928	8,740
Bear River at Pardoe Camp	December 11, 1937	5,850
Middle Fork Mokelumne River at West Point	January 23, 1914	2,550
South Fork Mokelumne River near West Point	February 2, 1945	3,760
South Fork Mokelumne River near Railroad Flat	January 25, 1914	3,330
North Fork Cosumnes River near El Dorado	March 31, 1940	8,350
Cosumnes River at Michigan Bar	November 18, 1950	27,200*
Mokelumne River near Clements	November 21, 1950	30,000*

* Preliminary estimate, subject to revision.

FLOOD FREQUENCIES

In flood-frequency studies for streams of the Central Valley Area shown on Plates 40 to 82, recorded flow was used except where the effect of upstream regulation was considered sufficient to justify correction. Gaging stations for which such correction was made, and the works by which stream flow regulation was effected are indicated in the following tabulation:

Gaging station	*Regulating works*
Sacramento River at Shasta Dam	Shasta Reservoir
Sacramento River near Red Bluff	Shasta Reservoir
Stony Creek above Stony Gorge	East Park Reservoir
Stony Creek near Orland	East Park Reservoir
North Fork of Feather River near Prattville	Lake Almanor Almanor-Butt Creek Tunnel
North Fork of Feather River at Big Bar	Lake Almanor Butt Valley Reservoir
Middle Fork of Yuba River near North San Juan	Milton-Bowman Tunnel
Tuolumne River near Hetch Hetchy	Hetch Hetchy Reservoir
Stanislaus River below Melones Powerhouse	Melones Reservoir
North Fork of Mokelumne River below Salt Springs Dam	Salt Springs Reservoir Tiger Creek Power Conduit
Mokelumne River near Clements	Salt Springs Reservoir Pardee Reservoir

Studies for streams and locations listed in the tabulation on page 418, were made from records at two or more stations, as indicated. Floods at each station were reduced to second-feet per square mile, and then combined and used as the record for a single station.

In flood-frequency studies in the Central Valley Area a number of special conditions were encountered which were dealt with as discussed in the following paragraphs.

Hat Creek has a perennial flow of 0.65 second-foot per square mile. Flows shown on the flood-frequency curve for that stream have been reduced by this amount.

No stream flow records are available for North Fork of Feather River at Big Bar for April, 1907, or for the seasons of 1909, 1911, and 1938, during which periods floods of large magnitude occurred. Their magnitudes were estimated from a correlation with the summation of corresponding floods at stations on the North Fork of Feather River near Prattville, Indian Creek near Crescent Mills and Spanish Creek at Keddie. Gaps in records at the three latter stations were first filled by inter-station correlations. The year 1911 was not included in the study, since the record for that year was missing at all stations.

The study for Indian Creek near Crescent Mills was extended by means of correlations with Spanish Creek at Keddie, and the North Fork of Feather River at Prattville, to cover the period from 1906 to 1948, excluding 1911.

Stream and location at gaging station	Gaging stations for which records were combined	Years
Stony Creek above Stony Gorge Reservoir	Stony Creek—	
	near Elk Creek	1920–1933
	above Stony Gorge Reservoir	1935–1941
	computed inflow to Stony Gorge Reservoir	1941–1949
Stony Creek near Orland	Stony Creek—	
	near Fruto	1901–1912
	near Orland	1920–1929
North Fork of Yuba River below Goodyear Bar	North Fork of Yuba River—	
	at Goodyear Bar	1911–1931
	below Goodyear Bar	1932–1947
Middle Fork of Yuba River near North San Juan	Middle Fork of Yuba River—	
	near North San Juan	1912–1941
	above Oregon Creek plus Oregon Creek	1941–1948
Yuba River at Smartville	Yuba River—	
	at Smartville	1904–1941
	at Narrows Dam plus Deer Creek near Smartville	1942–1948
Bear River near Wheatland	Bear River—	
	at Van Trent	1905–1927
	near Wheatland	1929–1948
North Fork of American River at North Fork Dam	North Fork of American River—	
	near Colfax	1913–1941
	at North Fork Dam	1941–1948
South Fork of Mokelumne River near West Point	South Fork of Mokelumne River—	
	near Railroad Flat	1911–1934
	near West Point	1934–1947
Stanislaus River below Melones Powerhouse	Stanislaus River—	
	at Knights Ferry	1903–1915
	near Knights Ferry	1915–1931
	below Melones Powerhouse	1931–1948
Tuolumne River above La Grange Dam near La Grange	Tuolumne River—	
	at La Grange Dam	1896–1915
	above La Grange Dam near La Grange	1915–1948
Kern River near Kernville	Kern River—	
	at Kernville	1905–1912
	near Kernville	1913–1948

The study for North Fork of Yuba River was based on records at Goodyear Bar and below Goodyear Bar. The gaging station below Goodyear Bar was destroyed by a flood on December 11, 1937, and was not reinstalled until December, 1938. This resulted in a break in the record from November 9, 1937, through December 9, 1938. High-water marks indicated that during this period a flood occurred that probably was greater than any other either at or below Goodyear Bar.

The basic data for the study of San Joaquin River near Friant are records for the period from 1907 to 1910, published by the United States Geological Survey, and records of daily natural flow since 1910 computed by Miller and Lux. The latter record includes corrections for all upstream regulation.

Flood flows in streams draining high basins on the west slope of the Sierra Nevada have been grouped into two classes, designated by the major source of flow as either rain-water or snow-water floods.

Snow-water floods, resulting from the melting of snow pack during periods of high temperature, are characterized by flows of moderate intensity lasting for many days or even several weeks. They occur for the most part during the spring and early summer months.

Rain-water floods, produced by excessive precipitation in the form of rain, are characterized by high flows that seldom last more than two or three days. These floods occur mostly in the late fall and winter. However, as a result of thunderstorms, small basins in the higher mountains may occasionally produce rain-water floods during the summer.

In flood-frequency analyses of rain-water floods an attempt has been made to exclude snow-water floods, by omitting all flows occurring subsequent to April 15 and prior to November 1. For major drainage basins above foothill gaging stations this exclusion has accomplished its intended purpose. Although snow-water flows do occur prior to April 15, rain-water flows prior to that date are so much larger that few if any snow-water floods appear in calculations from which flood-frequency graphs were prepared. Excluding flows between April 15 and November 1 in the smaller basins, which for the most part lie below the snow line, was also effective in eliminating snow-water floods from the calculations.

The flood-frequency graphs for smaller basins in the higher Sierra Nevada are not entirely representative of true rain-water floods. During many winters the snow cover in these basins is so deep that any precipitation in the form of rain is quickly absorbed, and no rain-water runoff occurs. It is only at rare intervals in these small high basins that warm rains fall on a snow cover sufficiently shallow to result in heavy rain-water floods. On the other hand, small rain-water floods that occur in such basins during the early spring are imposed upon snow-water floods. They appear in the lists of rain-water floods, even though predominantly of the snow-water type. Consequently, in drafting curves for these smaller basins in the high Sierra Nevada, primary consideration was given to larger flows which could be definitely identified as rain-water floods, and little significance was attached to smaller floods in which snow water often made up the major portion of the flow.

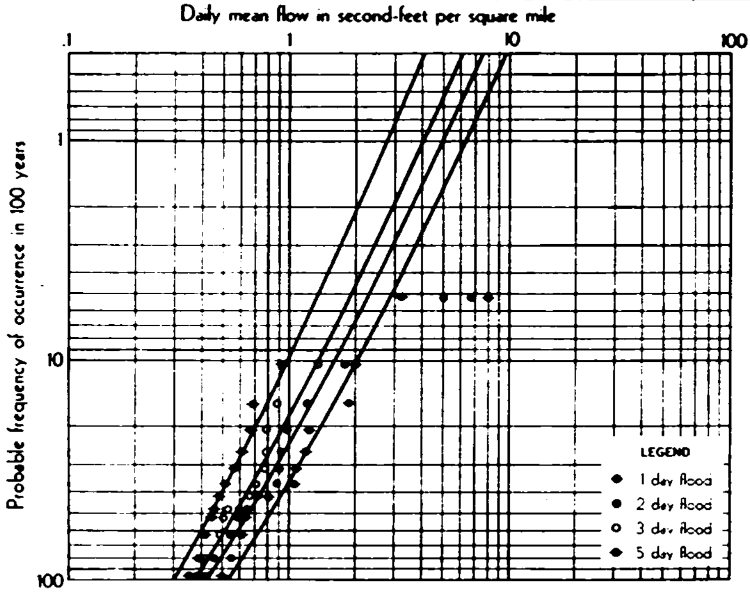
Rain-water flood-frequency curves which were adjusted to compensate for floods obviously caused by melting snow are for the following streams, at the gaging stations indicated:

Kern River near Kernville;
South Fork of Kern River near Onyx;
North Fork of Kaweah River at Kaweah;
North Fork of Kings River at Cliff Camp;
Merced River at Happy Isles Bridge;
Falls Creek near Hetch Hetchy;
Tuolumne River near Hetch Hetchy;
Eleanor Creek near Hetch Hetchy;
Cherry Creek near Hetch Hetchy;
Middle Fork of Tuolumne River at Oakland Recreation Camp;
South Fork of Tuolumne River near Oakland Recreation Camp;
Tuolumne River near Buck Meadow;
North Fork of Stanislaus River near Avery;
Middle Fork of Stanislaus River at Sand Bar Flat;
North Fork of Mokelumne River below Salt Springs;
Bear River at Pardoe Camp;
San Joaquin River above Big Creek.

Flood-frequency studies involving runoff resulting primarily from snow melt were made for the streams listed below, the flood-frequency curves appearing as Plates 78 to 82. These studies were of total runoff for the period from April 1st to July 31st. Although some runoff during this period resulted from rainfall, this was of minor influence.

Kern River near Bakersfield;
Tule River above South Fork near Porterville;
Kaweah River near Three Rivers;
Kings River at Piedra;
San Joaquin River near Friant;
Merced River at Exchequer;
Tuolumne River above La Grange Dam near La Grange;
Stanislaus River below Melones Powerhouse;
Mokelumne River near Clements.

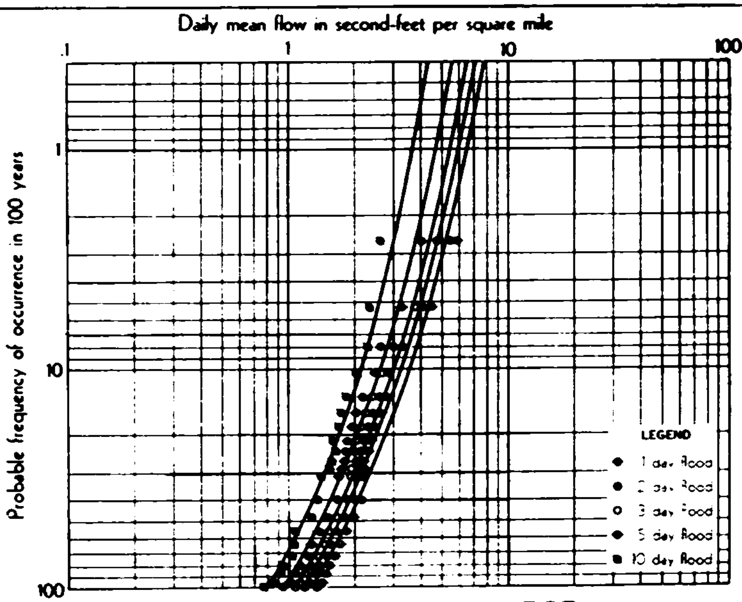
PLATE 40



HAT CREEK FLOOD DISCHARGE

NEAR HAT CREEK

AREA OF DRAINAGE BASIN 155 SQUARE MILES

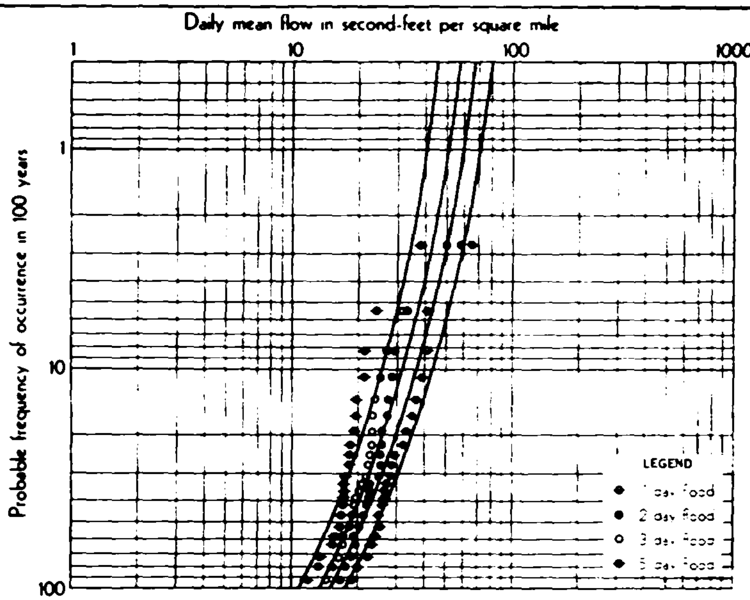


PIT RIVER FLOOD DISCHARGE

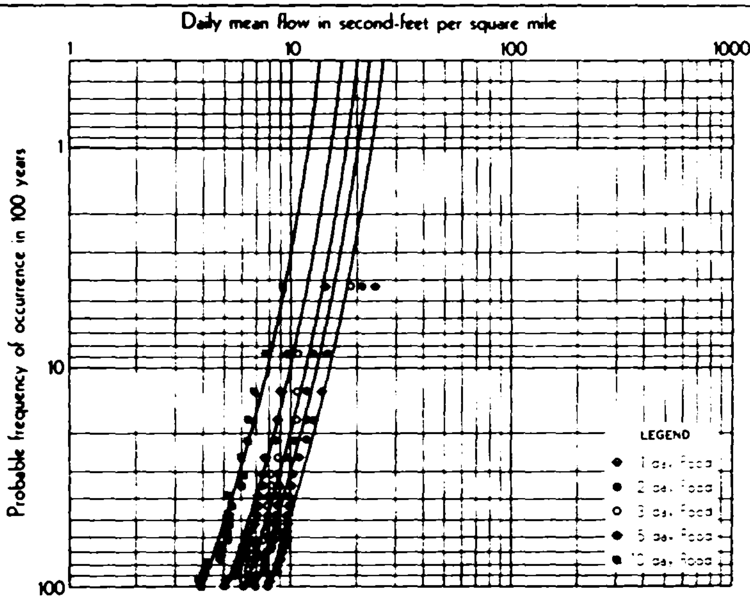
AT BIG BEND

AREA OF DRAINAGE BASIN [illegible] SQUARE MILES

PLATE 41

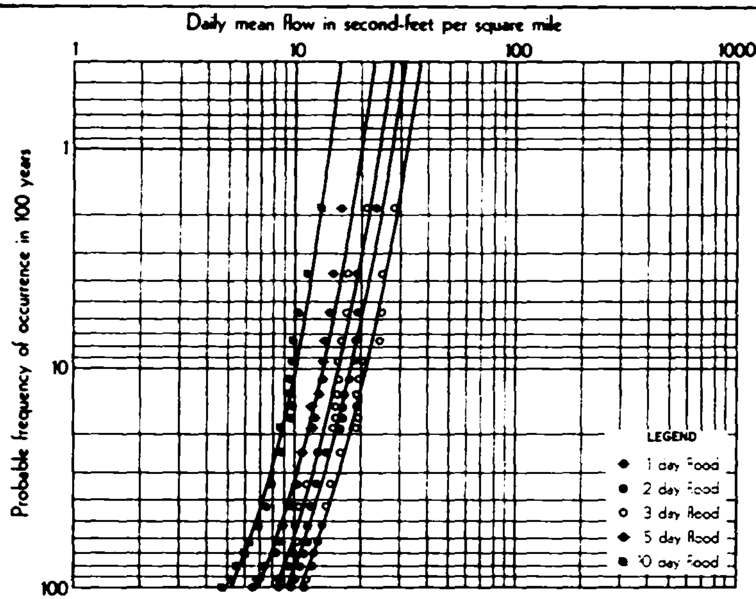


MCCLOUD RIVER FLOOD DISCHARGE
AT BAIRD
AREA OF DRAINAGE BASIN 685 SQUARE MILES

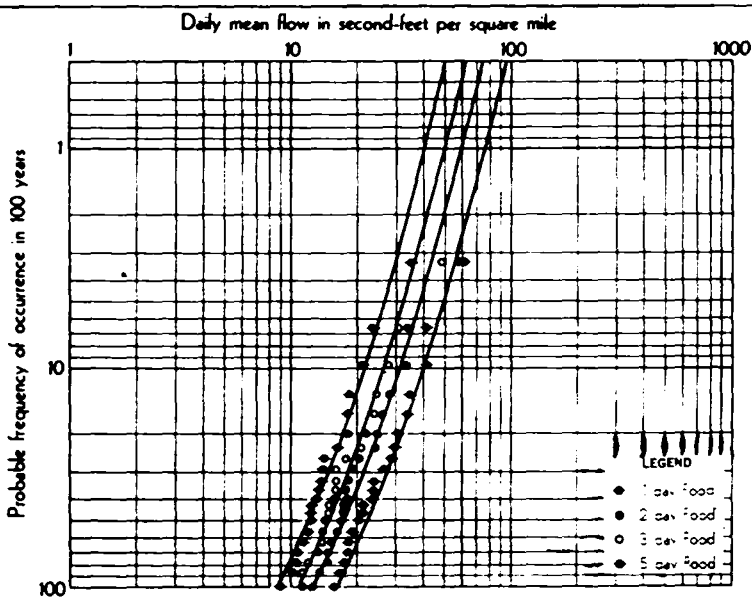


SACRAMENTO RIVER FLOOD DISCHARGE
AT SHASTA DAM
AREA OF DRAINAGE BASIN 6649 SQUARE MILES

PLATE 42

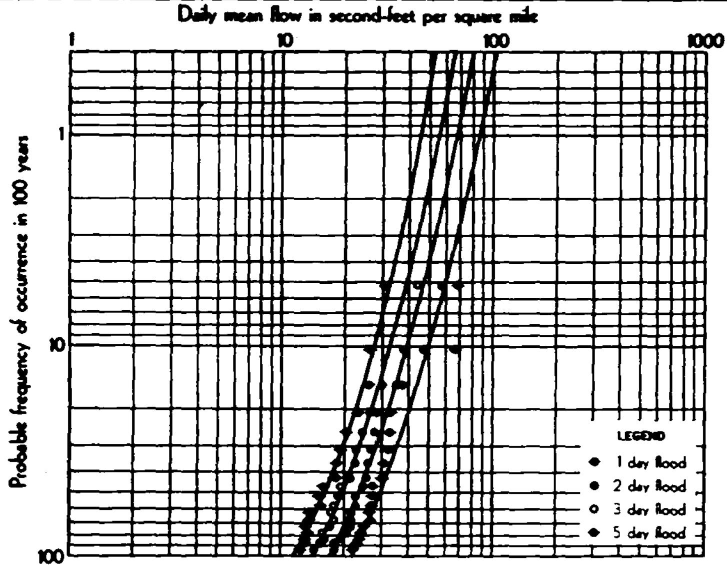


SACRAMENTO RIVER FLOOD DISCHARGE
NEAR RED BLUFF
AREA OF DRAINAGE BASIN 9258 SQUARE MILES

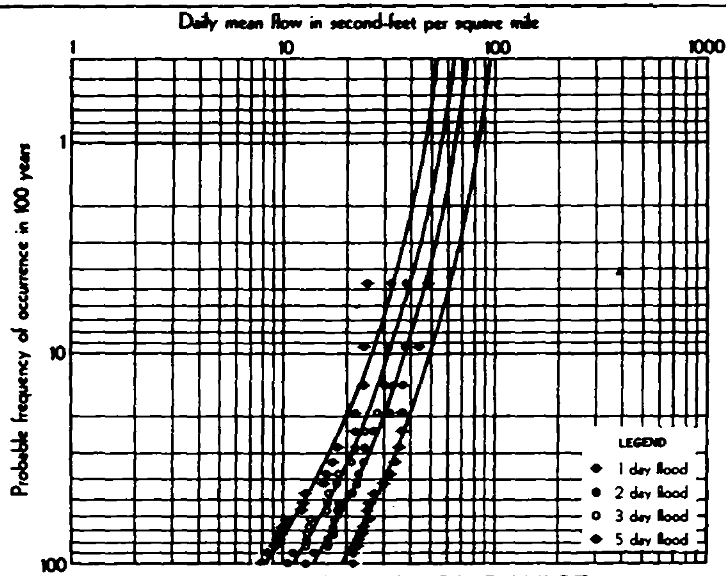


DEER CREEK FLOOD DISCHARGE
NEAR VINA
AREA OF DRAINAGE BASIN 200 SQUARE MILES

PLATE 43

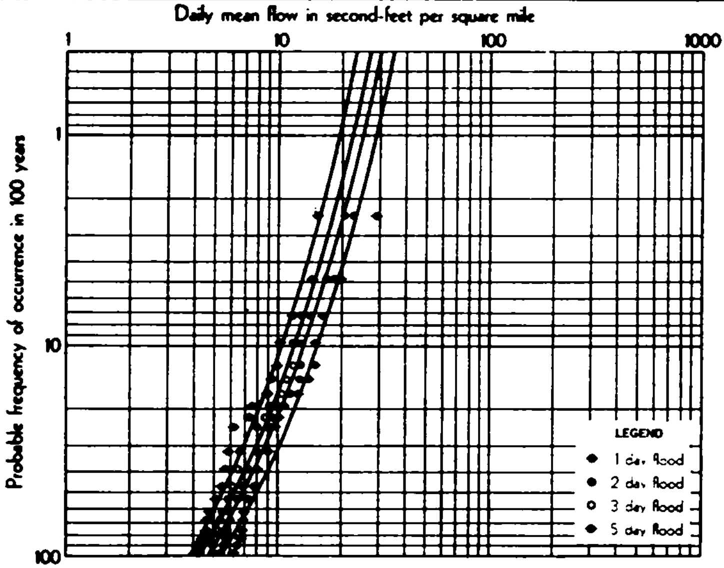


STONY CREEK FLOOD DISCHARGE
ABOVE STONY GORGE RESERVOIR
AREA OF DRAINAGE BASIN 266 SQUARE MILES



STONY CREEK FLOOD DISCHARGE
NEAR ORLAND
AREA OF DRAINAGE BASIN 636 SQUARE MILES

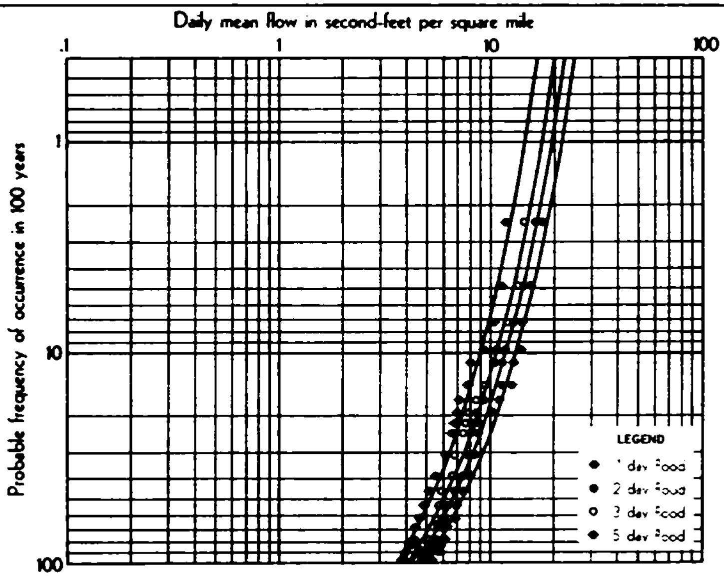
PLATE 44



NORTH FORK FEATHER RIVER FLOOD DISCHARGE

NEAR PRATTVILLE

AREA OF DRAINAGE BASIN 507 SQUARE MILES

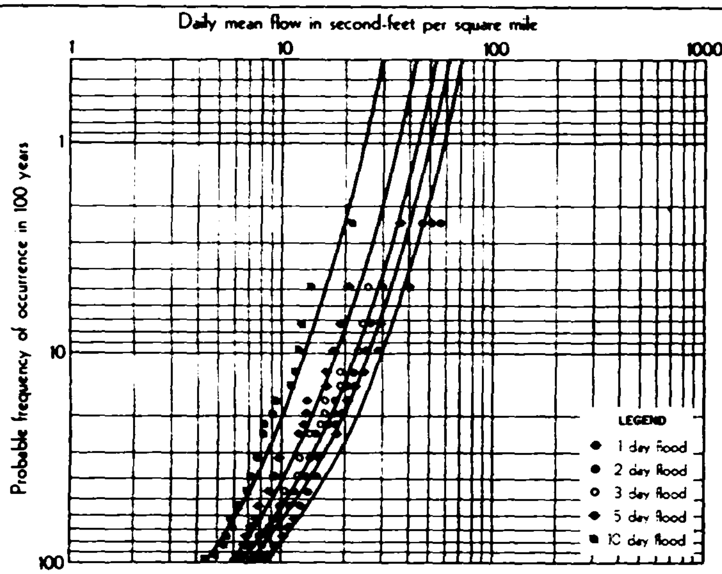


INDIAN CREEK FLOOD DISCHARGE

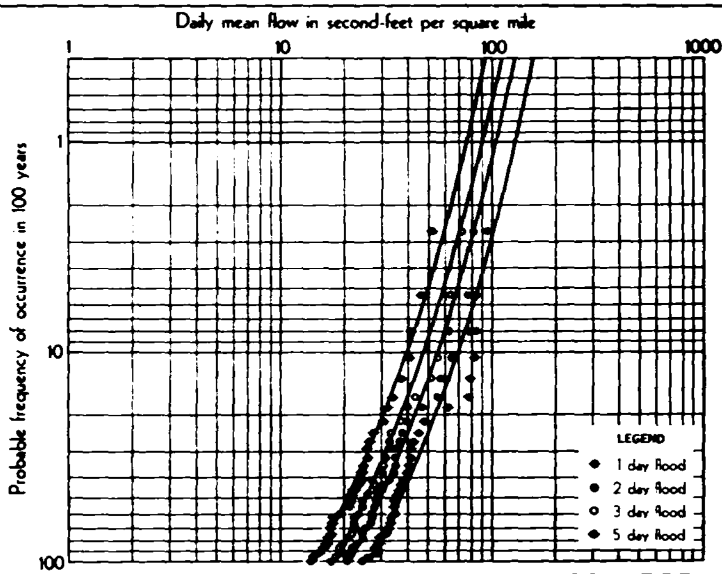
NEAR CRESCENT MILLS

AREA OF DRAINAGE BASIN 746 SQUARE MILES

PLATE 45

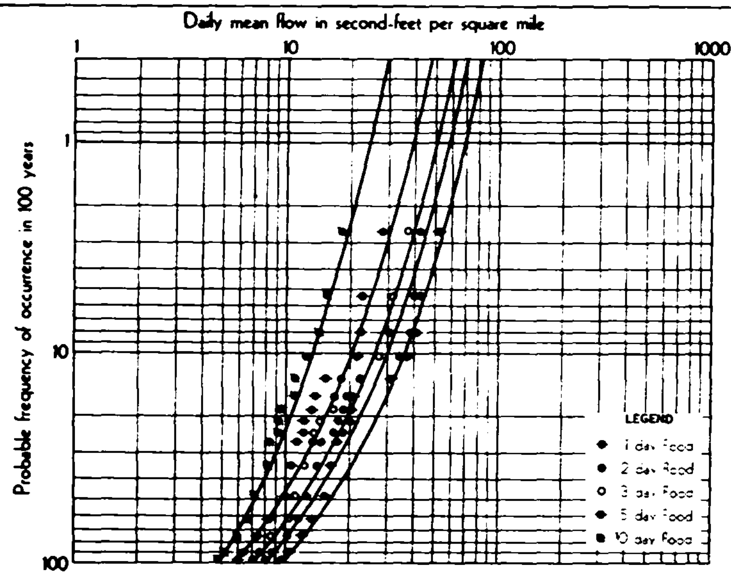


NORTH FORK FEATHER RIVER FLOOD DISCHARGE
AT BIG BAR
AREA OF DRAINAGE BASIN 1945 SQUARE MILES



SOUTH FORK FEATHER RIVER FLOOD DISCHARGE
AT ENTERPRISE
AREA OF DRAINAGE BASIN 134 SQUARE MILES

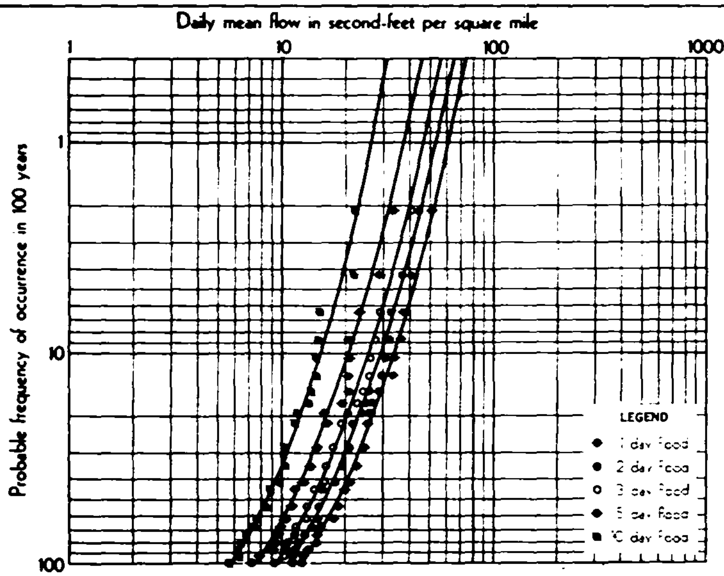
PLATE 46



MIDDLE FORK FEATHER RIVER FLOOD DISCHARGE

AT BIDWELL BAR

AREA OF DRAINAGE BASIN 1353 SQUARE MILES

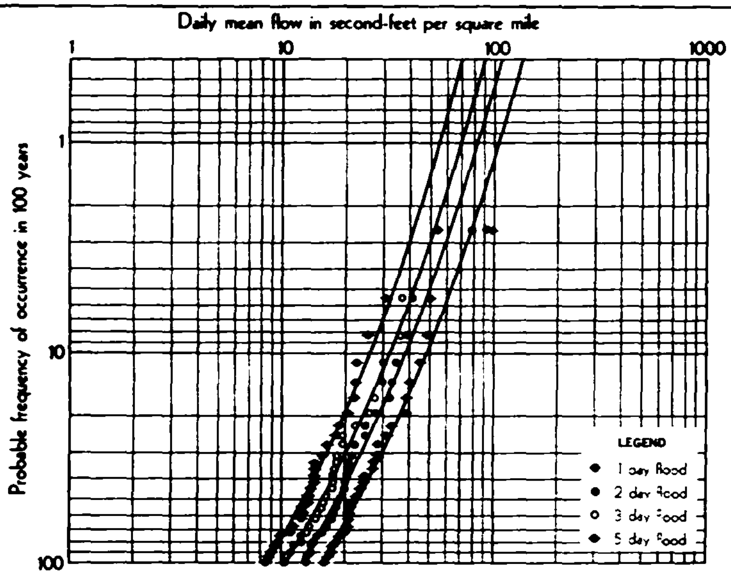


FEATHER RIVER FLOOD DISCHARGE

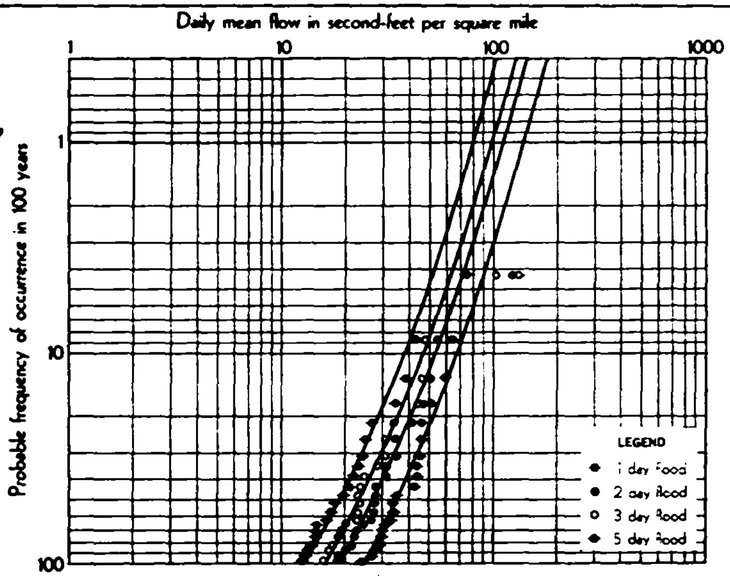
NEAR OROVILLE

AREA OF DRAINAGE BASIN 36[illegible] SQUARE MILES

PLATE 47

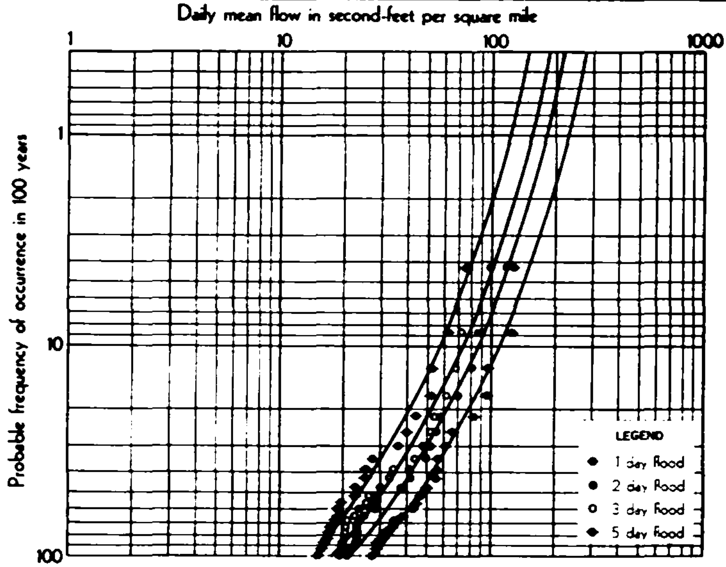


NORTH FORK YUBA RIVER FLOOD DISCHARGE
BELOW GOODYEAR BAR
AREA OF DRAINAGE BASIN 244 SQUARE MILES

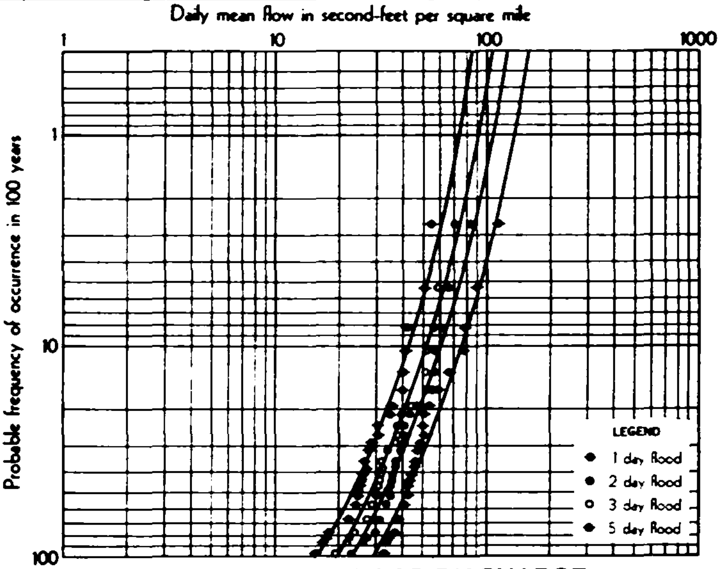


ROCK CREEK FLOOD DISCHARGE
AT GOODYEAR BAR
AREA OF DRAINAGE BASIN 11 SQUARE MILES

PLATE 48

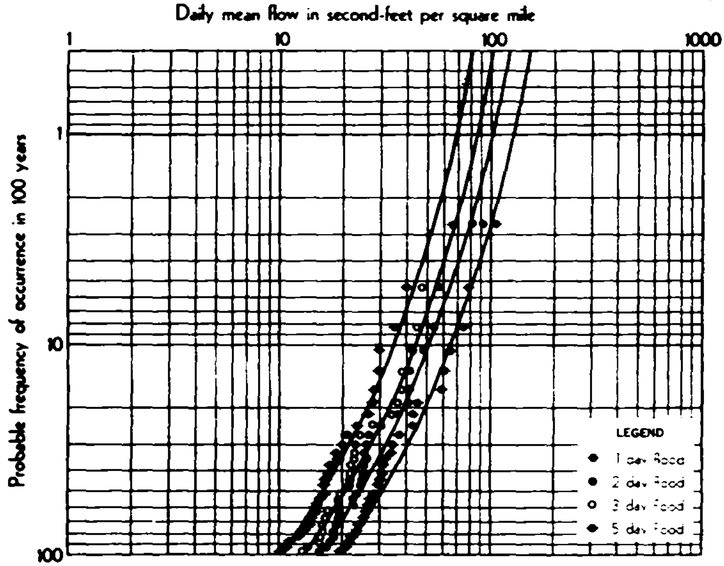


GOODYEAR CREEK FLOOD DISCHARGE
AT GOODYEAR BAR
AREA OF DRAINAGE BASIN 12 SQUARE MILES

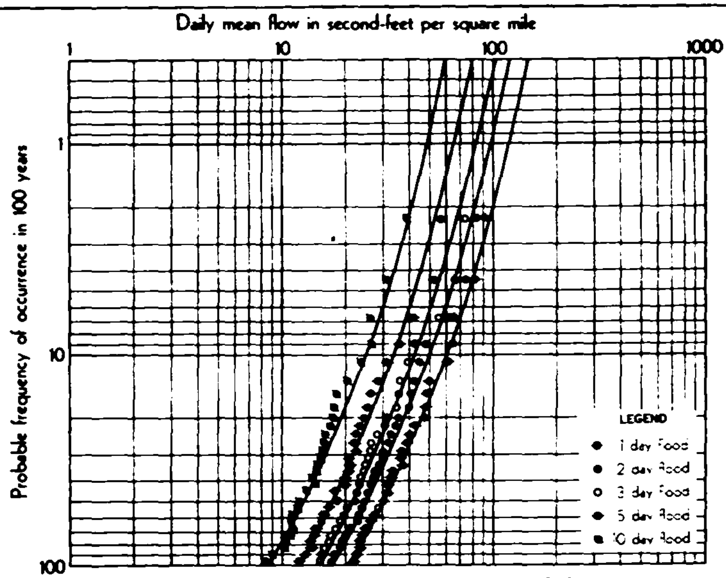


OREGON CREEK FLOOD DISCHARGE
NEAR NORTH SAN JUAN
AREA OF DRAINAGE BASIN 35 SQUARE MILES

PLATE 49

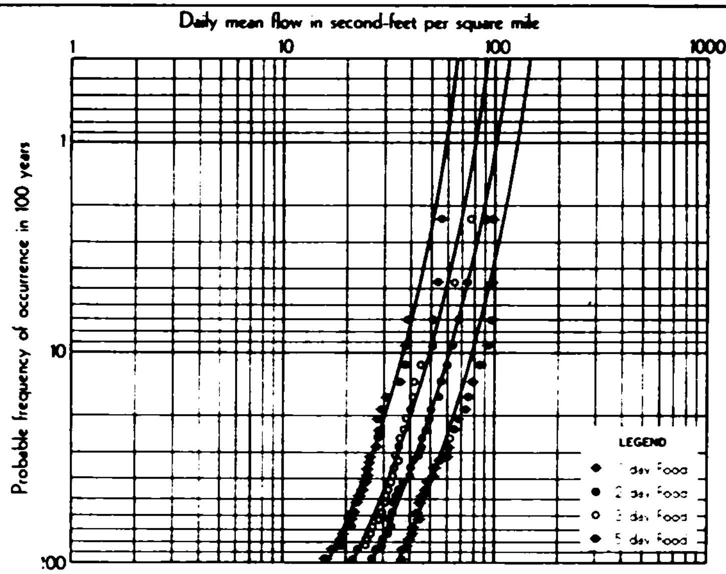


MIDDLE FORK YUBA RIVER FLOOD DISCHARGE
NEAR NORTH SAN JUAN
AREA OF DRAINAGE BASIN 207 SQUARE MILES



YUBA RIVER FLOOD DISCHARGE
AT SMARTVILLE
AREA OF DRAINAGE BASIN 1194 SQUARE MILES

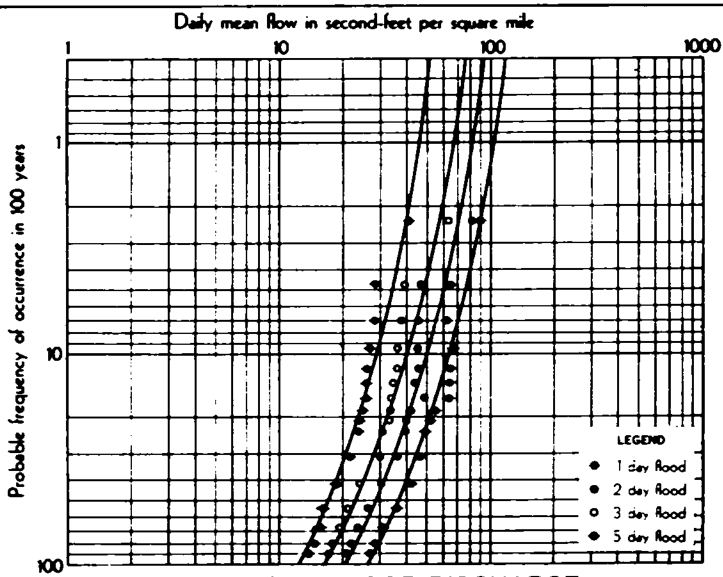
PLATE 50



BEAR RIVER FLOOD DISCHARGE

NEAR WHEATLAND

AREA OF DRAINAGE BASIN 295 SQUARE MILES

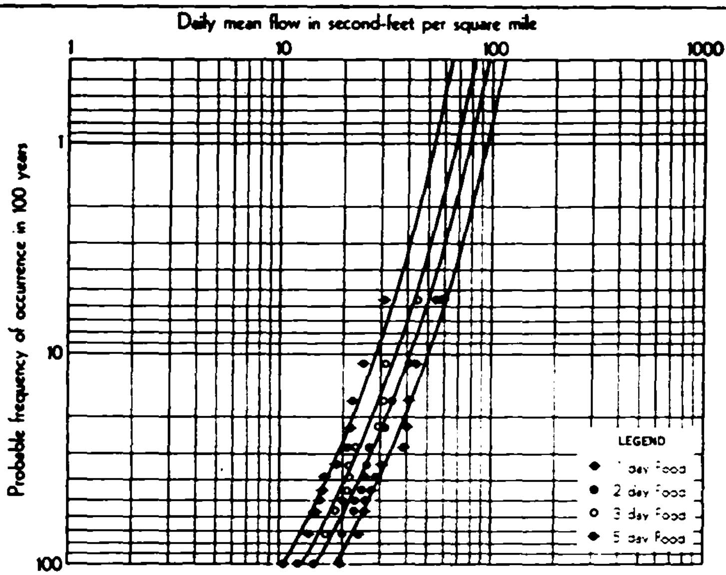


PUTAH CREEK FLOOD DISCHARGE

NEAR WINTERS

AREA OF DRAINAGE BASIN 577 SQUARE MILES

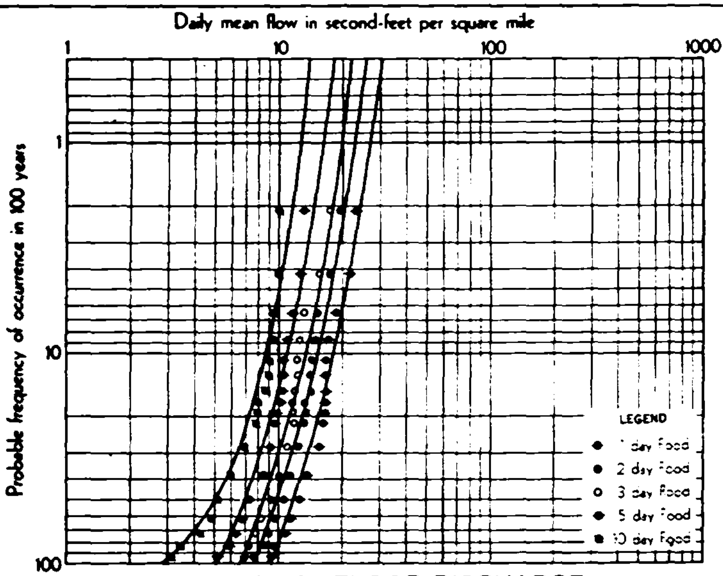
PLATE 51



NORTH FORK CACHE CREEK FLOOD DISCHARGE

NEAR LOWER LAKE

AREA OF DRAINAGE BASIN 214 SQUARE MILES

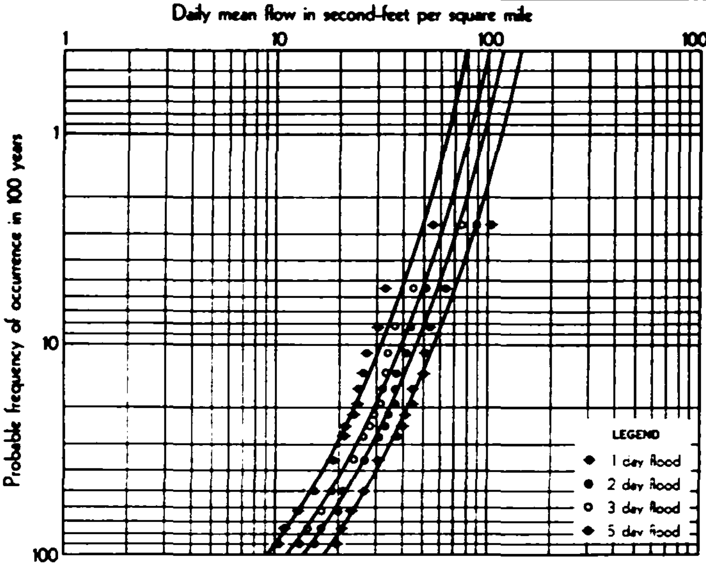


CACHE CREEK FLOOD DISCHARGE

AT YOLO

AREA OF DRAINAGE BASIN 1150 SQUARE MILES

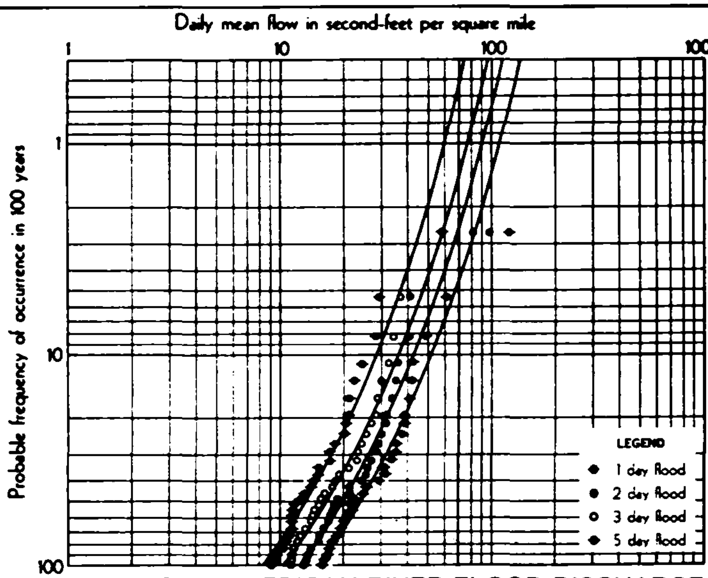
PLATE 52



NORTH FORK AMERICAN RIVER FLOOD DISCHARGE

AT NORTH FORK DAM

AREA OF DRAINAGE BASIN 343 SQUARE MILES

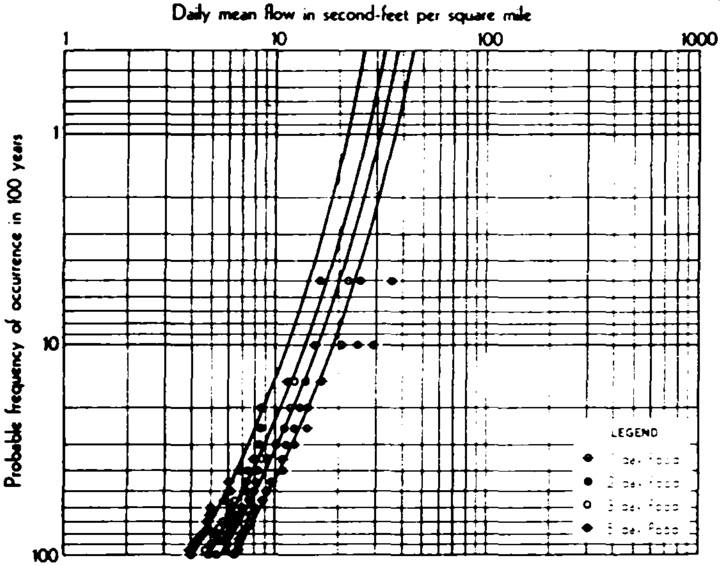


MIDDLE FORK AMERICAN RIVER FLOOD DISCHARGE

NEAR AUBURN

AREA OF DRAINAGE BASIN 619 SQUARE MILES

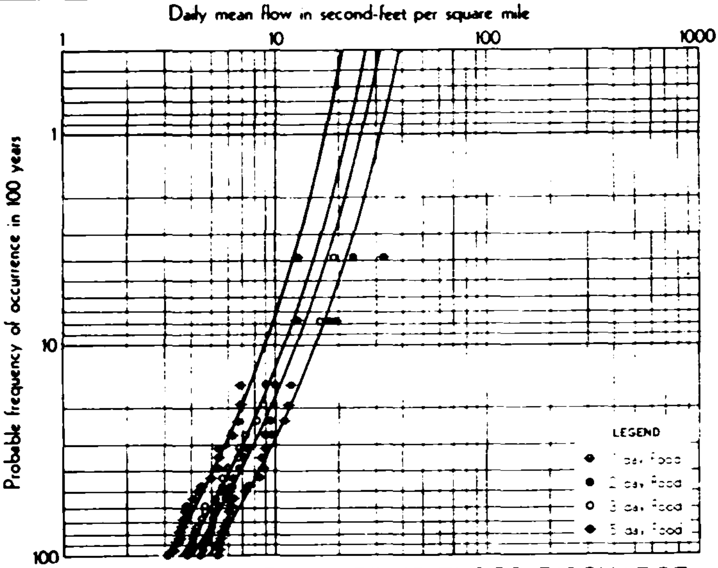
PLATE 53



SILVER FORK AMERICAN RIVER FLOOD DISCHARGE

NEAR KYBURZ

AREA OF DRAINAGE BASIN [illegible] SQUARE MILES

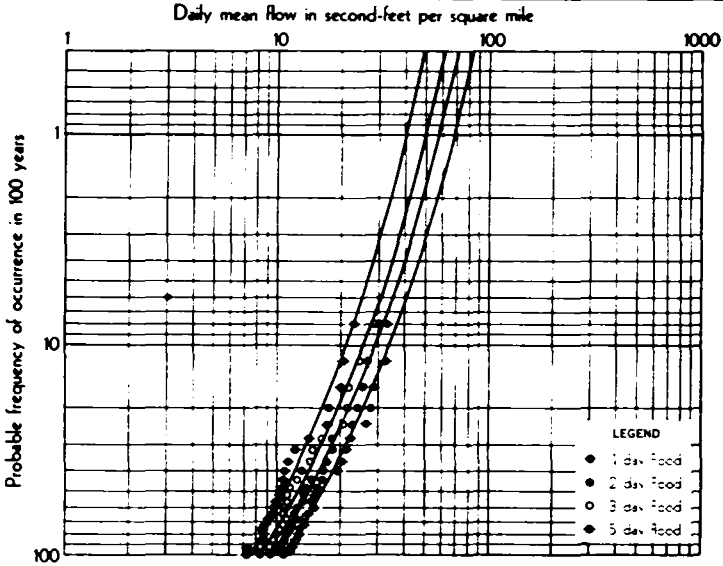


SOUTH FORK AMERICAN RIVER FLOOD DISCHARGE

NEAR KYBURZ

AREA OF DRAINAGE BASIN [illegible] SQUARE MILES

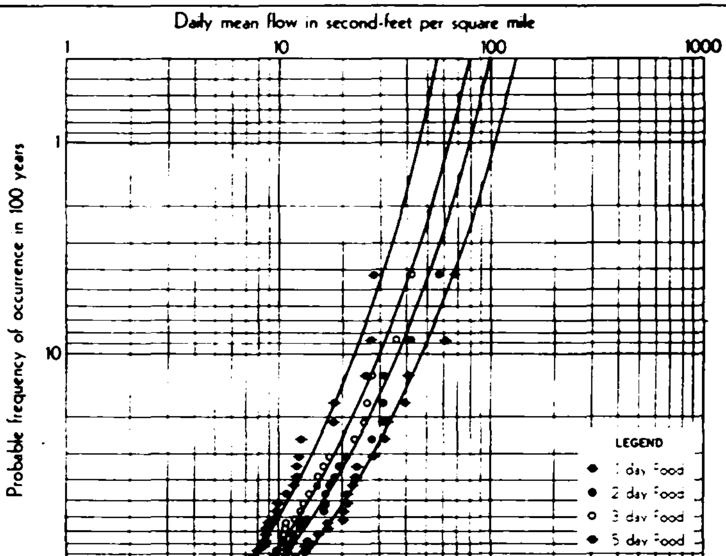
PLATE 54



ALDER CREEK FLOOD DISCHARGE

NEAR WHITEHALL

AREA OF DRAINAGE BASIN 23 SQUARE MILES

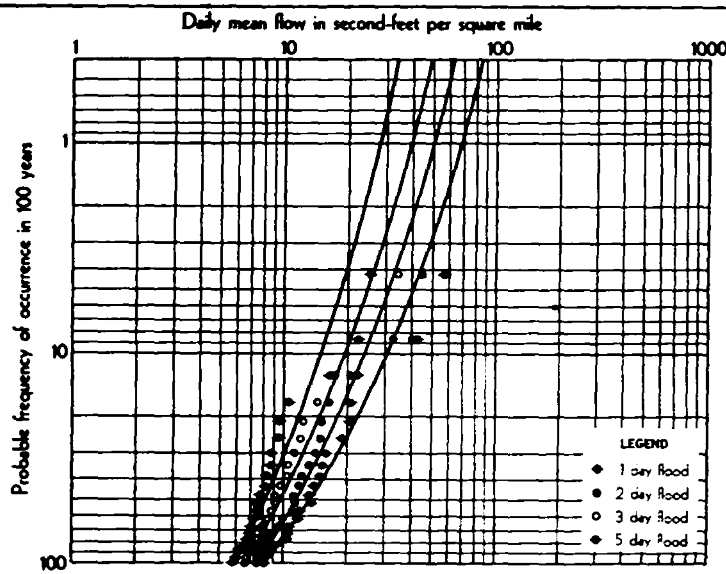


SILVER CREEK FLOOD DISCHARGE

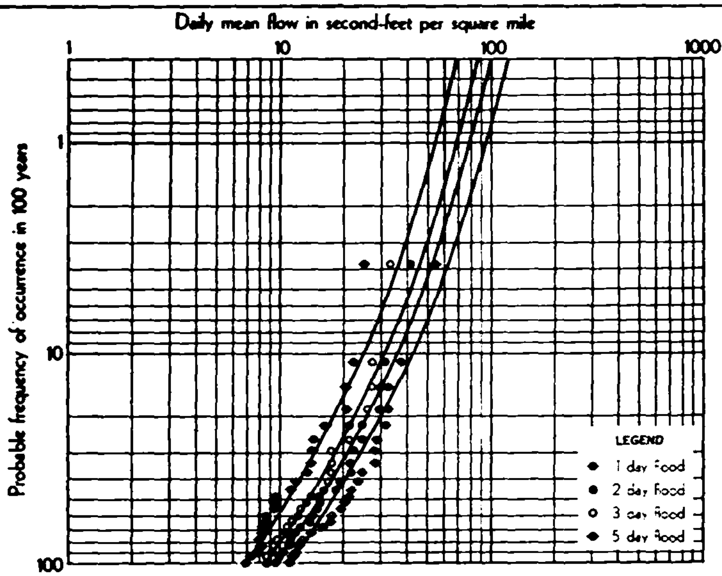
AT UNION VALLEY

AREA OF DRAINAGE BASIN 93 SQUARE MILES

PLATE 55

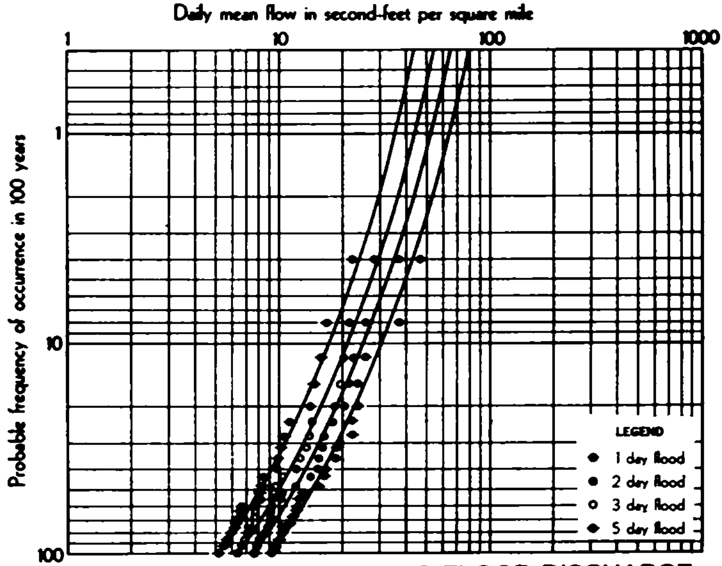


SOUTH FORK SILVER CREEK FLOOD DISCHARGE
NEAR ICEHOUSE
AREA OF DRAINAGE BASIN 28 SQUARE MILES

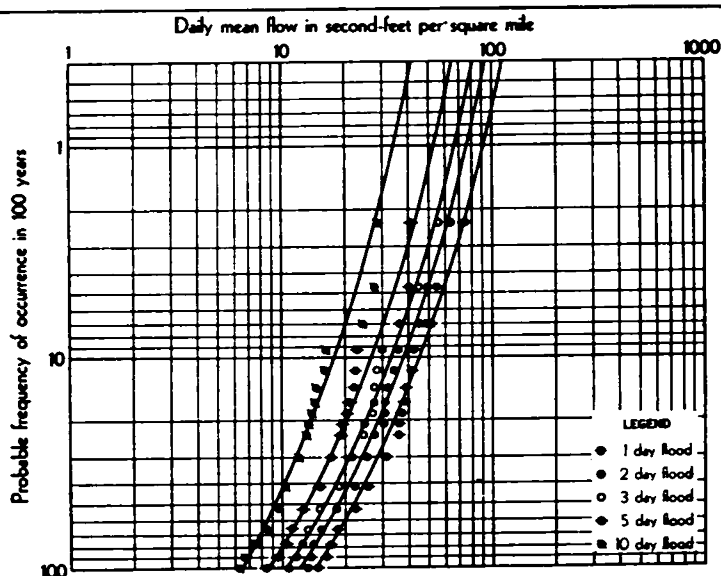


SILVER CREEK FLOOD DISCHARGE
NEAR PLACERVILLE
AREA OF DRAINAGE BASIN 176 SQUARE MILES

PLATE 56

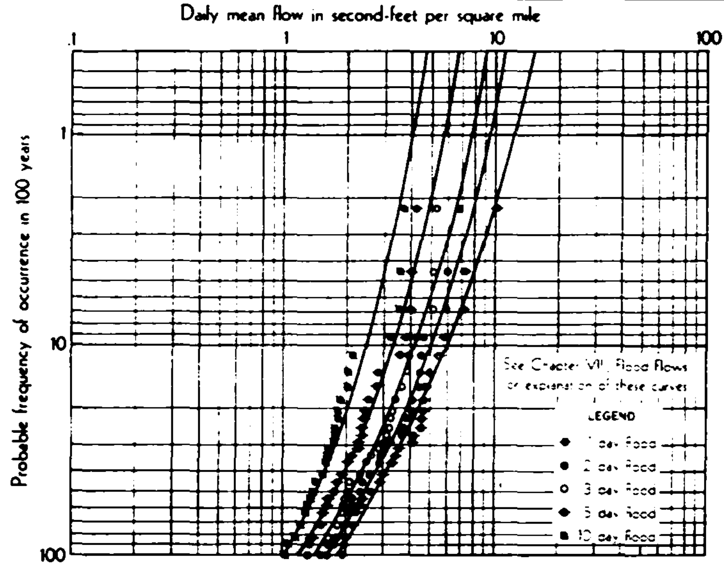


SOUTH FORK AMERICAN RIVER FLOOD DISCHARGE
NEAR CAMINO
AREA OF DRAINAGE BASIN 497 SQUARE MILES

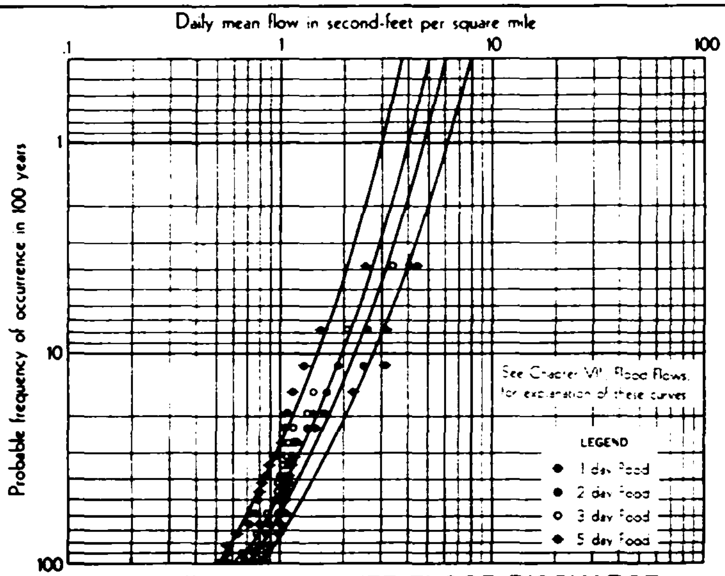


AMERICAN RIVER FLOOD DISCHARGE
AT FAIR OAKS
AREA OF DRAINAGE BASIN 1921 SQUARE MILES

PLATE 57

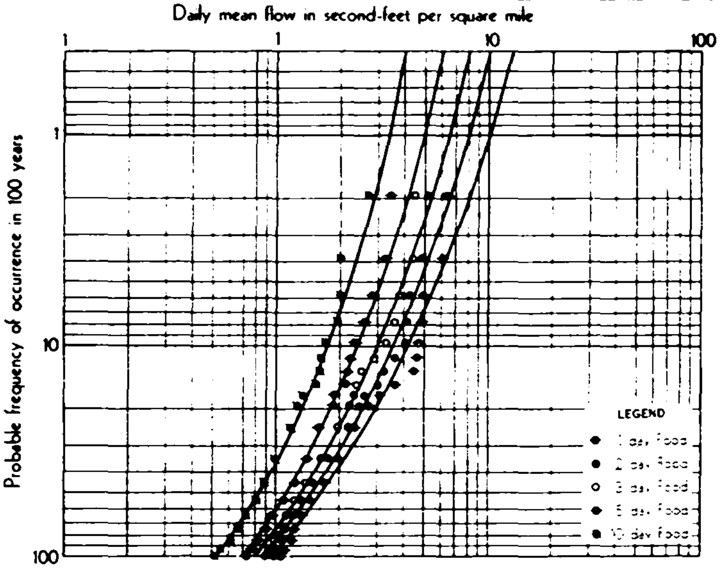


KERN RIVER FLOOD DISCHARGE
ABOVE SALMON CREEK NEAR KERNVILLE
AREA OF DRAINAGE BASIN 845 SQUARE MILES



SOUTH FORK KERN RIVER FLOOD DISCHARGE
NEAR ONYX
AREA OF DRAINAGE BASIN 531 SQUARE MILES

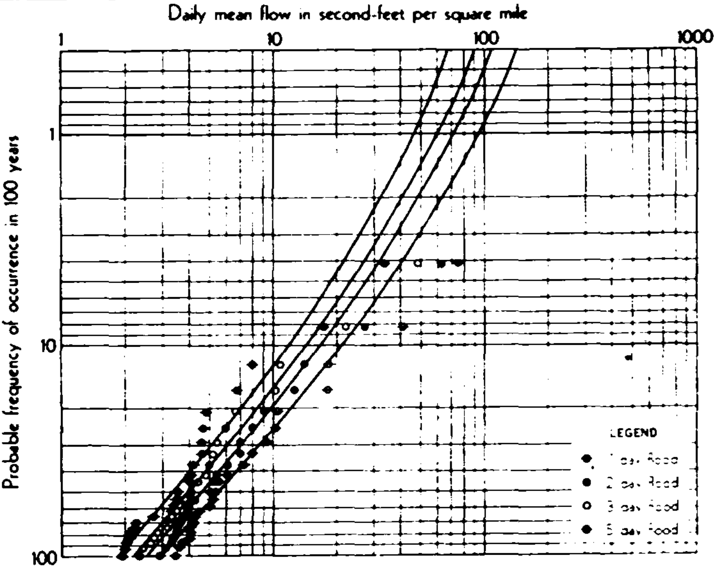
PLATE 58



KERN RIVER FLOOD DISCHARGE

NEAR BAKERSFIELD

AREA OF DRAINAGE BASIN 2420 SQUARE MILES

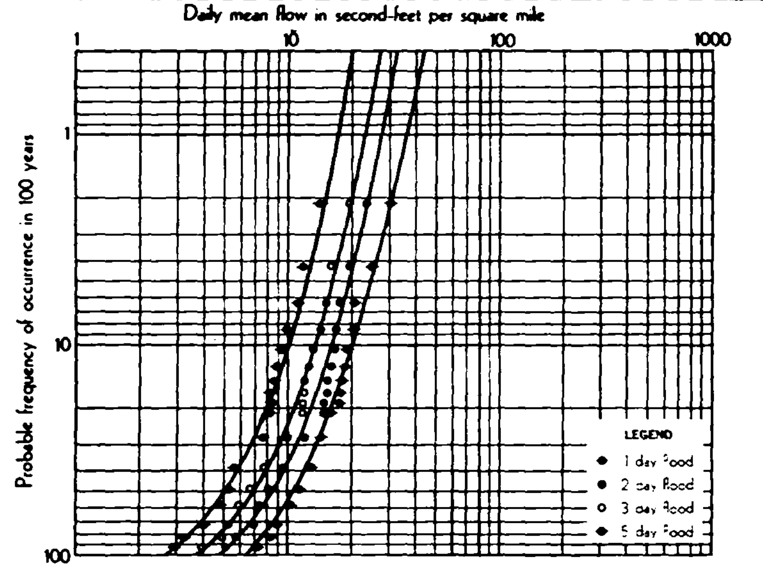


DEER CREEK FLOOD DISCHARGE

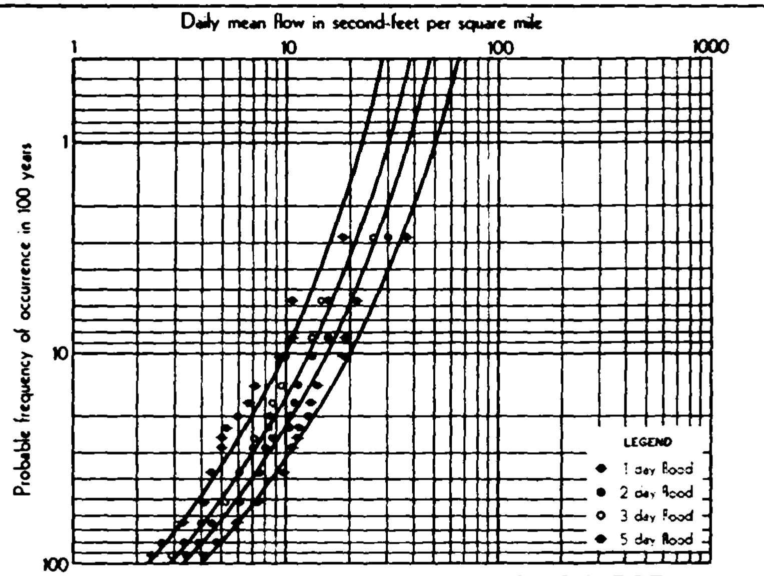
NEAR TERRA BELLA

AREA OF DRAINAGE BASIN 83 SQUARE MILES

PLATE 59

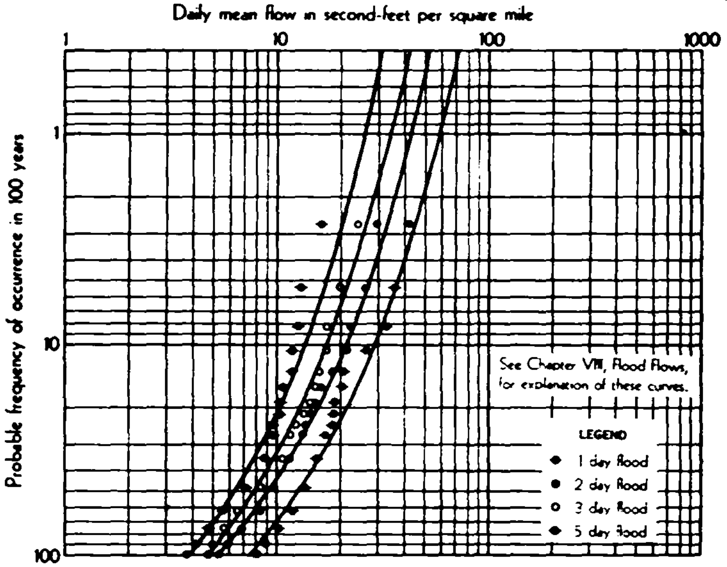


TULE RIVER FLOOD DISCHARGE
ABOVE SOUTH FORK NEAR PORTERVILLE
AREA OF DRAINAGE BASIN 266 SQUARE MILES

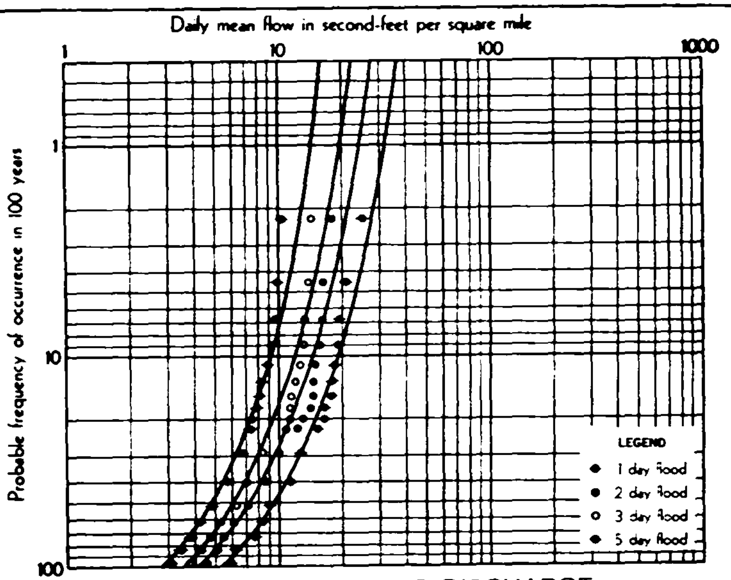


SOUTH FORK TULE RIVER FLOOD DISCHARGE
NEAR SUCCESS
AREA OF DRAINAGE BASIN 106 SQUARE MILES

PLATE 60

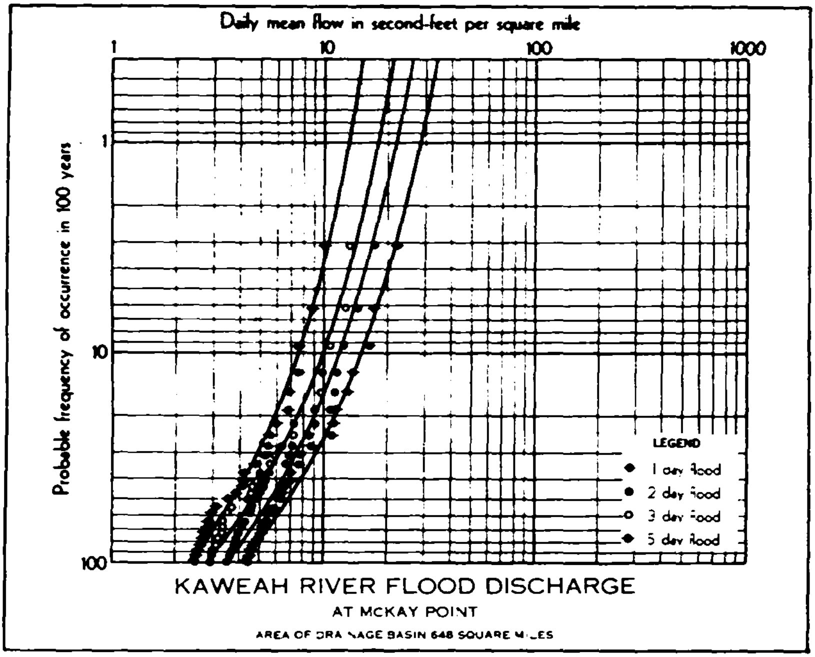


NORTH FORK KAWEAH RIVER FLOOD DISCHARGE
AT KAWEAH
AREA OF DRAINAGE BASIN 128 SQUARE MILES



KAWEAH RIVER FLOOD DISCHARGE
NEAR THREE RIVERS
AREA OF DRAINAGE BASIN 520 SQUARE MILES

PLATE 61


Daily mean flow in second-feet per square mile
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
1 day flood
2 day flood
3 day flood
5 day flood
KAWEAH RIVER FLOOD DISCHARGE
AT MCKAY POINT
AREA OF DRAINAGE BASIN 648 SQUARE MILES

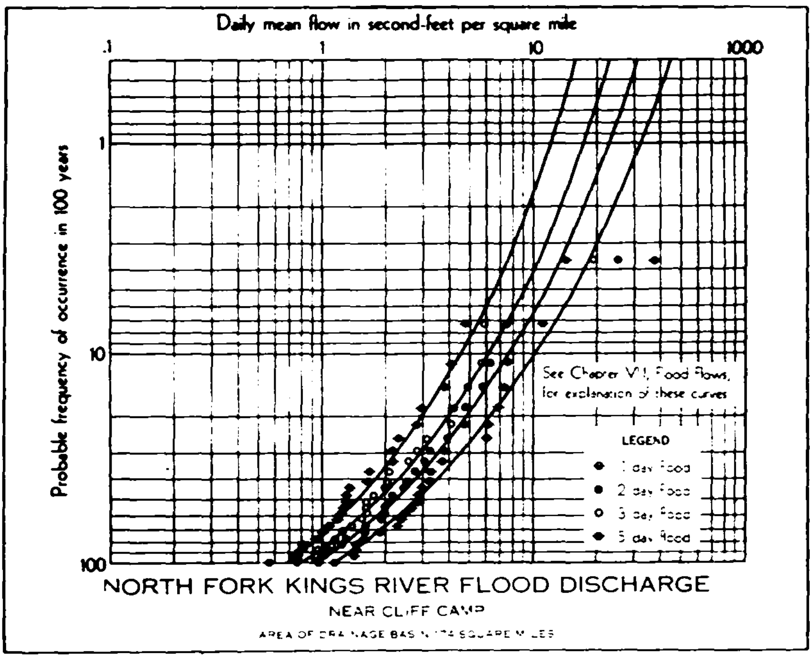
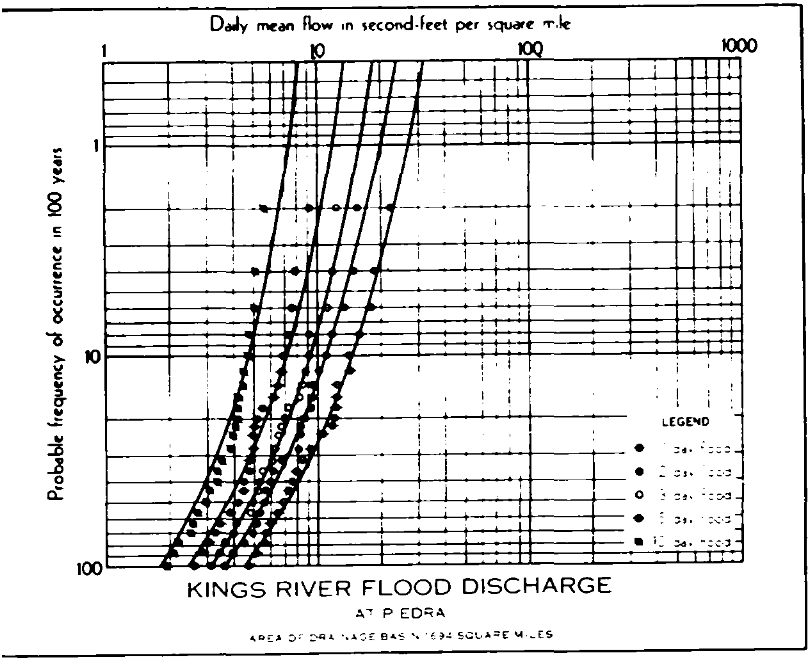

Daily mean flow in second-feet per square mile
.1
1
10
1000
Probable frequency of occurrence in 100 years
1
10
100
See Chapter VII, Flood Flows, for explanation of these curves
LEGEND
1 day flood
2 day flood
3 day flood
5 day flood
NORTH FORK KINGS RIVER FLOOD DISCHARGE
NEAR CLIFF CAMP

PLATE 62


Daily mean flow in second-feet per square mile
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
KINGS RIVER FLOOD DISCHARGE

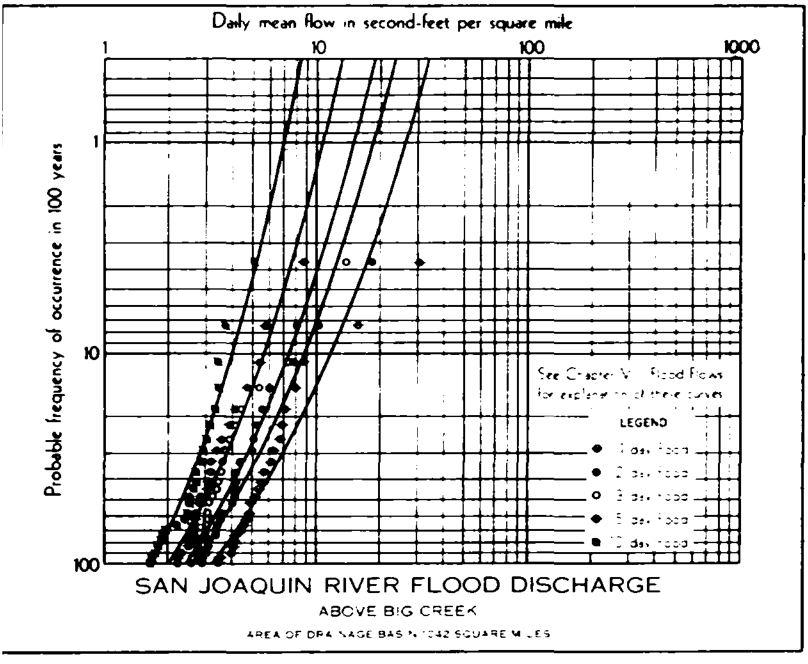
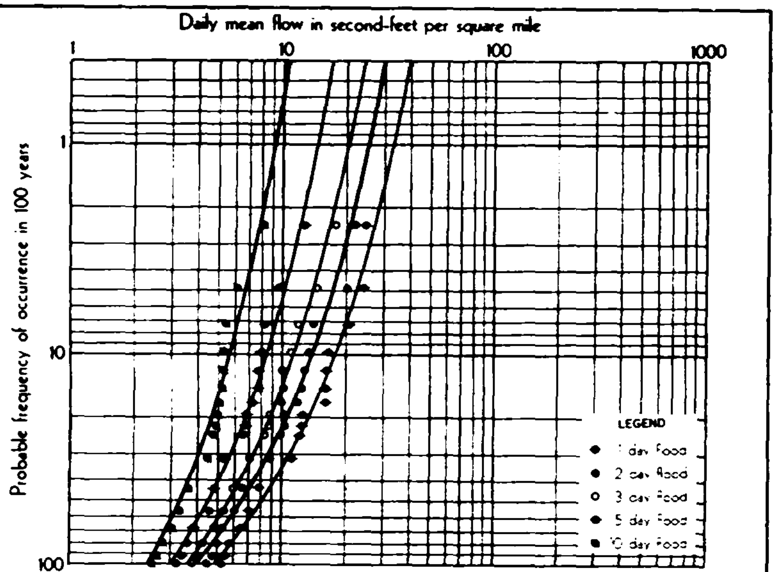

Daily mean flow in second-feet per square mile
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
SAN JOAQUIN RIVER FLOOD DISCHARGE
ABOVE BIG CREEK

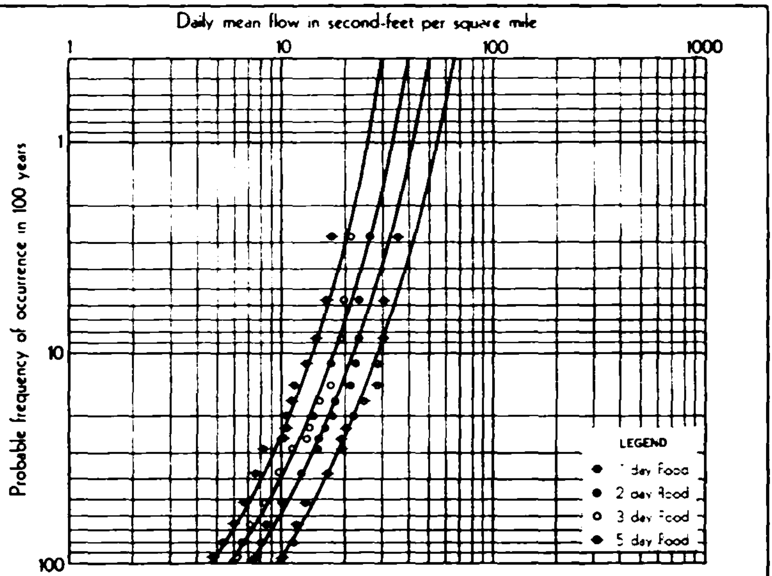
PLATE 63



SAN JOAQUIN RIVER FLOOD DISCHARGE

NEAR FRIANT

AREA OF DRAINAGE BASIN 1650 SQUARE MILES

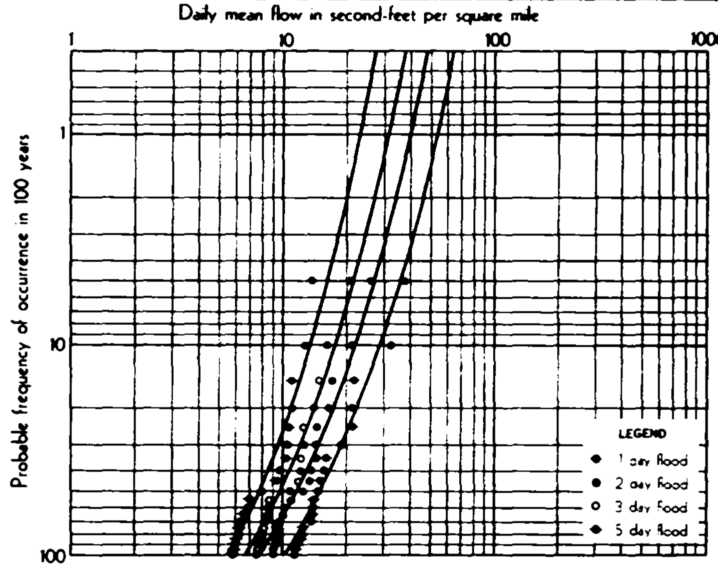


FRESNO RIVER FLOOD DISCHARGE

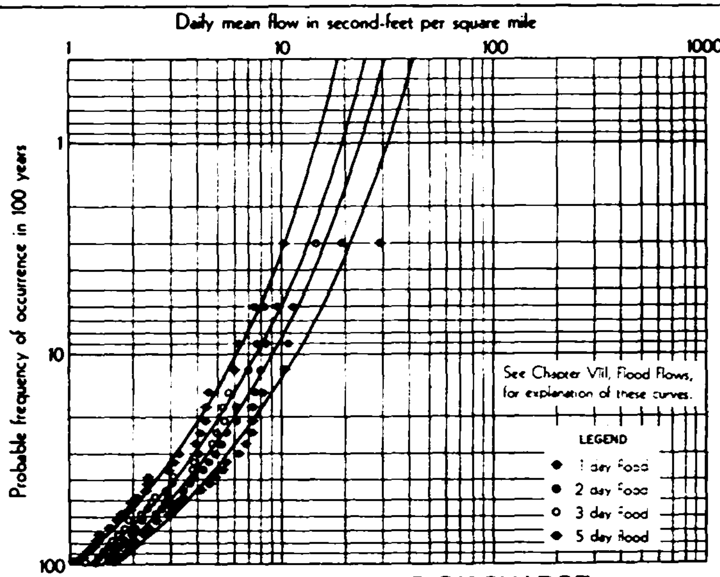
NEAR KNOWLES

AREA OF DRAINAGE BASIN 132 SQUARE MILES

PLATE 64

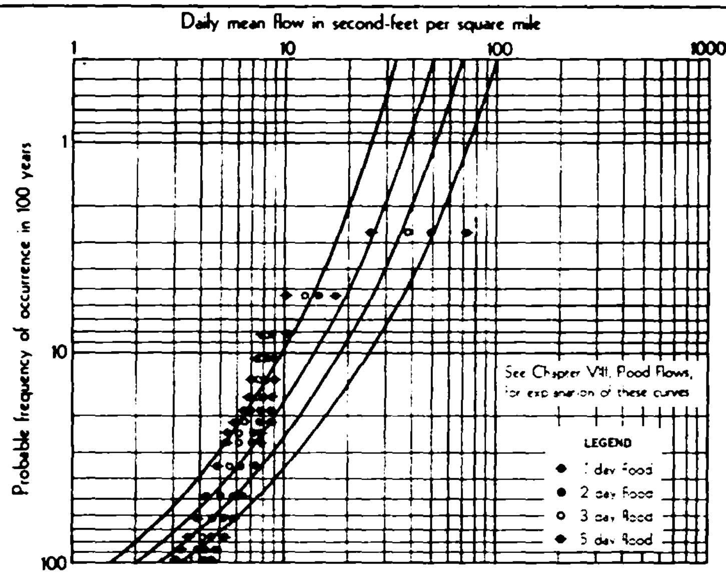


CHOWCHILLA RIVER FLOOD DISCHARGE
AT BUCHANAN DAMSITE
AREA OF DRAINAGE BASIN 238 SQUARE MILES



MERCED RIVER FLOOD DISCHARGE
AT HAPPY ISLES BRIDGE NEAR YOSEMITE
AREA OF DRAINAGE BASIN 181 SQUARE MILES

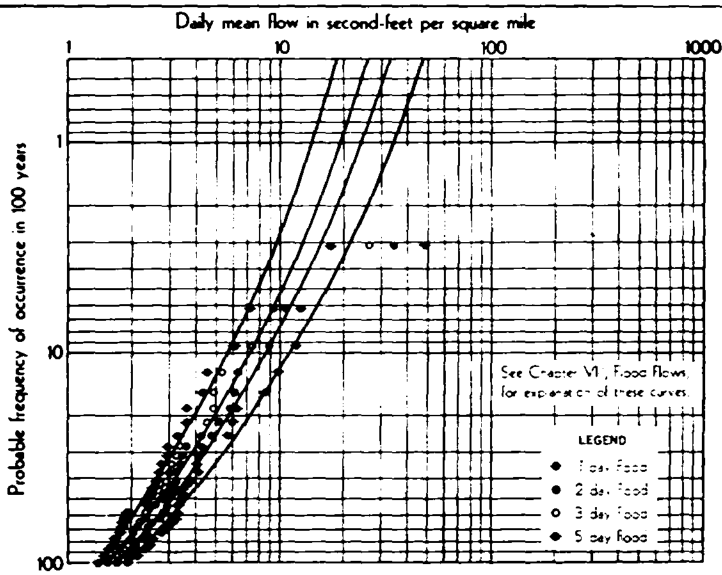
PLATE 65



TENAYA CREEK FLOOD DISCHARGE

NEAR YOSEMITE

AREA OF DRAINAGE BASIN 47 SQUARE MILES

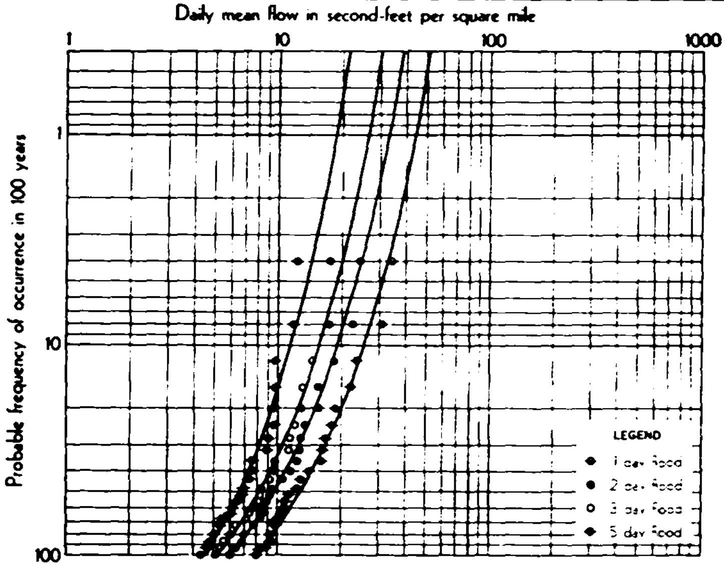


MERCED RIVER FLOOD DISCHARGE

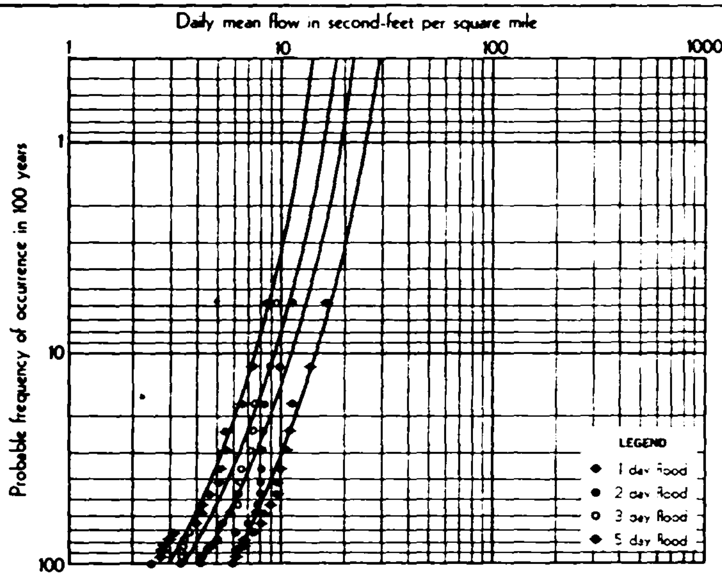
AT POHONO BRIDGE NEAR YOSEMITE

AREA OF DRAINAGE BASIN 321 SQUARE MILES

PLATE 66

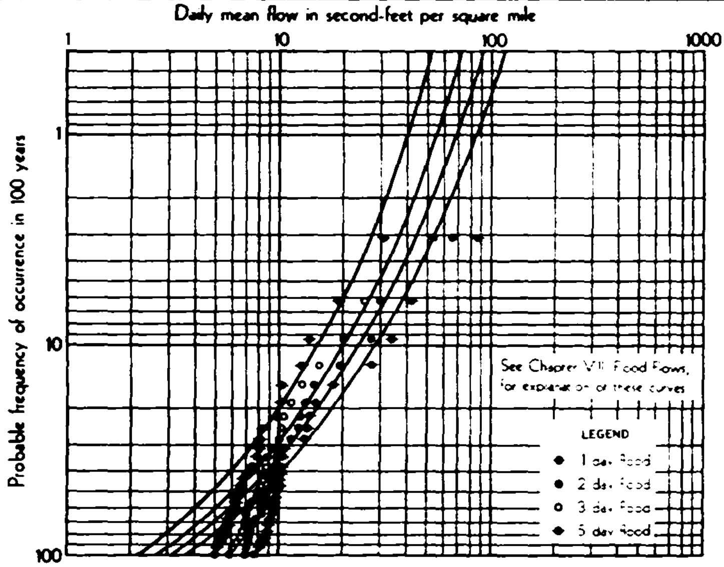


MERCED RIVER FLOOD DISCHARGE
AT KITTRIDGE
AREA OF DRAINAGE BASIN 935 SQUARE MILES



ORESTIMBA CREEK FLOOD DISCHARGE
NEAR NEWMAN
AREA OF DRAINAGE BASIN 129 SQUARE MILES

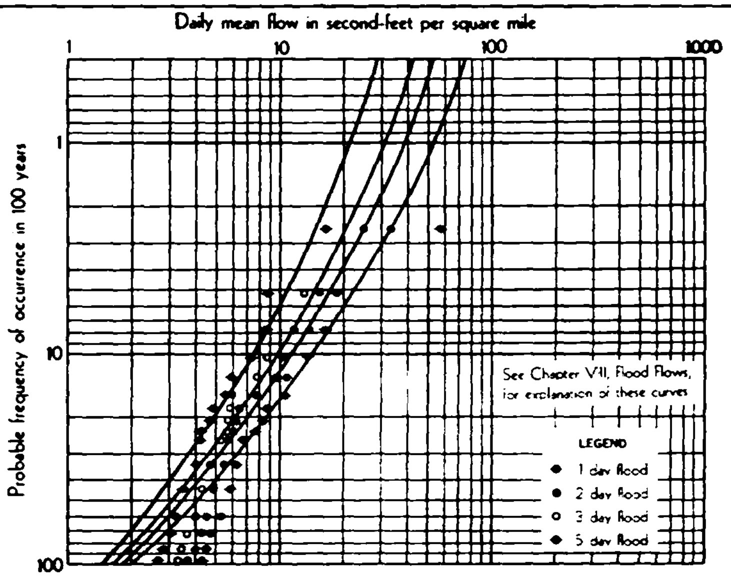
PLATE 67



FALLS CREEK FLOOD DISCHARGE

NEAR HETCH HETCHY

AREA OF DRAINAGE BASIN 45 SQUARE MILES

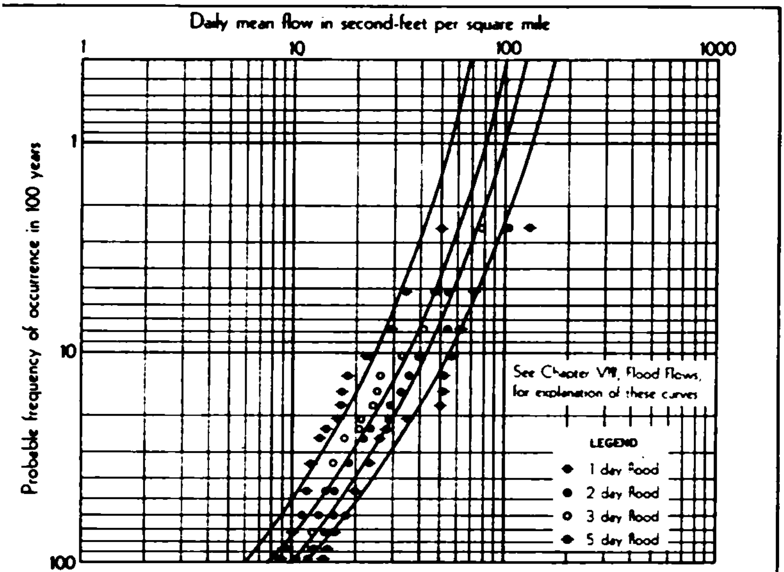


TUOLUMNE RIVER FLOOD DISCHARGE

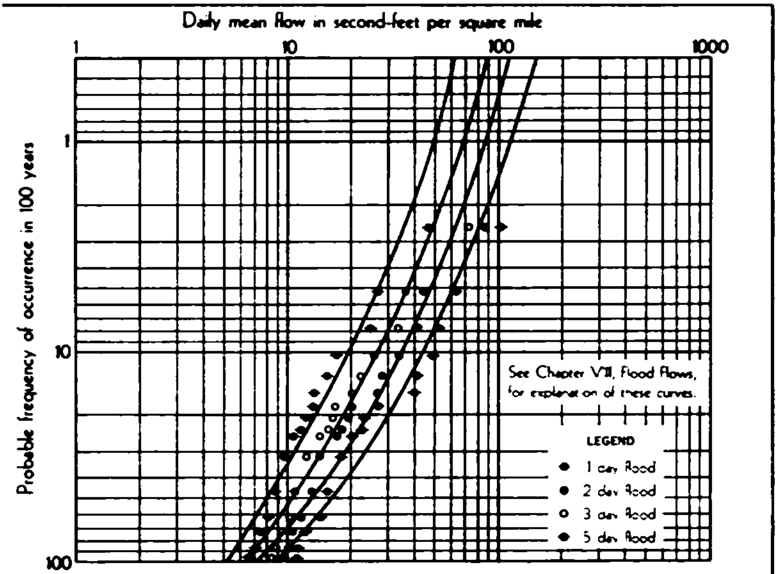
NEAR HETCH HETCHY

AREA OF DRAINAGE BASIN 462 SQUARE MILES

PLATE 68

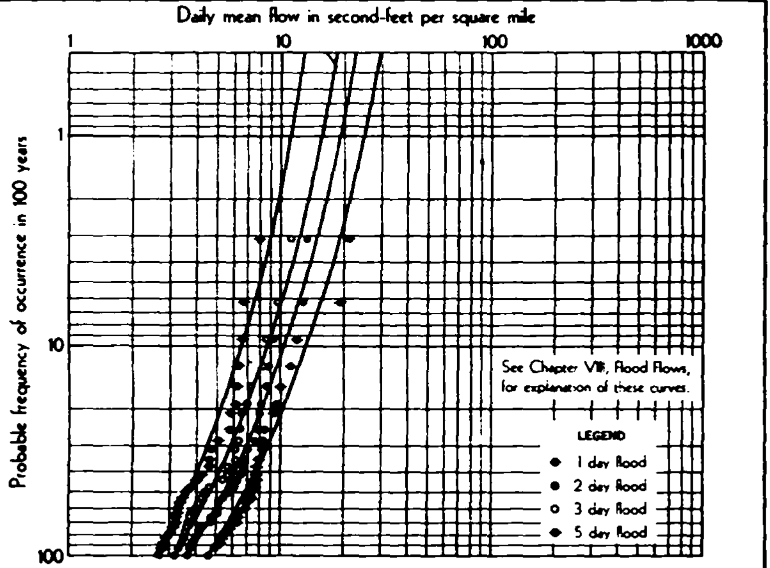


ELEANOR CREEK FLOOD DISCHARGE
NEAR HETCH HETCHY
AREA OF DRAINAGE BASIN 80 SQUARE MILES

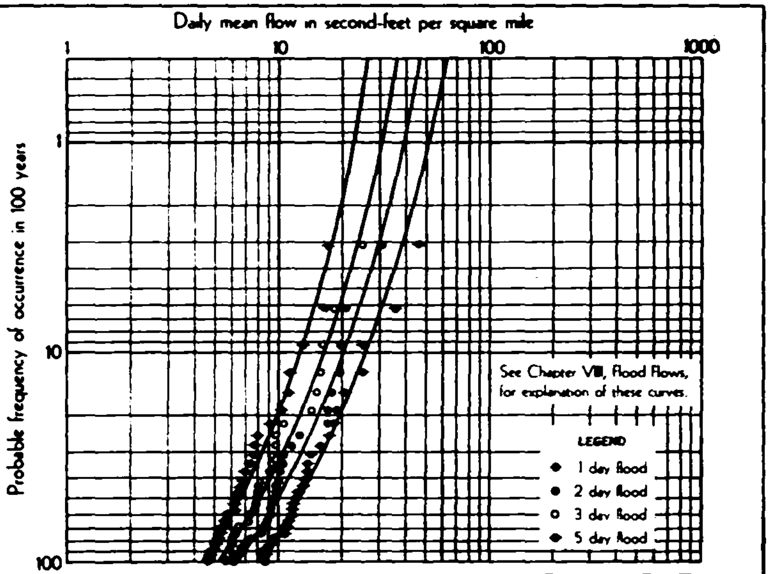


CHERRY CREEK FLOOD DISCHARGE
NEAR HETCH HETCHY
AREA OF DRAINAGE BASIN 111 SQUARE MILES

PLATE 69

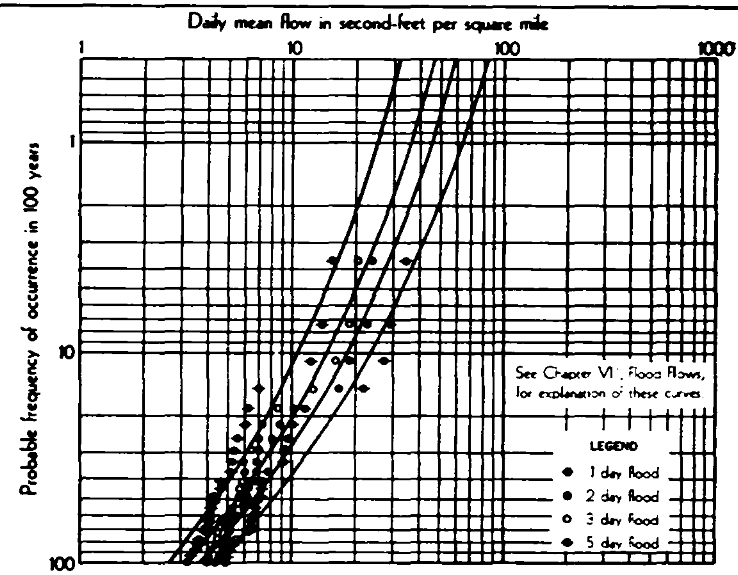


MIDDLE TUOLUMNE RIVER FLOOD DISCHARGE
AT OAKLAND RECREATION CAMP
AREA OF DRAINAGE BASIN 71 SQUARE MILES



SOUTH FORK TUOLUMNE RIVER FLOOD DISCHARGE
NEAR OAKLAND RECREATION CAMP
AREA OF DRAINAGE BASIN 88 SQUARE MILES

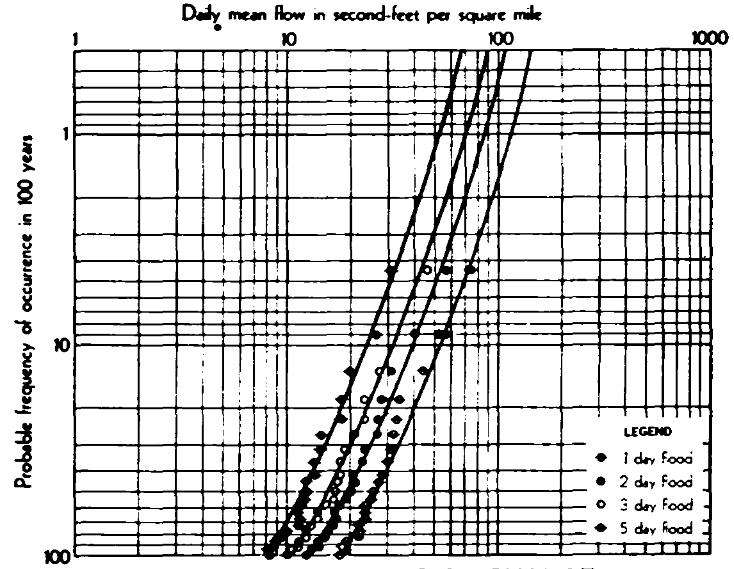
PLATE 70



TUOLUMNE RIVER FLOOD DISCHARGE

NEAR BUCK MEADOW

AREA OF DRAINAGE BASIN 934 SQUARE MILES

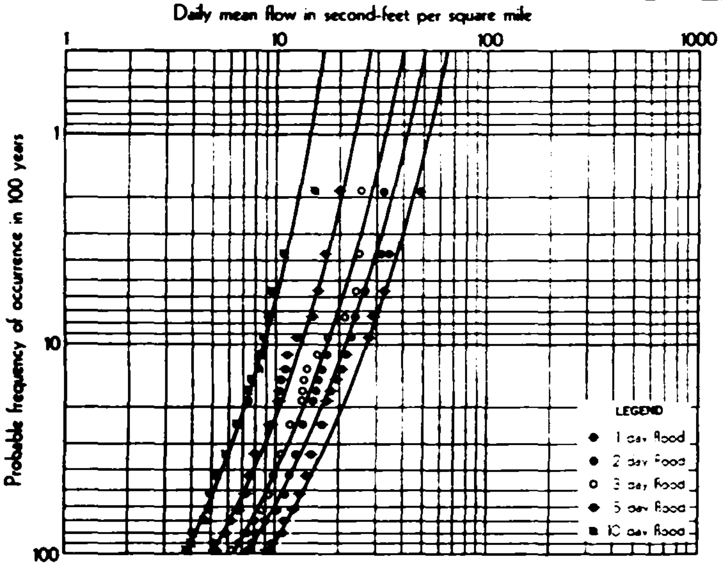


WOODS CREEK FLOOD DISCHARGE

NEAR JACKSONVILLE

AREA OF DRAINAGE BASIN 98 SQUARE MILES

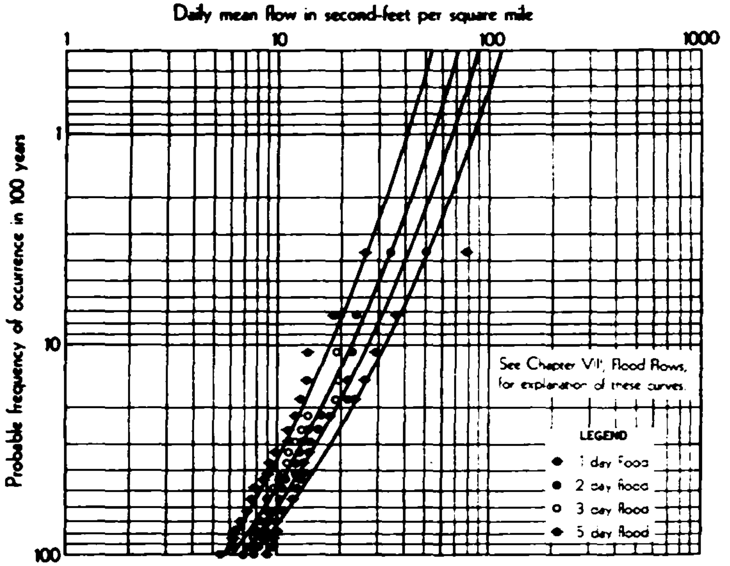
PLATE 71



TUOLUMNE RIVER FLOOD DISCHARGE

ABOVE LA GRANGE DAM NEAR LA GRANGE

AREA OF DRAINAGE BASIN 1540 SQUARE MILES

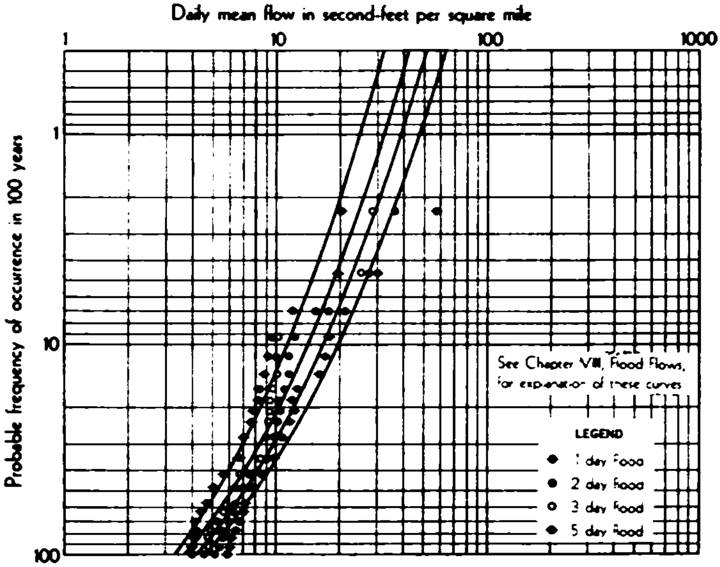


NORTH FORK STANISLAUS RIVER FLOOD DISCHARGE

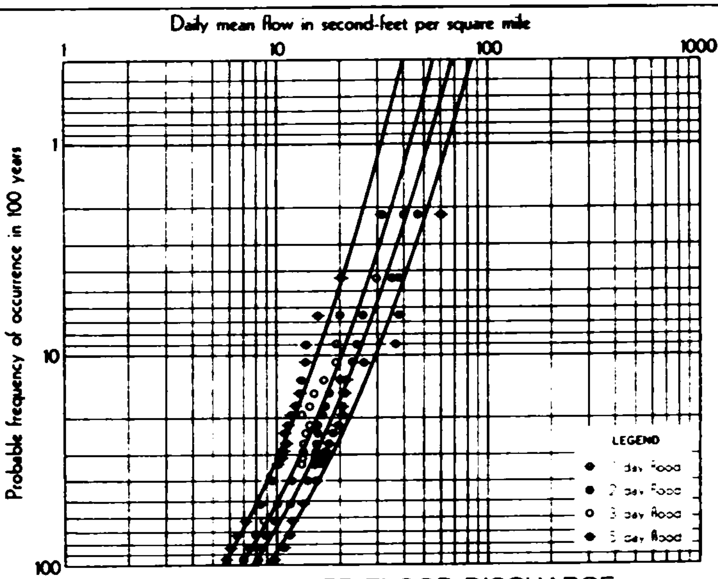
NEAR AVERY

AREA OF DRAINAGE BASIN 163 SQUARE MILES

PLATE 72

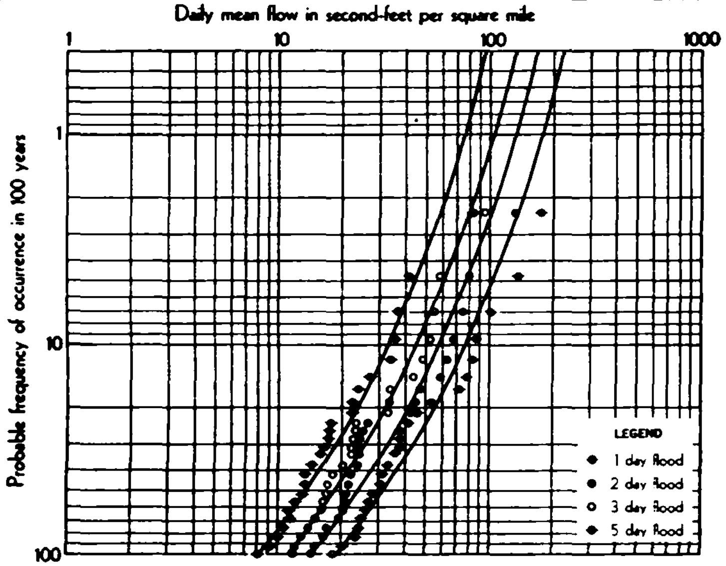


MIDDLE FORK STANISLAUS RIVER FLOOD DISCHARGE
AT SANDBAR FLAT NEAR AVERY
AREA OF DRAINAGE BASIN 318 SQUARE MILES



STANISLAUS RIVER FLOOD DISCHARGE
BELOW MELONES POWERHOUSE
AREA OF DRAINAGE BASIN 898 SQUARE MILES

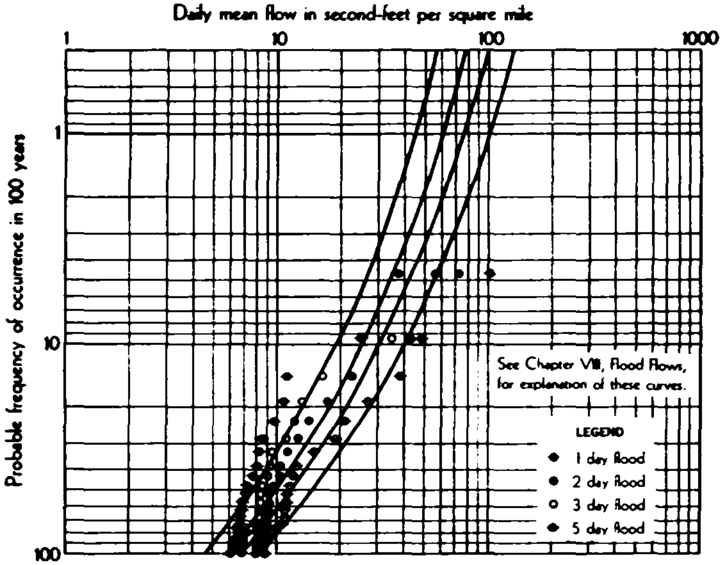
PLATE 73



CALAVERAS RIVER FLOOD DISCHARGE

AT JENNY LIND

AREA OF DRAINAGE BASIN 395 SQUARE MILES

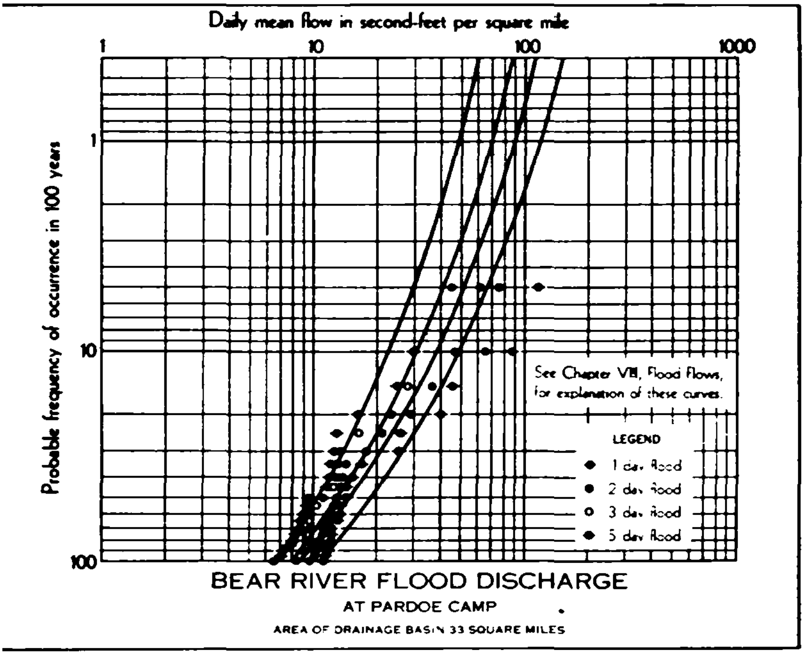


NORTH FORK MOKELUMNE RIVER FLOOD DISCHARGE

BELOW SALT SPRINGS DAM

AREA OF DRAINAGE BASIN 160 SQUARE MILES

PLATE 74


Daily mean flow in second-feet per square mile
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
See Chapter VII, Flood Flows, for explanation of these curves.
LEGEND
1 day flood
2 day flood
3 day flood
5 day flood
BEAR RIVER FLOOD DISCHARGE
AT PARDOE CAMP
AREA OF DRAINAGE BASIN 33 SQUARE MILES

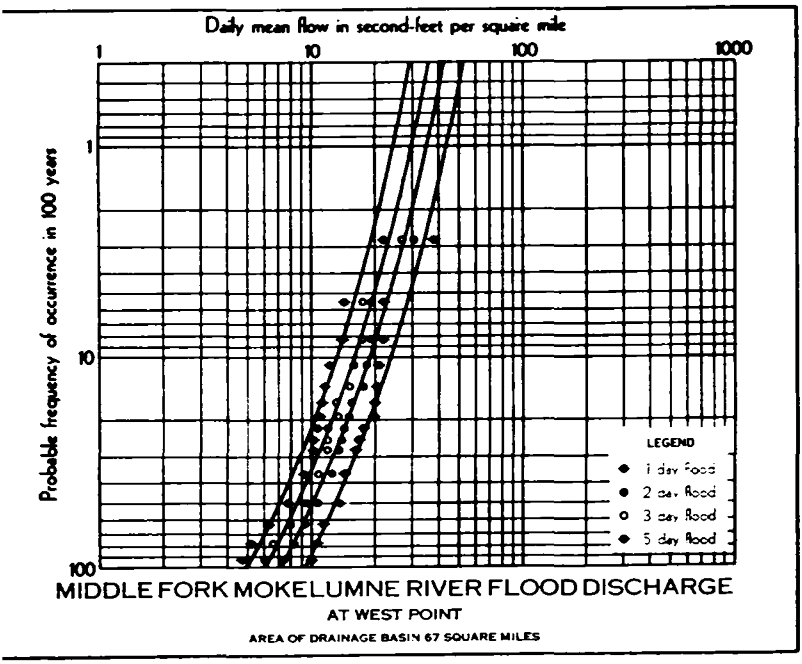
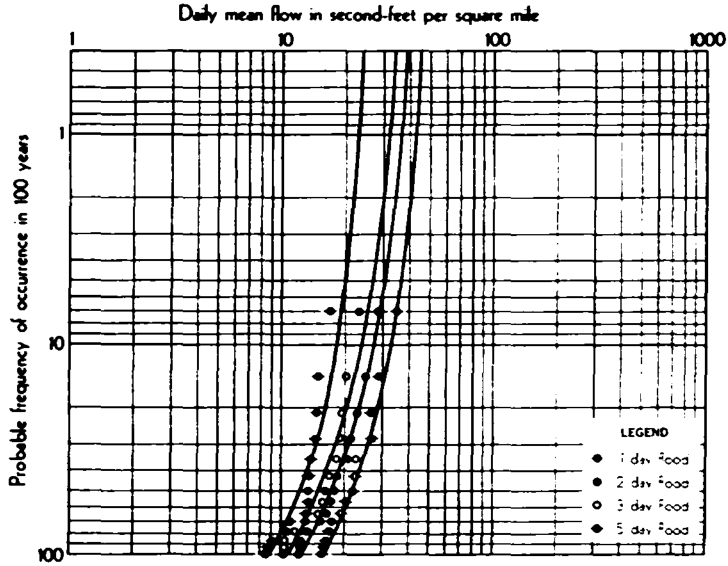
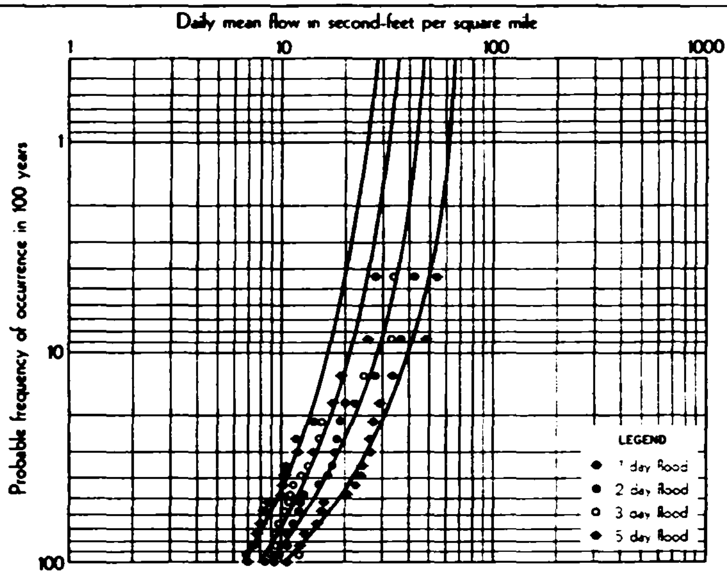

Daily mean flow in second-feet per square mile
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
LEGEND
1 day flood
2 day flood
3 day flood
5 day flood
MIDDLE FORK MOKELUMNE RIVER FLOOD DISCHARGE
AT WEST POINT
AREA OF DRAINAGE BASIN 67 SQUARE MILES

PLATE 75

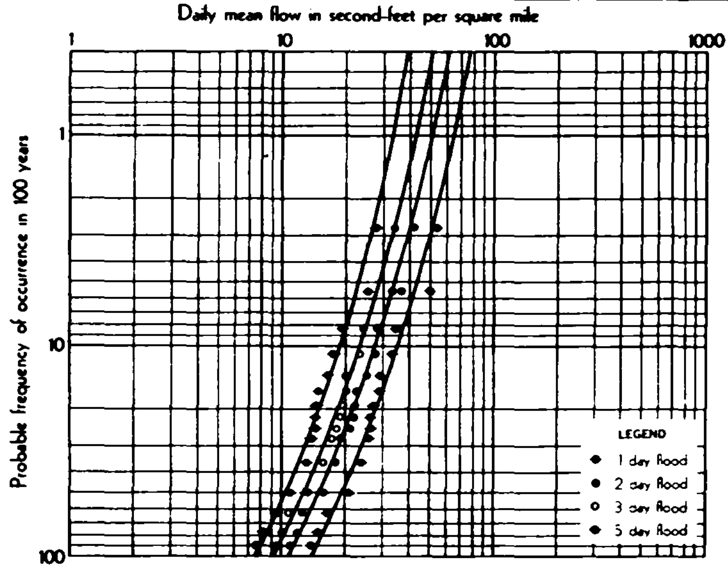


SOUTH FORK MOKELUMNE RIVER FLOOD DISCHARGE
NEAR WEST POINT
AREA OF DRAINAGE BASIN 74 SQUARE MILES

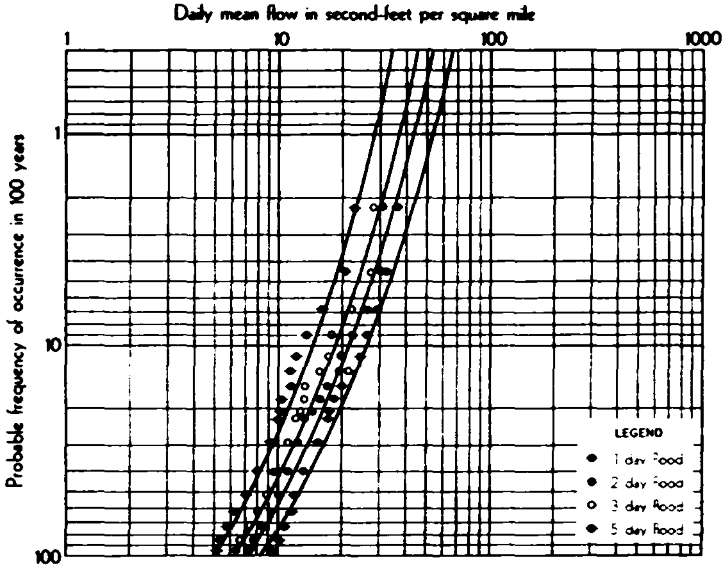


SOUTH FORK MOKELUMNE RIVER FLOOD DISCHARGE
NEAR RAILROAD FLAT
AREA OF DRAINAGE BASIN 37 SQUARE MILES

PLATE 76

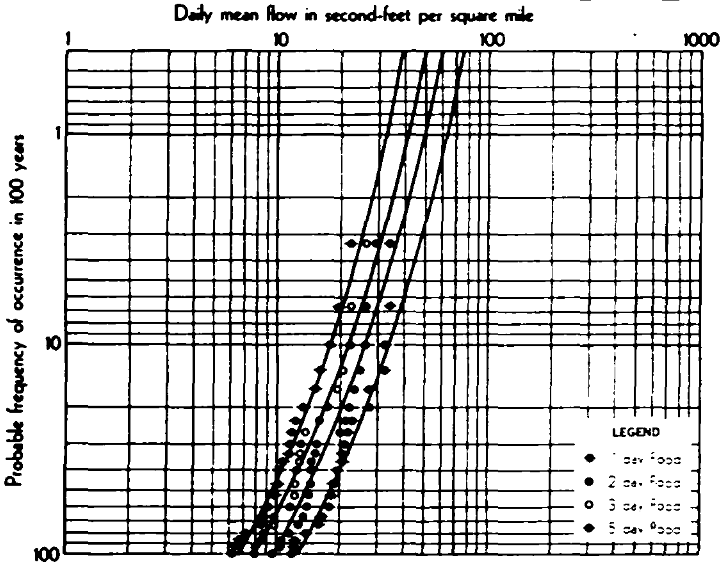


SOUTH FORK MOKELUMNE RIVER FLOOD DISCHARGE
NEAR RAILROAD FLAT AND NEAR WEST POINT
AREA OF DRAINAGE BASINS 37 AND 74 SQUARE MILES



MOKELUMNE RIVER FLOOD DISCHARGE
NEAR CLEMENTS
AREA OF DRAINAGE BASIN 630 SQUARE MILES

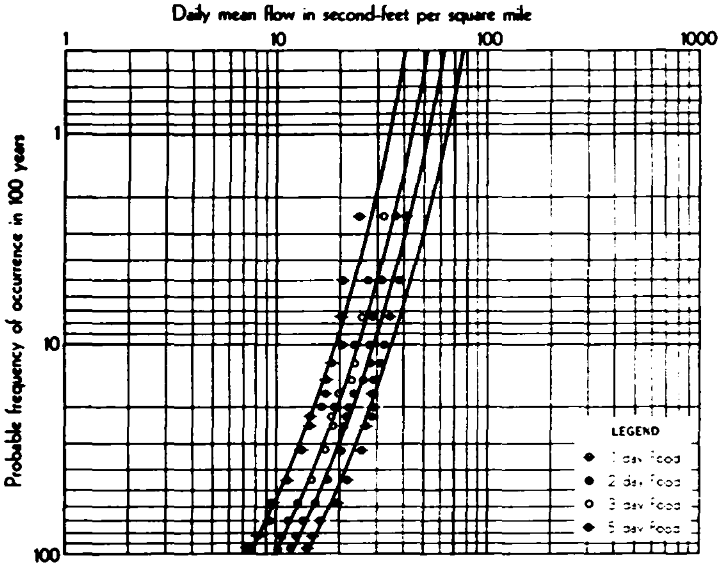
PLATE 77



NORTH FORK COSUMNES RIVER FLOOD DISCHARGE

NEAR ELDORADO

AREA OF DRAINAGE BASIN 202 SQUARE MILES

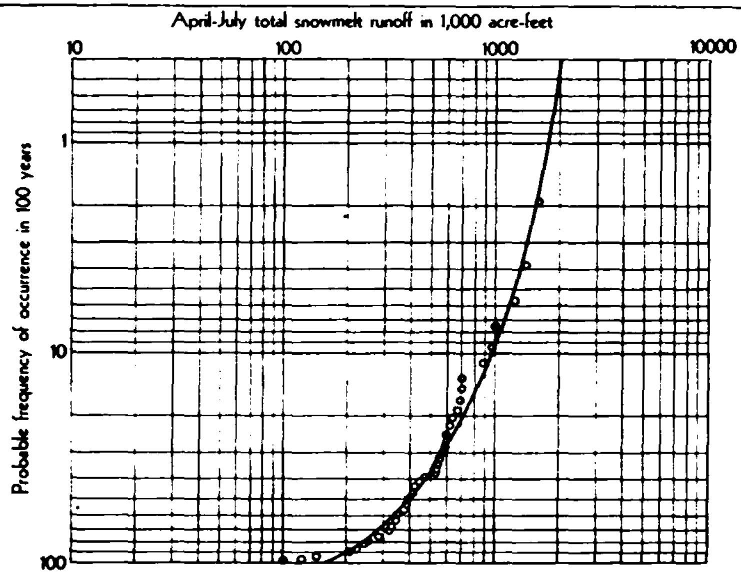


COSUMNES RIVER FLOOD DISCHARGE

AT MICHIGAN BAR

AREA OF DRAINAGE BASIN 537 SQUARE MILES

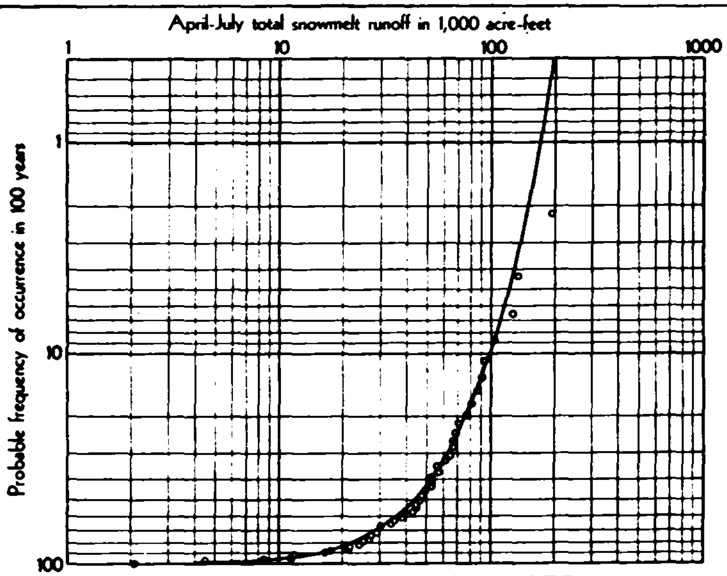
PLATE 78



KERN RIVER SNOWMELT RUNOFF

NEAR BAKERSFIELD

AREA OF DRAINAGE BASIN 2420 SQUARE MILES

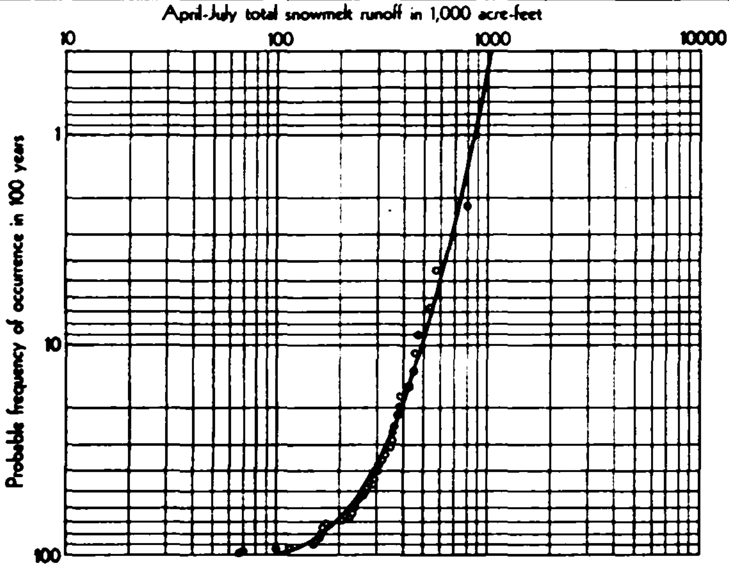


TULE RIVER SNOWMELT RUNOFF

ABOVE SOUTH FORK NEAR PORTERVILLE

AREA OF DRAINAGE BASIN 266 SQUARE MILES

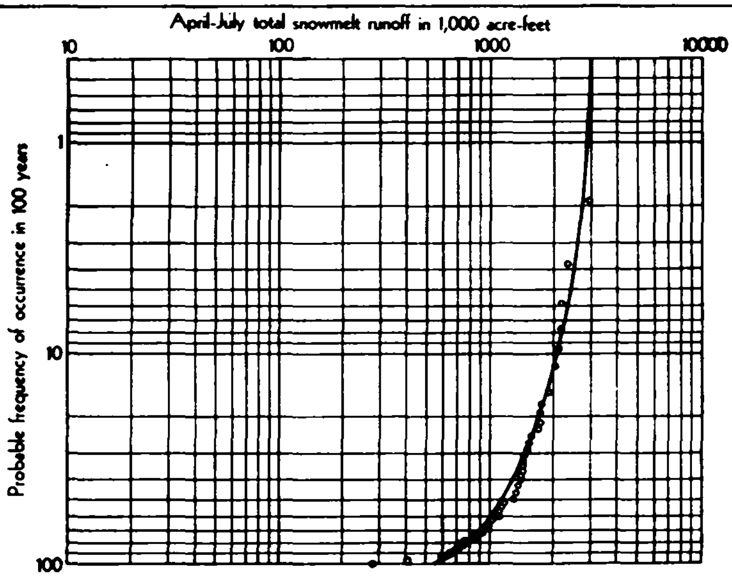
PLATE 79



KAWEAH RIVER SNOWMELT RUNOFF

NEAR THREE RIVERS

AREA OF DRAINAGE BASIN 520 SQUARE MILES

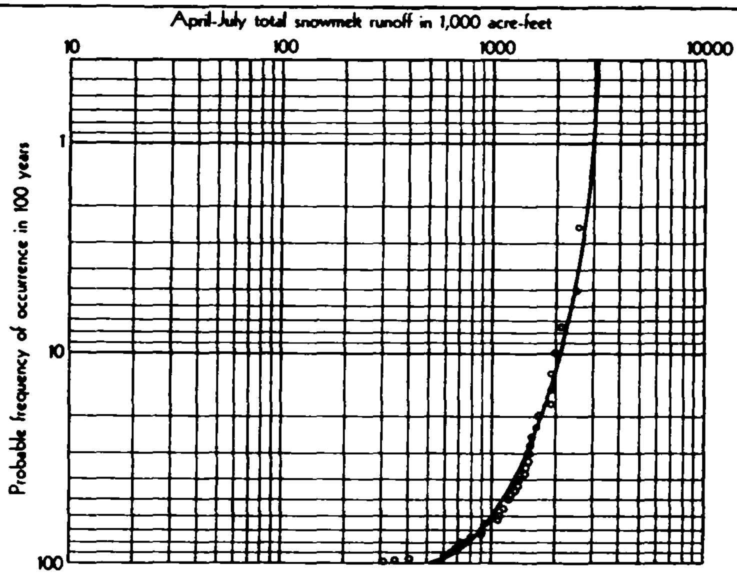


KINGS RIVER SNOWMELT RUNOFF

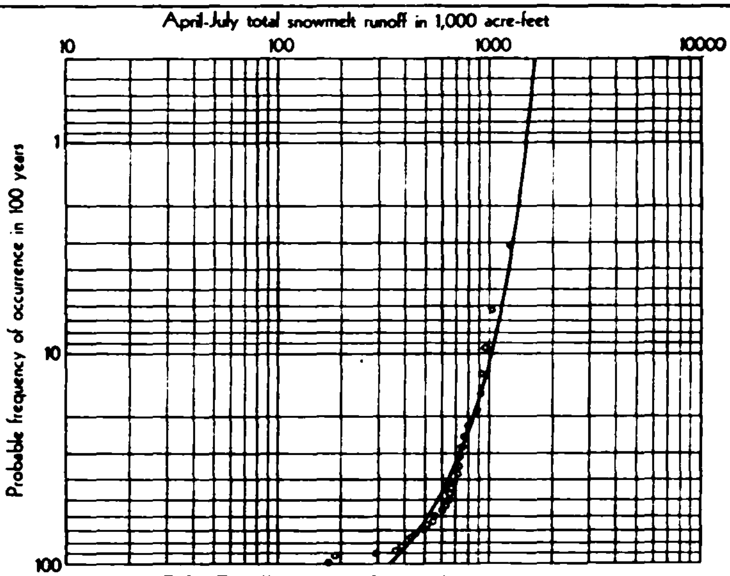
AT PIEDRA

AREA OF DRAINAGE BASIN 1694 SQUARE MILES

PLATE 80

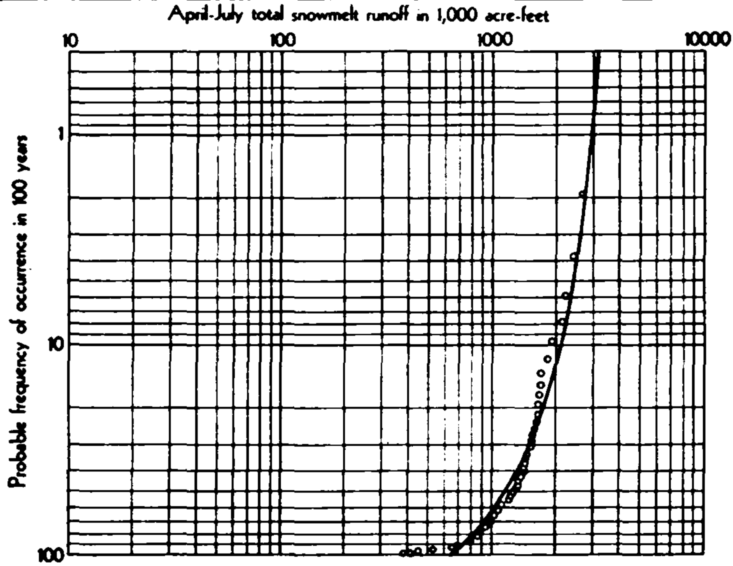


SAN JOAQUIN RIVER SNOWMELT RUNOFF
NEAR FRIANT
AREA OF DRAINAGE BASIN 1650 SQUARE MILES

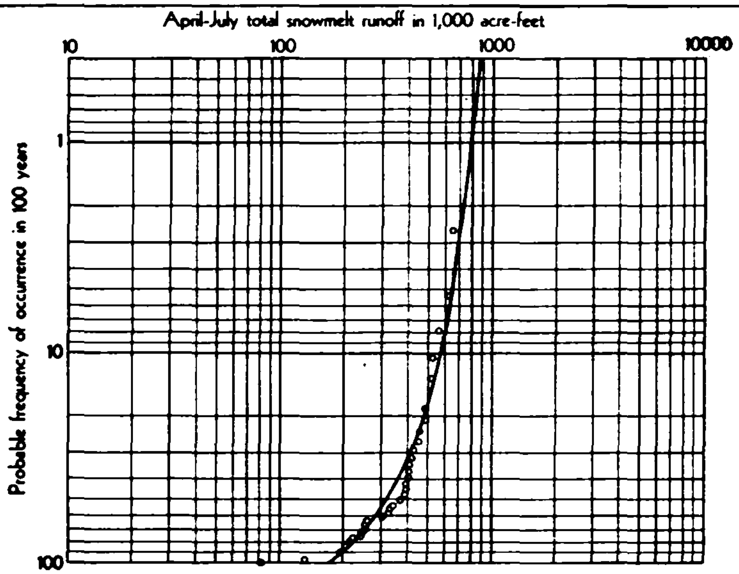


MERCED RIVER SNOWMELT RUNOFF
AT EXCHEQUER
AREA OF DRAINAGE BASIN 1035 SQUARE MILES

PLATE 81

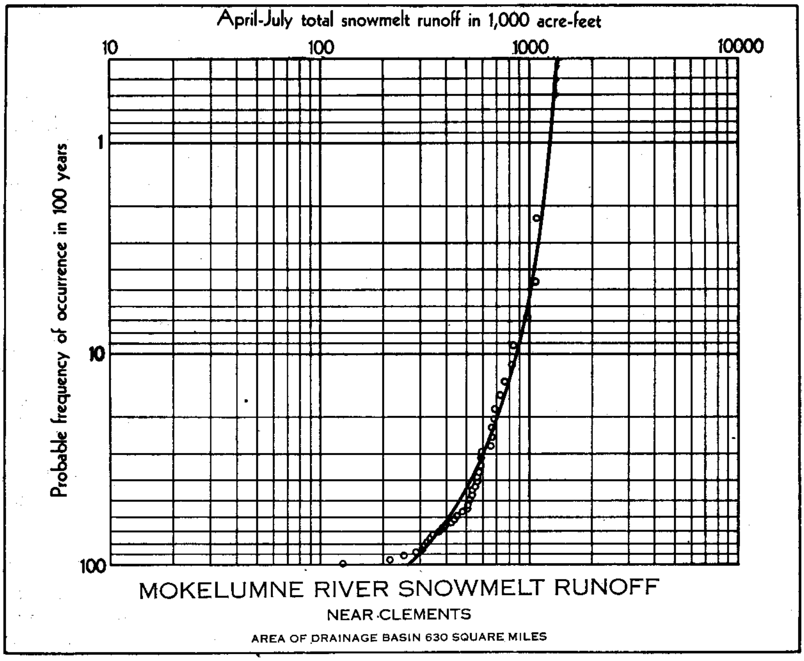


TUOLUMNE RIVER SNOWMELT RUNOFF
ABOVE LA GRANGE DAM. NEAR LA GRANGE
AREA OF DRAINAGE BASIN 1540 SQUARE MILES



STANISLAUS RIVER SNOWMELT RUNOFF
BELOW MELONES POWER HOUSE
AREA OF DRAINAGE BASIN 898 SQUARE MILES

PLATE 82



QUALITY OF WATER

The amount of mineral solubles in surface flow of streams of the Central Valley Area varies widely with regimen of the streams. Also, there generally is a gradual increment in mineral solubles during the course of flow from the foothills across the valley floor. Ground waters which receive their replenishment wholly or largely from the surface streams naturally reflect these changes. However, concentration of salts is generally lower in the northern and northeastern portions of the Central Valley Area than in the southern portion, owing to dilution from heavier rainfall and runoff.

From the point of view of their inorganic chemical characteristics, both surface and underground waters of the Central Valley Area may be divided areally into "east side," "west side," and "axial."

Surface Waters

Inorganic analyses of surface waters in the Central Valley Area appear in Table 63. Water in streams that flow from the Sierra Nevada is generally of excellent quality at the eastern edge of the valley floor, and suitable for any purpose without treatment, except that bacterial sterilization is usually necessary for domestic use. Water in streams from the Cascade and Klamath Mountains, tributary to the Sacramento Valley at the north, is of similar high quality. This is also true of the water of Stony Creek, which flows from an extension of the Klamath Mountains. All the foregoing waters are in the "east-side" quality classification, which is uniformly calcic-carbonate in type. Total mineral solubles are generally less than 100 parts per million, and the waters are susceptible of softening by standard treatment.

The "west-side" quality classification includes inflow of all streams 'om the coastal ranges south of Stony Creek, and from the San Emigdio ıd Tehachapi Mountains at the southern end of the San Joaquin Valley. he two largest of these streams are Cache and Putah Creeks, both ibutary to the Sacramento Valley west of Sacramento. Average con- ntration of salts in these two streams is three to four times that in ajor streams of the Central Valley Area. Their waters are both of the ırbonate type, although magnesium displaces calcium as the dominant ıse. Significant amounts of boron are contained in waters of Clear Lake ıd Cache Creek.

A number of creeks are tributary to the valley floor from the west de of the San Joaquin Valley. The more important of these are restimba, San Luis, Los Banos, Little Panoche, Big Panoche, Cantua, ıd Los Gatos Creeks. San Emigdio and Grapevine Creeks enter the valley om the south, and Caliente Creek from the east, all south of Bakers- ɜld. These streams are short, and except at flood times their waters ɜrcolate into alluvial cones before reaching the axis of the valley. While ıe combined flow of these streams is small, it is important because of the ·latively high amount of dissolved mineral matter contained, including gnificant concentrations of boron. These waters are of the sulphate 'pe, in contrast with the uniformly carbonate east-side waters.

"Axial" waters occur in the trough of the Central Valley and are mixture of east-side and west-side waters. Surface inflow from east-side ibutaries is generally so large that the effect of inferior quality west- de waters is obscured in the mixture. However, the effect of west-side 'ainage is noticeable much of the time in San Joaquin River between endota Pool and the Sacramento-San Joaquin Delta. Chloride and lphate content is generally greater than bicarbonate content in the ach between Mendota Pool and the confluence of Tuolumne River ıd the San Joaquin. Inflow of carbonate waters of Tuolumne and anislaus Rivers changes the mixture first to chlorides, then to bicar- ›nates, and finally in the flow past Vernalis to sulphates.

'ound Waters

Inorganic analyses of representative ground waters of the Central alley Area are given in Table 64.

Percolation from streams is the principal source of replenishment east-side ground waters, but north of Stockton precipitation directly ı the valley floor is also an important source of recharge.

Waters much alike in total mineral content and composition are nerally yielded by wells less than 1,100 feet deep on both sides of the ɜntral Valley north of Sutter Buttes, and on the east side, as far south , but not including, Kern County. These are the best underground ıters in the valley, being usually acceptable for all purposes. They be- ng almost exclusively to the calcic-carbonate type, and are more nearly ıiform in quality than ground waters in any other part of the valley. ›wer concentration of salts in the heavier rainfall belt north of the ıtter Buttes is appreciable. East-side wells of depths greater than 1,100 et often yield highly mineralized waters.

The west-side ground water basins of Cache and Putah Creeks in e Sacramento Valley contain magnesium-carbonate type waters, and eir sodium content is generally somewhat higher than their calcium content. Boron is also present in significant amounts in ground waters of Cache Creek Basin.

West-side ground waters in the San Joaquin Valley are characterized by high percentage of sulphate and abnormal amounts of boron, often in toxic concentrations. Nearly all have a brackish taste and many are unpalatable. The predominating sulphate radical usually has a concentration below the upper limit of safe use for irrigation. The usable zone of pumping on the west side of the San Joaquin Valley from Mendota to Buttonwillow is generally found between overlying unusable perched water, underlying brines, and a more or less effective impervious stratum in the trough of the valley, commonly known as the Mendenhall Dike.

Calcium and magnesium are dominant bases in both east-side and west-side ground waters. These bases are generally subordinated by sodium toward the trough of the valley, from Sutter Basin south to Buena Vista Lake. Chloride is often the principal acid radical in axial ground waters, although bicarbonate concentrations remain high. In the trough of the San Joaquin Valley, ground waters between depths of about 300 feet and about 1,000 feet generally are lower in mineral content than are shallow waters. Axial ground waters are characterized by diverse composition and concentration of salts.

GROUND WATER STORAGE CAPACITY OF SACRAMENTO VALLEY

For some years the State of California has cooperated with the United States Geological Survey in ground water investigations, and the results have been published in numerous reports of the Geological Survey. A summary of a recent unpublished report entitled "Ground-Water Storage Capacity of the Sacramento Valley, California," by J. F. Poland and others, dated November 1949, appears in this bulletin as Appendix D.

TABLE 63

INORGANIC ANALYSES OF SURFACE WATERS, CENTRAL VALLEY A[illegible]

Source and place of sampling	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reacti[illegible] values of constituents in me/l and [illegible]haracter formula in percent						
					Ca	M[illegible]	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
East-side Streams:											
Stony Creek at North Diversion	3/10/47	45.6	------	------	------	--	------	1.61 *35%*	0.42 *9%*	0.25 *6%*	----- -----
Sacramento River 400 feet below Shasta Dam	5/ 9/49	13.3	------	28	0.55 *20%*	0[illegible] *1[illegible]*	0.40 *14%*	1.16 *44%*	0.08 *3%*	0.09 *3%*	Trace -----
Feather River near Oroville	8/ 4/48	9.7	------	22	0.50 *23%*	0[illegible] *1[illegible]*	0.24 *11%*	0.97 *46%*	0.04 *2%*	0.04 *2%*	----- -----
Yuba River near Smartville	5/ 8/30	9.6	0.10	52	0.40 *24%*	-- --	0.43 *26%*	0.59 *31%*	0.06 *3%*	0.31 *16%*	Trace -----
Dry Creek at Camp Beale	3/21/49	16.4	------	20	0.71 *18%*	0[illegible] *2[illegible]*	0.40 *10%*	1.37 *38%*	0.13 *3%*	0.31 *9%*	Trace -----
American River at Fair Oaks	6/28/48	3.6	------	26	0.15 *24%*	0[illegible] *1[illegible]*	0.09 *13%*	0.30 *41%*	0.02 *4%*	0.04 *5%*	----- -----
Cosumnes River at McConnell Station	4/30/48	6.3	------	22	0.27 *22%*	0[illegible] *1[illegible]*	0.14 *11%*	0.52 *41%*	0.03 *3%*	0.08 *6%*	Trace -----
Dry Creek at Forni Ranch	3/21/49	18.5	------	22	0.92 *20%*	0[illegible] *1[illegible]*	0.49 *11%*	1.39 *32%*	0.13 *3%*	0.62 *15%*	Trace -----
Mokelumne River at Woodbridge	4/30/48	4.7	------	30	0.23 *24%*	0[illegible] *1[illegible]*	0.14 *15%*	0.33 *35%*	0.06 *6%*	0.08 *9%*	Trace -----

Calaveras River at Stockton	3/21/49	13.4	0.02	24	0.59 *20%*	0. *18*	0.36 *12%*	1.06 *40%*	0.08 *3%*	0.20 *7%*	---- ----
Stanislaus River at Bret Harte Pump	5/25/49	11.3	0.12	22	0.55 *23%*	0. *16*	0.27 *11%*	0.98 *43%*	0.04 *2%*	0.09 *4%*	0.02 *1%*
Fresno River near Knowles	5/13/30	9.8		62	0.35 *19%*	--- ---	0.57 *31%*	0.64 *33%*	0.28 *14%*	0.04 *2%*	0.02 *1%*
San Joaquin River below Friant Dam	5/21/48	4.9		42	0.15 *16%*	0. *13*	0.21 *21%*	0.29 *34%*	0.05 *5%*	0.09 *11%*	------ ------
San Joaquin River at Mendota Pool	10/18/48	24.5		48	0.20 *25%*	0. *1*	0.19 *24%*	0.31 *32%*	0.13 *14%*	0.04 *3%*	0.01 *1%*
San Joaquin River near Vernalis	6/25/30	11.3		42	0.38 *16%*	0. *13*	0.49 *21%*	0.61 *27%*	0.39 *17%*	0.13 *6%*	------ ------
San Joaquin River at Banta Carbona Irrigation District Diversion	5/28/48	9.9		44	0.35 *17%*	0. *11*	0.43 *22%*	0.49 *25%*	0.33 *17%*	0.17 *8%*	------ ------
Kings River at Highway 99	4/26/48	41.0		36	0.24 *25%*	0. *7*	0.17 *18%*	0.41 *42%*	0.03 *3%*	0.05 *5%*	------ ------
Kaweah River at McKays Point	4/28/48	4.9		30	0.31 *29%*	0. *6*	0.15 *15%*	0.42 *43%*	0.02 *2%*	0.04 *4%*	0.01 *1%*
Tule River at Worth Bridge	6/15/48	21.6		30	1.25 *28%*	0. *7*	0.65 *15%*	1.96 *44%*	0.10 *3%*	0.10 *3%*	------ ------
White River above Ducor	2/21/49	39		38	1.55 *20%*	0. *11*	1.52 *19%*	2.87 *36%*	0.59 *7%*	0.56 *7%*	------ ------
Kern River in Sec. 6, T29S, R30E, MDB&M	6/ 3/48	8.3	0.10	36	0.47 *26%*	0. *6*	0.33 *18%*	0.72 *41%*	0.06 *4%*	0.09 *5%*	------ ------

TABLE 63—Continued

INORGANIC ANALYSES OF SURFACE WATERS, CENTRAL VALLEY A[illegible]

Source and place of sampling	Date	Conductance ($K \times 10^6$)	Boron, ppm	Percent sodium	Reacti[illegible] values of constituents in me/l and [illegible]haracter formula in percent							
					Ca	1		Na	CO_3+ HCO_3	Cl	SO_4	NO_3
West-side Streams:												
Cache Creek near Capay	3/18/39	37.5	4.13	24	1.26 *15%*	1 *2*	) ,	0.97 *12%*	2.76 *36%*	0.72 *10%*	0.24 *3%*	0.03 *1%*
Cache Creek near Capay	11/ 1/48	79.5	2.50	30	2.25 *13%*	3 *1*	2 ,	3.00 *18%*	4.76 *30%*	2.59 *16%*	0.60 *4%*	------ ------
Putah Creek near Winters	3/31/48	37.2	-------	12	0.80 *11%*	2 *3*	5 ,	0.48 *6%*	3.11 *42%*	0.20 *3%*	0.40 *5%*	0.01 ------
Putah Creek near Winters	10/ 1/48	77.5	-------	18	0.16 *1%*	4 *4*	2 ,	1.14 *9%*	6.25 *40%*	0.73 *5%*	0.79 *5%*	------ ------
San Luis Creek at Pacheco Pass	5/23/30	99.7	0.55	46	2.51 *13%*	2 *1*	) ,	4.59 *23%*	4.60 *23%*	4.15 *21%*	1.14 *6%*	------ ------
Los Banos Creek in Sec. 9, T10S, R10E., MDB&M	3/22/49	20	-------	46	0.75 *19%*	0	5 ,	0.92 *23%*	0.69 *18%*	0.31 *8%*	0.92 *24%*	Trace ------
Little Panoche Creek in SE ¼ Sec. 19, T13S, R11E., MDB&M	5/22/30	659	18.6	58	13.89 *11%*	12 *1*	) ,	39.97 *29%*	5.45 *4%*	50.95 *39%*	9.46 *7%*	------ ------
Panoche Creek in W ½ Sec. 27, T15S, R11E., MDB&M	5/22/30	279	4.89	50	7.11 *11%*	9 *1*	3 ,	15.83 *25%*	5.20 *8%*	4.85 *8%*	22.25 *34%*	------ ------

ian Emigdio Creek in SW ¼ Sec. 36, T11N, R22W, SBB&M	4/27/30	192	0.93	14	11.00	7.92	.26	4.95	1.50	15.73	......
					25%	*18%*	*7%*	*11%*	*3%*	*36%*	......
irapevine Creek in Sec. 20, T10N, R19W, SBB&M	2/16/49	120	....	42	3.40	4.59	.66	7.87	1.47	4.37	......
					12%	*17%*	*1%*	*29%*	*5%*	*16%*	......
l Paso Creek in Sec. 30, T11N, R17W, SBB&M	2/16/49	45	....	14	2.85	1.39	.70	3.77	0.31	0.98	......
					29%	*14%*	*7%*	*37%*	*3%*	*10%*	......
ial Streams:											
Honcut Creek at La Porte Road	3/15/49	12.4	....	26	0.43	0.62	.36	1.08	0.12	0.15	Trace
					15%	*22%*	*13%*	*40%*	*4%*	*6%*	......
Feather River at Rednal Road	3/14/49	9.90	....	24	0.39	0.47	.27	0.91	0.06	0.09	Trace
					17%	*21%*	*12%*	*42%*	*3%*	*5%*	......
Feather River at Nicolaus	3/14/49	9.18	....	30	0.43	0.46	.40	0.77	0.03	0.20	0.09
					17%	*18%*	*15%*	*35%*	*2%*	*9%*	*4%*
Coon Creek at Highway 99	3/14/49	17.5	....	18	0.70	0.93	.36	1.51	0.16	0.32	0.06
					18%	*23%*	*9%*	*38%*	*4%*	*7%*	*1%*
Auburn Ravine at Highway 99	3/14/49	14.3	....	24	0.54	0.69	.39	1.04	0.16	0.28	0.10
					17%	*21%*	*12%*	*33%*	*5%*	*9%*	*3%*
iacramento River at Junction Point (near Rio Vista)	4/ 2/48	15.9	....	28	0.55	0.60	.45	1.05	0.19	0.33	0.02
					17%	*19%*	*14%*	*33%*	*6%*	*10%*	*1%*
ian Joaquin River at Mossdale Bridge	5/28/48	10.2	....	40	0.34	0.23	.40	0.52	0.30	0.15	0.05
					18%	*12%*	*20%*	*25%*	*15%*	*7%*	*3%*
ian Joaquin River at El Solyo Pumps	5/28/48	17.0	....	48	0.55	0.36	.83	0.67	0.76	0.27	......
					16%	*10%*	*24%*	*20%*	*22%*	*8%*	......
ian Joaquin River at West Stanislaus Irrigation District Diversion	5/27/48	57.5	....	52	1.45	1.22	.09	1.96	2.30	1.45	0.04
					13%	*11%*	*26%*	*17%*	*20%*	*12%*	*1%*

TABLE 63—Continued

INORGANIC ANALYSES OF SURFACE WATERS, CENTRAL VALLEY ARI

Source and place of sampling	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reactin 'alues of constituents in me/l and ıracter formula in percent						
					Ca	M	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
Axial Streams—Continued											
San Joaquin River at Patterson Water Co. Intake	7/29/48	76.2	...	60	1.70	1.'	4.43	2.13	3.66	1.75	0.08
					12%	*8'*	*30%*	*14%*	*24%*	*11%*	*1%*
San Joaquin River below mouth of Merced River	7/28/48	65.5	...	66	1.40	0.'	4.22	1.80	3.09	1.58	0.08
					11%	*6'*	*33%*	*14%*	*23%*	*12%*	*1%*
San Joaquin River above mouth of Merced River	7/28/48	119.8	...	64	2.10	2.(	7.39	1.96	6.47	3.54	0.01
					9%	*9'*	*32%*	*8%*	*26%*	*15%*	*1%*
San Joaquin River at Fremont Ford	8/24/48	48.3	...	60	1.06	0.!	2.82	1.96	2.00	0.85	0.02
					11%	*9*	*30%*	*20%*	*21%*	*8%*	*1%*

TABLE 64

INORGANIC ANALYSES OF GROUND WATERS, CENTRAL VALLEY IA

Source and location (All section designations refer to Mt. Diablo base line and meridian)	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reac g values of constituents in me/l and character formula in percent						
					Ca	g	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
East Side Wells											
USBR Well A in Sec. 2, T23N, R3W	8/13/48			24	1.10	06	0.65	2.67	0.11	0.16	......
					20%	%	*12%*	*45%*	*2%*	*3%*	......
USGS Well A-16 in City of Marysville	1923	.....	....	20	2.15	39	0.87	2.74	1.15	0.33	......
					24%	%	*10%*	*32%*	*14%*	*4%*	......
USGS Well A-23 in NE¼ Sec. 10, T14N, R4E	1923	....	...	16	1.40	32	0.40	1.69	0.70	0.17	Trace
					27%	%	*8%*	*33%*	*14%*	*3%*	......
USGS Well A-34 in NW¼ Sec. 34, T11N, R6E	1923	....	.....	24	1.50	07	0.82	2.92	0.37	0.04	0.05
					28%	%	*12%*	*43%*	*5%*	*1%*	*1%*
USDA Well in S½ Sec. 35, T3N, R7E	7/ 9/49	32.4	0.06	14	1.38	35	0.47	2.70	0.20	0.26	......
					22%	%	*7%*	*43%*	*3%*	*4%*	......
USDA Well in SE¼ Sec. 15, T2N, R8E	7/10/31	25.2	0.06	20	1.22	93	0.54	2.45	0.10	0.09	......
					23%	%	*10%*	*46%*	*2%*	*2%*	......
USDA Well in SE¼ Sec. 16, T1N, R9E	7/10/31	20.0	0.04	26	0.76	71	0.51	1.50	0.25	0.06	......
					19%	%	*13%*	*41%*	*7%*	*2%*	......
Escalon Municipal Well in Sec. 4, T2S, R9E	7/10/31	44.0	0.08	26	1.88	32	1.39	3.60	0.40	0.35	......
					19%	%	*13%*	*41%*	*7%*	*2%*	......
Turlock Municipal Well in Sec. 14, T5S, R10E	7/ 7/31	44.9	0.13	22	2.34	26	1.03	3.55	0.40	0.29	......
					25%	%	*11%*	*40%*	*6%*	*4%*	......

TABLE 64—Continued

INORGANIC ANALYSES OF GROUND WATERS, CENTRAL VALLEY AI \

Source and location (All section designations refer to Mt. Diablo base line and meridian)	Date	Conductance (K x 10[6])	Boron, ppm	Percent sodium	Reacti values of constituents in me/l and haracter formula in percent							
					Ca	I		Na	CO_3+ HCO_3	Cl	SO_4	NO_3
East Side Wells—Continued												
USDA Well in NW¼ Sec. 6, T8S, R16E	2/27/33	28.5	0.02	30	1.09 *18%*	1 *1'*	[illegible]	0.86 *15%*	2.10 *38%*	0.48 *9%*	0.11 *3%*	....
USBR Well in Sec. 14, T9S, R15E	12/22/47	22.0	....	32	1.10 *21%*	0 *1*	[illegible]	0.78 *16%*	1.96 *35%*	0.76 *14%*	0.03 *1%*	....
USDA Well in Sec. 30, T9S, R16E (Chowchilla Municipal Well)	7/ 7/31	25.1	0.05	28	1.25 *24%*	0 *1.*	[illegible]	0.72 *14%*	1.95 *38%*	0.55 *11%*	0.07 *1%*	....
USBR Well A in Sec. 8, T11S, R19E	3/ 3/48	46.0	0.20	38	1.65 *19%*	1 *1.*	[illegible]	1.65 *19%*	2.83 *33%*	0.42 *5%*	0.93 *11%*	0.07 *1%*
Fowler Municipal Well in Sec. 15, T15S, R21E	7/ 7/31	24.0	0.08	36	1.01 *23%*	0	[illegible]	0.78 *18%*	1.45 *35%*	0.55 *13%*	0.06 *2%*	....
Goshen Junction Well in Sec. 18, T18S, R24E	7/ 7/31	20.1	0.12	38	0.82 *26%*	0	[illegible]	0.58 *19%*	1.38 *43%*	0.20 *6%*	0.02 *1%*	....
USBR Well in Sec. 11, T22S, R27E	5/ 3/48	36.0	....	32	1.55 *19%*	1 *1*	[illegible]	1.35 *16%*	3.44 *42%*	0.34 *3%*	0.22 *4%*	0.05 *1%*
USBR Well A in Sec. 3, T23S, R26E	9/20/48	26.0	....	30	1.55 *26%*	0	[illegible]	0.91 *15%*	2.29 *40%*	0.23 *4%*	0.27 *5%*	0.05 *1%*

West Side Wells											
USDA Well in Sec. 15, T8N, R2E	5/ 5/30	79	0.59	26	1.52	16	2.17	7.00	0.90	0.95	......
					8%	%	13%	40%	5%	5%	......
USDA Well in Sec. 22, T8N, R1W	5/ 5/30	56	0.37	12	1.94	29	0.72	5.00	0.45	0.50	......
					16%	%	6%	41%	4%	5%	......
USGS Well A-53 near Madison, T10N, R1W	1923	....	....	16	2.20	70	1.00	4.31	0.44	1.21	0.04
					19%	%	8%	36%	3%	10%	1%
USDA Well in Sec. 5, T10N, R2E	5/ 5/30	78	2.03	28	2.50	33	2.42	6.35	1.35	1.05	......
					14%	%	14%	36%	8%	6%	......
USDA Well in Sec. 18, T10N, R2E	5/ 5/30	49	1.38		88	17	1.48	3.85	0.95	0.73	......
					'%	%	13%	35%	8%	7%	......
USDA Well in Sec. 23, T10N, R1E	5/ 5/30	69	1.72	22	2.36	08	1.57	4.55	1.80	0.66	......
					17%	%	11%	33%	13%	4%	......
USDA Well in Sec. 24, T10N, R1E	5/ 5/30	62	1.75	30	1.96	33	2.01	4.25	1.55	0.70	......
					15%	%	15%	33%	12%	5%	......
USDA Well in Sec. 31, T10N, R1E	5/ 5/30	87	1.65	20	3.44	37	1.71	5.15	2.50	1.17	......
					19%	%	10%	29%	14%	7%	......
USBR Well B in Sec. 26, T5S, R7E	9/22/48	320	3.40	68	6.00	08	24.12	4.09	12.95	17.08	......
					8%	%	34%	6%	19%	25%	......
USBR Well in Sec. 7, T6S, R8E	2/26/48	200	0.80	44	5.75	13	9.82	3.65	1.77	16.55	0.40
					12%	%	22%	8%	4%	37%	1%
USDA Well in SW Cor. Sec. 23, T11S, R10E	6/23/30	241	2.06	66	3.97	14	15.33	3.25	8.80	11.19	......
					9%	%	33%	7%	19%	24%	......
USBR Well in Sec. 20, T12S, R12E	5/25/48	140	2.20	82	1.40	22	11.87	3.44	1.83	9.16	0.02
					5%	%	41%	12%	6%	32%	......
USBR Well in Sec. 8, T14S, R13E	9/15/48	180	....	92	1.05	24	15.82	2.62	2.81	12.70	......
					3%	%	46%	7%	8%	35%	......

TABLE 64—Continued

INORGANIC ANALYSES OF GROUND WATERS, CENTRAL VALLEY AI

Source and location (All section designations refer to Mt. Diablo base line and meridian)	Date	Conductance ($K \times 10^6$)	Boron, ppm	Percent sodium	Reactin		values of constituents in me/l and aracter formula in percent				
					Ca	M	Na	CO_3+HCO_3	Cl	SO_4	NO_3
West Side Wells—Continued											
JSBR Well in Sec. 3, T15S, R14E	1946	150	....	60	4.35	2.	10.00	1.96	1.01	12.70	0.02
					13%	*7*	*30%*	*7%*	*3%*	*40%*	......
USDA Well in SE¼ Sec. 14, T15S, R14E	6/21/30	127	1.18	76	2.48	0.	9.33	2.70	2.00	7.69	......
					10%	*2*	*38%*	*11%*	*8%*	*31%*	......
Tranquillity Municipal Well in Sec. 5, T15S, R16E	9/26/29	118	0.93	90	1.05	0.	9.62	1.90	1.30	7.50	......
					5%	Tr	*45%*	*9%*	*6%*	*35%*	......
USBR Well in Sec. 23, T16S, R15E	7/27/48	180		28	5.00	9.	5.69	3.11	3.09	13.74	0.05
					12%	*24*	*14%*	*8%*	*8%*	*34%*	......
USDA Well in SW Cor. Sec. 33, T17S, R17E	5/21/30	254	2.03	66	5.30	3.	17.59	2.85	5.00	18.88	......
					10%	*7*	*33%*	*5%*	*9%*	*36%*	......
USBR Well A in Sec. 29, T18S, R17E	5/26/48	160	..	52	3.75	4.	9.13	1.63	2.50	13.12	0.03
					11%	*13*	*26%*	*5%*	*7%*	*38%*	......
Coalinga Municipal Well in Sec. 32, T20S, R15E	9/25/29	98.4	0.95	84	1.47	Tr	7.84	1.10	0.90	7.31	......
					8%	...	*42%*	*6%*	*5%*	*39%*	......
USDA Well in SW Cor. Sec. 14, T21S, R18E	9/25/29	93	0.38	72	2.19	0.	6.47	1.50	1.20	6.34	......
					12%	*2*	*36%*	*8%*	*7%*	*35%*	......
USDA Well in Center Sec. 9, T22S, R16E	5/20/30	235	0.66	40	7.95	8.	11.30	6.80	1.40	19.75	......
					14%	*10*	*20%*	*12%*	*2%*	*36%*	......

USBR Well in Sec. 33, T24S, R18E	7/ 2/48	140	1.70	42	3.15 *10%*	6. *19*	6.52 *21%*	5.09 *16%*	1.63 *6%*	8.33 *27%*	0.25 *1%*
USBR Well in Sec. 18, T26S, R18E	4/ 8/48	160	1.40	54	2.75 *7%*	6. *16*	10.00 *27%*	4.09 *11%*	3.28 *9%*	11.24 *29%*	0.16 *1%*
USBR Well in Sec. 2, T30S, R23E	6/ 9/48	500	7.30	84	6.50 *7%*	0. *1*	40.00 *42%*	1.40 *2%*	33.80 *35%*	12.28 *13%*	------ ------
USBR Well E in Sec. 7, T30S, R30E	1/ 8/48	63.0	2.30	66	1.90 *16%*	0. *1*	3.96 *33%*	2.29 *18%*	1.09 *9%*	2.70 *22%*	0.14 *1%*
Axial Wells											
USDA Well in NW ¼ Sec. 28, T27N, R3W	10/ 8/35	48.0	0.14	16	2.05 *20%*	2. *22*	0.69 *8%*	3.07 *30%*	0.91 *9%*	0.81 *8%*	0.36 *3%*
USBR Well in Sec. 36, T26N, R3W	7/30/47			12	1.50 *19%*	2. *25*	0.45 *6%*	3.41 *43%*	0.34 *4%*	0.24 *3%*	------ ------
USBR Well A in Sec. 24, T23N, R3W	8/13/48	--		28	0.85 *17%*	0. *19*	0.74 *14%*	2.34 *44%*	0.25 *4%*	0.10 *2%*	---- ----
USBR Well in Sec. 3, T21N, R1E	7/ 9/48		--	16	1.00 *19%*	1. *23*	0.43 *8%*	2.39 *45%*	0.19 *4%*	0.06 *1%*	------ ------
USBR Well in Sec. 17, T20N, R2E	7/25/47			6	0.90 *17%*	1. *30*	0.14 *3%*	2.30 *44%*	0.10 *2%*	0.19 *4%*	------ ------
USGS Well A-28 in SE ¼ Sec. 5, T14N, R4E	1923	--		20	1.70 *19%*	1. *21*	0.91 *10%*	3.87 *43%*	0.51 *6%*	0.12 *1%*	------ ------
USGS Well A-31 in NW ¼ Sec. 11, T12N, R5E	1923	------	-	8	1.35 *23%*	1. *23*	0.24 *4%*	2.11 *36%*	0.50 *9%*	0.18 *3%*	0.10 *2%*
USGS Well A-33 in SE ¼ Sec. 35, T11N, R4E	1923	-------	-----	60	1.15 *17%*	0. *3*	1.96 *30%*	2.43 *37%*	0.65 *10%*	0.20 *3%*	------ ------

TABLE 64—Continued

INORGANIC ANALYSES OF GROUND WATERS, CENTRAL VALLEY AI

Source and location (All section designations refer to Mt. Diablo base line and meridian)	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reacti values of constituents in me/l and aracter formula in percent						
					Ca	M	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
Axial Wells—Continued											
USGS Well A-62 in Sec. 12, T8N, R4E	1923	-------	-------	22	1.00 *20%*	0. *18*	0.57 *11%*	1.67 *33%*	0.29 *6%*	0.51 *10%*	0.06 *1%*
USGS Well A-63 in Sec. 31, T7N, R6E	1923	-------	-------	28	1.05 *17%*	1. *18*	0.87 *14%*	2.39 *39%*	0.38 *6%*	0.20 *4%*	0.05 *1%*
Brentwood Municipal Well in Sec. 18, T1N, R3E	6/24/30	92.1	1.12	42	3.04 *16%*	2. *15*	3.98 *21%*	4.60 *25%*	2.20 *12%*	2.56 *13%*	------ ------
USDA Well in Sec. 35, T1N, R6E	7/ 8/31	72.0	0.38	52	2.14 *15%*	1. *8*	3.60 *26%*	3.00 *21%*	3.90 *28%*	0.06 *1%*	------ ------
Tracy Municipal Well in Sec. 28, T2S, R5E	6/24/30	68	1.12	44	2.45 *18%*	1. *10*	2.96 *22%*	3.05 *22%*	1.30 *10%*	2.45 *18%*	------ ------
USBR Well G in Sec. 10, T2S, R6E	1/26/48	-------	-------	66	2.00 *13%*	0. *4*	5.26 *33%*	2.80 *18%*	4.78 *30%*	0.35 *2%*	------ ------
Ripon Municipal Well in Sec. 30, T2S, R8E	7/ 7/31	43.8	0.15	40	1.67 *20%*	0. *10*	1.66 *20%*	2.65 *37%*	0.70 *10%*	0.18 *3%*	------ ------
Modesto Municipal Well in Sec. 28, T3S, R9E	7/ 7/31	36.0	0.14	32	1.52 *23%*	0. *11*	1.05 *16%*	2.20 *34%*	1.00 *15%*	0.02 *1%*	------ ------
USBR Well B in Sec. 28, T4S, R8E	4/21/48	110	-------	88	1.00 *4%*	0. *2*	10.99 *44%*	10.98 *43%*	1.66 *6%*	0.24 *1%*	0.07 ------

USBR Well F in Sec. 30, T4S, R8E	6/25/48	210	--------	54	0.70 *16%*	0.3 *7*	1.21 *27%*	1.03 *23%*	1.01 *23%*	0.13 *3%*	0.03 *1%*
USDA Well in W ½ Sec. 19, T5S, R8E	5/23/30	80.7	0.47	38	1.69 *11%*	3.0 *20*	2.77 *19%*	2.70 *18%*	2.70 *18%*	2.10 *14%*	------ ------
Emerald Station Well in Sec. 31, T5S, R8E	5/23/30	73.4	0.47	38	1.81 *13%*	2.6 *18*	2.74 *19%*	3.20 *22%*	0.45 *3%*	3.51 *25%*	------ ------
USBR Well B in Sec. 20, T5S, R9E	4/22/48	240	--------	94	1.00 *2%*	0.4 *1*	25.00 *47%*	18.03 *33%*	9.01 *16%*	0.41 *1%*	0.02 ------
USBR Well in Sec. 3, T6S, R9E	11/25/47	76	--------	58	2.65 *16%*	0.8 *5*	4.78 *29%*	3.76 *25%*	3.38 *23%*	0.13 *1%*	0.06 *1%*
USDA Well in NE ¼ Sec. 25, T6S, R11E	5/24/32	27.0	0.05	56	0.72 *13%*	0.5 *9*	1.46 *28%*	1.85 *41%*	0.25 *6%*	0.14 *3%*	------ ------
USDA Well in NW Cor. Sec. 2, T7S, R10E	6/23/30	440	0.70	72	9.30 *12%*	2.0 *2*	29.13 *36%*	1.50 *2%*	37.50 *46%*	1.48 *2%*	------ ------
USBR Well in Sec. 3, T8S, R9E	11/28/47	150	1.20	54	3.50 *13%*	2.7 *10*	7.39 *27%*	2.62 *10%*	6.19 *24%*	3.95 *15%*	0.03 *1%*
Gustine Municipal Well in Sec. 8, T8S, R9E	10/ 8/29	68.0	0.46	40	2.50 *18%*	1.0 *12*	2.84 *20%*	3.55 *25%*	1.05 *8%*	2.41 *17%*	------ ------
USBR Well D in Sec. 36, T8S, R11E	8/26/48	140	--------	74	2.30 *9%*	1.0 *4*	9.56 *37%*	2.78 *10%*	8.45 *32%*	1.96 *8%*	------ ------
USBR Well in Sec. 4, T9S, R12E	4/26/48	210	--------	32	6.50 *15%*	8.1 *19*	6.60 *16%*	3.44 *8%*	14.93 *36%*	2.49 *6%*	Trace ------
Drainage Well in SE Cor. Sec. 4, T10S, R12E	6/10/30	117	0.14	38	3.73 *17%*	2.9 *14*	4.13 *19%*	1.40 *7%*	8.40 *39%*	0.98 *4%*	------ ------
USBR Well in Sec. 19, T10S, R12E	1/23/48	108	--------	40	3.20 *15%*	3.1 *15*	4.21 *20%*	3.76 *18%*	5.35 *26%*	1.33 *6%*	------ ------

TABLE 64—Continued

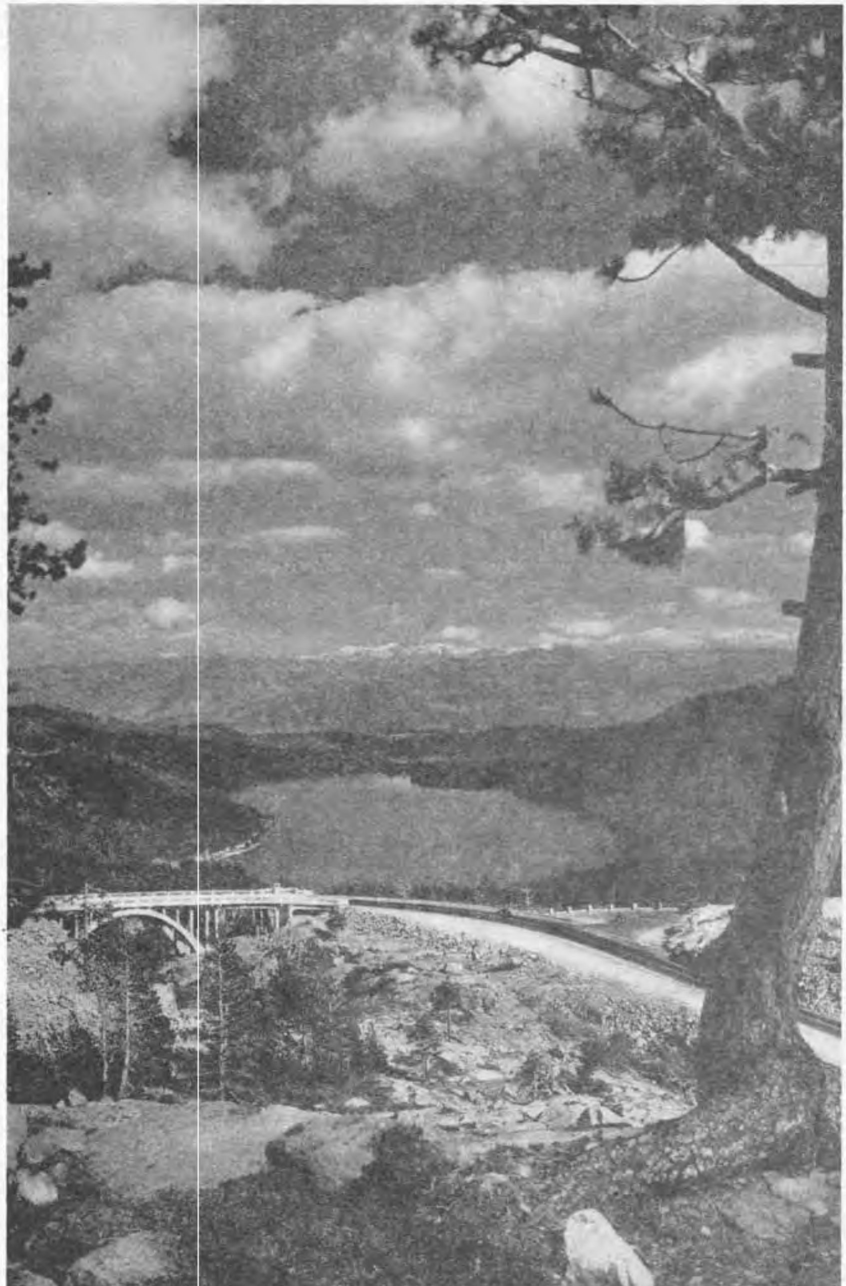
INORGANIC ANALYSES OF GROUND WATERS, CENTRAL VALLEY AR

Source and location (All section designations refer to Mt. Diablo base line and meridian)	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reactir		values of constituents in me/l and aracter formula in percent				
					Ca	M	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
Axial Wells—Continued											
USDA Well in Sec. 6, T11S, R13E	5/22/30	71.9	0.15	58	2.37 *18%*	0. *3*	3.95 *29%*	1.80 *13%*	4.40 *33%*	0.54 *4%*	----
USDA Well in NE ¼ Sec. 11, T11S, R12E	5/22/30	252	0.18	24	11.46 *22%*		6.18 *12%*	1.40 *3%*	22.25 *43%*	1.93 *4%*	----
Fresno Municipal Well in Sec. 4, T14S, R20E	6/22/30	13.5	Trace	22	0.48 *18%*		0.30 *11%*	1.10 *41%*	0.10 *4%*	0.13 *5%*	----
USBR Well A in Sec. 15, T18S, R23E	12/19/47	28.0	----	32	2.10 *20%*		1.36 *10%*	2.29 *27%*	1.35 *16%*	0.48 *6%*	0.02 *1%*
Tulare Municipal Well in Sec. 11, T20S, R24E	7/ 7/31	16.9	0.04	78	0.33 *9%*		1.46 *39%*	1.60 *44%*	0.15 *4%*	0.07 *2%*	----
Alpaugh Municipal Well A in Sec. 33, T23S, R26E	9/24/29	34.4	0.15	68	0.59 *9%*		2.34 *34%*	2.40 *35%*	0.90 *13%*	0.14 *2%*	----
USBR Well in Sec. 14, T26S, R21E	5/12/48	360	2.20	64	11.50 *14%*		27.17 *32%*	9.50 *11%*	14.08 *16%*	19.16 *23%*	Trace ----

USDA Well in Sec. 26, T28S, R24E	9/ 7/31	155	0.34	50	7.32	20	7.82	1.30	7.20	6.77	......
					24%	%	*25%*	*4%*	*24%*	*22%*	......
USBR Well A in Sec. 5, T29S, R23E	2/ 6/48	118	....	46	4.90	04	5.65	5.24	1.49	6.04	......
					19%	%	*23%*	*20%*	*6%*	*24%*	......
Buttonwillow Municipal Well in Sec. 14, T29S, R23E	5/20/30	91.4	0.38	56	3.44	03	5.49	5.25	0.80	3.91	......
					17%	%	*28%*	*26%*	*4%*	*20%*	......
USDA Well in NE ¼ Sec. 7, T32S, R27E	9/14/32	56.4	0.39	66	1.39	49	3.40	2.20	0.40	2.68	......
					13%	%	*33%*	*22%*	*4%*	*24%*	......
USBR Well in Sec. 22, T32S, R28E	2/11/48	52.0	....	44	1.40	90	1.87	1.74	0.42	1.75	0.15
					17%	%	*22%*	*21%*	*6%*	*21%*	*2%*

LIST OF ABBREVIATIONS USED IN TABLE 64

Abbreviation	*Name*
USBR	United States Bureau of Reclamation.
USGS	United States Geological Survey.
USDA	United States Department of Agriculture.



(*Division of Highways Photo*)

DONNER LAKE—LAHONTAN AREA

CHAPTER IX. LAHONTAN AREA

The Lahontan Area, designated Area No. 6 on Plate 2, is part of the Great Basin, and comprises all drainage basins in California east of the Central Valley and South Coastal Areas, except those basins in the southeastern part of the State that drain into the Salton Sea and Colorado River. The Area has no outlet to the ocean. It extends from latitude 34½° to 42° N., varying in width from a few miles in the northern portion to about 170 miles in the south.

STREAMS AND AREAS OF DRAINAGE BASINS

Principal streams of the Lahontan Area are the Susan, Truckee, Carson, Walker, and Owens Rivers draining eastern slopes of the Sierra Nevada, and Mojave River draining eastern slopes of the San Bernardino Mountains, all flowing into inland lakes in California or Nevada. A large portion of the Area consists of closed basins, or sinks, which Death Valley is a spectacular example. In this colorful and historic valley is Badwater, the lowest point in the United States, at an elevation 280 feet below sea level and situated less than 90 miles from Mount Whitney, which has an elevation of 14,496 feet and is the Nation's highest point. Areas of drainage basins in the Lahontan Area are given in Table 65.

PRECIPITATION

Mean seasonal precipitation in the Lahontan Area varies from 50 inches in the higher altitudes to 1.7 inches in the desert regions. For its principal north-south distance, the Area lies east of the Sierra Nevada. Storm clouds crossing these mountains from the west lose much of their moisture before entering the Area, owing to high elevations they must pass over. Snowfall is a characteristic of high plateaus of the Area during winter.

In the Mojave Desert in the southern extremity of the Lahontan Area, roughly 75 percent of seasonal precipitation occurs from November through April. Although precipitation is light, local summer thunderstorms in the Mojave Desert have been known to contribute the equivalent of mean seasonal precipitation in less than two hours.

There are 65 precipitation stations in the Lahontan Area with records unbroken for 10 or more seasons, as listed in Table 66. The longest of these records, extending from 1894 to 1946, is for the United States Weather Bureau station at Cedarville in Modoc County.

Maximum recorded seasonal precipitation in the Lahontan Area is 88.25 inches. This occurred at Morses, at an elevation of 5,350 feet in San Bernardino County, in 1906-1907, an average seasonal precipitation at this station being 50.59 inches. Minimum recorded seasonal precipitation for the Area was a trace recorded at Mojave, at an elevation of 2,751 feet in Kern County, during 1882-1883, at which station the average seasonal precipitation is 5.16 inches. Records of precipitation available are for a range in elevation from 178 feet below sea level to 9,700 feet above.

16—27922

TABLE 65

AREAS OF DRAINAGE BASINS, LAHONTAN AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, Lahontan Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
1	Twelve Mile Creek Basin in California	**13**	**6**	**19**
2	Alkali Lake Basin			
	In Nevada	(222)	(0)	(222)
	In California	**338**	**369**	**707**
3	Duck Flat Basin	**63**	**0**	**63**
4	Madeline Plains Basin			
	In Nevada	(51)	(0)	(51)
	In California	**354**	**405**	**759**
5	Smoke Creek Group	**215**	**75**	**290**
6	Eagle Lake Group	**216**	**183**	**399**
	Honey Lake Basin			
7-1	Susan River above gage near Susanville	157	81	238
7-2	Remainder of Honey Lake Basin	921	723	1,644
	Honey Lake Basin in Nevada	(229)	(0)	(229)
	Honey Lake Basin in California	**849**	**804**	**1,653**
	Truckee River Basin			
8-1	Above gage at Tahoe	311	192	503
8-2	Donner Creek above gage near Truckee	29	2	31
8-3	Prosser Creek above gage near Truckee	42	5	47
8-4	Little Truckee River above gage above Boca Reservoir	135	10	145
8-5	Remainder of Truckee River above gage at Farad	171	31	202
	Above gage at Farad	688	240	928
8-6	Remainder of Truckee River in California	42	0	42
	Truckee River in and draining into California	730	240	970
	In Nevada	(109)	(56)	(165)
	In California	**621**	**184**	**806**
	Carson River Basin			
9-1	West Fork above gage at Woodford	68	0	68
9-2	Remainder of West Fork in California	58	0	58
	East Fork above gage near Gardnerville in California	323	0	323
	East Fork above gage near Gardnerville in Nevada	(22)	(0)	(22)
9-3	East Fork above gage near Gardnerville	345	0	345
	Carson River, East Fork above Gardnerville and West Fork in California	471	0	471
	In Nevada	(22)	(0)	(22)
	In California	**449**	**0**	**449**
	Walker River Basin			
10-1	West Walker River above gage near Coleville	245	0	245
10-2	Remainder of West Walker River in California	137	25	162
	West Walker River in California	382	25	407
10-3	East Walker River above gage near Bridgeport	323	36	359
10-4	Remainder of East Walker River in California	144	0	144
	East Walker River in California	467	36	503
	Walker River Basin in California	**849**	**61**	**910**
	Mono Lake Basin			
11-1	East Sierra drainage	177	0	177
11-2	Remainder Mono Lake Basin	449	175	624
	Mono Lake Basin	626	175	801
	In Nevada	(116)	(0)	(116)
	In California	**510**	**175**	**685**

TABLE 65—Continued

AREAS OF DRAINAGE BASINS, LAHONTAN AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, Lahontan Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
12	Huntoon Valley Basin in California	**22**	**0**	**22**
13	Adobe Valley Basin	194	88	282
	In Nevada	(7)	(3)	(10)
	In California	**187**	**85**	**272**
	Owens River Basin			
14–1	Above gage near Round Valley	285	149	434
14–2	Rock Creek above gage near Little Round Valley	36	0	36
14–3	Remainder of Owens River above Tinemaha Reservoir	1,130	327	1,457
	Above Tinemaha Reservoir	1,451	476	1,927
14–4	Remainder of Owens River	1,012	258	1,270
	Owens River	2,463	734	3,197
	In Nevada	(54)	(10)	(64)
	In California	**2,409**	**724**	**3,133**
15	Cottonwood Creek Group	**231**	**54**	**285**
16	Deep Springs Group	**1,419**	**230**	**1,649**
17	Amargosa River Basin			
	In Nevada	(1,762)	(719)	(2,481)
	In California	**5,124**	**1,318**	**6,442**
18	Ivanpah Valley Group in California	**599**	**256**	**855**
	Mojave River Basin			
19–1	Above gage at Lower Narrows near Victorville	282	249	531
19–2	Remainder of Mojave River	3,215	1,160	4,375
	Mojave River	**3,497**	**1,409**	**4,906**
20	Antelope Valley Basin	**596**	**1,820**	**2,416**
	Searles Lake Group			
21–1	East drainage of Sierra Nevada Mountains	670	27	697
21–2	Remainder of Searles Lake Group	3,781	1,710	5,491
	Searles Lake Group	**4,451**	**1,737**	**6,188**
	TOTALS, LAHONTAN AREA IN CALIFORNIA	**23,012**	**9,895**	**32,907**

Precipitation stations having continuous recorders are listed in Table 67, and stations with records of less than ten seasons in Table 68. Monthly distribution of precipitation at four stations, considered to be representative of areas differing in elevation and topographic pattern, is set out in Table 69. Maximum and minimum precipitation figures given are monthly extremes during the period of record. Bar diagrams on Plate 83, "Distribution of Precipitation at Selected Stations, Lahontan Area," show graphically the paucity of precipitation in the Area, as indicated by records at four stations. The diagrams indicate also the characteristic irregular occurrence of precipitation in the Area.

The Weather Bureau has not published recorded maximum rainfall intensities at any stations in the Lahontan Area, but the following for Reno, Nevada, might be considered indicative of intensities in that part of the Area lying west of the general vicinity of Reno.

Precipitation and date	Minutes					Hours				
	5	10	15	30	60	2	3	6	12	24
Precipitation, inches*	0.32	0.54	0.69	0.86	0.93	0.95	0.95	1.49	1.68	2.71
Month, day	8/2	8/13	8/13	8/2	8/2	4/15	4/15	6/29	6/29	1/27
Year	1917	1931	1931	1912	1912	1934	1934	1920	1920	1903

* 10-minute amount also on August 2, 1912.

Mean seasonal precipitation on valley and mesa lands of the Lahontan Area for the period from 1897-98 to 1946-47 is estimated to have been 3,690,000 acre-feet, as shown in Table 70. Although there is a relatively large amount of valley and mesa land in this Area, precipitation on it is in general very light.

TABLE 66

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, LAHONTAN AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
6-9	Markleeville	Alpine	38° 41′ 119° 47′	5,526	1909-10 1946-47	ABC USWB	18.90	20.06	1913-14 1923-24	32.10 9.99
6-25	Alabama Hills	Inyo	36° 40′ 118° 06′	3,790	1922-23 1946-47	BD DWR	3.50	3.52	1940-41 1922-23	6.93 0.42
6-22	Big Pines Power Plant No. 3	Inyo	37° 07′ 118° 19′	5,200	1926-27 1946-47	B LADW&P	8.91	8.16	1937-38 1930-31	17.99 1.55
6-18	Bishop	Inyo	37° 22′ 118° 22′	4,450	1884-85 1946-47	BC USWB	6.26	6.14	1937-38 1897-98	13.37 1.69
6-17	Bishop Creek	Inyo	37° 20′ 118° 29′	8,390	1911-12 1940-41	BC USWB	14.57	15.30	1937-38 1928-29	31.06 7.20
6-28	Cottonwood Creek	Inyo	36° 27′ 118° 06′	6,000	1926-27 1935-36	B LADW&P	6.19	7.25	1935-36 1928-29	10.10 3.15
6-29	Cottonwood Gates	Inyo	36° 25′ 118° 02′	3,600	1924-25 1946-47	B LADW&P	5.81	5.54	1940-41 1924-25	11.08 1.59
6-27	Cow Creek	Inyo	36° 32′ 116° 53′	—152	1934-35 1946-47	B USWB	2.34	1.81	1938-39 1935-36	3.94 0.29
6-31	Greenland Ranch	Inyo	36° 27′ 116° 52′	—178	1911-12 1946-47	BC USWB	1.69	1.61	1938-39 1918-19	4.52 0.03
6-32	Haiwee	Inyo	36° 08′ 117° 58′	3,800	1923-24 1946-47	B USWB	6.20	5.96	1940-41 1932-33	15.36 1.77
6-21	Hillside Reservoir	Inyo	37° 10′ 118° 34′	9,700	1909-10 1922-23	D Private	18.95	17.71	1915-16 1919-20	29.09 12.25
6-24	Independence	Inyo	36° 48′ 118° 12′	3,944	1866-67 1946-47	ABC USWB	5.00	4.68	1867-68 1928-29	20.28 1.29
6-30	Keeler	Inyo	36° 29′ 117° 52′	3,622	1885-86 1908-09	BC USWB	3.01	2.83	1904-05 1897-98	8.60 0.53
6-19	Lake Sabrina	Inyo	37° 13′ 118° 36′	9,100	1909-10 1946-47	BD USWB	16.90	16.10	1937-38 1912-13	33.97 8.63
6-33	Little Lake	Inyo	35° 56′ 117° 54′	3,580	1928-29 1937-38	B LADW&P	5.80	5.96	1936-37 1928-29	9.80 2.51
6-26	Lone Pine	Inyo	36° 36′ 118° 04′	3,728	1904-05 1937-38	BC USWB	4.98	4.30	1916-17 1933-34	8.04 1.00
6-23	Los Angeles Aqueduct Intake	Inyo	36° 58′ 118° 12′	3,830	1919-20 1946-47	B LADW&P	4.35	4.49	1926-27 1920-21	9.09 0.10
6-20	South Lake	Inyo	37° 10′ 118° 34′	9,620	1925-26 1946-47	B USWB	17.99	17.04	1937-38 1930-31	28.79 9.51
6-40	Backus Ranch	Kern	34° 55′ 118° 11′	2,620	1936-37 1946-47	BC USWB	8.91	7.37	1940-41 1941-42	16.60 4.72
6-38	Mojave	Kern	35° 03′ 118° 10′	2,751	1876-77 1946-47	BC LADW&P	5.16	4.93	1943-44 1882-83	14.13 Trace

TABLE 66—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, LAHONTAN AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
–39	Monte Rio	Kern	34° 57′ 118° 30′	4,000	1899-00 1912-13	B USWB	17.75	18.68	1905-06 1909-10	26.91 11.68
6–5	Doyle	Lassen	40° 03′ 120° 05′	4,300	1923-24 1946-47	B USWB	9.72	10.34	1937-38 1938-39	17.43 5.12
6–4	Susanville	Lassen	40° 25′ 120° 39′	4,271	1889-90 1946-47	ABC USWB	18.26	17.06	1889-90 1932-33	36.26 9.14
–54	Big Pines Park	Los Angeles	34° 23′ 117° 41′	6,860	1926-27 1946-47	ACD LAFC & USWB	26.77	25.64	1940-41 1932-33	47.59 14.29
–49	Calivalli Farms	Los Angeles	34° 32′ 117° 59′	2,835	1931-32 1946-47	CD LAFC	8.50	6.90	1943-44 1933-34	15.26 3.28
–43	Fairmont (Near)	Los Angeles	34° 43′ 118° 26′	3,036	1909-10 1946-47	B USWB	15.21	14.28	1940-41 1924-25	29.13 5.76
–53	Jackson Lake Big Pines	Los Angeles	34° 24′ 117° 44′	6,075	1931-32 1942-43	CD LAFC	27.25	23.49	1937-38 1941-42	44.89 13.40
–45	Lancaster High School	Los Angeles	34° 42′ 118° 08′	2,350	1930-31 1946-47	CD LAFC	8.65	7.01	1940-41 1935-36	17.48 4.03
–48	Little Rock Creek	Los Angeles	34° 30′ 118° 02′	3,035	1929-30 1946-47	CD LAFC	11.17	9.17	1943-44 1933-34	20.08 4.39
–50	Llano	Los Angeles	34° 30′ 117° 47′	3,400	1916-17 1946-47	B USWB	7.79	7.68	1943-44 1933-34	19.02 2.12
–44	Munts Valley Ranch	Los Angeles	34° 43′ 118° 21′	2,600	1930-31 1946-47	CD LAFC	11.53	9.35	1940-41 1935-36	21.17 4.99
–47	Palmdale	Los Angeles	34° 34′ 118° 07′	2,660	1932-33 1946-47	B USWB	10.09	8.37	1940-41 1933-34	18.41 5.64
–46	Rouff Ranch	Los Angeles	34° 36′ 118° 17′	3,200	1928-29 1946-47	BCD LAFC	16.24	14.14	1931-32 1929-30	25.84 8.28
–56	Sawmill Flat (Big Pines)	Los Angeles	34° 22′ 117° 41′	6,750	1930-31 1942-43	C LAFC	27.26	24.13	1940-41 1932-33	44.73 10.90
–42	Sawmill Mountain Ranch	Los Angeles	34° 43′ 118° 35′	3,700	1920-21 1946-47	CD LAFC	14.38	13.27	1940-41 1923-24	44.74 7.64
–55	Table Mountain	Los Angeles	34° 23′ 117° 41′	7,500	1926-27 1946-47	CD LAFC & USWB	14.69	14.09	1926-27 1928-29	23.92 6.08
–52	Vallyermo	Los Angeles	34° 27′ 117° 52′	3,740	1911-12 1946-47	BCD LAFC	11.16	10.62	1940-41 1922-23	21.22 4.81
6–3	Cedarville	Modoc	41° 32′ 120° 09′	4,675	1894-95 1945-46	BC USWB	12.37	12.17	1937-38 1932-33	21.17 7.04
6–1	Fort Bidwell	Modoc	41° 52′ 120° 09′	4,735	1866-67 1946-47	BC USWB	18.71	16.64	1866-67 1932-33	35.70 7.69
6–2	Lake City	Modoc	41° 38′ 120° 13′	4,680	1930-31 1946-47	B USWB	18.89	17.92	1937-38 1930-31	28.59 11.68

TABLE 66—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, LAHONTAN AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for— Period of record	Mean for— 1897-1947	Maximum and minimum Season	Maximum and minimum Inches
6-12	Bodie	Mono	38° 13′ 119° 02′	8,240	1895-96 1905-06	BC USWB	14.58	13.03	1900-01 1902-03	21.45 9.12
6-11	Bridgeport	Mono	38° 16′ 119° 14′	6,464	1912-13 1946-47	ABC USWB	10.67	10.11	1913-14 1928-29	16.79 4.70
6-14	Ellery Lake	Mono	37° 56′ 119° 14′	9,600	1925-26 1946-47	B USWB	28.79	31.69	1926-27 1943-44	40.83 14.95
6-15	Gem Lake	Mono	37° 45′ 119° 08′	9,120	1919-20 1946-47	B USWB	26.98	26.74	1919-20 1933-34	44.25 15.23
6-16	Long Valley Reservoir	Mono	37° 34′ 118° 43′	6,700	1920-21 1946-47	D LADW&P	9.69	9.95	1937-38 1923-24	20.09 3.69
6-13	Lundy Lake	Mono	38° 02′ 119° 13′	7,760	1919-20 1939-40	BD USWB	15.60	14.99	1937-38 1930-31	33.80 7.91
6-10	Shields Ranch	Mono	38° 32′ 119° 28′	5,300	1910-11 1945-46	B USWB	10.91	11.25	1931-32 1927-28	19.08 6.61
6-7	Boca	Nevada	39° 23′ 120° 06′	5,535	1870-71 1946-47	BC USWB	21.13	19.88	1889-90 1876-77	52.15 7.60
6-6	Truckee	Nevada	39° 20′ 120° 11′	5,819	1870-71 1946-47	BC USWB	27.21	25.39	1889-90 1887-88	54.84 9.35
6-8	Tahoe	Placer	39° 10′ 120° 10′	6,330	1910-11 1946-47	BC USWB	29.57	30.60	1937-38 1923-24	50.94 14.18
6-64	Ash Meadows	San Bernardino	34° 17′ 117° 09′	4,650	1904-05 1914-15	B Private	23.91	23.32	1906-07 1912-13	39.09 12.29
6-41	Barstow	San Bernardino	34° 54′ 117° 02′	2,105	1889-90 1946-47	BC USWB	4.50	4.17	1940-41 1895-96	8.67 0.67
6-58	Burton Ranch	San Bernardino	34° 17′ 117° 24′	4,400	1904-05 1914-15	B Private	47.21	45.93	1906-07 1909-10	69.76 32.14
6-65	Deep Creek	San Bernardino	34° 14′ 117° 07′	5,200	1893-94 1914-15	B Mojave RI	30.53	31.53	1906-07 1895-96	50.57 11.09
6-57	Forks of Mojave	San Bernardino	34° 21′ 117° 14′	3,000	1905-06 1919-20	B Private	13.02	13.28	1906-07 1912-13	25.77 6.84
6-63	Gate House	San Bernardino	34° 16′ 117° 11′	5,100	1893-94 1933-34	BD Private	31.73	34.97	1921-22 1895-96	58.05 13.18
6-59	Grass Valley	San Bernardino	34° 16′ 117° 13′	5,190	1894-95 1914-15	B Private	40.78	40.57	1906-07 1895-96	70.42 19.03
6-62	Hesperia	San Bernardino	34° 25′ 117° 18′	3,200	1904-05 1914-15	B Private	8.55	8.33	1906-07 1912-13	13.94 3.19
6-66	Holcomb Creek	San Bernardino	34° 17′ 117° 05′	5,250	1893-94 1914-15	B USWB	22.35	22.35	1913-14 1898-99	36.43 6.96
6-35	Kingston	San Bernardino	35° 45′ 115° 40′	2,475	1925-26 1941-42	B USWB	4.18	4.05	1931-32 1925-26	8.31 0.69
6-61	Lake Arrowhead	San Bernardino	34° 15′ 117° 12′	5,100	1928-29 1946-47	D DWR	45.14	43.70	1937-38 1930-31	79.27 21.06

TABLE 66—Continued

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, LAHONTAN AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
6-60	Morses	San Bernardino	34° 14′ 117° 13′	5,350	1893-94 1914-15	B Private	50.59	58.29	1906-07 1903-04	88.25 23.84
6-34	Trona	San Bernardino	35° 45′ 117° 22′	1,656	1920-21 1946-47	B USWB	4.40	4.13	1940-41 1924-25	11.47 1.85
6-51	Victorville	San Bernardino	34° 32′ 117° 18′	2,840	1904-05 1946-47	AB USWB	6.02	5.48	1940-41 1912-13	12.35 1.63
6-36	Yucca Grove	San Bernardino	35° 23′ 115° 52′	3,951	1931-32 1946-47	B USWB	7.57	6.94	1940-41 1933-34	11.89 1.88

ABBREVIATIONS—LAHONTAN AREA

TYPE OF RECORD

Abbreviation	*Name*
B	Daily
C	Monthly
D	Seasonal

SOURCE OF RECORD

Abbreviation	*Name*
DWR	State Division of Water Resources
LADW&P	Los Angeles Department of Water and Power
LAFC	Los Angeles County Flood Control District
Mojave RI	Mojave River Investigation, State Division of Water Resources
USWB	United States Weather Bureau

TABLE 67

PRECIPITATION STATIONS WITH CONTINUOUS RECORDERS, LAHONTAN AREA

(Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
6-9*	Markleeville	Alpine	38° 41′ 119° 47′	5,526	Oct. 1940 June 1947	USWB
6-24*	Independence	Inyo	36° 48′ 118° 12′	3,944	April 1940 June 1947	City of Los Ang.
6-003	Lone Pine (near)	Inyo	36° 36′ 118° 03′	3,950	Sept. 1940 June 1947	USWB
6-008	Milford (near)	Lassen	40° 08′ 120° 21′	5,200	Sept. 1940 June 1947	USWB
6-4*	Susanville	Lassen	40° 25′ 120° 39′	4,271	Sept. 1940 Dec. 1946	USWB
6-012	Susanville Airport	Lassen	40° 23′ 120° 33′	4,155	Dec. 1946 June 1947	USWB
6-013	Termo	Lassen	40° 52′ 120° 27′	5,380	Oct. 1945 June 1947	USWB
6-54*	Big Pines Park	Los Angeles	34° 23′ 117° 41′	6,860	Sept. 1940 June 1947	USWB
6-021	Palmdale Airport	Los Angeles	34° 38′ 118° 05′	2,536	Mar. 1940 June 1947	CAA
6-11*	Bridgeport	Mono	38° 16′ 119° 14′	6,464	Oct. 1940 June 1947	USWB
6-030	Truckee No. 2	Nevada	39° 20′ 120° 11′	6,200	Oct. 1940 April 1946	USWB
6-029	Truckee Ranger Station	Nevada	39° 20′ 120° 11′	6,000	April 1946 June 1947	USFS
6-032	Amboy	San Bernardino	34° 33′ 115° 44′	615	Sept. 1944 June 1947	USWB
6-042	Crestline	San Bernardino	34° 15′ 117° 18′	4,900	Feb. 1940 June 1947	USWB
6-044	Daggett Airport	San Bernardino	34° 52′ 116° 47′	1,950	Mar. 1940 June 1947	CAA
6-060	Red Mountain (near)	San Bernardino	35° 21′ 117° 38′	3,750	Aug. 1940 June 1947	USWB
6-063	Silver Lake Airport	San Bernardino	35° 20′ 116° 05′	926	Nov. 1940 June 1947	CAA
6-51*	Victorville	San Bernardino	34° 32′ 117° 18′	2,840	April 1940 June 1947	USWB

SOURCE OF RECORD

Abbreviation	*Name*
USWB	United States Weather Bureau
USFS	United States Forest Service
City of Los Ang.	City of Los Angeles
CAA	Civil Aeronautics Administration Airway Communication Station

TABLE 68

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, LAHONTAN AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
-001	Bijou	El Dorado	38° 57′ 119° 58′	6,250	1917-18	B
-002	Cathedral Park	El Dorado	38° 54′ 120° 02′	7,000	1913-14	B
-003	Lone Pine (near)	Inyo	36° 36′ 118° 03′	3,950	1940-47	A
-004	Wells Meadow	Inyo	37° 27′ 118° 38′	5,280	1916-18	B
-005	Tinemaha Reservoir	Inyo	37° 03′ 118° 17′	3,865	1934-38	B
-006	Litchfield	Lassen	40° 23′ 120° 22′	4,200	1923-28	B
-007	Lone Valley	Lassen	40° 02′ 120° 06′	4,400	1909-16 1919-20	B
-008	Milford (near)	Lassen	40° 08′ 120° 21′	5,200	1940-47	A
-009	Norvell Flat	Lassen	40° 28′ 121° 00′	5,740	1941-44	B
-010	Standish	Lassen	40° 22′ 120° 24′	4,000	1916-18	B
-011	Susanville	Lassen	40° 25′ 120° 35′	4,175	1928-32 1935-39	B
-012	Susanville Airport	Lassen	40° 23′ 120° 33′	4,155	1946-47	A
-013	Termo	Lassen	40° 52′ 120° 27′	5,380	1945-47	A
-014	Earl Ranch	Los Angeles	34° 40′ 118° 13′	2,450	1913-21	D
-015	East Spunky	Los Angeles	34° 36′ 118° 22′	3,500	1932-39	B
-016	Fairmont Reservoir	Los Angeles	34° 42′ 118° 26′	3,050	1930-39	B
-017	Fern	Los Angeles	34° 12′ 117° 42′	5,200	1936-38	B
-018	Fernando	Los Angeles	34° 17′ 118° 26′	1,066	1897-1904	B
-019	Little Rock Creek (Cole)	Los Angeles	34° 29′ 118° 01′	3,399	1896-1900	B
-020	Little Rock Creek (Weather Bureau)	Los Angeles	34° 29′ 118° 02′	3,000	1919-23	B
-021	Palmdale Airport	Los Angeles	34° 38′ 118° 05′	2,536	1940-47	A
-022	Shenberger Ranch	Los Angeles	34° 45′ 118° 48′	3,200	1927-31	B
-023	West Palmdale	Los Angeles	34° 35′ 118° 07′	2,700	1896-97	B
-024	Cain Ranch	Mono	37° 53′ 119° 06′	6,915	1931-39	B
-025	East Portal	Mono	37° 44′ 118° 53′	7,050	1935-38	B
-026	Lake Mary	Mono	37° 36′ 119° 00′	9,000	1929-31 1946-47	B, C
-027	Shaft No. 1	Mono	37° 49′ 118° 59′	7,941	1934-37	B
-028	West Portal Camp	Mono	37° 51′ 119° 03′	7,075	1935-39	B
-029	Truckee Ranger Station	Nevada	39° 20′ 120° 11′	6,000	1940-47	A
-030	Truckee No. 2	Nevada	39° 20′ 120° 11′	6,200	1935-39 1940-47	A, B

TABLE 68—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, LAHONTAN AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
6-031	Deer Park	Placer	39° 11′ 120° 13′	6,500	1913-15	B
6-032	Amboy	San Bernardino	34° 33′ 115° 44′	615	1944-47	A
6-033	Big Bear Tavern	San Bernardino	34° 15′ 116° 57′	6,800	1918-23	B
6-034	Bloomington No. 2	San Bernardino	34° 04′ 117° 24′	1,090	1898-99 1927-28	B
6-035	Los Flores Ranch (Burcham Ranch)	San Bernardino	34° 19′ 117° 20′	3,200	1904-13	B
6-036	Canyon Redondo	San Bernardino	34° 17′ 117° 03′	5,500	1894-95	B
6-037	Clyde Ranch	San Bernardino	34° 19′ 117° 34′	4,850	1916-19	B
6-038	Converse Nursery	San Bernardino	34° 11′ 116° 55′	6,000	1914-18	B
6-039	Cox's Canyon	San Bernardino	34° 19′ 117° 34′	5,500	1894-95	B
6-040	Crab Park	San Bernardino	34° 16′ 117° 07′	5,800	1894-96	B
6-041	Crafts Peak	San Bernardino	34° 15′ 117° 01′	8,000	1894-95	B
6-042	Crestline	San Bernardino	34° 15′ 117° 18′	4,900	1940-47	A
6-043	Cushenbury Ranch	San Bernardino	34° 22′ 117° 26′	4,000	1918-19	B
6-044	Daggett Airport	San Bernardino	34° 52′ 116° 47′	1,950	1940-47	A
6-045	Deep Creek, East Fork	San Bernardino	34° 13′ 117° 02′	6,800	1894-95	B
6-046	Deep Creek, South Fork	San Bernardino	34° 12′ 117° 04′	6,700	1894-95	B
6-047	Dobie Ranch	San Bernardino	34° 30′ 117° 25′	3,300	1918-27	B
6-048	Dorman's Ranch	San Bernardino	34° 14′ 117° 16′	5,300	1915-16	B
6-049	Flemming Mill	San Bernardino	34° 15′ 117° 11′	5,010	1893-1900	B
6-050	Goffs	San Bernardino	34° 56′ 115° 04′	2,700	1915-18	B
6-051	Gray Mountain	San Bernardino	34° 38′ 117° 16′	3,000	1914-22	B
6-052	Helendale	San Bernardino	34° 45′ 117° 19′	2,500	1904-11	B
6-053	Holcomb	San Bernardino	34° 18′ 116° 55′	7,800	1910-16	B
6-054	Lake Arrowhead Fish Hatchery	San Bernardino	34° 19′ 117° 11′	5,000	1941-42	B
6-055	Lake Arrowhead Village	San Bernardino	34° 15′ 117° 12′	5,125	1930-34	B
6-056	Measors	San Bernardino	34° 14′ 117° 11′	5,480	1894-96	B
6-057	Morongo Valley	San Bernardino	34° 03′ 116° 34′	2,500	1919-46	Broken record B
6-058	Palmer's Service Station	San Bernardino	34° 18′ 117° 28′	3,000	1935-37	B
6-059	Point of Rocks	San Bernardino	34° 46′ 117° 19′	2,400	1910-11	B
6-060	Red Mountain (near)	San Bernardino	35° 21′ 117° 38′	3,750	1940-47	A

TABLE 68—Continued

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, LAHONTAN AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
6-061	Ridge (north)	San Bernardino	34° 15′ 117° 14′	5,350	1893-95	B
6-062	Section 9	San Bernardino	34° 16′ 117° 12′	5,120	1895-96	B
6-063	Silver Lake Airport	San Bernardino	35° 20′ 116° 05′	926	1940-47	A
6-064	Strawberry Flat	San Bernardino	37° 14′ 117° 14′	5,700	1894-96	B
6-065	Upper Holcomb	San Bernardino	34° 18′ 116° 55′	7,250	1893-99	B
6-066	Yucca Grove	San Bernardino	35° 24′ 115° 49′	3,952	1936-39	B

TYPE OF RECORD

Abbreviation	*Name*
A	Hourly
B	Daily
C	Monthly
D	Seasonal

TABLE 69

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATION IN EA MONTH FOR THE PERIOD OF RECORD, AT FOUR STATIONS, LAHONTAN AREA

In Inches

Month	Cedarville, Modoc County Number on Plate 3: 6-3			Susanville, Lassen County Number on Plate 3: 6-4			Shields Ra, Mono Cou Number on Plate 3: 6-10			Independ nce, Inyo County Number on Plate 3: 6-24		
	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum
July	0.25	1.44	0.00	0.20	1.00	0.00	0.50	2.47	0.00	0.13	1.56	0.00
August	0.16	1.09	0.00	0.15	1.77	0.00	0.39	3.20	0.00	0.16	1.51	0.00
September	0.50	1.64	0.00	0.53	3.70	0.00	0.27	1.48	0.00	0.15	1.17	0.00
October	1.03	3.76	0.00	1.00	5.21	Trace	0.61	3.31	0.00	0.35	3.08	0.00
November	1.50	5.76	0.00	2.12	10.66	0.00	0.91	5.06	0.00	0.32	4.69	0.00
December	1.54	4.26	0.18	3.06	8.66	0.05	1.64	5.68	0.00	1.09	12.19	0.00
January	1.76	7.28	0.31	3.67	11.59	0.03	1.90	7.14	Trace	1.03	8.69	0.00
February	1.56	3.70	0.30	2.84	9.75	0.05	1.90	5.60	Trace	0.81	3.62	0.00
March	1.45	4.61	0.13	2.46	12.30	0.00	1.17	3.76	0.00	0.50	4.76	0.00
April	0.96	2.94	0.11	1.10	5.10	0.05	0.69	2.47	0.00	0.22	1.99	0.00
May	0.98	3.51	0.00	1.05	6.26	Trace	0.60	3.26	0.00	0.19	0.96	0.00
June	0.70	2.56	0.00	0.57	2.17	0.00	0.53	4.58	0.00	0.07	0.62	0.00
SEASONAL TOTALS	12.39	--------	--------	18.75	--------	--------	11.11	--------	--------	5.02	--------	--------

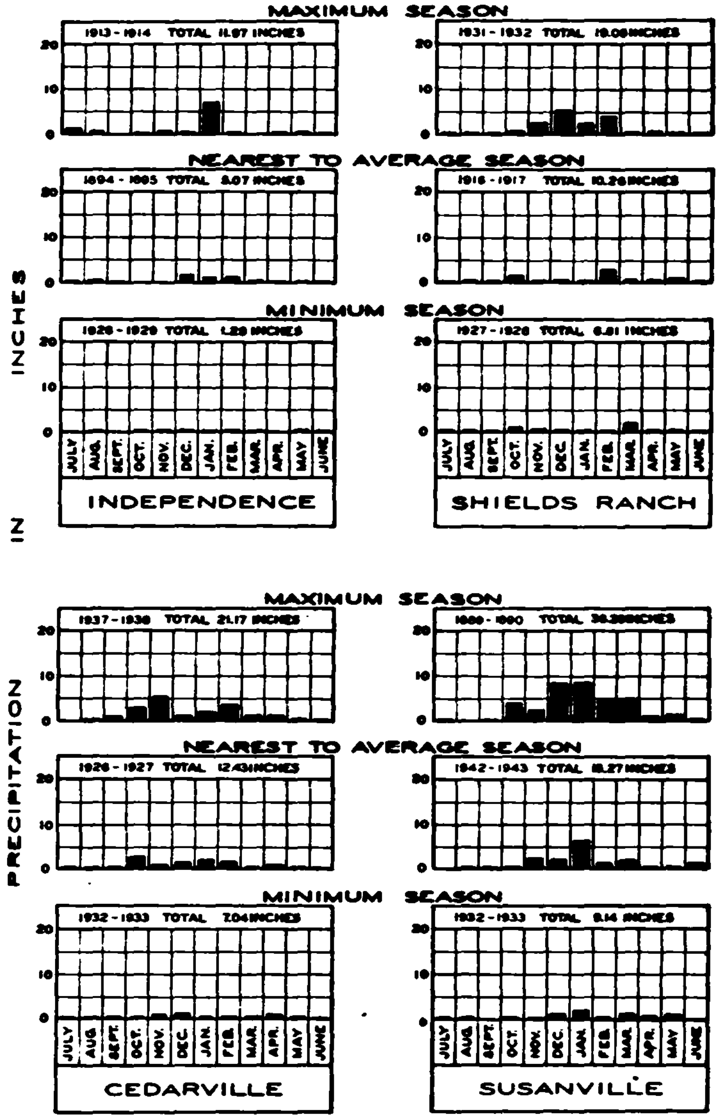
TABLE 70

ESTIMATED MEAN SEASONAL PRECIPITATION ON VALLEY AND MESA LANDS 1897-98 TO 1946-47

LAHONTAN AREA

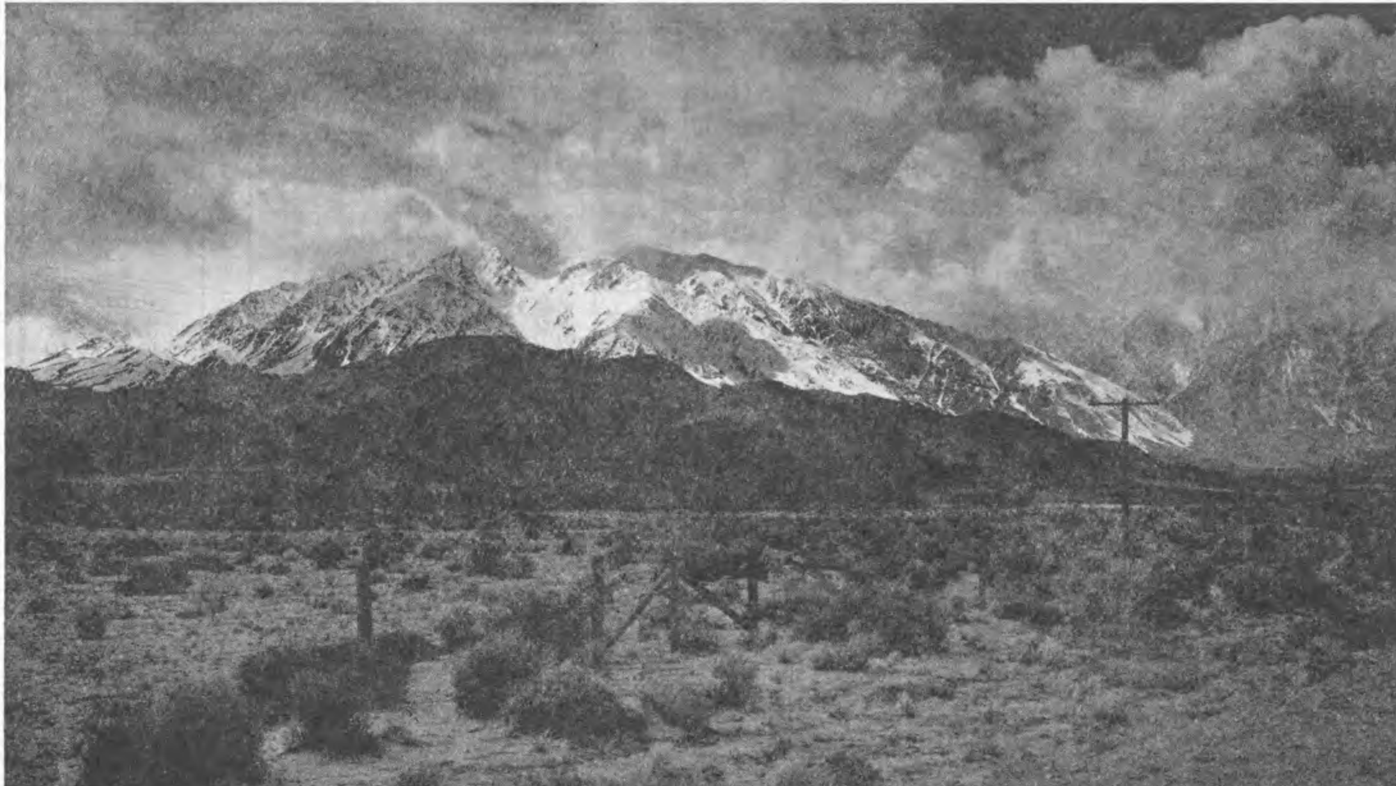
Number on Plate 2	Stream or stream group basin	Precipitation in acre-feet
1	Twelve Mile Creek Basin in California	3,800
	Alkali Lake Basin	
2	In California	216,000
	Madeline Plains Basin	
4	In California	281,000
5	Smoke Creek Group	36,000
6	Eagle Lake Group	146,000
	Honey Lake Basin	
7-1	Susan River above gage near Susanville	121,000
7-2	Remainder of Honey Lake Basin in California	424,000
	Truckee River Basin	
8-2	Donner Creek above gage near Truckee	3,500
8-3	Prosser Creek above gage near Truckee	7,200
8-4	Little Truckee River above gage above Boca Reservoir	9,600
8-5	Remainder of Truckee River above gage at Farad, in California	36,400
	Walker River Basin	
10-2	Remainder of West Walker River in California (below gage near Coleville)	13,300
10-3	East Walker River above gage near Bridgeport	21,100
	Mono Lake Basin	
11-2	Remainder of Mono Lake Basin in California (below East Sierra drainage)	131,000
13	Adobe Valley Basin in California	49,900
	Owens River Basin	
14-1	Above gage near Round Valley in California	95,400
14-3	Remainder of Owens River above Tinemaha Reservoir (below gage on Rock Creek near Little Round Valley)	122,000
14-4	Remainder of Owens River	68,800
15	Cottonwood Creek Group	43,200
16	Deep Springs Group	73,600
	Amargosa River Basin	
17	In California	211,000
18	Ivanpah Valley Group in California	68,300
	Mojave River Basin	
19-1	Above gage at Lower Narrows near Victorville	106,000
19-2	Remainder of Mojave River	247,000
20	Antelope Valley Basin	679,000
	Searles Lake Group	
21-1	East drainage of Sierra Nevada Mountains	15,800
21-2	Remainder of Searles Lake Group	456,000
21-1	Remainder of Searles Lake group	456,000
	TOTAL, LAHONTAN AREA IN CALIFORNIA	3,685,900

PLATE 83



DISTRIBUTION OF PRECIPITATION AT SELECTED STATIONS

LAHONTAN AREA



(Division of Highways Photo)

SIERRA NEVADA FROM OWENS VALLEY

RUNOFF

Estimated mean seasonal natural runoff of the Lahontan Area for the 53-year period from 1894-95 to 1946-47 is 3,177,000 acre-feet, or 4.5 percent of total surface runoff of the State. Minimum seasonal runoff amounting to 930,000 acre-feet occurred in 1923-24, and the maximum, totalling 7,070,000 acre-feet, in 1906-07. Water supply during each year of the 10-year period from 1923-24 to 1932-33, except 1926-27, was less than the 53-year seasonal mean, and the average was only 63 percent of this long-time mean.

Snow falls on large portions of the tributary drainage of the Lahontan Area. Consequently, a substantial portion of seasonal runoff is delayed until late spring and early summer. For Truckee River, a typical Lahontan Area stream that flows from the Sierra Nevada, snow melt contributes 95 percent of seasonal runoff. Minimum runoff in the Area occurs from August to October, inclusive. On Truckee River runoff during these months is only 4.9 percent of the seasonal total.

Stream gaging stations in the Lahontan Area, are listed in Table 71 together with the average, maximum and minimum seasonal runoff for stations with more than 10 years of record. Longest available records of stream flow are for Truckee River at or near the state line, and for Owens River near Round Valley. The record for the Truckee has been maintained since September, 1899, and that for Owens River since August, 1903, except from October, 1923, to March, 1927. Records for these two stations are no longer published by the Geological Survey, but may be secured from the Federal Court Watermaster for Truckee River and from the Department of Water and Power of the City of Los Angeles for Owens River.

Estimated mean seasonal natural runoff of the 53 years from 1894-95 to 1946-47, shown in Table 72, has been prepared in the same manner as corresponding tables in preceding chapters. For stations with partial records, mean seasonal runoff shown is the mean of estimated natural flow for each season of the 53-year period. At locations where records are not available, only directly derived long-time mean estimates are given.

Estimates of seasonal natural runoff of main stream and tributary basins having records, presented in Table 73, were made in accordance with principles outlined in Chapter III. Estimates of runoff from drainage basins where records were not available were made by comparison with runoff from other basins. In deriving the 53-year seasonal mean for unmeasured streams discharging into lakes in the northern portion of the Area, inflow to a lake, computed from records of lake levels, was taken to be runoff of the stream during the period of record. A relationship was then established with an adjacent stream, and the missing record was estimated by the third method of restoring missing records described in Chapter III.

Estimates of mean seasonal runoff for streams or basins for which no records of any type existed were made by comparison with runoff of adjacent areas, on the basis of geographical, geological and meteorological conditions. The portion of mean seasonal runoff that was estimated for the Lahontan Area approximates 1,183,000 acre-feet, the remaining 1,994,000 acre-feet being based on records.

An unusual feature of the natural flow estimate for Truckee River, in Table 73, is the occurrence in several years of negative values in estimated flow above the outlet of Lake Tahoe. This is due to evaporation from the lake, estimated to approximate 375,000 acre-feet seasonally. In years for which negative values of flow are shown, estimated evaporation exceeded inflow by the amounts given in the table.

An indication of variation in monthly flow in streams in the Lahontan Area draining from the Sierra Nevada is given by data for Truckee River at the state line, presented in the following tabulation:

AVERAGE MONTHLY DISTRIBUTION OF AVERAGE SEASONAL RUNOFF, TRUCKEE RIVER BETWEEN LAKE TAHOE AND FARAD

(Drainage Area—425 Square Miles)

Month	Percent of seasonal average	Acre-feet
October	1.8	7,000
November	2.5	10,000
December	3.2	13,000
January	4.2	17,000
February	4.8	19,000
March	9.8	39,000
April	21.4	85,000
May	26.8	106,000
June	17.0	67,000
July	5.4	21,000
August	1.7	7,000
September	1.4	6,000
Totals	100.0	397,000

TABLE 71

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RU OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, LAHONTAN AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Warner Lake Basin										
6-1	Twelve Mile Creek near Fort Bidwell	42° 00′ 120° 03′	5,600	1912-13 1917-19 1922	USGS	AD					
6-2	Keeno Creek near Fort Bidwell	41° 57′ 120° 00′	5,500	1917-19	USGS	D					
6-3	Bidwell Creek near Fort Bidwell	41° 57′ 120° 11′	5,300	1917-18	USGS	D					
6-4	Bidwell Creek at Fort Bidwell	41° 51′ 120° 10′	4,800	1917-18	USGS	D					
6-5	Mill Creek above Diversion	41° 38′ 120° 13′	4,800	1930-47	DWRWA	D					
6-6	Rutherford Creek above Diversion	41° 37′ 120° 13′	4,800	1930-34	DWRWA	D					
6-7	Soldier Creek above Diversion	41° 36′ 120° 12′	4,800	1926-47	DWRWA	D					
6-8	Cedar Creek above Diversion	41° 32′ 120° 11′	4,800	1926-47 ex. 1931	DWRWA	D					
6-9	North Deep Creek above Diversions	41° 31′ 120° 12′	5,400	1939-47	DWRWA	D					
6-10	South Deep Creek below Espil Ditch	41° 30′ 120° 12′	5,400	1939-46	DWRWA	D					
6-11	Rader Creek above Flume Division Structure	41° 19′ 120° 07′	5,000	1939-47	DWRWA	D					
6-12	Eagle Creek below Mouth of Canyon	41° 18′ 120° 08′	5,000	1934-47	DWRWA	D					

TABLE 71—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL I IOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, LAHONTAN AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Warner Lake Basin—Continued										
6-13	Owl Creek below Aiken	41° 22′ 120° 08′	5,000	1927 1939-47	DWRWA	D					
6-14	Emerson Creek above Arreche Ditch	41° 17′ 120° 06′	4,700	1929-34 1939-47	DWRWA	D					
	Honey Lake Basin										
6-15	Baxter Creek near Lassen	40° 20′ 120° 32′	4,200	1913-17	USGS	A					
6-16	Janesville Creek at Lassen	40° 18′ 120° 31′	4,150	1913, 15, 18	USGS	D					
6-17	Schloss Creek at Lassen	40° 18′ 120° 32′	4,200	1919	USGS	D					
6-18	Susan River near Susanville	40° 25′ 120° 41′	4,180	1900-05 1913, 18 & 1921	USGS	AD					
6-19	Lassen Creek near Susanville	40° 21′ 120° 39′	4,500	1913 1916	USGS	D					
6-20	Gold Run Creek near Susanville	40° 22′ 120° 39′	4,190	1916	USGS	D					
6-21	Willow Creek at Merrillville	40° 35′ 120° 42′	5,000	1904-05	USGS	D					
6-22	Willow Creek near Standish	40° 24′ 120° 26′	4,120	1900-01 1905	USGS	D					

6-23	Long Valley Creek near Doyle	40° 08′ 120° 13′	4,000	1917	USGS	D					
	Truckee River Basin										
6-24	Truckee River at Tahoe	39° 10′ 120° 09′	6,219	1900-43	USGS	A	179,552	19 07	657,000	1930-31	4,690
6-25	Truckee River near Truckee	39° 17′ 120° 12′	5,850	1944-47	USGS	A					
6-26	Donner Creek at Donner Lake	39° 19′ 120° 14′	5,950	1910	USGS	D					
6-27	Donner Creek near Truckee	39° 19′ 120° 13′	5,800	1902-15 1928-43	USGS	A	47,300	19 04	115,000	1912-13	13,900
6-28	Prosser Creek, South Fork, near Truckee	39° 22′ 120° 16′	6,480	1910	USGS	A					
6-29	Prosser Creek near Truckee	39° 22′ 120° 08′	5,620	1903-04 1907-12	USGS	A					
6-30	Prosser Creek near Boca	39° 22′ 120° 07′	5,550	1902-03	USGS	B					
6-31	Webber Creek near Truckee	39° 29′ 120° 24′	6,750	1910	USGS	A					
6-32	Little Truckee River, near Truckee	39° 29′ 120° 20′	6,450	1910	USGS	D					
6-33	Independence Creek near Truckee	39° 27′ 120° 17′	6,960	1910	USGS	D					
6-34	Independence Creek below Lake Independence	39° 27′ 120° 17′	6,950	1902-06	USGS	D					
6-35	Little Truckee River at Starr	39° 28′ 120° 06′	5,840	1908-10	USGS	D					
6-36	Little Truckee River, near Pine Station	39° 26′ 120° 06′	5,820	1903-07	USGS	B					
6-37	Little Truckee River at Boca	39° 23′ 120° 06′	5,500	1911-15	USGS	D					
6-38	Truckee River at Iceland	39° 23′ 120° 02′	5,420	1912-37	USGS	A	455,000	19 07	1,430,000	1930-31	133,000
6-39	Truckee River at Farad	39° 26′ 120° 02′	5,200	1900-09 1938-47	USGS	AD					
6-40	Truckee River near California-Nevada Line	39° 27′ 120° 00′	5,100	1909-12	USGS	A					

TABLE 71—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, LAHONTAN AR

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Carson River Basin										
6-41	Silver Creek near Markleeville	38° 37′ 119° 45′	6,200	1910-12	USGS	D					
6-42	Carson River, East Fork near Markleeville	38° 42′ 119° 46′	5,450	1910-32	USGS	D					
6-43	Markleeville Creek above Markleeville	38° 41′ 119° 48′	5,600	1911-30	USGS	D					
6-44	Pleasant Valley Creek at Markleeville	38° 41′ 119° 47′	5,600	1911	USGS	D					
6-45	Markleeville Creek at Markleeville	38° 41′ 119° 47′	5,500	1910-31	USGS	D					
6-46	Carson River, East Fork, at California-Nevada Line	38° 47′ 119° 42′	5,150	1911-14	USGS	A					
6-47	Carson River, East Fork, near Gardnerville, Nevada	38° 51′ 119° 42′	4,950	1890-93 1900-06 1908-10 1917 1924-29 1935-37 1939-45	USGS	A	310,000	1892-93	654,000	1925-26	143,000
6-48	Carson River, West Fork, at Woodfords	38° 46′ 119° 50′	5,800	1900-20 1938-47	USGS	A	93,400	1906-07	210,000	1943-44	46,850
	Walker River Basin										
6-49	West Walker River below East Fork near Coleville	38° 23′ 119° 27′	6,600	1938-47	USGS	A					

6-50	West Walker River Lower Station	38° 30′ 119° 29′	6,000	1909-10 1915-37	USGS	A	200,500	1	6-07	483,000	1923-24	67,900
6-51	West Walker River Upper Station	38° 31′ 119° 27′	5,500	1902-08	USGS	A						
6-52	Robinson Creek near Bridgeport	38° 12′ 119° 19′	6,000	1910-14	USGS	D						
6-53	Buckeye Creek near Bridgeport	38° 14′ 119° 19′	6,800	1910-14	USGS	D						
6-54	Swager Creek near Bridgeport	38° 16′ 119° 18′	7,000	1911-15	USGS	D						
6-55	East Walker River near Bridgeport	38° 20′ 119° 13′	6,400	1911-14 1921-47	USGS	A		1	7-38	240,700	1930-31	27,200
	Mono Lake Basin											
6-56	Mill Creek at Lundy Dam	38° 02′ 119° 13′	7,750	1919-47	City of LA	A, D						
6-57	Mill Creek Plant Discharge near Mono Lake	38° 02′ 119° 10′	7,000	1911-25 1939	City of LA	A	15,000	1	5-16	29,400	1918-19	6,690
6-58	No. 1 Leevining Plant Discharge near Tioga Lake	37° 56′ 119° 14′	9,550	1921-25	City of LA	A, D						
6-59	Poole Plant Discharge near Tioga Lake	37° 56′ 119° 14′	9,500	1939	City of LA	A						
6-60	Warren Creek at Tioga Road Crossing	37° 57′ 119° 14′	9,000	1920-25	City of LA	A						
6-61	Leevining Creek near Mono Lake	37° 56′ 119° 07′	7,150	1910-15	USGS	D						
6-62	Leevining Creek at Plant No. 3	37° 57′ 119° 07′	6,748	1910-16 1920-47	City of LA	A						
6-63	Walker Creek below Walker Dam	37° 53′ 119° 09′	7,900	1922-47	City of LA	A						
6-64	Parker Creek below Parker Lake	37° 53′ 119° 06′	6,900	1920-47	City of LA	A						
6-65	Rush Creek Plant Discharge near Gem Lake	37° 45′ 119° 08′	9,000	1939	City of LA	A						
6-66	Agnew Lake on Rush Creek	37° 45′ 119° 08′	8,700	1939	City of LA	A						

TABLE 71—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL NOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, LAHONTAN AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								ason	Acre-feet	Season	Acre-feet
	Mono River Basin—Continued										
6-67	Rush Creek at Agnew Lake	37° 45′ 119° 08′	8,000	1910-17	City of LA	A					
6-68	Reverse Creek at Rush Creek Plant	37° 46′ 119° 07′	7,220	1921-32	City of LA	A					
6-69	Rush Creek, North Fork, at Silver Lake	37° 47′ 119° 08′	8,000	1921-32	City of LA	A					
6-70	Rush Creek at Silver Lake	37° 50′ 119° 06′	7,070	1910-34	City of LA	A					
6-71	Parker Creek at Cain Ranch	37° 51′ 119° 03′	7,100	1921-23	City of LA	D					
6-72	Rush Creek near Mono Lake	37° 57′ 119° 03′	6,420	1910-14	USGS	A					
	Owens River Basin										
6-73	Convict Creek near Bishop	37° 37′ 118° 50′	7,100	1930-32	City of LA	A					
6-74	Hilton Creek near Bishop	37° 34′ 118° 45′	6,950	1930-32	City of LA	A					
6-75	Crooked Creek near Bishop	37° 34′ 118° 43′	6,780	1927-32	City of LA	A					
6-76	Owens River at Gorge	37° 35′ 118° 42′	6,680	1916-33	City of LA	A	132,800	21-22	198,400	1930-31	73,000
6-77	Owens River near Round Valley	37° 26′ 118° 33′	4,450	1903-23 1927-40 1941-47	USGS City of LA	A	163,624	06-07	276,000	1930-31	75,900

6-78	Rock Creek near Bishop	37° 29′ 118° 36′	4,900	1922-40	USGS City of LA	A	16,652	1[illegible]-38	36,530	1930-31	7,730
6-79	Rock Creek near Round Valley	37° 26′ 118° 34′	4,450	1903-47	USGS City of LA	A	27,440	1[illegible]-11	44,100	1930-31	10,300
6-80	Pine Creek near Bishop	37° 25′ 118° 37′	5,250	1921-47	USGS	A	29,500	1[illegible]-38	55,080	1930-31	14,200
6-81	Pine Creek near Round Valley	37° 26′ 118° 34′	4,450	1903-23 1930-47	USGS City of LA	A	16,290	1[illegible]-38	42,320	1930-31	887
6-82	Owens River at Pleasant Valley	37° 25′ 118° 32′	4,350	1918-40	USGS	A	177,380	1[illegible]-38	324,700	1930-31	97,700
6-83	Owens River Canal near Bishop	37° 24′ 118° 27′	4,300	1903-05	USGS	D					
6-84	McGee Creek Diversion at Southern Sierra Station	37° 17′ 118° 38′	9,125	1925-32	City of LA	A					
6-85	McGee Creek near Bishop	37° 17′ 118° 37′	8,500	1930-32	City of LA	A					
6-86	Birch Creek at intake	37° 16′ 118° 36′	8,000	1925-32	City of LA	A					
6-87	McNalley Canal near Bishop	37° 25′ 118° 25′	4,200	1904 1917-21	City of LA USGS	B, D					
6-88	Coyote Creek at Bishop	37° 19′ 118° 24′	5,600	1930-32	City of LA USGS	A					
6-89	Bishop Creek near Bishop	37° 23′ 118° 24′	4,170	1903-05	USGS	D					
6-90	Farmers Canal near Bishop	37° 25′ 118° 24′	4,175	1903-05	USGS	D					
6-91	Bishop Creek near Bishop	37° 21′ 118° 28′	4,500	1903-47	USGS City of LA	B, D					
6:92	A. C. Collins Canal near Bishop	37° 22′ 118° 20′	4,050	1903-05	USGS	D					
6-93	George Collins Canal near Bishop	37° 22′ 118° 20′	4,050	1903-05	USGS	D					

TABLE 71—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL RUNOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, LAHONTAN AREA

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								Season	Acre-feet	Season	Acre-feet
	Owens River Basin—Continued										
6-94	Rawson Canal near Bishop	37° 22′ 118° 20′	4,050	1903-05	USGS	D					
6-95	Dell Canal near Bishop	37° 19° 118° 19′	4,030	1903-05	USGS	D					
6-96	Big Pine and Owens River Canals near Bishop	37° 16′ 118° 19′	3,980	1903-05	USGS	D					
6-97	Big Pine Creek near Big Pine	37° 09′ 118° 20′	5,000 -	1903-05 1906-10 1919-47	USGS City of LA	B, D					
6-98	Baker Creek near Big Pine	37° 09′ 118° 21′	4,950 -----	1907-10 1919-47	USGS City of LA	D					
6-99	Birch Creek near Big Pine	37° 04′ 118° 16′	4,150 -----	1905-24 1936-47	USGS City of LA	A, D					
6-100	Tinemaha Creek near Big Pine	37° 04′ 118° 16′	4,170 ---	1906-11 1931-47	USGS City of LA	A, D					
6-101	Owens River near Big Pine	37° 02′ 118° 14′	3,850	1906-40	USGS	A, D	246,900	7-48	460,000	1924-25	126,000
6-102	Taboose Creek near Aberdeen	37° 00′ 118° 16′	4,100 ---	1906-11 1929-47	USGS City of LA	A, D					
6-103	Goodale Creek near Aberdeen	36° 59′ 118° 16′	3,960 -----	1906-11 1929-47	USGS City of LA	A, D					

6-104	Division Creek near Independence	36° 56′ 118° 16′	4,100	1906-11 1929-32 1935-36 1937-47	USGS City of LA	D					
6-105	Oak Creek near Independence	36° 50′ 118° 14′	4,000	1905-11 1924-47	USGS City of LA	A, D					
6-106	Little Pine Creek (Independence Creek) near Independence	36° 48′ 118° 12′	3,975 .	1904-10 1914-47	USGS City of LA	A, D					
6-107	Owens River near Citrus	36° 48′ 118° 08′	3,730	1903-06	USGS	B, D					
6-108	Owens River near Lone Pine	36° 37′ 118° 02′	3,650	1909-17	USGS	A, D					
6-109	Lone Pine Creek near Lone Pine	36° 36′ 118° 04′	3,800	1906-11 1913-47	USGS City of LA	B, D					
6-110	Tuttle Creek near Lone Pine	36° 35′ 118° 05′	4,200	1906-11 1931-47	USGS City of LA	A, D					
6-111	Cottonwood Creek near Olancha	36° 26′ 118° 05′	5,100	1903-47	USGS	A, D					
6-112	Shepard Creek near Thebe	36° 44′ 118° 10′	4,100	1906-11	USGS	B, D					
6-113	Bairs Creek near Thebe	36° 43′ 118° 11′	4,200 .	1906-11 1932-47	USGS City of LA	B, D					
6-114	George Creek near Thebe	36° 41′ 118° 10′	4,200	1906-11 1930-47	USGS City of LA	B, D					
6-115	Ash Creek near Lone Pine	36° 23′ 118° 04′	4,900	1905-32 1936-47	USGS City of LA	B, D					
	Mojave River Basin										
6-116	Mojave River, West Fork, near Hesperia	34° 20′ 117° 15′	3,050	1904-21 1930-47	Awhd Co. USGS	A	33,150	1907	118,000	1931	3,090
6-117	Deep Creek near Hesperia	34° 21′ 117° 14′	3,050	1904-22 1929-47	Awhd Co. USGS	A	58,200	1922	177,000	1934	11,690

TABLE 71—Continued

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL INOFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, LAHONTAN AREI

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								eason	Acre-feet	Season	Acre-feet
	Mojave River Basin—Continued										
6-118	Mojave River at Victorville	34° 32′ 117° 17′	2,700	1899-1906 1930-36	USGS	A	53,960	1903	107,000	1936	20,420
6-119	Mojave River at Narrows near Victorville	34° 34′ 117° 19′	2,645	1905-15 1937-47	Awhd Co. USGS	A	95,270	1907	202,000	1942	25,790
6-120	Mojave River near Helendale at Rocky Point	34° 45′ 117° 20′	2,375	1908-11	Awhd Co.	A					
6-121	Mojave River near Hodge	34° 50′ 117° 11′	2,250	1930-32	USGS	A					
6-122	Mojave River at Barstow	34° 54′ 117° 01′	2,100	1930-47	USGS	A	31,860	1938	138,100	1933-34	0
6-123	Mojave River at Afton	35° 02′ 116° 21′	1,350	1927-32	USGS	A					
6-124	Rock Creek near Valyermo	34° 25′ 117° 50′	4,050	1923-37 1938-47	USGS	A	12,400	1941	36,420	1925	2,860
6-125	Little Rock Creek near Little Rock	34° 28′ 118° 01′	3,290	1931-37 1940-47	LA Co. FCD USGS	A	16,600	1941	51,620	1936	3,320

TYPE OF RECORD

A—Daily.
B—Monthly.
C—Seasonal.
D—Intermittent.
E—Reservoir contents only.

SOUR OF RECORD

Abbreviation	*Name*
USGS	United ates Geological Survey.
DWRWA	Divisic ɔf Water Resources Water Rights Adju cation.
City of LA	City of ɔs Angeles.
Awhd Co.	Arrowl ıd Corporation.
LA Co. FCD	Los An les County Flood Control District.

TABLE 72

ESTIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, LAHONTAN AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
1	Twelve Mile Creek Basin			5,100
2	Alkali Lake Basin			174,000
	In Nevada			(44,000)
3	Duck Flat Basin			13,000
4	Madeline Plains Basin			61,000
	In Nevada			(8,000)
5	Smoke Creek Group			27,000
6	Eagle Lake Group			136,000
	Honey Lake Basin			
7-1	Susan River above gage near Susanville	50,900		
7-2	Remainder of Honey Lake Basin	59,000		109,900
	Truckee River Basin			
8-1	Above gage at Tahoe	173,000*		
8-2	Donner Creek above gage near Truckee	55,200		
8-3	Prosser Creek above gage near Truckee	60,800		
8-4	Little Truckee River above gage above Boca Reservoir	137,000		
8-5	Remainder of Truckee River above gage at Farad	155,000		
	Above gage at Farad		581,000*	
8-6	Remainder of Truckee River in California	28,000		
	Truckee River in and draining into California			609,000*
	In Nevada			(112,000)
	Carson River Basin			
9-1	West Fork above gage at Woodford	84,300		
9-2	Remainder of West Fork in California	40,000		
	West Fork at California State Line		124,300	
9-3	East Fork above gage near Gardnerville	274,000		
	In Nevada	(10,000)		
	Carson River Basin			398,300
	In Nevada			(10,000)
	Walker River Basin			
10-1	West Walker River above gage near Coleville	209,000		
10-2	Remainder of West Walker River in California	59,000		
	West Walker River in California		268,000	
10-3	East Walker River above gage near Bridgeport	163,000		
10-4	Remainder of East Walker River in California	53,000		
	East Walker River in California		216,000	
	Walker River Basin in California			484,000
	Mono Lake Basin			
	Walker Creek at Walker Lake	5,320		
	Rush Creek below Silver Lake	62,700		
	Parker Creek below Parker Lake	8,290		
	Leevining Creek at Power Plant No. 3	49,600		
	Mill Creek at Lundy Lake	22,000		
	Remainder of East Sierra drainage	47,090		
11-1	East Sierra drainage to Mono Lake		195,000	
11-2	Remainder of Mono Lake Basin	27,000		
	Mono Lake Basin			222,000
	In Nevada			(5,000)

* Does not include 375,000 acre-feet annual evaporation from Lake Tahoe.

TABLE 72—Continued

TIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING RUNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, LAHONTAN AREA

In Acre-feet

umber on ate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
12	Huntoon Valley Basin in California			4,000
13	Adobe Valley Basin			39,000
	In Nevada			(1,000)
	Owens River Basin			
14-1	Owens River above gage near Round Valley	164,800		
14-2	Rock Creek above gage near Little Round Valley	27,600		
14-3	Remainder of Owens River above Tinemaha Reservoir	219,000		
	Owens River above Tinemaha Reservoir		411,400	
14-4	Remainder of Owens River	124,600		
	Owens River Basin			536,000
	In Nevada			(10,000)
15	Cottonwood Creek Group			35,000
16	Deep Springs Group			71,000
17	Amargosa River Basin			124,000
	In Nevada			(32,000)
18	Ivanpah Valley Group			11,000
	Mojave River Basin			
	Below Forks	79,700		
19-2	Remainder of Mojave River	59,000		138,700
20	Antelope Valley Basin			66,000
	Searles Lake Group			
21-1	East Drainage of Sierra Nevada Mountains	40,000		
21-2	Remainder of Searles Lake Group	95,000		135,000
	TOTAL, LAHONTAN AREA IN CALIFORNIA			3,177,000

TABLE 73

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, LAHONTAN AREA

In Acre-feet

Season Oct. 1-Sept. 30	Susan River near Susanville	Lake Tahoe above Outlet*	Donner Creek near Truckee	Prosser Creek near Truckee	Little Truckee River above Boca	Truckee River near Farad‡
894-95	74,300	416,000	84,000	87,000	195,000	598,000
95-96	110,000	94,000	47,800	49,400	110,000	339,000
96-97	53,300	319,000	73,500	76,000	170,000	522,000
97-98	16,500	—74,000	28,600	29,600	66,100	203,000
98-99	22,800	24,000	40,100	41,500	92,700	285,000
899-1900	73,600	107,000	49,400	51,100	114,000	351,000
00-01	104,000	321,000	82,400	85,200	190,000	585,000
01-02	67,100	136,000	59,700	61,700	138,000	424,000
02-03	36,800	149,000	51,100	53,900	121,000	370,000
03-04	168,000	516,000	115,000	138,000	280,000	750,000
904-05	63,000	100,000	47,100	52,900	122,000	363,000
05-06	69,800	534,000	96,500	105,000	256,000	719,000
06-07	203,000	764,000	101,000	127,000	273,000	875,000
07-08	34,900	52,000	38,000	52,200	112,000	304,000
08-09	81,200	404,000	60,900	119,000	241,000	691,000
909-10	43,200	234,000	71,300	110,000	208,000	536,000
10-11	82,500	476,000	85,800	115,000	287,000	806,000
11-12	17,800	44,000	28,700	27,500	75,800	258,000
12-13	22,800	41,000	13,900	39,000	90,000	268,000
13-14	95,200	475,000	99,300	103,000	287,000	706,000
914-15	67,900	124,000	55,100	59,600	136,000	409,000
15-16	72,400	322,000	87,200	90,200	201,000	619,000
16-17	63,300	229,000	61,300	63,400	142,000	436,000
17-18	24,800	87,300	38,100	39,400	88,000	270,000
18-19	44,900	44,000	56,100	58,000	130,000	398,000
919-20	20,300	4,900	33,700	34,900	78,000	239,000
20-21	59,700	183,000	57,100	59,000	132,000	405,000
21-22	45,700	242,000	66,700	69,000	154,000	474,000
22-23	19,700	223,000	49,900	51,600	115,000	354,000
23-24	3,200	—202,000	13,900	14,400	32,200	99,000
924-25	16,500	211,000	42,800	44,300	98,900	304,000
25-26	17,800	—66,700	30,900	32,000	71,400	219,000
26-27	45,700	319,000	78,800	81,500	182,000	560,000
27-28	29,200	96,500	48,500	51,100	114,000	351,000
28-29	8,300	—121,000	27,900	27,900	62,300	192,000
929-30	26,000	68,200	43,300	44,600	99,600	306,000
30-31	3,200	—142,000	19,900	20,000	44,600	137,000
31-32	15,900	179,000	53,600	55,700	124,000	382,000
32-33	7,000	—91,900	35,900	30,800	69,000	211,000
33-34	5,100	—38,600	30,200	25,300	56,000	174,000
934-35	38,600	91,300	54,700	54,500	122,000	374,000
35-36	27,300	288,000	69,000	64,000	143,000	439,000
36-37	23,900	71,300	46,500	45,700	102,000	313,000
37-38	227,000	523,000	87,300	109,000	244,000	750,000
38-39	5,700	—81,100	24,700	24,100	53,900	166,000
939-40	44,900	280,000	71,300	72,200	156,000	496,000
40-41	74,800	167,000	58,200	60,900	139,000	418,000
41-42	76,800	344,000	64,800	70,400	158,000	483,000
42-43	41,000	360,000	64,200	72,500	161,000	502,000
43-44	37,400	—33,200	32,800	32,400	81,000	243,000
944-45	24,100	169,000	52,600	49,200	122,000	347,000
45-46	25,700	207,000	57,200	61,100	132,000	388,000
946-47	14,300	—26,600	36,600	32,200	79,000	221,000
MEAN	50,900	173,000	55,200	60,800	137,000	408,000

* Does not include lake evaporation, estimated to be 375,000 acre-feet annually.
‡ Runoff below Lake Tahoe outlet.

TABLE 73—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, LAHONTAN AREA

In Acre-feet

Season Oct. 1-Sept. 30	Truckee River at Farad*	East Fork Carson River near Gardnerville	West Fork Carson River at Woodfords	West Walker River near Coleville	East Walker River near Bridgeport	Walker Creek at Walker Lake
1894-95	1,014,000	372,000	125,000	304,000	222,000	8,400
95-96	433,000	243,000	69,600	165,000	136,000	6,800
96-97	841,000	335,000	108,000	257,000	191,000	7,100
97-98	129,000	173,000	43,900	105,000	103,000	3,400
98-99	309,000	215,000	58,800	139,000	123,000	3,800
1899-1900	458,000	247,000	71,800	167,000	138,000	4,400
00-01	906,000	379,000	103,000	294,000	214,000	7,400
01-02	560,000	243,000	98,500	165,000	138,000	5,200
02-03	519,000	325,000	85,000	225,000	159,000	5,300
03-04	1,266,000	449,000	128,000	265,000	214,000	6,400
1904-05	463,000	254,000	78,000	177,000	144,000	5,000
05-06	1,253,000	432,000	163,000	417,000	327,000	9,200
06-07	1,639,000	508,000	210,000	483,000	375,000	10,600
07-08	356,000	224,000	72,400	172,000	109,000	5,100
08-09	1,095,000	387,000	142,000	285,000	209,000	7,100
1909-10	770,000	312,000	103,000	234,000	165,000	6,000
10-11	1,282,000	478,000	150,000	402,000	306,000	9,200
11-12	302,000	201,000	73,000	112,000	107,000	4,400
12-13	309,000	204,000	74,000	115,000	109,000	3,300
13-14	1,181,000	427,000	108,000	282,000	207,000	6,100
1914-15	533,000	278,000	87,200	212,000	163,000	5,900
15-16	941,000	383,000	130,000	250,000	184,000	6,700
16-17	665,000	291,000	95,200	256,000	174,000	6,400
17-18	357,300	206,000	56,100	192,000	128,000	4,600
18-19	442,000	270,000	73,200	183,000	123,000	3,800
1919-20	243,900	191,000	53,100	171,000	123,000	3,500
20-21	588,000	274,000	83,100	225,000	161,000	5,000
21-22	716,000	309,000	97,600	266,000	193,000	6,500
22-23	577,000	248,000	72,500	221,000	168,000	5,370
23-24	—103,000	120,000	27,200	67,900	96,500	3,290
1924-25	515,000	224,000	62,400	200,000	157,000	4,920
25-26	152,300	146,000	46,400	128,000	117,000	2,340
26-27	879,000	323,000	117,000	236,000	174,000	5,030
27-28	447,500	190,000	71,800	138,000	115,000	3,770
28-29	71,000	167,000	41,700	109,000	102,000	3,470
1929-30	374,200	224,000	62,700	133,000	107,000	3,110
30-31	—5,000	140,000	33,000	71,500	79,600	2,620
31-32	561,000	263,000	83,100	202,000	152,000	4,560
32-33	119,100	177,000	45,000	120,000	113,000	2,800
33-34	135,400	158,000	38,800	95,000	95,300	2,200
1934-35	465,300	259,000	76,500	194,000	144,000	3,710
35-36	727,000	257,000	90,300	203,000	159,000	4,680
36-37	384,300	233,000	64,600	200,000	164,000	4,910
37-38	1,273,000	449,000	161,000	466,000	310,000	8,610
38-39	84,900	153,000	37,400	119,000	121,000	4,280
1939-40	776,000	279,000	76,200	203,000	138,000	5,050
40-41	585,000	255,000	77,600	237,000	180,000	7,480
41-42	827,000	361,000	106,000	262,000	200,000	6,940
42-43	862,000	337,000	90,200	233,000	181,000	6,580
43-44	209,800	183,000	46,900	137,000	128,000	4,360
1944-45	516,000	313,000	76,500	244,000	191,000	6,190
45-46	595,000	261,000	76,200	205,000	156,000	5,210
1946-47	194,400	187,000	48,400	137,000	124,000	4,060
MEAN	581,000	274,000	84,300	209,000	163,000	5,320

* Does not include lake evaporation, estimated to be 375,000 acre-feet annually.

TABLE 73—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, LAHONTAN AREA

In Acre-feet

Season :t. 1-Sept. 30	Rush Creek below Silver Lake	Parker Creek below Parker Lake	Leevining Creek at Power Plant No. 3	Mill Creek at Lundy Lake	Owens River near Round Valley	Rock Creek near Little Round Valley
1 -95	97,100	10,600	66,700	32,300	232,000	41,900
-96	79,000	9,600	48,800	25,200	196,000	34,500
-97	82,500	9,900	58,200	28,900	199,000	34,800
-98	40,800	6,700	29,900	14,400	136,000	21,600
-99	45,000	7,000	39,700	16,900	138,000	22,000
1 -1900	52,100	7,500	42,600	19,800	137,000	22,000
-01	86,100	10,100	67,700	30,300	224,000	40,000
-02	61,300	8,200	42,600	20,600	181,000	31,000
-03	62,700	8,300	48,000	22,900	179,000	30,600
-04	74,800	9,300	58,600	26,600	194,000	34,800
1 -05	59,200	8,100	43,300	20,600	167,000	27,600
-06	106,000	11,600	80,800	37,300	247,000	52,300
-07	122,000	12,800	83,300	39,600	279,000	44,800
-08	59,900	8,100	32,400	18,800	188,000	24,700
-09	82,500	9,900	63,300	30,100	213,000	37,900
1 -10	70,500	8,900	52,400	24,100	190,000	32,000
-11	77,100	11,600	78,400	36,300	253,000	45,000
-12	54,000	7,500	39,300	16,900	156,000	23,900
-13	39,100	6,600	39,100	15,900	139,000	20,300
-14	88,500	9,000	72,600	26,800	234,000	39,400
1 -15	70,400	8,800	62,400	23,700	182,000	33,300
-16	67,500	9,500	54,400	27,200	190,000	39,300
-17	70,100	9,300	54,600	25,800	203,000	35,800
-18	82,000	7,800	40,000	19,400	163,000	24,900
-19	53,200	7,100	37,900	17,300	160,000	26,700
1 -20	53,900	6,800	37,900	15,000	136,000	20,300
-21	70,600	8,900	56,600	14,200	134,000	24,200
-22	77,600	10,400	57,700	17,700	179,000	31,600
-23	55,900	7,500	44,800	16,500	146,000	20,300
-24	34,900	5,270	24,200	9,300	117,000	11,300
1 -25	58,600	6,110	45,200	16,800	112,000	14,200
-26	42,600	7,600	34,400	15,200	127,000	16,700
-27	61,000	8,970	54,100	24,600	147,000	30,800
-28	41,600	7,220	39,800	19,100	118,000	21,700
-29	31,000	5,820	32,800	13,800	91,600	16,700
1 -30	33,600	6,560	32,800	14,500	86,000	14,600
-31	22,900	5,430	23,200	11,000	75,900	10,600
-32	55,800	7,660	51,500	22,900	131,000	24,200
-33	35,200	5,570	35,900	17,300	114,000	16,600
-34	28,000	5,950	23,800	12,100	94,300	13,000
1 -35	60,300	8,280	44,200	16,700	121,000	18,700
-36	64,700	7,650	51,600	24,300	140,000	24,200
-37	58,100	7,760	40,300	23,300	160,000	26,200
-38	105,000	10,900	75,500	36,000	238,000	46,800
-39	38,600	7,260	29,400	16,300	135,000	23,000
1 -40	55,000	8,040	62,000	22,600	151,000	25,400
-41	82,900	9,470	67,500	28,300	180,000	33,400
-42	75,500	9,880	68,400	27,300	187,000	27,100
-43	63,900	8,920	75,900	28,100	178,000	26,800
-44	48,400	7,170	42,700	18,300	147,000	21,000
1 -45	70,900	9,140	55,900	26,300	189,000	29,200
-46	65,800	8,630	50,900	23,700	173,000	30,600
1 -47	45,100	6,850	35,100	15,500	148,000	21,500
MEAN	62,700	8,290	49,600	22,000	164,800	27,600

17--27922

TABLE 73—Continued

ESTIMATED SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, FROM MAIN STREAM AND TRIBUTARY BASINS FOR WHICH RECORDS ARE AVAILABLE, LAHONTAN AREA

In Acre-feet

Season Oct. 1-Sept. 30	Remainder of Owens River above Tinemaha Reservoir	Owens River above Tinemaha Reservoir	Remainder of Owens River below Tinemaha Reservoir	Total Owens River above Haiwee Dam	Mojave River below Forks
94-95	311,000	584,900	178,000	762,900	156,000
95-96	261,000	491,500	135,000	626,500	14,000
96-97	261,000	494,800	156,000	650,800	60,000
97-98	183,000	340,600	81,700	422,300	14,000
98-99	181,000	341,000	85,300	426,300	9,000
99-1900	181,000	340,000	82,400	422,400	7,000
00-01	287,000	551,000	162,000	713,000	50,000
01-02	247,000	459,000	126,000	585,000	12,000
02-03	244,000	453,600	125,000	578,600	68,000
03-04	265,000	493,800	134,000	627,800	14,000
04-05	234,000	428,600	102,000	530,600	106,000
05-06	378,000	677,300	276,000	953,300	135,000
06-07	320,000	643,800	193,000	836,800	256,000
07-08	214,000	426,700	134,000	560,700	58,600
08-09	290,000	540,900	235,000	775,900	96,200
09-10	255,000	477,000	134,000	611,000	181,000
10-11	327,000	625,000	164,000	789,000	147,000
11-12	199,000	378,900	105,000	483,900	45,000
12-13	173,000	332,300	98,800	431,100	25,900
13-14	293,000	566,400	194,000	760,400	165,000
14-15	256,000	471,300	140,000	611,300	135,000
15-16	294,000	523,300	200,000	723,300	235,000
16-17	248,000	486,800	146,000	632,800	54,700
17-18	195,000	382,900	113,000	495,900	58,700
18-19	196,000	382,700	111,000	493,700	15,400
19-20	191,000	347,300	107,000	454,300	89,400
20-21	196,000	354,200	96,600	450,800	51,100
21-22	279,000	489,600	160,000	649,600	345,000
22-23	213,000	379,300	101,000	480,300	58,000
23-24	128,000	256,300	52,700	309,000	23,000
24-25	160,000	286,200	66,000	352,200	15,000
25-26	161,000	304,700	68,200	372,900	51,000
26-27	226,000	403,800	126,000	529,800	117,000
27-28	168,000	307,700	72,100	379,800	16,000
28-29	134,000	242,300	54,200	296,500	17,500
29-30	122,000	222,600	69,500	292,100	31,300
30-31	106,000	192,500	49,600	242,100	15,400
31-32	214,000	369,200	121,000	490,200	99,200
32-33	147,000	277,600	79,800	357,400	22,500
33-34	119,000	226,300	58,100	284,400	16,100
34-35	161,000	300,700	85,600	386,300	57,600
35-36	190,000	354,200	114,000	468,200	24,100
36-37	216,000	402,200	151,000	553,200	169,000
37-38	313,000	597,800	178,000	775,800	218,000
38-39	176,000	334,000	110,000	444,000	40,500
39-40	185,000	361,400	110,000	471,400	31,200
40-41	277,000	490,400	194,000	684,400	161,000
41-42	229,000	443,100	131,000	574,100	26,000
42-43	205,000	409,800	140,000	549,800	150,000
43-44	165,000	333,000	121,000	454,000	86,800
44-45	231,000	449,200	138,000	587,200	70,700
45-56	226,000	429,600	133,000	562,600	54,500
46-47	173,000	342,500	103,000	445,500	50,200
MEAN	219,000	411,400	124,600	536,000	79,700

FLOOD FLOWS

Limited information has been found regarding early floods in the Lahontan Area. Newspaper files and historical writings give accounts of floods in 1861-62 on Truckee, Carson, and Walker Rivers, the three main streams that flow into Nevada from California. The towns of Dayton and Empire, and sites of the present cities of Reno, Sparks, and Fallon were inundated and a large lake formed in Truckee Meadows. This damage was all in Neveda and little is known of damage in California. There were also destructive floods on the Truckee and the Carson in 1867, 1886, 1890, and 1892, but the extent of damage in California is not known. During storms of March, 1938, there was a very destructive flood on Mojave River at the southern end of the Lahontan Area.

Maximum recorded instantaneous flood flows at representative stream gaging stations in the Lahontan Area are given in the following tabulation:

Stream and station	*Maximum recorder-instantaneous discharge*	
	Date	*Second-feet*
Truckee River between Lake Tahoe and Farad	November 21, 1950	17,000 *
East Fork Carson River near Gardnerville	December 11, 1937	12,000
West Fork Carson River at Woodfords	December 11, 1937	3,500
Mojave River at Lower Narrows near Victorville	March 2, 1938	70,600

* Preliminary estimate, subject to revision.

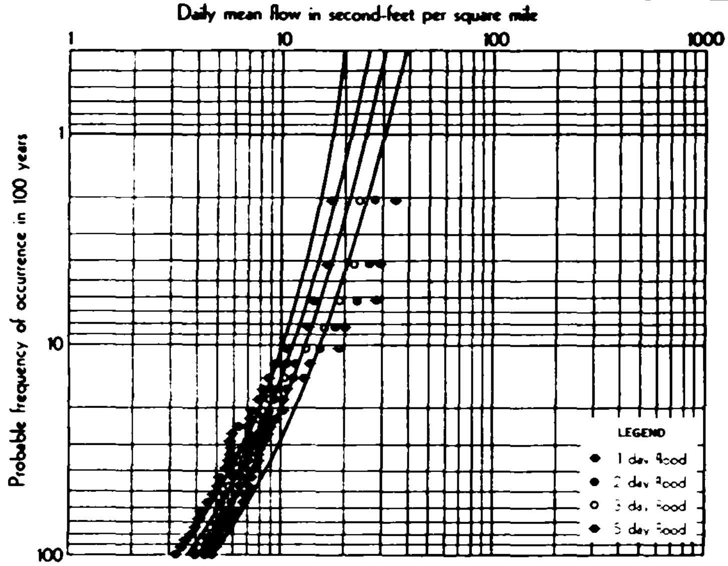
FLOOD FREQUENCIES

In flood-frequency studies for this Area, illustrated on Plates 84 to 87, measured flow at gaging stations named was generally used. However, because of natural and artificial regulation of Truckee River by Lake Tahoe, the flood-frequency study at Farad included only floods produced by the drainage area between Lake Tahoe and Farad.

The stream flow record of Truckee River at the California-Nevada line started in 1899 and was unbroken until 1912. From 1912 to 1937 a station was maintained near the state line at Iceland, and from 1937 to date a station has been maintained at Farad. In the flood-frequency study for Truckee River between Lake Tahoe and Farad, these three records were combined and considered as the record for a single station. The number and size of individual floods were obtained by subtracting flow of the Truckee above the outlet of Lake Tahoe from that in the river at Farad as derived from the three records.

Frequency of occurrence of snow-melt runoff for the four-month period from April 1st to July 31st is shown on Plates 86 and 87, for the Truckee River between Lake Tahoe and Farad, West Fork Carson River at Woodford, West Walker River below West Fork near Coleville, and Owens River near Round Valley.

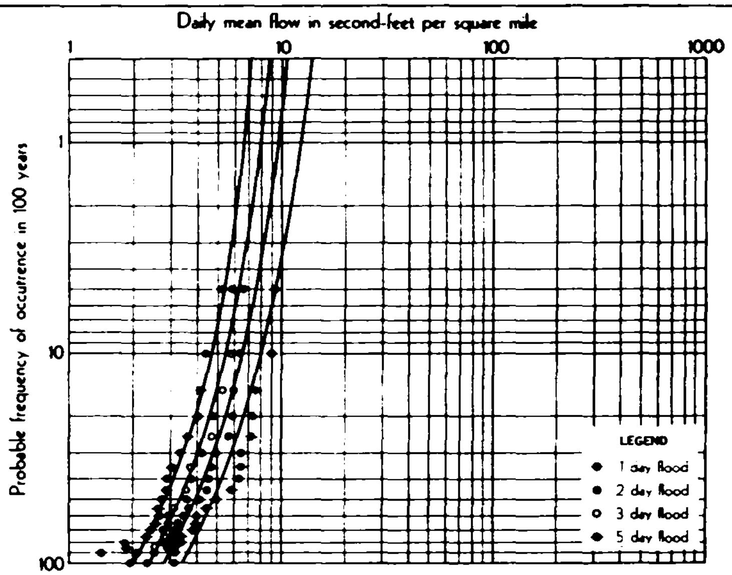
PLATE 84



TRUCKEE RIVER FLOOD DISCHARGE

BETWEEN LAKE TAHOE AND FARAD

AREA OF DRAINAGE BASIN 425 SQUARE MILES

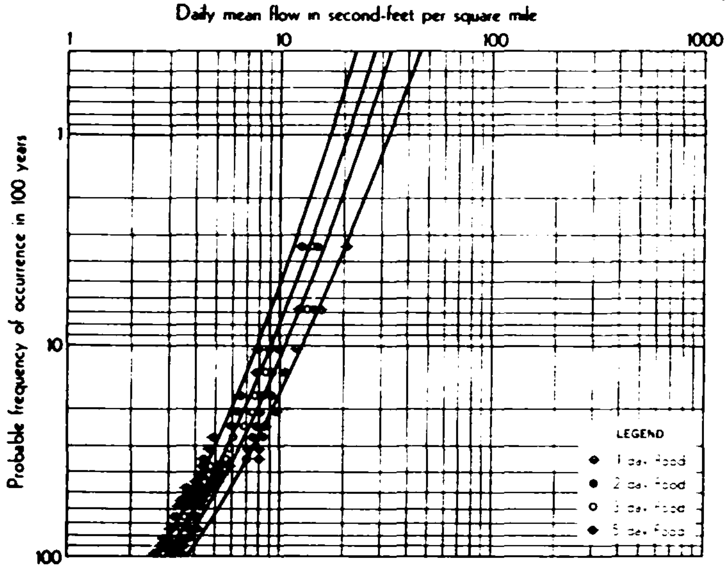


EAST FORK CARSON RIVER FLOOD DISCHARGE

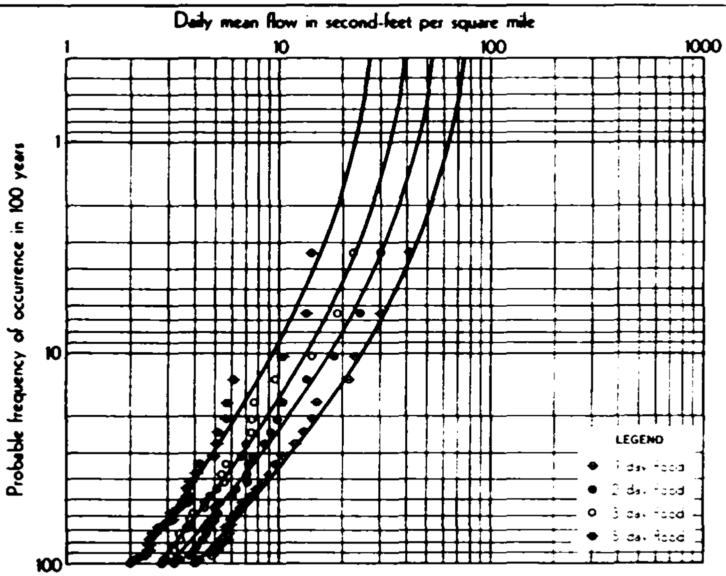
NEAR GARDNERVILLE

AREA OF DRAINAGE BASIN 345 SQUARE MILES

PLATE 85

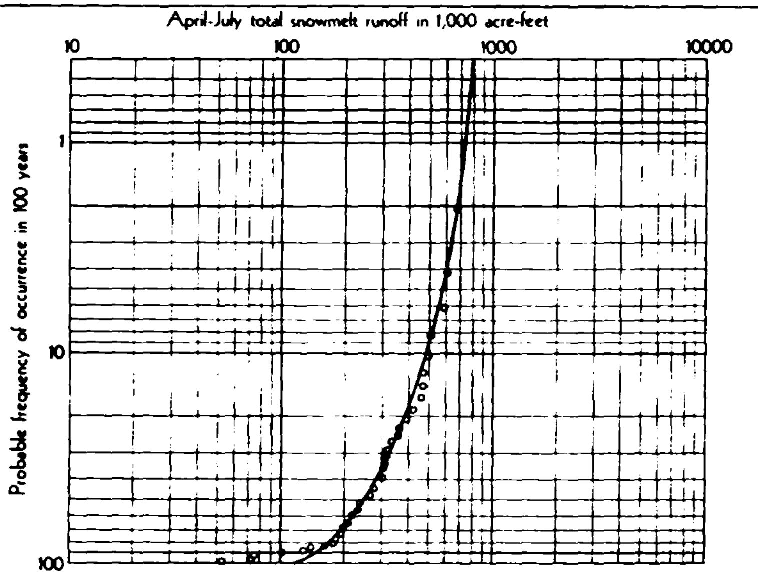


WEST FORK CARSON RIVER FLOOD DISCHARGE
AT WOODFORDS
AREA OF DRAINAGE BASIN 68 SQUARE MILES

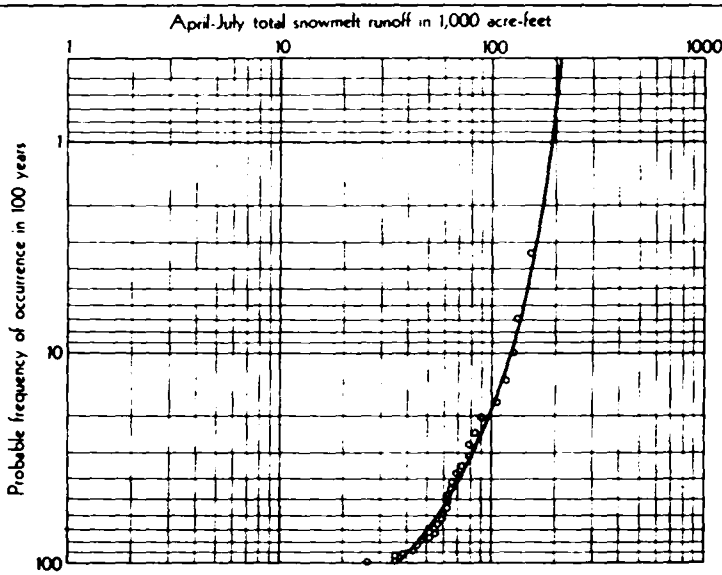


MOJAVE RIVER FLOOD DISCHARGE
AT LOWER NARROWS, NEAR VICTORVILLE
AREA OF DRAINAGE BASIN 53 SQUARE MILES

PLATE 86

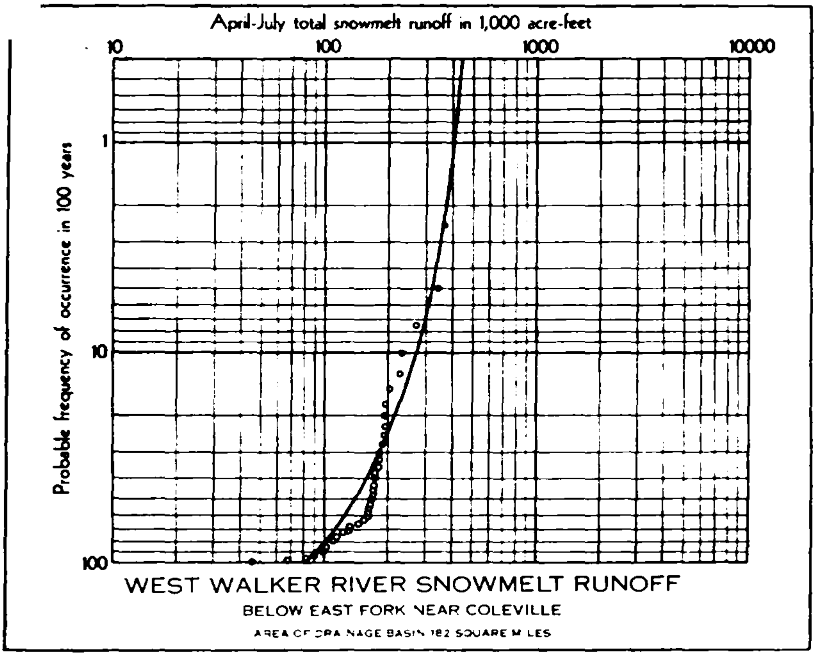


TRUCKEE RIVER SNOWMELT RUNOFF
BETWEEN LAKE TAHOE AND FARAD
AREA OF DRAINAGE BASIN 425 SQUARE MILES

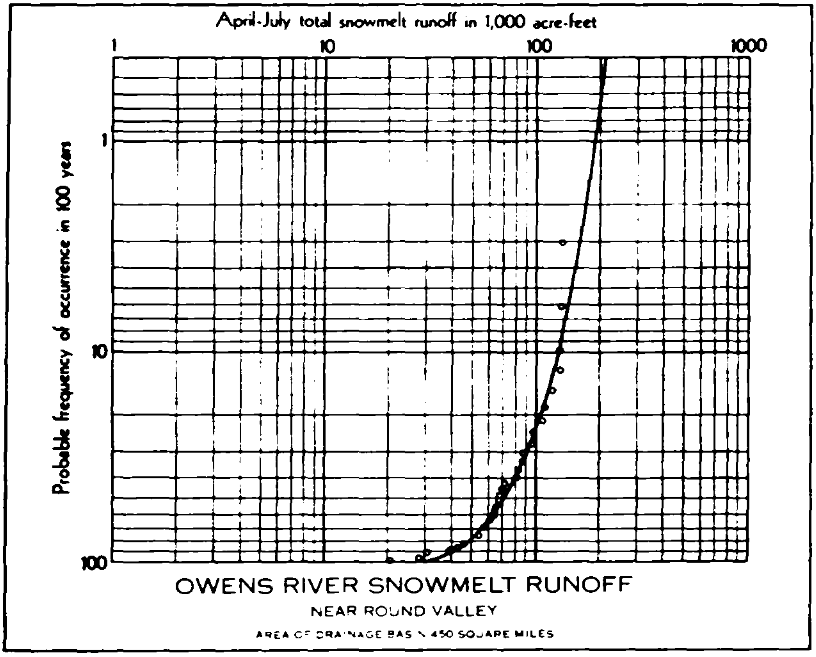


WEST FORK CARSON RIVER SNOWMELT RUNOFF
AT WOODFORDS
AREA OF DRAINAGE BASIN 68 SQUARE MILES

PLATE 87



April-July total snowmelt runoff in 1,000 acre-feet
10
100
1000
10000
Probable frequency of occurrence in 100 years
1
10
100
WEST WALKER RIVER SNOWMELT RUNOFF
BELOW EAST FORK NEAR COLEVILLE



April-July total snowmelt runoff in 1,000 acre-feet
1
10
100
1000
Probable frequency of occurrence in 100 years
1
10
100
OWENS RIVER SNOWMELT RUNOFF
NEAR ROUND VALLEY

QUALITY OF WATER

The Lahontan Area has several closed basins which terminate in kes, salt sinks, or playas, some in California and some in Nevada. The ıportant water supplies originate in the Sierra Nevada north of Owens ake, in the Warner Range in northeastern Modoc County, and along the uthern boundary of the Area in the San Gabriel and San Bernardino ountains. More than 300,000 acre-feet of waters of the Owens Valley ıd Mono Basin are exported annually to the South Coastal Area by the ity of Los Angeles. Relatively minor water supplies originate in a num- r of mineral springs.

ırface Waters

Surface waters draining from eastern slopes of the Warner Range, e Sierra Nevada, and the San Gabriel and San Bernardino Mountains e of excellent mineral quality and well suited for general use, as shown Table 74. These mountains, composed largely of granitic materials, ntribute only slight quantities of mineral solubles to runoff. Low min- al content and favorable composition of the stream flow have coun- rparts in the previously discussed high quality surface waters that flow om western slopes of mountains in the Central Valley Area. In parts of e Lahontan Area hot springs adversely affect surface waters. A typical se is Hot Creek above its confluence with Owens River, which receives flow from hot springs containing high percent sodium, and as high as or more parts per million of elemental boron. About one-third of the ron in the Los Angeles water supply may be attributed to Hot Creek.

Water in Mono Lake contains a concentration of salts higher than at of sea water. These salts are alkaline carbonates, chlorides, and sul- ıates. Even heavier concentrations of similar salts are present in Owens ıke, and in alkali lakes in Surprise Valley. Although moderately min- alized, water of Eagle Lake in Honey Lake Basin, after being mixed th high quality water in Willow Creek, was used for irrigation from 23 until 1935, when the surface of Eagle Lake fell below the intake rtal of the outlet tunnel. Tule Lake in Lassen County contains water usable quality in wetter years.

ound Waters

Use of ground water for irrigation in the Lahontan Area has been nfined mainly to Antelope and Owens Valleys, although there are a w wells in Honey Lake Basin and in Surprise Valley. Analyses of ound waters in Antelope and Owens Valleys, presented in Table 75, ow these waters to be calcic-carbonate type, and generally of good ıality and suitable for irrigation. However, ground waters in local tracts the Owens Valley contain abnormal amounts of boron, as indicated the last three analyses in Table 75. Sodium displaces calcium as the minant base in these latter waters.

TABLE 74

INORGANIC ANALYSES OF SURFACE WATERS, LAHONTAN AR

Source and place of sampling	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Rea	ng values of constituents in me/l and character formula in percent					
					Ca	Mg	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
Lake Tahoe	1906	10	....	40	0.47 *20%*	.25)%	0.47 *20%*	0.91 *42%*	0.06 *3%*	0.11 *5%*	....
West Walker River near Coleville	8/ 3/30	8	....	44	0.55 *28%*	....	0.44 *22%*	0.87 *43%*	0.06 *3%*	0.08 *4%*	Trace ......
Parker Creek in Mono Basin	8/ 4/30	5.53	0.05	38	0.33 *28%*	.04 3%	0.22 *19%*	0.45 *38%*	0.05 *4%*	0.09 *8%*	....
Walker Creek in Mono Basin	8/23/31	4.71	0.01	48	0.17 *19%*	.06 7%	0.21 *24%*	0.30 *28%*	0.10 *10%*	0.13 *12%*	....
Leevining Creek in Mono Basin	8/23/31	4.71	0.01	32	0.25 *26%*	.08 8%	0.15 *16%*	0.40 *32%*	0.10 *8%*	0.12 *10%*	Trace ......
Rush Creek in Mono Basin	8/23/31	7.61	0.03	22	0.44 *29%*	.15)%	0.16 *11%*	0.65 *40%*	0.10 *6%*	0.06 *4%*	Trace ......
Owens River in SW ¼ Sec. 22, T2S, R28E, MDB&M	8/5 /30	19.9	0.40	48	0.41 *11%*	.55 5%	0.91 *24%*	1.45 *39%*	0.35 *9%*	0.07 *2%*	....
Tinemaha Reservoir (composite Owens River)	6/22/33	28.7	0.56	52	0.93 *16%*	.45 8%	1.47 *26%*	2.35 *39%*	0.48 *8%*	0.18 *3%*	Trace ......
Hot Creek in E½ Sec. 19, T3S, R19E, MDB&M	8/ 7/30	59.4	2.38	76	0.76 *7%*	.63 5%	4.48 *38%*	3.70 *32%*	1.65 *13%*	0.52 *3%*	....
Mojave River in SW ¼ Sec. 18, T3N, R3W, SBB&M	1/ 5/32	16.5	0.03	24	0.85 *26%*	.41 2%	0.39 *12%*	1.25 *43%*	0.11 *4%*	0.08 *3%*	....

TABLE 75

INORGANIC ANALYSES OF GROUND WATERS, LAHONTAN AREA

Source and location	Date	Conductance (K x 10⁶)	Boron, ppm	Percent sodium	Reacti values of constituents in me/l and aracter formula in percent						
					Ca	M	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
Antelope Valley:											
DWR Well B in Sec. 23, T5N, R10W, SBB&M........	9/14/48	79	0.50	6	4.80	2	0.39	4.00	1.35	2.54	------
					30%	*1*	*3%*	*25%*	*9%*	*16%*	------
DWR Well B in Sec. 18, T5N, R13W, SBB&M.......	10/ 5/48	31	0.50	32	1.40	0	1.00	2.16	0.56	0.42	------
					22%	*1*	*16%*	*34%*	*9%*	*7%*	------
DWR Well A in Sec. 13, T5N, R14W, SBB&M.....	10/ 5/48	79	0.50	24	2.80	3	1.91	5.59	1.47	0.87	------
					18%	*2*	*12%*	*35%*	*9%*	*6%*	------
DWR Well B in Sec. 23, T5N, R14W, SBB&M........	10/ 5/48	45	0.50	30	2.40	0	1.40	2.16	1.92	0.46	------
					26%		*15%*	*23%*	*21%*	*6%*	------
DWR Well B in Sec. 24, T6N, R12W, SBB&M........	9/14/48	34	0.50	16	1.80	1	0.57	2.23	0.56	0.64	------
					26%	*1*	*8%*	*33%*	*8%*	*9%*	------
DWR Well D in Sec. 15, T7N, R12W, SBB&M	9/14/48	34	0.50	22	1.60	0	0.78	2.43	0.34	0.60	------
					24%	*1*	*11%*	*36%*	*5%*	*9%*	------
DWR Well A in Sec. 23, T7N, R15W, SBB&M...	3/15/49	90	0.50	4	4.80	3	0.30	6.49	1.47	0.98	0.24
					26%	*2*	*2%*	*35%*	*8%*	*5%*	*2%*
DWR Well A in Sec. 22, T8N, R15W, SBB&M........	3/15/49	46	0.50	0	3.20	1	------	3.54	0.34	0.70	------
					34%	*1*	*0*	*39%*	*4%*	*7%*	------
DWR Well A in Sec. 32, T8N, R16W, SBB&M.....	3/15/49	62	0.50	0	3.60	2	0.02	4.46	0.39	1.39	0.08
					29%	*2*	*0*	*35%*	*3%*	*11%*	*1%*

DWR Well A in Sec. 2, T8N, R17W, SBB&M	3/15/49	62	0.50	18	3.60 *29%*	.56 *8%*	1.09 *9%*	4.20 *33%*	0.56 *4%*	1.50 *12%*	0.08 *1%*
Owens Valley:											
DWR Well 31 in Sec. 27, T13S, R35E, MDB&M	8/30/34	14	0.03	42	0.55 *20%*	.24 *9%*	0.60 *21%*	1.06 *38%*	0.17 *6%*	0.17 *6%*	------ ------
DWR Well 60 in Sec. 16, T13S, R35E, MDB&M	8/30/34	11	0.07	28	0.90 *27%*	.32 *9%*	0.48 *14%*	1.16 *34%*	0.31 *9%*	0.23 *7%*	------ ------
DWR Well 82 in Sec. 24, T14S, R35E, MDB&M	8/30/34	15	0.00	38	0.60 *20%*	.32 *1%*	0.55 *19%*	1.26 *43%*	0.11 *4%*	0.10 *3%*	------ ------
DWR Well 75 in Sec. 10, T14S, R35E, MDB&M	8/30/34	13	0.00	26	0.65 *23%*	.40 *4%*	0.35 *13%*	1.06 *38%*	0.22 *8%*	0.12 *4%*	------ ------
DWR Well 106 in Sec. 27, T11S, R34E, MDB&M	9/25/34	20	0.07	26	0.85 *21%*	.65 *6%*	0.57 *13%*	1.60 *39%*	0.22 *5%*	0.25 *6%*	------ ------
DWR Well 16 in Sec. 10, T11S, R34E, MDB&M	10/17/34	31	0.09	28	1.55 *24%*	.81 *2%*	0.91 *14%*	2.70 *41%*	0.30 *5%*	0.25 *4%*	0.02 ------
DWR Well 58 in Sec. 23, T12S, R35E, MDB&M	8/20/35	128	3.68	64	2.55 *9%*	.45 *9%*	8.56 *32%*	7.22 *28%*	4.08 *15%*	1.77 *7%*	------ ------
DWR Well 104 in Sec. 22, T12S, R34E, MDB&M	8/20/35	103	2.10	52	3.25 *16%*	.72 *8%*	5.21 *26%*	4.18 *21%*	4.40 *21%*	1.33 *8%*	------ ------
DWR Well 54 in Sec. 26, T12S, R34E, MDB&M	4/18/35	180	7.40	82	1.20 *3%*	.37 *6%*	15.82 *41%*	10.30 *25%*	7.21 *18%*	2.63 *7%*	0.07 ------

LIST OF ABBREVIATIONS USED IN TABLE 75

Abbreviation	*Name*
SBB&M	San Bernardino Base and Meridian.
DWR	Division of Water Resources.
MDB&M	Mount Diablo Base and Meridian.

(*Division of Highways Photo*)

JOSHUA TREES—COLORADO DESERT AREA

CHAPTER X. COLORADO DESERT AREA

Although the Colorado Desert Area is characteristically arid, it is nmed by high mountains on the northwest, with peaks that may be scribed as Alpine in nature. Irrigation by surface water from the lorado River, and by pumping from ground water in the Coachella illey has transformed great acreages of desert lands into productive rmlands, making the Area one of the most outstanding agricultural gions in the State.

LOCATION AND DESCRIPTION

The Colorado Desert Area, designated Area No. 7 on Plate 2, braces the portion of the Colorado River Basin that is within Cali-nia, including the Salton Sea Basin and local sinks east of the South astal Area. It extends from the southern boundary of the Lahontan ea to the California-Mexico boundary. Large expanses are below sea el, the lowest point being Salton Sink with its lowest elevation 278 feet low sea level. The Area lies between latitudes 32½° and 35½° N., and ends about 180 miles north to south and about 150 miles east to west.

The Colorado River, which forms the eastern boundary of Southern lifornia and borders the Colorado Desert Area on the east, together th its great drainage basin of over 250,000 square miles reaching into en states, is considered in Appendix E, "Colorado River."

STREAMS AND AREAS OF DRAINAGE BASINS

Most of the runoff in the Colorado Desert Area is derived from the ithern portion of the San Bernardino Mountains, from which White-ter River drains into Salton Sea. Several minor streams drain from San Jacinto and Peninsular Ranges toward Salton Sea. New and amo Rivers, old overflow channels of Colorado River, flow from the lifornia-Mexico border through Imperial Valley to Salton Sea, but y now contribute no natural runoff, carrying only waste and other inage from canals and irrigated lands of the Imperial Valley and the xicali Valley in Mexico. Streams directly tributary to Colorado River this Area are small, with only sporadic flow. Table 76 lists areas of inage basins in the Colorado Desert Area.

PRECIPITATION

Seasonal precipitation in the Colorado Desert Area is light, the sonal average for stations with records extending ten years or longer, wn in Table 77, being 7.9 inches. For stations under 1,000 feet in eleva-1 the seasonal average is 3.6 inches, and for those above 1,000 feet it is 6 inches. Three-fourths of the seasonal precipitation occurs from ember to April, inclusive, but local cloudbursts of high intensity are infrequent from May to November.

Summers in the Colorado Desert Area are hot, with low relative nidity, and there is marked contrast between day and night tempera-es during all seasons. Eighty-five percent of possible sunshine is

TABLE 76

AREAS OF DRAINAGE BASINS, COLORADO DESERT AREA

In Square Miles

(Only Figures in Bold Face Type Are Carried Into "Totals, Colorado Desert Area")

Number on Plate 2	Stream or stream group basin	Mountains and foothills	Valley and mesa	Totals
1	Mojave Desert Group	**5,833**	**2,764**	**8,597**
2	Whitewater River Basin	**1,074**	**500**	**1,574**
3	West Salton Sea Group	**84**	**341**	**425**
4	Carrizo Creek Group	**969**	**489**	**1,458**
5	Coyote Wash Group	**96**	**182**	**278**
6	Imperial Irrigation District Group	**11**	**1,683**	**1,694**
7	East Salton Sea Group	**637**	**771**	**1,408**
	Direct drainage to Colorado River			
8-1	Pilot Knob Group	81	231	312
8-2	Yuma Group	345	610	955
8-3	Blythe Group	155	563	718
8-4	Needles Group	644	1,667	2,311
	Colorado River direct	**1,225**	**3,071**	**4,296**
	TOTALS, COLORADO DESERT AREA IN CALIFORNIA	**9,929**	**9,801**	**19,730**

normal. Prevailing winds are from the west, with highest velocities in the spring. Of the 20 precipitation stations in the Area that have unbroken records of 10 or more seasons, that at Indio has the longest record, being unbroken since 1878. The 20 stations now maintained are insufficient to cover adequately the 19,730 square miles in the Area.

Maximum recorded seasonal precipitation in the Area occurred at Raywoods Flat, at an elevation of 7,200 feet in San Bernardino County, in 1936-37, and amounted to 68.34 inches. Average seasonal precipitation at this station is 39.22 inches. Palm Springs, at an elevation of 584 feet in Riverside County, recorded no precipitation during 1896-97, the seasonal average at this station being 5.77 inches. At Bagdad, at an elevation of 784 feet in San Bernardino County, there was no precipitation during 1917-18, and average seasonal precipitation is only 2.24 inches. Elevations of the 20 present stations range from 250 feet below sea level to 7,200 feet above.

Continuous recorders are maintained at nine precipitation stations in the Area, as listed in Table 78, the first having been installed at Coachella in 1939. Records provided by these recorders are not of sufficient length to show satisfactorily rainfall intensities to be expected in the Area. Precipitation stations with records of less than 10 years are listed in Table 79. Data presented in Table 80, and on the bar diagrams of Plate 88, "Distribution of Precipitation at Selected Stations, Colorado Desert Area," relate to monthly distribution of precipitation at four stations considered representative of the Area with respect to elevations and topography. At each of these stations the minimum recorded precipitation for every month of the year was zero.

Mean seasonal precipitation on valley and mesa lands of the Colorado Desert Area for the period from 1897-98 to 1946-47 is estimated to have been 2,030,000 acre-feet, as shown in Table 81. Precipitation records are so scattered in this Area that this estimate is no more than a rough approximation. Although nearly half of the Colorado Desert Area is classed as valley or mesa land, rainfall upon it is generally so light that aggregate contribution from this source to the State's water resources is of little practical significance.

TABLE 77

MEAN, MAXIMUM, AND MINIMUM SEASONAL PRECIPITATION AT STATIONS WITH UNBROKEN RECORDS OF 10 YEARS OR LONGER, COLORADO DESERT AREA

(For Explanatory Notes, See End of Table)

No. on Plate 3	Name of station	County	Latitude and longitude	Elevation, feet	Period of record	Type and source of record	Mean for—		Maximum and minimum	
							Period of record	1897-1947	Season	Inches
7-13	Amos	Imperial	33° 08' 115° 16'	255	1878-79 1930-31	BC USWB	2.46	3.02	1911-12 1897-98	7.85 Trace
7-18	Bard	Imperial	32° 47' 114° 32'	137	1911-12 1937-38	B Private	3.91	4.18	1926-27 1928-29	9.20 0.36
7-15	Brawley	Imperial	32° 59' 115° 32'	—119	1909-10 1945-46	B USWB	2.70	2.40	1939-40 1933-34	8.02 0.02
7-17	Calexico	Imperial	32° 40' 115° 30'	0	1905-06 1946-47	B USWB	2.81	2.71	1921-22 1924-25	6.84 0.71
7-16	El Centro	Imperial	32° 49' 115° 34'	—52	1932-33 1946-47	BD USWB	3.11	3.17	1940-41 1933-34	7.19 0.67
7-14	Imperial	Imperial	32° 50' 115° 36'	—69	1902-03 1946-47	BD USWB	3.67	3.49	1904-05 1928-29	10.03 0.16
7-19	Banning No. 3	Riverside	33° 56' 116° 52'	2,400	1919-20 1938-39	B Private	17.52	16.18	1936-37 1933-34	30.18 9.46
7-11	Blythe	Riverside	33° 36' 114° 36'	268	1909-10 1946-47	BC USWB	4.13	4.03	1939-40 1933-34	8.25 0.21
7-9	Hayfield Reservoir	Riverside	33° 42' 115° 37'	1,372	1936-37 1946-47	AB USWB	5.28	3.69	1939-40 1942-43	11.29 3.23
7-6	Hurley Flat	Riverside	33° 52' 116° 47'	3,600	1919-20 1937-38	B Private	20.35	20.01	1936-37 1930-31	36.06 8.54
7-8	Indio	Riverside	33° 43' 116° 12'	—20	1878-79 1946-47	BC USWB	3.28	3.57	1939-40 1922-23	11.50 0.18
7-10	Mecca	Riverside	33° 34' 116° 05'	—185	1905-06 1946-47	D USWB	3.40	3.40	1926-27 1928-29	8.01 0.12
7-7	Palm Springs	Riverside	33° 49' 116° 33'	584	1889-90 1946-47	BC USWB	5.77	6.04	1926-27 1896-97	17.68 0
7-12	Salton	Riverside	33° 28' 115° 53'	—250	1889-90 1906-07	BC USWB	2.66	2.71	1904-05 1895-96	9.29 Trace
7-2	Bagdad	San Bernardino	34° 35' 115° 52'	784	1903-04 1942-43	ABC USWB	2.24	2.22	1904-05 1917-18	10.20 0
7-5	Iron Mountain	San Bernardino	34° 09' 115° 07'	924	1935-36 1946-47	AB USWB	3.50	2.93	1939-40 1946-47	9.01 1.11
7-1	Needles Airport	San Bernardino	34° 46' 114° 38'	887	1892-93 1946-47	ABC USWB	4.63	4.81	1939-40 1895-96	13.36 0.50
7-3	Parker Reservoir	San Bernardino	34° 17' 114° 10'	723	1934-35 1946-47	B USWB	6.16	5.28	1940-41 1942-43	13.00 2.97
7-4	Raywood Flats	San Bernardino	34° 03' 116° 50'	7,200	1919-20 1945-46	BD DWR	39.22	37.83	1936-37 1933-34	68.34 23.56
7-20	San Felipe	San Diego	33° 11' 116° 37'	3,600	1911-12 1944-45	B Private	20.60	22.50	1915-16 1918-19	35.28 10.08

ABBREVIATIONS—COLORADO DESERT AREA

TYPE OF RECORD

Abbreviation	*Name*
B	Daily
C	Monthly
D	Seasonal

SOURCE OF RECORD

Abbreviation	*Name*
DWR	State Division of Water Resources
USWB	United States Weather Bureau

TABLE 78

RECIPITATION STATIONS WITH CONTINUOUS RECORDERS, COLORADO DESERT AREA

Asterisk indicates stations at which precipitation records have been kept for 10 years or longer; also the station number on Plate 3)

File umber	Station	County	Latitude and longitude	Elevation, feet	Period of record	Source of record
7-001	El Centro	Imperial	32° 47′ 115° 34′	39	Dec. 1941 June 1947	City of El Centro
7-007	Blythe Airport	Riverside	33° 37′ 114° 43′	385	Nov. 1940 June 1947	CAA
7-008	Coachella	Riverside	33° 41′ 116° 10′	—70	Apr. 1940 June 1947	CAA
7-9*	Hayfield Reservoir	Riverside	33° 42′ 115° 37′	1,372	Dec. 1941 June 1947	Met. WD of S Cal.
7-2*	Bagdad	San Bernardino	34° 35′ 115° 52′	784	Nov. 1941 Dec. 1943	USWB
7-5*	Iron Mountain	San Bernardino	34° 09′ 115° 07′	924	Dec. 1941 June 1947	USWB
7-1*	Needles Airport	San Bernardino	34° 46′ 114° 38′	887	Nov. 1940 June 1947	CAA
7-3*	Parker Reservoir	San Bernardino	34° 17′ 114° 10′	723	Dec. 1941 June 1947	Met. WD of S Cal.
7-016	Canebrake Canyon	San Diego	32° 52′ 116° 20′	2,460	July 1945 June 1947	USWB

SOURCE OF RECORD

Abbreviation	*Name*
USWB	United States Weather Bureau
CAA	Civil Aeronautics Administration Airway Communication Station
Met. WD of S. Cal.	Metropolitan Water District of Southern California

TABLE 79

PRECIPITATION STATIONS WITH RECORDS OF LESS THAN 10 YEARS, COLORADO DESERT AREA

File number	Station	County	Latitude and longitude	Elevation, feet	Period of record	Type of record
7-001	El Centro	Imperial	32° 47′ 115° 34′	39	1942-47	A
7-002	Heber	Imperial	32° 44′ 115° 28′	-20	1906-14	B
7-003	Ogilby	Imperial	32° 49′ 114° 50′	354	1897-1903	C
7-004	Picacho	Imperial	33° 01′ 114° 37′	250	1896-98	B
7-005	Andreas Canyon	Riverside	33° 45′ 116° 33′	800	1920-22	B
7-006	Andreas Garden	Riverside	33° 47′ 116° 33′	700	1920-22	B
7-007	Blythe Airport	Riverside	33° 37′ 114° 43′	385	1940-47	A
7-008	Coachella	Riverside	33° 41′ 116° 10′	-70	1940-47	A
7-009	Millard Canyon	Riverside	33° 57′ 116° 48′	2,500	1919-22	B
7-010	Millard Forks	Riverside	33° 59′ 116° 47′	3,500	1919-22	B
7-011	Mission Valley	Riverside	34° 00′ 116° 34′	1,700	1918-22	B
7-012	Palm Canyon	Riverside	33° 43′ 116° 32′	1,400	1919-21	B
7-013	Whitewater Canyon	Riverside	33° 54′ 116° 38′	1,500	1919-21	B
7-014	Whitewater Ranch	Riverside	33° 57′ 116° 39′	1,200	1920-21	B
7-015	Los Flores	San Bernardino	34° 04′ 116° 39′	1,390	1944	A
7-016	Canebrake Canyon	San Diego	32° 52′ 116° 20′	2,460	1945-47	A

TYPE OF RECORD

Abbreviation	*Name*
A	Hourly
B	Daily
C	Monthly

TABLE 80

AVERAGE MONTHLY PRECIPITATION, AND MAXIMUM AND MINIMUM PRECIPITATION IN E H MONTH FOR THE PERIOD OF RECORD, AT FOUR STATIONS, COLORADO DESERT AREA

In Inches

Month	Amos, Imperial County Number on Plate 3: 7-13			Blythe, Riverside County Number on Plate 3: 7-11			Indi Riverside unty Number or late 3: 7-8			Needles, San Bernardino County Number on Plate 3: 7-1		
	Average monthly	Maximum	Minimum	Average monthly	Maximum	Minimum	Average monthly	Max mu	Minimum	Average monthly	Maximum	Minimum
July	0.15	2.50	0.00	0.29	2.20	0.00	0.07	1.	0.00	0.34	1.88	0.00
August	0.41	5.40	0.00	0.47	2.49	0.00	0.28	3.	0.00	0.72	7.21	0.00
September	0.13	1.05	0.00	0.53	5.72	0.00	0.32	8.	0.00	0.44	7.61	0.00
October	0.12	1.15	0.00	0.26	1.95	0.00	0.20	2.	0.00	0.28	2.37	0.00
November	0.14	1.01	0.00	0.32	1.98	0.00	0.21	1.	0.00	0.34	2.20	0.00
December	0.41	3.18	0.00	0.70	2.57	0.00	0.60	3.	0.00	0.66	3.62	0.00
January	0.23	1.29	0.00	0.45	2.41	0.00	0.67	6.	0.00	0.55	3.36	0.00
February	0.42	3.45	0.00	0.48	3.20	0.00	0.48	3.	0.00	0.58	4.50	0.00
March	0.26	3.45	0.00	0.41	2.50	0.00	0.30	2.	0.00	0.44	2.65	0.00
April	0.11	1.55	0.00	0.17	2.29	0.00	0.11	2.	0.00	0.20	2.12	0.00
May	0.04	1.10	0.00	0.03	0.47	0.00	0.04	0.	0.00	0.08	0.78	0.00
June	0.04	1.90	0.00	0.08	1.76	0.00	0.01	0.	0.00	0.05	0.88	0.00
SEASONAL TOTALS	2.46			4.19			3.21			4.68		

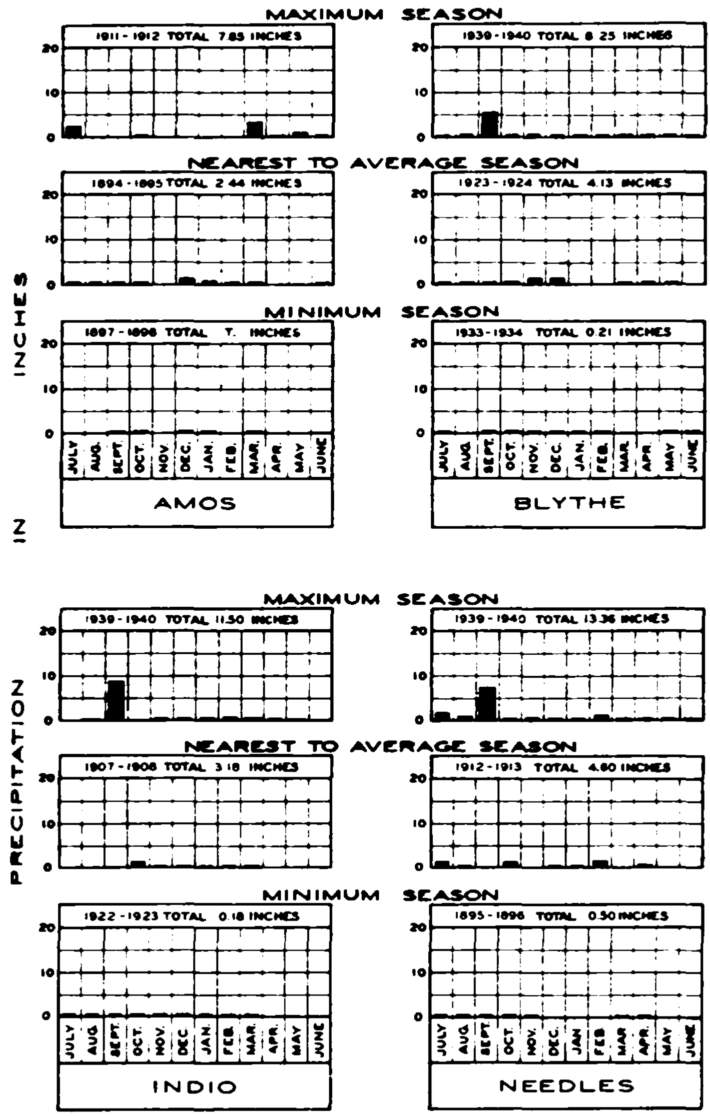
TABLE 81

ESTIMATED MEAN SEASONAL PRECIPITATION ON VALLEY AND MESA LANDS 1897-98 TO 1946-47

COLORADO DESERT AREA

Number on Plate 2	Stream or stream group basin	Precipitation in acre-feet
1	Mojave Desert Group	590,000
2	Whitewater River Basin	133,000
3	West Salton Sea Group	54,600
4	Carrizo Creek Group	156,000
5	Coyote Wash Group	48,500
6	Imperial Irrigation District Group	269,000
7	East Salton Sea Group	123,000
	Direct drainage to Colorado River	
8-1	Pilot Knob Group	49,300
8-2	Yuma Group	130,000
8-3	Blythe Group	120,000
8-4	Needles Group	356,000
	TOTAL, COLORADO DESERT AREA IN CALIFORNIA	2,029,400

PLATE 88



DISTRIBUTION OF PRECIPITATION AT SELECTED STATIONS

COLORADO DESERT AREA

RUNOFF

The Colorado Desert Area has the most meager runoff of the seven hydrographic Areas of the State. Occasional cloudbursts may cause brief and localized torrential runoff. However, runoff from mountains and foothills is usually derived from more general rainfall, and streams in the northwestern portion are partly fed from snow on Mount San Gorgonio and Mount San Jacinto.

Aside from those on the Colorado River, there are only four stream gaging stations in the Area, as listed in Table 82. Owing to lack of adequate runoff records, estimates of long-time mean seasonal runoff were made from available information on types and distribution of storms in the Area, and from historical knowledge of stream flow and of the condition of stream channels. It was assumed that all precipitation in excess of one inch per storm becomes runoff. To estimate runoff, all available precipitation records were examined and one inch was subtracted from recorded precipitation of each storm exceeding that amount. The result was a total probable runoff of 64.11 inches for 188 station-seasons, or a mean runoff of 0.34 inch per season, which is the equivalent of 18 acre-feet per square mile.

Streams in the Area were then segregated into eight stream groups. By applying the estimated seasonal runoff rate of 18 acre-feet per square mile to the drainage area of each group, estimated mean seasonal natural runoff for the 53-year period from 1894-95 to 1946-47 was derived, results of which are shown in Table 83. Total mean seasonal natural runoff for the Area was estimated to be 179,000 acre-feet, or 0.3 percent of the total from mountain and foothill land in the State.

If natural flow of Mojave River is taken as an index of runoff to be expected from basins of the Colorado Desert Area, minimum seasonal runoff in the Area was only 16,000 acre-feet in 1899-1900, and the maximum totaled 774,000 acre-feet in 1921-22. Using the same basis for an estimate, average seasonal water supply of the Area during the 10-year period from 1895-96 to 1904-05 was found to be 44.4 percent of the long-time mean.

TABLE 82

STREAM GAGING STATIONS, AND AVERAGE, MAXIMUM, AND MINIMUM SEASONAL R[illegible] OFF FOR STATIONS WITH RECORDS OF 10 YEARS OR LONGER, COLORADO DESERT AR[illegible]

Number on Plate 2	Stream and location of gaging station	Latitude and longitude	Approximate elevation, feet	Period of record	Source of record	Type of record	Average, period of record, acre-feet	Maximum		Minimum	
								S[illegible]on	Acre-feet	Season	Acre-feet
	Salton Sink										
7-1	Palm Canyon Creek at Palm Springs	33° 45′ 116° 32′	700	1930-41	USGS	A	5,600	1[illegible]-37	18,980	1933-34	168
7-2	Falls Creek near Whitewater	33° 52′ 116° 40′	1,800	1922-31	USGS	A					
7-3	Snow Creek near Whitewater	33° 52′ 116° 41′	2,400	1921-29	USGS	A					
7-4	Southern Pacific Ditch near Whitewater	33° 52′ 116° 41′	2,400	1921-34 Ex.1931	USGS	A	5,187	1[illegible]-27	7,240	1933-34	3,630

TYPE OF RECORD

A—Daily.

SOURCE [illegible]F RECORD

Abbreviation	*Name*
USGS	United State[illegible]logical Survey.

TABLE 83

STIMATED MEAN SEASONAL NATURAL RUNOFF, 1894-95 TO 1946-47, INCLUDING UNOFF OF STREAMS FOR WHICH THERE ARE NO RECORDS, COLORADO DESERT AREA

In Acre-feet

Number on Plate 2	Basin, sub-basin, or stream group	Sub-basin or main tributary	Subtotals	Total for basin or group
1	Mojave Desert Group			105,000
2	Whitewater River Basin			19,300
3	West Salton Sea Group			1,500
4	Carrizo Creek Group			17,400
5	Coyote Wash Group			1,700
6	Imperial Irrigation District Group			200
7	East Salton Sea Group			11,500
	Direct drainage to Colorado River			
8-1	Pilot Knob Group	1,500		
8-2	Yuma Group	6,200		
8-3	Blythe Group	2,800		
8-4	Needles Group	11,600		22,100
	TOTAL, COLORADO DESERT AREA IN CALIFORNIA			178,700

FLOOD FLOWS

Floods in streams and dry washes of the Colorado Desert Area are generally local in nature. While damage resulting from them has occasionally been severe, it has been mainly limited to highways and railroads, and to canals in the Imperial Valley. Principal cause of these local floods has been summer cloudbursts. Because of lack of available data, no studies of flood frequencies in the Area have been attempted during the present investigation. Flood flows in Colorado River are related to the entire Colorado River Basin and are discussed generally in Appendix E.

As a matter of historical interest, a flood of great magnitude in the Colorado Desert Area resulted in 1905 and 1906 from an uncontrolled diversion from Colorado River into Imperial Valley. On May 17, 1904, the California Development Company, through a Mexican subsidiary, "*La Sociedad de Reigos y Terrenos de la Baja California,*" was granted a right by the Mexican Government to convey through Mexico, to the United States, water diverted in the United States or in Mexico and, in addition, a right to divert 10,000 second-feet of water from the Colorado River in Mexico for such purpose.

Because of physical difficulty experienced in diverting water from the Colorado in the United States, two dredger cuts were made from the river in Mexico to accomplish this diversion. The cuts extended to the Alamo Canal, also known as the Imperial Canal, and the first was immediately below, and the second about four miles below the International Boundary. Pending approval by the Mexican Government of the right to install control gates in these cuts, none was constructed, but water neverthe less was diverted into Alamo Canal. Unprecedented floods from Gila River in Arizona during the winter of 1904-05 made closing of the lower cut imperative, but efforts to do this were unavailing. This cut, originally 60 feet wide, had been greatly enlarged by the river, as had also the Alamo Canal below the cut. By August, 1905, the entire Colorado was running through the cut into Imperial Canal, and through Imperial Valley into Salton Sink. Throughout 1906 strenuous efforts to turn the river permanently back into its old channel toward the Gulf of California were unsuccessful. Although the river had been confined to its old channel on November 4, 1906, following completion of Hind Dam, a second break occurred on December 7th. On December 20th, at the request of President Theodore Roosevelt, the Southern Pacific Company started on a second closure. This was finally accomplished on February 19, 1907, with completion of Clarke Dam, which permanently re-established the river in its previous channel. Estimated cost of twice turning back the river exceeded $2,000,000, and widespread damage, estimated to be more than $8,000,000, was caused by flooding. Of recent years, more than 40 years after the closure, the United States paid the Southern Pacific Company over $1,000,000 as compensation for its expenditures in closing the break. Among principal flood losses were virtual destruction of 13,000 acres of agricultural land of which 3,000 acres was under cultivation at the time, extensive damage to the main line of the Southern Pacific Company, scouring of the channels of New and Alamo Rivers, and extensive destruction to portions of the town of Mexicali.

TABLE 84

INORGANIC ANALYSES OF SURFACE WATERS, COLORADO DESERT AREA

Source and place of sampling	Date	Conductance (K x 10^6)	Boron, ppm	Percent sodium	Rea[illegible]ng values of constituents in me/l and character formula in percent						
					Ca	Mg	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
WHITEWATER RIVER DRAINAGE											
San Gorgonio Creek in NE Cor., Sec. 29, T2S, R1E, SBB&M	4/13/37	23.4	0.10	10	1.46 *29%*	.83 *[illegible]%*	0.27 *5%*	2.23 *42%*	0.10 *2%*	0.30 *6%*	---- ----
Snow Creek in NW¼, Sec. 33, T3S, R3E, SBB&M	4/13/37	8.1	0.05	26	0.66 *32%*	.11 *[illegible]%*	0.27 *13%*	0.89 *47%*	0.05 *3%*	Trace ------	Trace ----
Tahquitz Creek in SW¼, Sec. 22, T4S, R4E, SBB&M	4/13/37	7.8	0.13	34	0.43 *26%*	.13 *[illegible]%*	0.28 *17%*	0.72 *41%*	0.10 *5%*	0.07 *4%*	----- ------
Palm Creek in SW¼, Sec. 14, T5S, R4E, SBB&M	4/13/37	58	0.18	36	2.38 *21%*	.34 *[illegible]%*	2.13 *18%*	3.20 *26%*	1.00 *9%*	1.78 *15%*	--- ---
Mission Creek in W½ Sec. 2, T2S, R3E, SBB&M	4/16/37	55.1	0.07	22	3.02 *25%*	.72 *[illegible]%*	1.26 *11%*	4.47 *36%*	0.23 *2%*	1.53 *12%*	----- ----
Whitewater River in NW¼ Sec. 35, T2S, R3E, SBB&M	4/13/37	34.7	0.08	16	1.77 *28%*	.88 *[illegible]%*	0.54 *8%*	3.12 *46%*	0.13 *2%*	0.12 *2%*	------ ------
Whitewater River in NW¼ Sec. 35, T2S, R3E, SBB&M	6/15/38	30.7	0.12	12	1.98 *32%*	.76 *[illegible]%*	0.37 *6%*	2.86 *45%*	0.18 *3%*	0.16 *2%*	Trace ------

COLORADO RIVER DRAINAGE											
Colorado River below Hoover Dam	Jan. 2-3, 6-10, '47	100	0.07	42	3.[illegible] *18[illegible]*	2.30 *11%*	4.50 *21%*	2.57 *12%*	2.09 *10%*	5.95 *28%*	0.02 ------
Colorado River at Parker Dam*	1948	115	0.10	42	4.[illegible] *18[illegible]*	2.58 *11%*	4.86 *21%*	2.39 *10%*	2.53 *11%*	6.77 *29%*	0.01 ------
Colorado River at Imperial Dam	Jan. 1949	--------	--------	40	5.[illegible] *20[illegible]*	2.6 *10%*	5.0 *20%*	2.8 *11%*	2.7 *11%*	7.2 *28%*	0.02 ------
Colorado River water sampled from East Side Canal in Imperial Valley	Feb. 1939	98	--------	34	4.[illegible] *24[illegible]*	1.74 *9%*	3.57 *17%*	2.46 *12%*	2.05 *10%*	5.73 *28%*	0.08 ------

* Average of analyses for the year ended June 30, 1948.

TABLE 85

INORGANIC ANALYSES OF GROUND WATERS, COLORADO DESERT A[illegible]

Source and location (All section designations refer to San Bernardino base line and meridian)	Date	Conductance (K x 10^6)	Boron, ppm	Percent sodium	Reactin[illegible] values of constituents in me/*l* and [illegible]aracter formula in percent						
					Ca	M[illegible]	Na	CO_3+ HCO_3	Cl	SO_4	NO_3
[illegible]oachella Valley:											
Well in SE¼ of Sec. 23, T4S, R4E	7/13/38	38.8	Trace	26	1.91 *30%*	0.[illegible] *7*[illegible]	0.76 *13%*	2.13 *35%*	0.51 *8%*	0.32 *5%*	0.12 *2%*
Well in NW Cor. of Sec. 7, T5S, R4E	8/23/38	28.9	0.07	30	1.66 *29%*	0.[illegible] *6*[illegible]	0.89 *15%*	2.15 *37%*	0.38 *7%*	0.35 *6%*	------ ------
Well "C" in NE¼ of Sec. 21, T5S, R6E	12/12/38	39.9	0.25	30	2.31 *27%*	0.[illegible] *8*[illegible]	1.30 *15%*	2.38 *28%*	0.59 *7%*	1.20 *14%*	0.09 *1%*
Well "j" in SW¼ of Sec. 22, T5S, R6E	12/12/38	49.1	0.10	40	2.54 *25%*	0.[illegible] *5*[illegible]	1.95 *20%*	2.63 *26%*	0.70 *7%*	1.66 *16%*	0.05 *1%*
Well "a" in SE¼ of Sec. 21, T5S, R7E	4/19/38	30.2	0.04	40	1.40 *22%*	0.[illegible] *8*[illegible]	1.27 *20%*	2.45 *40%*	0.25 *4%*	0.32 *5%*	0.05 *1%*
Well "a" in NE¼ of Sec. 31, T5S, R8E	9/13/38	30.4	0.02	44	1.39 *22%*	0.[illegible] *6*[illegible]	1.33 *22%*	2.42 *39%*	0.31 *5%*	0.41 *6%*	------ ------
Well in SW¼ of Sec. 25, T6S, R7E	7/19/38	36.1	Trace	58	1.27 *18%*	0.[illegible] *3*[illegible]	2.09 *29%*	1.96 *27%*	0.97 *14%*	0.67 *9%*	0.01 ------
Well in NW¼ of Sec. 25, T6S, R8E	6/15/32	42.9	0.06	64	0.94 *13%*	0.[illegible] *5*[illegible]	2.38 *32%*	1.25 *17%*	0.90 *12%*	1.56 *21%*	Trace ------

Well "b" in NE Cor. of Sec. 2, T7S, R8E	9/13/38	23.9	Trace	78	0.48	Tr	1.77	1.41	0.36	0.51	------
					11%	---	*39%*	*31%*	*8%*	*11%*	------
Well "b" in NW¼ of Sec. 35, T7S, R8E	4/20/37	34.0	0.07	88	0.32	0.(	2.96	1.64	0.65	0.96	0.01
					5%	*1'*	*44%*	*26%*	*9%*	*15%*	------
Well "b" in NW¼ of Sec. 1, T8S, R8E	12/10/38	30.6	0.15	90	0.19	0.	2.78	1.68	0.32	0.92	0.02
					3%	*2'*	*45%*	*29%*	*5%*	*16%*	------
Well "c" in NE¼ of Sec. 33, T8S, R9E	9/13/38	66.6	0.05	92	0.41	Tr	5.35	2.09	1.11	2.75	------
					4%	---	*46%*	*18%*	*9%*	*23%*	------

QUALITY OF WATER

Beginning in a small way in 1900, Colorado River has been the source of irrigation water for the Imperial Valley, and for a longer period for lands adjacent to the river in the vicinities of Blythe and Yuma. Since 1949 water service from the Colorado has also been available in Coachella Valley, which was almost entirely dependent on ground water prior to that time. A considerable portion of the irrigable lands in Coachella Valley remains dependent upon ground water.

Surface Waters

Excluding the Colorado River, surface inflows to the Colorado Desert Area are largely from minor streams, of which Whitewater River is the largest, originating in the San Bernardino, San Jacinto, San Ysidro, and Santa Rosa Mountains. Waters of these streams are of the calcic-carbonate type. Percent sodium and boron content are low, as are total solubles except in dry-weather flows of Palm, Deep, and Martinez creeks. Inorganic chemical analyses of waters representative of surface streams of the Area are presented in Table 84.

During any year since storage on Colorado River commenced at Lake Mead, the concentration of mineral solubles in water released from the reservoir has varied less than 10 percent from the following: total mineral solubles, 661 parts per million; specific electrical conductance, 100; elemental boron, 0.07 part per million; and percent sodium, 42. Weighted average concentration of salts in water diverted into the Colorado River Aqueduct from the Colorado is about 10 percent higher than the foregoing values.

Ground Waters

No special studies of quality of ground waters in the Colorado Desert Area were made in the present investigation. Instead, reference is made to a paper by Raymond A. Hill, Consulting Engineer, entitled, "Geochemical Patterns in Coachella Valley," in Part 1 of Transactions, American Geophysical Union, January, 1940, and to a report by M. R. Huberty, A. F. Pillsbury, and V. P. Sokoloff, entitled "Hydrologic Studies in Coachella Valley," published in June, 1948, by the University of California Agricultural Experiment Station. Both publications deal with quality of ground water in the Coachella Valley. The detailed studies set forth show that percent sodium is generally less than 30 in ground water of the upper portion of the valley northwest of Indio, and that it gradually increases down the valley toward Salton Sea to about 90 in the vicinity of Mecca. Magnesium gradually decreases from moderate amounts in the upper portion of the valley to only a trace near Mecca. Calcium content shows a similar but less marked decrease down the valley. Representative inorganic chemical analyses of these waters are presented in Table 85.

APPENDIX A

RECLAMATION OF SEWAGE AND WASTE WATERS

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RECLAMATION OF SEWAGE AND WASTE WATERS

Data are presented in this appendix relating to quantity and quality of sewage discharged directly into the ocean or tidal waters in the San Francisco Bay and South Coastal Areas. Such sewage is substantial in amount, and a portion has the possibility of being reclaimed and utilized for certain beneficial purposes. The aggregate quantity of sewage discharged to the ocean in the North and Central Coastal Areas is relatively small, however, while in the other five major hydrographic areas of the State the disposal of sewage is generally onto lands overlying ground water basins or into inland streams, thereby replenishing ground water supplies or augmenting stream flow.

The term "sewage," as used in this appendix, is defined as wastes flowing in sewers from residences, business buildings, institutions, and industrial establishments, with such ground, surface, and storm waters as may be admitted to or find their way into the sewers.

Quantitative data presented in this appendix relating to sewage dispersed into sea water in the San Francisco Bay and South Coastal Areas, as well as certain of the information on mineral quality of the sewage, were obtained from cities or other public agencies operating sewerage works. Mineral quality of sewage in the San Francisco Bay Area was largely determined from analyses of samples obtained in the course of the investigation from sewerage systems in the area. Analyses of sewage from cities or districts in the South Coastal Area were obtained from official reports which have been made to those agencies. In all cases the data pertain to dry-weather flow or firm supply of sewage, and are exclusive of storm waters which may in some cases be discharged through the sewer outfalls during winter storms.

Presentation of data included in this appendix should not be considered as a finding of feasibility for reclamation and utilization of sewage. To determine feasibility, each individual sewage reclamation project must be considered on its own merits, after detailed investigation and study. Certain of the factors affecting feasibility of reclamation of sewage are discussed in the following section.

FACTORS AFFECTING FEASIBILITY OF SEWAGE RECLAMATION

The feasibility, economic and otherwise, of reclaiming sewage and utilizing it for beneficial purposes is dependent upon a number of conditions.

Among the factors relating to feasibility is the determination that need for supplemental water exists. In this connection, investigation of the feasibility of reclaiming and utilizing water from sewage is particularly important for densely settled coastal areas around San Francisco Bay and from Ventura south to the Mexican border, in portions of which acute water shortages now prevail, and where significant quantities of sewage are discharged through outfall sewers into sea water.

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A project for reclamation and utilization of sewage must be physically practicable. The determination of practicability is essentially an engineering problem, and dependent upon analysis and study of engineering data pertinent to the proposed sewage reclamation and utilization works.

Water reclaimed from sewage of suitable mineral quality by proper treatment could be used directly for irrigation and certain industrial purposes. Consideration is now being given in the South Coastal Area as to the feasibility of using reclaimed sewage to build up a ground water ridge along certain sections of the coast to prevent intrusion of sea water. Since in many instances the demand for reclaimed sewage would not be continuous, it would be advantageous to utilize underground storage capacity, if available, for regulatory purposes, in order that full use could be made of the reclamation facilities. Maximum benefits as regards water conservation would result from replenishment of underground storage reservoirs by reclaimed sewage only where the ground water basins were overdrawn, or where there was planned operation of the underground reservoirs for maximum sustained yield.

In order to preserve the quality of the water resources of a given area, it is desirable that any sewage used there as a supplemental irrigation supply, or for recharge of ground water basins, possess mineral quality at least comparable with that of local ground water supplies. Reclaimed water might be within acceptable limits for irrigation use yet be considerably poorer in mineral quality than the water supply being supplemented. Prolonged use of such water for irrigation might result in deterioration of mineral quality of ground water supplies in zones of free ground water.

The feasibility of reclamation and reuse of water from sewage would depend in part on quality and on cost of water from competitive sources. Cost of the reclaimed sewage delivered at points of use would have to compare favorably with that of water at least equal in quantity and quality obtainable from another source. Furthermore, to qualify for economic comparison there would have to be evidence that a proposed sewage reclamation project would yield a firm supply of water, suitable in sanitary and mineral quality for uses considered. In order to assure a dependable water supply from sewage, a contractual agreement for maintenance of minimum requirements both as to quantity and quality of sewage would be essential in most cases. Sewage which is now of acceptable quality might progressively deteriorate due to uncontrolled addition of deleterious wastes. Furthermore, without such an agreement, an agency might rearrange and relocate its sewerage system, with possible resultant harmful effects on both quantity and quality of the sewage available to the reclamation plant.

Insofar as mineral quality of sewage is concerned, success of reclamation projects would depend in many cases upon segregation of domestic sewage from deleterious industrial wastes. Domestic sewage is usually of sufficiently good mineral quality to be reclaimable for irrigation and certain industrial uses, except where degraded by wastes from water-softening plants or by infiltration of saline ground waters into sewer lines. In general, experience has shown that the increment in mineral content of domestic sewage is about 100 parts per million over that of the water supply, consisting chiefly of sodium and chlorides derived from soap and body wastes. By contrast, sewage containing indus- wastes is often highly mineralized, and in most instances is not table for reclamation and use for irrigation, recharge of ground basins, nor for many industrial uses.

The minimum sanitary standards for reclaimed water for agricultural use are set forth in regulations adopted by the State Department of Public Health on May 27, 1933, in its Special Bulletin No. 59, "Regulations on Use of Sewage for Irrigating Crops." Briefly, these regulations provide that no raw or untreated sewage shall be used on fodder crops, field crops, and some orchard crops, and that well-oxidized and thoroughly disinfected effluents may be used without restriction if the bacterial standards of the United States Public Health Service for drinking water are continuously met. To meet public health standards both primary and secondary treatment of sewage would be required.

Standards pertaining to mineral quality of sewage for irrigation use are the same as those generally used in evaluating quality of fresh water for such use. These standards have been presented and discussed in Chapter III of this bulletin.

Quality requirements for water to be used in industrial processes vary widely depending upon the particular process involved. Reclaimed water is in general suitable for such industrial uses as cooling and quenching.

In its untreated state sewage normally contains inorganic and organic matter in suspension and in solution, together with a large number of bacteria. Concentration of suspended and soluble constituents is generally of the order of 0.1 percent by weight. The offensive characteristics of sewage result primarily from bacterial action on its putrescible organic constituents. Conversion of sewage into a stable, inoffensive, and sterile effluent may be accomplished by a combination of two or more processes. Primary treatment removes the greater amount of the suspended materials, while secondary or final treatment removes most of the remaining offensive organic matter and destroys bacteria and pathogenic organisms to a degree dependent on the process used.

Primary treatment usually consists of sedimentation processes for the removal of grit and organic solids, and skimming or grease flotation for grease and scum removal. The effluent contains a considerable portion of the original organic load, which, being in solution or finely divided form, will not form sludge banks.

Secondary treatment processes involve oxidation of sewage, after primary treatment, to produce a stable effluent. This may be a biological process whereby the primary effluent is brought into contact with bacterial slimes and oxygen, the organic matter adhering to the slimes and being digested by the organisms in the presence of oxygen. Other types of secondary treatment rely on oxidation by means of dissolved oxygen provided by chlorophyll-bearing algae in open ponds, or by aeration.

Sewage treatment has no significant effect on the dissolved mineral constituents in sewage which are of major concern in irrigation waters, since they pass through the process undiminished in concentration. Reduction of the mineral constituents in an effluent is economically infeasible by presently known methods. The only practicable methods which can be employed to decrease mineral concentrations are dilution with water of better quality, or elimination of the pollution at its source.

SAN FRANCISCO BAY AREA

Data pertaining to the amount of sewage presently discharged into San Francisco Bay by cities and communities in the San Francisco Bay Area, as well as to the mineral quality of the sewage, are presented in this section. Sewage treatment and disposal facilities are also briefly described.

Quantity of Sewage

Based on data furnished by agencies operating sewerage works, it is estimated that average dry-weather sewage flow in the San Francisco Bay Area totaled some 210,000 acre-feet during the calendar year 1949.

The Richmond-Sunset sewage plant of the City of San Francisco, in the west end of Golden Gate Park, receives sewage from the western residential area of the city and discharges it after primary treatment into San Francisco Bay in the vicinity of the Golden Gate. The North Point sewage plant, now under construction, will give primary treatment to sewage from the northeastern downtown and south-central residential districts of the city. A large industrial load will be tributary to this plant. This sewage is presently discharged into the Bay through five outfalls without treatment. The Southeast sewage plant, also under construction, will give primary treatment to sewage from the heavily industrialized southeastern district of San Francisco. Raw sewage from this district is now discharged to the Bay through 16 outfall lines. It is planned by the city that a portion of the sewage from the south-central district, largely domestic in nature and presently being discharged through the North Point sewerage system, will be diverted to the Southeast plant upon its completion.

Data furnished by the City of San Francisco indicate that total dry-weather flow of sewage from the city was in the order of 80,000 acre-feet during the calendar year 1949. Dry-weather discharge from the Richmond-Sunset sewage plant was about 14,000 acre-feet during 1949, and corresponding discharges from areas to be served by the North Point and Southeast sewage plants were approximately 50,000 acre-feet and 16,000 acre-feet, respectively.

Sources of sewage on the peninsula south of San Francisco include the cities and communities of South San Francisco, San Bruno, Millbrae, Burlingame, San Mateo, San Carlos, Belmont, Redwood City, Atherton, Menlo Park, Palo Alto, Moffett Field, Mountain View, Sunnyvale, Santa Clara, and San Jose. The sewage is disposed of through numerous outfall lines to San Francisco Bay, or to tributary tidal waters. These cities and communities either presently treat their sewage before disposal, or are constructing or planning to construct treatment plants in the near future. In most cases only primary treatment is contemplated, although Moffett Field now provides secondary treatment, and a portion of the sewage from the City of Palo Alto receives secondary treatment. The City of San Jose is planning to provide both primary and secondary treatment for sewage from San Jose, Santa Clara, and certain surrounding areas.

Data furnished by South San Francisco and San Bruno indicate that dry-weather discharge of sewage from the two cities was about 2,200 acre-feet during the calendar year 1949. Similar data obtained from local governmental agencies indicate that such sewage flow from all sources on the peninsula from Millbrae to Sunnyvale, inclusive, totaled about 15,800 acre-feet during the same period. Data from a report on the proposed City of San Jose sewage treatment works by Hyde and Sullivan, Consulting Engineers, dated June, 1950, indicate that average dry-weather discharge in the common outfall line serving Santa Clara, San Jose, and vicinity, is about 11,600 acre-feet per year.

Disposal of sewage from East Bay sources is generally effected without treatment through some 60 separate outfall lines leading directly into San Francisco Bay. However, the central Contra Costa and Oro Loma sanitary districts and the City of San Leandro provide either primary or complete treatment before disposal of their sewage. Comprehensive sewerage works, comprising trunk sewers to collect and convey sewage from the Cities of Albany, Berkeley, Oakland, Alameda, Emeryville, and Piedmont, to a common primary treatment plant, are under construction by the East Bay Municipal Utility District.

The total dry-weather flow of sewage from East Bay sources receiving at least primary treatment during 1949 is estimated to have been about 8,000 acre-feet. During the same year an estimated total of about 87,000 acre-feet of such sewage was discharged into the Bay from East Bay sources without treatment. Of the latter quantity, about 64,000 acre-feet was from Albany, Berkeley, Oakland, Alameda, Emeryville, and Piedmont, the cities for which treatment facilities are now being provided.

The majority of cities and communities along the north side of San Francisco Bay provide at least primary treatment for their sewage before its discharge to the Bay. However, the quantities of sewage carried by the various outfalls are relatively small, and of only minor importance as regards possible reclamation and re-use.

Quality of Sewage

Sewage in amounts sufficient to be of particular significance in connection with possible reclamation and utilization in the San Francisco Bay area is presently available from the cities of San Francisco and San Jose, the communities served by the East Bay Municipal Utility District. Complete mineral analyses of sewage sampled from these sources are set forth in ensuing tabulations. Analyses of water samples of the several cities and communities are likewise presented for comparative purposes.

Two samples of sewage from the Richmond-Sunset Sewerage District of the City of San Francisco were collected for analysis. One was obtained in September, 1949, at a small existing sewage reclamation plant located in Golden Gate Park. Sewage reclaimed at this plant is intercepted from the principal trunk sewer tributary to the Richmond-Sunset sewage plant. A 24-hour composite sample of effluent from the Richmond-Sunset plant was also obtained in November, 1950. Mineral constituents of these samples and of the San Francisco municipal water supply are given in the following tabulation.

Two sets of samples of sewage from the North Point Sewerage District of the City of San Francisco were collected for analysis. A composite sample was obtained at the outfall located at the terminus of Beach Street at San Francisco Bay, made up of samples collected every half hour from 8.30 a.m. to 4 p.m. on October 10 and 11, 1949. Further samples of sewage were obtained in November, 1950, at Third and Howard treets and at the Mariana pumping plant, and composited proportionately to approximate sewage flow in the respective sewer lines, in order o obtain a representative sample of the entire flow from the North Point District. Mineral analyses of these samples are given in the following abulation.

MINERAL ANALYSES OF SEWAGE FROM RICHMOND-SUNSET SEWARAGE DISTRICT AND OF SAN FRANCISCO WATER SUPPLY

Mineral constituent	Golden Gate Park Reclamation Plant Sept. 26, 1949	Richmond-Sunset Sewage Plant Nov. 8, 1950	San Francisco Water Supply
	in milligram equivalents per liter		
alcium	0.93	1.10	0.78
lagnesium	0.70	1.15	0.53
odium	1.73	2.96	0.45
icarbonate	1.20	5.18	1.24
hloride	1.58	2.34	0.31
ulphate	0.69	0.40	0.25
itrate	----	0.03	tr
Total solubles, in parts per million	230	536	131
Boron, in parts per million	----	----	0.1
Sodium, in percent of total base constitutents	52	54	26

MINERAL ANALYSES OF SEWAGE TRIBUTORY TO NORTH POINT SEWAGE PLANT

Mineral constituent	Beach Street Outfall Oct. 10 and 11, 1949	Composite Sample Nov. 9, 1950
	in milligram equivalents per liter	
alcium	1.27	1.18
lagnesium	1.52	1.33
odium	8.82	5.66
icarbonate	4.96	4.45
hloride	5.52	3.21
ulphate	1.08	0.73
itrate	----	0.05
Total solubles, in parts per million	770	610
Boron, in parts per million	1.40	---
Sodium, in percent of total base constitutents	76	66

Nine sewage samples from the Southeast Sewerage District of the ty of San Francisco were collected for mineral analysis. A composite s made from samples obtained in September, 1949, at Keith Street d Evans Avenue, Bayshore Boulevard and Sunnydale Avenue, and lau Avenue near Griffith Street, composited according to proportionate w in the two sewers. Individual samples of sewage were collected from en principal outfall lines of the Southeast Sewerage District during cember, 1950. Mineral analyses of the foregoing composites and indi-lual samples are given in the following tabulation.

Sewage from the San Jose sewerage system has been sampled riodically since June, 1949. Hyde and Sullivan, Consulting Engineers, tained a continuous four-day composite sample from June 21 to 25, 49, from the outfall sewer conveying the entire disposal from the San se sewerage system. In the fall of the same year, representatives of Division of Water Resources prepared a composite made from sam-s collected every 10 minutes from 8.30 a.m. to 3 p.m. on September th, at the same sampling point used by Hyde and Sullivan. Three lividual samples were also collected at other points on the San Jose tfall line in November, 1950. Mineral analyses of these samples, and the San Jose water supply as furnished by the San Jose Water Works, given in the following tabulation.

MINERAL ANALYSES OF SEWAGE TRIBUTARY TO SOUTHEAST SEWAGE .ANT

Mineral Constituent	Composite Sept. 22, 1949	Composite Nov. 9, 1950	Evans Ave. and Lane St.	Palau Ave. and Griffith St.	Yosemite Ave. and Keith St.	Sunnydale and Bayshore	ird St. and 'my St.	Third St. and Mariposa St.	24th St. and Illinois Ave.
			December 12, 1950						
	in milligram equivalents per liter								
Calcium	0.90	1.04	0.85	1.30	1.50	1.00	2.30	1.85	38.82
Magnesium	1.22	1.24	1.48	1.23	1.56	0.90	2.96	4.03	11.43
Sodium	5.56	9.19	2.87	8.22	8.44	2.70	3.52	1.91	184.81
Potassium	- -	0.47	0.31	0.49	0.64	0.08	0.28	0.33	3.27
Bicarbonate	5.04	3.85	6.88	5.67	3.28	2.69	5.01	0.00	2.34
Culoride	2.67	4.83	2.28	5.19	4.91	1.38	3.05	1.55	212.09
Sulphate	tr	1.45	0.56	0.81	3.06	1.15	1.94	1.48	55.54
Total solubles, in parts per million	500	748	449	661	714	304	546	309	15,560
Sodium, in percent of total base constituents	72	77	52	73	70	58	39	23	78

MINERAL ANALYSES OF SEWAGE FROM SAN JOSE AND VICINITY, AND THE SAN JOSE WATER SUPPLY

Mineral constituent	Outfall Line ½ Mile North of Trimble Road		North 4th Street and Bayshore Boulevard	Outfall Line 200 feet North of Trimble Road	Outfall Line 600 feet North of Agnew Hospital Annex Road	Water Supply of San Jose
	June 21-25, 1949	Sept. 27, 1949	November 9, 19			
	in milligram equivalents per liter					
alcium	3.80	3.25	3.99	2.69	3.49	2.60
agnesium	2.58	2.33	2.88	2.47	2.88	1.50
odium	12.21	17.40	16.44	8.96	11.13	1.14
icarbonate	4.87	9.19	0*	5.08	1.97	3.62
hloride	11.51	14.28	20.02	11.06	12.92	0.48
ulphate	2.21	0.69	1.67	1.37	2.08	0.84
otal solubles, in parts per million	1,150	1,550	1,470	1,090	1,250	387
odium, in percent of total base constituents	66	76	59	60	50	22

* Carbonate = 6.87.

Samples of sewage were obtained from outfalls of principal trunk sewers serving Berkeley, Oakland, and Emeryville, during October, 1949. These were composited in proportion to flow in the respective sewers, and the composite is considered representative of sewage to be treated at the new plant of Special District No. 1 of the East Bay Municipal Utility District. Results of mineral analysis of this composite, together with that of the water supply of the East Bay Municipal Utility District served in the area, are presented in the following tabulation.

MINERAL ANALYSES OF SEWAGE FROM SPECIAL DISTRICT NO. 1 OF EAST BAY MUNICIPAL UTILITY DISTRICT, AND THE UTILITLY DISTRICT WATER SUPPLY

Mineral constituent	Sewage Oct. 19, 1949	Water Supply
	in milligram equivalents per liter	
Calcium	0.84	0.38
Magnesium	0.58	0.09
Sodium	3.94	0.12
Bicarbonate	3.24	0.48
Chloride	1.30	0.08
Sulphate	0.82	0.03
Total solubles, in parts per million	299	30
Sodium, in percent of total base constituents	73	20

Summary

Sewage from cities and communities in the San Francisco Bay Area which might be available for reclamation and reuse for beneficial purposes would be the flow occurring at existing or proposed disposal works where the diversions for reclamation would probably be made. A summary of quantity and mineral quality of such sewage, all of which is or will be given at least primary treatment by local public agencies, is given in the following tabulation.

PARTIAL SUMMARY OF QUANTITY AND QUALITY OF SEWAGE AT DISPOSAL WORKS IN PORTIONS OF SAN FRANCISCO BAY AREA

Community	Estimated Average Dry-Weather Flow, 1949		Indicated Mineral Quality			
	In million gallons per day	In acre-feet per year	Chlorides, in milligram equivalents per liter	Total solubles, in parts per million	Percent sodium	Date sampled
North Point Sewage Plant, City of San Francisco	45	50,000	5.52	770	76	Oct. 10 and 11, 1949
Richmond-Sunset Sewage Plant, City of San Francisco	12.7	14,200	2.34	536	54	Nov. 8, 1950
Southeast Sewage Plant, City of San Francisco	14.3	16,000	4.83	748	77	Nov. 9, 1950
South San Francisco and San Bruno	2.0	2,200	7.11	1,325	71	Nov. 8, 1950
Millbrae and vicinity	0.5	600	2.96	585	60	Nov. 9, 1950
Burlingame Sewage Plant	1.2	1,300	16.41	1,380	73	Nov. 9, 1950
San Mateo Sewage Plant	2.8	3,100	10.00	1,480	70	Sept. 23, 1949
San Carlos and Belmont Sewage Plant	1.3	1,500	1.30	428	66	Nov. 9, 1950*
Redwood City Sewage Plant	2.3	2,500	28.20	2,330	75	Sept. 23, 1949
Atherton-Menlo Park and vicinity	2.3	2,500	1.97	642	60	Nov. 9, 1950*
Palo Alto Sewage Plant	2.2	2,400	4.08	780	77	Sept. 26, 1949
Mountain View	0.5	600	32.01	2,550	82	Nov. 9, 1950
Moffett Field Sewage Plant	0.5	600	0.99	320	44	Nov. 9, 1950
Sunnyvale	0.6	700	1.80	614	41	Oct. 21, 1949
San Jose and vicinity	10.3	11,600	11.51	1,150	66	June 21-25, 1949
Union Sanitary District	0.5	600	1.52	1,200	66	Mar. 21, 1951
Oro Loma Sanitary District	3.5	3,900	4.22	800	71	Oct. 18, 1949
San Leandro	2.2	2,500	6.81	920	75	Sept. 28, 1949
Special District No. 1, East Bay Municipal Utility District	57.0	63,800	1.30	299	73	Oct. 19, 1949
Richmond	10.2	11,400	8.19	716	69	July 26-27, 1948
Stege Sanitary District	1.8	2,000	2.51	610	48	Mar. 21, 1951
San Pablo Sanitary District	2.0	2,200	2.90	620	52	Mar. 21, 1951
Central Contra Costa County Sanitary District	1.5	1,700	40.00	3,200	71	Sept. 29, 1949
Martinez	0.8	800	5.33	1,000	62	Mar. 21, 1951
Vallejo and Mare Island	5.4	6,000	2.25	680	52	Oct. 18, 1949

* Quantity reported at point above disposal works as such works subject to tidal water.

SOUTH COASTAL AREA

Data pertaining to the amount of sewage presently discharged to the :ean by cities and communities in the South Coastal Area, as well as to ıe mineral quality of the sewage, are presented in this section.

ɩuantity of Sewage

Based on data furnished by agencies operating sewerage works, it estimated that average dry-weather sewage flow to the ocean in the outh Coastal Area totaled some 400,000 acre-feet during the calendar ear 1949.

Source of the largest single supply of sewage in the South Coastal rea is the City of Los Angeles. The city has estimated that during 1948 bout 213,000 acre-feet of sewage was discharged into the ocean from s Hyperion outfall, and that because of increasing population and inustrial activity the average annual dry-weither flow at this outfall will ıcrease to 274,000 acre-feet by 1970.

The second largest supply of sewage discharged to the ocean in the outh Coastal Area comes from the joint outfall of the Los Angeles ounty Sanitation Districts at White's Point, estimated to have been)6,000 acre-feet in 1949. County officials estimate that average annual ry-weather discharge from this outfall will increase to 140,000 acre-feet r 1970.

Substantial amounts of sewage are discharged to the ocean from ıtfalls of Orange County, Terminal Island, and the City of San Diego. ry-weather sewage flow in the Orange County joint outfall during 1949 estimated to have been of the order of 28,000 acre-feet. Measured dryeather sewage flows from San Diego and Terminal Island during the ıme period were 26,100 and 6,400 acre-feet, respectively.

Average dry-weather flows of sewage presently discharged into the :ean from the South Coastal Area, all of which now receives or will :ceive at least primary treatment, are summarized in the following ıbulation.

IMMARY OF ESTIMATED AVERAGE DRY-WEATHER FLOW OF SEWAGE FROM PRINCIPAL RESIDENTIAL AND INDUSTRIAL DISTRICTS IN THE SOUTH COASTAL AREA

Calendar Year 1949

Source	In million gallons per day	In acre-feet per year
ty of Los Angeles, Hyperion outfall	190	213,000
ounty of Los Angeles, Joint Outfall	95	106,000
erminal Island	5.7	6,400
ange County, Joint Outfall	25	28,000
ty of San Diego	23.3	26,100

uality of Sewage

Mineral quality of sewage at the Hyperion outfall of the City of Los ngeles is indicated by the analysis set forth in the following tabulaon. An analysis representative of the Owens Valley water supply of the

;y is likewise given for comparative purposes. Both analyses were furshed by the City of Los Angeles.

NERAL ANALYSES OF EFFLUENT FROM HYPERION SCREENING PLANT, AND OF OWENS VALLEY WATER SERVED BY THE CITY OF LOS ANGELES

Mineral constituent	Sewage	Water supply
	in milligram equivalents per liter	
lcium	3.05	1.40
gnesium	2.38	0.57
lium	9.82	1.96
arbonate	6.00	3.00
loride	6.75	0.59
phate	2.50	0.54
Total solubles, in parts per million	1,039	234
ron, in parts per million	----	0.7
lium, in percent of total base constituents	64	47

In a report for the West Basin Water Association by Harold Conng, consulting engineer, dated July 15, 1946, and entitled "An Imrted Water Supply for West Basin, Los Angeles County," it is indi:ed that quality of sewage in the sewerage system above Baldwin Hills uld be satisfactory for reclamation and reuse for certain beneficial rposes. Included in the Conkling report are analyses indicating that vage above Baldwin Hills has total solubles of about 640 parts per 00,000 and percent sodium of 54. These reported values are substanlly lower than those found in sewage at the Hyperion sewage plant, d indicate that by-passing of brines from Baldwin Hill oil fields and rersion of other industrial wastes of high mineral content might result marked improvement in mineral quality of sewage at or near the perion outfall. In February, 1951, a report was submitted to the ard of Public Works of the City of Los Angeles, by Lloyd Aldrich, y engineer, on reclamation and use of effluent from the new Hyperion vage treatment plant, for recharge of ground water in San Fernando lley and along the coast. The report states that "in some cases legision relating to the character of certain industrial wastes may be reired when such a program is undertaken."

A report for the County of Los Angeles, made in April, 1949, by E. Arnold, H. E. Hedger, and A. M. Rawn, entitled "Report Upon Reclamation of Water From Sewage and Industrial Wastes in Los geles County," cites conditions giving rise to heavy mineralization sewage from various portions of Los Angeles County. The report conns analyses that indicate the probable mineral quality of sewage subt to possible reclamation from various trunk sewers. Sewage flows in trunk sewer of Los Angeles County Sanitation District No. 2, and in lower portion of the trunk sewer of Los Angeles County Sanitation strict No. 5, as given in that report, have concentrations of mineral ubles near or in excess of acceptable limits for irrigation use. It is stated in the report that excessive mineralization is "due to the heavy discharge of wastes from the Vernon industrial area in District No. 2 and the Torrance industrial area in District No. 5." Analyses of sewage samples taken above and below the main industrial waste discharge in District No. 5 show total mineral solubles of 850 and 1,600 parts per 1,000,000, respectively. Results of these analyses are given in the following tabulation:

MINERAL ANALYSES OF SEWAGE FROM LOS ANGELES COUNTY SANITATION DISTRICT NO. 5 TRUNK SEWER

Mineral constituents	Above the City of Torrance	Below the City of Torrance	Increase in Solubles
	in milligram equivalents per liter		
Calcium	2.35	3.40	1.05
Magnesium	1.64	3.85	2.21
Sodium	6.52	14.78	8.26
Bicarbonate	5.74	3.11	—2.63
Chloride	3.38	18.30	14.92
Sulphate	1.77	6.66	4.89
Total solubles, in parts per million	850	1,600	750
Boron, in parts per million	0.5	1.4	0.9
Sodium, in percent of total base constituents	60.0	67.0	7.0

Analyses of sewage sampled from the Orange County Joint Outfall Sewer show total solubles of 2,130 parts per million, percent sodium of about 81.5, and boron content varying from 1.88 to 5.74 parts per million. These analyses are from a report to the County of Orange by A. M. Rawn, C. G. Hyde, and F. Thomas, dated July, 1947, entitled "Report Upon the Collection, Treatment, and Disposal of Sewage and Industrial Wastes of Orange County, California." This report indicates that excessive mineralization of Orange County sewage is due to entrance of oil field brines and wastes from citrus processing and packing plants. Analysis of Orange County sewage from which waste brines have been subtracted, as set forth in the cited report, shows that such sewage would have total solubles of 714 parts per million and percent sodium of 39.2.

The mineral quality of water that might be reclaimed from sewage of the City of San Diego has not been determined. It is known that chlorides are high because of the addition of sewage from North Island, where sea water is used for sanitary purposes.

APPENDIX B

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA

TABLE OF CONTENTS

APPENDIX B—TABLE 1

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

	Station	County	Number on Plate 3
A	otts	Monterey	3-37
A	n (Charities Camp)	Los Angeles	4-48
A	n (Hubbard Ranch)	Los Angeles	4-13
A	n (near Mellon)	Los Angeles	4-12
A	a Springs	Napa	5-125
A	n Ranch	Ventura	4-60
A	nga	Riverside	4-515
A	ama Hills	Inyo	6-25
A	neda Creek No. 109	Santa Clara	2-81
A	mbra	Los Angeles	4-242
A	mbra (City Hall)	Los Angeles	4-243
A	(Irvine Ranch)	Orange	4-469
A	ne	San Diego	4-560
A	ne Dam	Marin	2-20
A	Canada	Los Angeles	4-107
A	dena (Allen)	Los Angeles	4-128
A	dena (Barton)	Los Angeles	4-126
A	dena (Chiesa)	Los Angeles	4-120
A	dena (Curtis)	Los Angeles	4-121
A	Loma (Cherbak)	San Bernardino	4-330
A	Loma (Smith)	San Bernardino	4-328
A	Loma (Valley View Ranch)	San Bernardino	4-172
A	Loma Heights (Citrus Association)	San Bernardino	4-329
A	ras	Modoc	5-1
A	rado (near)	Alameda	2-57
A	go	San Diego	4-530
A	s	Imperial	7-13
A	neim	Orange	4-398
A	neim (H. A. Dickel)	Orange	4-402
A	neim (Jos. Carroll)	Orange	4-395
A	neim Association Laboratories, Inc.	Orange	4-399
A	neim Union Water Co.	Orange	4-403
A	neim Water Dept.	Orange	4-404
A	ls Camp No. 2	Calaveras	5-174
A	ola	Tulare	5-270
A	lope Valley	Kern	5-272
A	och	Contra Costa	5-166
A	s	Santa Cruz	3-16
A	dia Forbrich (West)	Los Angeles	4-253
A	dia Pumping Plant	Los Angeles	4-143
A	gton (San Jacinto Land Co.)	Riverside	4-420
A	whead Springs	San Bernardino	4-184
A	yo Grande Canyon	San Luis Obispo	3-66
A	yo Seco (Patrol Station)	Los Angeles	4-112
A	yo Seco (Ranger Station)	Los Angeles	4-116
A	sia (Barr Lumber Co.)	Los Angeles	4-387
A	n	Kern	5-292
A	Meadows	San Bernardino	6-64
A	Mountain	Tulare	5-248
A	ciated Oil Co. No. C	Fresno	5-250
A	ciated Oil Co. MMT	Monterey	3-26
A	ciated Oil Co. No. 1	Fresno	5-263
A	ciated Oil Co. No. 2	Fresno	5-262
A	ciated Oil Co. No. 3	Fresno	5-261
A	ciated Oil Co. No. 4	San Benito	3-40
A	ciated Oil Co. No. 5	San Benito	3-35
A	ciated Oil Co. No. 6	Monterey	3-34
A	ciated Oil Co. No. 7A	Monterey	3-29
A	one	Merced	5-212
A	rry	Fresno	5-220
A	rn	Placer	5-109
A	on	Los Angeles	4-509
A	s Ranch	San Luis Obispo	3-55
A	s (Chamber of Commerce)	Los Angeles	4-269

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
Azusa (Foothill Ranch)	Los Angeles	4-270
Azusa (Griffith)	Los Angeles	4-272
Azusa (Hibsh)	Los Angeles	4-271
Backus Ranch	Kern	6-40
Bagdad	San Bernardino	7-2
Bakersfield	Kern	5-287
Balch Power House	Fresno	5-229
Baldwin Park Experiment Station	Los Angeles	4-262
Baldwin Park No. 1 (Leach)	Los Angeles	4-263
Banning No. 3	Riverside	7-19
Bard	Imperial	7-18
Bardsdale	Ventura	4-31
Barrett Dam	San Diego	4-581
Barstow	San Bernardino	6-41
Bassett	Los Angeles	4-258
Bear Gulch Reservoir	San Mateo	2-68
Bear Valley	Kern	5-294
Beaumont	Riverside	4-435
Beaumont (near)	Riverside	4-436
Bel Aire (Administration Building)	Los Angeles	4-210
Bel Aire Bay Club	Los Angeles	4-202
Bell (Chamber of Commerce)	Los Angeles	4-378
Bell Canyon	Orange	4-508
Bell Canyon Johnson (Woodruff)	Los Angeles	4-69
Bellflower First National Bank	Los Angeles	4-382
Bellota	San Joaquin	5-171
Ben Lomond	Santa Cruz	3-5
Bennett Ranch	San Bernardino	4-177
Benson Ferry	San Joaquin	5-149
Berkeley	Alameda	2-29
Bernardo Bridge	San Diego	4-544
Betteravia	Santa Barbara	3-69
Beverly Hills (City Hall)	Los Angeles	4-214
Bieber	Lassen	5-8
Big Bear Lake (Preston)	San Bernardino	4-189
Big Bear Lake (Rideout)	San Bernardino	4-188
Big Bear Lake Dam	San Bernardino	4-187
Big Bend	Shasta	5-6
Big Creek Power House No. 1	Fresno	5-217
Big Creek No. 2	Santa Cruz	3-2
Big Dalton Dam	Los Angeles	4-163
Biggs	Butte	5-69
Big Pines County Park	Los Angeles	6-54
Big Pines Power Plant No. 3	Inyo	6-22
Big Santa Anita Dam	Los Angeles	4-146
Big Sur	Monterey	3-36
Big Tujunga (Edison Station)	Los Angeles	4-114
Big Tujunga Dam No. 1	Los Angeles	4-110
Bishop	Inyo	6-18
Bishop Creek	Inyo	6-17
Black Mountain	Santa Clara	2-83
Blue Canyon	Placer	5-89
Blum Ranch	Los Angeles	4-49
Blythe	Riverside	7-11
Boca	Nevada	6-7
Bodie	Mono	6-12
Bonita	San Diego	4-585
Boquet Canyon	Los Angeles	4-10
Borden	Madera	5-226
Borgstroms Ranch	Ventura	4-53
Boulder Creek	Santa Cruz	3-3
Bowman Dam	Nevada	5-78
Brand Estate (Glendale)	Los Angeles	4-98

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

	Station	County	Number on Plate 3
Br	l Park	Los Angeles	4-100
Br	comb	Mendocino	1-27
Br	ey	Imperial	7-15
Br	Canyon (South Fork)	Orange	4-297
Br	eport	Mono	6-11
Br	Terrace	Los Angeles	4-105
Br	ton	Sacramento	5-132
Br	dale (Booth)	Santa Cruz	3-4
Br	s	Yolo	5-114
Br	ne Ranch	Ventura	4-192
Br	n's Ranch	Los Angeles	4-299
Bu	Storage Dam	Plumas	5-37
Bu	Park	Orange	4-394
Bu	nk (City Hall)	Los Angeles	4-95
Bu	n Ranch	San Bernardino	6-58
Bu	n Ranch	San Benito	3-20
Bu	nwillow (Union Oil Co.)	Kern	5-284
Ca	asas (Farmer)	Los Angeles	4-70
Ca	eras	Alameda	2-79
Ca	eras Big Trees	Calaveras	5-161
Ca	co	Imperial	7-17
Ca	ite	Kern	5-293
Ca	rnia Institute of Technology	Los Angeles	4-239
Ca	oga	Napa	2-2
Ca	oga (Southern Pacific Co.)	Napa	2-3
Ca	lli Farms	Los Angeles	6-49
Ca	Baldy	San Bernardino	4-171
Ca	bell	Santa Clara	2-90
Ca	o	San Diego	4-592
Ca	Pardee	Calaveras	5-154
Ca	Rincon	Los Angeles	4-157
Ca	Silverado	Orange	4-484
Ca	tonville	Yuba	5-76
Ca	los Ranch Headquarters	Ventura	4-39
Ca	a Larga	Ventura	4-22
Ca	n Dam	Plumas	5-21
Ca	(Taber)	Yolo	5-115
Ca	n Canyon	San Bernardino	4-417
Ca	u	Plumas	5-28
Ca	ad	San Diego	4-518
Ca	s Ranch	Ventura	4-16
Ce	ville	Modoc	6-3
Ce	ville Powerhouse	Butte	5-47
Ch	nan Wells	Los Angeles	4-251
Ch	ells Ranch	Los Angeles	4-91
Ch	r Oak	Los Angeles	4-286
Ch	worth	Los Angeles	4-72
Ch	worth Reservoir	Los Angeles	4-71
Ch	r	Plumas	5-20
Chi		Butte	5-46
Chi	Flat	Humboldt	1-16
Chi		San Bernardino	4-314
Chi	(American Sugar)	San Bernardino	4-313
Chi	(Delphey No. 1 and No. 2)	San Bernardino	4-318
Chi	(Southern California Edison Co.)	San Bernareino	4-319
Ch	late Creek	San Diego	4-558
Ch	ne	San Luis Obispo	3-53
Ch	s Heights	San Diego	4-572
Ch	hilla	Madera	5-219
Ch	ar	Monterey	3-30
Ch	Vista	San Diego	4-584
Ch	Creek	Shasta	5-12
Ch	Camp (Head Dam)	Yuba	5-75

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
isco	Placer	5-91
laremont	Los Angeles	4-301
laremont (Bernard)	Los Angeles	4-309
laremont (Fire Station)	Los Angeles	4-311
laremont (Indian Hill)	Los Angeles	4-310
lark Estate	Los Angeles	4-220
larksburg	Yolo	5-140
lear Creek	Los Angeles	4-115
lear Lake	Lake	5-103
liff Camp	Fresno	5-222
loverdale	Sonoma	1-32
lovis (near)	Fresno	5-228
oalinga (USWB)	Fresno	5-264
oalinga (Standard Oil Co.)	Fresno	5-251
olby Ranch No. 1	Los Angeles	4-123
old Brook Camp	Los Angeles	4-162
olfax	Placer	5-99
olgate	Yuba	5-73
olton (Police Department)	San Bernardino	4-343
olton No. 1	San Bernardino	4-342
olton No. 2	San Bernardino	4-344
olusa	Colusa	5-82
ompton (American Sugar)	Los Angeles	4-377
ompton (Day)	Los Angeles	4-376
onejo Ranch	Ventura	4-65
orcoran	Kings	5-265
orning Observer	Tehama	5-31
orona	Riverside	4-423
orona American Fruit Growers Association	Riverside	4-429
orona Foothill Lemon Co. No. 1	Riverside	4-424
orona Foothill Lemon Co. No. 2	Riverside	4-425
orona Foothill Lemon Co. No. 3	Riverside	4-422
orona No. 1 (Jamison Co.)	Riverside	4-428
orona No. 2 (Temescal Water Co.)	Riverside	4-426
oronado No. 2 (Costa Mesa)	San Diego	4-570
ewport Mesa	Orange	4-499
ottonwood Creek	Inyo	6-28
ottonwood Gates	Inyo	6-29
ounty Farm	Los Angeles	4-380
ovelo Ranger Station	Mendocino	1-26
ovina (Mathews)	Los Angeles	4-275
ovina (Temple)	Los Angeles	4-281
ovina (Thorpe)	Los Angeles	4-276
ovina No. 1	Los Angeles	4-280
owane Ranch	Los Angeles	4-89
ow Creek	Inyo	6-27
afton Heights	San Bernardino	4-358
aftonville	San Bernardino	4-356
ag's Country Club	Los Angeles	4-196
ane Valley Dam	Madera	5-214
eekside	Santa Clara	3-10
escent City (near)	Del Norte	1-1
escent City Lighthouse	Del Norte	1-5
eston	San Luis Obispo	3-59
ockers	Tuolumne	5-192
ockett	Contra Costa	2-18
ows Landing	Stanislaus	5-206
ystal Lake Park (East)	Los Angeles	4-51
ystal Lake Park (West)	Los Angeles	4-158
ystal Springs Cottage	San Mateo	2-56
camonga (Thomas)	San Bernardino	4-333
camonga Mission Winery	San Bernardino	4-331
lps	Monterey	3-82
lver City	Los Angeles	4-215

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
C nings	Mendocino	1-25
C nings Valley	Kern	5-299
C n (East side)	Los Angeles	4-216
C ng Ranch	Santa Clara	3-11
C maca	San Diego	4-564
C maca Dam No. 1	San Diego	4-565
D n No. 1	Los Angeles	4-155
D rons	San Diego	4-535
D	Yolo	5-130
D mans Hole	San Diego	4-516
D ers Ranch	Riverside	4-496
D Creek	San Bernardino	6-65
D Creek	Nevada	5-86
D o	Kern	5-274
D far Ranch	Ventura	4-54
D fonte	Monterey	3-25
D	Shasta	5-10
D Canyon	San Diego	4-511
D ir	Stanislaus	5-196
D ison's	Ventura	4-23
D ibla	Butte	5-34
D anso Ranger Station	San Diego	4-563
D s Canyon No. 2	San Bernardino	4-181
D s Canyon Gate	San Bernardino	4-182
D re	San Bernardino	4-179
Di ond Bar Ranch No. 1	Los Angeles	4-412
Di ond Bar Ranch No. 2	Los Angeles	4-289
Di ond Bar Ranch No. 3	Los Angeles	4-414
Di y Meadow	Fresno	5-221
Di a	Tulare	5-241
Di ting Dam	San Diego	4-561
Di Grangers	Solano	5-139
D ins	Yuba	5-74
D nguez Hill	Los Angeles	4-374
D ley (Fire Station)	Los Angeles	4-381
D nieville	Sierra	5-64
D	Lassen	6-5
D Forebay	Placer	5-88
D Canyon Reservoir	Los Angeles	4-42
D Town	Amador	5-142
D te (Monrovia City)	Los Angeles	4-260
D ry	Kings	5-269
D rys	Mariposa	5-191
D ura	San Diego	4-588
D ura (Summit)	San Diego	4-589
D igan	Yolo	5-105
D muir	Siskiyou	5-3
D am	Butte	5-60
D (Holly Sugar Corporation)	Orange	4-467
E Ranch No. 2	Riverside	4-488
E Intake	Tuolumne	5-184
E Highlands (Gold Buckle Association)	San Bernardino	4-353
E Highlands (Orange Co.)	San Bernardino	4-354
E Park	Colusa	5-68
E Whittier	Los Angeles	4-391
Ed wood	Siskiyou	1-12
Ed n (near)	Kern	5-289
Ed nton	Plumas	5-38
El jon	San Diego	4-577
El jon No. 1	San Diego	4-578
El jon Valley	San Diego	4-579
El pitan Dam	San Diego	4-559

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
l Centro	Imperial	7-16
lectra	Amador	5-145
llery Lake	Mono	6-14
lliot	San Joaquin	5-151
l Mirador Ranch	Los Angeles	4-113
l Modena	Orange	4-472
l Monte (Chamber of Commerce)	Los Angeles	4-255
l Segundo (Standard Oil)	Los Angeles	4-365
lsinore	Riverside	4-492
lsinore (Sherman)	Riverside	4-490
l Torro	Orange	4-505
l Verano	Sonoma	2-8
migrant Gap	Placer	5-90
ncino (Adohr Dairy)	Los Angeles	4-76
ncino Reservoir	Los Angeles	4-203
pworth	Ventura	4-63
E" Reservoir (Vista Irrigation District)	San Diego	4-521
rnst Ranch	San Luis Obispo	3-58
scondido (Ditch head)	San Diego	4-529
scondido (Ditch head No. 3)	San Diego	4-528
scondido No. 1	San Diego	4-541
scondido No. 2	San Diego	4-543
scondido No. 3	San Diego	4-542
sparto	Yolo	5-116
tiwanda No. 2	San Bernardino	4-334
ureka	Humboldt	1-18
airmont (near)	Los Angeles	6-43
allbrook No. 1	San Diego	4-512
allbrook No. 2	San Diego	4-513
all River Mill	Shasta	5-7
armington	San Joaquin	5-177
eather River	Plumas	5-39
eather River (California Forestry)	Plumas	5-40
lton	Santa Cruz	3-6
rndale	Ventura	4-25
llmore	Ventura	4-34
llmore Citrus Association	Ventura	4-33
rebaugh	Fresno	5-223
sh Canyon	Los Angeles	4-154
int Ridge (Fire Station)	Los Angeles	4-109
orin	Sacramento	5-133
lsom	Sacramento	5-134
ntana	San Bernardino	4-336
ntana (Powerhouse)	San Bernardino	4-339
ntana Farms Co.	San Bernardino	4-337
rbestown	Butte	5-63
rd-Craig Ranch	Los Angeles	4-86
rdyce Dam	Nevada	5-80
rest Home (Southern California Edison)	San Bernardino	4-363
rks of Mojave	San Bernardino	6-57
rt Bidwell	Modoc	6-1
rt Bragg	Mendocino	1-28
rt Gaston	Humboldt	1-15
rt Ross	Sonoma	1-33
anklin (Mulholland)	Los Angeles	4-338
esno	Fresno	5-233
iant	Fresno	5-227
icot City	Calaveras	5-159
uto	Glenn	5-56
llerton	Orange	4-405
llerton (Desgrange)	Orange	4-407
llerton (Jack Zimm Laboratory)	Orange	4-397
llerton (Knowlton)	Orange	4-406

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
Gal	Sacramento	5-150
Gal a Siding	Contra Costa	2-34
G & Pumping Station	Orange	4-410
Gar ι Grove (Allen Brothers)	Orange	4-460
Gar ι Grove Lumber Co.	Orange	4-461
Gar ato Creek	Los Angeles	4-200
Gat [ouse	San Bernardino	6-63
Gav a	Santa Barbara	3-79
Gen ake	Mono	6-15
Geo town	El Dorado	5-110
Gia Forest	Tulare	5-243
Gib er Dam	Santa Barbara	3-78
Gill e Ranch	San Diego	4-582
Gilr	Santa Clara	3-14
Gilr (Wentz)	Santa Clara	3-13
Gir	Los Angeles	4-73
Gir -Brant Rancho	Los Angeles	4-74
Gle le	Los Angeles	4-231
Gle le (Bartlett)	Los Angeles	4-227
Gle le (Jones)	Los Angeles	4-102
Gle ra (Azusa Plant)	Los Angeles	4-267
Gle ra (C. C. Warren)	Los Angeles	4-287
Gle ra (Englewilde Ranch)	Los Angeles	4-283
Gle ra (H. C. Warren)	Los Angeles	4-274
Gle ra Irrigation Co.	Los Angeles	4-278
Gle ra (West)	Los Angeles	4-279
Gle ra No. 1	Los Angeles	4-277
Gle Ivy (Temescal Water Co.)	Riverside	4-489
Gle ille (near)	Kern	5-276
Gle anch	San Bernardino	4-175
Gol un	Placer	5-85
Gor es	Monterey	3-31
Gos ι	Tulare	5-245
Gra la Pumping Plant	Los Angeles	4-77
Gra ille	San Diego	4-571
Gra Valley	Nevada	5-83
Gra Valley	San Bernardino	6-59
Gra	Sonoma	1-36
Gre and Ranch (Furnace Creek)	Inyo	6-31
Gre Valley (City of Vallejo)	Solano	2-12
Gre ille	Plumas	5-29
Gre lo	Siskiyou	1-11
Gri	Butte	5-70
Gri ι Park (North Slope)	Los Angeles	4-222
Gri ι Park (Nursery)	Los Angeles	4-225
Gri ι Park (South Slope-Mt. Holly)	Los Angeles	4-240
Gri ι Park (Tunnel)	Los Angeles	4-223
Gri ι Park (Zoo)	Los Angeles	4-226
Gro ιont	San Diego	4-576
Gro Island	Tuolumne	5-183
Gus	San Bernardino	4-332
Gui ι	Yolo	5-104
Hai Canyon (Lower)	Los Angeles	4-99
Hai Canyon (Upper)	Los Angeles	4-101
Hai Rock Crusher	Los Angeles	4-96
Hai e	Inyo	6-32
Hal [oon Bay	San Mateo	2-61
Hal rg	Sonoma	1-34
Har on City	Glenn	5-44
Har ck Park	Los Angeles	4-217
Har d	Kings	5-254
Hay Camp	Siskiyou	1-6
Har Ranch	San Diego	4-566

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
atch Ranch	San Luis Obispo	3-54
at Creek	Shasta	5-15
ayfield Reservoir	Riverside	7-9
ayfork	Trinity	1-21
ayward Union High School	Alameda	2-48
eadworks (Pumping Plant)	Los Angeles	4-221
ealdsburg	Sonoma	1-35
elen Mine	Lake	5-112
elm	Fresno	5-237
enleys	Ventura	4-32
enninger Flats (Forest Service)	Los Angeles	4-129
enshaw Dam	San Diego	4-532
esperia	San Bernardino	6-62
etch Hetchy	Tuolumne	5-186
ickman	Stanislaus	5-198
ighland (Ewig)	San Bernardino	4-350
ighland (Frazer)	San Bernardino	4-348
ighland Park	Los Angeles	4-234
ighway Maintenance	San Mateo	2-63
illside Reservoir	Inyo	6-21
ills Orchard	Tulare	5-267
obergs	Lake	5-102
odges Dam	San Diego	4-540
oegees Camp	Los Angeles	4-141
olcomb Creek	San Bernardino	6-66
oldridge Ranch	San Diego	4-533
ollister	San Benito	3-19
ollywood (City Engineer Branch Office)	Los Angeles	4-219
ollywood Dam	Los Angeles	4-218
ornbrook	Siskiyou	1-2
ornitos	Mariposa	5-203
ot Springs	Tulare	5-282
owell Reservoir	Santa Clara	2-86
ullville	Lake	5-66
untington Beach (City Hall)	Orange	4-458
untington Beach (Holly Sugar)	Orange	4-456
untington Beach (Union Oil)	Orange	4-457
untington Lake	Fresno	5-216
untington Library (San Marino)	Los Angeles	4-245
untington Park	Los Angeles	4-375
urley Flat	Riverside	7-6
ia	San Benito	5-244
illwild	Riverside	4-497
perial	Imperial	7-14
lependence	Inyo	6-24
lio	Riverside	7-8
lewood High School	Los Angeles	4-367
kip	Butte	5-27
ake	Butte	5-51
ie	Amador	5-141
ra Hill	Placer	5-100
n Mountain	San Bernardino	7-5
ine (at Irvine)	Orange	4-480
ine Co. (Shady Camp)	Orange	4-502
ine County Park	Orange	4-481
ine Home Ranch	Orange	4-476
ine Ranch (Harkle Road)	Orange	4-475
ine Ranch (Hog Ranch)	Orange	4-463
ine Ranch (Johnson)	Orange	4-504
ine Ranch (Lambert)	Orange	4-483
ine Ranch (Morro)	Orange	4-501
ine No. 1	Orange	4-470
bella	Kern	5-283

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
tling	San Mateo	2-65
kson (near)	Amador	5-144
kson Lake (Big Pines)	Los Angeles	6-53
ksonville	Tuolumne	5-182
obs (Irvine Co.)	Orange	4-478
estown	Tuolumne	5-180
ny Lind	Calaveras	5-172
en Ranch	Alameda	2-49
Valley	Modoc	5-5
n	Monterey	3-47
an	San Diego	4-551
ction (Union Oil Co.)	Kern	5-278
ella Substation	Orange	4-462
ler	Inyo	6-30
ne	Kern	5-295
ley's Camp	San Bernardino	4-173
seyville	Lake	5-101
nedy Mine	Amador	5-143
nett	Shasta	5-13
tfield	Marin	2-25
nville	Kern	5-277
n Canyon	Kern	5-249
ner Ranch	Los Angeles	4-87
rc Forebay	Shasta	5-14
g City	Monterey	3-38
g City (Southern Pacific Milling Co.)	Monterey	3-39
gsburg	Fresno	5-239
gston	San Bernardino	6-35
gston Reservoir	Ventura	4-19
neloa	Los Angeles	4-130
ghts Landing	Yolo	5-118
o Tayee	Lake	5-95
tona	Ventura	4-20
Canada (Brigham)	Los Angeles	4-108
Cienega	Los Angeles	4-159
Crescenta (Ranger Station)	Los Angeles	4-106
ayette	Contra Costa	2-33
Grange	Stanislaus	5-200
una Beach	Orange	4-503
una Bell	Los Angeles	4-379
unitas Lake	Marin	2-21
Habra Citrus Association	Orange	4-396
Jolla	San Diego	4-552
e Arrowhead	San Bernardino	6-61
e Chabot	Alameda	2-47
e City	Modoc	6-2
e Curry	Napa	2-6
e Eleanor	Tuolumne	5-185
e Hemet	Riverside	4-498
e Herman	Solano	2-19
e Merced	San Francisco	2-39
eport	Lake	5-94
e Ranch Reservoir	Santa Clara	2-84
e Sabrina	Inyo	6-19
eside Ranch	Kern	5-291
e Spaulding	Nevada	5-79
e Wilenor	Butte	5-49
nanda Park	Los Angeles	4-246
e Mesa	San Diego	4-574
Mirada (Standard Oil Co.)	Los Angeles	4-392
caster High School	Los Angeles	6-45
cha Plana (Camp Pardee)	Calaveras	5-155

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
nkershim Power Plant	Los Angeles	4-90
Porte	Plumas	5-53
s Plumas	Butte	5-50
throp	San Joaquin	5-188
urel	Santa Cruz	3-7
uterbachs Ranch	San Diego	4-590
Verne (Leader)	Los Angeles	4-302
Verne (Sheldon)	Los Angeles	4-304
Vida Springs	Orange	4-416
avens and Goodenough Ranch	Ventura	4-36
chusa Patrol Station	Los Angeles	4-193
effingwell Ranch	Los Angeles	4-393
Grande	Merced	5-213
moncove	Tulare	5-246
moore (City Clerk)	Kings	5-253
tora Ranch	Calaveras	5-160
ck Observatory	Santa Clara	2-80
mestone Irvine Co.	Orange	4-482
moneira Ranch	Ventura	4-58
ndsay	Tulare	5-258
an Ranch	San Luis Obispo	3-49
ttle Lake	Inyo	6-33
ttle Rock Creek	Los Angeles	6-48
ttle Tujunga	Los Angeles	4-94
ve Oak Canyon (Elder)	Los Angeles	4-308
vermore	Alameda	2-50
vingston	Merced	5-208
ano	Los Angeles	6-50
ano Seco Rancho	Butte	5-59
ckeford	San Joaquin	5-152
di	San Joaquin	5-169
di No. 2	San Joaquin	5-170
mpoc (Southern Pacific Milling Co.	Santa Barbara	3-75
ne Pine	Inyo	6-26
ng Beach	Los Angeles	4-446
ng Beach (Alamitos Land Co.)	Los Angeles	4-444
ng Beach (City Hall	Los Angeles	4-445
ng Beach (Southern Pacific Co.)	Los Angeles	4-443
ng Beach (First and Prospect	Los Angeles	4-448
ng Beach (10th and Roswell)	Los Angeles	4-447
ng Beach (16th and Chestnut)	Los Angeles	4-442
ng Valley Reservoir (Crooked Creek)	Mono	6-16
omis Ranch (Alder Creek)	Los Angeles	4-50
rdsburg	Los Angeles	4-320
s Alamitos	Orange	4-450
s Alamos	Santa Barbara	3-74
s Angeles	Los Angeles	4-229
s Angeles (Ducommun)	Los Angeles	4-232
s Angeles (Junior College)	Los Angeles	4-224
s Angeles (Southern California Edison No. 3)	Los Angeles	4-233
s Angeles Water Department	Los Angeles	4-230
s Angeles Aqueduct	Inyo	6-23
s Banos	Merced	5-218
s Burros	Monterey	3-46
s Coaches	San Diego	4-556
s Gatos	Santa Clara	2-88
s Gatos Reservoir	Santa Clara	2-89
s Gatos (Summit)	Santa Clara	2-92
s Medanos	Contra Costa	5-165
s Molinos	Tehama	5-26
s Padres Rancho	San Diego	4-580
st Hills	Kern	5-279
we Observatory	Los Angeles	4-125
wer Crystal Spring	San Mateo	2-53

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
Lower Otay Reservoir	San Diego	4-587
Lundquists	Lake	5-113
Lundy Lake	Mono	6-13
Lytle Creek	San Bernardino	4-178
Lytle Creek (Fontana Union Water Co.)	San Bernardino	4-180
Lytle Creek Ranger Station	San Bernardino	4-176
Lytle Creek (San Bernardino Water Department Plant)	San Bernardino	4-341
Lytle Creek (Southern California Edison Co.)	San Bernardino	4-174
Madeline	Lassen	5-9
Madera	Madera	5-225
Madero Colorado	Santa Clara	2-37
Manderville Canyon No. 1	Los Angeles	4-206
Maranjal	Orange	4-409
March Field	Riverside	4-423
Maricopa	Kern	5-297
Marin Meadows Ranch	Marin	2-17
Mariposa	Mariposa	5-204
Markleeville	Alpine	6-9
Marysville	Yuba	5-97
Mason Estate	Los Angeles	4-194
Matilija Canyon	Ventura	4-18
McCloud	Siskiyou	5-4
Mecca	Riverside	7-10
Melones	Tuolumne	5-179
Mendota	Fresno	5-231
Mendota (Standard Oil Co.)	Fresno	5-232
Menlo Park	San Mateo	2-70
Mentone (Crafton Orange Grower's Association)	San Bernardino	4-358
Merced	Merced	5-211
Merced Falls	Merced	5-202
Mercey Hot Springs	Fresno	5-230
Mesa Grande (Angels)	San Diego	4-581
Mesa Grande Store	San Diego	4-584
Middlewater	Kern	5-286
Midway (Standard Oil Co.)	Kern	5-290
Midway (Union Oil Co.)	Kern	5-296
Mill Creek No. 1	Amador	5-147
Mill Creek No. 2	San Bernardino	4-361
Mills College	Alameda	3-3
Milo	Tulare	5-259
Milton	Calaveras	5-173
Mineral	Tehama	5-19
Mint Canyon	Los Angeles	4-11
Miramar	San Diego	4-554
Moccasin	Tuolumne	5-189
Mockingbird Canyon	Riverside	4-401
Modesto	Stanislaus	5-196
Mojave	Kern	6-38
Mokelumne Hill	Calaveras	5-157
Mono Ranch	Ventura	4-4
Monroeville	Glenn	5-68
Monrovia Canyon (Lower End)	Los Angeles	4-147
Monrovia (Chamber of Commerce)	Los Angeles	4-286
Monrovia (O'Connor)	Los Angeles	4-148
Monrovia	Los Angeles	4-149
Montague	Siskiyou	1-10
Montana Ranch	Los Angeles	4-283
Monterey	Monterey	3-34
Monte Rio	Kern	6-39
Montgomery Creek	Shasta	5-11
Monticello	Napa	5-128

APPENDIX 8—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 2
Montpellier	Stanislaus	5-199
Moorpark	Ventura	4-64
Morena Dam	San Diego	4-583
Morgan Hill (Edes)	Santa Clara	3-12
Morino Mutual Water Co.	Riverside	4-434
Morris Dam	Los Angeles	4-156
Morses	San Bernardino	6-60
Mountain View	Santa Clara	2-74
Mt. St. Helena	Sonoma	1-39
Mt. St. Mary's College	Los Angeles	4-208
Mount Shasta	Siskiyou	5-2
Mt. Tamalpais	Marin	2-22
Mt. Wilson	Los Angeles	4-132
Mt. Wilson Powerhouse	Los Angeles	4-133
Mouth of San Antonio Canyon	Los Angeles	4-168
Munts Valley Ranch	Los Angeles	6-44
Munz Ranch (Elizabeth Lake)	Los Angeles	4-4
Murphy's	Calaveras	5-175
Murray Dam	San Diego	4-573
Napa	Napa	2-10
Needles Airport	San Bernardino	7-1
Nellie	San Diego	4-514
Nevada City	Nevada	5-34
Newcastle	Placer	5-108
Newhall	Los Angeles	4-43
Newhall Forestry Station	Los Angeles	4-44
Newhall Ranch	Ventura	4-40
Newman	Stanislaus	5-210
Newmark	Los Angeles	4-244
Newmark Reservoir	San Bernardino	4-188
Newport Beach (Balboa Fire Station No. 1)	Orange	4-500
Nicolaus	Sutter	5-107
Niles	Alameda	2-58
Ninety-sixth and Central (Southern California Edison Co.)	Los Angeles	4-372
Nipomo	San Luis Obispo	3-58
Norco	Riverside	4-427
North Bloomfield	Nevada	5-77
North Fork	Madera	5-215
North Hollywood	Los Angeles	4-92
North Los Angeles (Andrews)	Los Angeles	4-75
North Whittier (Cole Ranch)	Los Angeles	4-259
Norwalk (Chamber of Commerce)	Los Angeles	4-388
Oakdale (near)	Stanislaus	5-178
Oakland	Alameda	2-42
Oakwilde	Los Angeles	4-111
Oceanside No. 1	San Diego	4-517
Oceanside No. 4	San Diego	4-519
Ojai	Ventura	4-21
Oleta	Amador	5-135
Olive (Bank)	Orange	4-413
Ontario (Braundale Acres)	San Bernardino	4-327
Ontario (Hamilton)	San Bernardino	4-324
Ontario (Imbach)	Riverside	4-421
Ontario (Woca)	San Bernardino	4-317
Ontario No. 1	San Bernardino	4-325
Ontario No. 2 (Chaffey High School)	San Bernardino	4-333
Opids Canyon	Los Angeles	4-127
Orange (Sam Armour)	Orange	4-480
Orange Cove	Fresno	5-242
Orland	Glenn	[illegible]

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
Orleans	Humboldt	1-13
Oroville	Butte	5-62
Oroville (River Station)	Butte	5-61
Oxnard	Ventura	4-56
Ozena	Ventura	3-83
Pacific Beach	San Diego	4-568
Pacoima (Warehouse)	Los Angeles	4-88
Pacoima Dam	Los Angeles	4-47
Padre Barona Valley	San Diego	4-557
Padua Hills	Los Angeles	4-312
Palermo	Butte	5-71
Palmdale	Los Angeles	6-47
Palm Springs	Riverside	7-7
Palo Alto	Santa Clara	2-71
Palos Verdes (Office)	Los Angeles	4-438
Parker Reservoir	San Bernardino	7-3
Parkfield	Monterey	3-48
Pasadena	Los Angeles	4-241
Pasadena (Bennett)	Los Angeles	4-236
Pasadena (Chlorine Plant)	Los Angeles	4-118
Pasadena (Water Department)	Los Angeles	4-235
Paso Robles	San Luis Obispo	3-57
Patterson	Stanislaus	5-205
Pattiway	Kern	3-73
Petaluma	Sonoma	2-7
Phelan-Parrott	Butte	5-45
Phoenix	Marin	2-23
Piedra	Fresno	5-236
Pigeon Point Lighthouse	San Mateo	3-1
Pilarcitos	San Mateo	2-51
Pilot Creek	El Dorado	5-111
Pine Canyon Patrol Station	Los Angeles	4-3
Pine Crest	Santa Barbara	3-77
Pine Tree Ranch	Ventura	4-29
Piru Citrus Association	Ventura	4-38
Placentia (Anaheim Union Water Co.)	Orange	4-408
Placentia (Mutual Orange Association)	Orange	4-411
Placerita Canyon (Morsus Ranch)	Los Angeles	4-45
Placerville	El Dorado	5-123
Pleasanton Pumps	Alameda	2-77
Point Arena Lighthouse	Mendocino	1-31
Point Lobos	San Francisco	2-38
Point Loma	San Diego	4-567
Point Reyes	Marin	2-15
Point Reyes Station	Marin	2-16
Point Vicente	Los Angeles	4-437
Pole Creek Canyon	Ventura	4-35
Pomona	Los Angeles	4-306
Pomona (Frater)	Los Angeles	4-307
Pomona (Nichols)	Los Angeles	4-303
Pomona (Southern Pacific Co.)	Los Angeles	4-305
Pond	Kern	5-273
Porterville	Tulare	5-266
Port Hueneme Lighthouse	Ventura	4-191
Portola	Plumas	5-54
Potrero Heights	Los Angeles	4-249
Poway	San Diego	4-555
Prado (U. S. Experimental Plant)	Riverside	4-419
Prattville	Plumas	5-22
Priest	Tuolumne	5-190
Priest Valley	Monterey	3-41
Proctor and Lutheridge Ranch	Ventura	4-37
Puddingstone Dam	Los Angeles	4-293

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
Puente (Southern California Edison)	Los Angeles	4-266
Puente Hills (Elliot)	Los Angeles	4-261
Puente Hills (Weisel Ranch)	Los Angeles	4-400
Quincy	Plumas	5-41
Radium Hot Springs (Elizabeth Lake)	Los Angeles	4-7
Railroad Canyon Dam	Riverside	4-493
Ramona (Sentinel)	San Diego	4-546
Ramona (Verlaqua)	San Diego	4-547
Rancho La Questa	Ventura	4-26
Rancho Matilija	Ventura	4-17
Rancho Quien Sabe	San Benito	3-21
Rancho San Lucas	Monterey	3-43
Rancho Sespe	Ventura	4-30
Raynor	San Mateo	2-64
Raywood Flats	San Bernardino	7-4
Reche Canyon (Atopa Ranch)	San Bernardino	4-347
Red Bluff	Tehama	5-24
Redding	Shasta	5-17
Redlands	San Bernardino	4-351
Redlands (Anderson)	San Bernardino	4-352
Redlands (Crown Jewels Grove)	San Bernardino	4-349
Redondo	Los Angeles	4-366
Redwood City	San Mateo	2-67
Reedly	Fresno	5-240
Represa	Sacramento	5-121
Rialto (Boyd)	San Bernardino	4-340
Ridgewood Ranch	Mendocino	1-29
Rio Bravo (Union Oil Co.)	Kern	5-285
Rio Vista	Solano	5-167
Rivera	Los Angeles	4-384
Rivera Pico	Los Angeles	4-386
Riverside	Riverside	4-431
Riverside (Citrus Experiment Station)	Riverside	4-432
Riverside (Press)	Riverside	4-430
Rixford	San Mateo	2-66
Robbins	Sutter	5-106
Rocklin	Placer	5-120
Rockwood Ranch	San Diego	4-545
Rohnerville	Humboldt	1-20
Romoland (Temescal Water Co.)	Riverside	4-494
Rosco (Merrill)	Los Angeles	4-93
Rosecrans Ranch (Gardena)	Los Angeles	4-371
Roseville High School	Placer	5-119
Rouff Ranch	Los Angeles	6-46
Rowland Ranch (Puente)	Los Angeles	4-265
Rubio Canyon Water Co	Los Angeles	4-122
Running Springs	San Bernardino	4-186
Ruth	Trinity	1-23
Sacramento	Sacramento	5-131
St. Helena	Napa	2-4
Saint John	Glenn	5-43
Salinas	Monterey	3-27
Salinas	Monterey	3-22
Salton	Riverside	7-12
Salt Springs	Amador	5-136
San Andreas	Calaveras	5-158
San Andreas Lake	San Mateo	2-52
San Antonio (Sierra Powerhouse)	Los Angeles	4-170
San Antonio Canyon (Intake)	Los Angeles	4-169
San Ardo	Monterey	3-45
San Bernardino	San Bernardino	4-345

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
Bernardino (Water Department)	San Bernardino	4-346
Bernardo Rancho	Monterey	3-44
Clemente	Orange	4-510
d Bar	Tuolumne	5-162
dberg	Los Angeles	4-2
d Canyon Riley Ranch	Los Angeles	4-46
Diego	San Diego	4-569
Dieguito Dam	San Diego	4-539
Dimas (Ferguson Ranch)	Los Angeles	4-291
Dimas (Fire Station)	Los Angeles	4-294
Dimas (Harris)	Los Angeles	4-292
Dimas (Howard)	Los Angeles	4-298
Dimas (Orange Association)	Los Angeles	4-288
Dimas (Stevens)	Los Angeles	4-290
Dimas Dam	Los Angeles	4-300
Dimas Mountain	Los Angeles	4-295
Dimas Mountain No. 1	Los Angeles	4-296
Dimas Ranger Station	Los Angeles	4-166
Emigdio	Kern	5-301
Felipe	San Diego	4-538
Fernando	Los Angeles	4-83
Fernando (Lemon Growers Association)	Los Angeles	4-81
Fernando (Miller Ranch)	Los Angeles	4-85
Fernando (Lower Reservoir)	Los Angeles	4-79
Francisco	San Francisco	2-40
Francisquito (Powerhouse No. 1)	Los Angeles	4-9
Francisquito (Powerhouse No. 2)	Los Angeles	4-8
Gabriel (Gleason)	Los Angeles	4-247
Gabriel (Powerhouse)	Los Angeles	4-268
Gabriel (Watts)	Los Angeles	4-248
Gabriel Dam No. 2	Los Angeles	4-151
Gabriel Forks (Ranger Station)	Los Angeles	4-160
Gabriel Intake (Southern California Edison Co.	Los Angeles	4-161
Gabriel River (East Fork)	Los Angeles	4-164
ger	Fresno	5-234
Jacinto	Riverside	4-495
Joaquin Fruit Co.	Orange	4-479
Jose	Santa Clara	2-78
Juan Bautista	San Benito	3-18
Juan Capistrano	Orange	4-506
Leandro	Alameda	2-44
Lucas (Southern Pacific Milling Co.)	Monterey	3-42
Luis Obispo	San Luis Obispo	3-64
Luis Rey	San Diego	4-520
Marcos Pass	Santa Barbara	3-76
Mateo	San Mateo	2-55
Miguel	San Luis Obispo	3-52
Miguel	San Luis Obispo	3-50
Miguel (Twisselman)	San Luis Obispo	3-51
Miguel Island	Santa Barbara	3-81
Pablo	Contra Costa	2-27
Pablo Creek Patrol House	Contra Costa	2-31
Pablo Reservoir Dam	Contra Costa	2-28
Pedro	Los Angeles	4-440
Pedro Hills (West End)	Los Angeles	4-439
Rafael	Marin	2-24
ta Ana	Orange	4-464
ta Ana (Hill)	Orange	4-465
ta Ana (Powerhouse No. 1)	San Bernardino	4-360
ta Ana (Southern California Edison Powerhouse No. 3)	San Bernardino	4-357
ta Ana Canyon (Albert Yorba)	Orange	4-418
ta Ana River	San Bernardino	4-359
ta Anita Canyon (Clarks)	Los Angeles	4-142
ta Anita Forest Station	Los Angeles	4-145

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
Santa Barbara	Santa Barbara	3-80
Santa Clara	Santa Clara	2-76
Santa Cruz	Santa Cruz	3-15
Santa Maria	Santa Barbara	3-70
Santa Maria	Santa Barbara	3-71
Santa Margarita	San Luis Obispo	3-62
Santa Margarita (Southern Pacific Co.)	San Luis Obispo	3-63
Santa Monica	Los Angeles	4-206
Santa Monica (Sulliger)	Los Angeles	4-207
Santa Paula	Ventura	4-27
Santa Paula (County Agricultural Office)	Ventura	4-28
Santa Rosa	Sonoma	1-37
Santa Rosa Valley No. 1	Ventura	4-62
Santa Ynez Canyon	Los Angeles	4-201
Santa Ysabel Ranch	San Diego	4-548
Santa Ysabel Store	San Diego	4-549
Santiago Canyon (Pleasants Ranch)	Orange	4-486
Santiago Canyon (Redman)	Orange	4-485
Saratoga Reservoir	Santa Clara	2-85
Saticoy Walnut Association	Ventura	4-57
Saugus (Southern California Edison Co.)	Los Angeles	4-41
Sausalito	Marin	2-26
Sawmill Flat (Big Pines)	Los Angeles	6-56
Sawmill Mt. Ranch (Bauer Ranch)	Los Angeles	6-42
Sawpit Canyon	Los Angeles	4-153
Sawpit Canyon Deer Park	Los Angeles	4-152
Sawpit Dam Nos. 1 and 2	Los Angeles	4-150
Sawtelle (West Los Angeles)	Los Angeles	4-211
Schilling	San Mateo	2-73
Scotia	Humboldt	1-22
Scott Bar	Siskiyou	1-7
Scripps Pier (La Jolla)	San Diego	4-553
Seal Beach	Orange	4-449
Searsville Lake	San Mateo	2-69
Selby Ranch	Ventura	4-15
Selleck Ranch	Santa Cruz	3-9
Selma	Fresno	5-238
Seminole Hot Springs	Los Angeles	4-195
Sepulveda (Chase)	Los Angeles	4-82
Sepulveda and Mulholland	Los Angeles	4-204
Seriterre	Butte	5-72
Seven Mile Reservoir	Santa Clara	2-91
Seven Oaks	San Bernardino	4-190
Shasta	Shasta	5-16
Shields Canyon (mouth)	Los Angeles	4-104
Shields Ranch	Mono	6-10
Shingle Springs	El Dorado	5-122
Sierra Madre	Los Angeles	4-135
Sierra Madre (Blummer)	Los Angeles	4-136
Sierra Madre (Blummer No. 1)	Los Angeles	4-137
Sierra Madre (Hersey)	Los Angeles	4-138
Sierra Madre (Miramonte Power Plant)	Los Angeles	4-139
Sierra Madre (Pegler)	Los Angeles	4-252
Sierra Madre Dam	Los Angeles	4-134
Sierra Madre (Pumping Plant)	Los Angeles	4-144
Sierraville	Sierra	5-65
Sierra Vista Ranch	Tulare	5-275
Silverado Canyon	Orange	4-487
Silverado Ranch	Napa	2-1
Silver Lake Reservoir	Los Angeles	4-228
Simi Valley	Ventura	4-68
Sinsheimer Brothers	San Luis Obispo	3-65
Sisquoc Ranch	Santa Barbara	3-72
Sister Elsie Peak (Mt. Lukens)	Los Angeles	4-103

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
rline	San Mateo	2-82
lling	Merced	5-201
rder Ranch	Ventura	4-61
la Lake	San Luis Obispo	3-67
la Springs	Nevada	5-92
diers Home	Los Angeles	4-212
edad	Monterey	3-32
edad (Southern Pacific Milling Co.)	Monterey	3-33
ioma	Sonoma	2-9
iora	Tuolumne	5-181
juel Creek	Santa Cruz	3-8
itheast Farallon	San Francisco	2-37
ith Lake	Inyo	6-20
ith of Monrovia (Martin)	Los Angeles	4-257
ith Pasadena (City Hall)	Los Angeles	4-237
ith Pasadena (Cooper)	Los Angeles	4-238
ith Pasadena (Marsh)	Los Angeles	4-254
eckels	Monterey	3-28
ing Gap	Tuolumne	5-163
ingville (Tule Head Dam)	Tulare	5-260
ingville Ranch	Ventura	4-59
ingville Ranger Station	Tulare	5-268
iirrel Inn	San Bernardino	4-185
nford Corporation Yard	Santa Clara	2-72
nton	Orange	4-452
nwood	Butte	5-52
te Narcotic Hospital	Los Angeles	4-284
ele Swamp	Modoc	1-4
wart Pumping Station	Orange	4-401
ling City	Butte	5-35
es Ranch	Yolo	5-129
ckton	San Joaquin	5-176
ne Canyon Dam	Los Angeles	4-209
nyford Ranger Station	Colusa	5-67
ny Gorge Reservoir	Glenn	5-55
rey	Madera	5-224
rrie (Bucks Powerhouse)	Plumas	5-36
awberry Dam	Tuolumne	5-164
rtevant Camp	Los Angeles	4-140
sun	Solano	2-14
nmerdale	Mariposa	5-209
nmit	Placer	5-93
nmit Topanga	Los Angeles	4-198
nnyvale	Santa Clara	2-75
iol	Alameda	2-59
iset Canyon (Country Club)	Los Angeles	4-97
anville	Lassen	6-4
eetwater Dam	San Diego	4-575
tzer's Camp	Los Angeles	4-119
mer Packing Corporation	Los Angeles	4-80
ole Bluff Lighthouse	Humboldt	1-17
ole Mountain	Los Angeles	6-55
ioe	Placer	6-8
bert	Orange	4-459
narack (Blue Lakes)	Alpine	5-137
ibark Flats	Los Angeles	4-165
o Mutual Water Co.	Ventura	4-66
ate	San Diego	4-591
achapi	Kern	5-300
ama	Tehama	5-25
on Rancho	Kern	5-298
egraph Road	Los Angeles	4-385
nescal Reservoir	Alameda	2-30

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
Templeton (Garrett)	San Luis Obispo	3-56
Terra Bella	Tulare	5-271
Three Rivers	Tulare	5-247
Tiger Creek	Amador	5-148
Topanga Canyon Guard Station	Los Angeles	4-199
Torrance (General Petroleum Co.)	Los Angeles	4-368
Torrance (Southern California Edison Co.)	Los Angeles	4-370
Towle	Placer	5-87
Tracy	San Joaquin	5-187
Tres Pinos	San Benito	3-23
Trinidad Head	Humboldt	1-14
Trabuco Canyon	Orange	4-507
Trona	San Bernardino	6-34
Truckee	Nevada	6-6
Truesdale Ranch	San Luis Obispo	3-60
Tulare	Tulare	5-256
Tulare (near)	Tulare	5-255
Tule Lake	Siskiyou	1-3
Turlock	Stanislaus	5-207
Tustin	Orange	4-477
Tustin High School	Orange	4-474
Tustin (Whitson Co.)	Orange	4-473
Twin Lakes	Alpine	5-124
Twin Oaks	San Diego	4-523
Ukiah	Mendocino	1-30
U. S. Cotton Field	Kern	5-281
U. S. Forest Service Shops	Los Angeles	4-117
Upland (Johnson)	San Bernardino	4-322
Upland (Jordan)	San Bernardino	4-321
Upland (Liberty Groves)	San Bernardino	4-326
Upland (Ward)	San Bernardino	4-316
Upland (Wood)	San Bernardino	4-315
Upper Crystal Springs	San Mateo	2-54
Upper Franklin Resrvoir	Los Angeles	4-213
Upper Lake	Lake	5-81
Upper Mattole	Humboldt	1-24
Upper Ojai No. 2	Ventura	4-24
Upper Otay Dam	San Diego	4-586
Upper San Fernando Reservoir (Powerhouse No. 3)	Los Angeles	4-78
Upper San Leandro	Alameda	2-46
Upper Sespe Creek	Ventura	4-5
Vacaville	Solano	5-138
Valencia Heights	Los Angeles	4-273
Valle Vista	Contra Costa	2-45
Valley Center No. 1	San Diego	4-526
Valley Center No. 2	San Diego	4-524
Valley Center No. 3	San Diego	4-525
Valley Forge Lodge (Kamp Kole)	Los Angeles	4-131
Valley Springs	Calaveras	5-156
Vallyermo (Noble)	Los Angeles	6-52
Van Nuys	Los Angeles	4-84
Venice (City Hall)	Los Angeles	4-364
Ventura	Ventura	4-52
Veramont	Plumas	5-30
Veterans Home	Napa	2-5
Victorville	San Bernardino	6-51
Villa Park (Allen)	Orange	4-468
Villa Park (Orchard Association)	Orange	4-471
Vina-Stanford	Tehama	5-32
Vincent Patrol Station	Los Angeles	4-14
Visalia	Tulare	5-257
Vista Irrigation District	San Diego	4-522

APPENDIX B—TABLE 1—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF 10 YEARS OR LONGER

Station	County	Number on Plate 3
Volcan Mountain	San Diego	4-550
Volta	Shasta	5-18
Von Schrodeder	San Luis Obispo	3-61
Wait	Kern	5-288
Wallace	Calaveras	5-153
Walla Walla Creek	Siskiyou	1-8
Walnut (Fruit Growers Association)	Los Angeles	4-285
Walnut (Howell Ranch)	Los Angeles	4-282
Walnut Creek	Contra Costa	2-35
Warner Springs	San Diego	4-537
Warner Summer Road	San Diego	4-536
Wasco	Kern	5-280
Waterford	Stanislaus	5-197
Watsonville	Santa Cruz	3-17
Watts-Jordan High School	Los Angeles	4-373
Weaverville	Trinity	1-19
West Branch	Butte	5-33
West Covina (Hurst Brothers Ranch)	Los Angeles	4-264
Western Avenue (Tank)	Los Angeles	4-369
West Haven	Fresno	5-252
Westley	Stanislaus	5-194
West Point	Calaveras	5-146
West Saddle Peak	Los Angeles	4-197
West Saticoy	Ventura	4-55
West Winters	Yolo	5-127
Westwood	Lassen	5-23
Wheatland	Yuba	5-98
Whittier (City hall)	Los Angeles	4-390
Whittier (Southern Pacific Co.)	Los Angeles	4-389
Whittier Narrows	Los Angeles	4-250
Wilcox	Contra Costa	2-36
Wild Horse Valley	Solano	2-11
Williams	Colusa	5-96
Williams Reservoir	Santa Clara	2-94
Willits	Mendocino	1-38
Willms	San Joaquin	5-168
Willota Ranch	Solano	2-13
Willows	Glenn	5-57
Willows	San Diego	4-562
Wilmington (City Hall)	Los Angeles	4-441
Wineville (Mira Loma Rancho)	Riverside	4-335
Winters (Thornberry)	Yolo	5-128
Wintersburg Avenue	Orange	4-453
Wintersburg (Moore)	Orange	4-454
Wintersburg (Murdy)	Orange	4-451
Wintersburg (Slater)	Orange	4-455
Wohlford Lake	San Diego	4-527
Wolf Ranch	Ventura	4-67
Wolfskill Falls (San Dimas)	Los Angeles	4-167
Woodland	Yolo	5-117
Woodside (Bear Gulch Creek)	San Mateo	2-62
Wrights	Santa Clara	2-93
Yerba Buena Lighthouse	San Francisco	2-41
Yorba Linda	Orange	4-415
Yosemite	Mariposa	5-193
Yreka	Siskiyou	1-9
Yucaipa (Arnett)	San Bernardino	4-362
Yucca Grove	San Bernardino	6-36

APPENDIX B—TABLE 2

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
bertine	Butte	5-005
gnews	Santa Clara	2-048
lameda	Alameda	2-001
lameda Creek 105-A	Alameda	2-002
lcade	Fresno	5-048
lhambra (Southern Pacific Co.)	Los Angeles	4-001
liso Canyon	Orange	4-0143
llen Ranch	San Diego	4-0269
losta	Los Angeles	4-002
lpine Heights	San Diego	4-0270
lta Canada	Los Angeles	4-003
lta Loma No. 1	San Bernardino	4-0204
lturas No. 2	Modoc	1-035
lturas No. 3	Modoc	1-036
mboy	San Bernardino	6-032
nada	Trinity	5-0206
nderson (near)	Shasta	5-0169
ndreas Canyon	Riverside	7-005
ndreas Garden	Riverside	7-006
ngels Camp No. 1	Calaveras	5-018
ntioch (near)	Contra Costa	2-014
pache Camp	Ventura	3-0140
rbuckle	Colusa	5-024
rcadia (Southern Pacific Co.)	Los Angeles	4-004
rlington (American Sugar)	Riverside	4-0183
rroyo Sequis	Los Angeles	4-005
ssociated Oil Co. (A)	Fresno	5-050
ssociated Oil Co. No. 2 H	Fresno	5-049
ssociated Oil Co. No. 3 H	Monterey	3-001
ssociated Oil Co. No. 3 HA	Monterey	3-002
ssociated Oil Co. No. 4 H	San Benito	3-032
ssociated Oil Co. No. 5 H	Monterey	3-003
ssociated Oil Co. No. 6 H	Monterey	3-004
ssociated Oil Co. No. 7	Monterey	3-005
ssociated Oil Co. No. 8	Monterey	3-006
ssociated Oil Co. No. 8 H	Monterey	3-007
tascadero (Atascadero Mutual Water Co.)	San Luis Obispo	3-048
tascadero Sub-station	San Luis Obispo	3-049
tlas Road	Napa	2-028
vila	San Luis Obispo	3-050
adger	Tulare	5-0207
adger Camp	Santa Cruz	3-0114
agnall Ranch	Ventura	4-0354
aldwin Hills	Los Angeles	4-006
arrett Post Office	San Diego	4-0271
arton's Resort	Fresno	5-051
assett	Sonoma	1-047
ass Lake	Madera	5-0106
ear Creek Dam Site	Santa Cruz	3-0115
eckwith	Plumas	5-0143
eegum	Tehama	5-0201
ell Canyon (Platt Ranch)	Los Angeles	4-007
ell (California Forest and Range Experiment Station)	Los Angeles	4-008
elmont	San Mateo	2-040
en Lomond Mountain	Santa Cruz	3-0116
en Mar Hills	Los Angeles	4-009
erenda	Madera	5-0107
g Bear Lake (near)	San Bernardino	4-0205
g Bear Tavern	San Bernardino	6-033
g Creek No. 2	Fresno	5-052
jou	El Dorado	6-001
rmingham General Hospital	Los Angeles	4-010
oomington No. 2	San Bernardino	6-034
ue Lakes	Alpine	5-001

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
Blythe Airport	Riverside	7-007
Boca	Nevada	5-0130
Bonita No. 2	San Diego	4-0272
Bonnie Doon	Santa Cruz	3-0117
Boulder Creek (near No. 1)	Santa Cruz	3-0118
Bouquet Canyon	Los Angeles	4-011
Boyce & Boyce Orchard	Solano	5-0187
Bradley	Monterey	3-008
Branciforte	Santa Cruz	3-0119
Brea Canyon	Ventura	4-0355
Brea Dam	Orange	4-0144
Bremer	Sutter	5-0195
Brentwood	Contra Costa	5-031
Brookdale (Schmaber)	Santa Cruz	3-0120
Brush Creek Ranger Station	Butte	5-006
Bryson (near)	Monterey	3-009
Buchanan	Madera	5-0108
Buck Creek Dam Site	Ventura	4-0356
Buckman Springs	San Diego	4-0273
Buena Park	Orange	4-0145
Buena Ventura Springs	Ventura	4-0357
Buena Vista	San Benito	3-033
Burbank Airport	Los Angeles	4-012
Butte Creek House	Butte	5-007
Butte Valley	Plumas	5-0144
Butte Valley Irrigation District	Siskiyou	1-038
Byron	Contra Costa	5-032
Cahuenga Park	Los Angeles	4-013
Cahuilla	Riverside	4-0184
Cain Ranch	Mono	6-024
Cajon Camp	San Bernardino	4-0206
Cajon (near)	San Bernardino	4-0207
Cajon Summit	San Bernardino	4-0208
Calaveras Big Trees No. 2	Calaveras	5-019
Calaveras Ranger Station	Calaveras	5-020
California Hot Springs	Tulare	5-0208
California Institute of Technology	Los Angeles	4-014
Calistoga	Napa	5-0126
Calistoga (Williams)	Napa	5-0127
Calloway Canal	Kern	5-076
Callow Ranch	San Joaquin	5-0158
Cambria	San Luis Obispo	3-051
Camino (near)	El Dorado	5-033
Camp No. 5	San Luis Obispo	3-052
Camp Angelus	San Bernardino	4-0209
Campbell (Hyde)	Santa Clara	2-049
Campbells Ranch	San Diego	4-0274
Camp Denny	San Diego	4-0275
Camp McQuaide	Santa Cruz	3-0121
Campo Pachard	San Diego	4-0276
Campo No. 2	San Diego	4-0277
Campo No. 3	San Diego	4-0278
Camp Pioneer	Yuba	5-0231
Camp Rincon	Los Angeles	4-015
Camp Wishon	Tulare	5-0209
Camulos Ranch Hill No. 5	Ventura	4-0358
Canebrake Canyon	San Diego	7-016
Canyon Redondo	San Bernardino	6-036
Capitola	Santa Cruz	3-0122
Carmel Valley	Monterey	3-010
Carneras	Kern	5-072
Carroll Dam Site	San Diego	4-0279
Carvin Mine	Sierra	5-0182
Casebere Ranch	San Diego	4-0280

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
astaic	Ventura	4-0359
astle Pinckey	Santa Barbara	3-087
astroville	Monterey	3-011
astroville	Monterey	3-012
athay (near)	Mariposa	5-0113
athedral Park	El Dorado	6-002
ellier Place	Lake	5-091
enterville	Alameda	2-003
entral Point	Merced	5-0119
hallenge	Yuba	5-0232
harlton Flats	Los Angeles	4-016
hatsworth Patrol Station	Los Angeles	4-017
henery Filter Plant	Contra Costa	2-015
herokee	Butte	5-008
herry Summit	Los Angeles	4-018
hevy Chase	Los Angeles	4-019
hews Ridge	Monterey	3-013
hico (near)	Butte	5-011
hico Army Flying School	Butte	5-009
hico (Parrott Investment Co.)	Butte	5-010
hihuahua Mountain	San Diego	4-0281
hilao	Los Angeles	4-020
hilds Ranch	Amador	5-003
hino Delphy No. 2	San Bernardino	4-0210
hino (Thomas)	San Bernardino	4-0185
holame (near)	San Luis Obispo	3-053
huchupate	Ventura	4-0360
hula Vista (Carpenter)	San Diego	4-0282
ity Creek CCC Camp	San Bernardino	4-0211
lark's ½-Way House	Los Angeles	4-021
lay (Bolton)	Sacramento	5-0151
learlake Park	Lake	5-092
learlake Park	Lake	5-093
lements	San Joaquin	5-0159
loverdale	Sonoma	1-048
loverdale (near)	Sonoma	1-049
lyde Ranch	San Bernardino	6-037
oachella	Riverside	7-008
olby Ranch No. 2	Los Angeles	4-022
ompton (Southern Pacific Company)	Los Angeles	4-023
onejo Ranch No. 2	Ventura	4-0361
onfidence (Hiatt Ranch)	Tuolumne	5-0219
onverse Nursery	San Bernardino	6-038
oalinga (near)	Fresno	5-053
oalinga Pump	Fresno	5-054
orona (American Fruit Growers Exchange)	Riverside	4-0186
orona (near)	Riverside	4-0187
oronado No. 1	San Diego	4-0283
orral	San Luis Obispo	3-054
orralitos	Santa Cruz	3-0123
ovelo (Barton)	Mendocino	1-017
ovelo (Brown)	Mendocino	1-018
ovelo (near)	Mendocino	1-019
ovina (H. H. Snodgrass)	Los Angeles	4-0214
ovina (Southern Pacific Company)	Los Angeles	4-025
ox's Canyon	San Bernardino	6-039
oyote	Santa Clara	2-050
rab Park	San Bernardino	6-040
rafts Peak	San Bernardino	6-041
rescent City	Del Norte	1-001
restline	San Bernardino	6-042
ucamonga No. 1	San Bernardino	4-0212
ucamonga Water Co.	San Bernardino	4-0213
uripamba	Santa Clara	3-0110
urson Canyon (Lower Ridge)	Los Angeles	4-026

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
ashenbury Ranch	San Bernardino	6-043
ayama Ranger Station	Santa Barbara	3-088
ayamaca (East)	San Diego	4-0284
ayamaca No. 2	San Diego	4-0285
aggett Airport	San Bernardino	6-044
avenport	Santa Cruz	3-0124
ay	Modoc	5-0124
ep Dreek (East Fork)	San Bernardino	6-045
ep Creek (South Fork)	San Bernardino	6-046
er Park	Placer	6-031
er Creek Ranger Station	Tulare	5-0210
drick (near)	Trinity	1-055
hesa	San Diego	4-0286
l Rosa	San Bernardino	4-0214
l Rosa Heights	San Bernardino	4-0215
scanso Valley	San Diego	4-0287
vil Canyon	San Bernardino	4-0216
vil Canyon Shaft	San Bernardino	4-0217
vils Canyon Panorama Point	San Bernardino	4-0218
wey	San Diego	4-0288
ablo Post Office	Contra Costa	2-016
amond Bar Horse Ranch	Los Angeles	4-027
Giorgio Farm	Kern	5-073
nuba	Tulare	5-0211
bie Ranch	San Bernardino	6-047
dgeland	Butte	5-012
rman's Ranch	San Bernardino	6-048
uble Eagle Ranch	Los Angeles	4-028
wney (Jordon)	Los Angeles	4-029
arte (Southern Pacific Company)	Los Angeles	4-030
blin	Alameda	2-004
nlap	Fresno	5-055
nlap (near)	Fresno	5-056
nnigan (Davis)	Yolo	5-0228
erville No. 1	Humboldt	1-006
erville No. 2	Humboldt	1-007
gle	San Luis Obispo	3-055
gles Nest	San Diego	4-0289
rl Ranch	Los Angeles	6-014
st Pine Flat	Los Angeles	4-031
st Portal	Mono	6-025
st Santa Susana	Ventura	4-0362
st Spunky	Los Angeles	6-015
st Whittier (Mendenhall)	Los Angeles	4-032
en Creek	Alameda	2-005
na	San Luis Obispo	3-056
wards Ranch	Ventura	4-0363
Cajon No. 2	San Diego	4-0290
Cajon No. 3	San Diego	4-0291
Casco	Riverside	4-0188
Centro	Imperial	7-001
Dorado	El Dorado	5-034
Dorado Powerhouse	El Dorado	5-035
zabeth Lake Canyon	Los Angeles	4-033
: Grove	Sacramento	5-0152
: Valley	Del Norte	1-002
nira	Solano	5-0188
Modena	Orange	4-0146
Monte Fire Station	Los Angeles	4-034
Sereno	Los Angeles	4-035
Sereno (Morgan)	Los Angeles	4-036
Solyo	Stanislaus	5-0191
inore (near)	Riverside	4-0189

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
l Toro Camp	Orange	4-0147
l Toro Cemetery	Orange	4-0148
rnst Ranch	San Luis Obispo	3-057
scondido (near No. 1)	San Diego	4-0292
scondido No. 4	San Diego	4-0293
scondido Patrol Station	Los Angeles	4-037
stero	San Luis Obispo	3-058
strada	San Luis Obispo	3-059
tiwanda	San Bernardino	4-0219
tiwanda (near)	San Bernardino	4-0220
tiwanda (Moore)	San Bernardino	4-0221
tna	Siskiyou	1-039
xchequer	Mariposa	5-0114
xeter	Tulare	5-0212
xeter (near)	Tulare	5-0213
airfield (near)	Solano	2-065
airmont Reservoir	Los Angeles	6-016
allbrook (near)	San Diego	4-0294
amosa	Kern	5-074
arallon Island	San Francisco	2-037
ern	Los Angeles	6-017
ernando	Los Angeles	6-018
iddletown (near)	Amador	5-004
igueroa Lookout	Santa Barbara	3-089
igueroa Mountain	Santa Barbara	3-090
ilirea Reservoir Site	San Bernardino	4-0222
irebaugh (near)	Fresno	5-057
ish Camp	Mariposa	5-0115
ish Canyon	Los Angeles	4-038
itzhugh	San Mateo	2-041
lemming Mill	San Bernardino	6-049
lorence	Los Angeles	4-039
lorence Lake	Fresno	5-058
loriston	Nevada	5-0131
ollows Camp	Los Angeles	4-040
oothill Irrigation Co.	San Bernardino	4-0223
oothill Lemon Co. No. 4	Riverside	4-0190
oothill Lemon Co. No. 5	Riverside	4-0191
ordham Farms	Monterey	3-014
oresters Sanitarium	Los Angeles	4-041
orest Home Lodge	San Bernardino	4-0224
ort Jones (near)	Siskiyou	1-040
ort Romie No. 1	Monterey	3-015
ort Tejon	Kern	5-075
ortuna	Humboldt	1-008
outs Spring	Colusa	5-025
razier Mine	Ventura	3-0141
redalba	San Bernardino	4-0225
remont Peak	San Benito	3-034
reydoz No. 1	Riverside	4-0192
reydoz No. 2	Riverside	4-0193
ullerton (Hegar)	Orange	4-0151
ullerton (Royer No. 1)	Orange	4-0152
ullerton (Royer No. 2)	Orange	4-0153
ullerton Dam	Orange	4-0149
ullerton Evaporation Station	Orange	4-0150
arcia	San Luis Obispo	3-060
azelle	Siskiyou	1-041
eneral Grant National Park	Fresno	5-059
eorgetown Ranger Station	El Dorado	5-036
ilman Ranch	Shasta	5-0170
ilroy (near)	Santa Clara	2-054
ilroy (near No. 2)	Santa Clara	2-051

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
G oy Hot Springs	Santa Clara	2-052
G oy Hot Springs (near)	Santa Clara	2-053
G a	Siskiyou	1-042
G rd No. 2	Kern	5-077
G hoff Ranch	Solano	2-066
G dora	Los Angeles	4-042
G Ellen	Sonoma	2-070
G Ranch (McCarthy)	San Bernardino	4-0227
G Ranch	San Bernardino	4-0228
G ville (near No. 2)	Kern	5-078
G wood	Santa Cruz	3-0125
G s	San Bernardino	6-050
G sales	Monterey	3-016
G ada	Los Angeles	4-043
G d Island	Colusa	5-026
G t Grove	Fresno	5-060
G Mountain	San Bernardino	6-051
G n Valley Toll House	San Bernardino	4-0226
G by's Ranch	San Diego	4-0295
G dy Flats	El Dorado	5-037
G eland No. 1	Tuolumne	5-0220
G eland No. 2	Tuolumne	5-0221
G dalupe	Santa Barbara	3-091
H ilton Field	Marin	2-024
H sen Dam	Los Angeles	4-044
H sen Ranch	Los Angeles	4-045
H bin Hot Springs	Lake	5-094
H lin Ranch	Napa	5-0128
H vey Ranch	San Diego	4-0296
H Creek (near)	Shasta	5-0171
H ser Creek	San Diego	4-0297
H thorne	Los Angeles	4-046
H ward (Escheleon)	Alameda	2-007
H ward (near)	Alameda	2-008
H ward (Southern Pacific Co.)	Alameda	2-006
H ps Peak	San Bernardino	4-0229
H rst	Mendocino	1-020
H er	Imperial	7-002
H Avenue Evaporation Station	Orange	4-0154
H ndale	San Bernardino	6-052
H et	Riverside	4-0194
H et Reservoir	Riverside	4-0195
H ninger Flat (Peavy)	Los Angeles	4-047
H burn Well	San Luis Obispo	3-061
H andes	San Benito	3-035
H andes (near)	San Benito	3-036
H andes (near No. 2)	San Benito	3-037
H land Park	Santa Cruz	3-0126
H Ranch	San Luis Obispo	3-062
H dale	Sutter	5-0196
H art Mills	Nevada	5-0132
H omb	San Bernardino	6-053
H Pumping Station	Orange	4-0155
H ister	San Benito	3-039
H ister No. 2	San Benito	3-038
H ywood City Engineer	Los Angeles	4-048
H or Camp No. 4	Los Angeles	4-049
H ks Ranch	San Diego	4-0298
H pa	Humboldt	1-009
H ver Ranch	Santa Cruz	3-0127
H land (near)	Mendocino	1-021
H land (near No. 1)	Lake	5-095
H per Mountain	Ventura	4-0364
H e Canyon	Santa Barbara	3-092

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
orseshoe Bend	Fresno	5-061
ot Springs Mt	San Diego	4-0299
oward Forest	Mendocino	1-022
uasna	San Luis Obispo	3-063
ueneme	Ventura	4-0365
ume No. 1	Fresno	5-062
ume No. 2	Fresno	5-063
unsaker Flat	San Bernardino	4-0230
urlburds Ranch	San Diego	4-0300
uston Flat	San Bernardino	4-0231
yampom	Trinity	1-056
yampom	Trinity	1-057
ydesville	Humboldt	1-010
ynes-Hayden	Los Angeles	4-050
vine Ranch Coast	Orange	4-0156
vine Ranch Tract No. 706	Orange	4-0157
es	Monterey	3-017
mul Ranch	San Diego	4-0301
hnsondale	Tulare	5-0214
hnsville	Plumas	5-0145
lian (near)	San Diego	4-0302
ncal Dam	Santa Barbara	3-093
ırnak	Sutter	5-0197
ene Ranger Station	Kern	5-079
lly Ranch	San Diego	4-0303
ttleman	Kings	5-089
ng Island	San Joaquin	5-0160
ngsburg	Fresno	5-064
ngs Mountain	San Mateo	2-042
ngs Mountain Road	San Mateo	2-043
nsley	Mariposa	5-0116
tchen Valley	San Diego	4-0304
amath	Del Norte	1-003
ıeeland (near No. 2)	Humboldt	1-011
ıob	Shasta	5-0172
ıffles	San Bernardino	4-0232
burz	El Dorado	5-038
burz (near)	El Dorado	5-039
guna Beach No. 2	Orange	4-0158
guna Canyon	Santa Cruz	3-0128
ke Arrowhead Fish Hatchery	San Bernardino	6-054
ke Arrowhead Village	San Bernardino	6-055
ke City	Modoc	1-037
ke Mary	Mono	6-026
ke Mountain	Trinity	1-058
ke Pillsbury	Lake	1-016
ke Sherwood	Ventura	4-0366
keside	San Diego	4-0305
mbert	Orange	4-0159
Mesa No. 1	San Diego	4-0306
Mesa No. 2	San Diego	4-0307
Mesa No. 3	San Diego	4-0308
ınkershim (San Francisco and San Joaquin Valley Raiload)	Los Angeles	4-051
Panza	San Luis Obispo	3-064
Porte No. 2	Plumas	5-0146
Posta	San Diego	4-0309
Presa	San Diego	4-0310
ırel (Dodge)	Santa Cruz	3-0129
Verne	Los Angeles	4-052
wrence	Santa Clara	2-055

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
Laytonville	Mendocino	1–023
Laytonville No. 2	Mendocino	1–025
Laytonville (Division of Highways)	Mendocino	1–024
Lemon	Los Angeles	4–053
Lincoln	Placer	5–0136
Lind Airport	San Joaquin	5–0161
Lindblooms	Lake	5–096
Linden (Davis)	San Joaquin	5–0162
Litchfield	Lassen	6–006
Littlelands	Los Angeles	4–054
Little Rock Creek (Cole)	Los Angeles	6–019
Little Rock Creek	Los Angeles	6–020
Little Tujunga	Los Angeles	4–055
Little Uvas	Santa Clara	3–0111
Live Oak Canyon "B"	Los Angeles	4–056
Livingston No. 1	Merced	5–0120
Lockwood Mesa	San Diego	4–0311
Lockwood (near)	Monterey	3–018
Lodi No. 3	San Joaquin	5–0163
Lone Pine (near)	Inyo	6–003
Lone Valley	Lassen	6–007
Long Barn	Tuolumne	5–0222
Long Beach (Louise and Locust)	Los Angeles	4–062
Long Beach (South and Lemon)	Los Angeles	4–061
Long Beach (Seventh and California)	Los Angeles	4–057
Long Beach (Eighth and Cedar)	Los Angeles	4–058
Long Beach (37th and Gaita)	Los Angeles	4–059
Long Beach (54th and Lime)	Los Angeles	4–060
Long Beach (60th and Rose)	Los Angeles	4–063
Long Camp	Tuolumne	5–0223
Loomis Ranch	Los Angeles	4–064
Loraine	Kern	5–081
Los Angeles (Casey)	Los Angeles	4–065
Los Angeles Examiner	Los Angeles	4–068
Los Angeles Flood Control Office No. 1	Los Angeles	4–067
Los Angeles Flood Control Office No. 2	Los Angeles	4–066
Los Angeles (Morrill)	Los Angeles	4–069
Los Angeles (Southern Pacific Company)	Los Angeles	4–070
Los Angeles (West 80th St.)	Los Angeles	4–071
Los Banos Valley	Merced	5–0121
Los Burros	Monterey	3–020
Los Burros Mine	Monterey	3–019
Los Flores	San Bernardino	7–015
Los Flores Ranch	San Bernardino	6–035
Los Molinos	Tehama	5–0202
Los Olivas	Santa Barbara	3–094
Los Posas Tract No. 59	Ventura	4–0367
Los Vaqueros	Monterey	3–021
Loveland Dam	San Diego	4–0312
Lower Haines Canyon	Los Angeles	4–072
Lower Lytle Creek	San Bernardino	4–0233
Loydton	Sierra	5–0183
Lucia (near)	Monterey	3–022
Lyon Peak	San Diego	4–0313
Lytle Creek (Foothill Blvd.)	San Bernardino	4–0234
Lytton Springs	Sonoma	1–050
Macumber	Shasta	5–0173
Macdoel	Siskiyou	1–043
Madeline No. 2	Lassen	5–0105
Magic Mountain	Los Angeles	4–075
Mandeville Canyon (San Vincente Point)	Los Angeles	4–073
Mandeville Canyon No. 4	Los Angeles	4–074
Manteca	San Joaquin	5–0164
Manzanita Mountain	Santa Barbara	3–095

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
arch Field	Riverside	4-0196
arron Valley	San Diego	4-0314
artinez	Contra Costa	2-017
artinez (near)	Contra Costa	2-018
atagual	San Diego	4-0315
ather	Tuolumne	5-0224
ay Canyon	Los Angeles	4-076
cClung Ranch	Kern	5-081
cKinney	Placer	5-0137
cKittrick	Kern	5-082
cMullin	Fresno	5-065
cPherson	Orange	4-0160
eadow Valley No. 2	Plumas	5-0147
easors	San Bernardino	6-056
endenhall Valley	San Diego	4-0316
ercury	Santa Clara	2-056
chigan Bluff	Placer	5-0138
ddletown	Lake	5-097
lford (near)	Lassen	6-008
llard Canyon	Riverside	7-009
llard Forks	Riverside	7-010
llbrae	San Mateo	2-044
ll Creek A	San Bernardino	4-0235
ll Creek Ranger Station	San Bernardino	4-0236
lls Orchard	Glenn	5-070
lls Estate Park	San Mateo	2-045
lpitas	Santa Clara	2-057
nturn	Madera	5-0109
ra Monte Pumping Plant	Los Angeles	4-077
randa (near)	Humboldt	1-012
ssion Valley	Riverside	7-011
tchell Mill	Calaveras	5-021
desto No. 2	Stanislaus	5-0192
ffett Field	Santa Clara	2-058
nkey Hill	San Diego	4-0317
nroe	Los Angeles	4-078
ntague Airport	Siskiyou	1-044
ntalvo	Ventura	4-0368
nte	Los Angeles	4-079
ntebello Chamber of Commerce	Los Angeles	4-080
ntebello (Cotton)	Los Angeles	4-081
ntebello (Smith)	Los Angeles	4-082
ntgomery Creek (near)	Shasta	5-0175
ntgomery Creek No. 2	Shasta	5-0174
nticello (near)	Napa	5-0129
numental	Del Norte	1-004
numental (Mine)	Del Norte	1-005
rena Dam (near)	San Diego	4-0318
rgan Hill	Santa Clara	2-060
rgan Hill (U. S. Soil Conservation Service)	Santa Clara	2-059
rgan Hill (near No. 1)	Santa Clara	3-0112
rango Valley	San Bernardino	6-057
untain Home No. 1	Tulare	5-0215
Breckenridge	Kern	5-083
Danaher	El Dorado	5-0408
Eden	Alameda	2-009
Frazier	Ventura	4-0369
Hebron	Siskiyou	1-045
Madam	Santa Cruz	3-0130
Madonna	Santa Clara	2-061
Palomar Observatory	San Diego	4-0319
St. Helena	Sonoma	1-051
Shasta Airway	Siskiyou	5-0185
Tamalpais (near)	Marin	2-025
ooy Ranch Road Camp	San Bernardino	4-0243

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
Muscoy Ranch Rose Place	San Bernardino	4-0244
Muscoy Ranch No. 1	San Bernardino	4-0237
Muscoy Ranch No. 2	San Bernardino	4-0238
Muscoy Ranch No. 3	San Bernardino	4-0239
Muscoy Ranch No. 4	San Bernardino	4-0240
Muscoy Ranch No. 5	San Bernardino	4-0241
Muscoy Ranch No. 6	San Bernardino	4-2042
Mutah Flat	Ventura	4-0370
Nevada City (near No. 2)	Nevada	5-0133
New Almaden	Santa Clara	2-062
Newark	Alameda	2-010
Newcastle (Lamina)	Placer	5-0139
Newhall Airport	Los Angeles	4-083
Newhall Ranch (McGuire)	Ventura	4-0371
Nipomo	San Luis Obispo	3-065
Nobles Mine	San Diego	4-0320
Noah Ranch	Sutter	5-0198
Norden	Placer	5-0140
Nordhoff	Ventura	4-0372
North Hill Vineyard	Calaveras	5-022
North Hollywood Observatory	Los Angeles	4-084
North Lakeport	Lake	5-098
North San Juan	Nevada	5-0134
North Whittier Heights	Los Angeles	4-085
Norvell Flat	Lassen	6-009
Norwalk	Los Angeles	4-086
Novato	Marin	2-026
Oak Grove	San Diego	4-0321
Oakland Airport	Alameda	2-011
Oakville	Napa	2-029
Oakville (near)	Napa	2-032
Oakville (near No. 1)	Napa	2-030
Oakville No. 2	Napa	2-031
Oceana	San Luis Obispo	3-066
Oceanside Airport	San Diego	4-0322
Oceanside (near)	San Diego	4-0323
Oceanside No. 3	San Diego	4-0324
Ogilby	Imperial	7-003
Olinda	Shasta	5-0176
O'Melveny Camp	Los Angeles	4-087
Ontario (Taylor No. 2)	San Bernardino	4-0245
Orange County Reservoir	Orange	4-0161
Orange Cove	Fresno	5-066
Orangevale	Sacramento	5-0153
Oreut Ranch	Los Angeles	4-088
Oreutt	Santa Barbara	3-096
Orick	Humboldt	1-013
Orinda (Filter)	Contra Costa	2-019
Oroville (McDermott)	Butte	5-013
Oroville (near)	Butte	5-014
Oroville (State Forestry)	Butte	5-015
Otay	San Diego	4-0325
Pacific Colony	Los Angeles	4-089
Pacific Union College	Napa	2-033
Padre Vineyard Co.	San Bernardino	4-0246
Paicines (near)	San Benito	3-040
Pajaro	Monterey	3-023
Palm Canyon	Riverside	7-012
Palmdale Airport	Los Angeles	6-021
Palmdale (near)	Los Angeles	4-091
Palmdale (Schoeller)	Los Angeles	4-090
Palmers Service Station	San Bernardino	6-058

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
ms	Los Angeles	4-092
omar Mountain	San Diego	4-0326
os Verdes	Los Angeles	4-093
os Verdes Golf Club	Los Angeles	4-094
os Verdes Ranch	Los Angeles	4-095
no	San Diego	4-0327
ioche Store	San Benito	3-041
kfield (near No. 2)	Monterey	3-024
kfield No. 3	Monterey	3-025
kenta	Tehama	5-0203
o Robles (near)	San Luis Obispo	3-067
o Robles (State Forestry)	San Luis Obispo	3-068
terson Pumping Station No. 2	Stanislaus	5-0193
stock Camp	Tuolumne	5-0225
ton	Contra Costa	2-020
llips	El Dorado	5-041
enix Dam	Tuolumne	5-0226
cho	Imperial	7-004
cbot	Los Angeles	4-096
e Hills Hotel	San Diego	4-0328
e Knot	San Bernardino	4-0247
e Mountain	San Diego	4-0329
e Valley	San Diego	4-0330
nacles	San Benito	3-042
o Grande	El Dorado	5-042
No. 5	Shasta	5-0178
ville	Shasta	5-0177
te	Kern	5-084
erville (Forest Genetics)	El Dorado	5-044
erville (near)	El Dorado	5-043
asanton (Southern Pacific Co.)	Alameda	2-012
nt Arena	Mendocino	1-026
nt of Rocks	San Bernardino	6-059
nt Piedras Blancas	San Luis Obispo	3-069
nona (near)	Los Angeles	4-097
t Los Angeles	Los Angeles	4-098
rero Canyon	Riverside	4-0197
rero Seco	Ventura	4-0373
ter Valley	Mendocino	1-027
o Guard Station	San Luis Obispo	3-070
do Dam	Riverside	4-0198
do (Turner)	Riverside	4-0199
ttville No. 1	Plumas	5-0148
nceton	Colusa	5-027
blo Farm	San Diego	4-0331
nte (Southern Pacific Co.)	Los Angeles	4-099
rtala Cruz	San Diego	4-0332
pa	Butte	5-016
ston's Bouquet Canyon	Los Angeles	4-0100
nona (Green)	San Diego	4-0333
nona No. 3	San Diego	4-0334
nona No. 4	San Diego	4-0335
ch House	Orange	4-0162
cho Corte Madera	San Mateo	2-046
cho Los Coches	Monterey	3-026
cho Remolino	San Diego	4-0336
cho Santa Fe	San Diego	4-0337
ger Station	San Bernardino	4-0248
or's Lodge	El Dorado	5-045
enna	Los Angeles	4-0101
mond	Madera	5-0110
lands (near)	San Bernardino	4-0249
Mountain (near)	San Bernardino	6-060
Rock Canyon Trail	Los Angeles	4-0102

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
Redwood Valley	Mendocino	1-028
Relief	Tuolumne	5-0227
Rialto (near)	Los Angeles	4-0103
Ridge (North)	San Bernardino	6-061
Rincon of Warner Ranch	San Diego	4-0338
Rio Bravo	Kern	5-085
River Ranch	Monterey	3-027
Rock City Headquarters	Contra Costa	2-021
Rose Glen	San Diego	4-0339
Rosewood	Tehama	5-0204
Round Timbers	San Joaquin	5-0165
Rubidoux Laboratory	Riverside	4-0200
Running Springs (near)	San Bernardino	4-0250
Running Springs No. 1	San Bernardino	4-0251
Ruppert	Lake	5-099
Sacramento (Airport)	Sacramento	5-0154
Sacramento (Logan)	Sacramento	5-0155
Sacramento Olive Farm	Sacramento	5-0156
St. Helena	Napa	2-034
St. Helena (near No. 3)	Napa	2-035
St. Vrain Ranch	Shasta	5-0179
San Antonio Intake	Los Angeles	4-0104
San Benito (near)	San Benito	3-043
San Bernardino (near)	San Bernardino	4-0252
San Bernardino No. 2	San Bernardino	4-0253
Sandberg	Los Angeles	4-0105
San Dimas	Los Angeles	4-0107
San Dimas (Southern Pacific Co.)	Los Angeles	4-0106
Sandy	San Luis Obispo	3-071
San Felipe	Santa Clara	3-0113
San Fernando Powerhouse No. 3	Los Angeles	4-0108
San Fernando Valley	Los Angeles	4-0109
San Francisco (Airport)	San Mateo	2-038
San Francisco (Standard Oil Co.)	San Francisco	2-039
San Gabriel Dam No. 1	Los Angeles	4-0112
San Gabriel Fish Hatchery	Los Angeles	4-0113
San Gabriel River (North Fork)	Los Angeles	4-0111
San Gabriel (Southern Pacific Co.)	Los Angeles	4-0110
San Jacinto No. 2	Riverside	4-0201
San Joaquin Experimental Range	Merced	5-0122
San Jose Hills	Los Angeles	4-0114
San Juan Bautista Mission (near No. 2)	San Benito	3-044
San Juan Capistrano	Orange	4-0163
San Juan Hot Springs	Riverside	4-0202
San Lucas	Monterey	3-028
San Luis Obispo (State Forestry)	San Luis Obispo	3-072
San Luis Obispo Substation	San Luis Obispo	3-073
San Luis Obispo	San Luis Obispo	3-074
San Mateo No. 2	San Mateo	2-047
San Nicolas Island	Ventura	4-0374
San Rafael No. 2	Marin	5-0112
Santa Ana No. 1	Orange	4-0165
Santa Ana No. 3	Orange	4-0254
Santa Ana Evaporation Station	Orange	4-0164
Santa Ana Valley	Ventura	4-0375
Santa Anita Fern Lodge	Los Angeles	4-0115
Santa Barbara Potrero	Santa Barbara	3-097
Santa Cruz (Burton)	Santa Cruz	3-0131
Santa Cruz (City Hall)	Santa Cruz	3-0132
Santa Fe Dam	Los Angeles	4-0116
Santa Fe Ranch	San Diego	4-0340
Santa Margarita (Atascadero Mutual Water Co.)	San Luis Obispo	3-075
Santa Margarita (Union Oil Co.)	San Luis Obispo	3-076
Santa Maria No. 2	Santa Barbara	3-0102

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
nta Maria (Airport)	Santa Barbara	3-098
nta Maria Damsite	San Diego	4-0341
nta Maria (Hancock Field)	Santa Barbara	3-099
nta Maria Substation	Santa Barbara	3-0100
nta Maria (Union Oil Co.)	Santa Barbara	3-0101
nta Rosa Valley No. 2	Ventura	4-0376
nta Susana Schoolhouse	Ventura	4-0377
nta Susana Mountain	Los Angeles	4-0117
nta Ynez	Santa Barbara	3-0103
nta Ysabel (Warner Divide)	San Diego	4-0342
ntiago Dam (Irvine Co.)	Orange	4-0166
ntiago Dam (U. S. Engineer Department)	Orange	4-0167
ratoga Summit	Santa Cruz	3-0133
rgent	Santa Clara	2-063
ticoy (Edwards)	Ventura	4-0378
ugus (near)	Los Angeles	4-0119
ugus No. 2	Los Angeles	4-0118
usalito No. 2	Marin	2-027
ales	Sierra	5-0184
hilling	San Diego	4-0343
bastopol	Sonoma	1-052
ction 9	San Bernardino	6-062
eley Flat	San Bernardino	4-0255
ad Valley Ranger Station	Siskiyou	1-046
pulveda Dam	Los Angeles	4-0120
aft No. 1	Mono	6-027
after	San Luis Obispo	3-077
andon (Standard Oil)	San Luis Obispo	3-078
andon (Union Oil)	San Luis Obispo	3-079
andon (White)	San Luis Obispo	3-080
asta Dam	Shasta	5-0180
attucks Mill	San Bernardino	4-0256
enberger Ranch	Los Angeles	6-022
ingles Springs No. 2	El Dorado	5-046
ively	Humboldt	1-014
orb	Los Angeles	4-0121
rra Alta Ranch	Los Angeles	4-0122
nal Hill	Los Angeles	4-0123
verado Ranger Station	Orange	4-0168
ver Lake Airport	San Bernardino	6-062
oons Ranch	Lake	5-0100
quoc (South Fork Camp)	Santa Barbara	3-0104
ye Valley	San Diego	4-0344
ck Creek No. 2	Monterey	3-029
ybacks Ranch	Ventura	4-0379
iths Point	Plumas	5-0149
eddens Ranch	Ventura	4-0380
ow Crest Camp	San Bernardino	4-0257
ow Laboratory	Nevada	5-0135
la Creek	Mendocino	1-029
nis (Berylwood Investment Co.)	Ventura	4-0381
nis (near No. 1)	Ventura	4-0382
quel (Mullens)	Santa Cruz	3-0134
quel (Sheppa)	Santa Cruz	3-0135
ita Paula (South Mountain)	Ventura	4-0383
ith Portal	Santa Barbara	3-0105
ith Vallejo	Solano	2-067
idra	Los Angeles	4-0124
irr Heights	Los Angeles	4-0125
eckels Sugar Co.	San Joaquin	5-0166
inky Summit	Los Angeles	4-0126
iirrel	San Luis Obispo	3-081
ndish	Lassen	6-090
nford University	Santa Clara	2-064
nley Miller Mine	Los Angeles	4-0127

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
State Forestry (Howard Forestry)	Mendocino	1-022
Stayton Mine	Merced	5-0123
Stevenson Creek	Fresno	5-067
Stonyford (Rice)	Colusa	5-028
Stony Gorge Reservoir	Glenn	5-071
Strawberry Flat	San Bernardino	6-064
Success	Tulare	5-0216
Sulphur Banks	Lake	5-0101
Summit (Atascadero Mutual Water Co.)	San Luis Obispo	3-082
Summit (Daly)	San Bernardino	4-0258
Summit (Union Oil Co.)	San Luis Obispo	3-083
Summer Flat	San Luis Obispo	3-084
Sunny Hills Ranch (Laboratory)	Orange	4-0169
Sunny Hills Ranch (Lemon Mesa)	Orange	4-0170
Sunny Hills Ranch (Red Tank)	Orange	4-0171
Sunny Hills Ranch (Santa Fe)	Orange	4-0172
Sunny Hills Ranch (Viejo)	Orange	4-0173
Sunnyside	Napa	2-036
Sunset (Union Oil Co.)	Kern	5-086
Sunset Beach	Santa Cruz	3-0136
Surf	Santa Barbara	3-0106
Surf (Standard Oil Co.)	Santa Barbara	3-0107
Susanville	Lassen	6-011
Susanville Airport	Lassen	6-012
Taft	Kern	5-087
Talbott Ranch	Monterey	3-030
Tallac	El Dorado	5-047
Talmadge	San Bernardino	4-0259
Tamarack	Alpine	5-002
Tank Farm	San Luis Obispo	3-085
Tapo Citrus Association	Ventura	4-0384
Tar Canyon	Kings	5-090
Teakettle Creek	Fresno	5-068
Tecarte Dam	San Diego	4-0345
Tejon Ranger Station	Los Angeles	4-0128
Telegraph Canyon	San Diego	4-0346
Tequisquito Rancho	San Benito	3-045
Termo	Lassen	6-013
The Geysers	Sonoma	1-053
The Pines	Ventura	4-0385
Thermalito	Butte	5-017
Tidwell Oaks	Orange	4-0174
Tinemaha Reservoir	Inyo	6-005
Toll House (Mount Wilson)	Los Angeles	4-0129
Topanga Ranger Station	Los Angeles	4-0130
Torrey Lease	Ventura	4-0386
Trabuco Cabin Grounds	Orange	4-0175
Trabuco Canyon (Refractory Materials Co.)	Orange	4-0176
Trabuco Canyon (Soil Conservation Service)	Orange	4-0177
Trabuco Oaks	Orange	4-0178
Trabuco Oaks	Orange	4-0179
Tracy (near)	San Joaquin	5-0167
Tres Hermanos No. 3	San Bernardino	4-0260
Tres Pinos	San Benito	3-046
Triangle Station	Modoc	5-0125
Trinity Center	Trinity	1-059
Tropico	Los Angeles	4-0131
Truckee Ranger Station	Nevada	6-029
Truckee No. 2	Nevada	6-030
Tujunga Canyon Terrace	Los Angeles	4-0132
Tunjunga Mill Creek	Los Angeles	4-0133
Tulare (Southern Pacific Co.)	Tulare	5-0217
Tunnel C	San Bernardino	4-0262
Tunnel No. 2	San Bernardino	4-0261

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

Station	County	File number
Turlock (Southern Pacific Co.)	Stanislaus	5-0194
Tustin (Central Lemon Association)	Orange	4-0180
Tustin (Shaffer)	Orange	4-0181
Tustin (Southern Pacific Co.)	Orange	4-0182
Twin Cities	Sacramento	5-0157
Twin Lakes Park	Los Angeles	4-0134
Twin Valley	Lake	5-0102
Two Canyon Ranch	Los Angeles	4-0135
Udel Ranch	Solano	5-0189
University (Southern Pacific Co.)	Los Angeles	4-0136
Upland No. 1	San Bernardino	4-0263
Upland No. 2	San Bernardino	4-0264
Upland No. 3	San Bernardino	4-0265
Upper East Fork	Los Angeles	4-0137
Upper Holcomb	San Bernardino	6-065
Upper Lake No. 1	Lake	5-0103
Upper Lake No. 2	Lake	5-0104
Upper Lytle Creek	San Bernardino	4-0266
Upper Mill Creek	San Bernardino	4-0267
Upper San Leandro Filters	Alameda	2-013
Upper Toll Gate	San Bernardino	4-0268
Upper Tres Pinos	San Benito	3-047
Vacaville (near)	Solano	5-0190
Vallecito	San Diego	4-0347
Vallecito (near)	San Diego	4-0348
Valleton (near)	Monterey	3-031
Valley Springs No. 1	Calaveras	5-023
Vaughn Ranch	Los Angeles	4-0138
Venedo (near)	Sonoma	1-054
Venice	Los Angeles	4-0139
Ventura County Water District No. 1	Ventura	4-0387
Victor (Clancy Ranch)	San Joaquin	5-0168
Viejas Vista	San Diego	4-0349
Vignola Ranch	Madera	5-0111
Vina	Tehama	5-0205
Vinton	Plumas	5-0150
Vollmers	Shasta	5-0181
Wabash	Los Angeles	4-0140
Walnut Creek No. 1	Contra Costa	2-023
Walnut Creek (near)	Contra Costa	2-022
Warner Ranch House	San Diego	4-0350
Warner Springs	San Diego	4-0351
Wasioja	Santa Barbara	3-0108
Watsonville (near)	Santa Cruz	3-0137
Watsonville Junction	Santa Cruz	3-0138
Wawona	Mariposa	5-0117
Wawona No. 2	Mariposa	5-0118
Weitchpec	Humboldt	1-015
Weldon	Kern	5-088
Wells Meadow	Inyo	6-004
Werner Ranch	Placer	5-0141
West Big Pine Lookout	Santa Barbara	3-0109
West Branch Soquel Creek	Santa Cruz	3-0139
Westhaven	Fresno	5-069
West Palmdale	Los Angeles	6-023
West Portal Camp	Mono	6-028
Wheatland	Sutter	5-0199
Wheatland (near)	Yuba	5-0233
Wheeler Springs (near No. 1)	Ventura	4-0388
Wheeler Springs (near No. 2)	Ventura	4-0389
Wheeler Springs (near No. 3)	Ventura	4-0390
Whitewater Canyon	Riverside	7-013

APPENDIX B—TABLE 2—Continued

ALPHABETICAL LIST OF PRECIPITATION STATIONS IN CALIFORNIA WITH RECORDS OF LESS THAN 10 YEARS

	Station	County	File number
W	tewater Ranch	Riverside	7-014
W	ttier News	Los Angeles	4-0141
W	rins Slough	Colusa	5-029
W	iams Airport	Colusa	5-030
W	its	Mendocino	1-030
W	its No. 2	Mendocino	1-031
W	its (near No. 3)	Mendocino	1-032
W	its (near No. 4)	Mendocino	1-033
W	otta Ranch (Reclamation)	Solano	2-068
W	otta Ranch (Viti)	Solano	2-069
W	ow Creek	San Luis Obispo	3-086
W	nington (Southern Pacific Co.)	Los Angeles	4-0142
W	chester	Riverside	4-0203
W	dy Springs	Tulare	5-0218
W	etka Valley	San Diego	4-0352
W	ters	Yolo	5-0229
W	ters (near)	Yolo	5-0230
W	bridge	Placer	5-0142
W	h Creek	San Diego	4-0353
Y	cville	Mendocino	1-034
Y	a (Pyle)	Siskiyou	5-0186
Y	a City	Sutter	5-0200
Y	a Grove	San Bernardino	6-066
Z	a	Trinity	1-060

APPENDIX C

DESCRIPTION OF DRAINAGE BASINS

TABLE OF CONTENTS

APPENDIX C—TABLE 1

DESCRIPTION OF DRAINAGE BASINS, NORTH COASTAL AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
1	Rogue River in California	Illinois River	Del Norte and Siskiyou	7,000	California portion Rogue River Basin totals 147 square miles. Drainage f California is northward into Oregon.
2	Winchuck River group	Winchuck River	Del Norte	1,400	An area in Northw rn California between Smith River Basin and Oregon bou ary. Consists of a portion of Winchuck River Basin drai g into Oregon, and several small creeks draining directly o ocean.
3	Smith River	Smith River, with three major tributaries	Del Norte	6,000	Eighty-seven squa miles are in Oregon. Basin is almost entirely inland below 3,000-foot elevation. Mouth of Smith River is 1 iles north of Crescent City.
4	Elk Creek group	Elk Creek, Wilson Creek, Jordan Creek	Del Norte	1,400	A coastal area ex ling from Lake Earl, 6 miles north of Crescent City, to e mouth of the Klamath River; a coastal length of 30 mi Approximately one-third is mountains and foothills. In thern portion, drainage is into a series of lakes; in southern ortion, creeks drain directly into ocean.
5	Klamath River in California	Klamath River, not including major tributaries	Del Norte, Siskiyou, Modoc, Trinity, and Humboldt	7,000	Klamath River Bas including basins of Shasta, Scott, Salmon, and Trinity Riv embraces 15,715 square miles, of which 5,695 square mil are in Oregon. Valley areas in California include Tule an Lower Klamath Lake areas and Butte Valley, formerly nsidered a part of the Great Basin. The mountain regions heavily forested. Mouth of the Klamath River is 16 miles th of Crescent City.
5-4	Shasta River	Shasta River, Little Shasta River	Siskiyou	14,161	First major area utary to Klamath River in California. Basin is formed mountains surrounding a circular valley. Shasta River is miles long, draining northward to meet Klamath River 9 les north of Yreka.
5-5	Scott River	Scott River	Siskiyou	8,000	Basin topography rugged with many high peaks. A valley from 1 to 5 miles ide occupies central portion. Scott River, formed by 2 forl drains northward from junction 30 miles to meet Klamath ver 22 miles west of Yreka.
5-7	Salmon River	Salmon River	Siskiyou	8,000	River, formed by orks, drains northward from junction 19 miles to Klamatl iver.

APPENDIX C—TABLE 1—Continued

DESCRIPTION OF DRAINAGE BASINS, NORTH COASTAL AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
5-9 5 10	Trinity River	Trinity River New River	Trinity	8,800	Basin almost comp ely mountainous. Principal valley areas are in Hoopa Ind Reservation and on the Hay Fork. Main river is 167 miles g, meeting Klamath River at Weitchpec, 40 miles northwe f Eureka.
6	Home Creek group	Home Creek	Del Norte and Humboldt	750	A coastal area, 17 n s long, between Klamath River and Redwood Creek. Drai ge is directly into the ocean.
7	Redwood Creek	Redwood Creek	Humboldt	4,600	A long, narrow basi xtending 55 miles southeastward from the coast. Topograpl almost entirely mountainous. Redwood Creek reaches the ean 1½ miles west of Orick.
8	Maple Creek group	Maple Creek	Humboldt	3,000	A coastal area, 26 n long, between Redwood Creek and Mad River. 15 square les of valley lands include the surface of 8 fresh water la ns in the northern portion. Drainage is directly into the an.
9	Mad River	Mad River	Humboldt, Trinity	6,000	Basin is long and n w, extending inland southeastward. Mad River is 98 mile ong, reaching ocean 10 miles north of Eureka. Valley la are near the mouth.
10	Elk River group	Elk River	Humboldt	2,500	A coastal area bet n Mad and Eel rivers, comprising the surface drainage o Humboldt Bay. Fifty square miles of valley lands. To area includes Humboldt Bay, a landlocked harbor. Tl ommunities of Eureka and Arcata are on the coastal plain.
11	Eel River	Eel River, Van Dusen River	Humboldt, Mendocino, Trinity, Glenn, and Lake	7,500	A large inland basir ith main drainage northwestward. Valley lands are near Sco and in Round, Long, and Willits valleys. Topography is rc h, with heavily wooded areas. Mouth of river is 13 miles ith of Eureka. Van Dusen River drains area north of ma Eel River Basin and joins Eel River 14 miles above the n th.
12	Bear River group	Bear River	Humboldt	3,500	A coastal area betw Eel River and Mattole River. Drainage is directly into o n from Bear River and numerous small creeks.

13	Mattole River	Mattole River	Humboldt, Mendocino	4,100	Basin long and r ·ow, extending inland to the southeast. Mattole River, i miles long, flows northwest to reach ocean 37 miles south o ureka. A small valley area is in vicinity of Petrolia.
14	Four Mile group	Four Mile Creek, Spanish Creek, Big Creek	Humboldt, Mendocino	4,100	A coastal area, ex ding 14 miles south of Mattole River and including a sha gulch on the south. Drainage is directly into the ocean fr many creeks.
15	Ten Mile River group	Ten Mile River, Rockport Creek, Pudding Creek, Usal Creek	Mendocino	2,500	A coastal area sou of Four Mile Creek Group including Pudding Creek at F Bragg, with a frontage of 40 miles. Drainage is directly ir ocean from many creeks.
16	Noyo River	Noyo River	Mendocino	2,500	A small drainage sin, extending eastward 25 miles. Noyo River reaches th cean at Fort Bragg.
17	Big River group	Big River, Caspar Creek, Little River, Albion River	Mendocino	2,500	A coastal drainag area between Noyo River and Navarro River, with 17- e frontage. Drainage directly into ocean from Big River many small creeks.
18	Navarro	Navarro River	Mendocino	3,000	Basin extends inl l southeastward. Navarro River follows 57-mile meande g course to reach ocean 28 miles west of Ukiah. Elevatio most of basin is less than 1,500 feet.
19	Alder Creek group	Alder Creek, Greenwood Creek, Elk Creek	Mendocino	2,500	A coastal area b reen Navarro River and Garcia River; frontage 17 mile Drainage is directly into ocean from many small streams.
20	Garcia River	Garcia River	Mendocino	2,450	Basin extends east om narrow coast frontage of 1 mile. Garcia River flows sou in eastern part turning northwestward to reach ocean 30 r s southwest of Ukiah.
21	Arena Creek group	Arena Creek, Gallaway Creek, Roseman Creek	Mendocino	1,350	A coastal area bet n Garcia River and Gualala River. Drainage directly into ean from many small streams.
22	Gualala River	Gualala River	Mendocino, Sonoma	2,700	Basin extends inla southeastward 32 miles. Principal drainage is from the sou fork. Wheatfield fork drains northern and eastern portions
23	Stewart's Point group	Stewart's Point Creek, Miller Creek	Sonoma	1,800	A coastal area witl l-mile frontage, between Gualala River and Russian River. rainage directly into ocean from many small streams.
24	Russian River	Russian River, Dry Creek, Mark West Creek	Mendocino, Sonoma	4,340	Inland basin ext ing 82 miles northeast-southwest. Major valley area is vicinity of Santa Rosa. Topography of mountain areas ite rough. River flows south and west to reach ocean 24 r s west of Eureka.
25	Salmon Creek group	Salmon Creek	Sonoma, Marin	1,200	A coastal area be en the Russian River and Tomales Bay. Boundary betw North Coastal and San Francisco Bay areas is center e of Tomales Bay. Drainage is directly into ocean and f from many small creeks.

APPENDIX C—TABLE 2

DESCRIPTION OF DRAINAGE BASINS, SAN FRANCISCO BAY AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
1	Lagunitas Creek group	Lagunitas Creek, Geronimo Creek	Marin	2,600	A coastal area ex ding from Tomales Bay to Lime Point (Golden Gate B ge), a frontage of 60 miles. Drainage is directly into the an from many small streams.
2	Petaluma Creek group	Petaluma Creek, San Antonio Creek, Corte Madera Creek, Sonoma Creek	Sonoma, Marin	2,700	A minor drainage a between Lime Point and Napa River. One hundred fif three square miles are valley lands. All drainage from th rea is directly into San Francisco Bay.
3	Napa River	Napa River, Conn Creek, Rector Creek, Dry Creek	Napa, Solano	3,000	Major river basin butary to San Francisco Bay from the north. Below city Napa, valley spreads into a wide coastal plain, parts of wl are kept swampy by tidal action. Mountain areas of basi re fairly rugged.
4	Suisun Creek group	Suisun Creek, Gordon Valley Creek, Green Valley Creek	Napa, Solano	2,800	Minor drainage ar on north side of San Francisco Bay, between Napa Riv and Collinsville. Drainage is directly into Suisun Bay. I e areas of coastal plain are kept swampy by tidal action.
5	Mt. Diablo Creek group	Mt. Diablo Creek, Kirker Creek, Walnut Creek	Contra Costa	3,850	A minor drainage on south side of Suisun Bay from Selby to and including rker Creek on the east. Drainage is north into Suisun Bay. lley areas lie east and southeast of Martines.
6	East Bay	San Pablo Creek, San Leandro Creek, San Lorenzo Creek	Contra Costa	1,900	Drainage from Eas ay area into San Francisco Bay, extending from Canad lel Cierbo to Mt. Eden Creek. Coastal plain is under in sive urban development.
7	Alameda Creek group	Alameda Creek, Calaveras Creek, Positas Creek, Tassajero Creek	Alameda, Santa Clara, Contra Costa	3,800	A large interior ba draining into San Francisco Bay through Niles Canyon. M ntainous area is steep and rugged. Livermore Valley is central part of basin. Alameda Creek reaches San Fr isco Bay after crossing Niles Cone, an alluvial deposit ating on the bay.

8	Coyote Creek	Coyote Creek, Silver Creek, Penitencia Creek	Santa Clara	3,700	Basin extends 46 iles southeastward from San Francisco Bay. Terrain is irly rugged. Coyote Creek reaches San Francisco Bay fr south, after flowing across Santa Clara Valley floor.
9	Guadalupe River group	Guadalupe Creek, Los Alamitos Creek, Los Gatos Creek, Stevens Creek	Santa Clara	3,000	Basin surrounds Sa Clara Valley on south and west. Drainage flows across alley floor and into San Francisco Bay from the south. y of San Jose is in the valley, which is under intensive cultural and urban development.
10	San Francisquito Creek group	San Francisquito Creek, San Antonio Creek	San Mateo, Santa Clara	2,550	A small basin betw Guadalupe River group and San Mateo Creek Group. D age is eastward to San Francisco Bay.
11	San Mateo Creek group	San Mateo Creek	San Mateo, San Francisco	1,100	Drainage from eas ide of San Francisco Peninsula between San Francisquito eek and Fort Point (Golden Gate Bridge). Area is under in sive urban development.
12	Pescadero Creek group	Pilarcitos Creek, San Gregorio Creek, Pescadero Creek	San Mateo, San Francisco		A coastal area betw n Fort Point and Pescadero Point. Drainage is westward Pacific Ocean.

APPENDIX C—TABLE 3

DESCRIPTION OF DRAINAGE BASINS, CENTRAL COASTAL AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
1	Scott Creek group	Arroyo de los Frijoles, Waddell Creek, Scott Creek	San Mateo, Santa Cruz	2,500	A coastal area exte ng from Arroyo de los Frijoles to San Lorenzo River, v frontage of 34 miles. Topography is rugged and mou ainous. Drainage is directly into the ocean.
2	San Lorenzo	San Lorenzo River, Branciforte Creek	Santa Cruz	3,000	A small basin of r ed terrain. San Lorenzo River reaches the ocean at the c of Santa Cruz.
3	Soquel Creek group	Soquel Creek, Aptos Creek	Santa Cruz	3,100	A coastal area betw n San Lorenzo River and Pajaro River. Major portion of a is mountainous. Drainage is southward into Monterey B
4	Pajaro River	Pajaro River, San Benito River, Tres Pinos Creek, Pacheco Creek, Llagas Creek, Uvas Creek	Santa Cruz, San Benito, Santa Clara	5,200	An inland area witl northwest-southeast length of 82 miles. Much of it is r ed, mountainous terrain. Valley lands are along the coas n vicinity of Hollister, and in the southern part of Santa Cl Valley. Pajaro River is formed at the base of the moun ns by junction of tributaries; flows westward 21 miles to an.
5	Elkhorn Slough Basin	Elkhorn Slough	Monterey	1,280	A coastal area betw Pajaro River and Salinas River. Drainage is through E orn Slough, a swamp area adjacent to the coast.
6	Moro Cojo group	Moro Cojo Slough	Monterey	515	A coastal area betw Pajaro River and Salinas River. Drainage is through M Cojo Slough, a swamp area adjacent to the coast.
7	Salinas River	Salinas River, Nacimiento River, San Antonio River, Arroyo Seco	Monterey, San Luis Obispo	5,850	A large basin exte ing 135 miles southeastward from the coast. Approxima y three-fourths is rugged, mountainous terrain. A long v ey occupies the central part, expanding into a wide coas plain under intensive agricultural development. The of Salinas is on this coastal plain.
8	Canyon del Rey group	Canyon del Rey	Monterey	1,325	A coastal area betv n Salinas River and Carmel River. The entire area is mo tains and foothills. Drainage is directly into Monterey Ba nd Pacific Ocean.

9	Carmel River	Carmel River	Monterey	3,500	Basin extends sout[illegible] stward from coast 28 miles. Practically entire terrain is [illegible] and rugged. Carmel River flows northwestward to meet [illegible] ocean 18 miles southwest of Salinas.
10	Rocky Creek group	San Jose Creek, Rocky Creek, Bixby Creek	Monterey	4,400	A coastal area betw[illegible] the Carmel and Little Sur Rivers. Terrain is rough an[illegible] mountainous. Drainage is directly into the ocean from m[illegible] small streams.
11	Little Sur River	Little Sur River	Monterey	4,800	A small, rugged c[illegible]al basin. Little Sur River reaches the ocean 25 miles so[illegible]west of Salinas.
12	Point Sur group	Swiss Canyon	Monterey	1,500	A coastal area bet[illegible]n the Little Sur River and Sur River. Drainage from th[illegible]eep topography is directly into the ocean.
13	Sur River	Sur River	Monterey	4,900	A small basin of r[illegible]h topography, extending inland southeastward. Sur R[illegible] reaches the ocean 28 miles southwest of Salinas.
14	Morro Creek group	Big Creek, San Carpoforo Creek, San Simeon Creek, Morro Creek, San Luis Obispo Creek	Monterey	5,150	A coastal area bet[illegible]n Sur River and Arroyo Grande, with frontage of 124 [illegible]s. About one-tenth is valley land; the remainder roughl[illegible] mountainous. Drainage from the group is directly into th[illegible] ocean.
15	Arroyo Grande	Arroyo Grade	San Luis Obispo	3,200	A coastal basin of r[illegible]ed topography. Mouth of Arroyo Grande is 12 miles south [illegible] San Luis Obispo.
16	Santa Maria River	Santa Maria River, Sisquoc River, Cuyama River, Huasna River, Alamo Creek	San Luis Obispo, Santa Barbara, Ventura	8,700	A large inland bas[illegible] five-sixths of terrain is mountains and foothills. Valley [illegible]ds are principally in coastal plain, with a portion on the [illegible]per Cuyama River. Santa Maria River proper, only 18 n[illegible] long, is formed by the junction of three tributaries near t[illegible]ity of Santa Maria.
17	San Antonio group	San Antonio Creek	Santa Barbara	3,000	A coastal area bet[illegible]n Santa Maria River and Santa Ynez River. Topograp[illegible] is low relative to surrounding watersheds. Drainage i[illegible]estward to the ocean.
18	Santa Ynez River	Santa Ynez River	Santa Barbara	6,800	A large basin exten[illegible]g eastward from the coast. Mountainous areas are steep [illegible] rugged. Mouth of Santa Ynez River, 92 miles long, is [illegible] miles northwest of Santa Barbara.
19	San Jose Creek group	San Jose Creek, San Antonio Creek, Gobernador Creek, Carpinteria Creek	Santa Barbara	4,800	A coastal are betwe[illegible] the Santa Ynez River and Santa Barbara County line, a fr[illegible]age of 87 miles. Thirty-five square miles of valley lands, [illegible]jacent to the ocean, support intensive urban and agric[illegible]ural development. Drainage is directly into ocean from [illegible]ny small streams.
20	Soda Lake		San Luis Obispo	5,100	A closed interior ba[illegible]in the eastern portion of San Luis Obispo County. A dry l[illegible] bed occupies the lowest portion of the valley, most of w[illegible]h is between 1,900 to 2,000 feet in elevation. Surrounding[illegible]lls prevent outflow to adjacent basins.

APPENDIX C—TABLE 4

DESCRIPTION OF DRAINAGE BASINS, SOUTH COASTAL AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
1	Padre Juan Canyon....	Los Sauces Creek, Padre Juan Creek	Ventura	2,000	A small coastal a between the Ventura County line and Ventura River. Drainage is directly into the ocean from many small stre ns.
2	Ventura River....	Ventura River, Matilija Creek.	Ventura.	6,000	An inland basin e nding northward from the coast, with the major part stee and rugged. Mouth of the river is at the city of Ventura
3	Santa Clara River	Santa Clara River, Piru Creek, Sespe Creek, Santa Paula Creek, Castaic Creek	Ventura, Los Angeles	6,840	A large inland b n extending 81 miles eastward from the coast. Seven-eig s of the basin is rugged mountainous terrain. Santa Cla River reaches the ocean 4 miles south of Ventura. The c stal plain of the basin is under intensive agricultural dev pment.
4	Calleguas and Conejo Creek group	Calleguas Creek, Conejo Creek	Ventura	3,500	A coastal drainag rea extending inland 35 miles, located between Santa C a River and Mugu Lagoon, with a frontage of 15 miles ver one-half is rough mountainous terrain. Drainage is wes ard into the ocean.
5	Malibu Creek group..	Malibu Creek, Topanga Creek, Ballona Creek	Ventura, Los Angeles	3,050	A coastal area ex nding southward from Mugu Lagoon and including Ballo Creek on the south, a 41-mile frontage. The southern p tion is intensively urbanized. The northern area is rou mountainous terrain. Drainage is directly into the ocean.
6	West coastal plain group..		Los Angeles ...	1,500	A coastal area ext ling from Ballona Creek to the Los Angeles River. Low foo ls are found in the Palos Verdes area near San Pedro. Dra age is directly into the ocean from many small streams.
7	Los Angeles River.	Los Angeles River, Pacoima Creek, Little Tujunga Creek, Tujunga Creek, Verdugo Creek, Flint Wash, Arroyo Seco, Eaton Creek, Little Santa Anita Creek, Santa Anita Creek, Sawpit and Rio Hondo Creeks	Los Angeles	7,100	A large inland bas with extensive valley areas. San Fernando Valley is enclos by mountains. The river breaks through a gap to flow ac s the coastal plain. The mouth of the river is near San Ped at Los Angeles Harbor.

8	San Gabriel River	San Gabriel River, Fish Creek, Rogers Creek, Little Dalton Creek, Dalton Creek, San Dimas Creek, San Jose Creek, Coyote Creek	Los Angeles, Orange	10,100	A large inland dr ge basin extending north and east from the coast. Pract lly all the mountainous area, of rugged terrain, is abov San Gabriel Valley. After crossing San Gabriel Valley t river emerges from a narrows onto the coastal plain, ov which it flows to reach the ocean at Long Beach.
9	Anaheim Creek	Anaheim Creek	Los Angeles, Orange	.	A coastal area betv n Los Angeles River and Santa Ana River, comprising low othills and coastal plain areas. Drainage is directly into t ocean.
10	Santa Ana River	Santa Ana River, San Antonio Creek, Cucamonga Creek, Day Creek, Lytle Creek, Lone Pine Creek, Cajon Creek, Devil Canyon Creek, Waterman Creek, Strawberry Creek, City Creek, Plunge Creek, Mill Creek, San Timoteo Creek, San Jacinto River, Santiago Creek	Riverside, San Bernardino, Los Angeles, Orange	11,500	A major river basi vith about two-thirds steep, rugged mountains. Three pe in excess of 10,000 feet are included in this basin: San ntonio, San Gorgonio, and San Jacinto mountains. Basi ncludes San Jacinto River, which reaches coastal plain by verflow from Lake Elsinore in extremely wet years. Vall and coastal plain areas are under intensive high-type a ultural develpment. Mouth of Santa Ana River is 12 mile uth of city of Santa Ana.
11	Newport Bay		Orange	....	A coastal area on h sides of the mouth of Santa Ana River; low foothills an alley lands. Drainage is directly into the ocean and bay.
12	San Juan Creek group	San Juan Creek, Aliso Creek, Trabuco Creek	Orange	5,680	A coastal area be en Newport Bay group and the Arroyo San Onofre grou extending from Reef Point on the north to include Segu s Deshecha Canada on the south. The topography is s p and rugged. Drainage is directly into the ocean.
13	Arroyo San Onofre group	Arroyo San Onofre, Las Pulgas Canyon	Riverside, San Diego	3,450	A coastal area bet n San Mateo Point and Santa Margarita River. Topograp is mountainous. Drainage is directly into the ocean from r y small streams.
14	Santa Margarita River	Santa Margarita River, Murrieta Creek, Temecula Creek	Riverside, San Diego	6,000	A large inland basi of which four-fifths is rugged, mountainous terrain. Santa M garita River is formed by the junction of two tributaries r Temecula, 27 miles from mouth of the river.
15	San Luis Rey River	San Luis Rey River	San Diego	6,000	A larg and bas one-ninth classed as valley or mesa land. Mo in areas steep and rugged. Mouth of river is at Oce le.
16	San Marcos Creek group	San Marcos Creek, Loma Alta Creek, Escondido Creek	San Diego	2,300	A coastal area bet en the San Luis Rey River and the San Dieguito River, th frontage of 18 miles and depth of 22 miles. Drainage lirectly into the ocean.
17	San Dieguito River	San Dieguito River, Santa Ysabel Creek, Black Canyon Creek, Temescal Creek, Santa Maria Creek, Guejito Creek	San Diego	5,000	An inland basin of oderately rugged topography. Valley areas totaling about tenth of basin are along streams and on coastal plain. Sa Dieguito River rises as Santa Ysabel Creek, flowing westwar reach ocean 18 miles north of San Diego.

APPENDIX C—TABLE 4—Continued

DESCRIPTION OF DRAINAGE BASINS, SOUTH COASTAL AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
18	Los Penasquitos Creek group	Los Penasquitos Creek, McGonigle Creek, San Clemente Creek	San Diego	2,600	A coastal area ween San Dieguito and San Diego rivers, in- cluding drain into Mission Bay. Drainage from the group is directly int cean and bay.
19	San Diego River	San Diego River, San Vicente Creek, Alvarado Creek, Boulder Creek	San Diego	6,500	An inland drai s basin of rugged topography. Small areas of valley lands along the course of river and on the coastal plain. San I go River discharges into the south end of Mission Bay
20	San Diego Bay group		San Diego	2,500	A coastal area luding all the areas tributary to San Diego Bay and the ean, including portions of the lower reaches of the Sweet er, Otay and Tia Juana rivers below Sweet- water Reserv , Lower Otay Reservoir, and the Tia Juana River gaging ation near Nestor. The coastal plain is under intensive url development and includes the city of San Diego. Drain is directly into ocean and bay.
21	Sweetwater River	Sweetwater River	San Diego	6,500	A small basin ugged topography. Sweetwater River rises in the eastern tion of the basin and follows a meandering course, 57 m long, westward to San Diego Bay.
22	Otay River	Otay River, Proctor Valley Creek, Jamul Creek, Dalzura Creek	San Diego	3,500	A small basin noderately rough topography, below the crest of the Penin r Range. Otay River proper is formed below Lower Otay m and flows westward to discharge into San Diego Bay.
23	Tia Juana River	Cottonwood Creek, Pine Valley Creek, Rio del Tecate	San Diego	6,350	An internation river, lying in both California and Mexico. About one-f th of the total watershed is in California. Mountain a are rough topography. The upper portion of the basin California is drained by several creeks, the main stream aving California about 20 miles from the coast. It ret s as Tia Juana River, crossing the border 6 miles from th oast, from which point it flows northwestward to reach the an 10 miles south of San Diego.

APPENDIX C—TABLE 5

DESCRIPTION OF DRAINAGE BASINS, CENTRAL VALLEY AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
1	Goose Lake	Lassen Creek, Davis Creek, Fandango Creek	Modoc	7,800	A semiclosed bas on the northern border of California, receiving drainag from Oregon. Goose Lake within historic times overflow into Pit River; the last overflow occurred in 1868.
2-2	Pit River	Pit River, Hat Creek, Squaw Creek	Siskiyou, Modoc, Shasta, Lassen	10,400	A large inland ba with rugged topography in the mountainous areas. Extensiv ava bed formations are in the watershed. Much of the v ey area is under agricultural development. Below Ydalpoi the Pit receives the McCloud River drainage and then l s its identity by merging with Sacramento River.
2-3	McCloud River	McCloud River, Squaw Valley Creek	Siskiyou, Shasta	14,161	An inland basin rugged topography. McCloud River joins Pit River abov he junction of the latter with Sacramento River.
2-1 to 2-6	Sacramento River	Sacramento River, Pit River, McCloud River	Siskiyou, Modoc, Shasta, Lassen, Tehama	14,161	The watershed o acramento River above Red Bluff includes the basin of tl Pit and McCloud rivers. The valley areas below Shasta l n are under extensive agricultural development.
2-7	West side minor stream group	Willow Creek, Elder Creek	Tehama, Glenn	6,000	A minor group o he west side of Sacramento Valley between Red Bluff and ny Creek.
2-8	West side minor stream group	Spring Creek, Sand Creek	Glenn, Colusa, Yolo	3,000	A minor group o he west side of Sacramento Valley between Stony Creek a Cache Creek.
2-9	West side minor stream group	Buckeye Creek	Yolo, Solano, Napa	2,000	A minor group o he west side of Sacramento Valley between Cache Creek a the western boundary of Area 5, excepting the watershed Putah Creek.
2-10	Stony Creek	Stony Creek, Grindstone Creek	Tehama, Glenn, Colusa, Lake	6,000	A small basin o he west side of Sacramento Valley. Valley areas are un extensive agricultural development. The U. S. B. R. Or d Project is in this area.

APPENDIX C—TABLE 5—Continued

DESCRIPTION OF DRAINAGE BASINS, CENTRAL VALLEY AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
2-11 to 2-13	Cache Creek	Cache Creek	Lake, Yolo, Colusa, Napa	4,000	A large basin on e west side of Sacramento Valley. Cache Creek is forme by outflow from Clear Lake. Valley areas are extensively veloped.
2-14	Putah Creek	Putah Creek	Lake, Solano, Napa	4,000	An inland basin the west side of Sacramento Valley. The valley areas in le Berryessa Valley, an interior area under agricultural de opment.
2-15	East side minor stream group	Butte Creek, Deer Creek, Mill Creek	Tehama, Butte	10,400	A minor group o he east side of Sacramento Valley between Red Bluff and ther River.
2-16	East side minor stream group	Honcut Creek, Dry Creek, Coon Creek, Auburn Ravine	Butte, Yuba, Nevada, Placer, Sacramento	3,800	A minor stream g p on the east side of the Sacramento Valley between Feath and American Rivers, excepting the watersheds of Yuba l Bear Rivers.
3-1 to 3-3	East side minor stream groups	Poso Creek, Deer Creek, Yokohl Creek, Limekiln Creek, Cottonwood Creek, Little Dry Creek	Kern, Tulare, Fresno	5,000	Minor drainage s on the east side of San Joaquin Valley, south of San J uin River and including Grapevine Creek. Valley areas ar nder intensive agricultural development.
3-4	Kern River	Kern River	Tulare, Kern	14,500	A major watersh t southern end of the Central Valley. Kern River heads in e northern portion of the basin and flows south and west discharge on the valley floor near Bakersfield. Mountain eas are steep and heavily wooded.
3-5	Tule River	Tule River	Tulare	10,000	One of the smalle asins in the east side of San Joaquin Valley. Mountain area e steep and rugged.
3-6	Kaweah River	Kaweah River	Tulare	12,650	One of the smalle asins on the east side of San Joaquin Valley. A large part lie Sequoia National Park. Mountain areas are steep and, in s cases, heavily wooded.
3-7	Kings River	Kings River	Fresno, Tulare	14,000	A large interior in with rugged topography. Much of it is bare granite d es and ridges. Portions of the basin, particularly above 00-foot elevation, are heavily wooded.

3-8	West side minor stream group	Los Gatos Creek, Buena Vista Creek, San Emigdio Creek	Fresno, Kern, Kings	8,800	A minor stream grc on the west side of San Joaquin Valley including Turney ılch on the north and Tecuya Creek on the south. Draina ıs direct to the San Joaquin Valley floor.
3-10	East side minor stream group	Cottonwood Creek, Bear Creek, Dry Creek	Stanislaus, Tuolumne, Merced, Mariposa, Madera, Fresno	2,700	A minor stream grc on the east side of San Joaquin Valley. Drainage is direct the San Joaquin Valley floor.
3-11	San Joaquin River	San Joaquin River	Madera, Fresno, Tulare	13,000	A large basin on the st side of San Joaquin Valley. Practically the entire watersl is within the Sierra National Forest. The terrain is ste and rugged.
3-12	Fresno River	Fresno River	Madera	5,000	A small watershed b w the crest of the Sierra Nevada draining to San Joaquin V y floor.
3-13	Chowchilla	Chowchilla River	Madera, Mariposa	5,000	A small watershed b w the crest of the Sierra Nevada draining to the San Joaqui 'alley floor.
3-14	Merced River	Merced River	Madera, Mariposa	13,100	An interior watersh with steep, rugged topography; portions are heavily woode Yosemite Valley lies within this drainage basin.
3-15	Tuolumne River	Tuolumne River	Tuolumne	13,000	A large basin of rug topography. A large part is in Yosemite National Park. P ons are heavily wooded.
3-16	Stanislaus River	Stanislaus River	Calaveras, Tuolumne, Alpine	11,500	An interior basin of ep and rugged topography.
3-17	West side minor stream group	Orestimba Creek, Los Banos Creek, Panoche Creek	San Joaquin, Stanislaus, Merced, Fresno, Alameda, San Benito	2,400	A minor stream grc on the west side of San Joaquin Valley including Corral I low on the north and Panoche Creek on the south. Draina s directly to the San Joaquin Valley floor.
3-19	East side minor stream group	Littlejohn Creek, Bear Creek, Dry Creek	Sacramento, Amador, Calaveras, San Joaquin, El Dorado	4,000	A minor stream gro on the east side of San Joaquin Valley. Drainage is direct to the San Joaquin Valley floor.
3-20	Calaveras River	Calaveras River	Calaveras	5,500	A watershed on the st side of the San Joaquin Valley below the crest of the rra Nevada Range. The topography is fairly rugged.
3-21	Mokelumne River	Mokelumne River	Alpine, Calaveras, Amador, San Joaquin	10,100	A basin on the east) of San Joaquin Valley, long and narrow and of rugged top aphy. Portions are heavily wooded.

APPENDIX C—TABLE 5—Continued

DESCRIPTION OF DRAINAGE BASINS, CENTRAL VALLEY AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
3-22	Cosumnes River	Cosumnes River	Amador, El Dorado	7,700	A watershed lying o … he east side of San Joaquin Valley below the crest of the … ra Nevada Range. The terrain is fairly rugged.
3-23	West side minor stream group		Contra Costa, Alameda, San Joaquin	2,200	A minor stream gro … on the west side of San Joaquin Valley, between the mou … f San Joaquin River and Corral Hollow. Drainage is to th … an Joaquin Valley floor and the Sacramento-San Joaqu … Delta.
2-20 3-9 3-18 3-24	Sacramento and San Joaquin Valley Floor				The alluvial valley … ending from south of Bakersfield in Kern County to Red … ff in Tehama County, a total of 17,991 square miles, pr … ically all of which is under intensive agricultural deve … ment.

APPENDIX C—TABLE 6

DESCRIPTION OF DRAINAGE BASINS, LAHONTAN AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
1	Twelve Mile Creek	Twelve Mile Creek	Modoc	7,000	An interstate basin, ining into Oregon.
2	Alkali Lake Basin	Soldier Creek, Owl Creek, Eagle Creek	Modoc, Lassen	10,000	An interstate closed in, draining into three lakes in California. Some agricultural velopment has taken place in California. Mountain areas a teep and rugged.
3	Duck Flat Basin	Tuledad Creek	Lassen	7,000	An interstate closed sin draining into Nevada.
4	Madeline Plains Basin	Red Rock Creek	Lassen	7,000	An interstate basin, tions of which drain into Nevada.
5	Smoke Creek group	Smoke Creek	Lassen	7,000	An interstate basin ining into Nevada.
6	Eagle Lake group	Pine Creek	Lassen	7,000	A closed basin drain into Eagle Lake.
7	Honey Lake Basin	Susan River	Lassen, Sierra	7,000	A closed basin, lying rtly in Nevada and draining into Honey Lake in Californ Considerable agricultural development has taken place ir alifornia, particularly in the area around Honey Lake.
8	Truckee River	Truckee River	Sierra, Nevada, Placer, El Dorado	10,000	An interstate basin, ining into Lake Tahoe in California and Nevada, the outl forming Truckee River, which drains into Nevada. Mo ainous portion is steep and rugged.
9	Carson River	East Carson River, West Carson River	Alpine	10,000	An interstate water l with steep and rugged topography. The two branches of river join in Nevada to form the main stream.
10	Walker River	East Walker River, West Walker River	Mono	10,000	An interstate wate ed with steep and rugged topography. The two branche f the river join in Nevada to form the main stream.
11	Mono Lake Basin	Rush Creek, Leevining Creek, Mill Creek	Mono	13,100	A closed interstate l n draining into Mono Lake in California. Some agricultural velopment is in the valley areas. Mountainous areas are ep and rugged with some heavily wooded portions.

APPENDIX C—TABLE 6—Continued

DESCRIPTION OF DRAINAGE BASINS, LAHONTAN AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
12	Huntoon Valley Basin		Mono	8,400	An interstate basin dı ıing into Nevada.
13	Adobe Valley Basin	Adobe Creek	Mono	11,100	An interstate basin dı ıing into California.
14	Owens River	Owens River, Bishop Creek, Rock Creek, Big Pine Creek, Cottonwood Creek	Mono, Inyo	14,500	A watershed draining e eastern slopes of the Sierra Nevada. Mountainous areas e steep and rugged. Many peaks are above 13,000 feet ii evation and 10 exceed 14,000 feet, Mt. Whitney being the ghest. Owens River formerly reached the now dry bed (Owens Lake, but for many years has been diverted to su y water for the City of Los Angeles.
15	Cottonwood Creek group	Cottonwood Creek, Leidy Creek	Mono, Inyo	14,000	An interstate watersh draining into Nevada.
16	Deep Springs group	Willow Creek	Mono, Inyo	11,100	An interstate basin w a small area in Nevada, draining into two closed valley a ı in California.
17	Amargosa River	Amargosa River, Furnace Creek	Inyo, San Bernardino	10,000	An interstate basin, d rt in character, draining into California. Death Valley, the vest point of which is 280 feet below sea level, is in this in.
18	Ivanpah Valley group		Inyo, San Bernardino	8,000	An interstate basin, d rt in character, draining into Nevada.
19	Mojave River	Mojave River	San Bernardino	8,500	A closed basin, princ ılly desert in character. Mojave River rises on the northe ılope of the San Bernardino Mountains. Mountain areas ar teep and rugged. Considerable agricultural development occurred in the valley above Victorville.
20	Antelope Valley Basin	Big Rock Creek, Little Rock Creek	San Bernardino, Los Angeles, Kern	9,300	A closed interior basi ıorth of the Sierra Madre Range, principally desert in (racter. Intensive agricultural development has occurred ır a large part of the valley area.
21	Searles Lake group	Indian Wells Creek	San Bernardino, Inyo, Kern	10,000	A closed interior basi lesert in character.

APPENDIX C—TABLE 7

DESCRIPTION OF DRAINAGE BASINS, COLORADO RIVER AREA

No.	Basin or group	Principal streams	Counties	Approximate maximum elevation, feet	Location and character
1	Mojave Desert group		Riverside, San Bernardino	7,500	An inland region ' rough topography, subject to torrential flash floods, bı without perennial stream systems. Valley areas are desert character.
2	Whitewater River	Whitewater River	Riverside, San Bernardino	9,300	An inland basin ugged topography, containing some of the highest peaks i outhern California. Valley areas are desert in character, a ough extensive agricultural developments, supported by ındwater basins supplied from the White-water River aı other tributary streams, are in the lower valley areas. W ewater River discharges into northern end of Salton Sea.
3	West Salton Sea group		Riverside, San Diego, Imperial	6,600	An inland area ir ıe east slope of the Santa Rosa Mountains. Drainage from area is directly into Salton Sea.
4	Carrizo Creek group	Carrizo Creek	Riverside, San Diego, Imperial	6,600	An inland area oı ugh topography. Some valley area is under agricultural dı opment. Drainage from the group east-ward, through Imperial Irrigation District, to Salton Sea.
5	Coyote Wash group	Coyote Wash	San Diego, Imperial	4,500	A minor drainag ırea in the southern border of the State. Valley lands aı esert in character. Drainage from this area is northward iı Salton Sea.
6	Imperial Irrigation District group		Imperial		An inland area inı ling Imperial Irrigation District. Practically the entire area classed as valley lands, a major portion of which is inten ly cultivated. Several smaller cities are in the valley. Dra ge is northward into Salton Sea.
7	East Salton Sea group		Riverside, Imperial	5,000	A minor area of gged topography. About 45 percent of the area is valley l l, principally desert in character. Drainage from the group westward to Salton Sea.
8	Colorado River	Colorado River	San Bernardino, Riverside, Imperial	7,500	A strip adjoining lorado River with mountain areas of rough topography, pr ipally desert in character. Areas suitable for agricultural dı opment are under intensive cultivation. Drainage is eas ırd into Colorado River.

APPENDIX D

GROUND-WATER STORAGE CAPACITY OF THE SACRAMENTO VALLEY, CALIFORNIA

SUMMARY STATEMENT

By J. F. Poland, G. H. Davis, F. H. Olmsted, and Fred Kunkel

GROUND WATER BRANCH
WATER RESOURCES DIVISION
UNITED STATES GEOLOGICAL SURVEY

November, 1949

21—27922

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UNITED STATES
DEPARTMENT OF THE INTERIOR
Geological Survey

Ground Water Branch, 2520 Marconi Avenue
Sacramento 15, California
December 30, 1949

M EDWARD HYATT, *State Engineer*
Division of Water Resources
P. O. Box 1079, Sacramento, California

Attention: Mr. P. H. Van Etten

DEAR SIR: Transmitted herewith is the summary statement on the " round-water storage capacity of the Sacramento Valley, California," w ch has been prepared by the Geological Survey as a product of the pro- g m of cooperative ground-water investigation with the California Divi- si ı of Water Resources.

This summary has been approved by the Director of the Geological S ·vey for publication as an appendix to Bulletin 1 of the Division of V ter Resources on the "California Water Plan."

The title page is set up in a form satisfactory to the Geological Sur- v . If the Division of Water Resources desires an organization chart to a ɔmpany this appendix, this office will supply one. However, the ap- p dix is short, and it would seem that the organization charts could be d ɔensed with. The suggested title page is essentially similar to that for A pendix E of your Bulletin 29 (p. 635). We would appreciate receiving a ·ice on any modifications of the suggested title page.

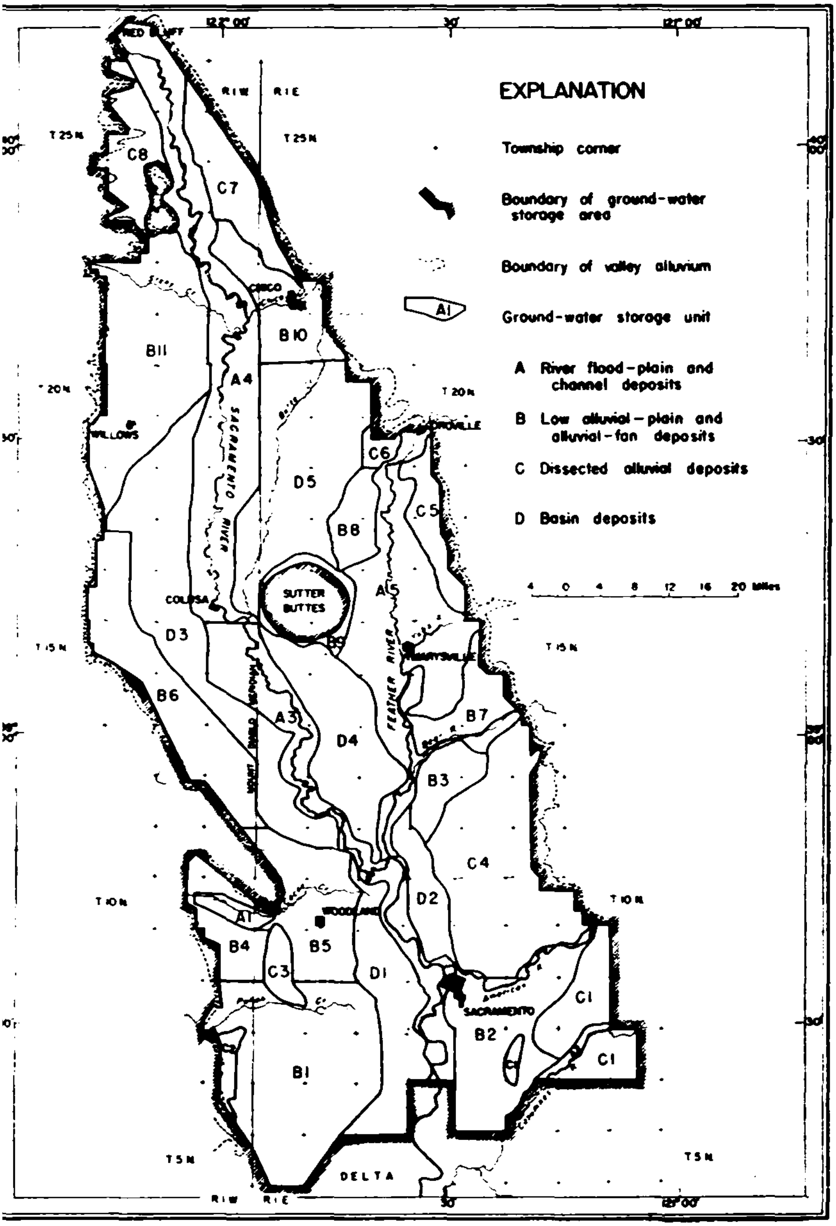
Will you please return the uncorrected copy of this summary state- n ıt which was given to Mr. Simpson for temporary reference. If you d ire a duplicate copy for reference, we will be glad to make necessary c rections and return it subsequently.

The text of a brief report on the "Geology and ground-water storage c acity of the Sutter Yuba area" is now being prepared as a proposed a ›endix to the divisions' Sutter-Yuba report. Subsequently we will com- p te the text for the full report on the "Geology and ground-water stor- a capacity of the Sacramento Valley, California." It is understood that t latter report probably will be published as a separate bulletin and will i lude the Sacramento Valley well logs assembled and located by the G ›logical Survey, the Division of Water Resources, and other agencies.

Very truly yours,

(Signed) JOSEPH F. POLAND
District Geologist

GEOLOGICAL SURVEY PLATE I



MAP OF THE SACRAMENTO VALLEY, CALIFORNIA, SHOWING GROUND-WATER STORAGE UNITS

GROUND-WATER STORAGE CAPACITY OF THE SACRAMENTO VALLEY, CALIFORNIA

By J. F. Poland, G. H. Davis, F. H. Olmsted and Fred Kunkel

Purpose and scope of the investigation

In March, 1948, a cooperative agreement was made by the Geological Survey, United States Department of the Interior, and the Division of Water Resources, Department of Public Works, State of California, providing for an investigation of geologic features of ground-water basins in California.

At the request of the Division of Water Resources, the first activity of the Geological Survey has been to make an estimate of the total ground-water storage capacity of the near-surface water-bearing deposits in the Sacramento Valley. This valley has a surplus water supply—that is, there is more surface and ground water jointly available than is now used or than will be used in the valley in the future. The State desires to know the order of magnitude of the ground-water storage volume to assist in estimating the magnitude of the surplus.

The investigation summarized here relates to *total* ground-water storage capacity to a depth of 200 feet below the land surface. No attempt has been made to estimate *usable* storage capacity [1] because such an estimate would require detailed investigation of geologic and ground-water conditions far beyond the scope of and funds available for the present study. However, the work accomplished to date is a necessary first step in an estimate of usable storage capacity. Accordingly, there would be no duplication of effort if the more refined estimate of usable storage capacity should be undertaken at a later date.

The area included in the estimate of storage capacity is shown on Plate 1. It extends southward from Red Bluff beyond Sacramento, terminating at the Cosumnes River on the southeast, and at the northern edge of the Sacramento-San Joaquin Delta on the south.

In addition to the estimate of underground storage capacity, the full report now in preparation will include a section on geology, describing the water-bearing deposits of the valley with respect to physical and hydrologic character, thickness, distribution, and structural features.

The investigation is being made under the general direction of A. N. Sayre, geologist in charge of the Ground Water Branch, and under the immediate direction of J. F. Poland, District Geologist for California. The field work and interpretation have been carried on almost wholly by George H. Davis, Fred Kunkel, and Franklin H. Olmsted.

[1] Usable storage capacity is that reservoir capacity that can be shown to be economically capable of being dewatered during periods of deficient surface supply and capable of being resaturated, either naturally or artificially, during periods of excess surface supply. Obviously it must contain usable water, which may be defined as that having a satisfactory quality for irrigation and occurring in sufficient quantity in the underground reservoir to be available without uneconomic yield or drawdown.

GENERAL FEATURES OF THE VALLEY

The Sacramento Valley is the northern part of the Great Central alley of California, lying between the northern Coast Ranges on the est and the Sierra Nevada-Cascade mountain systems on the east and orth. The principal stream is the Sacramento River, which flows generlly south from Red Bluff to Suisun Bay—150 miles by air but some 240 iiles by river. The valley has a maximum width of about 45 miles near s center, and an over-all extent of about 5,000 square miles. It occupies ie central part of the Sacramento River drainage basin, which has an rea of 26,150 square miles—about one-sixth of the area of California.

The valley surface is a nearly flat to gently undulating plain sloping om an altitude of about 300 feet near Red Bluff to sea level at Suisun ay. The Sutter Buttes, which are erosional remnants of an old volcano, ise to an altitude of 2,132 feet near the center of the valley.

The surface of the Sacramento Valley is immediately underlain by nconsolidated alluvial deposits of Quaternary age, which comprise early all the water-bearing materials considered in this investigation. he Quaternary and underlying older sediments have accumulated in ie Great Valley trough during and since the Cretaceous period. All the uaternary deposits and most of the late Tertiary (Pliocene) deposits re gravel, sand, silt, and clay washed in by streams from the surrounding ills and mountains.

The alluvial deposits of the valley are saturated with ground water shallow depths. During the summers of 1912 and 1913—two dry ears—the depth of water in more than 80 percent of the valley was ss than 25 feet.[1] At that time about 41,000 acres of land was irrigated ith ground water. By 1929, the area irrigated by water pumped from ells had increased to about 203,000 acres.[2] However, the depth of ground ater had not changed appreciably from 1912. (See pl. F-2 of Bull. 26.) lthough irrigation by ground water has increased substantially since 929, the water table still is less than 25 feet below the land surface eneath nearly all the basin lands and the river flood plains. (For definion and location, see pp. 625 to 626 and pl. 1.) Beneath a large part of ie low alluvial plains and the dissected alluvial uplands, the water vel now is from 25 to 50 feet below the surface. Only locally near the alley margins is the level more than 50 feet below the surface.

In general the recharge to ground water is along the flanks of the alley from stream flow and penetration of rainfall and irrigation water. Movement is toward the Sacramento River which, in the reach north f the Sutter Buttes, receives a substantial part of its flow from groundater discharge.

ESTIMATES OF STORAGE CAPACITY

ollection of Well Logs and Location of Wells

Most of the information on ground-water storage capacity of the acramento Valley was derived from well logs obtained from water-well rillers. During the course of the current investigation, logs for approxiiately 6,000 wells were assembled by the Geological Survey. Most of the

[1] Bryan, Kirk, Geology and ground-water resources of Sacramento Valley, Califrnia: U. S. Geol. Survey Water-Supply Paper 495, p. 82 and pl. 2, 1923.

[2] Edmonston, A. D., and others, Sacramento River Basin: California Dept. Public Works, Div. Water Resources Bull. 26, p. 535 and pl. F-2, 1931.

records assembled are recent data collected from well drillers by the Geological Survey and cooperating agencies, but some material was obtained from publications of the Geological Survey, the California Division of Water Resources, and the California Division of Mines. Of the 6,000 well logs assembled by the Geological Survey, about 3,600 were collected by the survey, 2,000 by the Bureau of Reclamation, and 400 by the California Division of Water Resources. About 4,800 of these logs were located in the field: 3,200 by the Geological Survey, 900 by the Bureau of Reclamation, and 700 by the California Division of Water Resources in connection with their investigation in the Sutter-Yuba area.

In the drillers' logs, gravel, sand, clay, and volcanic rocks are usually distinguished, and the more complete logs mention the color, coarseness, hardness, degree of cementation, and other easily identifiable characteristics of the sediments. In interpreting these logs, it must be remembered that different drillers attach different meanings to the various terms used for identifying sediments.

Peg Model

A peg model of the Sacramento Valley, based on drillers' logs, was constructed to help in recognition of hydrologic units and geologic features. Each well log was represented by a wooden peg a quarter of an inch in diameter, mounted on a base map of the valley. A vertical scale of 50 feet to the inch and a horizontal scale of 4,000 feet to the inch were used on the model. Eight major lithologic types were recognized, and each was distinguished by a different color on the pegs. Three datum planes, the land-surface altitude as interpolated from topographic sheets, sea level, and 1,000 feet below sea level, were marked on each peg. Each peg in its respective location was set in a hole bored in a wooden table so that the top of the table represented 1,000 feet below sea level.

At the scale used for the base map (4,000 feet to the inch) it was neither practical nor efficient to attempt to utilize all the well logs. Therefore, in places where wells were closely spaced, it was decided to select the deeper logs and not to make pegs for logs of wells closer to each other than about 1,500 feet. With this selection, about 3,000 well logs were utilized in the model. These same logs were used for the estimates of specific yield and storage capacity described beyond.

To estimate the storage capacity of the valley, it was necessary to subdivide the near-surface sediments into hydrologic units. The peg model has been of great value in making this subdivision. In addition, much was learned from the peg model about such geologic information as continuity of sand and gravel strata, depth to bedrock, and the extent and position of volcanic flows and of buried gravels of ancient stream courses.

Selection of Depth Zones

At the request of the California Division of Water Resources, the storage capacity of the water-bearing deposits of the Sacramento Valley has been estimated for three depth zones: 20 to 50 feet, 50 to 100 feet, and 100 to 200 feet below the land surface. The only exception to this three-zone treatment was for the area south of Marysville between the flood-plain deposits of the Sacramento River on the west and the channel of the Feather River on the east. The California Division of Water Resources reports that water of poor quality exists there at relatively shallow depths and that it is not generally practicable to draw down the water level to ıore than 100 feet below the land surface because of saline intrusion from eneath. Accordingly, in that area storage capacity was estimated only or the deposits in the top 100 feet (the upper and middle zones).

It is believed that for most of the valley it would not be practicable store water in the deposits less than 20 feet below the surface, even here they are permeable. Also, for economic reasons, it is considered that nwatering extensively to depths greather than 200 feet is a very remote ossibility in the Sacramento Valley. For the near future, drawdown of ater levels in the valley probably will not extend below the 100-foot epth. However, it is wholly likely that, with more complete integration f surface and ground water supplies and with increase in demand, water vels in the better ground reservoirs will be drawn down into the second undred feet within the next two decades.

lassification of Materials in Drillers' Logs

In order to estimate the storage capacity of the water-bearing eposits it was necessary to classify the materials in the drillers' logs ıto a few groups to which arbitrary specific yield values could be asgned. Although many of the logs reported only gravel, sand, or "clay" actually silt in most places), or gradations between these primary units, her logs reported as many as 10 to 20 different types of material. After review of the many types of material described, it was decided to group ıe materials logged in five general classes, namely: (1) Gravel; (2) ınd, including sand and gravel, and gravel and sand; (3) tight sand, ard sand, or sandstone, with which were combined 26 different drillers' rms covering material with more or less similar hydrologic properties; 4) cemented gravel, or clay and gravel, which embraced 19 additional rillers' terms; and (5) "clay," which included 19 different types of aterial ranging from silt through clay to shale, and included lava. To otain a reasonable geographic distribution of logs, the same well logs reviously selected for the peg model on the basis of depth and reprentative geographic distribution also were utilized for the classification materials. Thus, for approximately 3,000 well logs, materials were assified in the five general classes described above.

ssignment of Specific Yield Values

It was not feasible to make an extensive field investigation to deterine the specific yield of the different types of water-bearing materials the Sacramento Valley. Therefore, it was necessary to assign an estiated specific yield value to each of the five general categories of mateal on the basis of available data.

Only two intensive field studies have been undertaken in California determine the specific yield of water-bearing materials. The most exnsive of these was the study by Eckis [1] of the water-holding capacity the sediments in the South Coastal Basin of the Los Angeles area. ı this appraisal, several hundred samples of typical gravels, sands, and ays of the South Coastal Basin were taken from surface exposures or om borings, and about 2,000 samples were collected from wells during rilling. Porosities were determined for the samples taken in place and or those taken from wells. Specific retention was determined by several

[1] Eckis, Rollin, South Coastal Basin investigation, geology and ground-water store capacity of valley fill: California Dept. Public Works, Water Resources Div. Bull. , 273 pp., 1934.

n thods on materials ranging from gravel to clay. Specific yield was o ained as the difference between porosity and specific retention.[1]

In the Mokelumne investigation two methods were used to determine s cific yield.[2] In the first method, the volume of material saturated and u vatered by alternate addition and withdrawal of measured volumes of w ter from columns of undisturbed soil was determined for materials f m 13 localities. This is a direct volumetric method for determining s cific yield. In the second method the difference between the porosity a l the specific retention of samples of undisturbed material was deter- n ied on 16 samples in duplicate after drainage for periods as long as 3 days. This is an indirect method similar to those employed by Eckis.

On the basis of the results obtained in these two investigations. t ether with specific-yield data from less detailed studies by others, the f owing specific-yield values were assigned to the five groups of material c ssified in the well logs of the Sacramento Valley:

Material	*Specific yield (percent)*
Gravel	25
Sand, including sand and gravel, and gravel and sand	20
Fine sand, hard sand, tight sand, sandstone, and related deposits	10
Clay and gravel, gravel and clay, cemented gravel, and related deposits	5
"Clay," silt, sandy clay, lava rock, and related fine-grained deposits	3

S division of the Valley Into Storage Units

For the purpose of estimating underground storage capacity, the S ramento Valley was divided roughly into four storage groups and tl se in turn were subdivided into a total of 29 storage units, as shown on P te 1. The subdivision into groups and into the smaller storage units w first made areally from physiography and soils; that is, from what c be seen at the land surface; then the boundaries of the units were m lified on the basis of the subsurface geology to a depth of 200 feet, as sl wn by the peg model. In the modification, special emphasis was placed o he hydrologic character of the sediments and the continuity of water- b ring beds in the top 100 feet (the upper and middle zones).

This was done for three reasons. First, it is believed that the storage u ts should be representative for the depth range most widely subject t inwatering or resaturation under present conditions or under mod- e ely increased utilization to be anticipated in the near future. Second, f nearly all the storage units in the valley except the basin deposits, tl specific yield is greater above the 100-foot depth than below it. Lastly, w 1 reference to natural or artificial recharge at or near the land sur- f , the distribution of water-bearing beds in the near-surface deposits is f primary importance. In this respect, the coarse gravel tongues or bl ikets that are so well defined at shallow depths beneath the channels o Cache Creek (A1), and the Feather River (A5), are especially note- w thy.

[1] The porosity of a rock or soil is its property of containing interstices or voids. It expressed quantitatively as the percentage of the total volume of the rock that is oc pied by interstices or that is not occupied by solid rock material. The specific yield of rock is the ratio of (1) the volume of water which, after being saturated, it will yi by gravity to (2) its own volume. The specific retention of a rock is the ratio of (1 the volume of water which, after being saturated, it will retain against the pull of gr ity to (2) its own volume.

[2] Piper, A. M., Gale, H. S., Thomas, H. E., and Robinson, T. W., Geology and ground w r hydrology of the Mokelumne area, California: U. S. Geol. Survey Water-Supply P r 780, pp. 101-122, 1939.

In the table summarizing the ground water storage capacity of the lley the 29 storage units have been assembled within the four groups. ach group has certain common physiographic and geologic characteris-s which are sufficiently different from those of the other groups to stify this classification. Briefly summarized, the groups are:

A. *River flood-plain and channel deposits,* identified at the land rface as low ridges. These deposits contain a high proportion of sand d gravel deposited by the larger streams in the valley. Nearly all this aterial has been laid down adjacent to present or old stream courses times of flood, as a result of channel filling and natural levee construc-n. Alluvial-fan deposits such as the Stony Creek fan (B11), or Chico eek fan (B10), are not included in this category. In general, the river od-plain and channel deposits have the highest specific yield of the ur groups in all three depth zones.

B. *Low alluvial-plain and alluvial-fan deposits,* which appear on e surface as undissected or slightly dissected plains having gentle pes. The deposits vary greatly from place to place in physical char-ter, continuity of water-bearing beds, and hydrologic properties. Per-ability and specific yield are higher than for the dissected alluvial and e basin deposits, but not so high as for the river flood-plain and channel posits except in the upper depth zone of the Chico Creek fan (storage it B10), Stony Creek fan (B11), and the low plains south of the nerican River (B2).

C. *Dissected alluvial deposits,* characterized in general at the land rface by dissected plains with moderate slopes. The dissected alluvial posits are variable in water-bearing character, probably even more than the deposits beneath the low alluvial plans (group B). Average ecific yields are lower than for the low plains, particularly in the upper pth zone, except in the area around Corning (C8), in the northwestern rt of the valley, where the upper zone has a comparatively high specific ld.

D. *Basin deposits,* which on the surface are low-lying, nearly flat, orly drained lands. The basins lie between the natural levees of the cramento River and the low plains at the sides of the valley, and they tend from near Chico to the American River on the east and from near illows to the delta and the Montezuma Hills on the west. The basin posits have a high proportion of clay and silt accumulated at times of erflow of the Sacramento River and its tributaries. The permeability d specific yield of the deposits are low.

mputation of Storage Capacity

Computation of the ground-water storage capacity of the Sacra-nto Valley involved the following steps:

1. The valley deposits were divided areally into four storage groups d these were subdivided into 29 storage units.

2. For each of the 29 units the area within each township or portion a township included was measured to the nearest 10 acres with a scale planimeter. The township or part of a township became the basic unit for computation of storage capacity.

3. For each of three depth zones under consideration (20-50, 50-100, d 100-200 feet below land surface), logged material in selected wells

each basic subunit was classified into five categories of material. An itrary specific yield was assigned to each category.

4. Using these arbitrarily assigned specific-yield values, the *average* cific yield was computed for each depth zone in each basic subunit.

5. The storage capacity (to the nearest 100 acre-feet) in each subt was obtained as the product of average specific yield times volume of iments in the depth zone.

6. Storage capacity for each storage unit was obtained as the sum storage in all the subunits. These were then totaled by groups to give estimated ground-water storage capacity for the Sacramento Valley.

Several modifications of this procedure were employed, depending local problems. For example, if there was an insufficient number of ls or reliable sampling within any one township (basic unit), wells m one or more adjacent townships were included and the resultant cific-yield values used for all the townships so treated. In a few tances, for example, the American Basin (D2), wells were so few that logged wells within the area were utilized to obtain the average cific yields of the three zones.

S mmary of Results

The following table (p. 628) summarizes the estimated ground-water rage capacity of the Sacramento Valley for the four storage groups. s summary is followed by a tabulation of storage capacity for each of 29 storage units, listed by groups.

The summary for the entire valley by storage groups (p. 628) first es total storage capacities for all deposits, including those beneath the in lands. The totals are then given with the storage capacity of the in deposits eliminated. There are several reasons for omitting the age capacity of these deposits from consideration. First, the landface altitude in the basins is lower than that of all the surrounding ds and the water table is close to the land surface. Second, the deposits he Sutter and Colusa Basins and in the Butte Creek lowland are tively impermeable in all three depth zones, and those in the Yolo American Basins in the top two depth zones. Therefore, well yields ld be low and it would be difficult to lower the water levels by pump- Because of low well yields and the availability of surface water, it rdinarily more economical to use surface water than ground water irrigation of the basin lands.

Excluding the basin storage, the estimated ground-water storage acity for the Sacramento Valley between limits of 20 and 200 feet w the land surface is about 28,200,000 acre-feet. About half of this age is in the deposits 20 to 100 feet below the surface. As discussed viously (p. 621), how much of this ground-water storage capacity sable is not known.

ESTIMATED TOTAL GROUND-WATER STORAGE CAPACITY OF SACRAMENTO VALLEY, N ACRE-FEET

Storage group	Area[1] (acres)	Depth zone: 20-50 feet, Specific yield (percent)	20-50 feet, Storage (acre-feet)	50-100 feet, Specific yield (percent)	50-100 feet, Storage (acre-feet)	100-) feet, Specific yield (percent)	100-) feet, Storage (acre-feet)	All zones (20-200 feet), Specific yield (percent)	All zones (20-200 feet), Storage (acre-feet)
River flood-plain and channel deposits	613,880 (589,920)	11.7	2,160,000	10.5	3,230,000	8.0	4,700,000	9.3	10,090,000
Low alluvial-plain and alluvial-fan deposits	1,007,650	8.0	2,420,000	7.5	3,780,000	6.9	6,990,000	7.3	13,190,000
Dissected alluvial deposits	444,810	6.2	830,000	6.0	1,340,000	6.2	2,770,000	6.2	4,940,000
Basin deposits	632,530 (518,020)	5.0	950,000	4.5	1,430,000	6.0	3,100,000	5.4	5,480,000
Totals	2,698,870 (2,560,400)	7.9	6,360,000	7.2	9,780,000	6.9	7,560,000	7.1	33,700,000
ercent of total			18.9		29.0		52.1		100.0

ESTIMATED GROUND-WATER STORAGE CAPACITY, EXCLUDING BASIN DE SITS

Total (A + B + C)	2,066,340 (2,042,380)	8.7	5,410,000	8.1	8,350,000	7.1	14,460,000	7.6	28,220,000
ercent of total			19.2		29.6		51.2		100.0

[1] Figures in parentheses indicate acreage utilized for computing storage in zone 100 to 200 feet below land surface. (See p. 623.)

ESTIMATED GROUND-WATER STORAGE CAPACITY OF RIVER FLOOD-PLAIN AND CHA[illegible]NEL DEPOSITS (A)

Storage unit	Area[1] (acres)	Depth zone: 20-50 feet, Specific yield (percent)	20-50 feet, Storage (acre-feet)	50-100 feet, Specific yield (percent)	50-100 feet, Storage (acre-feet)	1[illegible] 200 feet, Specific yield (percent	1[illegible] 200 feet, Storage (acre-feet)	All zones (20-200 feet), Specific yield (percent)	All zones (20-200 feet), Storage (acre-feet)
1. Cacho Creek	12,420	18.0	67,000	14.8	92,000	6.[illegible]	84,000	10.9	243,000
2. Cosumnes River	9,630	11.8	34,000	11.2	54,000	7.[illegible]	73,000	9.3	161,000
3. Sacramento River south of Colusa	146,000	9.7	425,000	10.0	729,000	8.[illegible]	1,256,000	9.2	2,410,000
4. Sacramento River north of Colusa	237,100	12.8	911,000	11.2	1,329,000	9.[illegible]	2,147,000	10.3	4,387,000
5. Feather, Yuba and Bear Rivers	208,730 (184,770)	11.5	718,000	9.8	1,025,000	6.[illegible]	1,138,000	8.2	2,881,000
Totals	613,880 (589,920)	11.7	2,160,000	10.5	3,230,000	8.[illegible]	4,700,000	9.3	10,090,000

[1] Figures in parentheses indicate acreage utilized for computing storage in zone 100 to 200 feet below land surface.

ESTIMATED GROUND-WATER STORAGE CAPACITY OF LOW ALLUVIAL-PLAIN AND LUVIAL-FAN DEPOSITS (B)

Storage unit	Area (acres)	Depth zon							
		20-50 feet		50-100 feet		100-200 feet		All zones (20-200 feet)	
		Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Sp[illegible]ic y[illegible]l (pe[illegible]nt)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)
1. Putah Creek fan	221,490	7.3	482,000	8.4	925,000	[illegible].3	1,849,000	8.2	3,256,000
2. Low plains south of American River	127,010	9.9	379,000	7.3	463,000	[illegible].0	759,000	7.0	1,601,000
3. Low plains south of Bear River	38,090	6.5	74,000	5.2	99,000	[illegible].2	160,000	4.9	333,000
4. Low plains south of Dunnigan Hills	45,680	6.6	91,000	6.5	149,000	[illegible].1	370,000	7.4	610,000
5. Low plains east of Dunnigan Hills	91,040	8.3	[illegible]8,000	8.3	378,000	[illegible].2	749,000	8.3	1,355,000
6. Alluvial fans, west side, Delevan to Zamora	129,730	5.9	[illegible]000	6.0	392,000	[illegible].9	768,000	5.9	1,389,000
7. Low plains north of Bear River	47,070	4.7	[illegible]00	4.5	105,000	[illegible].4	253,000	5.0	425,000
8. Low plains west of Feather River	30,670	5.[illegible]	[illegible]000	6.0	92,000	[illegible].2	158,000	5.5	303,000
9. Alluvial plains enclosing Sutter Buttes	15,930	4.8	2[illegible],000	5.8	46,000	[illegible].7	59,000	4.5	123,000
10. Chico Creek alluvial fan	75,100	9.5	213,000	6.5	244,000	[illegible].7	426,000	6.5	883,000
11. Stony Creek fan	185,840	10.4	583,000	9.6	891,000	[illegible].7	1,438,000	8.7	2,912,000
Totals	1,007,650	8.0	2,420,000	7.5	3,780,000	[illegible].9	6,990,000	7.3	13,190,000

ESTIMATED GROUND-WATER STORAGE CAPACITY OF DISSECTED ALLUVIAL DEPOSITS (C)

Storage unit	Area (acres)	Depth zone							
		20-50 feet		50-100 feet		100-200 feet		All zones (20-200 feet)	
		Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)	Specific yield (percent)	Storage (acre-feet)
1. Deposits south of American River	73,490	7.1	156,000	6.2	226,000	7.1	524,000	6.8	906,000
2. Deposits south of Winters	11,290	5.9	20,000	6.2	35,000	6.1	69,000	6.1	124,000
3. Plainfield Ridge	15,230	5.9	27,000	5.1	39,000	4.[illegible]	74,000	5.1	140,000
4. Deposits between American and Bear Rivers	188,810	5.5	311,000	5.8	543,000	6.[illegible]	1,184,000	6.0	2,038,000
5. Deposits south of Oroville	32,960	5.2	51,000	6.2	103,000	4.[illegible]	148,000	5.1	302,000
6. Deposits west of Oroville	8,990	7.0	19,000	8.5	38,000	7.1	64,000	7.5	121,000
7. Deposits north of Chico	61,580	5.6	103,000	5.3	162,000	4.[illegible]	280,000	4.9	545,000
8. Deposits on northwest side of valley	52,460	9.3	147,000	7.4	194,000	8.1	426,000	8.1	767,000
Totals	444,810	6.2	830,000	6.0	1,340,000	6.[illegible]	2,770,000	6.2	4,940,000

ESTIMATED GROUND-WATER STORAGE CAPACITY OF BASIN DEPOSIT (D)

Storage unit	Area[1] (acres)	Depth zone: 20-50 feet, Specific yield (percent)	20-50 feet, Storage (acre-feet)	50-100 feet, Specific yield (percent)	50-100 feet, Storage (acre-feet)	100-200 feet, Specific yield (percent)	100-200 feet, Storage (acre-feet)	All zones (20-200 feet), Specific yield (percent)	All zones (20-200 feet), Storage (acre-feet)
1. Yolo Basin	96,610	4.4	130,000	5.4	259,000	8.3	802,000	6.8	1,191,000
2. American Basin	41,270	4.6	57,000	5.0	104,000	7.7	317,000	6.4	478,000
3. Colusa Basin	195,640	4.6	272,000	3.4	335,000	5.7	1,121,000	4.9	1,728,000
4. Sutter Basin	114,510 (0)	5.5	189,000	5.2	295,000	...	...	5.3	484,000
5. Butte Creek Lowland	184,500	5.5	304,000	4.7	434,000	4.7	860,000	4.8	1,598,000
Totals	632,530 (518,020)	5.0	950,000	4.5	1,430,000	6.0	3,100,000	5.4	5,480,000

[1] Figures in parentheses indicate acreage utilized for computing storage in zone 100 to 200 feet below land surface.

APPENDIX E
COLORADO RIVER

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APPENDIX E

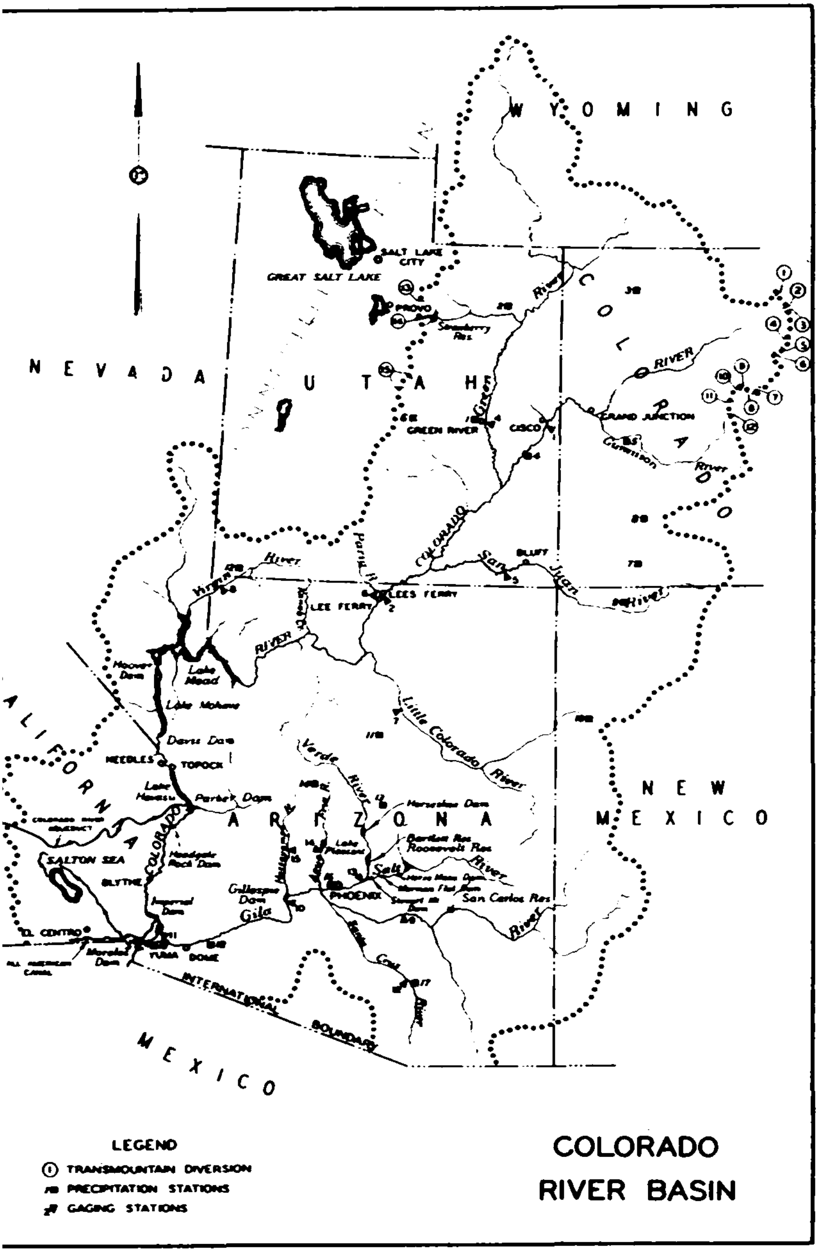
COLORADO RIVER

Diversions were first made from Colorado River for the irrigation of lands in California in the 1870s. Over the years this irrigation has increased tremendously, so that the agricultural economy within California dependent upon Colorado River is now of significant importance to the State and to the Nation. Furthermore, since completion of the Colorado River Aqueduct by the Metropolitan Water District of Southern California in 1940, a present population of more than 4,000,000 in the South Coastal Area of California is dependent upon Colorado River as a source of supplemental water for domestic, industrial, and municipal purposes.

Increasing diversions from Colorado River for irrigation of lands in California, together with other diversions for upstream irrigation, were so great by the early 1920s as to cause deficiencies in supply during dry years. The urgent need for regulation of the river, both for augmentation of the supply during dry years and for control of floods, was apparent. However, preliminary to construction of works for river regulation it was essential that an understanding be reached as to division of the waters between the interests of the seven states into which Colorado River extends.

The Colorado River Compact, signed in 1922 by commissioners representing the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, and the United States, apportioned the waters of the Colorado River System between the Upper and Lower Basins of the river. As defined in the compact, the dividing point between the Upper and Lower Basins is Lee Ferry, a point on the main stream of Colorado River one mile below the mouth of Paria River in northern Arizona. In 1923 the legislatures of all Colorado River Basin states, except Arizona, ratified the compact. The State of Arizona did not ratify the compact until 1944, when its legislature gave its approval.

Initial legislative efforts in connection with further development on Colorado River were the so-called Kettner Bills, seeking authorization for construction of the All-American Canal, which were introduced in 1919 and 1920, but failed to come to vote. The first of several bills providing for authorization of the Boulder Canyon Project was introduced in 1922 by Congressman Phil D. Swing and Senator Hiram W. Johnson, and became known as the first Swing-Johnson Bill. The Boulder Canyon Project Act, as finally passed by the Congress in 1928, provided for construction, operation, and maintenance of a storage dam and power plant at Black Canyon or Boulder Canyon on the main stream of Colorado River, and construction of the All-American Canal to divert water from the river and convey it to Imperial and Coachella Valleys by a conduit within the United States. The Secretary of the Interior was authorized to contract for the sale of water and power that would assure repaying the entire cost of the dam and power plant, with interest, together with operation and maintenance expenses, and repayment without interest of the cost of the All-American Canal under provisions of the Reclamation



COLORADO RIVER BASIN

Law. Under this authorization, the Secretary of the Interior entered into contracts with agencies in California, Arizona, and Nevada for the storage and delivery of Colorado River water. Contracts were also executed by the Secretary of the Interior with California agencies for disposal of power output of the project. The dam as subsequently constructed is known as Hoover Dam, and the reservoir behind it as Lake Mead. Thus is seen the vital nature of the interest of California in Colorado River and its development.

This appendix presents brief discussions of the drainage basin of Colorado River, and its characteristics as regard precipitation, runoff, flood flows, and quality of water. Because of the particular interest of California in flow of the river, estimates of seasonal natural runoff of Colorado River at points of primary significance to the State are presented herein. These estimates are based upon presently available data, which are incomplete and in many respects inadequate for the purpose. Therefore, the estimates as presented must be considered preliminary in nature, and subject to such revisions as may be necessary as more complete and adequate data pertinent to the subject become available.

DRAINAGE BASIN OF COLORADO RIVER

The drainage basin of Colorado River, comprising nearly one-twelfth of the area of the continental United States, is approximately 900 miles long and varies in width from about 250 to 600 miles. It is shown on the plate at the end of this appendix entitled "Colorado River Basin." The watershed area totals some 260,000 square miles, including about 2,000 square miles in northern Mexico. Areas of the drainage basin within the seven states into which tributaries of Colorado River extend are shown in the following tabulation:

State	*Square Miles*	*State*	*Square Miles*
Wyoming	17,550	New Mexico	20,120
Colorado	38,850	Nevada	9,900
Utah	41,320	California	19,730
Arizona	110,760		
		Total	258,230

For a distance of some 250 miles, between the vicinities of Needles, California, and Yuma, Arizona, Colorado River forms the southeastern boundary of California. The portion of the drainage basin within California includes the Coachella and Imperial Valleys, and other local drainage areas tributary to Salton Sea, in addition to areas draining directly into Colorado River.

The drainage basin of Colorado River comprises several areas that are topographically distinct. The Rocky Mountains lie along much of the northern and eastern borders of the basin, and the Wasatch Mountains along the northwestern border. In these rugged mountain ranges, particularly in the Rockies in Colorado, peaks rise to elevations of more than 10,000 feet above sea level. Aside from these bordering mountains, the upper two-thirds of the drainage basin constitutes a high plateau, with a general surface from 5,000 to 8,000 feet above sea level, and marked by broad valleys and deep canyons. The lower and southerly third of the drainage basin of the Colorado is low in general elevation, and characterized by broad, level valleys and rolling plateaus, broken by occasional mountain ranges varying in altitude from 2,000 to 6,000 feet.

The Colorado, one of the longest rivers in the Nation, rises in the ocky Mountains in north central Colorado, and flows in a generally uthwesterly direction some 1,700 miles before discharging into the ulf of California in Mexico. In its upper reaches in eastern Utah the ain stream is joined from the north by Green River, a principal tributry extending north into southwestern Wyoming and northeastern olorado. San Juan River is a large tributary of the Colorado entering om the east in southern Utah, and draining a basin roughly centered the junction of Colorado, New Mexico, Arizona, and Utah. Just above s Grand Canyon reach in northern Arizona, the main stream is joined om the southeast by Little Colorado River, draining a portion of eastern rizona and western New Mexico. Virgin River joins from the north at e lower end of the Grand Canyon reach, emptying into Lake Mead after aining areas in southern Nevada, southwestern Utah, and northwestern rizona. The Bill Williams, draining a portion of western Arizona, ters the Colorado River above Parker Dam about 150 miles below ake Mead. The remaining principal tributary of the Colorado is Gila iver, which enters from the east near the town of Yuma, Arizona, only few miles upstream from the International Boundary. The Gila drains ost of southern Arizona, and smaller areas in New Mexico and in the ate of Sonora, Mexico.

PRECIPITATION

Climate in the Colorado River Basin varies from semiarid to arid. ecipitation over most of the basin is relatively light, averaging about inches, and moderately heavy precipitation occurs only in the mounin areas. The greater part of the precipitation occurs as snow in the nter, and it is the melting of this snow that produces the major portion the runoff. Summer thunderstorms are prevalent throughout the Basin. hile precipitation accompanying these storms may be intense, it is ually of short duration, and its total contribution is not sufficient to preciably affect the need for irrigation. However, some summer thunrstorms are of sufficient duration to produce locally destructive floods.

Valleys in the upper portion of the Colorado River Basin are comonly covered with snow throughout the winter and the growing season relatively short. Downstream the climate moderates, until in the vicin- of Yuma near the International Boundary there is a desert climate, th low annual precipitation, high summer temperatures, and a growing ason extending throughout the year.

Average, maximum and minimum annual precipitation at selected presentative stations in the Colorado River Basin are shown on ge 639.

RUNOFF

A major portion of the runoff of Colorado River originates above e Ferry in Arizona. Between that point and Yuma, where the Gila joins e Colorado, the Little Colorado and Virgin rivers make minor contritions to the river flow. Between Hoover Dam and the mouth of the Gila Yuma, near the Mexican border, inflow to the river in many years is sufficient to offset natural channel losses through this desert region.

Under natural conditions seasonal flows of all streams in the Colodo River Basin fluctuate greatly. The main Colorado below the Grand nyon has at times reached flood peaks of 250,000 second-feet or more.

AVERAGE, MAXIMUM AND MINIMUM ANNUAL PRECIPITATION AT SELECTED STATIONS

Colorado River Basin

Map no.	Station	State	Tributary	Period of record	Average in inches	Maximum		Minimum	
						Year	Inches	Year	Inches
1	Green River	Wyoming	Green	1905–1947	8.05	1947	14.09	1901	1.22
2	Fort Duchesne	Utah	Green	1888–1947	7.00	1941	12.93	1918	3.10
3	Lay	Colorado	Green	1890–1945	13.91	1927	22.25	1900	7.60
4	Moab	Utah	Upper Colorado	1890–1947	9.34	1918	15.96	1898	4.32
5	Delta	Colorado	Upper Colorado	1888–1947	8.31	1941	12.79	1904	3.42
6	Emery	Utah	San Juan	1901–1947	7.59	1941	16.84	1902	0.94
7	Durango	Colorado	San Juan	1895–1947	19.22	1911	34.29	1901	8.90
8	Silverton	Colorado	San Juan	1907–1947	25.58	1911	44.78	1939	16.63
9	Aztec	New Mexico	San Juan	1895–1902 1910–1941	9.52	1941	23.74	1907	2.90
10	Fort Wingate	New Mexico	Little Colorado	1864–1911 1940–1947	14.35	1873	26.00	1879	6.37
11	Flagstaff	Arizona	Little Colorado	1897–1947	20.17	1905	34.53	1897	9.12
12	St. George	Utah	Virgin	1890–1947	8.60	1907	18.74	1894	3.55
13	Natural Bridge	Arizona	Gila	1890–1947	24.28	1905	50.17	1900	12.28
14	Prescott	Arizona	Gila	1870–1947	18.65	1905	39.47	1942	9.36
15	Bisbee	Arizona	Gila	1890–1947	18.92	1931	29.52	1947	10.47
16	Phoenix	Arizona	Gila	1877–1947	7.61	1905	19.73	1924	3.03
17	Tucson	Arizona	Gila	1868–1947	11.37	1905	24.17	1885	5.26
18	Mohawk	Arizona	Gila	1880–1947	3.95	1941	14.23	1895	0.10
19	Yuma	Arizona	Colorado	1870–1947	3.40	1905	11.41	1928	0.47

)uring the driest season of record the flow dropped to less than 1,000 econd-feet. The only sustained summer flow of most tributaries comes om numerous mountain lakes fed by melting snow. Northern tributaries ave greater sustained flow than those in the south, but the former are evertheless subject to major fluctuations. Flow of the river varies greatly om year to year. At Lees Ferry, the seasonal measured runoff has varied om about 4,377,000 to more than 19,190,000 acre-feet. Flows of tribu-ry streams, especially those of the Lower Basin, have even greater ariations.

Records of the runoff of the Colorado River and its tributaries are resently being obtained at some 350 gaging stations generally dis-ibuted throughout the basin. A few of these are listed in the following bulation, "Selected Gaging Stations, Colorado River Basin." The ecords obtained at these stations were the principal ones used in esti-ating the natural run-offs presented in the appendix.

atural Flow of Colorado River at Lee Ferry

Natural flow of Colorado River at Lee Ferry has been estimated for e 44-year period from 1904-05 to 1947-48. This period is believed to ncompass a complete cycle covering a wet and dry series of years, and is further believed that the runoff of the Basin during this period is presentative of the long-time average.

SELECTED GAGING STATIONS

Colorado River Basin

ap o.	*Station and location*	*Period of record*
	Colorado River near Cisco, Utah	1914-1917 1922-1948
	Colorado River at Lees Ferry, Arizona	1921-1948
	Colorado River at Yuma, Arizona	1902-1948
	Green River at Green River, Utah	1894-1899 1904-1948
	San Juan River near Bluff, Utah	1914-1917 1927-1948
	Paria River at Lees Ferry, Arizona	1923-1948
	Little Colorado River at Grand Falls, Arizona	1925-1948
	Virgin River at Littlefield, Arizona	1929-1948
	Gila River at Kelvin, Arizona	1911-1948
	Gila River below Gillespie Dam, Arizona	1921-1948
	Gila River near Dome, Arizona	1903-1948
	Santa Cruz River at Tucson, Arizona	1905-1948
	Salt River at Granite Reef Dam, Arizona	1913-1948
	Agua Fria River at Lake Pleasant Dam, Arizona	1910-1924 1933-1948
	Hasayampa River near Morristown, Arizona	1938-1948

Natural flow of Colorado River at Lee Ferry is considered to be the m of the following quantities:

1. Recorded flow at Lees Ferry, the stream gaging station on the olorado just above the mouth of Paria River, and about one mile above e Ferry.
2. Recorded flow of Paria River.
3. Irrigation and domestic consumption in the Upper Basin.
4. Trans-mountain diversions to areas outside the Colorado River asin from Green River above Green River, Utah, and from Colorado ver above Cisco, Utah.
5. Annual gain or loss in storage of Strawberry Reservoir in the een River Basin.

A record of flow of the Colorado at Lees Ferry is available from 21-22 to 1947-48, and of Paria River from 1923-24 to 1947-48.

Natural flow of the Colorado at Lee Ferry for the period prior to ord was estimated by correlation between natural flow at that point the period of record, and natural flow at three upper stations on the er and its tributaries having longer records. These upper stations are San Juan River near Bluff, Utah, on Colorado River near Cisco, Utah, d on Green River near Green River, Utah, and essentially measure al flow in the Upper Basin.

The amount and rate of increase of irrigated acreage in the Upper lorado River Basin were determined from federal census data, and m reports of the State Engineer of Colorado. Census data are pub- ed separately for each state and county, and for each stream basin hin states. Total irrigated acreage within each stream basin is avail- e for 1919, 1929, and 1939, and data segregated by counties are ilable for 1899 and 1909. Irrigated acreages for 1899 and 1909 were imated by applying a ratio to county census totals. This ratio was ained by comparing the sum of county totals for all counties wholly or rtially in a given drainage basin, with the total for the drainage basin given by the census for 1939, as more complete information was avail- e from this census. Although complete information on the amount of igated acreage in the Upper Basin since 1939 was not available, trends re projected based on information available from state agencies.

Total consumptive use of water resulting from irrigation in the per Basin was estimated by applying estimated seasonal consumptive values, derived from data contained in the report of the Engineering visory Committee of the Upper Basin Compact Commission, 1949, to ermined irrigated acreages.

The quantity of water exported from the Colorado River Basin by trans-mountain diversions was determined from records or estimates each diversion. Three of these trans-mountain diversions are in the in of Green River above Green River, Utah, and 12 are in the basin Colorado River above Cisco, Utah. The diversions considered are wn on page 642.

Total exportation from the Upper Basin was estimated to be 160,000 e-feet in 1947-48. There are other trans-mountain diversions from the lorado River Basin above Lee Ferry, but information was not avail- e as to their time and amount. Since their aggregate amount is ieved to be relatively small, no correction was made for these other ersions.

A record was available of change of storage in Strawberry Reser- r since the time of its construction in 1915 on Strawberry River, Utah, l the effect of such change was considered in computing natural flow Lee Ferry. There are many other reservoirs in the Upper Basin of orado River, but for the most part of small capacity, aggregating ut 800,000 acre-feet. However, no data were available on operation hese reservoirs, and no corrections were made for possible change in rage from season to season. It is believed that most of these upstream ervoirs were operated for regulation of runoff within the season, and t aggregate carry-over storage from one season to the next, which uld affect estimates of seasonal natural runoff, was small.

TRANS-MOUNTAIN DIVERSIONS

'ap 'o.	Name	Diversion to
	olorado River Above Gage Near Cisco, Utah	
	Grand River Ditch	Cache La Poudre River South Platte River Basin
	Eureka Ditch	South Platte River
	Colorado Big Thompson Tunnel	Thompson River South Platte River Basin
	Moffat Tunnel	South Boulder Creek South Platte River Basin
	Berthoud Pass Ditch	Clear Creek South Platte River Basin
	Williams River (or Jones Pass) Tunnel	Clear Creek South Platte River Basin
	Fremont Pass Ditch	Arkansas River
	Wurtz Ditch	Arkansas River
	Ewing Ditch	Arkansas River
	Columbine Ditch	Arkansas River
	Busk-Ivanhoe Tunnel	Arkansas River
	Twin Lakes Tunnel	Lake Creek Arkansas River Basin
	om Green River Above Gage at Green River, Utah	
	Daniels Creek Ditch	Daniels Creek Bonneville Basin
	Strawberry Tunnel	Spanish Fork Bonneville Basin
	San Pete Diversions	Oak and Ephraim Creeks Bonneville Basin

The average seasonal natural flow in Colordo River at Lee Ferry, ie Compact division point, for the period from 1904-05 to 1947-48, was timated on the foregoing bases to be 15,723,000 acre-feet. Estimated atural flow for each season for that period is presented in the table at ie end of this appendix, "Estimated Seasonal Natural Runoff, Colo-ido River Basin."

ver Regulation and Diversions on the Main Colorado Below Lee Ferry

The hydrologic regimen of the Colorado River Basin below Lee Ferry complicated by several structures and diversions for irrigation and her uses. The principal structure on Colorado River, and the key to ontrol and use of the main stream in the Lower Basin, is Hoover Dam. ake Mead, the reservoir with storage capacity of over 32,000,000 acre-et formed by the dam, regulates the variable flow of the river, which released as required for domestic, municipal, industrial, and irrigation ses in the Lower Basin, and for electric power production. The reservoir so acts as a desilting basin, and to a great extent moderates periodic oods. A relatively small amount of water is pumped from Lake Mead id conveyed by pipe line to Henderson, Nevada, for municipal and dustrial use, and water is also pumped for municipal use in Boulder ity and adjacent areas. Davis Dam, on the Colorado 67 miles below oover Dam, creates a reservoir of 1,600,000 acre-foot storage capacity regulate releases from Lake Mead for downstream uses, and for pro-iction of electric power. There are also five diversion dams on the olorado, named in order below Davis Dam: Parker Dam, for the Metro-olitan Water District of Southern California, creating a reservoir of

716,000 acre-feet capacity; Headgate Rock Dam, for the Colorado River Indian Reservation; Imperial Dam, for the All-American Canal System and the Gila and Yuma projects; Laguna Dam, originally built for the Yuma Project, but no longer used therefor; and Morelos Dam in Mexico.

The Colorado River Aqueduct, constructed by the Metropolitan Water District of Southern California, is a large municipal diversion from Colorado River in the Lower Basin. Water is pumped into the aqueduct from Havasu Lake created by Parker Dam, and conveyed by gravity and additional pumping to areas in southern California.

The Colorado River Indian Reservation Project in Arizona is the first major irrigation development downstream from Parker Dam. Irrigation has been practiced on this reservation for about 75 years, first by gravity ditch diversions which later failed, then by pumping, and since June, 1942, by diversion at the Headgate Rock diversion dam.

The Palo Verde Irrigation District lies along Colorado River in Riverside and Imperial Counties in California. Works have been constructed by the district to deliver water to 75,000 acres. Water rights of the district are based on the oldest filings of record on Colorado River in California, the first, dated July 17, 1877, being for 95,000 miners inches.

The Gila Project of the United States Bureau of Reclamation is in the southwest corner of Arizona, and borders the east side of the Yuma Project. As originally conceived, the Gila Project contemplated irrigation of 585,000 acres. However, under the provisions of Public Law 272, Eightieth Congress, First Session, the Gila Project is limited to a total annual consumptive use of 600,000 acre-feet from Colorado River, and includes only 115,000 acres of irrigable land. The principal project diversion is through the Gila Gravity Main Canal, and amounted to 161,500 acre-feet in 1947-48. The North Gila Irrigation District, a portion of the Gila Project lying north of Gila River, now diverts at Laguna Dam, which was constructed in 1909 for the Yuma Project. This diversion, which has remained fairly constant for several years, was 40,740 acre-feet in 1947-48.

The Yuma Project of the United Sates Bureau of Reclamation, in Yuma County, Arizona, and Imperial County, California, was one of the first federal reclamation developments on Colorado River. Settlement and irrigation of lands in Yuma Valley was begun by local interests in 1890, and the Yuma County Water Users Association, formed to contract with the Federal Government in connection with the Yuma Project, was incorporated in November, 1903. Construction of an irrigation system under the Reclamation Act was approved in 1904, and the first portion was completed in 1907. Diversions for the Yuma Project were made originally at Laguna Dam, but are now made at Imperial Dam and delivered to both Arizona and California lands through the All-American Canal. In 1948 there were 56,500 acres irrigated in the Yuma Project, including 7,940 acres in California. Annual diversions for the Yuma Project have been almost constant during recent years, and in 1947-48 amounted to 462,500 acre-feet.

The Yuma Project has the right to 2,000 second-feet of diversion through the All-American Canal for irrigation and generation of power at Siphon Drop Power Plant, so long as the excess of such diversion over the irrigation requirements of the project is not required by the Imperial Irrigation District for irrigation and domestic purposes.

In 1876 the United States Corps of Engineers made a study of a posal to bring water from Colorado River to Imperial Valley. The ps reported unfavorably on a canal location entirely within the United ites, but, as others had done previously, called attention to the physical sibility of carrying water from the Colorado to Imperial Valley along natural drainage line through Mexico. The first important effort to this was made by C. R. Rockwood and associates, who in 1892 organ- d the Colorado River Irrigation Company. A canal was surveyed it would divert water north of the international boundary and carry across the boundary to Alamo River, a natural channel draining back o California and finally into Salton Sea, which lies below sea level the northern end of Imperial Valley. Notices of appropriation of water re posted starting in 1895 and continuing through 1900, each notice ering 10,000 second-feet for the irrigation of lands in California. nstruction of a canal system was carried on between 1896 and 1902. ad of the main canal, known as the Alamo Canal, was at Hanlon about) feet north of the international boundary, where a wooden headgate s built. Water was delivered through this canal to lands in Mexico l in the vicinity of Calexico and Imperial in California in 1901. The ginal headgate was replaced in 1906 by a reinforced-concrete struc- e, and in 1918 a new diversion structure was built 1,000 feet upstream. to 1940 all irrigated lands in Imperial Valley were served by this ial system. The Imperial Irrigation District was organized in 1911, l took over the canal system in 1916.

The Boulder Canyon Project Act provided for construction by the ited States of diversion works on the lower Colorado River, and a ial entirely within the United States, replacing the Alamo Canal, for ivery of water to Imperial and Coachella velleys. Imperial Dam on Colorado was completed in 1938. Water deliveries were made through canal to Imperial Valley in September of 1940. The branch to Coa- lla Valley was completed in 1949, and the Coachella Valley distribu- n system is now under construction. The last delivery of water to lands the United States from the Alamo Canal was made in February, 1942. 1947-48 a total of about 3,000,000 acre-feet was diverted in the All- ierican Canal, as measured at Pilot Knob, for the Imperial Irrigation strict and Coachella Valley County Water District.

In formulation of the Colorado River Compact, and in later legis- ion enacted by the Congress implementing provisions of the compact applied to the Lower Basin, it was recognized that allocation to Mexico a portion of the waters from Colorado River might be made at some ure date. This allocation was effected by a treaty between the United tes and Mexico, signed on February 3, 1944, and later ratified by two governments. This treaty provides that the United States will irantee to Mexico a minimum of 1,500,000 acre-feet of water annually, water to be delivered in accordance with schedules to be furnished advance by the Mexican Section of the International Boundary and iter Commission. By terms of the treaty, whenever the United States tion of that commission decides that there is surplus water in the er, the United States will allocate to Mexico an additional 200,000 e-feet, or up to an aggregate of not more than 1,700,000 acre-feet year. Furthermore, Mexico may use any water reaching that country, can acquire no right to any quantity beyond the minimum of 1,500,000 acre-feet guaranteed by the treaty. This quantity, which may be made up of any waters of the Colorado from any and all sources, whether direct river flow, return flow, or seepage, will be delivered by the United States in the boundary portion of the river, except that until 1980 Mexico may receive 500,000 acre-feet annually, and after that year 375,000 acre-feet annually, through the All-American Canal as part of the guaranteed quantity. Davis Dam has been built by the United States to provide regulation of flow required to meet commitments of the Mexican treaty. The treaty provides that Mexico shall construct, at its expense, a main diversion structure below the point where the northernmost part of the international land boundary line intersects Colorado River. In complying with this provision, the Mexican Government has constructed Morelos Dam on Colorado River about five miles southwest of Yuma. Since February, 1942, all water delivered to the Alamo Canal through the Pilot Knob Wasteway of the All-American Canal, plus water diverted from the Colorado into the Alamo Canal, has been used in Mexico.

For the major part of its length between Hoover Dam and Havasu Lake created by Parker Dam, the Colorado flows in well confined canyon sections where there is little opportunity for meandering. There is, however, an exception to this general topography immediately upstream from Topock, where the river flows through an alluvial valley about 33 miles long and from two to five miles wide. In years past the river has meandered through this valley, with general aggradation of the valley floor. As a result, the river now spreads over almost the full width of the lower half of this valley, forming a swamp through which water flows in a number of small channels, with resulting heavy water losses. The United States Bureau of Reclamation has a channel rectification project under construction in this reach.

Natural Flow of Colorado River Above Gila River

Natural flow of Colorado River above Gila River was determined by deducting recorded flow of Gila River at Dome from that of Colorado River at Yuma, and correcting the resulting record for effects of upstream regulation, diversion, and irrigation consumptive uses on the main Colorado River and upstream tributaries. Records of flow of Colorado River at Yuma and of Gila River at Dome are available for the entire period from 1904-05 to 1947-48 used in the current study.

Regulation, diversions, and irrigation consumptive uses in the Upper Basin of the Colorado were estimated as set forth in the discussion of the natural flow at Lee Ferry. Similarly, impairments to natural flow of the river in the Lower Basin were estimated by reaches above and below Hoover Dam.

Irrigation diversions above Hoover Dam include those from the Virgin and Little Colorado Rivers, and Kanab Creek. Available records from the Bureau of Census were used to estimate annual irrigated acreage segregated by stream systems. These acreages were then multiplied by estimated unit values of seasonal consumptive use, which were computed separately for each stream system.

Diversions from the Colorado below Hoover Dam are mainly for irrigation. Records are available covering practically the entire period during which these diversions have been made. Consumptive use was estimated for the few periods or diversions for which no records were 'ailable. Where records were available a supplementary adjustment for rigation diversions was made to compensate for return flows to the ain stream from drainage systems of the various irrigation projects on e river.

Evaporation losses at Lake Mead and Havasu Lake were computed om records of evaporation at Lake Mead furnished by the United States ureau of Reclamation. The net effect of change in storage at Straw-rry Reservoir in the Upper Basin, and at Lake Mead and Havasu ike, was computed from records of the United States Bureau of Recla-ation.

Diversion from Lake Havasu by the Metropolitan Water District Southern California is the only exportation from the Colorado River isin below Hoover Dam. The runoff record of the Colorado at Yuma was ljusted for the amount of this diversion, and adjustments were also ade for the small supply furnished the Henderson area and Boulder ty from Lake Mead.

An estimate of depletions and accretions due to bank storage in ike Mead was made by correlation of flows above and below Hoover am, over a period of years during which water surface elevation at ike Mead was the same at the beginning as at the end of the period.

Based upon the criteria and procedures as outlined, the average asonal natural flow of Colorado River above Gila River for the period 04-05 to 1947-48 is estimated at about 16,180,000 acre-feet. The esti-ated natural flow for each season in that period is presented in the ble at the end of this appendix.

ıtural Flow of Colorado River at International Boundary

The Colorado River Compact defines the "Colorado River System" "that portion of the Colorado River and its tributaries within the nited States of America." The Gila River is a tributary of the Colorado ver and the flow of that tributary is a part of the natural flow of the ılorado River System. The natural flow of the Colorado River at the ternational Boundary would be estimated by adding the natural flow the Gila River at its mouth to the estimated natural flow of the Colo-do River above the mouth of the Gila. However, since the natural flow the Gila River System in the vicinity of Phoenix greatly exceeds the tural flow at the mouth of the Gila, a misleading result within the ɜaning of the Colorado River Compact might be reached by following e normal procedure. Thus it was deemed not pertinent for the purpose this report to estimate the natural flow of the Gila River. Therefore, e natural flow of the Colorado River at the International Boundary ıs not estimated and incorporated in this appendix.

Gila River has been measured near Dome, Arizona, since 1903, and e records of runoff have been published by the United States Geo-gical Survey. The present gaging station is 12 miles above the mouth Gila River. The recorded average seasonal flow at this station during e 22-year period from 1904-05 to 1925-26, inclusive, was 971,000 acre-ɜt, and for the 22-year period from 1926-27 to 1947-48, inclusive, was ,000 acre-feet. In the earlier period the maximum seasonal runoff was ;61,000 acre-feet in 1915-16, and the minimum was 64,920 acre-feet in 24-25. In the more recent period the maximum seasonal runoff was 9,700 acre-feet in 1940-41. During this recent period no runoff occurred nine seasons, and there were seven consecutive seasons without runoff lowing 1941. The large reduction in runoff during the second 22-ır period is in part indicative of increased upstream diversions and ter use.

FLOOD FLOWS

Prior to construction of Hoover Dam and creation of Lake Mead, structive floods occurred on the lower Colorado River, inundating large as. As has been stated, these flood flows at times reached peaks of),000 second-feet or more. Since 1935 when it began operation, Lake ad has completely regulated all flood flows reaching it from the tribu-y watershed.

At times in the past Gila River has contributed destructive flood ws to the Colorado. Such floods were principally responsible for the ındation and severe damage in Imperial Valley in early years of this ıtury, as described in Chapter X of this bulletin. However, reservoirs ce constructed on the Gila or its tributaries have some regulating effect flood flows of that stream. A flood control reservoir is proposed for ıstruction on the Gila River at the "Painted Rock" site, 126 miles stream from its mouth, which would regulate floods not now controlled upstream reservoirs.

As was previously stated in the section on "Precipitation," summer ınderstorms are prevalent throughout the Colorado River Basin, ne of which are of sufficient duration and intensity to produce locally structive floods.

QUALITY OF WATER

Tributaries of the Colorado River at the higher elevations generally ıtribute water of good quality to the river. Soluble salts in quantities naging to plant growth occur in some isolated tributaries, but become harmful by mixture with larger streams of the system. Water of main river, as is typical of most other western river systems, becomes gressively more saline as it moves downstream and receives return ws from irrigation and drainage from lands of the basin. However, ter of Colorado River is of quality suitable for most irrigation uses wnstream to the lowest diversion.

SILT

The silt problem is one of the most important of the several problems be solved in connection with the development of Colorado River. The er in its natural state had an average silt content exceeded by only or two rivers in the world. Daily tests of the water in the main canal Imperial Irrigation District prior to the building of Hoover Dam wed, on several occasions, a silt content of as much as 30 percent by ume. For the entire month of August, 1930, these tests showed an rage silt content of approximately 15 percent by volume. The high content of the water aggravated the flood problem in the lower river. cause of this fact, the location of Hoover Dam and the height to which ould be constructed were exceptionally favorable. About 95 percent the river's silt originates above Hoover Dam. The great reservoir acity created by the dam provides relief from the silt problem in the er river for many years, and an opportunity to study and find a sible permanent solution for the problem.

RECOMMENDATION FOR ADDITIONAL INVESTIGATION

Attention is again called to various assumptions and incomplete data upon which the runoff figures presented herein are based. Results given are considered the best estimates that can be made with data now available. In this connection, the following recommendation made in "Views and Recommendations of the State of California on Proposed Report of Secretary of Interior entitled 'Colorado River'," which was issued in 1947 is cited:

> "It is recommended that additional investigation and studies on the Colorado River System be diligently prosecuted and reported on by the Department of the Interior and other federal agencies concerned, in cooperation with the states of the Basin, and that appropriations be authorized in amounts adequate for that purpose; and that, in particular, such investigations and studies include adequate coverage of (a) water supplies at point of use for individual projects, on the basis of critical drought periods; (b) water requirements of individual projects on the basis of consumptive use and not on the basis of main-stream depletion; (c) project and reservoir operations; (d) silt and its control and prevention; (e) present and future quality of water; * * *"

Information developed from the investigations and studies recommended in the foregoing report could be utilized in further more accurate estimates of natural flow of the Colorado River System.

ESTIMATED SEASONAL NATURAL RUNOFF, COLORADO RIVER BASIN

In Acre-feet

Season	Colorado River at Lee Ferry	Colorado River above Gila River	Season	Colorado River at Lee Ferry	Colorado River above Gila River
1904–05	12,593,000	16,640,000	27–28	17,144,000	16,956,000
05–06	18,516,000	17,892,000	28–29	20,945,000	20,024,000
06–07	25,528,000	25,934,000	1929–30	14,756,000	14,582,000
07–08	13,708,000	13,750,000	30–31	8,042,000	8,009,000
08–09	24,850,000	26,013,000	31–32	16,959,000	17,192,000
1909–10	14,917,000	15,784,000	32–33	11,411,000	11,310,000
10–11	13,532,000	17,128,000	33–34	6,012,000	6,052,000
11–12	19,543,000	20,489,000	1934–35	11,578,000	11,400,000
12–13	14,684,000	13,291,000	35–36	13,762,000	13,869,000
13–14	20,768,000	21,440,000	36–37	13,746,000	14,611,000
1914–15	12,437,000	15,199,000	37–38	17,360,000	18,042,000
15–16	18,600,000	18,962,000	38–39	11,270,000	11,748,000
16–17	22,918,000	22,569,000	1939–40	8,882,000	9,042,000
17–18	16,514,000	14,748,000	40–41	17,865,000	19,810,000
18–19	11,422,000	12,126,000	41–42	18,809,000	19,061,000
1919–20	19,917,000	22,747,000	42–43	13,078,000	12,865,000
20–21	22,473,000	21,396,000	43–44	15,011,000	15,152,000
21–22	18,170,000	19,517,000	1944–45	13,322,000	13,656,000
22–23	18,114,000	19,025,000	45–46	10,535,000	10,146,000
23–24	14,305,000	14,646,000	46–47	15,262,000	16,008,000
1924–25	13,034,000	13,597,000	1947–48	15,453,000	15,662,000
25–26	15,774,000	15,671,000			
26–27	18,298,000	18,263,000	Averages	15,723,000	16,182,000

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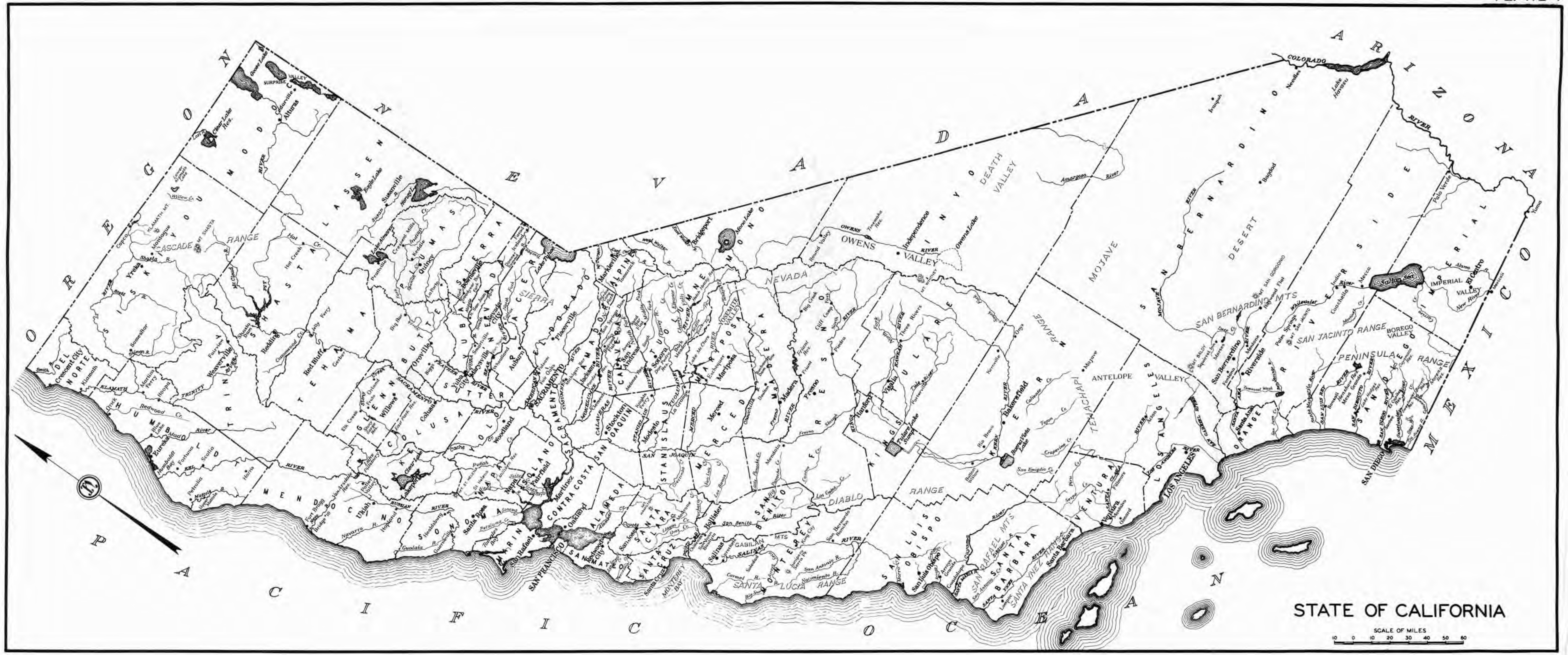
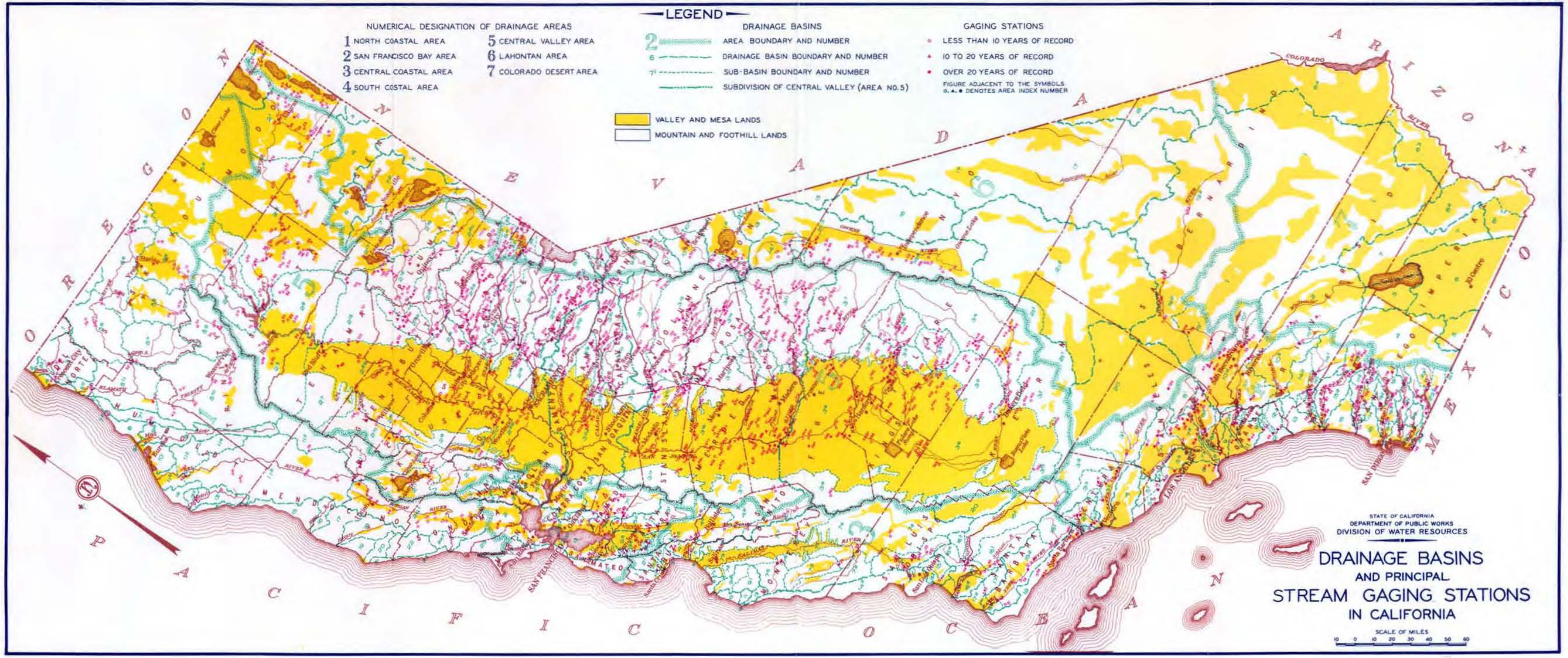
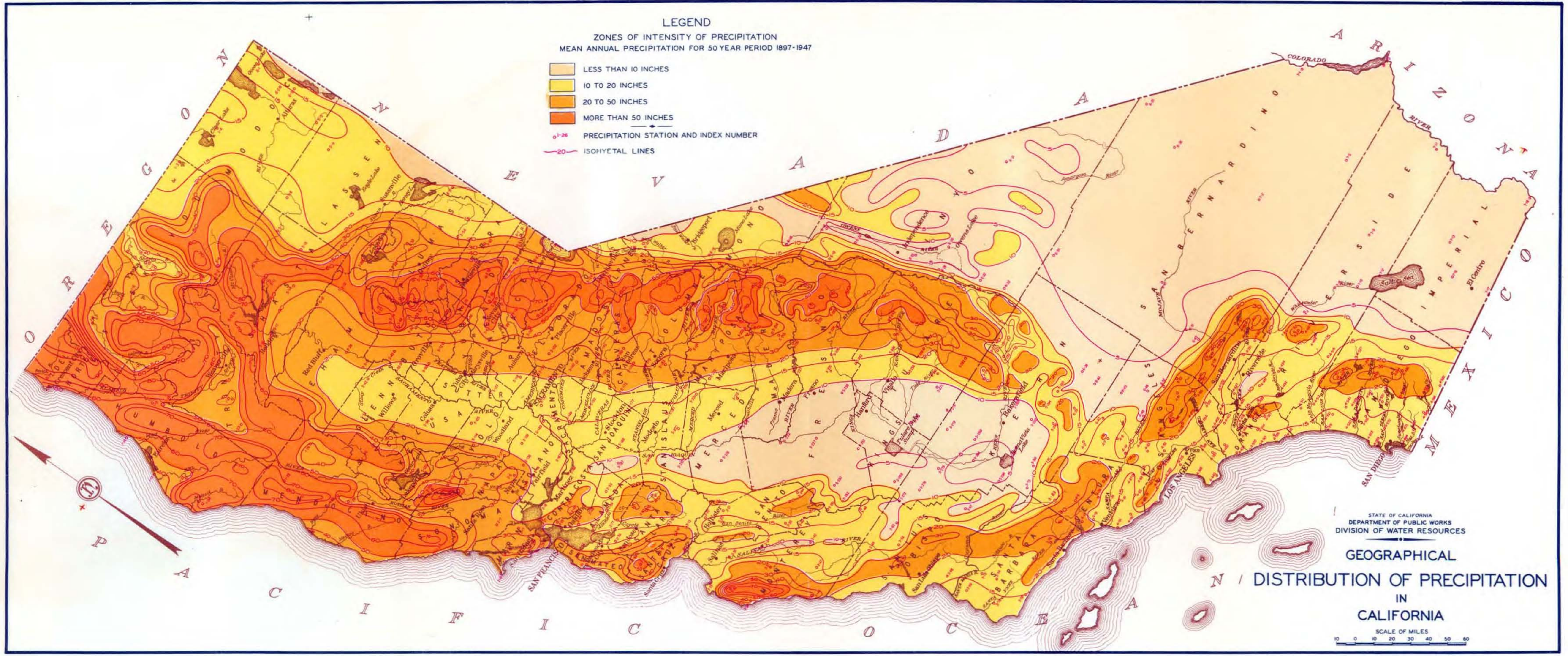
PLATE 1



STATE OF CALIFORNIA


LEGEND
NUMERICAL DESIGNATION OF DRAINAGE AREAS
1 NORTH COASTAL AREA
2 SAN FRANCISCO BAY AREA
3 CENTRAL COASTAL AREA
4 SOUTH COSTAL AREA
5 CENTRAL VALLEY AREA
6 LAHONTAN AREA
7 COLORADO DESERT AREA
DRAINAGE BASINS
AREA BOUNDARY AND NUMBER
DRAINAGE BASIN BOUNDARY AND NUMBER
SUB-BASIN BOUNDARY AND NUMBER
SUBDIVISION OF CENTRAL VALLEY (AREA NO. 5)
GAGING STATIONS
LESS THAN 10 YEARS OF RECORD
10 TO 20 YEARS OF RECORD
OVER 20 YEARS OF RECORD
FIGURE ADJACENT TO THE SYMBOLS DENOTES AREA INDEX NUMBER
VALLEY AND MESA LANDS
MOUNTAIN AND FOOTHILL LANDS
OREGON
NEVADA
ARIZONA
MEXICO
PACIFIC OCEAN
COLORADO
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
DRAINAGE BASINS
AND PRINCIPAL
STREAM GAGING STATIONS
IN CALIFORNIA
SCALE OF MILES
10 0 10 20 30 40 50 60


LEGEND
ZONES OF INTENSITY OF PRECIPITATION
MEAN ANNUAL PRECIPITATION FOR 50 YEAR PERIOD 1897-1947
LESS THAN 10 INCHES
10 TO 20 INCHES
20 TO 50 INCHES
MORE THAN 50 INCHES
PRECIPITATION STATION AND INDEX NUMBER
ISOHYETAL LINES
OREGON
NEVADA
ARIZONA
MEXICO
PACIFIC OCEAN
SAN FRANCISCO
LOS ANGELES
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
GEOGRAPHICAL
DISTRIBUTION OF PRECIPITATION
IN
CALIFORNIA
SCALE OF MILES
10 0 10 20 30 40 50 60