CALIFORNIA PATTERNS

A Geographical and Historical ATLAS

DAVID HORNBECK

David L. Fuller / Design and Cartography

CALIFORNIA PATTERNS

Endorsed By
The California Council for Geographic Education

MAYFIELD PUBLISHING COMPANY

CALIFORNIA PATTERNS:
A GEOGRAPHICAL AND HISTORICAL ATLAS

David Hornbeck
CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

Physical Geography
Phillip Kane
CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

Design and Cartography
David L. Fuller
CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

Cartographic Assistants
Richard Doss
Robert Kuboshima

For My Father
Eugene Cabading

First edition

Library of Congress Catalog Card Number: 82-073743
International Standard Book Number: 0-87484-583-1

Manufactured in the United States of America
Mayfield Publishing Company
1240 Villa Street
Mountainview, California 94041

Manuscript editor: Liz Currie
Managing editor: Pat Herbst
Art director: Nancy Sears
Production manager: Cathy Willkie
Compositor: Publisher's Typography

CONTENTS

PART THREE

PART FOUR

APPENDIXES

PREFACE

This atlas is written for people who want to know more about California and especially for students taking California Geography or California History classes. I have attempted to depict California's contemporary landscape through a historical geography perspective; I believe that one cannot understand California's current geography without first knowing how and why certain geographical patterns emerged and changed in the past to become a part of today's landscape. To depict California's changing patterns, many of the maps and graphics were prepared from primary data and are presented here for the first time in a cartographic style that simplifies even the most complicated geographical patterns. *California Patterns* begins with a detailed illustration of the varied and unique character of the physical landscape and then focuses on the development and changes in the human landscape from aboriginal settlement to the present. The tracing of California's changing landscape to the present day is inevitably historical in approach, but the results presented here are geographical.

I am grateful to the many people who have helped me put together this atlas. First and foremost is David Fuller, whose considerable creativity and cartographic abilities are apparent on every plate. Without this dedication to the project it would not have been completed. I am indebted to him. Phillip Kane compensated for my lack of depth in physical geography by preparing the section on physical patterns, and I gratefully acknowledge his assistance. Richard Doss, Robert Kuboshima, Susan Handy, Michael Swift, and Robert Provin provided valuable cartographic assistance at crucial times and their efforts are very much appreciated. To Peggy Michaels, who cheerfully and patiently deciphered my handwriting and typed endless pages of copy, I am deeply grateful. I was fortunate to receive very helpful editorial assistance from Liz Currie and also from my wife, Virginia, who read and commented on all of my innumerable drafts of manuscript. I thank them both, especially my wife, who gave up valuable time to help me. Through the years, the staffs at Bancroft Library, the Huntington Library, the Santa Barbara Mission Archives, and the California State Library were gracious and giving of their time; their helpfulness is appreciated.

David Hornbeck

INTRODUCTION

Know ye that at the right hand of the Indies there is an island named California, very close to the side of the Terrestrial Paradise, and it was peopled by black women, without any man among them, for they lived in the fashion of Amazons.
García Ordóñez de Montalvo, ca. 1510

California sprang from a quill pen as an imaginary island endowed with fantastical and mystical qualities. Through the centuries, writers have competed to see who could produce the most tantalizing superlatives about California, creating literary teases and evocative fantasies so grand that only a living experience can substantiate them.

The making of the California myth and the creation of the formidable body of literature sustaining it have, more than anything else, shaped present-day life in the state. Adjectives such as wondrous, luxuriant, incomparable, majestic, and glorious have been used so often to describe everything in California—from mountains to deserts to cities to the coastline—that if all that is in print were true, California surely would be a terrestrial paradise. The myth has soared and reached such heights that California seems to be a land of promise for everyone. So great is its allure that literally millions of people have uprooted themselves to see whether paradise truly does exist "at the right hand of the Indies." The one thin thread that runs through the seemingly infinite variations of the myth, through the alluring descriptions, both true and false, is the promise of opportunity. California is a symbol to men and women who wish for a better life, to those who dream of a new beginning. The lures of uncommon abundance and economic opportunity have brought successive waves of people—farmers and merchants, boosters and drifters, Okies and Filipinos eager to "try" California. And try they did, for they have left a legacy of extravagant success, a success that whispers in the ear of every person who has failed elsewhere: "Try California."

In spite of its incomparable image, California remains a relatively unknown region. Among Californians there is a complacent illiteracy on matters Californian. Couched in half-truths and myths, the history and geography of the state are nebulous and vague in the minds of residents and outsiders alike. The lack of a time-and-space perspective is common among immigrants who have broken with the past: yesterday is forgotten and today is merely one step toward tomorrow's paradise. The *future* is every Californian's concern. The past is seldom consulted to solve problems; solutions are improvised as the need occurs. Californians have popularized their past to fit their hopes for the future. No one believes in the myth as fervently as Californians themselves. Failure is seldom dramatized; the past is portrayed as bright, cheerful, and above all successful. If one believes literary descriptions, California's past could not have been less than an arcadian period complete with romantic missionaries, stalwart Spanish dons, tough Forty-Niners, determined farmers, and brilliant capitalists. In these idealized accounts, the only imperfection is the California Indian, who usually receives scant attention and is invariably defamed by the pejorative term "digger."

California, however, has a rich heritage, a history that does not need to be adorned with fictional decorations to be made interesting. Like all histories, it is filled with the dreams and aspirations, the successes and the failures of men and women who sought a new life. It is also a history of change and movement, a history in which the patterns created upon the land were never permanent but resembled a kaleidoscope of changing shapes and designs. For 200 years, California has undergone remarkable growth and change. Today's cities, filled with millions of people, and farms that stretch to the horizon could not have been foreseen by the small band of exhausted Spanish soldiers and priests who established a tenuous foothold on San Diego Bay in 1769.

From that meager beginning, Spanish civilization slowly spread outward. The Spanish colonized the land, converted the natives, and implanted Spain's culture, institutions, and values. In 1822, Spain's efforts in California gave way to Mexico. A fledging nation, Mexico saw new alternatives and was quick to use more egalitarian ideas to settle the land and to extend its control. Mexico's experiment was short-lived, abbreviated by the United States's idealistic plan of manifest destiny, which sent California off in yet another direction in 1848.

In less than 100 years, three nations occupied California, and each had very definite ideas about how land was to be inhabited, organized, and used. The result was patterns of human occupancy that were not simply the extension of institutions of an expanding people, but were the odd and curious blending of the frontier institutions of the invader and the invaded.

California's history is a comforting illusion to those who filter its past through ethnocentric screens and are inclined to give almost exclusive attention to the period after the Gold Rush. Judged from the amount of space in the current crop of textbooks devoted to Indian and Hispanic settlement of California, it seems that the serious business of occupying the land and putting it to productive uses awaited the arrival of American miners, farmers, and merchants. The Indian, Spanish, and Mexican inhabitants appear mostly as stewards or trustees of the land, holding it until the more energetic and industrious Americans arrived. The portrayal of Indians as simpletons, the Spanish as treasure seekers, and the Mexicans as idle drifters is a not-altogether-uncommon view of pre-American California. This myopic view of the past focuses attention only on the people and events that connect California with the eastern United States and treats it as part of an expanding frontier, ignoring its Spanish heritage.

In all that has been written about California's past, the source of information most often overlooked is the land itself. Land is the stage upon which the actors—Indians and Spaniards, Mexicans and Americans, Asians and others—played their parts, each in sequence, each bringing their own individual touches to the scene. The manner in which each group perceived, organized, and used the land resulted in patterns that reveal a great deal about the inhabitants, their values, their institutions, and their vitality. The landscape is a reflection of human culture in all of its facets, a record of the success and failure of rich and poor alike. The land anchors people, events, and conditions that change through time. The California landscape remains a permanent storehouse of the past, where, if we look carefully, we can find simple people acting like geniuses, discouraged miners playing the role of astute planners, and idlers working as efficient controllers of the land. The human geography of California's past has not been completely erased; the stage was not cleared to begin again; the props were simply rearranged to fit a new play.

This atlas focuses on the changing patterns of human occupancy from about 1760 to 1980. A brief overview of the successive settlement patterns discussed in Parts Two, Three, and Four will serve to emphasize the change and instability prevalent throughout California's history.

The first permanent human imprint on California was made some 40,000 years ago by aboriginal occupants, a diverse group known collectively as California Indians. Their imprint rested lightly on the land, because, with the exception of the localized use of fire, they lacked the technical ability to significantly alter their environment. They had no knowledge of the wheel, no system of writing, and in general they lived a Stone Age existence. Proto-agriculture was practiced only in a restricted southern area, and land was generally held by hunting, fishing, and gathering rights. The environment literally provided all that was needed to sustain aboriginal life. So abundant was it that, in a number of areas, the density of the native population is believed to have been as much as four times greater than in any other area in North America. It is difficult to generalize about aboriginal occupancy patterns, however, because of the great number of Indian groups, each occupying a relatively small area. Aboriginal population distributions were shaped largely by the resources available in each area and by the institutionalization of trade, which during times of environmental stress facilitated movement of goods between areas.

In 1769, Spain made California part of the Spanish Empire. As a colonial power, Spain imposed a rigid settlement scheme on California and made the first formal, systematic effort to organize and use the land for specific goals. The Spanish introduced three frontier institutions that were to reshape much of the aboriginal landscape: the mission and presidio were used to gain a foothold, and when that had been accomplished, the pueblo was introduced. Using all three institutions, Spain was able to effectively occupy only a small area of California, extending from present-day San Diego to San Francisco and reaching from 50 to 75 miles inland. The missions became the dominant frontier institution. Missionaries reorganized and reshaped the land to conform to specific Christian goals, which included rapidly baptizing "heathen" Indians and teaching the new converts the "civilized" ways of Spanish society. Presidios and pueblos were established along the coast—an area that experienced considerable change with the founding of 21 missions, 4 presidios, and 3 pueblos. Beyond the coastal region, Spanish influence and control were minimal: the only direct impact on the natives was the spread of diseases introduced by the Spanish.

Mexico's independence from Spain in 1822 signaled the introduction of a new order. The rigid settlement policies of the Spanish Crown gave way to liberalized policies that allowed greater access to land and encouraged individual initiative: land tenure laws were changed; trade barriers were removed; and the mission system was dismantled. To encourage the settlement of former mission lands, the Mexican government offered free land to Mexican citizens and to immigrants willing to become citizens. These grants resulted in the creation of over 800 ranchos, ranging in size from a few hundred acres to over 133,000 acres. Mexico's liberal land policies broke up the large mission estates, intensified settlement along the coast, and pushed settlement into the interior, colonizing a large part of the Sacramento Valley by 1846. With the establishment of free trade, cattle raising became an important economic activity in response to the growing demand for hides and tallow in New England ports. The chance to obtain large grants of land and the opportunity to amass large profits from trade in hides and tallow brought Americans to California in numbers that would soon surge and send California toward yet another series of changes.

The Americans had a different way of life and a different set of institutions, and they initiated changes designed to bring the land and its use into alignment with their "progressive views." With U.S. acquisition of California in 1846 (statehood would come in 1850), the number of Americans substantially increased, particularly after the discovery of gold. During the first four years of American occupancy, the population increased from 15,000 to 100,000; by 1860, it had risen to 300,000. The Gold Rush accounted for a sizeable portion of the early migration and brought about a new landscape—especially in the interior, away from the established Hispanic settlements along the coast.

As the Gold Rush excitement waned, however, disillusioned miners turned to other pursuits—mainly farming—but found to their dismay that much of the best agricultural land in the state was held in large tracts by Mexican rancheros. After considerable legal maneuvering between ranchero and farmer, the large ranchos were finally broken up into smaller Midwestern-type farms. Along with small farms came new towns, railroads, and more settlers, each adding new elements to the landscape. The changes initiated by newcomers were not accepted without difficulty. The Americans could not wipe away the Hispanic past and begin anew. They were forced to compromise, and their efforts brought into being a hybrid landscape containing both Hispanic and American elements. By 1880, California had two distinct cultural landscapes: a Hispanic-American one along the coast and an American one in the interior.

The last 20 years of the nineteenth century were no less tumultuous than the first 30 years of American settlement had been. The difficulty lay in unrealistic expectations about the land and its resources. Settlers searched for the ideal, for a Western utopia. By 1900, California had become a synthesis of contrasting and sometimes conflicting institutions, a composite representing the aspirations, failures, and expectations of men and women about to enter the twentieth century.

California's growth since 1900 has not been a smooth evolution of relatively simple patterns into more complex, integrated ones. There have been significant changes, often abrupt and sometimes turbulent, which have resulted in the reshaping of the land, readying it for the implementation of new goals. To the casual observer, the present-day landscape exhibits few readily identifiable links with the past. The rapid addition of new institutions and people in the eighteenth and nineteenth centuries created and perpetuated an atmosphere of change. When change becomes the norm, it is difficult to achieve any degree of continuity or stability that would impart a consistent design to the land. In the twentieth century, change has been the normal state of affairs—to such an extent that one is tempted to suggest that change itself has become a California institution.

Even to those who see California only as the present state, it should be apparent that much has occurred in its past. Each pattern existed for a short time, only to merge into another. Increasingly complex interruptions offered new alternatives. Indians, rancheros, Forty-Niners, city planners—all have left marks on the land, marks that have become part of an ongoing mosaic of differing perceptions and uses, a blending of people's achievements, failures, and persistence in shaping the land.

PART ONE

PHYSICAL PATTERNS

GEOLOGIC DEVELOPMENT AND BEDROCK GEOLOGY

The geology of California has origins that go back almost 1 billion years. The geologic movements that formed California also involved the entire North American Cordillera, the great mountain belt extending from Alaska to Guatemala. The interactions that created the intricate geology of the state have been complex, and it is not yet entirely clear to earth scientists how the various geologic provinces that make up California have come to be joined together.

Explanations usually begin with plate tectonics—a theory that explains continental and oceanic placement in terms of huge lithospheric masses, called plates, that cover the Earth's surface. These plates have shifted positions over millions of years, and some are still shifting. The geologic development of California is a result of the ongoing movement of the Pacific Ocean Plate and the North American Plate.

From about 600 million to 400 million years ago, the western coastline of North America extended from what is now Southern California through northwestern Arizona. Westward offshore, where most of California is now, existed two huge, shallow undersea troughs. These shallow seas were probably bounded on their western extent by chains of volcanic islands. The volcanoes resulted from the extrusion of lava that was generated by the melting of the Pacific Ocean Plate as it was forced under the North American Plate. Lava flowed and other volcanic debris fell as ash into the shallow seas, where it mixed with material eroded from the continent to the east. In this way the shallow seas received massive deposits of sediments. Beginning about 100 million years ago, this mixture of materials was squeezed upward and eastward and eventually was added onto the western edge of the continent.

Geologic events began to take a very different turn about 150 million to 140 million years ago. During that time a cataclysmic rearrangement of plate margins took place in the growing Cordillera. The Pacific Ocean Plate and North American Plate, which earlier had been slipping relatively quietly under and over one another in opposite directions, violently interacted. The boundary between them—for reasons not yet understood—collapsed eastward, causing the rocks and sediment in the western edge of the continent and in the marginal sea to be strongly squeezed, intricately folded, tilted to the west, and piled up along eastward-dipping faults in overlapping slabs. This event, called the Nevada orogeny, accounted for the initial and major building of the Sierra Nevada, the Klamath Mountains, and the Peninsular Ranges.

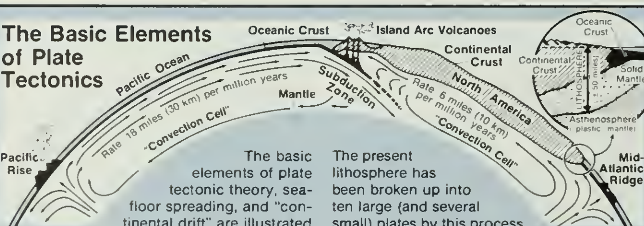
The Nevada orogeny ended when the eastward-moving floor of the Pacific Ocean once again, as it had done prior to the orogeny, began to slip under the North American Plate. By this time, 150 million to 90 million years ago, magma (the molten matter under the Earth's crust) generated along the subduction zone rose into the continent rather than erupting onto the seafloor and creating islands as before. The magma melted part of the continental rocks into which it intruded and formed great masses of granitic magma that either cooled within the crust or created volcanic landforms on the surface of the Earth. The earliest granitic rocks generated in this fashion were in the western Sierra foothills. Successively younger intrusions appeared farther east all the way to what is now the Sierra Nevada crest. Seaward of all this activity, a new undersea trough was forming and was receiving large amounts of debris from the continent. These sediments would eventually become the Sacramento and San Joaquin valleys and the Coast Ranges.

Beginning about 90 million years ago, and lasting until about 30 million years ago, the plate movement pattern changed again. Although the geologic results of this change are apparent enough, it is

California and the Geologic Time Scale

Eras	Periods / Epochs	Duration in Million Years before Present	Orogenies	Major Geologic Events in California (read from bottom to top)
CENOZOIC	*Quaternary*		Coast Ranges	*Continued tectonics in all provinces*
	Holocene	present to 0.01		
	Pleistocene	0.01-3		*Glaciation; major building of Coast Ranges, Transverse Ranges, and Cascade volcanoes; major block faulting in Basin and Range*
	Tertiary			
	Pliocene	3-11		
	Miocene	11-25		*Early building of Coast and Transverse Ranges. Origin of present San Andreas fault system*
	Oligocene	25-40		
	Eocene	40-60		
	Paleocene	60-70		*Continued emergence of major mountain ranges*
MESOZOIC	*Cretaceous*	70-135	Nevada	*Major building of Sierra Nevada, Klamath Mountains, and Peninsula Ranges*
	Jurassic	135-180		
	Triassic	180-225	Sonoma	*Continued volcanism and mountain building in shallow seas*
PALEOZOIC	*Permian*	225-270		
	Pennsylvanian	270-305		
	Mississippian	305-350	Antler	*Shallow seas over much of California (Cambrian to Permian); island arc terrain*
	Devonian	350-400		
	Silurian	400-440		
	Ordovician	440-500		
	Cambrian	500-600		
PRE-CAMBRIAN	*Late*	600-1800		*Some mountain building in southern California*
	Early	1800-2700		

The Basic Elements of Plate Tectonics

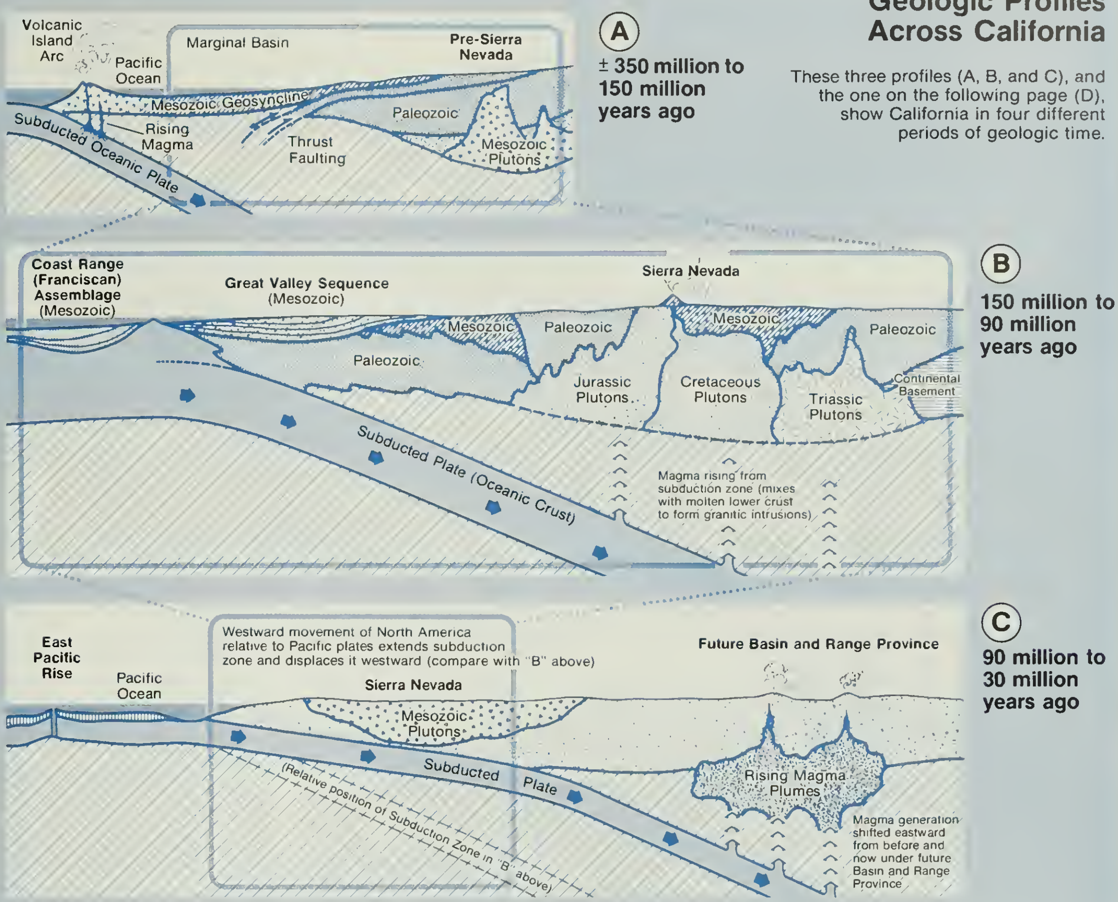


The basic elements of plate tectonic theory, sea-floor spreading, and "continental drift" are illustrated in the diagram above, which shows the general plate arrangements involving North America about 150 million years ago. The lithosphere, which includes the Earth's crust, is rigid, but the underlying asthenosphere yields to slow (plastic) flow. The material in the asthenosphere is heated by radioactive decay from deeper sources and is thought to be moving as a group of convection cells (somewhat analogous to the way soup "rolls" and circulates when heated in a pan). Upward-convected material in these cells comes up against the underside of the lithosphere, moves under it laterally in two opposite directions, rifts the lithosphere apart, and finally injects new oceanic crustal material (magma) into the rift zone. Once established, these zones of weakness in the crust are used over and over for the injection of magma, they are found as mountain ranges on ocean floors and are called oceanic ridges or rises.

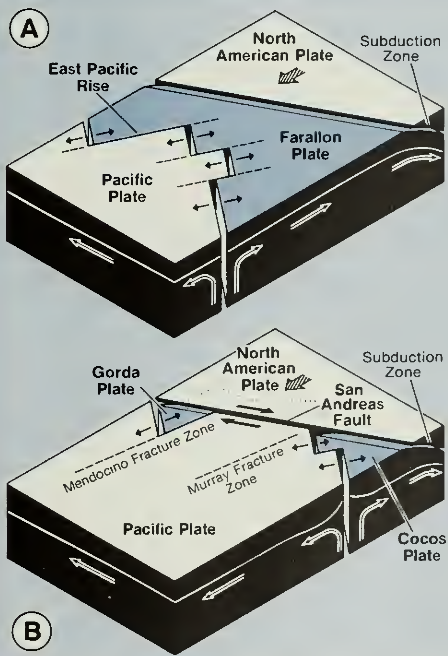
The present lithosphere has been broken up into ten large (and several small) plates by this process. A plate—which may or may not have a block of continental crust on it—is carried away from its oceanic ridge (sea-floor spreading). It moves as a rigid unit and, after it has cooled enough, eventually descends back into the mantle along a subduction zone. Selective melting of a subducted plate generates a new continental crust type of magma that can feed volcanoes and build up the crust on the opposite plate above it. The continents, made of less dense rocks than oceanic crust, are buoyant and cannot be drawn down subduction zones. As a result, continents grow seaward over time whenever new crust is added to them along subduction zones as volcanic chains and mountain ranges are compressed against their margins. The interiors of the Earth's lithospheric plates are quite stable; it is along their margins that the most intense volcanism, earthquake activity, and mountain building takes place.

Geologic Profiles Across California

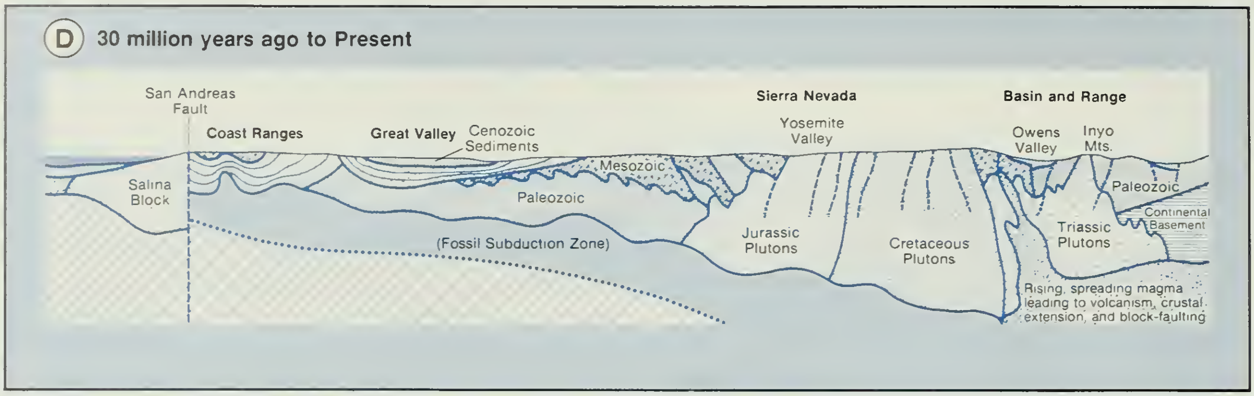
These three profiles (A, B, and C), and the one on the following page (D), show California in four different periods of geologic time.



The Origin of the San Andreas Fault

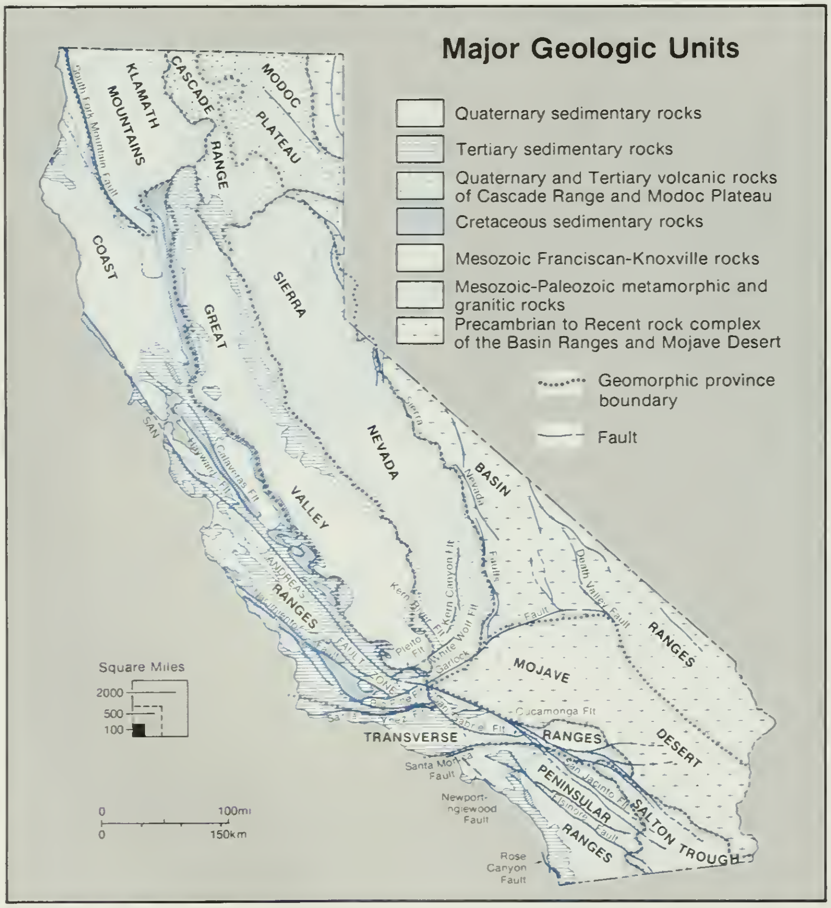


Compared to the present arrangement of tectonic plates along the North American West Coast, the arrangement until about 30 million years ago was much different. The area of seafloor spreading in the Pacific Ocean, called the East Pacific Rise, was not adjacent to the continent as now, but was entirely within the ocean basin, and there was a long, continuous subduction zone immediately offshore (see Figure A at left). The relative westward movement of the North American Plate (vis-à-vis the Pacific Plate) has resulted in the continent first "overriding" the subduction zone and then, beginning about 30 million years ago, overriding part of the East Pacific Rise as well. The subduction zone continued to generate magma even after going under the continent, but only until it began to subduct the East Pacific Rise (see Profile C and Profile D on the following page). Such an oblique meeting of a subduction zone (where crust is destroyed) and a rise (where crust is created) is relatively rare. When it happens, the resulting mutual annihilation must be a compromise—a *lateral (transform) fault*—where the two involved plates slide past each other horizontally without destroying or creating crust. The present plate tectonic situation (see figures B and C), then, has subduction still going on north and south of the San Andreas fault, thereby generating magma to feed the Cascade and Mexican Occidental volcanoes. Only lateral slippage—often felt as earthquakes—is taking place along the fault zone itself, however.



still unclear just what caused the new pattern. One favored hypothesis is that the westward-moving North American Plate finally overrode the subduction zone that was along its coast, forcing the zone to extend and migrate westward with the continent. This alteration in the shape of the subduction zone would have cut off the Sierra Nevada's deep-seated source of magma and shifted the zone of magma generation farther to the east, to where the Mojave Desert and the Basin and Range province are today.

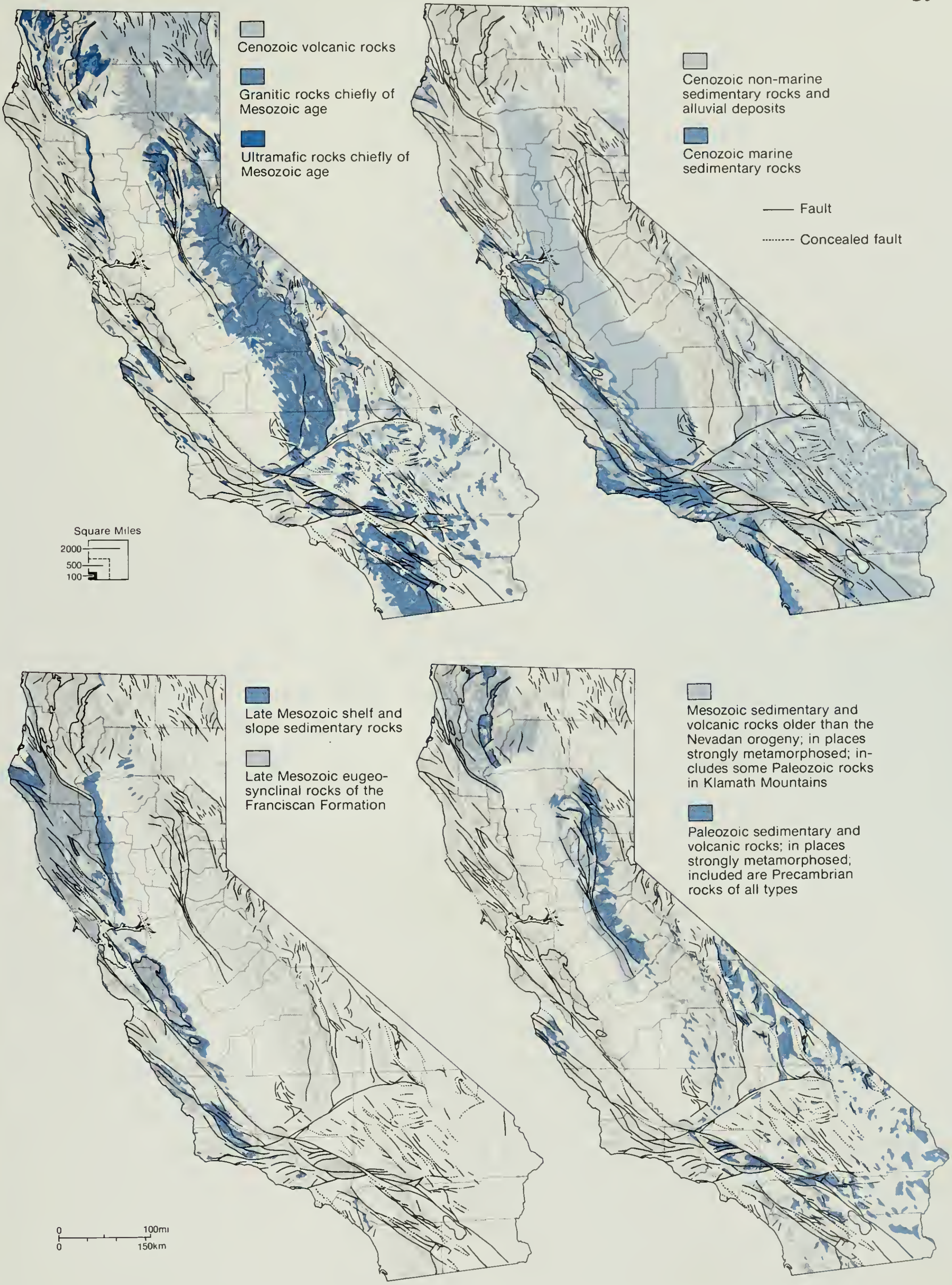
The altered subduction zone might have continued to produce magma, but about 30 million years ago events took yet another dramatic turn. The area off the California coast had been spreading apart for millions of years along a zone called the East Pacific Rise. This zone, over millions of years, had slowly been approaching the North American Plate. By 30 million years ago it had finally arrived, and it began to be subducted under California and Mexico. This swallowing of the East Pacific Rise not only caused its demise, but also sealed off the subduction zone. In California, the event completely altered the relative movements of the Pacific and North American plates. What had been a long-established zone of plate collision-compression and subduction now changed to a boundary where the two plates would slide past each other. This zone of sliding is now called the San Andreas fault system. Much of California and the Southwest inland from the San Andreas fault system also became an area of pull-apart faulting instead of collision and compression.



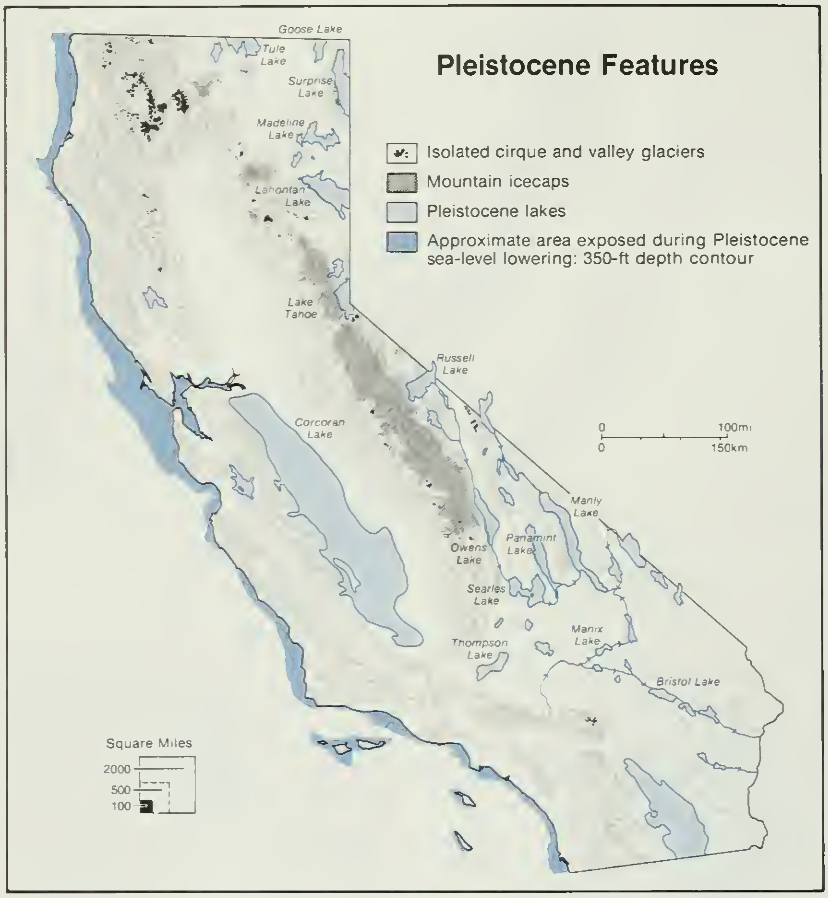
Besides the creation of the San Andreas fault system, several other geologic events accompanied the last major modification of California's plate-movement setting. With the final approach of the East Pacific Rise toward its subduction zone, the undersea trough that was trapped between the Rise and the continent was intensely compressed and folded and, in the end, added to the western coast of the continent as what are now called the Great Valley, the Coast Ranges, and the Transverse Ranges. Both the coastal mountains and the Sierra Nevada have experienced continued regional elevation because of crustal thickening accompanying the overriding of the East Pacific Rise.

Also during this era there was extensive pull-apart faulting and active volcanism in the eastern parts of California. With the subduction of the East Pacific Rise, deep-reaching fractures in the crust were created throughout the Basin and Range province, the Mojave Desert, and the Modoc-Cascade region. These activated faults not only brought vast volumes of underlying magma to the surface, but they also led to the horst and graben (fault-bounded mountain and valley) landscapes that characterize these regions. Continued subduction off the north coast of California (see the San Andreas fault illustration) has built the present-day Cascade volcanoes.

Bedrock Geology



GEOMORPHOLOGY



The natural regions into which the Earth's surface is divided are controlled mainly by differences in the planet's geologic framework. Primarily on the basis of geology, the United States is divided into 21 natural regions called geomorphic provinces. California is made up of three of these provinces: the Pacific Border province, the Sierra-Cascade province, and the Basin and Range province.

The Pacific Border province consists of a series of mountain ranges along the Pacific Coast, bordered on the east by an almost continuous and parallel lowland. The mountain ranges include, from north to south, the Klamath Mountains, Coast Ranges, Transverse Ranges, and Peninsular Ranges. The lowland to the east of these mountains is the Great (Sacramento and San Joaquin) Valley. Structurally, the mountains consist of folded and faulted rocks of varying types and ages, including mainly Paleozoic-Mesozoic metamorphic and granitic rocks in the Klamath and Peninsular mountains, and Mesozoic-Cenozoic sedimentary rocks in the intervening Coast and Transverse ranges. The Klamath Mountains are the most rugged of the Pacific Border group, with several peaks reaching close to 9,000 ft (2,745 m). The Coast Ranges are much lower, typically between 2,000 and 4,000 ft (600 and 1,200 m) elevation, but they still present a formidable barrier; only at San Francisco's Golden Gate is there any real break in the line of mountains. The Transverse Ranges, with peaks above 10,000 ft (3,050 m), effectively divide Northern and Southern California, much as the Peninsular Ranges (with equally high peaks) separate the southern coastal plain from the southeastern deserts.

The Sierra-Cascade province includes the Sierra Nevada and the Cascade Range. Geologically, these mountainous landscapes are very different; the Cascades are a chain of Quaternary volcanoes atop slightly older Tertiary volcanic rocks, whereas the Sierra Nevada is a large westward-tilted fault block of exposed Paleozoic-Mesozoic metamorphic and granitic rocks. Their unity, however, lies in their similar relief and structural location as part of a 1,000-mile-long (1,600 km) mountainous backbone that extends up the West Coast into Canada. The Sierra Nevada is one of the most impressive mountain ranges in the world, with many peaks over 13,000 ft (3,965 m). The Cascades are dominated by Mount Shasta (elevation 14,162 ft/4,319 m) and Lassen Peak (elevation 10,457 ft/3,189 m).

The Basin and Range province is divided into several smaller state provinces: the Basin and Range proper, Mojave Desert, Salton Trough (also called the Colorado Desert), and Modoc Plateau. Except for the Modoc Plateau, which is volcanic rock, the rock types and ages are very diverse. The unity of the Basin and Range province is in its characteristic structure of mountains and valleys created by movement along fault lines. Altitudes range from below sea level in Death Valley and at the Salton Sea to more than 12,000 ft (3,660 m) along parts of the Sierra Nevada crest. Often the relief, or elevation difference between mountains and adjoining valleys, is as much as 5,000 ft (1,525 m). Most of the basins do not drain to the sea, and there are numerous dry lake beds.

The most striking characteristic of California's geomorphology is its unusual diversity, which has created unique and varied topographies throughout the state. Much of the most spectacular scenery has been inherited from the last ice age, which lasted from about 2 million to 10,000 years ago. During this period of alternating cooler and warmer climates, there were long chains of interconnected lakes that are now dry. But most important for those interested in the geologic formation of the state is the legacy left by the movement of ice. Extensive alpine glaciation in all the higher mountains during the last ice age created the well-known craggy peaks, steep-sided gorges, and deep U-shaped valleys of California's mountain landscape.

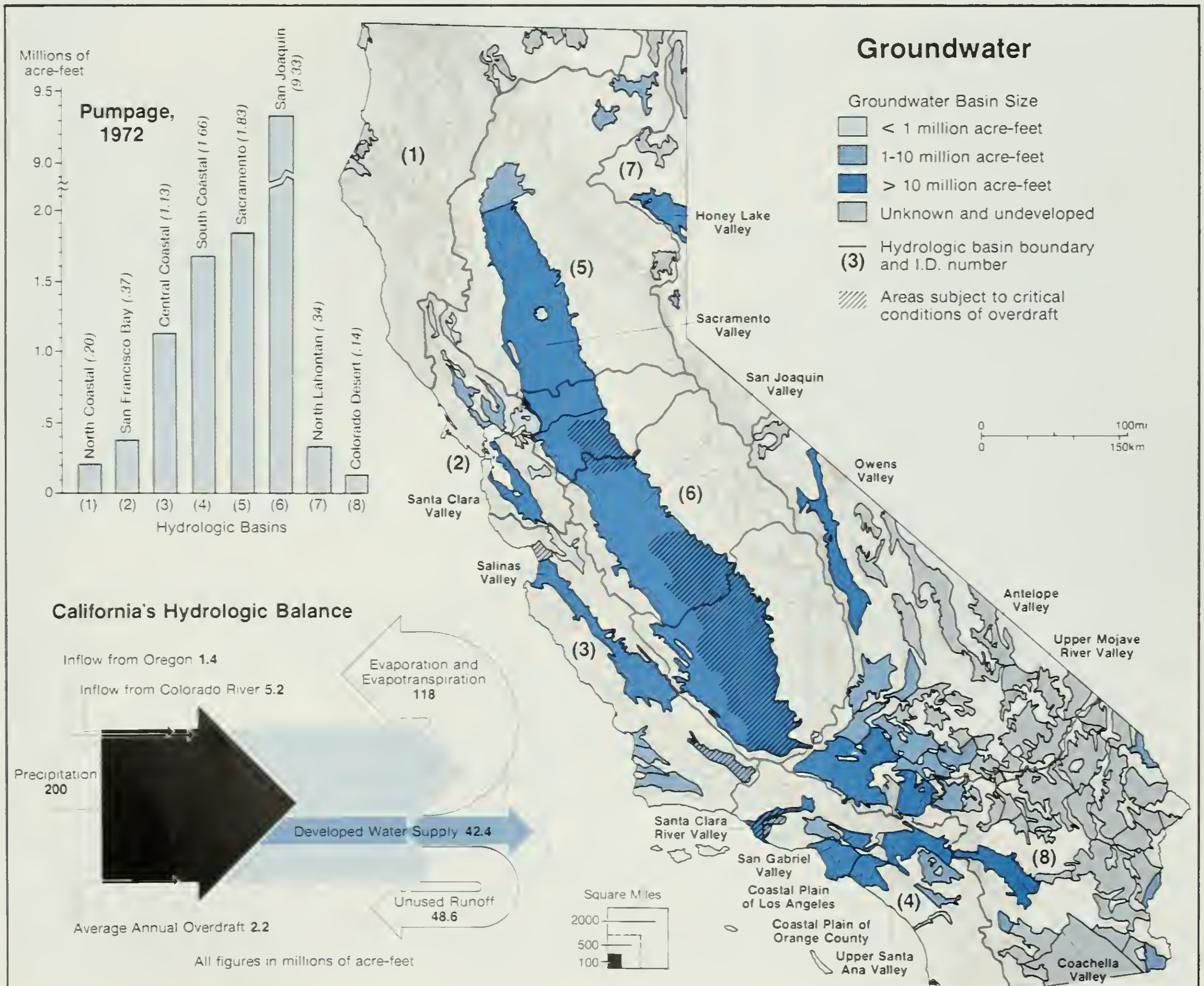

Landforms
Geomorphic Provinces
Klamath Mountains
Modoc Plateau
Cascade Range
Coast
Sierra Nevada
Great Valley
Ranges
Basin Ranges
Mojave Desert
Transverse Ranges
Peninsular Ranges
Salton Trough
Crescent City
Eureka
C Mendocino
Pt Arena
Redding
Chico
Sacramento
Stockton
Tomales Bay
Pt Reyes
Golden Gate
San Francisco
San Jose
Santa Cruz
Monterey
Carmel
Salinas
Pt. Sur
Coalinga
Merced
Madera
Fresno
Bakersfield
Bishop
Mono
Pt Sal
Pt Concepcion
Santa Barbara
Los Angeles
Anacapa Is
Santa Rosa I
San Nicolas I.
Santa Catalina I
San Clemente I.
La Jolla
San Diego
Pt Loma
Barstow
Salton Sea
0
100mi
0
150km
Map adapted from E. Raisz: *Landform Map of the United States*

STREAMFLOW AND WATER SUPPLY

Water is California's most valuable natural resource; its supply, distribution, and quality affect every segment of agricultural development, industrial activity, power generation, recreation, and urbanization. If any "internal factor" ever puts a lid on the state's economic and population growth, it will most likely be the availability of water.

It may seem surprising that there is so much concern in California about the storage and transfer of its water. Average total water consumption (75 percent of it for agriculture) is only about 55 million acre-feet, compared to an average annual runoff from the state's many streams of 72 million acre-feet (an acre-foot is the water needed to cover one acre to a depth of one foot; it equals 325,900 gallons). This apparent surplus of runoff—especially when combined with a subsurface (groundwater) supply of more than 250 million acre-feet—would seem to suggest that there is an abundance of water. But this is not the case. The key problems of California's water supply are the "untimely" seasonality of the precipitation, the great disparity in the amount of annual runoff, and the imbalanced distribution of water.

Almost all of California's precipitation occurs during the winter season from November through March. Much of it falls as snow and remains on the ground in "frozen storage" until early summer. Stream runoff is usually low or nonexistent throughout the state between September and December. The more than 1,000 reservoirs in California (with a combined storage capacity of over 35 million acre-feet) help relieve this seasonality problem, but they cannot solve it. Because of the great range in annual runoff (which has varied between 18 million and 135 million acre-feet), and because the northern one-third of the state has 70 percent of this water but only 20 percent of the total consumption, water remains a critical issue in California. Groundwater supplies 40 percent of California's water needs, but this, too, presents problems because we pump out this water in many areas faster than it can be replaced.

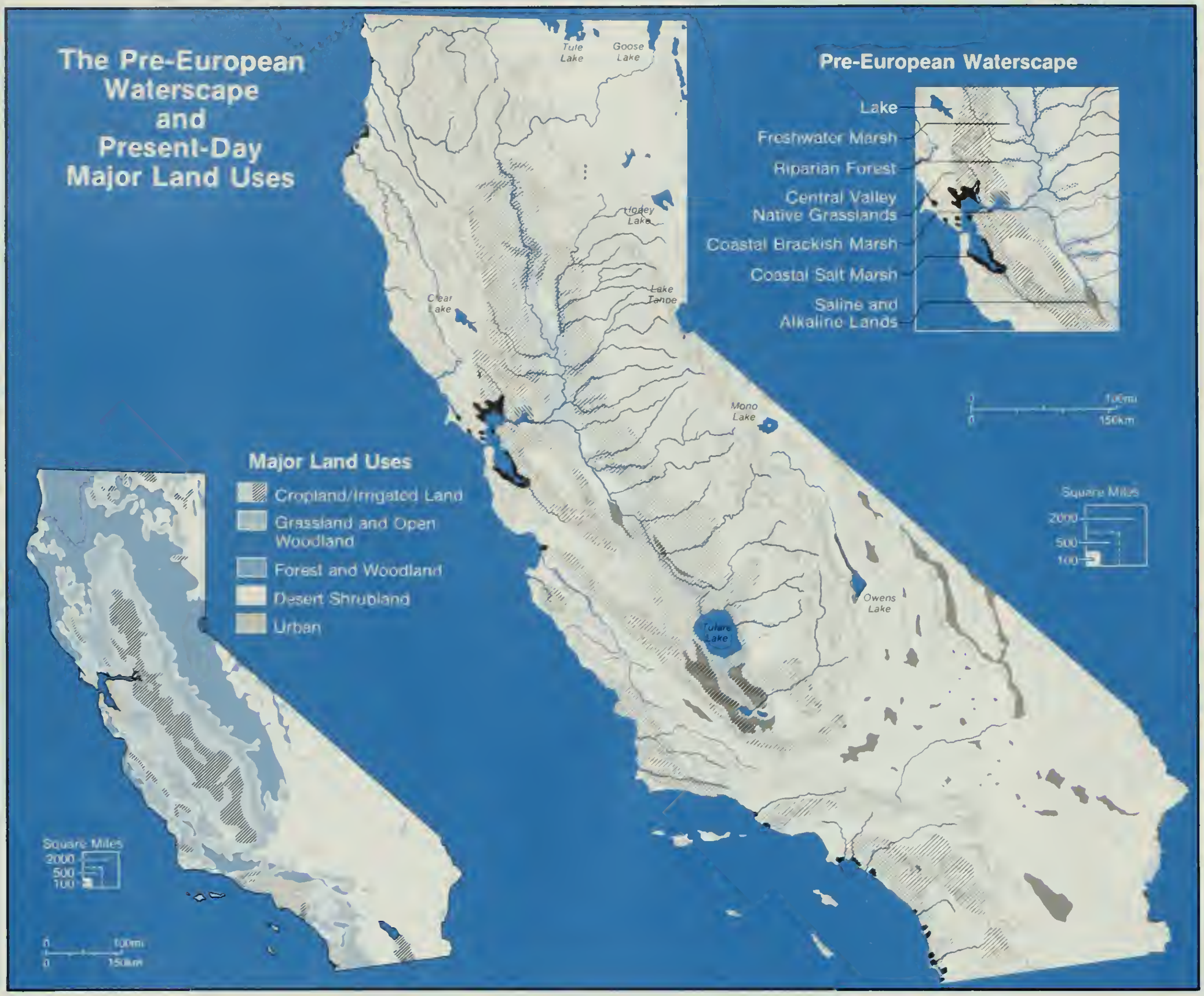


Lakes, Reservoirs, and Unused Runoff

Area of Drainage Basins
(in sq. miles)

Smith River	631
Klamath River System	12,000
Mad River	496
Eel River System	3,701
Mattole River	273
Noyo River	114
Navarro River	316
Garcia River	114
Russian River	1,498
Putah Creek	577
Sacramento River System	23,329
Truckee River	932
Cosumnes/Mokelumne System	1,167
East Fork Carson River	345
East Walker River	503
San Joaquin River System	7,235
Salinas River	4,401
Owens River	3,133
Kaweah River	520
Tule River	390
Kern River	2,420
Los Angeles River	822

NATURAL VEGETATION

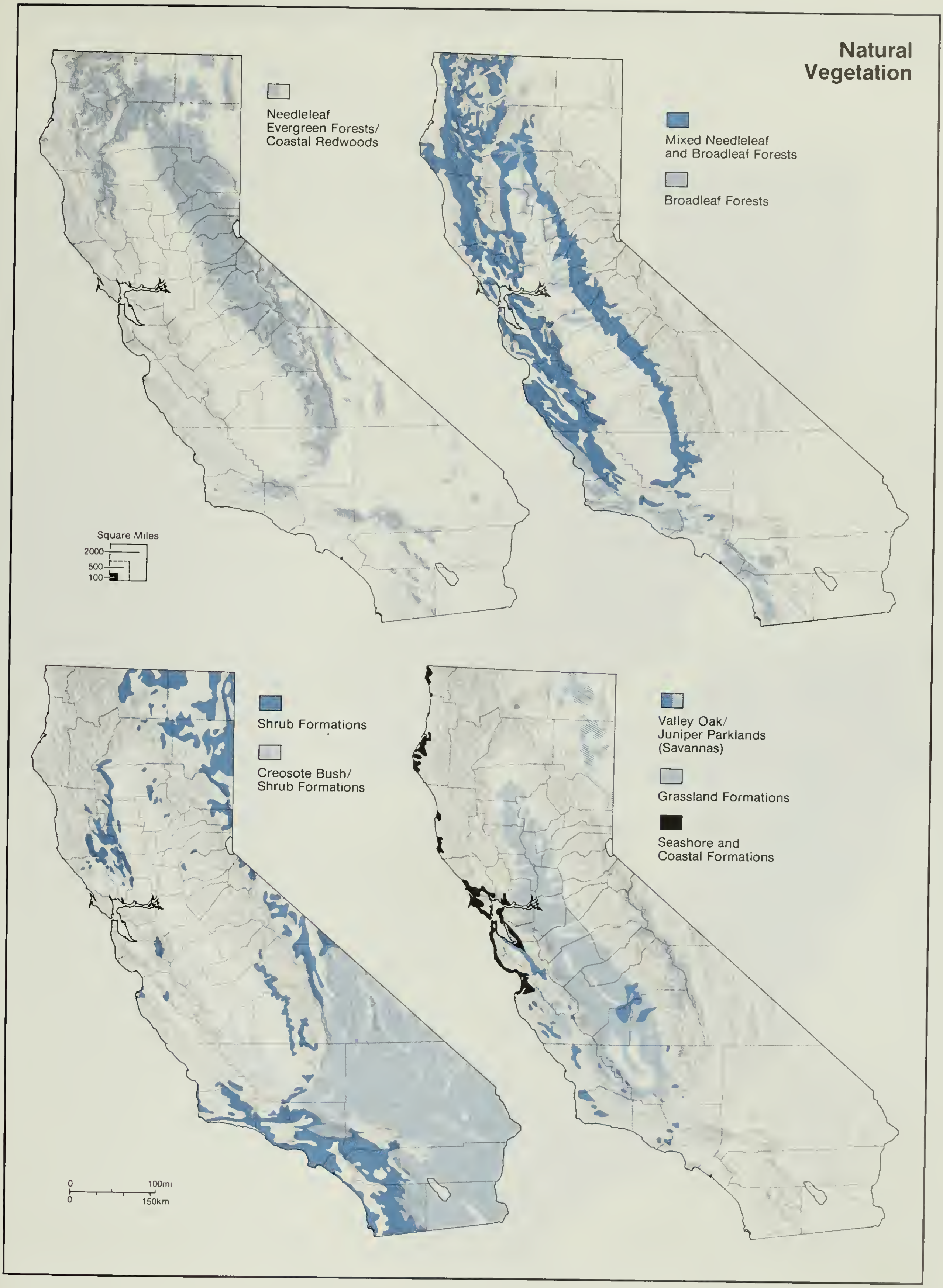


Maps of California's natural vegetation reflect changes in environment that accompany changes in altitude. Such "vertical zonation" into plant (and animal) zones is common in areas such as California where there are great ranges in relief over relatively short distances.

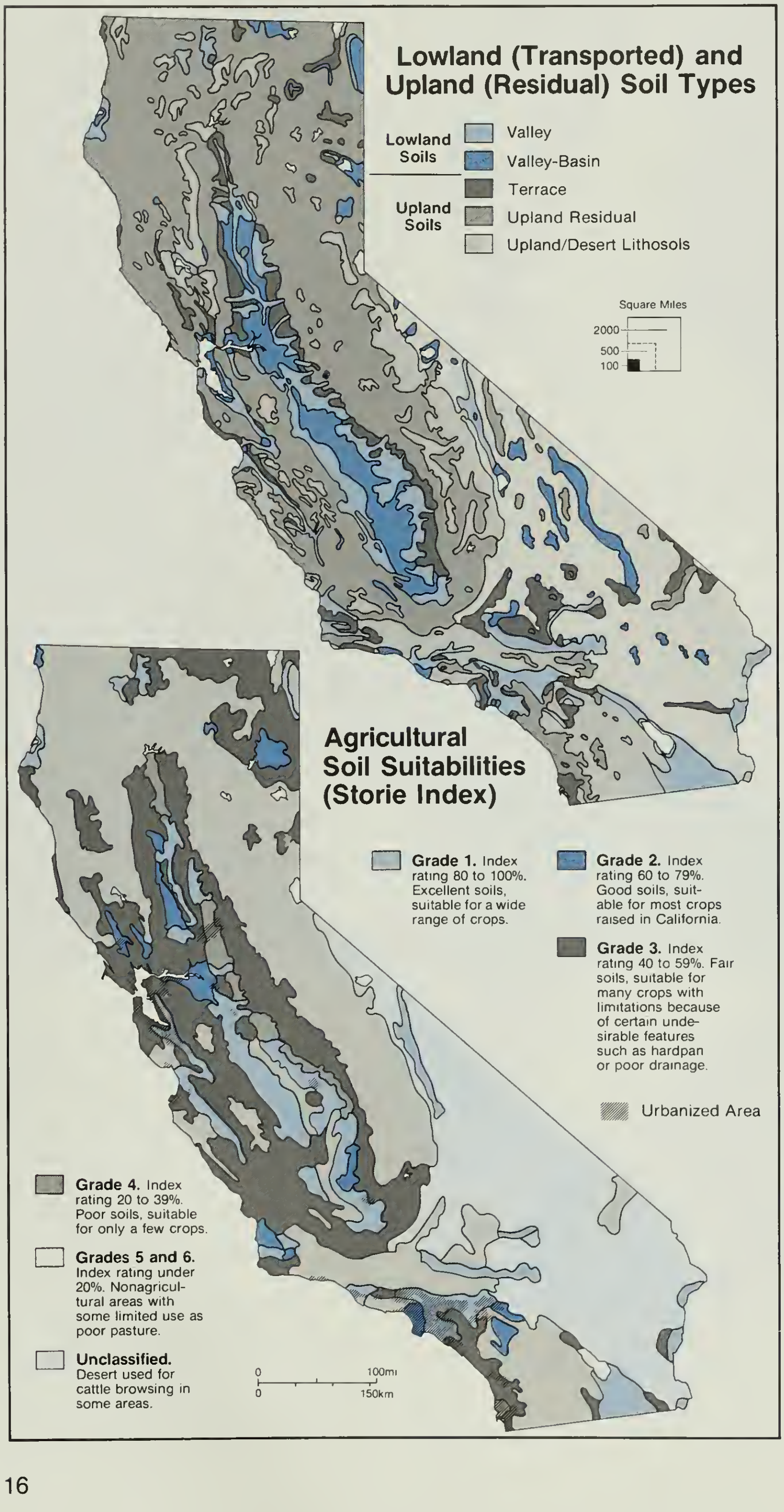
In the coastal mountains, heavy winter precipitation and summer fog support dense needleleaf evergreen (redwood, pine, fir) and needleleaf-broadleaf forests as far south as the Transverse Ranges. Broadleaf (oak) forests dominate the higher elevations from the Transverse Ranges south to the Mexican border. Eastward across the Cascades and Sierra Nevada, the regular increase of precipitation with higher elevation leads to an orderly succession of plant communities, from grasslands (California prairie), through mixed oak and pine woodlands and forests, and finally to an even higher elevation sequence of pine, pine and fir, and subalpine communities. In the high mountains of Southern California, the forest successions are similar, but the lower slopes are commonly dominated by extensive sagebrush and chaparral.

Compared to the mountainous areas, the California lowlands are relatively dry, even on the coast, and consequently support mainly treeless grasslands and marsh (in the Central Valley) or scrub formations (in the eastern deserts) dominated by creosote bush, saltbrush, and some Joshua tree woodlands.

California still supports a mostly natural (although not all native) vegetative cover; over 86 percent of the state has not been urbanized or put into cultivation. Human activities—logging, animal grazing, drainage of wetlands, control of wildfires, and introduction of nonnative plants—have altered the vegetative composition of the state. Perhaps the most obvious change has been the replacement of many of the native perennial grasses by annual grasses; the summertime drying of these annuals (accidentally introduced since the arrival of Europeans) has contributed greatly to the image of California as the "golden state."


Natural Vegetation
Needleleaf Evergreen Forests/ Coastal Redwoods
Mixed Needleleaf and Broadleaf Forests
Broadleaf Forests
Square Miles
2000
500
100
Shrub Formations
Creosote Bush/ Shrub Formations
Valley Oak/ Juniper Parklands (Savannas)
Grassland Formations
Seashore and Coastal Formations
0
100mi
0
150km

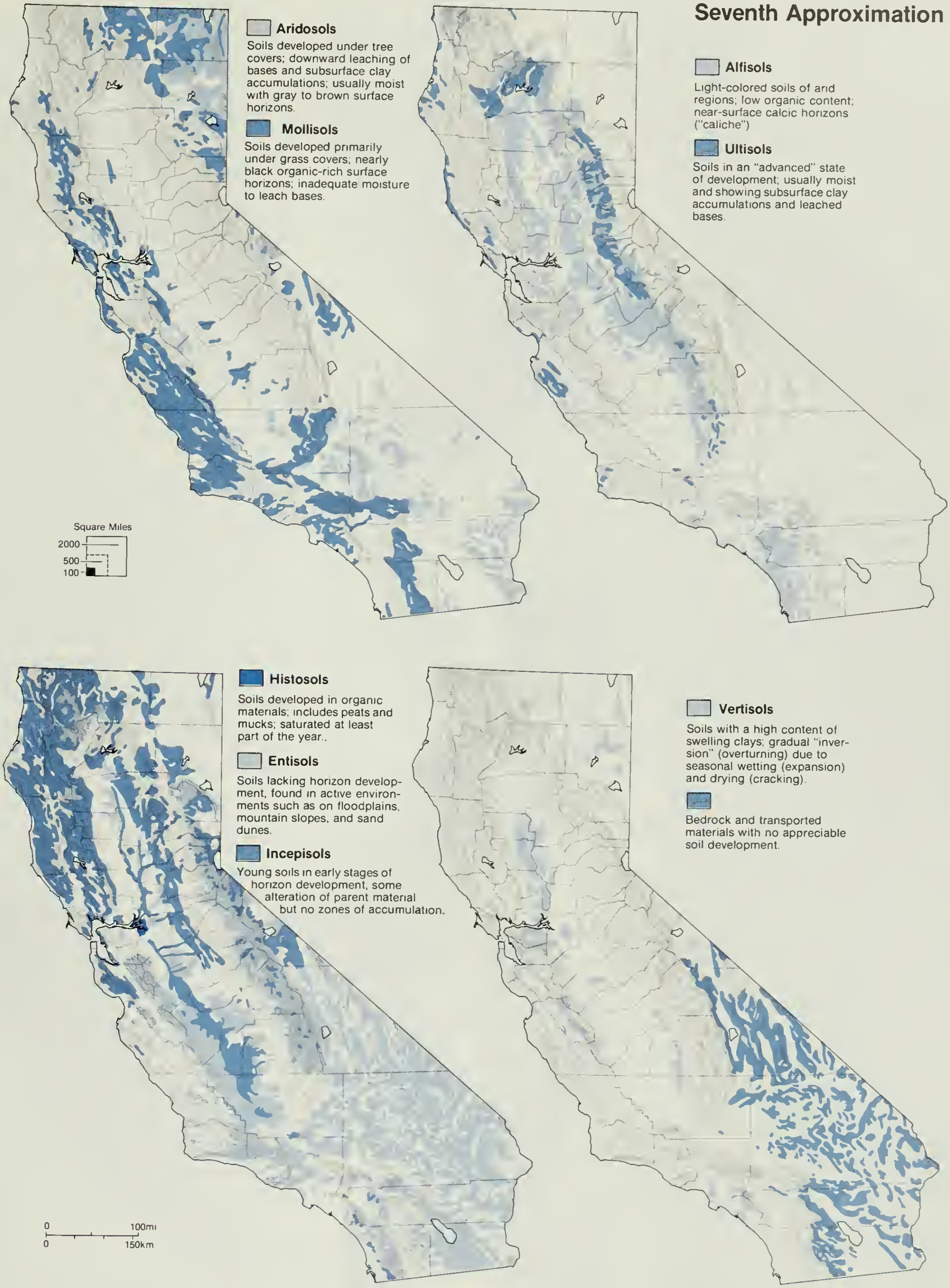
SOILS



The types of soils found in California reflect the interaction of several soil-forming factors: climate, vegetation, topography, and parent material (the rocks or sediments from which the soils develop). Because of the great spatial variations in these controlling factors, the resultant pattern of California's soils is very complex. About the only generalization one can make is that the high rates of erosion in the state's hills and mountains, coupled with the relatively meager annual rainfall in the intervening lowlands, produce immature (thin or poorly horizoned) soils. Thin soils tend to be found in hills and mountains, for example, because the rock parent material is near the surface; in the surrounding lowlands the soils lack good horizon development because they are formed on materials only recently (in a geologic sense) transported to those sites. The dominance in California of *aridosols, entisols, incepisols,* and bedrock soils reflects these slow soil-forming environments. The accompanying illustration, "Soil Orders of the Seventh Approximation," defines the various types of soils found in California.

The topographic distinction between *upland* and *lowland* soils in California is a useful one. The former are predominantly *residual* in origin, developing in place as the bedrock weathers. They are for the most part agriculturally nonproductive and best used in their natural state as forest, for watershed protection, and in some cases for grazing. The lowland soils are *transported* in origin and have formed on geologically young sediments, river floodplains (alluvium), alluvial fans, and other loosely cemented or unconsolidated deposits such as sand dunes. As a rule, these transported soils are very productive for agriculture, even though poor drainage and the presence of alkali (salts) can be problems in some *terrace* and *valley-basin* areas. *Valley* soils, located on gently sloping and well-drained alluvial plains, have few, if any, drawbacks, and their suitability for agriculture rates them as "Grade 1" in the commonly used classification scheme developed by R. E. Storie. Unfortunately, extensive areas of Grade 1 soil have been removed from agricultural use as a result of the spread of urbanization.

Soil Orders of the Seventh Approximation



WEATHER/CLIMATE—II

The uneven heating of the Earth by the Sun (resulting in warmer climates in the tropics and colder climates toward the poles) is the ultimate cause of what is called the General Circulation. The General Circulation is the average global distribution of large, semipermanent high- and low-pressure centers and the winds that are exchanged between them. High-pressure and low-pressure centers reflect, respectively, places where the accumulation of air is greater and less than average. Where surface pressures are high, air is forced to diverge (flow outward) as winds; these winds converge into nearby surface lows, where atmospheric accumulations are less than average. Because of the influence of the Earth's rotation (known as the Coriolis effect), the winds follow curved paths, veering to the right out of the highs in the Northern Hemisphere, and to the left out of highs in the Southern Hemisphere.

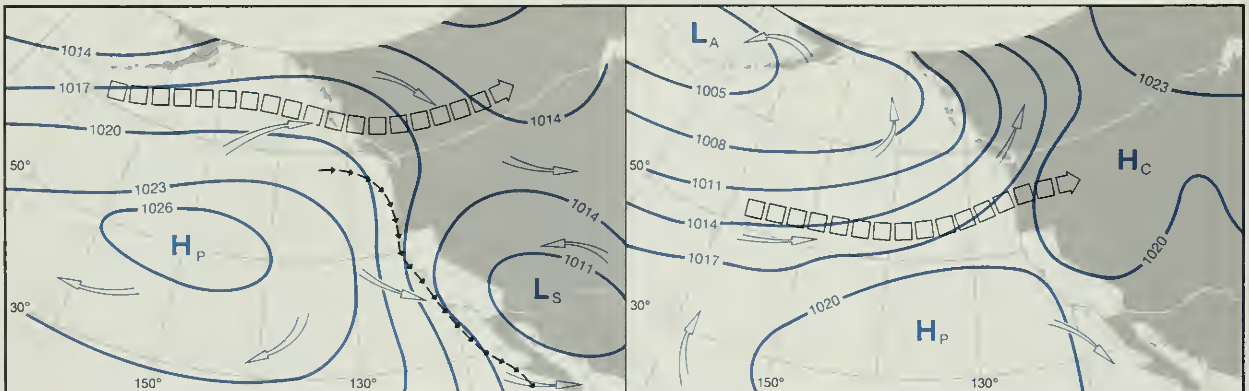
Surface high-pressure areas are associated with cloudless weather because the air diverging out of them is replaced by subsiding air from higher up that is compressed, and therefore warmed, on its way to the surface. This warming lowers the air's relative humidity and makes condensation of the water vapor into clouds impossible. In contrast, the air in surface low-pressure centers converges, ascends to higher elevations, cools because of the ascent, and condenses its water vapor into clouds. General cloudiness, stormy weather, and the passage of "fronts," therefore, are associated with areas of low pressure.

Two of the illustrations on this page—one for summer and one for winter—depict the General Circulation features that influence California. The northern margins of the Pacific High are a part of the Polar Front—the major boundary zone between warm, moist tropical air and colder, drier polar air. High-velocity westerly winds (often called "jet streams") parallel the front at high altitudes. Variations in the shape and velocity of these high-speed winds can pump air toward, or draw air away from, the Polar Front surface below. When air is drawn away from the surface, convergence and ascent result, producing centers of low pressure. Many of the lows develop into stormy "wave cyclones," with well-defined cold and warm fronts where the polar and tropical air masses are mixed into the low-pressure center. These storms are moved along in a west-to-east direction, embedded in the general westerly flow of the atmosphere.

The primary effect of the General Circulation on California's weather and climate is a well-defined "two season" year: a six-month or seven-month cool-to-cold precipitation season alternating with a five- or six-month warm-to-hot season of virtual drought. The dominant factor in this pattern is the cyclic change in latitude and intensity of the semipermanent Pacific High pressure cell. This pressure center intensifies and moves northward in summer, holding Polar Front storm tracks well to the north; as a result, California receives little or no precipitation from that source during those months.

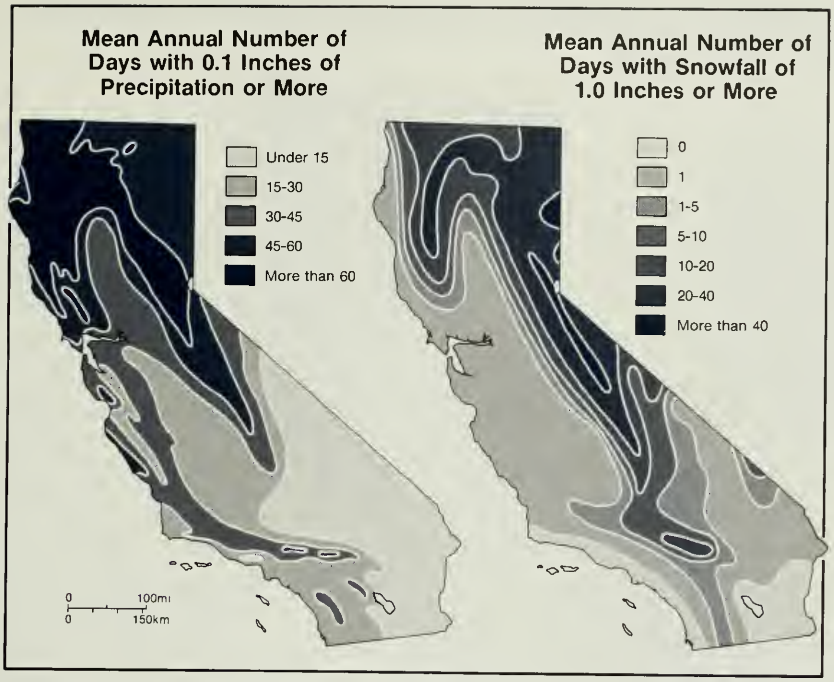
In winter, the Pacific High retreats southward, permitting storms to swing into and across California. These cyclonic storms bring widespread, moderate precipitation to the state. Some of them travel far enough to the south to spread moisture beyond the Mexican border. (See page 22 on precipitation patterns.) In the northern part of California, October through April are the months of heaviest precipitation. The rainy season becomes shorter in the southern part of the state, where the wet weather occurs between November and March. In the north and over the central and northern mountains, there are usually from 60 to 100 days of precipitation per year, while in the southern desert, there may be as few as 10 days of rain.

Mountain ranges (orographic barriers) are a very important weather and climate control in California. Not only do mountains have colder temperature conditions than lowlands (see the discussion of the Normal Lapse Rate, on page 18), they also act as barriers to winds and storms. The eastern mountain ranges of California, for example, usually serve as a very effective blocking barrier protecting much of the state from the extremely cold winter air of the Great Basin. On occasions when the Great Basin air is not totally blocked, the mountain ranges still play



July Mean Sea Level Pressure-Wind Pattern **January Mean Sea Level Pressure-Wind Pattern**

H P Pacific High
L S (Summer) Sonoran Low
H C (Winter) Continental High (Canadian-Great Basin High)
L A (Winter) Aleutians Low
Polar Front Zone and Main Cyclonic Storm Track
(Summer) Cold Oceanic California Current



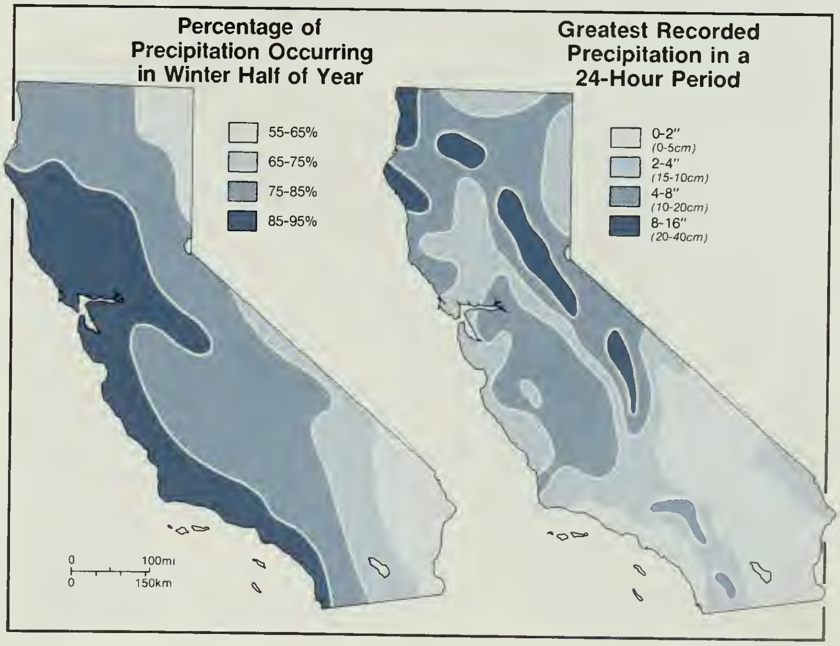
an important role in channeling the air westward and southward down the state's major valleys. The winds associated with such Great Basin "overflows" are compressionally heated and dried along the way to become the Santa Anas of Southern California and the "northers" of the Central Valley.

California's coastal mountain ranges also influence atmospheric circulations. The Los Angeles Basin is largely surrounded by high mountains, except along the coast. During the summer and fall months, the hot Southern California land surface often draws onshore a thick layer of cooler marine air. Because of the atmospheric stability and the high surrounding mountains, however, pollutants emitted into and trapped in this air cannot be readily expelled to the east, which leads to severe smog episodes. Atmospheric conditions are somewhat better in the San Francisco Bay Area, where the summertime air continually flows eastward through the Coast Range gap established by the Golden Gate and the Carquinez Straits. This natural "air conditioning" helps to carry locally produced air pollutants away from the Bay Area.

Perhaps the most obvious effect of mountain barriers on weather and climate is their influence on the distribution of precipitation. Because most of the state's mountain ranges are oriented in a north-south direction (and thus across the prevailing westerly flow), their windward (western) slopes receive greater amounts of precipitation compared with their lee (eastern) sides. The heavy rain and snow on the windward side are the result of the cooling (and thus the possible condensation) of the rising air, in contrast to the downslope compression and rewarming of air on the lee side. The dry conditions east of the mountain crests are referred to as "rainshadow effects"; they are the reasons for the semiarid regions to the east of the Coast Ranges (the Sacramento and San Joaquin valleys) and for the three deserts that lie east of the Cascade–Sierra Nevada Ranges and of the mountains of Southern California (the Basin-Range, Mojave, and Sonoran deserts).

Ocean currents are another atmospheric control of some importance to California. Ocean currents generally are driven by (and basically parallel to) the strong and persistent wind flow patterns around the General Circulation semipermanent high-pressure cells.

The Japanese Current, driven by the westerly winds emerging from the north side of the Pacific High, is the major ocean current affecting California and the West Coast. This current reaches the coast near the latitude of the United States–Canada border, where it then branches. One branch, the Alaska Current, turns northward; the other branch, the California Current, turns southward, carrying relatively cold water (especially in the summer) along the coasts of Washington, Oregon, and California. Because of the orientation of the coastline, the current tends to pull away from the coast as it flows southward. In response to this, the drift of the surface water between the current and the shoreline is offshore. This causes "upwelling" immediately off the coast as the water from deeper layers is drawn into the surface circulation. The temperature of this upwelled water can be even colder than the water in the current, and up to 10° F (5.5° C) colder (in the summer) than the ocean waters far offshore. Comparatively warm, moist Pacific air masses drifting over this band of cold water in summer are often cooled enough to form a bank of fog. The fog is then swept inland by the prevailing westerly winds flowing out of the Pacific High.



PRECIPITATION PATTERNS

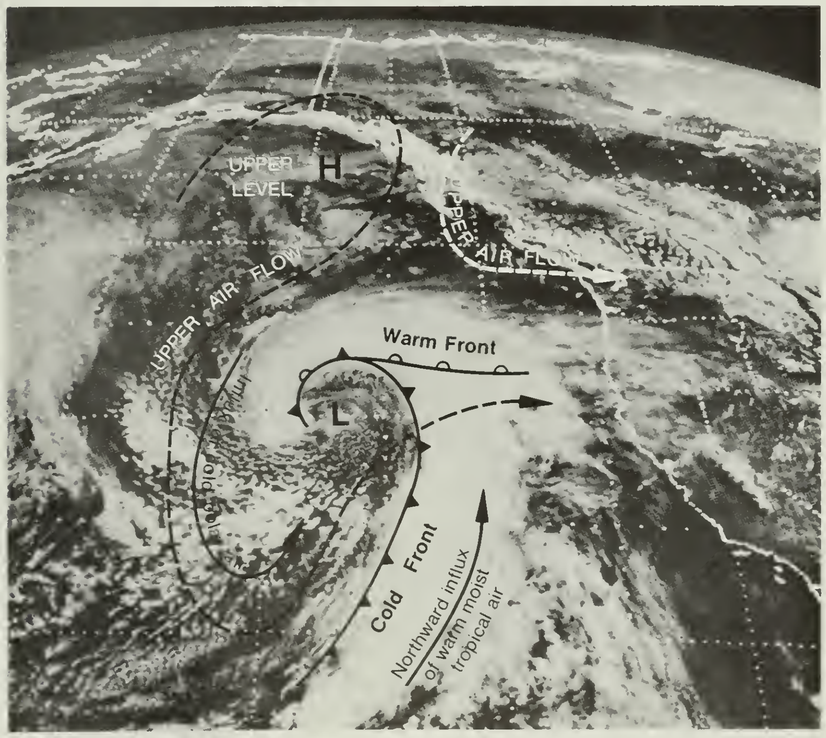
Annual precipitation totals in California exceeding 50 in (127 cm) are characteristic of the west slope of the Sierra Nevada north of Stockton, most of the west slope of the Coast Ranges north of Monterey, and parts of the Cascades. On the lee (east) sides of the Coast Ranges, yearly amounts of precipitation drop to 15 in (38 cm) in parts of the Sacramento Valley and to less than 8 in (20 cm) over most of the San Joaquin Valley. The northeast interior of the state receives from 15 to 18 in (38 to 46 cm) of precipitation in a year.

In the mountains of Southern California annual precipitation totals reach 30 to 40 in (75 to 100 cm), while the coastal plain receives only 10 to 15 in (25 to 40 cm). The deserts of the southeast receive as little as 2 to 5 in (5 to 8 cm) of precipitation in a year. The extreme range within the state is represented by an annual total of less than 2 in (5 cm) at Death Valley and by more than 100 in (250 cm) along the coastal mountains near the Oregon border.

The typical precipitation season in California (from October through April) brings intermittent stormy weather over a period ranging from 2 to 5 days, followed by 7 to 14 days of clear, dry weather. The stormy periods are the result of the west-to-east passage through the state of extratropical cyclones (depressions) that form in the Pacific Ocean along the Polar Front (see page 22). Three different types of Polar Front cyclones bring their rain and snow to California. The most common "mid-latitude" type forms far off to the west of the state between latitudes 35° north (N) and 45° N when the Polar Front is located (normally in winter) between the Aleutian Low and the Pacific High. If the Aleutian Low is displaced by an intrusion of subtropical air, creating a cutoff, or "blocking," high in the Gulf of Alaska, other storm tracks are followed. The circumstances then favor either "high-latitude" cyclones, which move down the West Coast from Canada until they reach California, or "low-latitude" cyclones, which form south of the blocking high between Hawaii and California (this latter type is illustrated in the accompanying photograph).

Much of the precipitation delivered by these traveling storms is in the form of snow. Snowfall has been reported at one time or another in nearly every part of California. It is very infrequent, however, west of the Sierra Nevada except at the higher elevations of the Coast, Klamath, and Cascade ranges. In the Sierra Nevada, moderate snowfall is reported nearly every winter at elevations as low as 2,000 ft (600 m). Amounts and intensities of snow increase with elevation to around 7,000 to 8,000 ft (2,100 to 2,400 m). Above 4,000 ft (1,200 m) snow usually remains on the ground each year until well into the summer months. The 24-hour snowfall record for California is 67 in (170 cm), set at Echo Summit in El Dorado County (elev. 7,377 ft/2,250 m) in January 1982. Tamarack, in Alpine County (elev. 8,000 ft/2,400 m), holds the state record for the greatest average annual snowfall at 445 in (1,120 cm).

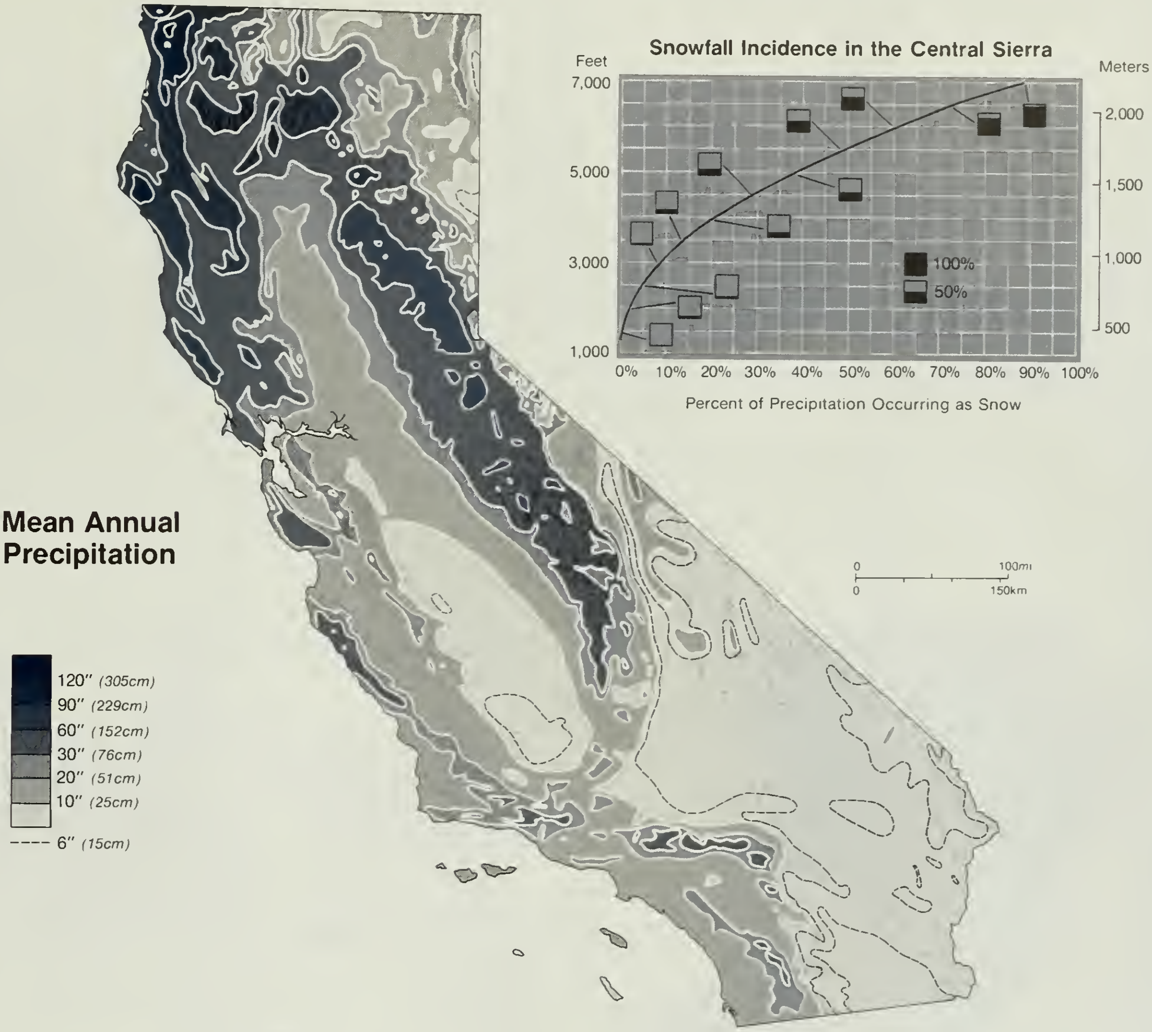
Thunderstorms not related to the Polar Front cyclonic storms may occur in California at any time of the year. The storms are usually light and infrequent near the coast and over the Central Valley. Over the interior mountains, thunderstorms are more intense, and occasionally they may become unexpectedly severe at intermediate and high elevations of the Sierra Nevada. These mountain storms usually occur when cool, moist marine air moves in to break a prolonged hot spell; many of them produce little total precipitation, but start numerous range and forest fires with their accompanying lightning strikes. Although summer is the dry season over most of California, summer thunderstorm precipitation provides significant amounts of the total annual rainfall in the southeastern desert areas. The warm, moist unstable air involved has most often drifted northward from the Gulf of Mexico or the Gulf of California. Thunderstorm-related tornadoes strike only once or twice a year.



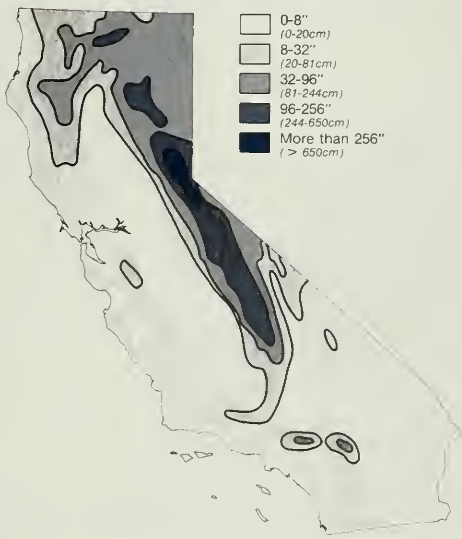
Satellite picture of March 25, 1979, showing the West Coast approach of a Polar Front cyclone. Thick middle and low clouds are forming in the warm, moist tropical air being lifted along the cold and warm fronts. Snow and rain are falling north of the warm front and rain is falling east of the cold front. The storm's central low pressure has formed in response to the meandering upper-level air flow. Just east of where the storm's low is located, the upper air is diverging, this is drawing air up from lower levels and inducing convergence (the low-pressure center) back on the surface. The storm struck the California coast on the following day.

Mean Annual Precipitation

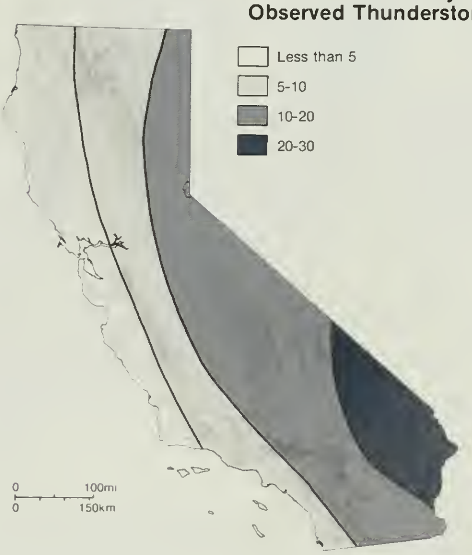
Snowfall Incidence in the Central Sierra



Mean Annual Total Snowfall (Inches)



Mean Number of Days with Observed Thunderstorms



PRECIPITATION PATTERNS

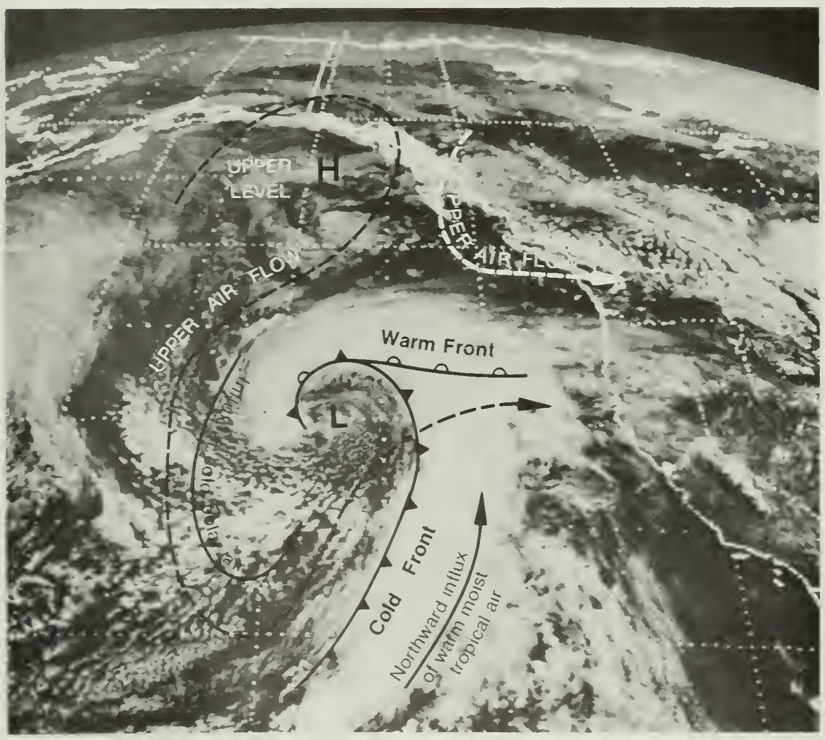
Annual precipitation totals in California exceeding 50 in (127 cm) are characteristic of the west slope of the Sierra Nevada north of Stockton, most of the west slope of the Coast Ranges north of Monterey, and parts of the Cascades. On the lee (east) sides of the Coast Ranges, yearly amounts of precipitation drop to 15 in (38 cm) in parts of the Sacramento Valley and to less than 8 in (20 cm) over most of the San Joaquin Valley. The northeast interior of the state receives from 15 to 18 in (38 to 46 cm) of precipitation in a year.

In the mountains of Southern California annual precipitation totals reach 30 to 40 in (75 to 100 cm), while the coastal plain receives only 10 to 15 in (25 to 40 cm). The deserts of the southeast receive as little as 2 to 5 in (5 to 8 cm) of precipitation in a year. The extreme range within the state is represented by an annual total of less than 2 in (5 cm) at Death Valley and by more than 100 in (250 cm) along the coastal mountains near the Oregon border.

The typical precipitation season in California (from October through April) brings intermittent stormy weather over a period ranging from 2 to 5 days, followed by 7 to 14 days of clear, dry weather. The stormy periods are the result of the west-to-east passage through the state of extratropical cyclones (depressions) that form in the Pacific Ocean along the Polar Front (see page 22). Three different types of Polar Front cyclones bring their rain and snow to California. The most common "mid-latitude" type forms far off to the west of the state between latitudes 35° north (N) and 45° N when the Polar Front is located (normally in winter) between the Aleutian Low and the Pacific High. If the Aleutian Low is displaced by an intrusion of subtropical air, creating a cutoff, or "blocking," high in the Gulf of Alaska, other storm tracks are followed. The circumstances then favor either "high-latitude" cyclones, which move down the West Coast from Canada until they reach California, or "low-latitude" cyclones, which form south of the blocking high between Hawaii and California (this latter type is illustrated in the accompanying photograph).

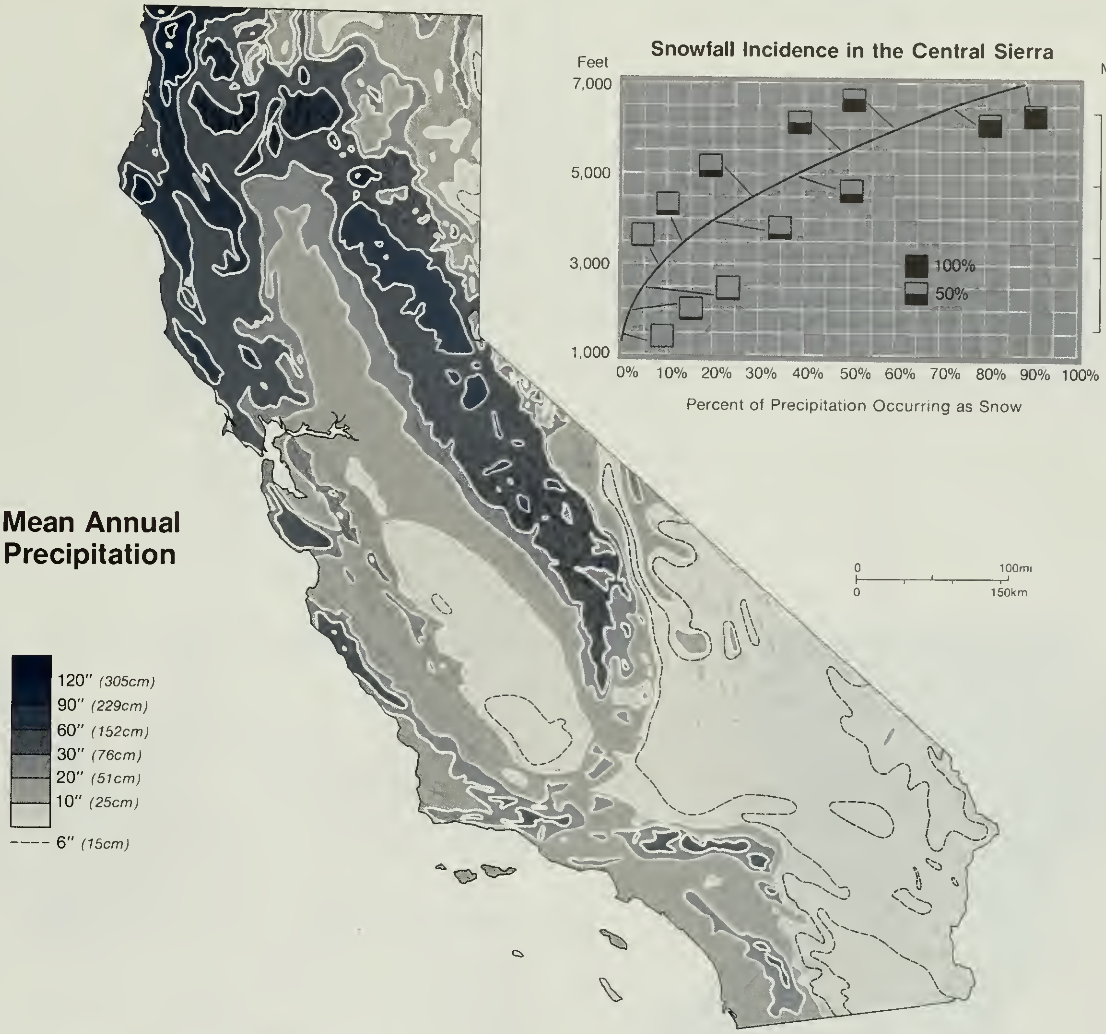
Much of the precipitation delivered by these traveling storms is in the form of snow. Snowfall has been reported at one time or another in nearly every part of California. It is very infrequent, however, west of the Sierra Nevada except at the higher elevations of the Coast, Klamath, and Cascade ranges. In the Sierra Nevada, moderate snowfall is reported nearly every winter at elevations as low as 2,000 ft (600 m). Amounts and intensities of snow increase with elevation to around 7,000 to 8,000 ft (2,100 to 2,400 m). Above 4,000 ft (1,200 m) snow usually remains on the ground each year until well into the summer months. The 24-hour snowfall record for California is 67 in (170 cm), set at Echo Summit in El Dorado County (elev. 7,377 ft/2,250 m) in January 1982. Tamarack, in Alpine County (elev. 8,000 ft/2,400 m), holds the state record for the greatest average annual snowfall at 445 in (1,120 cm).

Thunderstorms not related to the Polar Front cyclonic storms may occur in California at any time of the year. The storms are usually light and infrequent near the coast and over the Central Valley. Over the interior mountains, thunderstorms are more intense, and occasionally they may become unexpectedly severe at intermediate and high elevations of the Sierra Nevada. These mountain storms usually occur when cool, moist marine air moves in to break a prolonged hot spell; many of them produce little total precipitation, but start numerous range and forest fires with their accompanying lightning strikes. Although summer is the dry season over most of California, summer thunderstorm precipitation provides significant amounts of the total annual rainfall in the southeastern desert areas. The warm, moist unstable air involved has most often drifted northward from the Gulf of Mexico or the Gulf of California. Thunderstorm-related tornadoes strike only once or twice a year.



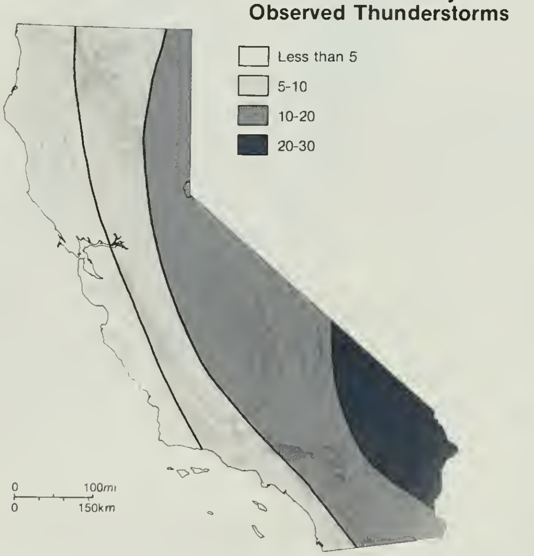
Satellite picture of March 25, 1979, showing the West Coast approach of a Polar Front cyclone. Thick middle and low clouds are forming in the warm, moist tropical air being lifted along the cold and warm fronts. Snow and rain are falling north of the warm front and rain is falling east of the cold front. The storm's central low pressure has formed in response to the meandering upper-level air flow. Just east of where the storm's low is located, the upper air is diverging, this is drawing air up from lower levels and inducing convergence (the low-pressure center) back on the surface. The storm struck the California coast on the following day.

Mean Annual Precipitation



Mean Annual Total Snowfall (Inches)

Mean Number of Days with Observed Thunderstorms

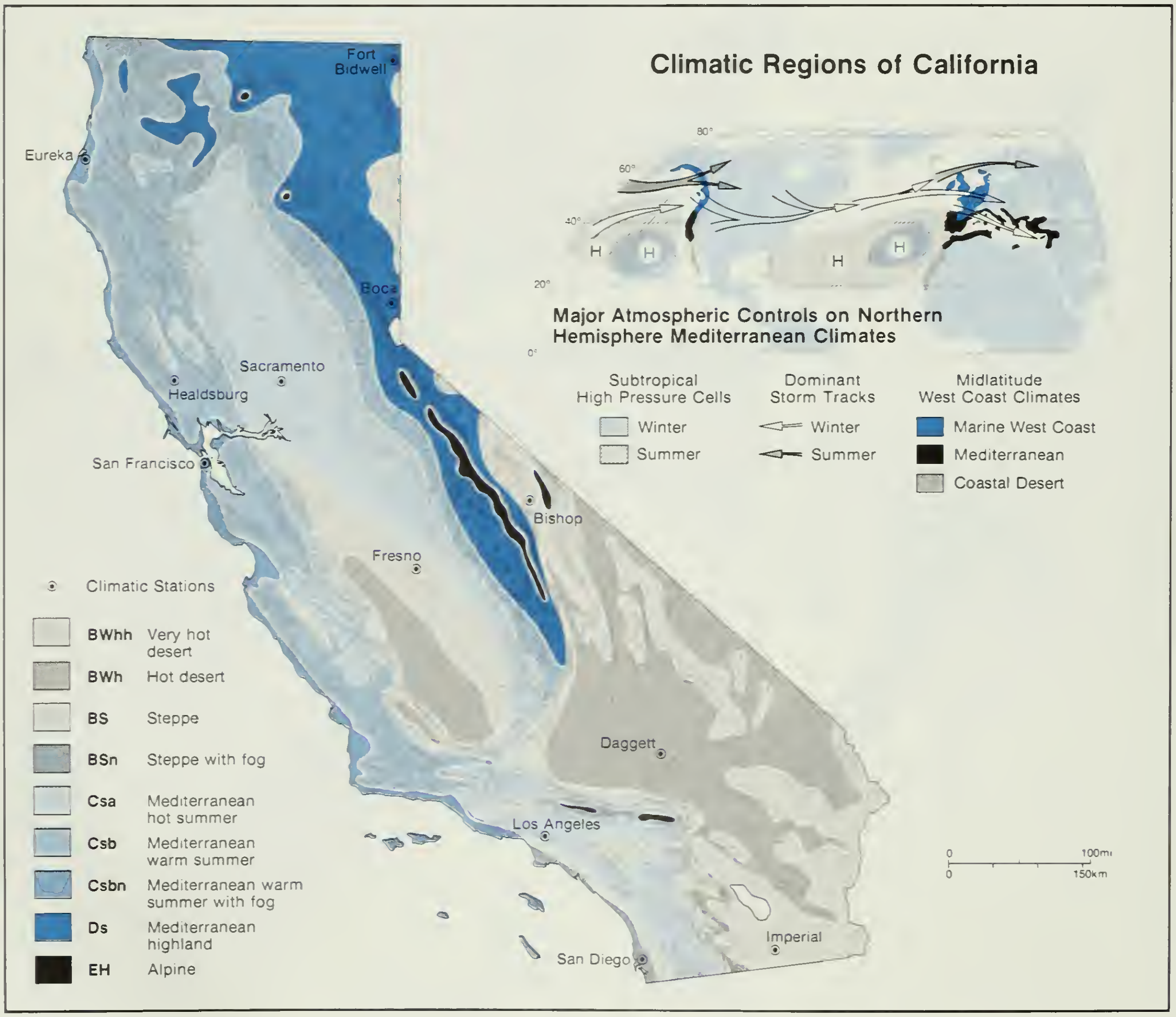


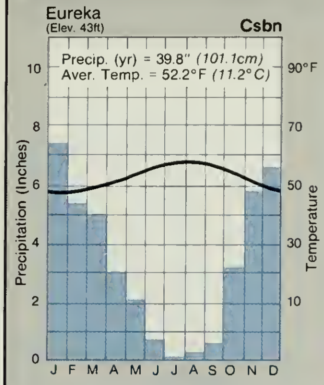
CLIMATE REGIONS

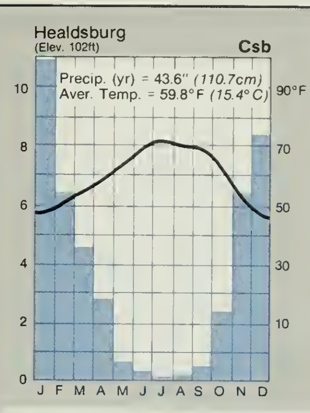
The Köppen system of climatic classification provides one way to depict the state's great variety of climates. Using this system, we see that California has geographic areas in four of the five major climate groups: dry (**B** climates), temperate rainy (**C** climates), snowy (**D** climates), and arctic alpine (**E** climates). Only the hot, tropical rainy (**A**) climates are not represented in the state.

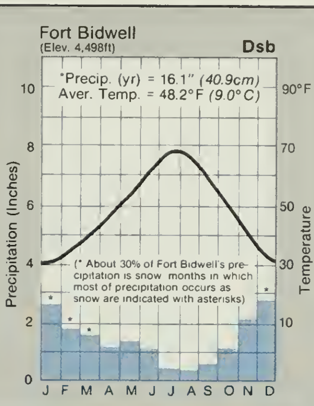
The eastern third of California and the western San Joaquin Valley have dry **B**-type climates of both the *steppe* (**BS**) and the true *desert* (**BW**) varieties. These dry regions are the northern and western edges of large arid zones in the southwestern United States and northwestern Mexico. They are arid either because they are far removed—and thereby cut off—from souces of moist Pacific Ocean air masses, or because they are almost always beneath the warm, dry subsiding air of the Pacific Subtropical High cell, where large-scale cloud formation (and thus even the chance for precipitation) is not generally possible. Small amounts of summertime precipitation from thunderstorms are possible, however, when the surface air becomes a hot thermal low and draws in moisture from the Gulf of Mexico.

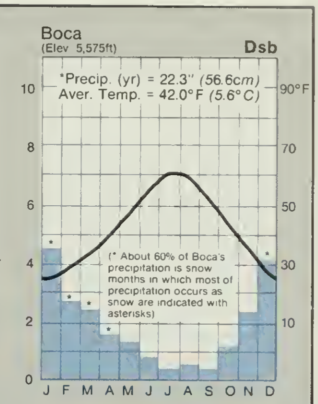
Coastal California and the western two-thirds of the state are dominated by **C**-type temperate rainy (and, in the mountains, **D**-type snowy) climates referred to as *Mediterranean* climates, characterized by dry summers and winter precipitation. The drought period is caused by the summertime extension of the dry **B**-type climates over virtually the whole state in response to intensification and northward movement of the Pacific Subtropical High cell. The winter precipitation accompanies the weakening of this high pressure cell. This results in a southward shift of the Polar Front (and its cyclonic storms) to a location over California.











The Köppen Climate System for California

Under the Köppen system, climates are defined according to assigned values of temperature and precipitation, and calculated in terms of annual or monthly values. Any given station can be assigned to its particular climate group and subgroup solely on the basis of the records of temperature and precipitation at that place.

The Köppen system features a shorthand code of letters designating major climate groups, subgroups within the major groups, and further subdivisions to distinguish particular seasonal characteristics of temperature and precipitation. The five major climate groups are designated by capital letters as follows:

A - **Tropical rainy climates.** Average temperature of every month is above 18°C (64.4°F). These climates have no winter season. Annual rainfall is large and exceeds annual evaporation. *Not represented in California.*

B - **Dry climates.** Evaporation exceeds precipitation on the average throughout the year. There is no water surplus; hence no permanent streams originate in B climate zones. Two major subdivisions are recognized:

- BS - **Steppe climate.** A semi-arid climate characterized by grasslands and scrub.
- BW - **Desert climate.** An arid climate.

C - **Mild, humid (mesothermal) climates.** Coldest month has an average temperature under 18°C (64.4°F), but above -3°C (26.6°F); at least one month has an average above 10°C (50°F). The C climates thus have both a summer and winter season.

D - **Snowy-forest (microthermal) climates.** Coldest month average temperature is under -3°C (26.6°F). Average temperature of the warmest month is above 10°C (50°F), that isotherm coinciding approximately with the poleward limit of forest growth.

E - **Arctic or alpine climates.** Average temperature of the warmest month is below 10°C (50°F). These climates have no true summer. (EH for alpine climates.)

For California's climates, in particular, several subdivisions of the four major groups represented can be defined:

First lower-case letters:

s - dry summer, at least 70% of precipitation occurs in the 6 winter (low-sun) months; C and D climates.

h - dry-hot; mean annual temperature is over 18°C (64.4°F); B climates only.

hh - as "h" but at least 3 months have maximum averages over 38°C (100.4°F).

k - dry-cold; mean annual temperature is under 18°C (64.4°F); B climates only.

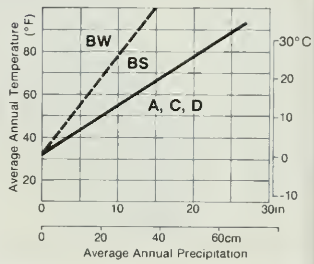
Second or last lower-case letters:

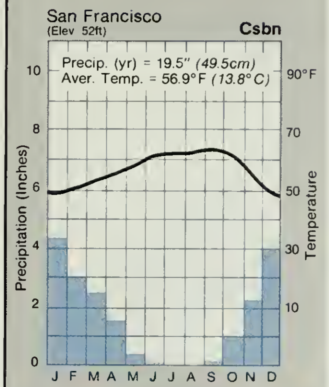
a - with hot summer; warmest month is over 22°C (71.6°F); C and D climates.

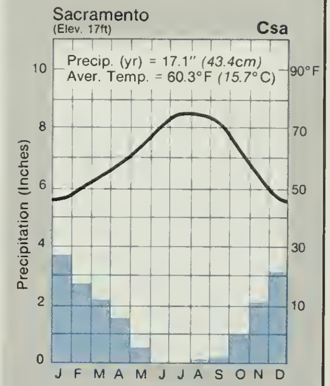
b - with warm summer; warmest month is below 22°C (71.6°F); C and D climates.

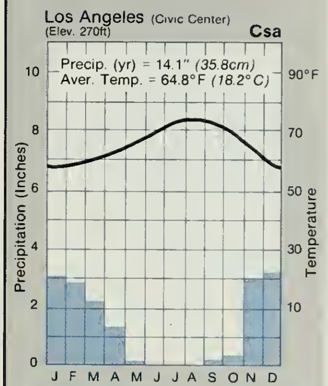
n - more than 30 days per year of dense fog.

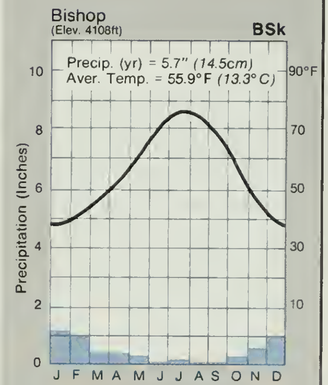
Graph for Establishing Boundaries Between BW, BS, and A-C-D Climates
(For Mediterranean Climates with Precipitation Primarily During Winter)

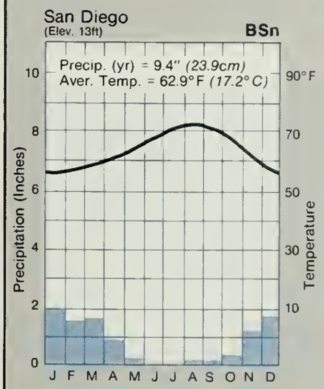


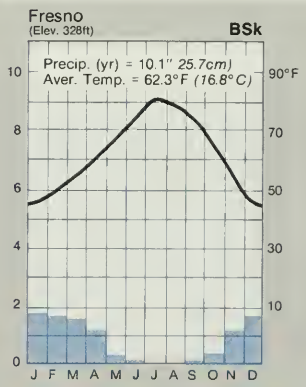


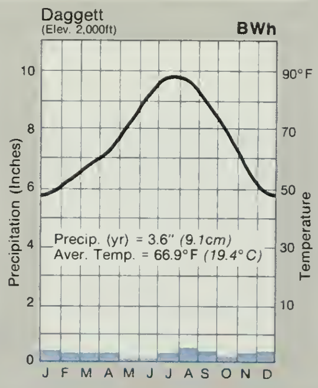


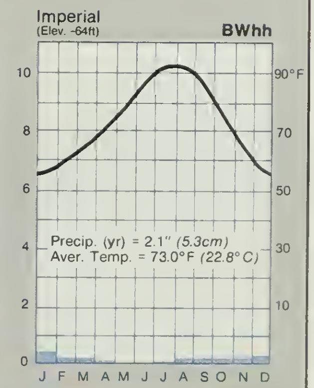












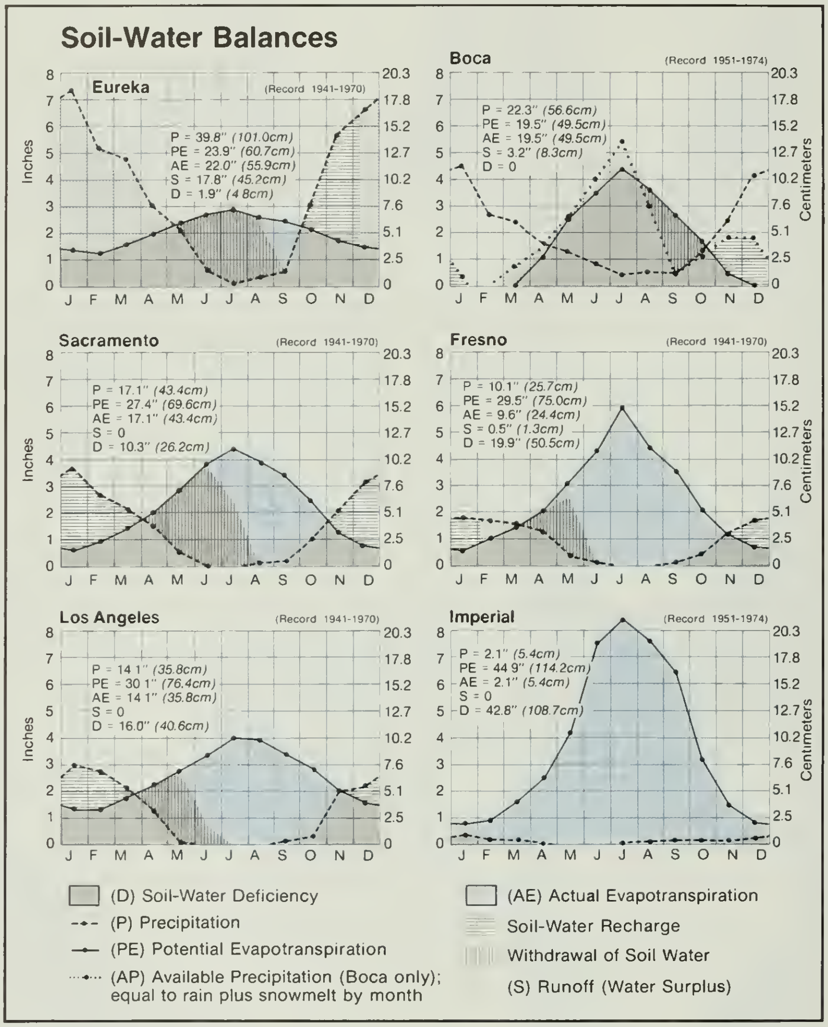
SOIL-WATER BALANCES

Because of variability in precipitation (in time as well as in space), water is not always available when and where it is needed. The very uneven distribution of California's water supply presents major social, economic, and political problems. In general, the state's large urban and agricultural regions have local water deficits during the year and are far removed from the areas with surpluses.

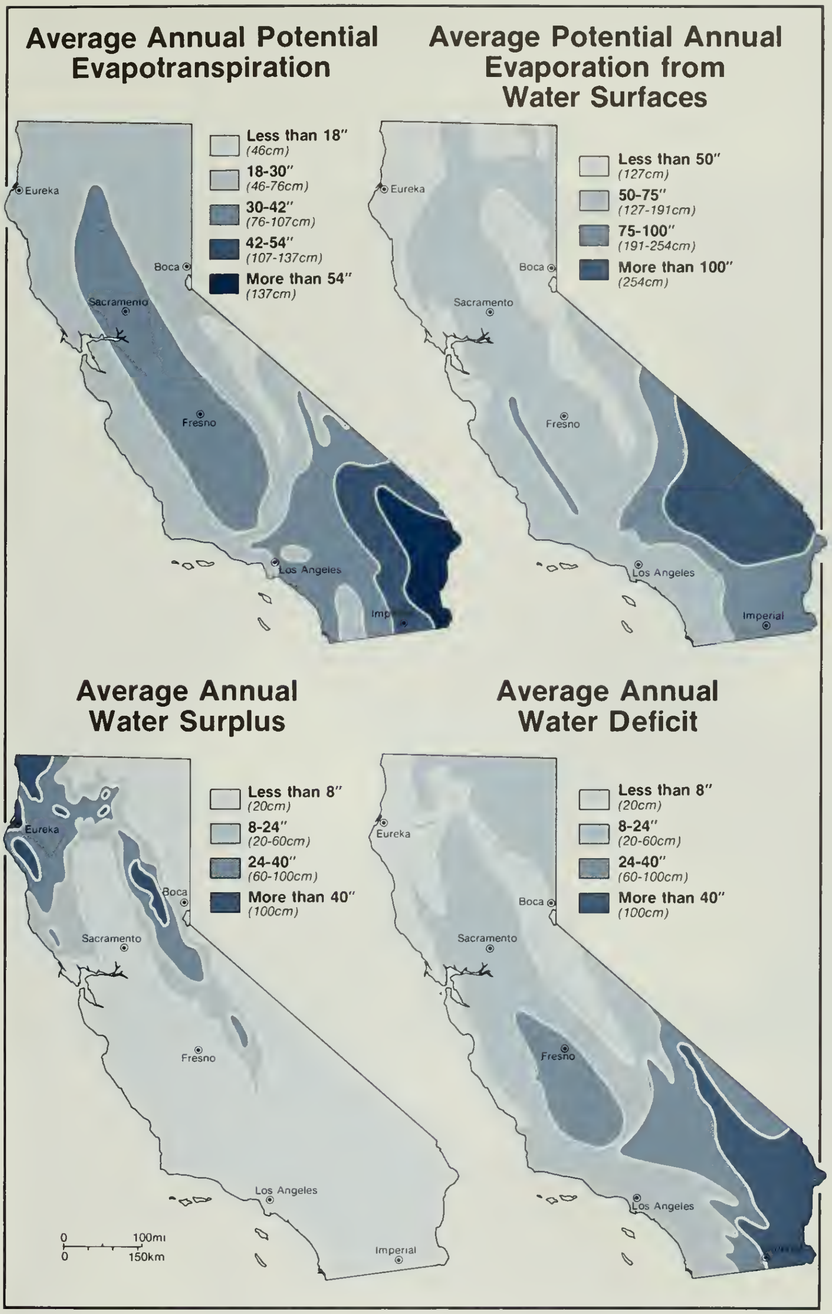
A soil-water "balance sheet" begins with a reserve of water stored in the soil. The amount that can be stored depends upon the characteristics of the soil. In California this reserve ranges from about 0.5 in (1 cm) in the deserts to 12 in (30 cm) in the northern Central Valley. The annual movements of water through the soil are into and out of this "account." Summer is the time of large withdrawals in California, and the stored water is usually exhausted by the end of the warm season in almost all locations except in the higher elevations of the northern mountains. (Compare the soil-water balance of Boca with that of the other five areas on the accompanying illustration.)

Precipitation is the only source of inflow of water into the soil. Evaporation from the soil surface and transpiration by plants (together called "evapotranspiration") are the sole outflows. The soil-water balance for a particular period of time is equal to precipitation minus evapotranspiration. One way of evaluating local water needs is by means of measuring soil-water balances—accounting for annual or monthly losses and gains in the amount of water stored in the soil.

An important distinction needs to be made between *potential* and *actual* evapotranspiration. The former is the maximum rate at which water is lost to the



The natural distribution of water in California results in major economic and political problems. Because the largest urban and agricultural regions in the state experience substantial local water deficits each year, huge amounts of water must be imported into these regions from distant mountainous and less populous parts of the state. (San Fernando Valley, left, Bishop Creek in the Sierra Nevada, right.)



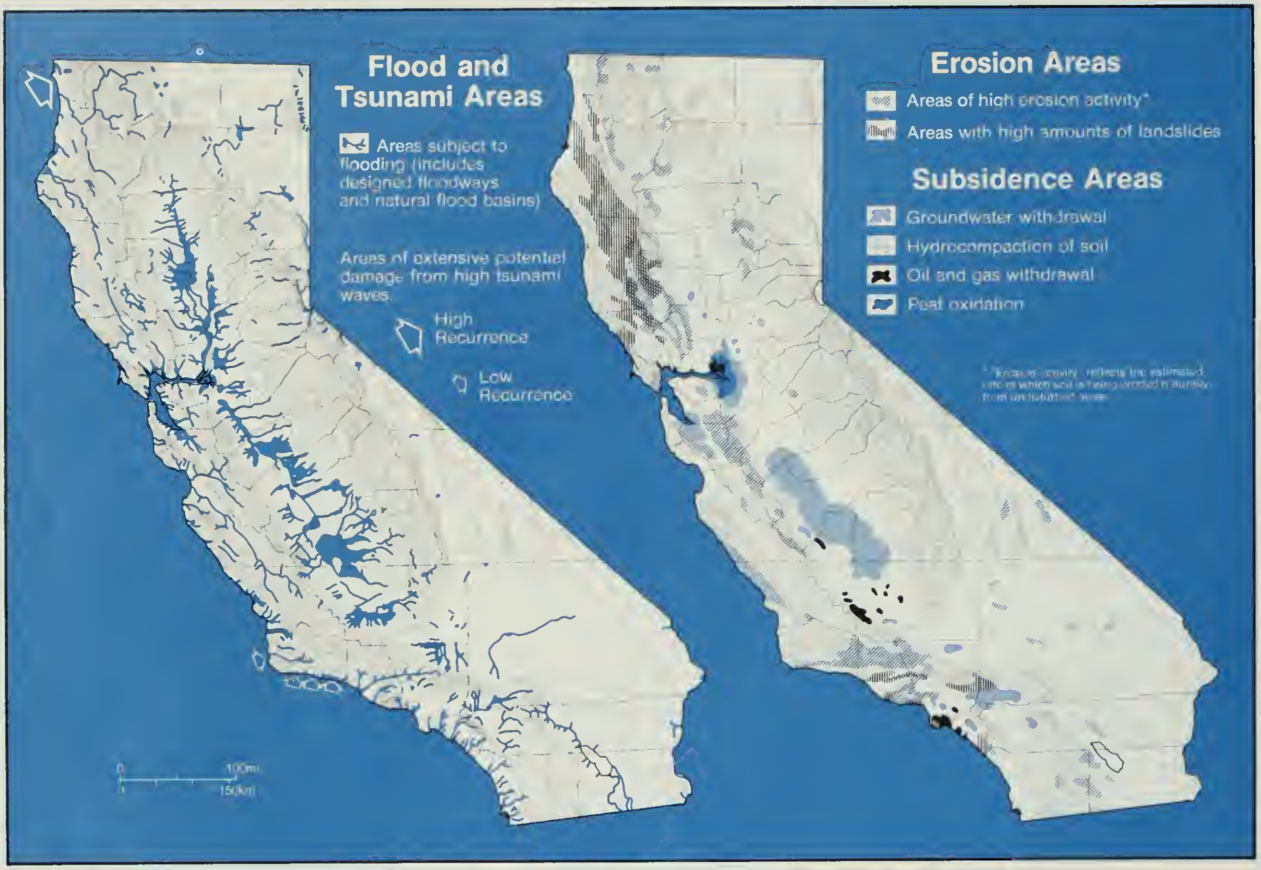
Abandoned shorelines from the 1913 diversion of Owens Lake water into the Los Angeles Aqueduct.

atmosphere from a dense vegetation cover that has been supplied artificially (by irrigation) with all the water it can use. Actual evapotranspiration is the quantity of naturally supplied water lost from an area's plants and soil. If a soil's stored water is partly exhausted, the actual rate of evapotranspiration from the land surface may fall below the potential rate because plants may be unable to absorb and transpire the full amount of water they could use. The monthly difference between these two types of evapotranspiration is called the soil-water deficit; it represents the amount of water that must be supplied through irrigation to field crops for optimum growth.

Once the stored water begins evapotranspiration, the water deficit starts to build because of the ever-widening gap between actual and potential evapotranspiration. During fall and winter, the reserve of water is rebuilt, and by spring—if the soil is recharged to its capacity—further moisture is rejected by the soil and shed as runoff. The city of Sacramento typifies California in general. About 17 in (43 cm) of precipitation are received, almost entirely in the winter months, but the greatest demand (potential evapotranspiration) is in the summer (27 in/70 cm). This results in a large deficit that is only partially made up by recharge in the winter months, leaving a net annual deficit of 10 in (26 cm).

As a whole, California's annual supply of and demand for water are in a precarious balance. Precipitation produces an average supply of about 200 million acre-feet (245 cu km). If it fell evenly over the entire state, all areas would receive 24 in (60 cm), but this is not the case. Runoff from streams accounts for about 72 million acre-feet (89 cu km), leaving 128 million acre-feet (156 cu km) for evaporation from soils and plants. However, the heat put into California's atmosphere from the Sun has the capacity to evaporate annually 298 million acre-feet (370 cu km), leaving a yearly deficit of 170 million acre-feet (211 cu km). This deficit is not spread out evenly. Deficits greater than 24 in (60 cm) characterize the San Joaquin Valley and the western Mojave Desert, and they are even higher (greater than 40 in/100 cm) in the southeastern deserts. Over half of the state has deficits larger than 16 in (40 cm), including the metropolitan areas of Southern California. Most of the state has no annual surplus at all. There is, though, a statewide winter surplus (stream runoff) of 60 million acre-feet (75 cu km) from the rain and snow that fall in the northern mountains.

NATURAL HAZARDS



If current methods of control and loss-reduction are not greatly changed, it is estimated that the seven natural hazards depicted on these maps will amount to a $40 billion problem for California between the years 1970 and 2000. Damages from earthquakes and fault displacement present the biggest hazard problem, and will probably account for about 55 percent of the total dollar damage.

All of the hazards illustrated on these pages are *natural* processes. Their characterization as "hazards" stems from people's decisions to inhabit the regions where these processes operate or to modify the landscape in ways that increase the impact or visibility of the natural phenomena. There is little that humans can do about the occurrence, intensity, and location of earthquakes, volcanic eruptions, and tsunamis. However, through supporting scientific research, employing state of the art engineering practices, implementing realistic land-use laws, and spending adequate time and money on planning and preparing for natural disasters, much can be done to control life and property.

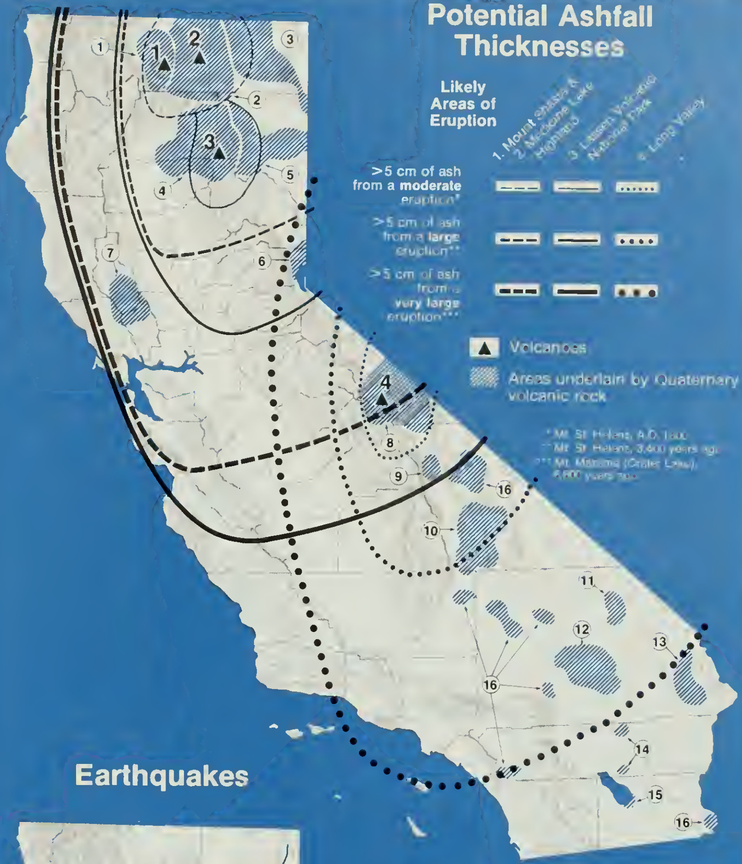
Two hazards, in particular, are strongly associated with (though hardly unique to) California: earthquakes and volcanic eruptions. As in the projection for the future, the largest losses of life and property due to a natural hazard in California have been caused by ground shaking and breakage during earthquakes. Since the early 1800s, a total of 26 damaging quakes (some of only moderate magnitude but located in populated areas) have taken 1,020 lives and resulted in about $14 billion of property damage (1981 dollar value). The greatest loss of life was in the 1906 San Francisco earthquake (700 deaths). Scenario studies of future events have estimated that an 8.3 magnitude late-afternoon earthquake along the San Andreas fault in the San Francisco Bay Area would kill over 10,000 people (with up to another 30,000 deaths from resultant dam failures). An earthquake of that same magnitude in the Los Angeles area would produce similar results.

Like earthquakes, volcanic eruptions cannot be prevented or even controlled. The most effective loss-reduction measure is to avoid large-scale settlement in vulnerable areas such as the natural drainage valleys downslope from recently active volcanic areas. Even so, prevailing winds during an eruptive event can spread and drop volcanic ash over very large and distant areas. The major urban areas of California are relatively safe from the threat of volcanic eruptions. Damage is most likely to occur in any of three recently active areas: (1) Mount Shasta–Medicine Lake Highland, (2) Lassen Volcanic National Park, and (3) the Long Valley (Mono Lake–Bishop) area.

Volcanic Hazards

Areas Underlain by Quaternary Volcanic Rock

1. Mount Shasta
2. Medicine Lake Highland-Lava Beds National Monument
3. Modoc Plateau
4. Lassen Volcanic National Park
5. Eagle Lake
6. Lousetown
7. Clear Lake
8. Mono Lake-Bishop (Long Valley)
9. Aberdeen
10. Coso Mountains
11. Cima
12. Amboy-Pisgah
13. Turtle Mountains
14. Pinto Basin-Salton Creek
15. Obsidian Buttes
16. Miscellaneous



Expectable Major Earthquakes

Note: A more detailed fault location map can be found in the Bedrock Geology section.

Region	Fault system	Richter magnitude	Chances of occurring in any year (percent)	Chances of occurring in next 20-30 years
1. Los Angeles-San Bernardino	Southern San Andreas	8.3	2-5	High
2. San Francisco Bay Area	Northern San Andreas	8.3	1	Moderate
3. San Francisco Bay Area	Hayward	7.4	1	Moderate
4. Los Angeles	Newport-Inglewood	7.5	0.1	Moderate-Low
5. San Diego	Rose Canyon	7.0	0.01	Low
6. Riverside-San Bernardino	Cucamonga	6.8	0.1	Moderate-Low
7. Los Angeles	Santa Monica	6.7	0.01	Low

Maximum Expectable Earthquake Intensity

Earthquakes

Selected Major Earthquakes Since 1836

Location number	Earthquake date and fault	Magnitude
1	1836—Hayward	7 ±
2	1838—San Andreas	7 ±
3	1852—Big Pine (?)	?
4	1857—San Andreas	8 ±
5	1861—Dublin	?
6	1868—Hayward	7 +
7	1888—Hayward	(?)
8	1872—Owens Valley	8.3 ±
9	1875—Mohawk Valley (?)	6.8 ±
10	1890—San Andreas	?
11	1899—San Jacinto	6.5
12	1901—San Andreas	6 ±
13	1906—San Andreas	8.3
14	1916—San Andreas	6 ±
15	1922—San Andreas	6.5
16	1934—San Andreas	6.0
17	1940—Imperial	6.7
18	1947—Manix	6.2
19	1950—Fort Sage	5.6
20	1951—Superstition Hills	5.6
21	1952—White Wolf	7.7
22	1966—Imperial	3.6
23	1966—San Andreas	5.5
24	1966—Truckee	6.0
25	1968—Unnamed	?
26	1968—Coyote Creek	6.4
27	1971—San Fernando	6.4
28	1975—Galway Lake	5.2
29	1975—Cleveland Hill	5.7
30	1975—Brawley	4.7
31	1980—Mammoth Lakes	6.3

BIBLIOGRAPHY / PHYSICAL PATTERNS

Atwater, Tanya. "Implications of Plate Tectonics for the Cenozoic Evolution of Western North America." *Geological Society of America Bulletin* 81, no. 12 (1970): pp. 3513–36.

Bailey, E. H., ed. *Geology of Northern California.* California Division of Mines and Geology, Bulletin 190, 1966.

Baldwin, John L. *Climates of the United States.* U.S. Department of Commerce (NOAA), 1973.

Bateman, Paul C. "Model for the Origin of Sierran Granites." *California Geology* (January 1974): pp. 3–5.

Blanc, R. P., and G. B. Cleveland. "Pleistocene Lakes of Southeastern California." *California Geology* (April 1981): pp. 1–8.

California Department of Finance. *California Statistical Abstract.* Sacramento: State Printing Office, 1981.

California Department of Water Resources. *Vegetative Water Use in California.* Bulletin 113-3. Sacramento: State Printing Office, 1974.

California Division of Mines and Geology. *Urban Geology Master Plan for California.* Bulletin 198. Sacramento: State Printing Office, 1973.

California Water Resources Board. *Water Resources of California.* Bulletin 1. Sacramento: State Printing Office, 1951.

Chesterman, C. W. "Volcanism in California." *California Geology* (August 1971): pp. 139–47.

Donley, Michael W., Stuart Allen, Patricia Caro, and Clyde Patton. *Atlas of California.* Culver City, Calif.: Pacific Book Center, 1979.

Ernst, W. G. "California and Plate Tectonics." *California Geology* (September 1979): pp. 187–98.

Felton, Ernest L. *California's Many Climates.* Palo Alto, Calif.: Pacific Book Publishers, 1965.

Hinds, Norman. *Evolution of the California Landscape.* California Division of Mines and Geology, Bulletin 158, 1952.

Jahns, R. H., ed. *Geology of Southern California.* California Division of Mines and Geology, Bulletin 170, 1954.

Jennings, Charles, compiler. *Fault Map of California.* California Division of Mines and Geology, Geologic Data Map no. 1 (scale 1:750,000), 1975.

Kahrl, William L., ed. *The California Water Atlas.* Prepared by the Governor's Office of Planning and Research in cooperation with the California Department of Water Resources. Sacramento, 1978.

King, Philip B. *The Evolution of North America.* Princeton, N.J.: Princeton University Press, 1977.

———. "Geologic History of California." *Mineral Information Service* (now *California Geology*) (March 1968): pp. 39–58.

Kuchler, A. W. *Natural Vegetation of California* (map and text). Available through California State Library, Sacramento, 1977.

Los Angeles Times. "Expectable Major California Earthquakes." June 27, 1982, p. 3f.

Major, J., and M. G. Barbour. *Terrestrial Vegetation of California.* New York: Wiley, 1977.

Matyas, W. J., and Ike Parker. *CALVEG: Mosaic of Existing Vegetation of California.* U.S. Forest Service, Regional Ecology Group, San Francisco, 1980.

Mullineaux, D. R. *Preliminary Overview Map of Volcanic Hazards in the Forty-Eight Conterminous United States.* U.S. Geological Survey, Miscellaneous Field Studies Map MF-786, 1978.

Oakeshott, Gordon B. *California's Changing Landscapes.* New York: McGraw-Hill, 1971.

Press, Frank, and Raymond Siever. *Earth.* San Francisco: W. H. Freeman, 1982. Chapter 19, "Global Plate Tectonics," and Chapter 20, "Deformation of the Earth's Crust."

Raisz, E. *Landforms of the United States* (map), 1954.

Rantz, S. E. *Mean Annual Precipitation in the California Region.* U.S. Geological Survey, open file maps. Menlo Park, Calif., 1969.

Real, Charles, Tousson Toppozada, and David Parke. *Earthquake Epicenter Map of California.* California Division of Mines and Geology, Map Sheet 39, 1978.

Russell, R. J. *Climates of California.* Berkeley and Los Angeles: University of California Press, 1953.

Storie, R. E. *Revision of the Soil Rating Chart.* California Agricultural Experiment Station, Berkeley, 1953.

Thomas, Harold E., and D. A. Phoenix. *Summary Appraisals of the Nation's Groundwater Resources—California Region.* In U.S. Geological Survey Professional Paper 813–F, 1976.

Thornbury, W. D. *Regional Geomorphology of the United States.* New York: Wiley, 1965.

U.S. Department of Agriculture, Soil Conservation Service. *Classification of Soil Series of the United States,* 1977.

———. *Soil Association Maps,* 1976.

U.S. Department of Commerce (NOAA). *Climate of California,* 1977.

U.S. Geological Survey. *California Streamflow Characteristics.* U.S. Geological Survey, open file report. Menlo Park, Calif., 1971.

U.S. Geological Survey. *The National Atlas of the United States.* Washington: Government Printing Office, 1970.

U.S. Geological Survey and California Division of Mines and Geology. *Geologic Map of California* (scale 1:2,500,000), 1966.

Wright, H. E., Jr., and David Frey. *The Quaternary of the United States.* Princeton, N.J.: Princeton University Press, 1965.

PART TWO

ABORIGINAL PATTERNS

ABORIGINAL LANGUAGE AND TERRITORIAL PATTERNS

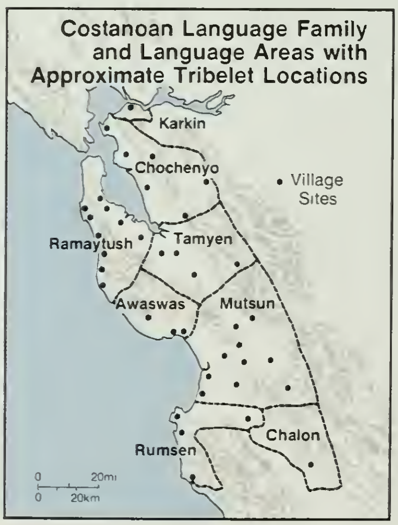
Indian fandango

For almost 200 years the California Indians were routinely described in a negative manner. First Spanish, then Mexican, and later American settlers portrayed them as a culturally deficient group who perched on the lowest rung of the civilization ladder. The usual signs of an advanced culture were not in evidence to the settlers: agriculture was nowhere to be found, and only the weakest strands of socio-political organization were noticeable in a few small, scattered groups. Because what was observed was not thought significant, precious little of the Indians' languages, institutions, and material culture was recorded before they began to fade from the scene in the wake of European settlement. The Spanish missionaries, first to work extensively with the California Indians, viewed them as childlike—children to be Christianized and transformed from their pagan ways into productive Spanish citizens. The Mexican ranchero looked upon the Indians as lowly laborers. To the American settlers, the Indians were a nuisance and were viewed as simple savages who stood in the way of progress. They were collectively named "Digger Indians," no doubt because of what appeared to the American settlers as a disgusting dietary habit of eating almost everything, from insects to acorns.

The inaccurate descriptions and negative attitude toward the California Indians stem in part from the inability of early observers to differentiate among the hundreds of small individual Indian groups and to understand the manner in which they made use of the environment. The California Indians had developed sophisticated social and economic institutions rather than technological skills to cope with a diverse and complicated environment. Within this environmental expanse of mountains and deserts, wet winters and dry summers, grasslands and oak forests, narrow valleys and flat plains, Indian groups took advantage of local resources. In turn, each stretch of beach, valley, and hillside had its own contingent of Indians, often very different from those living only a short distance away. The California Indians exhibited a bewildering mosaic of regional differences in human occupancy. But these differences were not apparent to the intruders, because the standard cultural signposts were not evident, and so the subtle balance maintained between Indian and environment went unnoticed, lost in the clamor for souls and desire for land. Instead, the Indians were grouped together, labeled cultural laggards, and dismissed as a crude, simple, and primitive people.

Early settlers left few documents that accurately detail the institutional or cultural practices of the Indians. Consequently, much of what is known today about the California Indians comes from archaeological and ethnographical studies conducted long after the bulk of California Indians lived freely in their environment. Only recently has enough information been pieced together to establish an objective view; no longer is the absence of technological achievement or the peculiar dietary habits the most distinguishing characteristic of the California Indian.

The attempt to understand a people from the unwritten past is always a difficult task and especially so in California. Unfortunately, the problem cannot be lessened by looking at a small region and then generalizing about the whole. If there is one rule to understanding both the physical and the cultural environments of California, past and present, it is that no two areas or regions are the same. The occupancy patterns of the California Indians reflect an incredibly diverse mixture of people and institutions integrated with the various physical environments.



The distribution of languages is probably the most difficult problem to overcome in any attempt to piece together aboriginal landscape patterns. Throughout California there existed 6 language stocks, approximately 14 language families, and about 80 mutually unintelligible tongues, all divided into more than 300 dialects. Penutian and Hokan stocks encompassed the most languages and the largest area. Probably the most complex language was the Yokutsan family in the San Joaquin Valley, where there were from 40 to 50 small groups with distinct dialects.

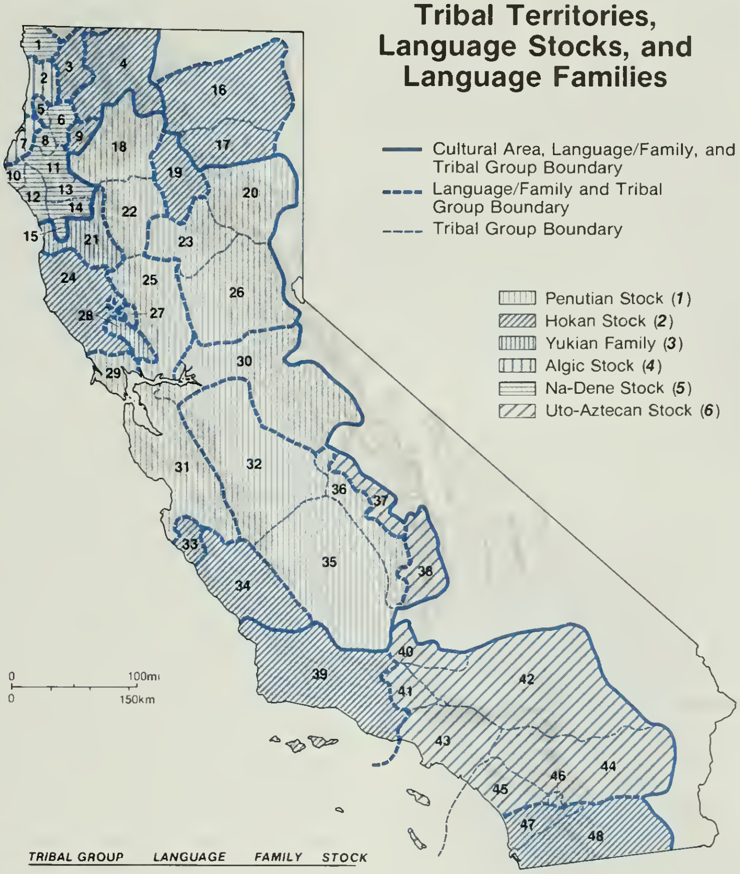
Linguistic areas are, however, only broad constructs that identify the complexity and diversity of the aboriginal landscape. Even the concept of tribe or tribal areas is difficult to apply to the California Indians because they did not organize themselves into large cultural groups with the type of social and political organizations usually associated with aboriginal tribes. Instead, the basis of California Indian occupancy was the tribelet, a small, self-governing, autonomous socio-political group. The tribelet has also been described as a group of people living in several separate villages with one larger village as the residence of the chief or acknowledged leader of the group. The number of tribelets, or village communities, varied from region to region, but for all of California they have been estimated to number almost 500, containing populations ranging from less than 100 to 1,000 or more per tribelet.

The linguistic areas consisted of many small tribelets around which the aboriginal landscape was organized. Although many of the conventional classification concepts employed by anthropologists may not precisely fit the California Indian, a general pattern based on language does emerge: language families formed the largest areas, which in turn can be divided into ethnic areas and further subdivided into tribelet areas that often contained several settlements where differing dialects might be used.

While political and social structure differed to some extent among the California Indians, the tribelet was organized as a corporate body based upon residence or kinship. The important feature of the tribelet, however, was its role as the basic landholding unit in aboriginal society and, in turn, the foundation upon which the aboriginal landscape rested. Control of land was based on occupancy and continued use. As a land-using unit, tribelet areas varied in size depending on the number of individuals attached to the tribelet and the availability of local resources. In general, tribelets with large populations had access to a continuous supply of plant and animal food and occupied relatively small areas. Boundaries outlined the areal extent, or economic range, in which a group hunted and gathered food.

The organization of aboriginal society in California and its spread on the land can be seen as a series of complex levels of social and political order loosely held together by language. The tribelet formed the largest unit to exercise control over resources and land, and as such was the most permanent feature around which all social and economic activities were centered. From a broad view the aboriginal landscape became a mosaic of hundreds of small, autonomous groups each differing from its neighbor in speech and custom.

Tribal Territories, Language Stocks, and Language Families



TRIBAL GROUP	*LANGUAGE*	*FAMILY*	*STOCK*
NORTHWESTERN CULTURAL AREA			
1. Tolowa		*Athapaskan*	5
2. Yuruk	*Yuruk*		4
3. Karok	*Karok*		2
4. Shasta		*Shastan*	2
5. Chilula		*Athapaskan*	5
6. Hupa		*Athapaskan*	5
7. Wiyot	*Wiyot*		4
8. Whilkut		*Athapaskan*	5
9. Chimariko	*Chimariko*		2
10. Mattole		*Athapaskan*	5
11. Nongatl		*Athapaskan*	5
12. Sinkyone		*Athapaskan*	5
13. Lassik		*Athapaskan*	5
14. Wailaki		*Athapaskan*	5
15. Cahto		*Athapaskan*	5
NORTHEASTERN CULTURAL AREA			
16. Achumawi		*Palaihnihan*	2
17. Atsugewi		*Palaihnihan*	2
CENTRAL CULTURAL AREA			
18. Wintu		*Wintuan*	1
19. Yana		*Yana*	2
20. Maidu		*Maiduan*	1
21. Yuki	*Yuki*		3
22. Nomlaki		*Wintuan*	1
23. Konkow		*Maiduan*	1
24. Pomo		*Pomoan*	2
25. Patwin		*Wintuan*	1
26. Nisenan		*Maiduan*	1
27. Lake Miwok		*Utian*	1
28. Wappo	*Wappo*		3
29. Coast Miwok		*Utian*	1
30. Miwok		*Utian*	1
31. Costanoan		*Utian*	1
32. N. Valley Yokuts		*Yokutsan*	1
33. Esselen	*Esselen*		2
34. Salinan	*Salinan*		2
35. S. Valley Yokuts			1
36. Foothill Yokuts		*Yokutsan*	1
37. Monache		*Numic*	6
38. Tubatulabal	*Tubatulabal*		6
SOUTHERN CULTURAL AREA			
39. Chumash		*Chumashan*	2
40. Kitanemuk		*Takic*	6
41. Tataviam		*Takic*	6
42. Serrano		*Takic*	6
43. Gabrielino		*Takic*	6
44. Cahuilla		*Takic*	6
45. Luiseno		*Takic*	6
46. Cupeno		*Takic*	6
47. Ipai		*Yuman*	2
48. Tipai		*Yuman*	2

ABORIGINAL POPULATION AND SETTLEMENT

The language and territorial patterns discussed on pages 32–33 serve to outline the areal extent of aboriginal settlement and to establish a framework within which to view population patterns. The number and location of the aboriginal inhabitants are not precisely known. Early Spanish and American settlers made few direct enumerations of the Indians and those that were taken were incomplete or for local groups only. The lack of accurate information has stimulated a number of estimates, many of which are pure speculation. The more earnest and serious estimates range upward from 133,000. The tendency in the past 30 years has been to revise the estimates upward, as more detailed information about the California Indian is obtained. The use of mission records, early diaries, and detailed ecological studies of small areas has repeatedly demonstrated that the number of Indians in California before European contact was far greater than earlier assumed. Among the estimates proposed, the most thorough and complete appears to be that of Sherburne F. Cook, who proposed a total of 310,000 California Indians.

In general, the population concentrated along the coast, diminished toward the interior, and dropped rapidly after crossing the Coast Ranges. The lower courses of large streams, particularly those running through the foothills of the Sierra Nevada, were the exception, having higher densities than the surrounding areas. Population generally was thinly distributed in the more arid regions and almost nonexistent in mountain areas above 5,000 feet. Overall, population density varied considerably, ranging from less than one per square mile to over ten per square mile. Large villages tended to cluster in three areas: along the Santa Barbara Coast; in the foothills of the upper San Joaquin Valley; and along the lower reaches of the Sacramento Valley.

The patterns indicate that California had a very large population. By one estimate, California held about 13 percent of the native inhabitants of the United States, yet they occupied only 5 percent of the total land utilized by aboriginal groups in the United States. That such a large aborginal population existed in California is not surprising until one recalls that the California Indians were hunters and gatherers with little knowledge of agriculture and resided in semipermanent villages. Their relatively large numbers and high local densities can be attributed to an optimum adaptation to local food supplies. If language and population are compared, it will be noted that the distribution and density of the aboriginal population cut across linguistic and tribelet boundaries. Overall, the population patterns appear to be shaped more by physical factors than by linguistic or social factors.

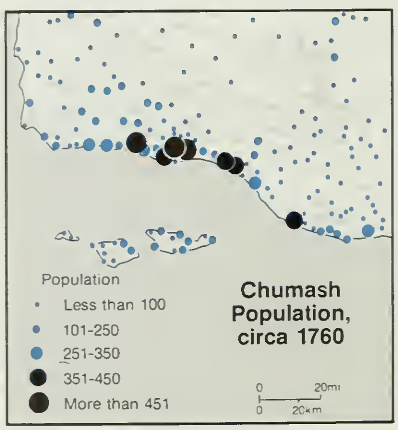

California State Library

Indian rancheria

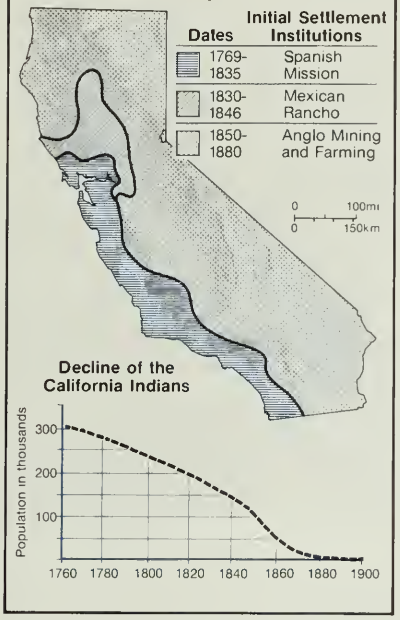
Not all areas in California neatly fit these generalizations. The Chumash area does; it has fairly good population data and provides a detailed view of the distribution of aboriginal population for one region. The Chumash were heavily concentrated along the coast and, much like the overall population pattern, rapidly declined in numbers away from the coast toward the interior. The Chumash example also illustrates that clustering of Indian groups occurred in areas where there was access to both inland and marine food sources.

Along with language and population, aboriginal settlement patterns also differed sharply from one region to the next. There were thousands of villages—large and small, temporary and permanent—located throughout California, forming a series of patterns on the land that reflected a keen awareness of local environments.

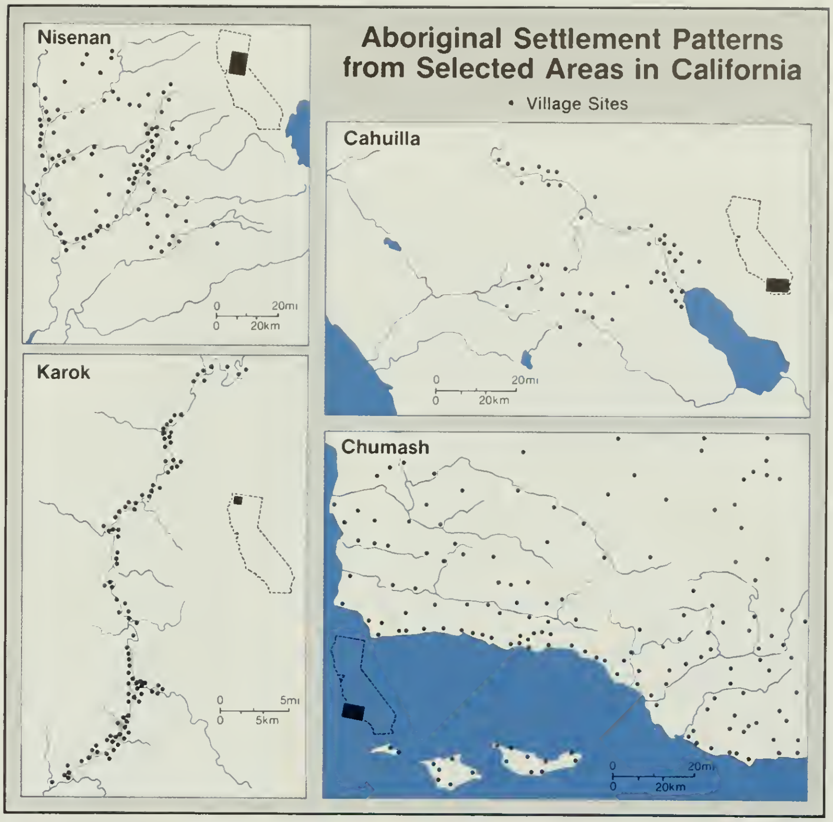
The settlement pattern of aboriginal California was a curious blending of many patterns that stretched across the land, a marbling effect that makes it difficult to classify, categorize, or even define specific communities that would truly reflect the overall distribution of settlement. Therefore, examples from four specific areas are presented to illustrate the extent to which patterns varied and were influenced by environmental conditions. The pattern for the Karok in northwestern California reflects the rugged topography and narrow canyons that exist in that area. Villages were small, usually containing from 4 to 6 houses with an average of fewer than 50 persons per village. They were located along year-round flowing streams. The



Direct Contact Between California Indians and European Settlement



Aboriginal Settlement Patterns from Selected Areas in California

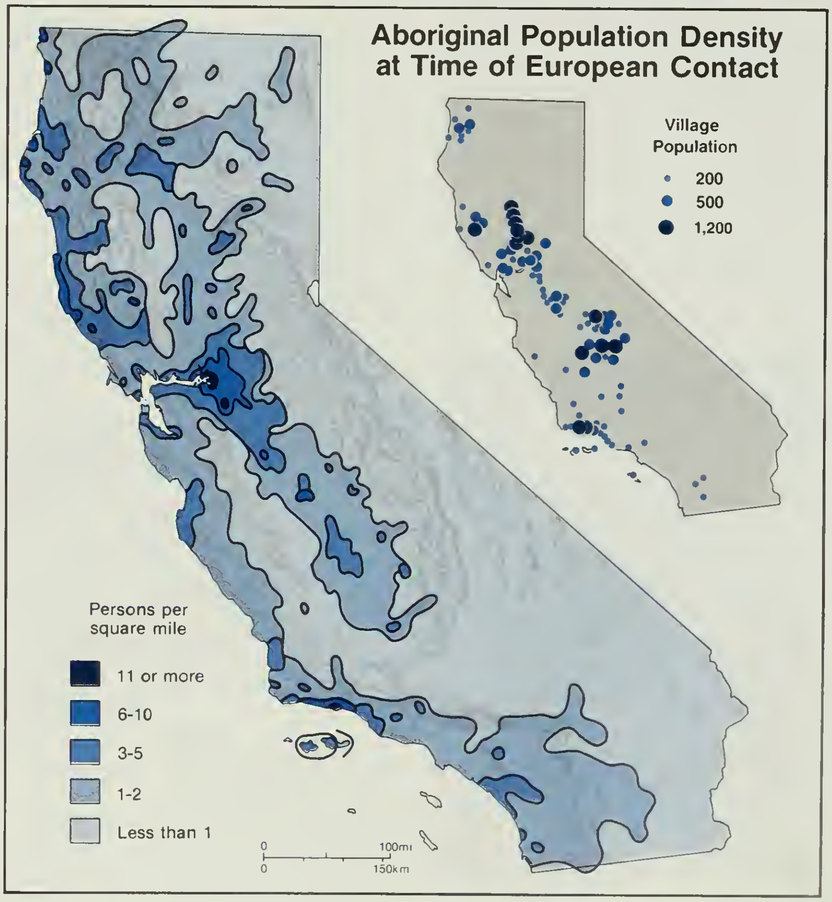


Nisenan, located in the foothills of the Sierra Nevada and on the floor of the Central Valley, presented a different pattern. Here the villages were scattered, but most were near year-round streams or around the edges of small lakes and valleys. Villages contained from 15 to 20 houses with a total population averaging around 125.

Farther south, the pattern shifts even more. In the Chumash area, large villages were clustered along the coast, usually on terraces set back from the sea. Villages located in the more hilly terrain away from the coast generally followed existing stream patterns. Villages varied in the number of households, with those on the coast averaging 35 houses and an average total population of between 300 to 500. In the interior, villages were somewhat smaller, containing from 5 to 7 houses each and averaging a population of around 30. The last example is from the Cahuilla area in the southern desert region of California. These settlements reflect the arid climate, with dispersed villages located in canyons or on small hills near springs or other water sources. Villages averaged from 3 to 5 houses with total populations ranging from 15 to 20.

European contact brought about a considerable decline in the number of California Indians. In the first 100 years of Spanish, Mexican, and American settlement the aboriginal population was reduced to perhaps 12 percent of its precontact size and 30 years later, in 1900, to 5 percent.

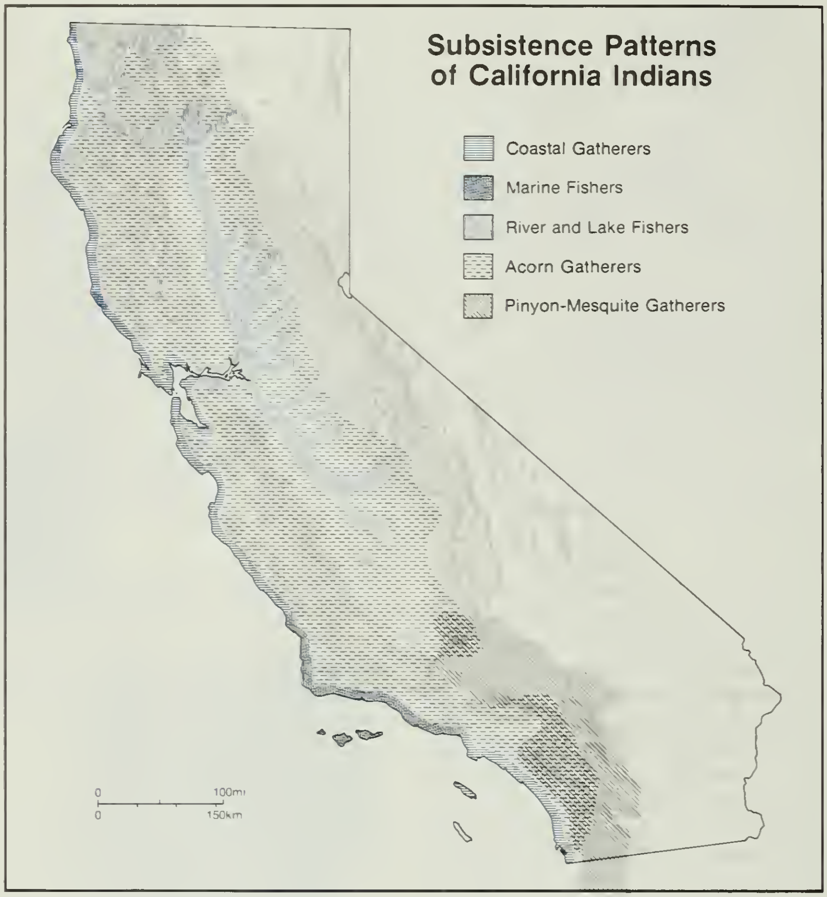
Aboriginal Population Density at Time of European Contact



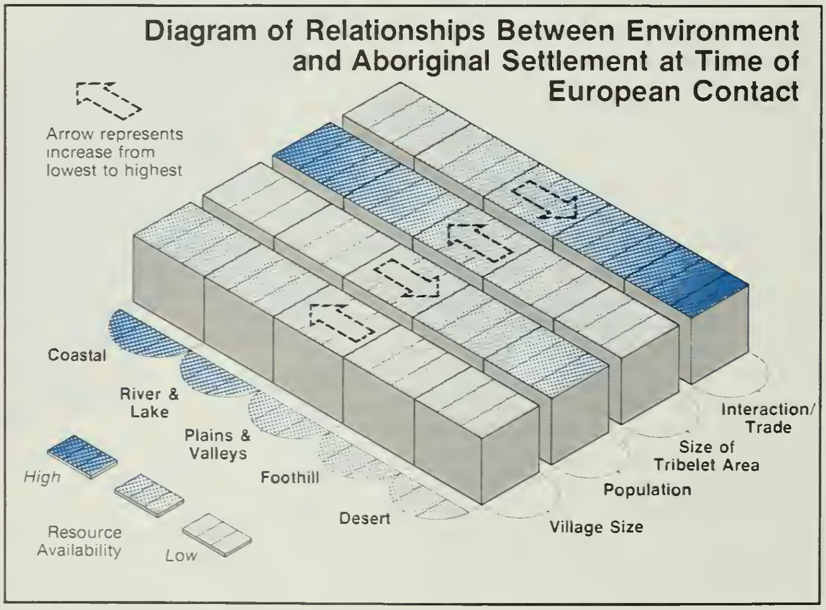
ABORIGINAL SUBSISTENCE PATTERNS

The California Indians did not practice agriculture; rather they were dependent on the natural products of the land. Their subsistence base was broad and included extensive use of almost all of the available wild plants and animals. Without the means to manipulate yields or to expand food sources, continued occupancy of an area required access to a sufficiently extensive and diverse source of plants and animals so that hunting and gathering activities would not permanently exhaust the food supply. The existence of the California Indian depended, therefore, on a steady and recurrent source of food, over which the tribelet could claim exploitive rights. Consequently, the natural distribution and seasonal quantity of wild plants and animals were important to some degree in affecting the settlement pattern, population densities, and village size of the Indians.

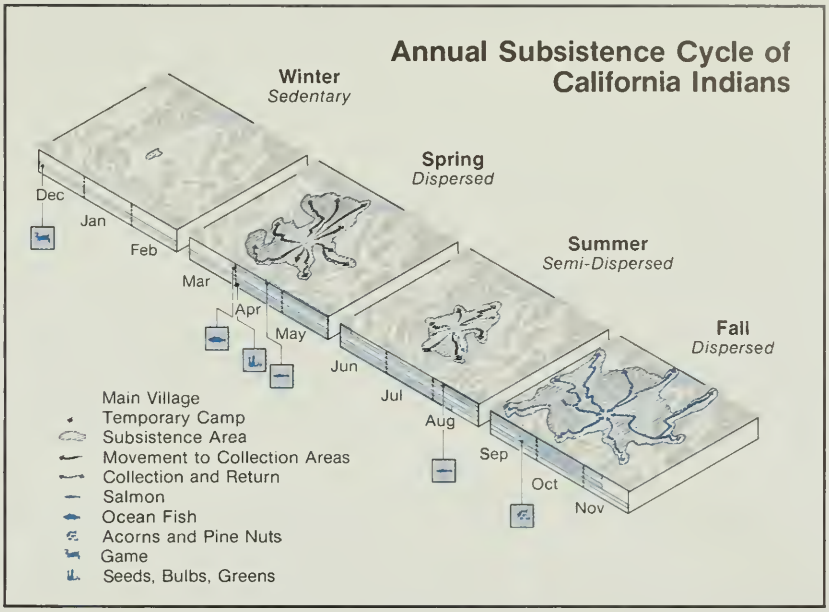
Environmental variation and the large number of tribelets make it difficult to identify specific subsistence patterns at the local level. In addition, no single subsistence pattern was exclusive: fishers were gatherers and gatherers were hunters. A significant feature of all subsistence activities, however, was the general tendency for most tribelets to depend upon acorns and fish as staples. Acorns were gathered in every region where they existed. In regions where acorns were not available, pine nuts were sub-



Gathering acorns



Gathering seeds



stituted or trade developed with tribelets who had acorns. Fish were also a staple throughout California, particularly in the northwest and along the coast. Salmon provided a considerable food supply during the annual spring and fall runs. Freshwater lakes and rivers also provided an ample supply of fish during most of the year. Ocean fish and other marine animals were especially important along the coast.

For the most part, the California Indians did not develop exploitive techniques to significantly alter the environment in their favor by expanding food production or increasing yields. The major exception to this pattern was the use of fire in many areas to promote the growth of grasses, thereby sustaining a higher than normal yield of plants and animals. Outside of fire, the California Indians appear to have developed adaptive rather than exploitive responses to the environment. These can be labeled as energy-extractive techniques, such as the leaching of acorns, developing grinding implements, and, for the Chumash, building seagoing canoes and fishing tackle that allowed them to extend their hunting activities into the sea.

The subsistence patterns of the California Indians reflect the availability of food products from region to region. The patterns depicted here are only the most dominant subsistence habits of various groups within each region. In general, the subsistence patterns may be interpreted as gathering those food resources that would provide the highest return with the least amount of risk. As hunters, gatherers, and fishers without the technology to overcome natural obstacles to food productivity, the California Indians were influenced to a considerable degree by seasonal availability of food resources.

A generalized model of the annual subsistence cycle of the California Indian attempts to portray the resources used throughout the year along with the accompanying change in the size of the subsistence area. The pattern shown here does not fit the subsistence activities of all Indian groups in California but reflects only the most prevalent activities.

The question that has been skirted so far is how a hunting and gathering society divided into many small groups with differing languages and spread over a complex and varied environment was able to reach population numbers and densities that matched those associated with agricultural societies. Without the technical ability to increase natural yields, the California Indians were subject to environmental shifts that could drastically reduce food resources and throw even the most efficient gathering system into disarray. What gave the California Indians a measure of control over their environment was the development of social and economic institutions that in times of unstable environmental conditions would allow the transfer of food resources between groups occupying different ecological zones.

The redistribution of resources took the form of direct trade between groups or exchanges during ceremonial meetings. Trade was based on a monetary system that used strings of shell beads as the medium of exchange to purchase the necessary commodities. When food was available, the surplus could be traded for beads to groups who were not as fortunate, and at a later date the beads could be used to purchase needed food if the situation were reversed. The redistribution of resources also occurred at ceremonial meetings, which were ostensibly social in function but had definite economic overtones. The gathering of several hundred or more Indians for religious or mourning ceremonies, for example, encouraged informal gift giving and exchanges with the anticipation of obtaining reciprocal gifts of equal or greater value at some future date.

By institutionalizing trade contacts and ceremonial functions, the California Indian was able to develop some degree of permanence on the land. Trade and social interaction ensured that the effect of seasonal, yearly, and areal variations of resources was reduced and that most villages had at least some access to resources lying outside their subsistence area. Accessibility to outside resources made it possible for communities to complete their subsistence cycle within a restricted area and to maintain large populations. Only in the case of widespread failure of natural resources would the overall subsistence base of the Indians be jeopardized and their survival threatened. The relationship between population density and distribution, settlement, territorial organization, and subsistence was very closely tied to the local environment, but it was the clever use of institutions that ensured the persistence of the Indian.

BIBLIOGRAPHY / ABORIGINAL PATTERNS

Baumhoff, Martin A. "Ecological Determinants of Aboriginal California Population." *University of California Publications in American Archaeology and Ethnology*, 49, no. 2: 155–236. Berkeley, 1963.

Beals, Ralph L., and Joseph A. Hester, Jr. "A New Ecological Typology of the California Indians." 1956. Reprinted in *The California Indians*. edited by Robert F. Heizer and M. A. Whipple. Berkeley and Los Angeles: University of California Press, 1971.

Bean, Lowell J. *Mukat's People: The Cahuilla Indians of Southern California*. Berkeley and Los Angeles: University of California Press, 1972.

Bean, Lowell J., and Thomas F. King, eds. *Antap: California Indian Political and Economic Organization*. Ballena Press Anthropological Papers, 2. Ramona, Calif., 1974.

Bean, Lowell J., and Harry W. Lawton. "Some Explanations for the Rise of Cultural Complexity in Native California with Comments on Proto-Agriculture and Agriculture." In *Patterns of Indian Burning in California: Ecology and Ethno-history*, edited by Henry Lewis, v–xlvii. Ballena Press Anthropological Papers, 2. Ramona, Calif., 1974.

Blackburn, Thomas C. "Ceremonial Integration and Social Interaction in Aboriginal California." In *Antap: California Indian Political and Economic Organization*, edited by Lowell J. Bean and Thomas F. King, 93–110. Ballena Press Anthropological Papers, 2. Ramona. Calif., 1974.

Brand, Donald D. "Aboriginal Trade Routes for Sea Shells in the Southwest." *Yearbook of the Association of Pacific Coast Geographers* 4: 3–10. Cheney, Wash., 1938.

Broadbent, Sylvia M. "The Tumsen of Monterey: An Ethnography from Historical Sources." In *Miscellaneous Papers on Archaeology*, 45–93. University of California Archaeological Research Facility Contributions, 14. Berkeley, 1972.

Brown, Alan K. "The Aboriginal Population of the Santa Barbara Channel." *University of California Archaeological Survey Reports* 69: 1–99. Berkeley, 1967.

Chagnon, Napoleon A. "Ecological and Adaptive Aspects of California Shell Money." *Annual Reports of the University of California Archaeological Survey* 12: 1–25. Los Angeles, 1970.

Cook, Sherburne F. "The Aboriginal Population of Alameda and Contra Costa Counties, California." *University of California Anthropological Records* 16, no. 4: 131–56. Berkeley, 1957.

________. "The Aboriginal Population of the San Joaquin Valley, California." *University of California Anthropological Records* 16, no. 2: 31–80. Berkeley, 1955.

________. "The Aboriginal Population of the North Coast of California." *University of California Anthropological Records* 16, no. 3: 81–130. Berkeley, 1956.

________. "The Aboriginal Population of Upper California." In *Proceedings of the 35th International Congress of Americanists*, 397–403. Mexico, 1962, 1964.

________. *The Population of the California Indians, 1769–1970*. Berkeley and Los Angeles: University of California Press, 1976.

Cook, Sherburne F., and Robert F. Heizer. "The Quantitative Approach to the Relation between Population and Settlement Size." *University of California Archaeological Survey Reports* 64:1–97. Berkeley, 1965.

Cook, Sherburne F., and Robert F. Heizer. "Relationships among Houses, Settlement Areas, and Population in Aboriginal California." In *Settlement Archaeological*, edited by K. C. Chang, 79–116. Palo Alto, Calif.: National Press Books, 1968.

Davis, James T. "Trade Routes and Economic Exchange among the Indians of California." *University of California Archaeological Survey Reports* 54. Berkeley, 1961. Reprinted in *Aboriginal California: Three Studies in Culture History*, edited by Robert F. Heizer. Berkeley and Los Angeles: University of California Press, 1963.

Forbes, Jack D. *Native Americans of California and Nevada: A Handbook*. Healdsburg, Calif.: Naturegraph Publishers, 1969.

Gould, Richard A. "Ecology and Adaptive Response among the Tolowa Indians of Northwestern California." *Journal of California Anthropology* 2, no. 2: 148–70.

Heizer, Robert F. "Aboriginal Trade between the Southwest and California." *Masterkey* 15, no. 5: 185–88 (1941).

________. "California Population Densities, 1770 and 1950." In *Paper's on California Archaeology. University of California Archaeological Survey Reports* 41: 1–9. Berkeley, 1960.

________, **ed.** *Handbook of North American Indians*. Vol. 8, California. Washington: Smithsonian Institute, 1978.

________, **ed.** *They Were Only Diggers: A Collection of Articles from California Newspapers, 1851–1866, on Indian and White Relations*. Ballena Press Publications in Archaeology, Ethnology, and History, 1. Ramona, Calif., 1974.

Heizer, Robert F., and Alan J. Almquist. *The Other Californians: Prejudice and Discrimination under Spain, Mexico, and the United States to 1920*. Berkeley and Los Angeles: University of California Press, 1971.

Heizer, Robert F., and Albert B. Elsasseiz. *The Natural World of the California Indians*. Berkeley and Los Angeles: University of California Press, 1980.

Heizer, Robert F., Karen M. Nissen, and Edward D. Castillo. *California Indian History: A Classified and Annotated Guide to Source Materials*. Ballena Press Publications in Archaeology, Ethnology, and History, 4. Ramona, Calif., 1975.

Kroeber, Alfred L. *Handbook of the Indians of California*. Bureau of American Ethnology Bulletin no. 78. Washington, 1925.

________. "The Nature of Land-holding Groups in Aboriginal California." In *Two Papers on the Aboriginal Ethnography of California*, edited by D. H. Hymes and Robert F. Heizer, 19–58. *University of California Archaeological Survey Reports* 56. Berkeley, 1962.

Kunkel, Peter H. "The Pomo Kin Group and the Political Unit in Aboriginal California." *Journal of California Anthropology* 1, no. 1 (1974): 7–18.

Landberg, Leif C. W. *The Chumash Indians of Southern California*. Southwest Museum Papers, 19. Los Angeles, 1965.

Lawton, Harry W., and Lowell J. Bean. "A Preliminary Reconstruction of Aboriginal Agricultural Technology among the Cahuilla." *The Indian Historian* 1, no. 5 (1968): 18–24, 29.

Lewis, Henry T. *Patterns of Indian Burning in California: Ecology and Ethnohistory*. Ballena Press Anthropological Papers, 1: 1–101. Ramona, Calif., 1973.

Powers, Stephen. *The Northern California Indians*. Edited by Robert F. Heizer. University of California Archaeological Research Facility Contributions, no. 25. Berkeley, 1975.

Sample, L. L. "Trade and Trails in Aboriginal California." *University of California Archaeological Survey Reports* 8. Berkeley, 1950.

Sutton, Imre. *Indian Land Tenure: Bibliographical Essays and a Guide to The Literature*. New York: Clearwater Publishing Company, 1975.

Wuertele, E. *Bibliographical History of California Anthropological Research*. University of California Archaeological Research Facility Contributions, 26. Berkeley, 1975.

PART THREE

HISPANIC PATTERNS, 1769–1846

SPANISH EXPLORATION AND SETTLEMENT

Early Spanish exploration and eventual settlement of California was not an isolated undertaking; it was part of an ambitious settlement scheme that was to extend from the Gulf of Mexico to the Pacific Ocean and from Chihuahua to Colorado. All of this area was part of Spain's northern frontier in the New World, and in the sixteenth and seventeenth centuries it was an exciting frontier, complete with its own unique set of myths and legends of fabulous treasures and peculiar people. Somewhere to the west, off the Pacific Coast, there lay California, an island with pearl-lined beaches ruled by the Amazon, Queen Califa, and her Griffins.

The island of California remained an integral part of these northern mysteries, even though in 1539–1540 Francisco de Ulloa proved California was not an island. Myth was stronger than fact, and California continued to act as a lure for exploration to find treasure or the elusive northwest passage. Juan Rodriguez Cabrillo, a Portuguese in the service of the Spanish Crown, sailed along the California coast in 1542 seeking fame, treasure, and a shortcut to the Orient. Cabrillo died while exploring the California coast, and his successor Bartolomé Ferrelo led the expedition home without acquiring fame or fortune. Spain's interest in California continued, not for the supposed treasure, but for a port needed for the highly profitable Manila galleons engaged in the Philippine trade. In 1595, Sebastian Rodriguez Cermenho, captain of a Manila galleon, was instructed to search the California coast for a suitable port on his return from the Philippines. His coastal survey was interrupted when his galleon was driven ashore in Drake's Bay, yet Cermenho continued his exploration in a small launch. In 1602–1603, Sebastian Vizcaíno was the next explorer along the California coast, he too was searching for a port for the Manila galleons. Vizcaíno's exploration is noted for its detailed mapping of the coast and the extravagant praise of Monterey Bay as a sheltered harbor.

Nothing came of Vizcaíno's voyage, and Spain abandoned its California plans to deal with the difficulties of settling and managing more lucrative frontiers. For the next 167 years Spain showed no interest in the Pacific Coast. When it was

rumored that Russia planned to extend settlement into California, Spain moved quickly to reaffirm its claim to the Pacific Coast. In 1769, two maritime and two land expeditions were dispatched to accomplish two goals: to gain a foothold at San Diego and then to occupy Vizcaíno's fabled Monterey Bay. San Diego became the first Spanish settlement in California and was also a regrouping and staging area for the final push to Monterey Bay. The leader of the expedition was Gaspar de Portolá, who, after an unsuccessful first attempt to find Monterey Bay from Vizcaíno's description, was successful in a second effort. In June 1770, nearly a year and a half after the California expedition began, Portolá planted the Spanish flag at Monterey and ceremoniously claimed California for Charles III, King of Spain.

After 1770, exploration of California began in earnest. The major concern was finding a land route to California other than the very difficult route up the Baja peninsula. Juan Bautista de Anza, military commander at Tubac, was charged with finding a suitable route to California from Sonora. Anza traced a route down the Gila River, across the Colorado River, and on to Mission San Gabriel in 1774. Anza returned in 1776 with colonists, livestock, and supplies, establishing a land route to California that remained open until Indian hostility closed it in 1783. Outside of Anza's feat, no other momentous exploration was accomplished during the remaining part of the eighteenth century. For the most part, exploration of California was confined to the coastal region from San Francisco Bay to San Diego. The major exception was a journey by Pedro Fages, who discovered and crossed the southwest corner of the Central Valley in 1772, an area that was left to be partially explored in the nineteenth century.

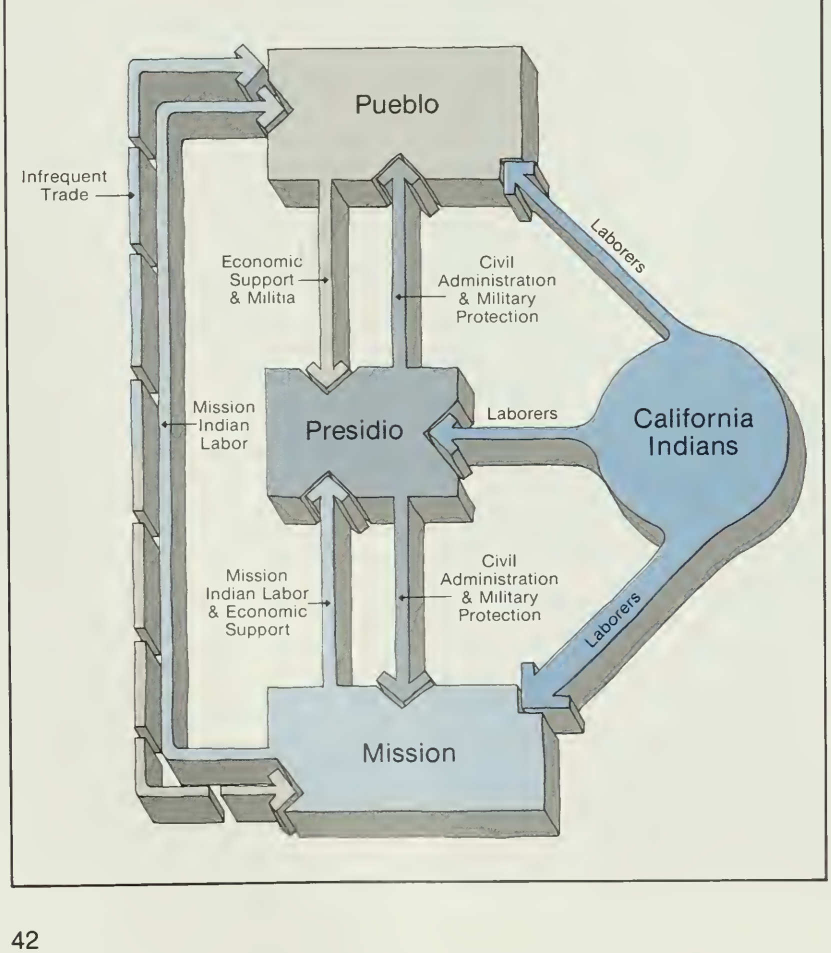
Exploration of California continued intermittently for the next 50 years, accomplished by small and often poorly equipped parties who for the most part made short, exploratory journeys into the Central Valley. In general, Spanish (and later Mexican) expeditions were unspectacular, except for those of Gabriel Moraga, who in two explorations was the first European to traverse the entire length of the Central Valley. Explorations were sporadic, often unplanned, and revealed little of the vastness of what lay to the east of the California coast. Intensive exploration and settlement of the area east of Spanish settlement would have to wait until American settlement began in 1848.

SPANISH SETTLEMENT STRATEGY

Tunis, *Frontier Living*, 1961

Pueblo of Los Angeles, 1847

Relationships Between Spanish Settlement Institutions and the California Indians



From the two small military outposts founded at San Diego and Monterey by 1770, Spain began the task of developing other settlements in California. The plan was to found five missions along the California coast that would firm up Spain's claim to the Pacific Coast, neutralize the colonization efforts of other European countries, and most important, protect its lucrative Manila galleon trade with the Philippines. The initial thrust of Spanish colonization centered on two time-tested frontier institutions, the mission and the presidio. A third settlement institution, the pueblo, was brought to California in 1777. All three frontier institutions were to work in tandem, each performing a specific role in Spain's colonization of California.

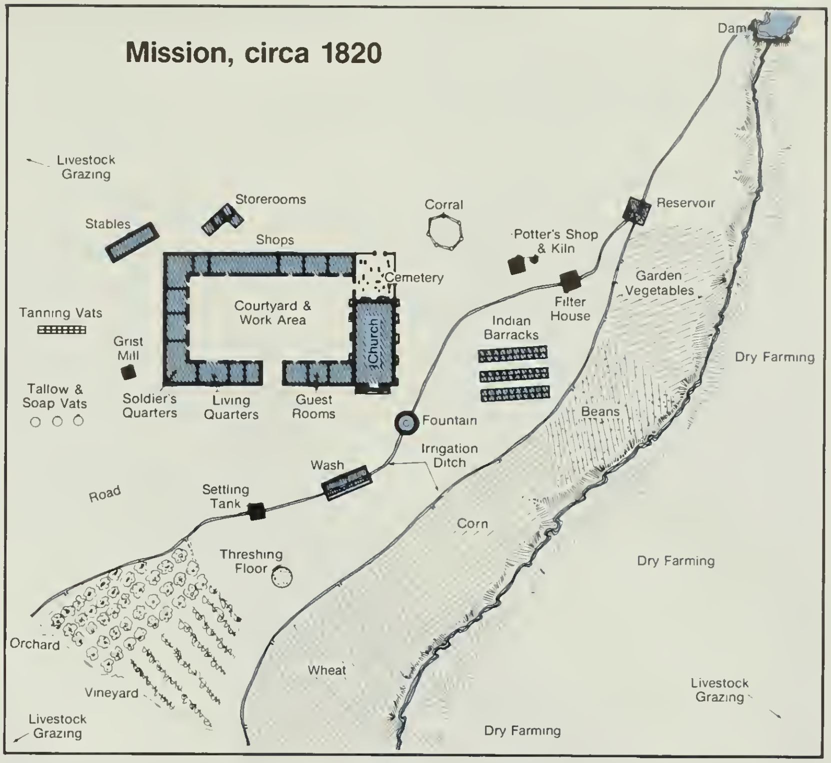
Spain's efforts in California were dependent upon a settlement strategy that included absorbing the indigenous population. To effect permanent settlement, Spain employed a system of Catholic mission stations that converted the local inhabitants to Christianity and trained them to become loyal Spanish subjects. The type of mission introduced to California was the *reducción* or *congregación.* Its purpose was to attract natives who lived in small, dispersed villages, congregate them in the mission, and "reduce" them from their heathen way of life to that of Christians. Indians were not to be forced into the mission; rather the conversion process was to be voluntary. Once in the mission, however, the Indians could not leave, and severe punishments were imposed to discourage desertion. The length of time prescribed by law to acculturate the Indians was ten years, after which the mission was to be turned over to the secular clergy, with the missionaries moving on to another frontier to repeat the process.

Presidios formed the defensive arm of Spanish settlement in California. As an agent of the government, the presidio was responsible for defending the coast, subduing hostile Indians, maintaining peaceful relationships with friendly Indians, and acting as the secular authority until a civil government could be established. Four presidios were founded on the California coast, each with a specific district to administer. Each presidio was a military fort staffed by infantry and cavalry, who were reassigned in part to duty at the missions within the presidio's jurisdiction. The duty of the soldiers was to protect the missionaries and enforce mission rules. Under the protective umbrella of the military, the missions were to work directly with the Indian population. The mission-presidio system had been successful in settling other areas of the Spanish Empire, and its initial deployment on the California coast was to differ little from previous practice.

Pueblos—civil communities—were a later addition to Spain's efforts to colonize California. They were established for the purpose of supplying the military with agricultural products, thereby reducing the high transport costs incurred by shipping food from Mexico and ensuring a consistent food supply in California. Pueblo citizens were also to set an example of Spanish life for the Indian to follow and to act as a reserve militia in times of emergency. Only three pueblos were founded in California, and their success was less than expected. The pueblos never seemed able to produce the needed agricultural surplus, and many of the colonists were malcontents or criminals banished to California from Mexico. Needless to say, they were not industrious farmers, model Spanish citizens, or active militia men. It was not until the 1820s that the pueblos became an important settlement institution.

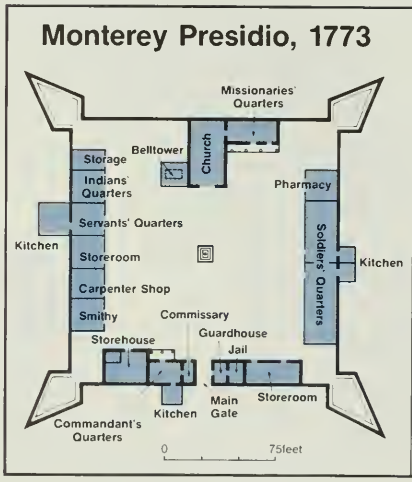
The ultimate goal of the presidio-mission-pueblo settlement strategy was to ensure Spain's claim to California and populate the newly settled area with Spanish citizens. The choice of sites therefore was an important consideration and in large measure was predetermined by the specific rules each institution played out on the frontier. As military outposts, the presidios were located in areas that would provide coastal defense and at the same time allow quick access to missions in case of hostility. Unfortunately, the presidios were not founded in areas well suited for agriculture. In contrast, the pueblos were located with an eye toward permanent settlement and agricultural development.

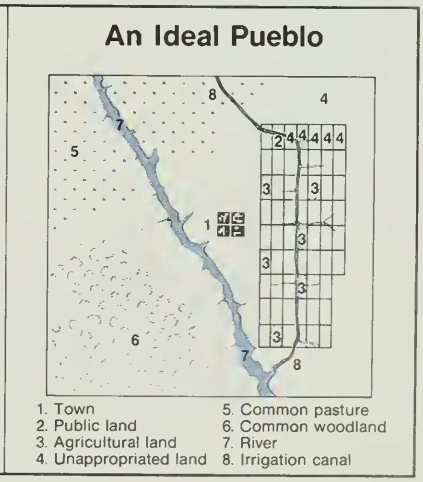
Mission sites were no less planned than the presidio and pueblo but were more flexible in their location. Missions were founded primarily in areas that contained large numbers of Indians and were allowed to take up and use as much land as was necessary to properly care for Indian neophytes, or converts. The missions thus were able to take advantage of good sites and Indian labor to expand into large, well-developed estates and eventually dominate the secular settlements.



Tunis, *Frontier Living*, 1961

Mission San Luis Rey





EARLY YEARS OF SPANISH SETTLEMENT

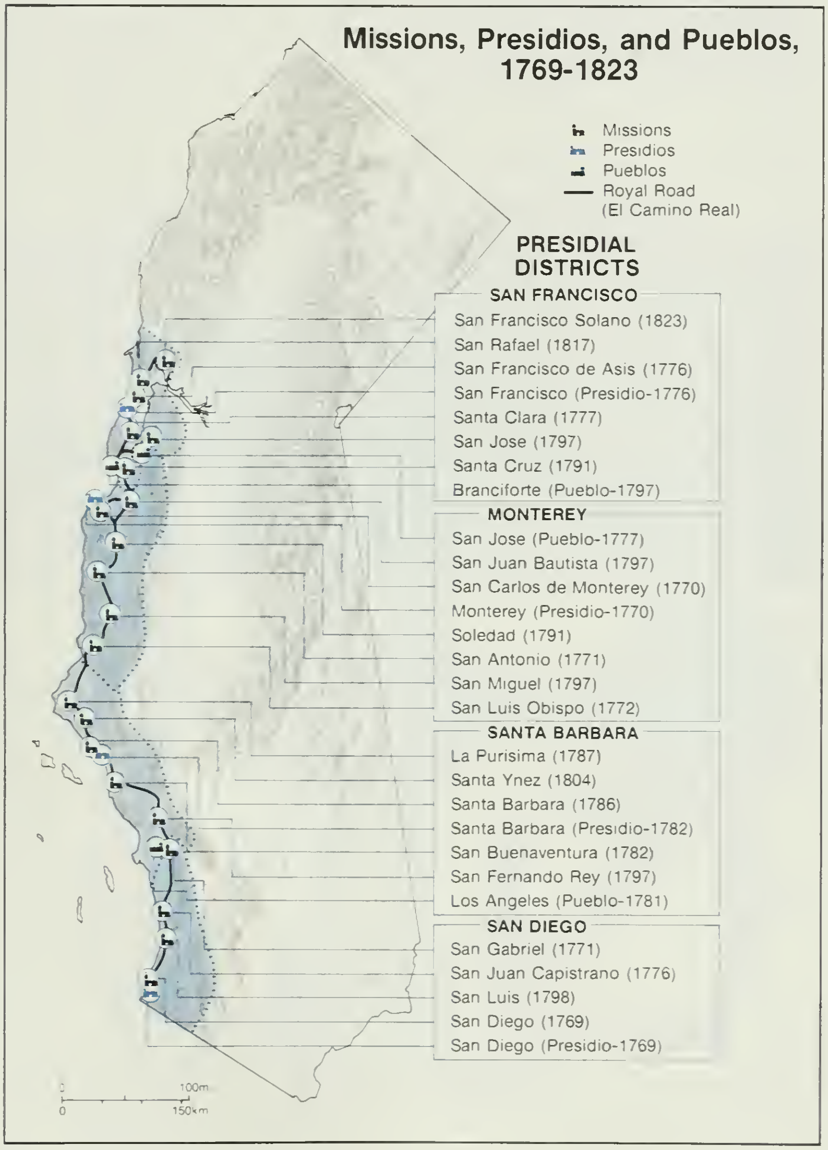
Although the presidio-mission-pueblo strategy might appear satisfactory, Spain was beset with problems in making its settlement strategy work in California. Distance posed the most immediate and serious obstacle to a successful occupation. Hundreds of miles of unexplored desert and an unknown number of hostile Indians separated California and the nearest Spanish settlements in Baja and Sonora. The only practical way to maintain the California outposts was by a tenuous sea route that extended well over 1,000 miles back to Mexico.

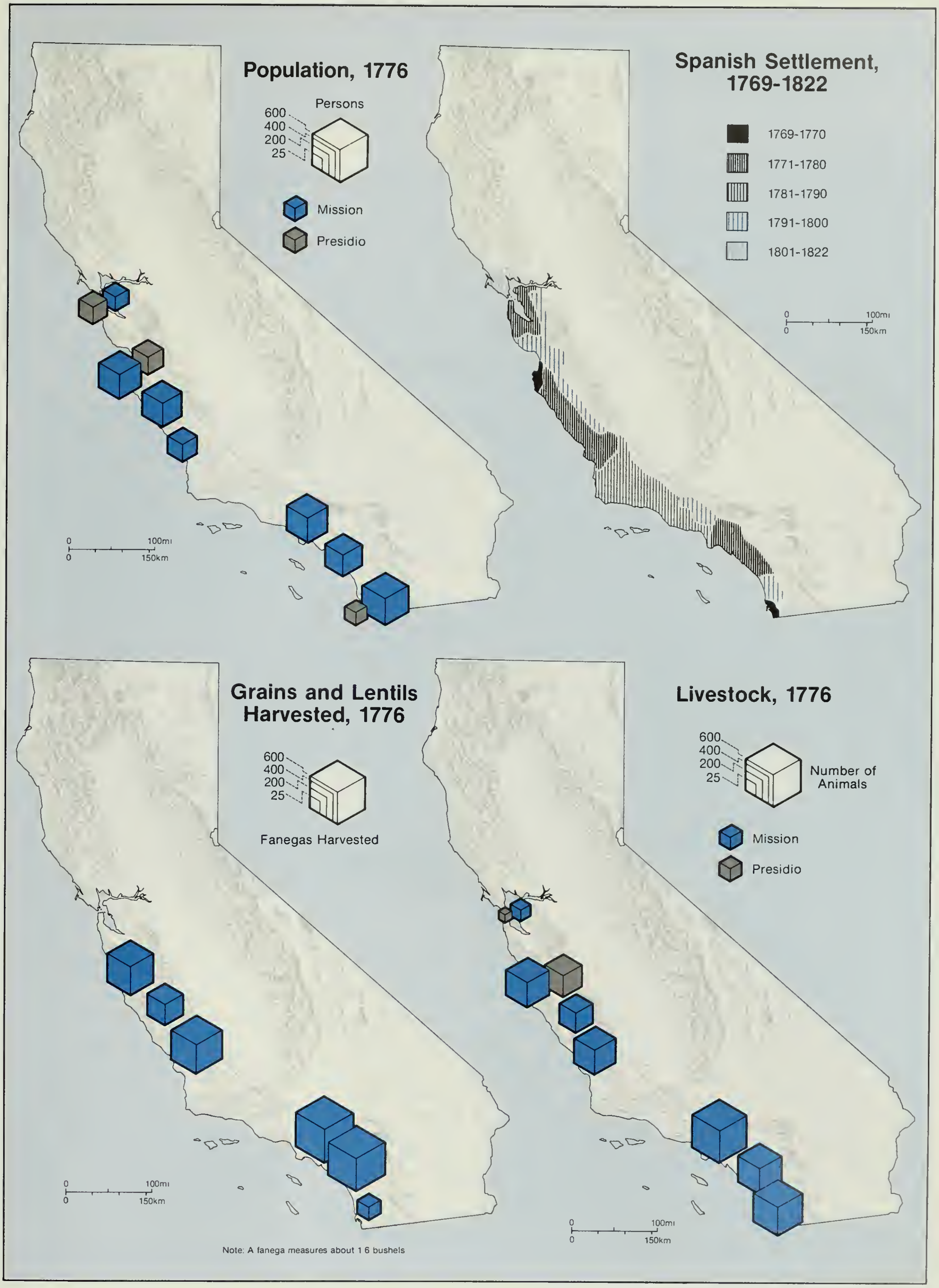
Isolated in a new environment, soldiers and missionaries found themselves groping to solve unfamiliar problems. In 1770 there were fewer than 50 soldiers and only a handful of missionaries, too few to make more than a feeble effort to occupy the land. Equipment, food, and labor were in short supply or nonexistent. It was originally expected that the local Indians could be relied upon for labor and food as was the custom on earlier Spanish frontiers. The California Indians proved to be a surprise; they had no building or agricultural skills and therefore could not be relied upon immediately to provide food or labor. The mission-presidio combination that had worked so well on other frontiers had to be adapted to fit local conditions.

The missionaries were not trained to teach agriculture or, for that matter, any of the trades. The military, therefore, was called upon to serve as temporary laborers and farmers. Many of the soldiers, however, knew little more about farming and building than did the missionaries. By 1773 Spanish settlement was in dire straits: little progress had been made in building missions, and crop production was low. The few Indian neophytes the missionaries had won over were required to comb the fields for food. The problems with food shortages and lack of laborers, combined with an unfamiliar environment, proved difficult to resolve. By the end of 1773, there was little to show for four years of effort; the two presidios and five missions were scarcely more than tenuous signs of occupation. Recognizing the problems, Spain attempted to resolve some of the difficulties. In 1774 Spain began to send laborers, civilian colonists, and more soldiers and made an attempt to expand the supply system.

The additional soldiers and new colonists added the final element that was needed to solidify Spain's hold on the Pacific Coast. With auxiliary labor, harvests at the missions began to improve. Existing settlements were strengthened, and new settlements started around San Francisco Bay. Although lean years loomed ahead, the early years of trial and error were coming to an end. With a steady food supply, the missions could attract more Indians, thereby enlarging their labor pool and, in turn, increasing their agricultural production. By 1775, the ability of the missions to provide their own food was no longer in doubt.

By 1776 permanent patterns of Spanish settlement had begun to take shape. Three presidios and seven missions had been founded in the areas surrounding Monterey and San Diego. The influx of colonists had increased the population to between 300 and 350, including 19 missionaries and 160 soldiers. Early missionary efforts were beginning to result in a steady increase in the neophyte population.




Population, 1776
Persons
600
400
200
25
Mission
Presidio
0 100mi
0 150km
Spanish Settlement, 1769-1822
1769-1770
1771-1780
1781-1790
1791-1800
1801-1822
0 100mi
0 150km
Grains and Lentils Harvested, 1776
600
400
200
25
Fanegas Harvested
0 100mi
0 150km
Note: A fanega measures about 1 6 bushels
Livestock, 1776
600
400
200
25
Number of Animals
Mission
Presidio
0 100mi
0 150km

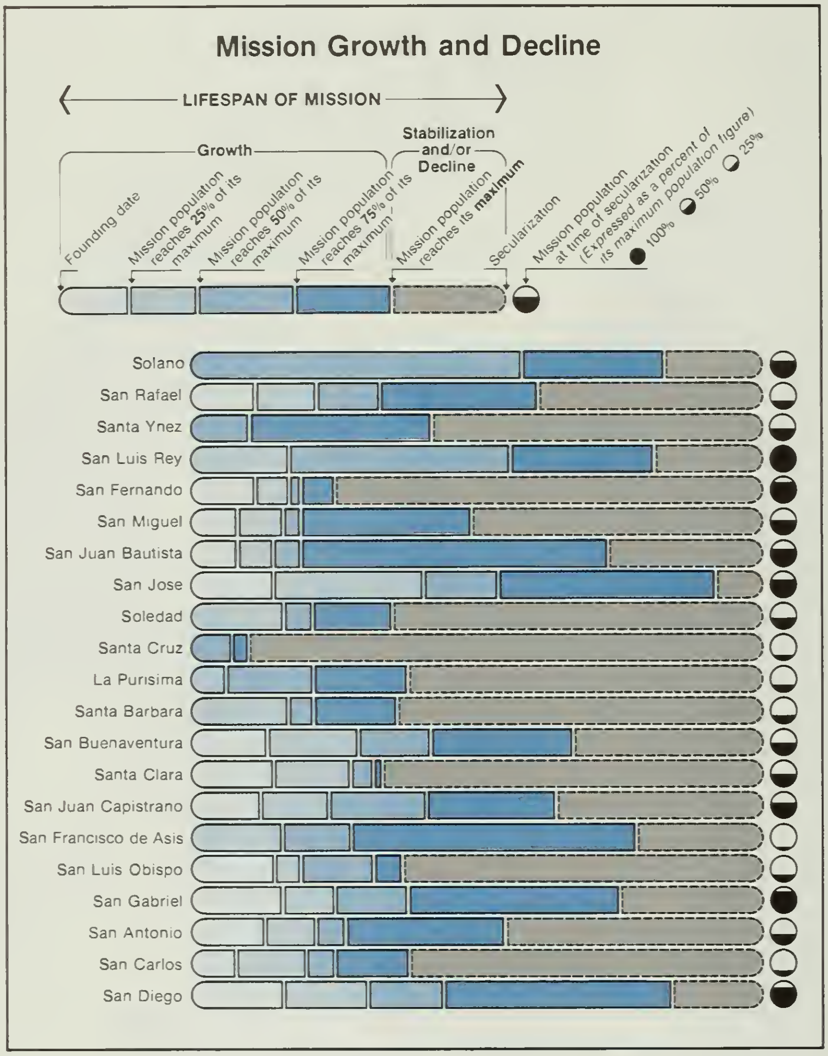
POPULATION OF THE CALIFORNIA MISSIONS

The mission system introduced to California brought Indians into contact with Spanish culture by grouping them into self-sufficient communities under the direction of missionaries. The Franciscan missionaries attempted to remake Indian communities into tightly woven, religious-oriented social and economic units through a gradual modification of Indian behavior. Each California mission then became a microcosm of Spanish culture, where missionaries supervised and guided cultural change.

The missions were to be secularized (discontinued) when the Indians had received sufficient training in Christianity and Spanish culture to allow them to become active citizens in Spanish society. However, the Franciscan order remained active for 65 years in California, well beyond the original expectations of how long it would take to acculturate the California Indians. The missionaries found it difficult to release their charges; they argued that the Indians had not made much progress and were like children who had to be nurtured along to Christian maturity before they could permanently leave the missions. However, in 1834 the missions were secularized, not because their task was completed, but as a direct result of increased demands for land and labor from an increasing civilian population.

Not all missions were equally successful in their attempts to persuade the California Indian to undertake the difficult task of becoming a Christian subject of the Spanish Crown. Population growth varied among missions and is difficult to assess because of varying founding dates and locations. However, if population growth is measured according to when each mission reached its maximum population, and is then placed on a constant time scale, similar patterns can be seen.

Interestingly, it appears that all missions reached from 20 to 25 percent of their maximum population at approximately 20 percent of their life span, but thereafter fell into one of three patterns of growth and decline. One group of missions displayed a slow growth, reaching a maximum population at from 75 to 80 percent of their life span, and at secularization had retained more than 75 percent of their maximum population.



San Diego and San Jose are examples of this pattern. A second group of missions, illustrated by San Antonio and San Miguel, exhibited a moderate growth. Each mission in this pattern reached a maximum population at about 50 or 55 percent of its life span and generally retained about 50 percent of its population when secularization occurred. The last group of missions, including San Carlos and Santa Barbara, showed the most rapid growth, reaching a maximum population at between 30 and 35 percent of their life span, and at the end of the mission period contained less than 25 percent of their peak population.

Many of the missions were never able to attract any substantial numbers of Indian converts; others far exceeded expectations. The problem in identifying successful and unsuccessful missions is masked in the overall growth of the mission system, which reflected a positive growth trend for 55 years. The annual mean population of all of the missions increased every year until 1805, dipped slightly through 1811, remained relatively constant through the early 1820s, and then declined rapidly until 1834. The population growth through 1805, however, resulted from the founding of new missions rather than from an increased population at existing missions. Out of the 19 missions founded by 1805, 10 had

California State Library

Mission Santa Barbara

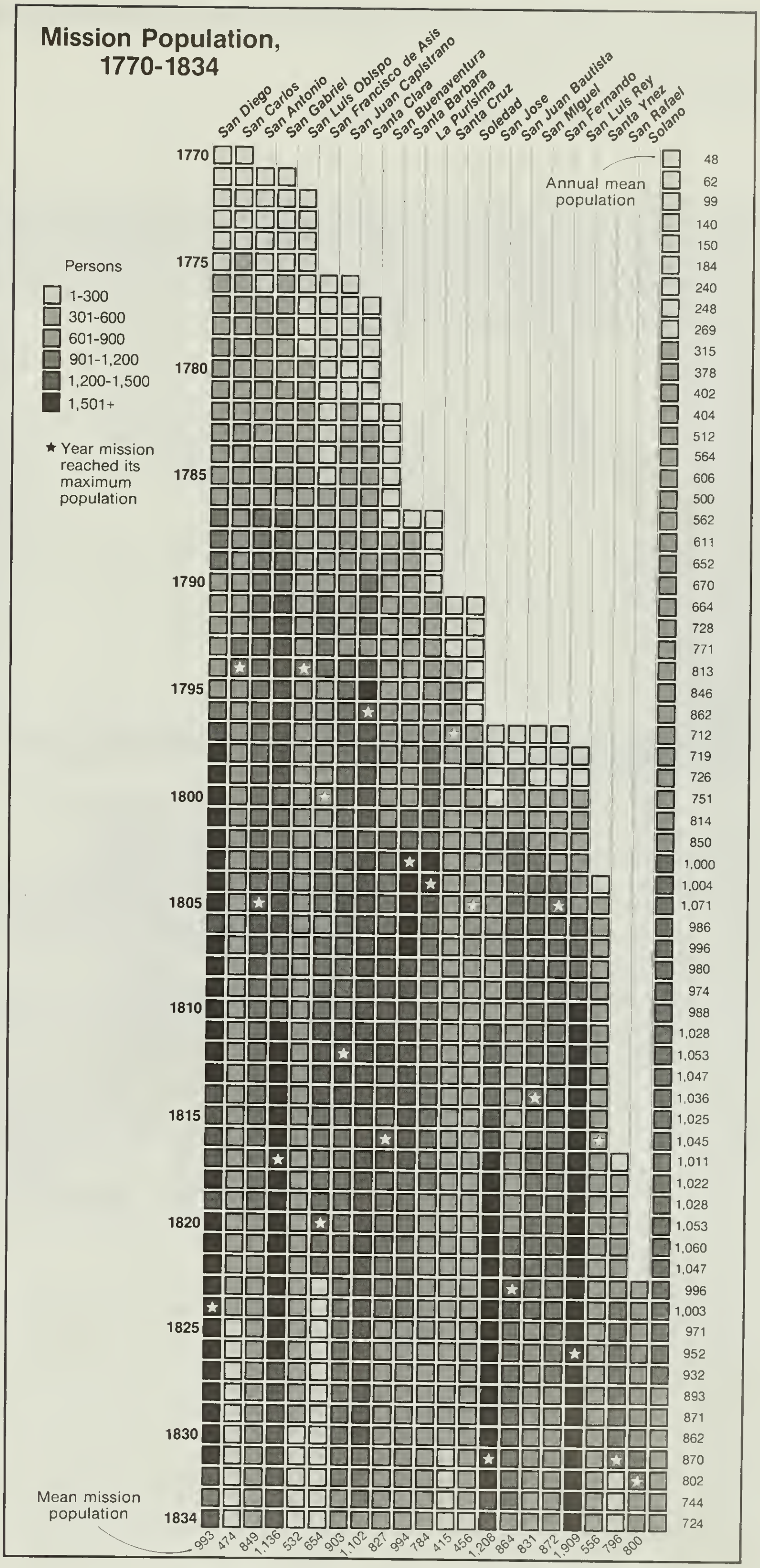
already reached their peak population and were beginning to decline. The growth that occurred after 1805 happened at only a few missions, notably Santa Clara, San Gabriel, San Jose, and San Luis Rey.

The ebb and flow of individual mission populations greatly concerned the missionaries. Those missions not able to draw and retain Indian converts over a period of time lacked a steady supply of labor to build and operate the mission. Consequently, without long-term population growth, a mission would not be able to carry out its duties without aid and support from more successful missions.

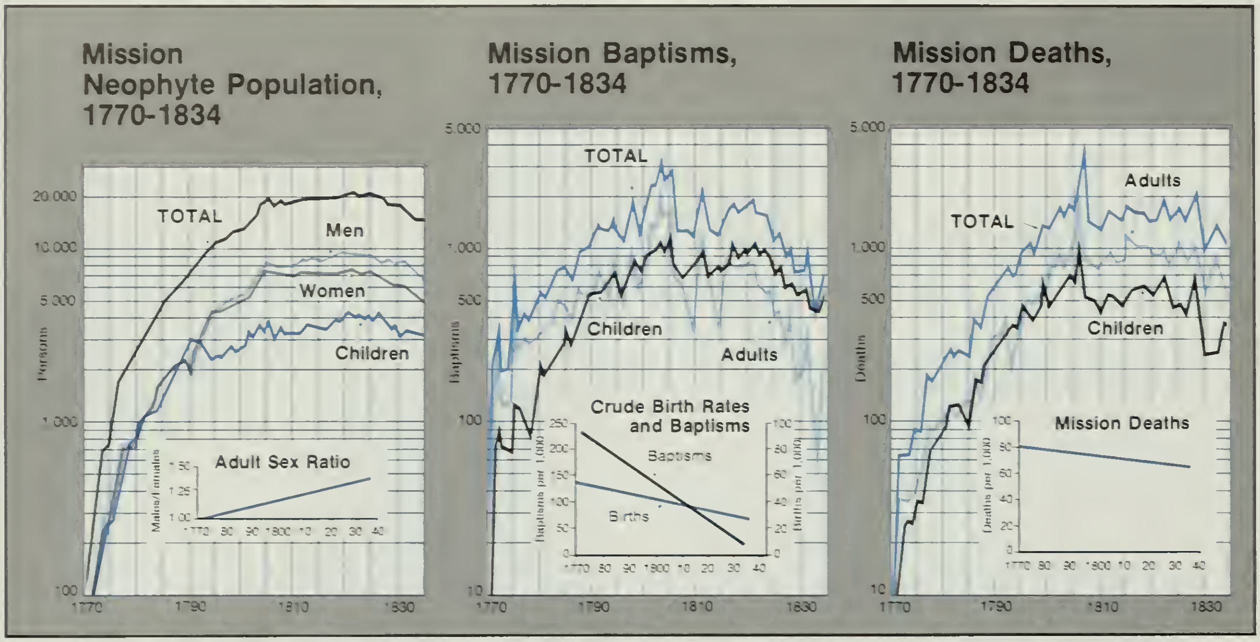
Regional variations in Indian population densities, along with differences in resource availability, accounted for much of the population disparity among missions. Population growth was also affected by social and economic problems such as disease, runaway Indians, and poor management. However, those missions located in Southern California, beginning with San Fernando, appear to have had the least difficulty in coping with those problems and were able to establish and maintain a viable population base. As a group, the Southern California missions were the most successful in achieving the social and religious goals that had brought the Franciscan missionaries to California.

Mission San Gabriel

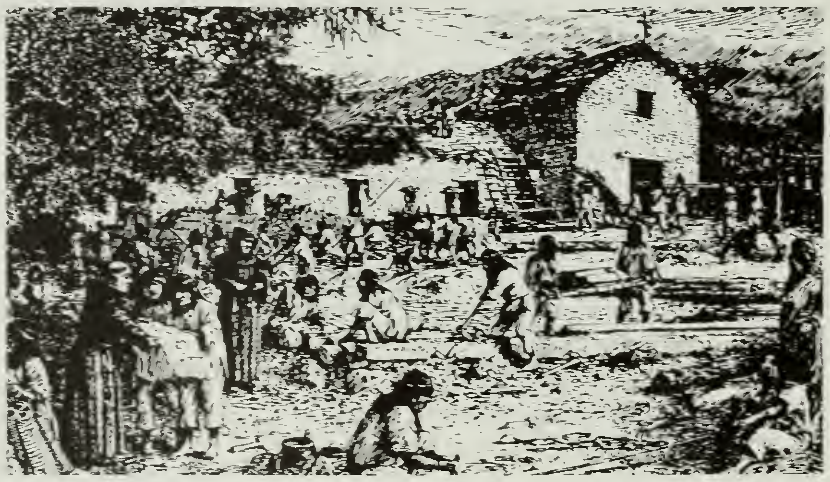
California State Library



DISTRIBUTION OF MISSION INDIANS



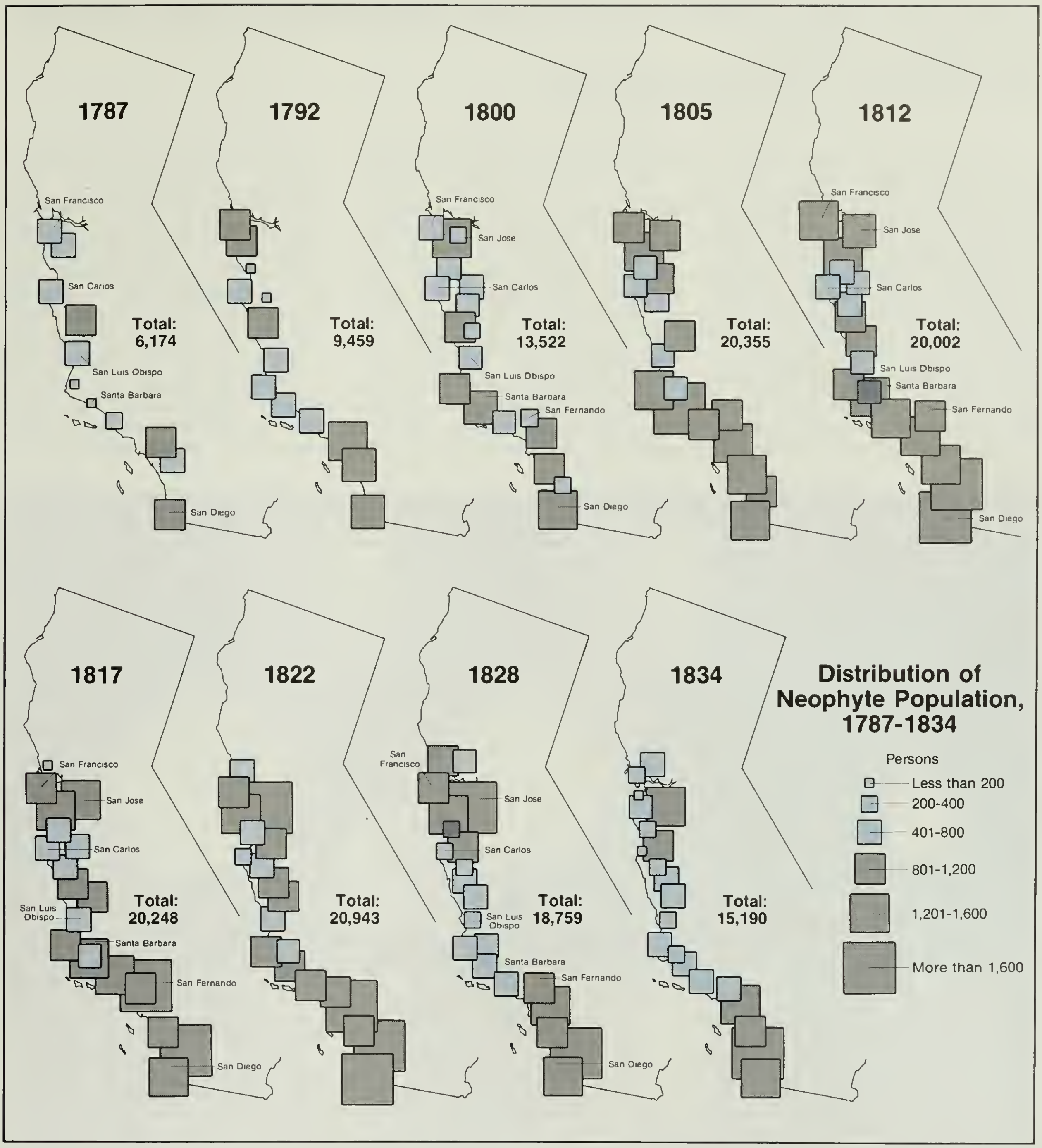
In California Hispanic society, the missions were considered temporary institutions to be moved to other frontiers once the job of Christianizing the Indian was completed. For the California Indians, however, there was nothing temporary about the mission. Once admitted to the missions, Indians were considered to be neophytes—beginners in learning Christianity and Hispanic culture—and had to remain within the mission community until they were ready to take part in the daily affairs of society. But few, if any, neophytes left the mission as functioning members of Hispanic society; rather, the chances were that a neophyte would never leave the mission.



Neophyte Indians working to build a mission

The enthusiasm that fostered the founding of missions in California quickly faded in the face of difficulties encountered in attracting neophytes. Initially, missions were able to recruit neophytes from local Indian tribes, but those sources soon became exhausted. The missionaries began to extend their search for new members into an ever-widening circle. Areas along the coast inaccessible for one mission but with a large Indian population were served by founding another mission. Through adding new missions and consistently expanding the recruiting area of each mission, the missionaries were able to report a dramatic increase in total neophyte population through the early part of the nineteenth century. By that time there were no large Indian populations remaining along the California coast (most of the Indians had been brought into the missions), and to maintain neophyte levels, missions with easy access to the Sacramento and San Joaquin valleys and to the Colorado desert began recruiting neophytes from those areas.

The number of neophytes at each mission was determined by the conversions and births within the mission. Throughout the mission period, 1769–1834, approximately 85,000 Indians were baptized by the missionaries (55,000 conversions and 30,000 mission births). During the early mission period, 1769–1795, conversion was by far the most important factor in increasing the neophyte population, but as it became more difficult to recruit from local sources,



missions came to depend on births as a source of neophytes. In most of the missions, the number of conversions began to decline by 1800, but births continued to increase until 1821. Between 1770 and 1780 the ratio of conversions to births was 6½ to 1. By 1800 this ratio had dropped to 2½ to 1, but by the early 1820s the ratio of conversions to births had changed to 4/5 to 1. While conversions and births acted at different times to increase or maintain mission population, deaths and desertions reduced the population. The average time a neophyte remained within a mission was only 8.4 years.

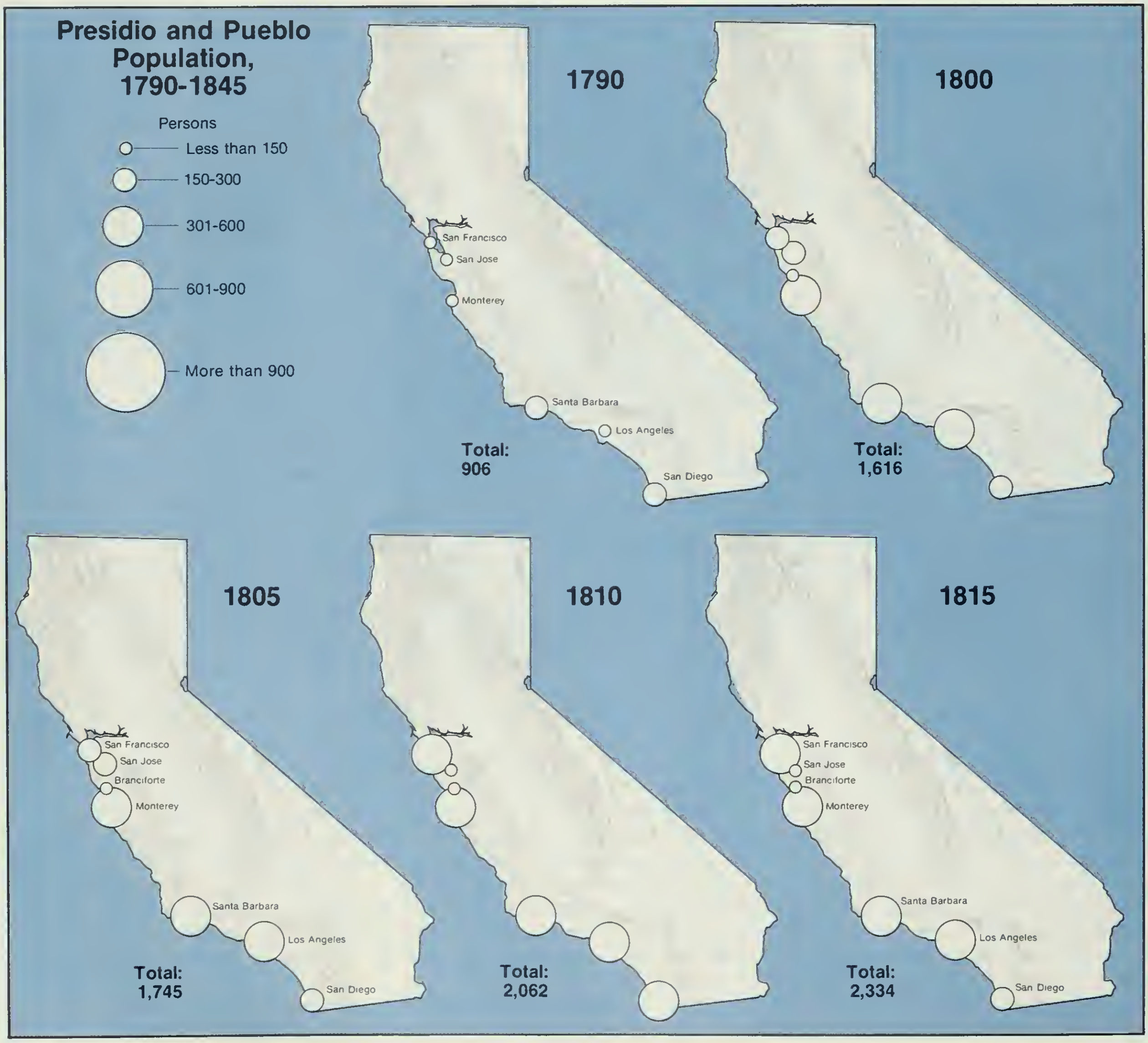
Although decline of the neophyte population was a serious problem, it did not affect all of the missions at the same time nor at the same rate. Changes in the neophyte population pattern illustrate that missions with relatively easy access to Indian tribes in the interior valleys were able to maintain—and in some instances increase—the number of neophytes, at least through the early 1820s. The missions were to aid the Indians, but they caused a substantial decline in the Indian population. At the end of the mission period, the coastal area from San Francisco to San Diego had no remaining aboriginal Indians, and many tribes in the interior area had been substantially reduced in size. Sixty-five years of missionary efforts resulted in fewer than 15,000 neophytes in 1834.

PUEBLO AND PRESIDIO POPULATION

The constant fear of foreign encroachment spurred Spain on to encourage civilian settlement in California. However, population growth was a slow and unsteady process; isolation, hardships, and irregular supply lines made it difficult to attract volunteers to the California frontier. The first colonists arrived in two planned colonizing operations. Fernando de Rivera y Moncada brought 51 colonists to California in 1774, and Juan Bautista de Anza arrived with 240 colonists in 1776. The colonists in both expeditions came to California at government expense and were expected to solidify Spain's tenuous hold on California.

By 1800 three pueblos (permanent civilian settlements) had been founded in California: San Jose in 1777, Los Angeles in 1781, and Branciforte (present-day Santa Cruz) in 1797. San Jose and Los Angeles were agricultural communities. Branciforte was established as a villa, a chartered frontier settlement, and was to serve as a center for local manufacturing as well as a source of military support to the presidios. The new villa was to be inhabited by soldier-settlers who were to be well versed in trade and manufacturing. Despite all of the good intentions and lavish support given to Branciforte, it never achieved the stature or success of San Jose or Los Angeles. Branciforte attracted few of the skilled artisans it needed because it was heavily populated by convicts and undesirables.

After the founding of Branciforte, no new civilian towns were founded, and no significant immigration took place until 1834. After Mexico's independence from Spain in 1821, Mexico attempted to so-

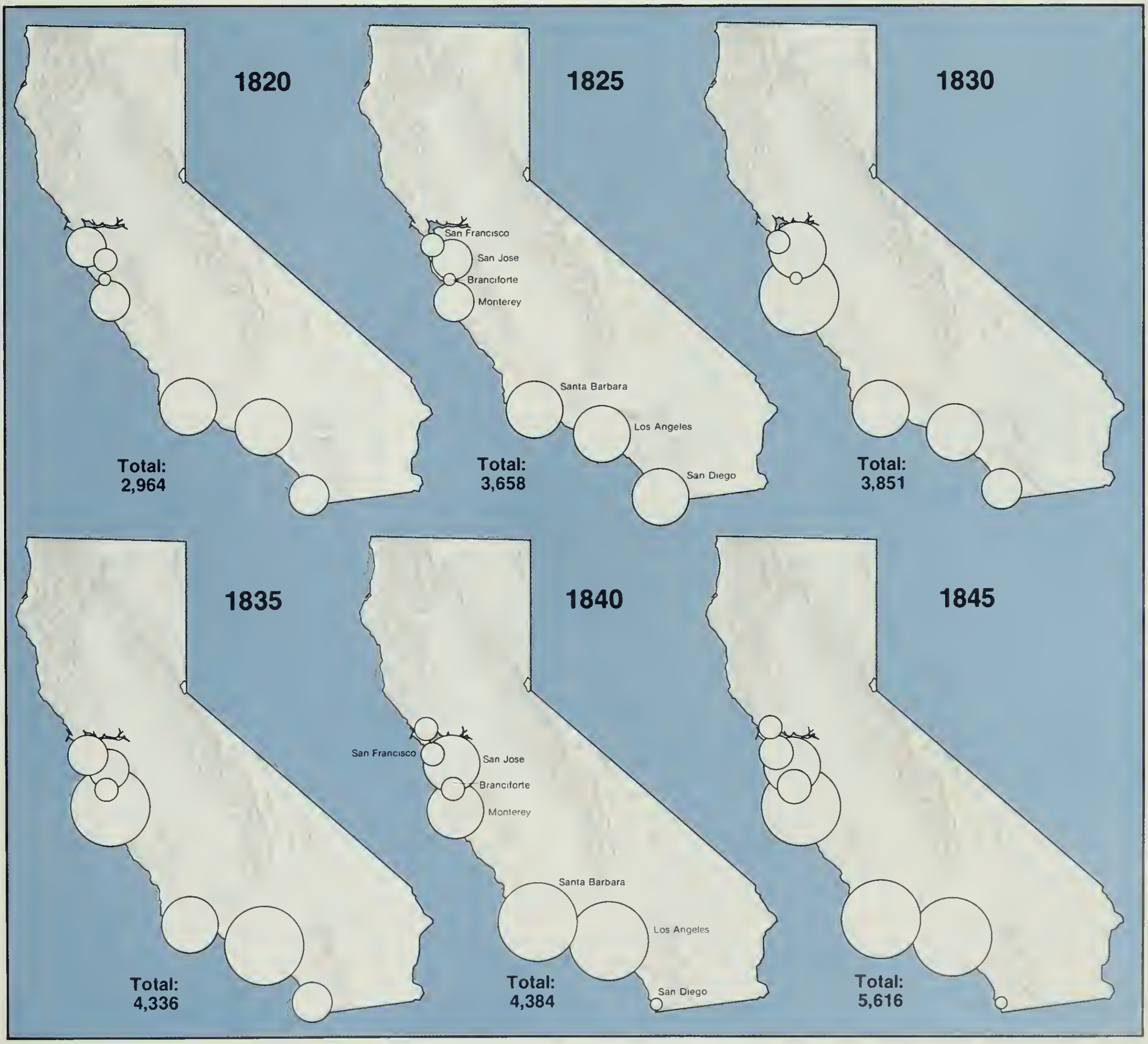


lidify its hold on California by expanding settlements. In 1834 the Mexican government sent the *Hijar-padres* colony to California. This group of 239 colonists was selected to expand agriculture, enlarge trade, and develop manufacturing. Although the enterprise was well planned at the outset, a conflict between California residents and newcomers developed; in addition, the Mexican government withdrew its support after the colony arrived in California. These problems prevented the colonists from achieving their initial goals. A few of the colonists returned to Mexico, but most remained and took up residence throughout California.

Initially the presidios were military forts, but they slowly began to attract civilian settlers as retiring soldiers took up residence with their families outside the presidio walls. Monterey, the capital and main California port, attracted the largest number of civilian settlers during Spanish rule. Under Mexico, the presidios were gradually converted to presidial towns because of the increasing civilian population. By the early 1830s Monterey and Santa Barbara were, for all practical purposes, civilian communities with a military attachment. The presidial towns were also attractive to foreign settlers. In 1830 there were 120 foreigners in California. By 1835 the number had risen to 240, and in 1840, 380 foreigners had settled in California.

California's tenuous existence during the early years of Spanish settlement was reflected by its slow growth. In 1790 California had only 900 soldiers and civilian settlers, with almost 60 percent of the population residing in the south. The Spanish population was overwhelmingly military, with 80 percent located in the presidios, primarily Santa Barbara. By 1800 Monterey and Los Angeles had grown substantially, and both rivaled Santa Barbara as the largest nonmission settlements in California.

With the opening of California to legitimate foreign trade in 1823, Monterey became the port of entry and almost doubled its population between 1825 and 1830. The increased economic activity focused on Monterey also stimulated population growth in the surrounding settlements. By 1830 the population was almost evenly divided between Northern and Southern California. Between 1830 and 1845, the population of Monterey, Santa Barbara, and Los Angeles increased rapidly; in 1845 Los Angeles was the largest settlement in California.

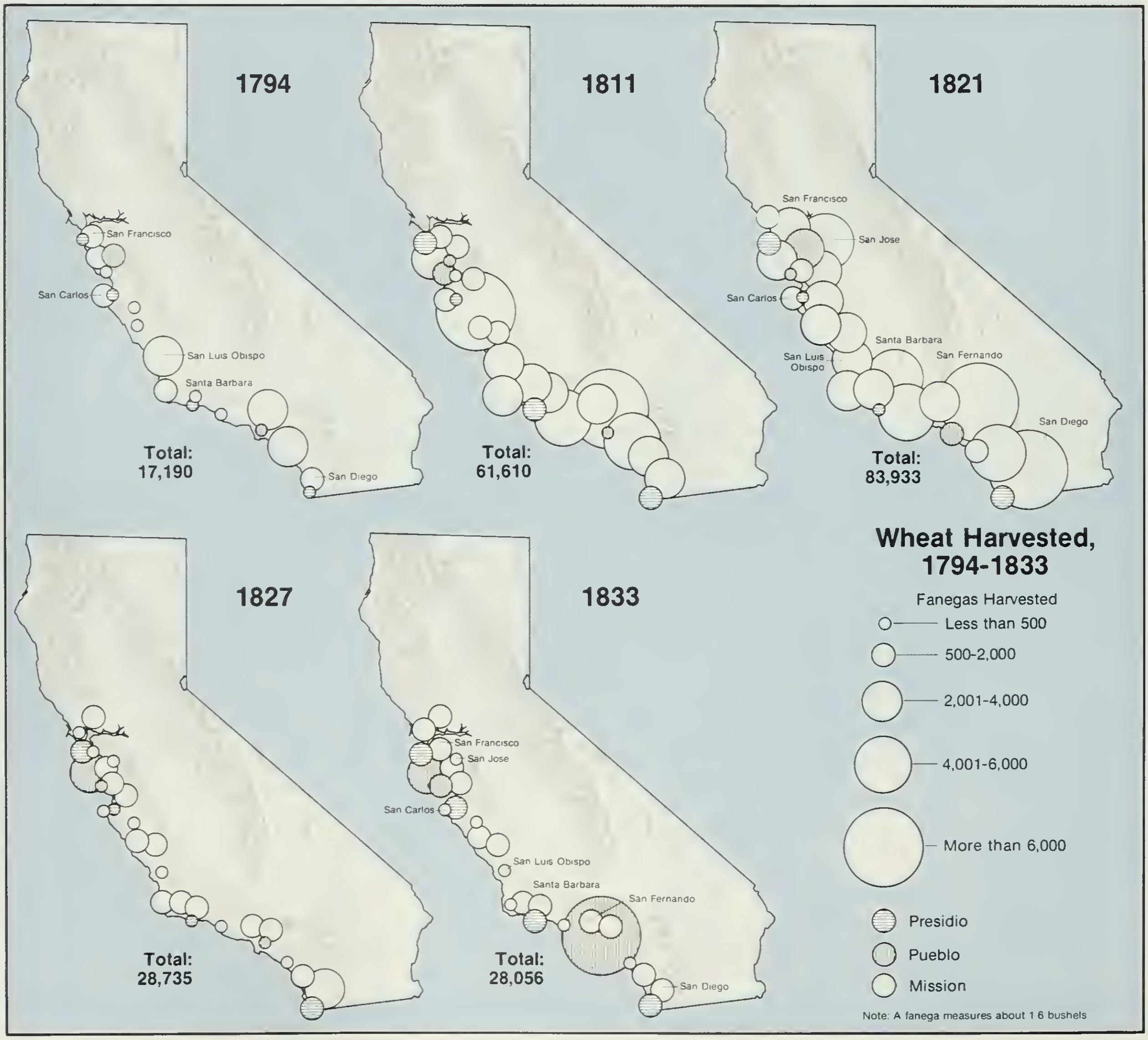


MISSION AGRICULTURE: WHEAT AND MAIZE

Success in agriculture and livestock production was the foundation that supported mission expansion in California and, during many years, maintained civilian and military settlements as well. Between 1780 and 1800, annual harvests of staple crops increased sevenfold, in part because of the founding of new missions, but also because some missions (such as San Diego and San Antonio) were relocated to areas better suited to farming, rudimentary irrigation systems were started, crops were adjusted to local climates, and most important of all, an adequate labor supply was available.

Early mission agriculture centered on planting staple crops that consisted of varying mixtures of wheat, maize, and barley. The quantity of each grain planted and harvested depended on the amount of planting seed available from the previous year's harvest and local weather conditions. Wheat was the most important grain crop, and both spring and winter varieties were planted. Wheat harvests usually accounted for more than half of the total grain harvested at each mission; yields were reliable and did not fluctuate as widely as did the yields of other grains. The most important factor favoring wheat as the primary staple grain was a preference for wheat over the other grains, and missionaries made conscientious efforts to increase production whenever possible.

Wheat proved to be somewhat adaptable to California's semiarid climate but was not the ideal grain crop for each mission. Its average yield was 15 to 1, while maize averaged 109 to 1. Also, maize usually needed only 1 percent of



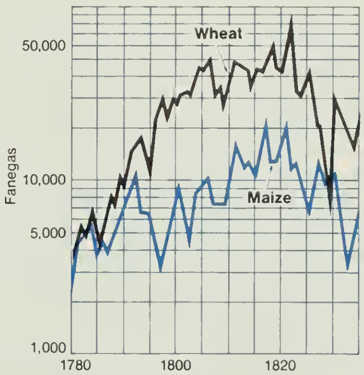
the harvest to be saved for next year's planting, while wheat required at least 7 percent saved for seeding. Northern coastal missions had low yields because high humidity often caused the wheat to rot on the stalks. In a dry climate, however, wheat had an advantage over maize because it could tolerate a lack of water for longer periods.

Maize, or corn, was the second most important staple crop and usually accounted for about 25 percent of total grain harvested. Maize was especially suited to the humid areas with long growing seasons along the California coast. Missions Santa Barbara, San Buenaventura, and San Gabriel were exceptional producers of maize. Because of its high yield, maize was especially well suited for the missions, particularly after irrigation was established. However, the planting of maize usually reflected the size of wheat yields in the previous year: if wheat yields were down, the amount of maize planted the next year was increased. Maize was the grain most often traded to passing ships and to the presidios, while wheat was kept for consumption at the mission.

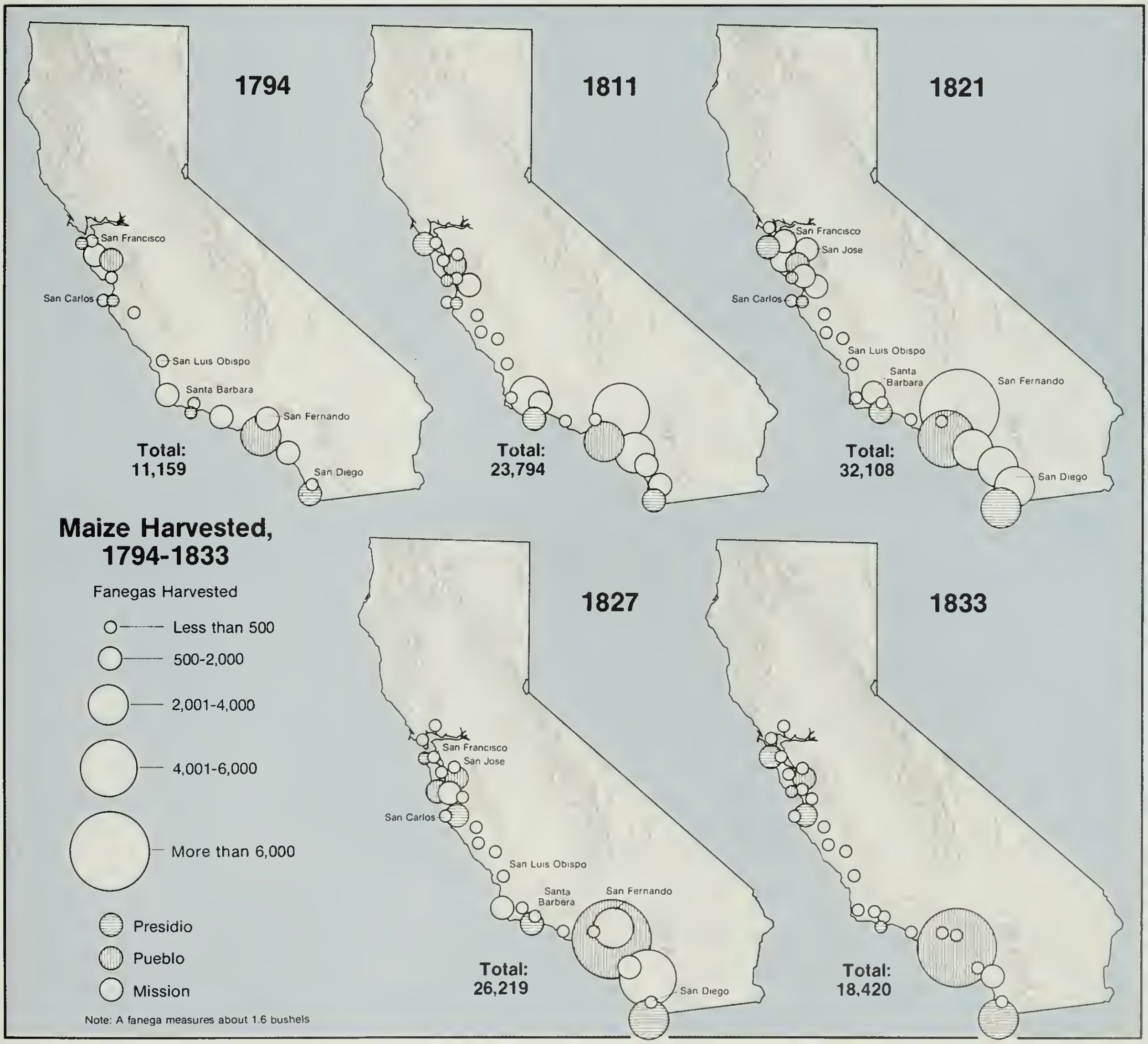
By 1815 most missions had completed an irrigation system in response to the semiarid climate and to a series of earlier droughts. With access to a constant water supply, missions were able to intensify and expand cultivation of vegetables and fruit trees and substantially increase wheat and maize yields.

Agricultural production was an integral part of the missions' goal to acculturate the California Indian. As mission populations began to decline, wheat and maize cultivation also declined.

Mission Wheat and Maize Harvest, 1780-1835



Maize Harvested, 1794-1833



Note: A fanega measures about 1.6 bushels

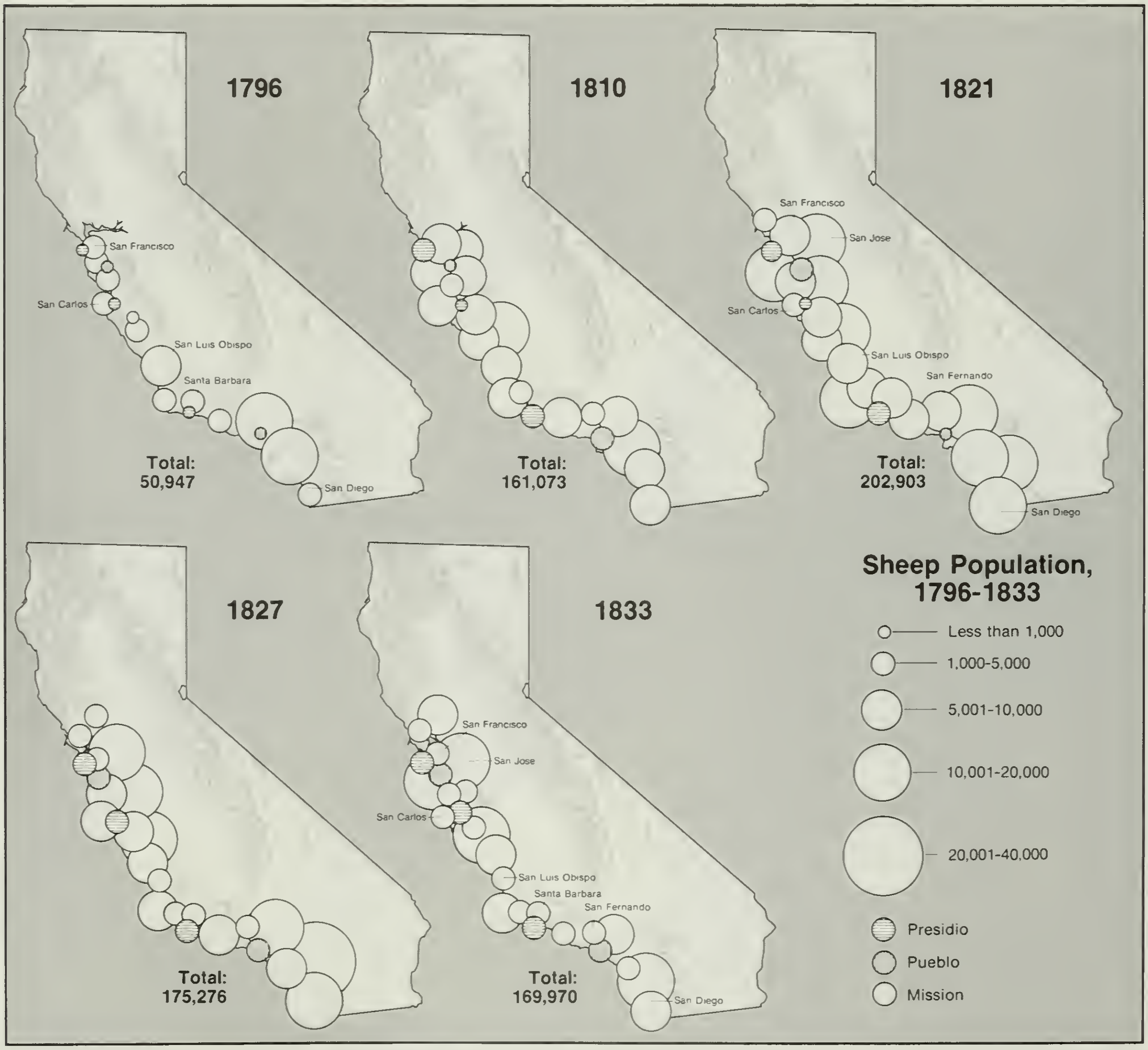
MISSION LIVESTOCK: CATTLE AND SHEEP

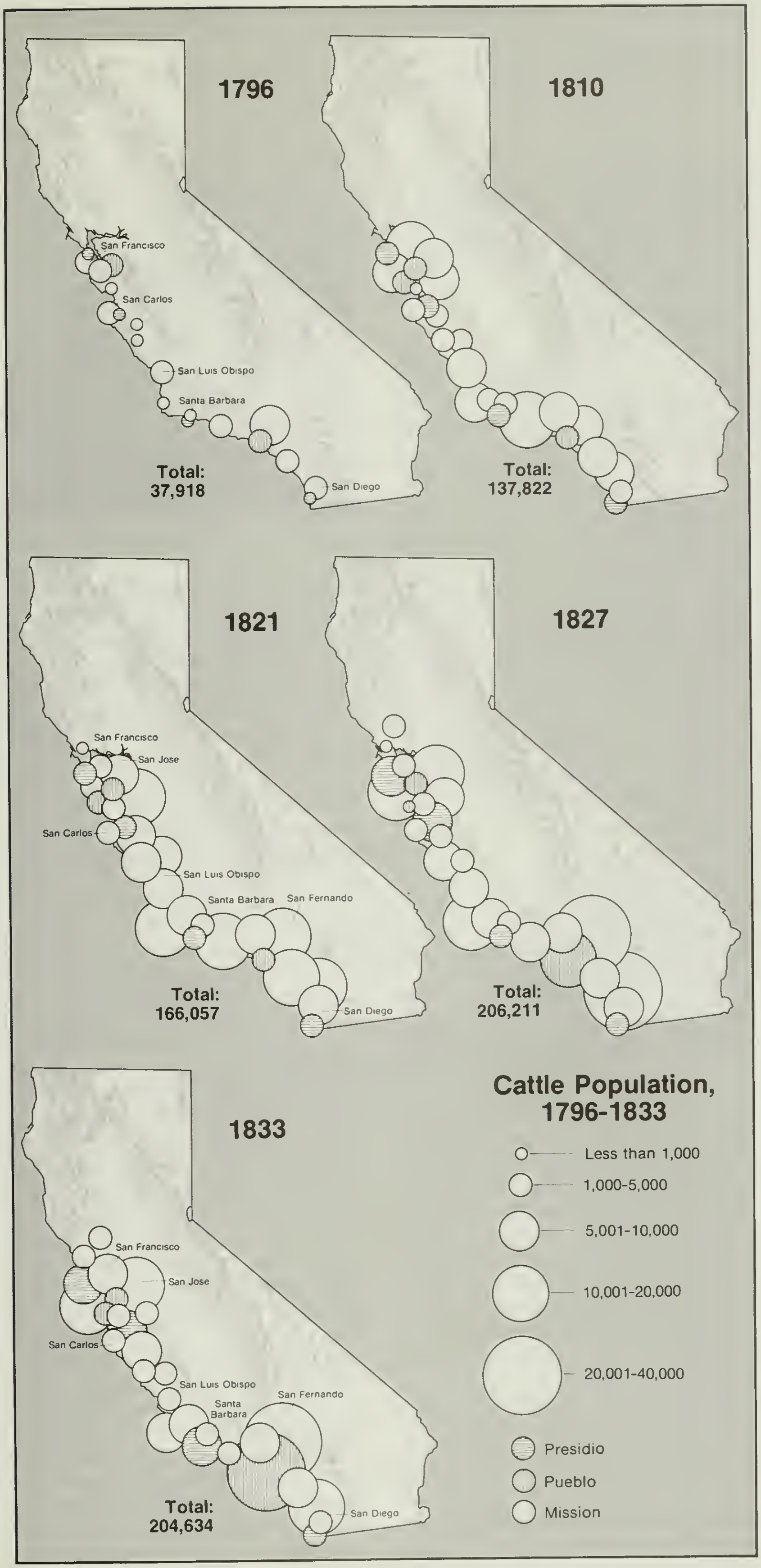
Livestock was an integral part of mission agriculture. Draft animals were needed to plow the fields, thresh harvested grains, and carry supplies among missions. Fleece, hides, and tallow taken from the animals provided the raw materials for clothes, leather products, soap, and candles. Mutton and beef were sources of protein and provided alternative dietary supplements whenever there was a widespread decline in wheat and maize yields.

The first substantial numbers of livestock in California came with Captain Fernando de Rivera y Moncada's 1769 expedition. Along with supplies, he brought 187 mules, 53 horses, and 204 head of cattle. Smaller animals were gradually incorporated into mission livestock herds, many arriving with the yearly supply vessel from San Blas, Mexico. From this small beginning livestock expanded rapidly, and by 1785 sheep and cattle numbered over 6,000 head each.

Unlike agricultural crops, livestock required little attention; herds were allowed to freely pasture throughout the year with only a few animals kept near the mission for domestic uses. Abundant pasture, a mild climate, and available water allowed mission livestock to increase substantially. By 1800, sheep had increased twelvefold since 1785, while the number of cattle had increased eightfold. The abundance of livestock reported by the missionaries after 1800 was probably based on estimates rather than on actual head counts; therefore, the number of mission livestock may be grossly over- or underestimated.

In numbers, horses followed sheep and cattle and were used—along with





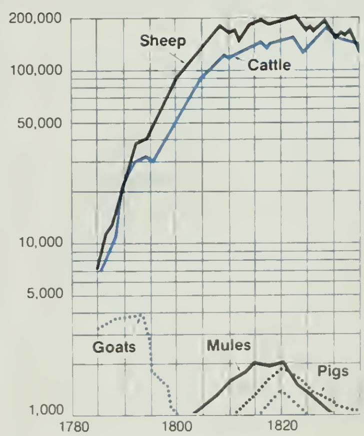
Cattle Population, 1796-1833

oxen and mules—as draft animals. Horses increased so rapidly that by 1800 many missions were slaughtering them to preserve pasture for cattle and sheep. Minor livestock such as goats and pigs were never an important part of mission livestock because they required too much attention, and many missions stopped raising them after 1810.

The distribution of cattle and sheep in California reflected climate and resource availability rather than livestock management or preference. During the mission period, sheep production gradually shifted toward the northern missions, where local weather conditions were more conducive to raising sheep. On the other hand, cattle appear to have been more numerous in the southern missions.

While all missions raised both cattle and sheep, cattle raising became the primary economic activity of the missions. Under the more liberal economic policies of Mexico, California was opened to foreign trade. In response, mission livestock herds, especially cattle, increased substantially after 1822. The abundant cattle provided an ample supply of hides and tallow that were traded outside of California for manufactured goods needed at the missions. The increased use of hides and tallow as commercial items was a significant boost to the economic development of the missions. The last official estimate of mission livestock made in 1834 listed almost 140,000 head of cattle, 130,000 sheep and over 15,000 head of horses and mules. It appears that the missionaries were more successful in grazing commercial livestock then in attracting and acculturating the California Indian.

Mission Livestock, 1785-1835



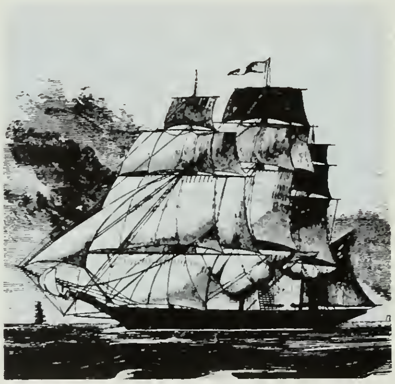
TRADE AND ECONOMIC GROWTH

Although the California frontier was far removed from Spain, its economic organization was based upon the Spanish system of mercantilism: colonial economies were to be kept in a state of dependency that would complement and supplement Spain's economic growth at home. Spain's economic policies had little effect on California through the mid-1780s because few surpluses of such quantities were produced that would interest private traders. In any case, private trading, either foreign or Spanish, was not allowed. Only officially sanctioned trade between Mexico and California was permitted, and then only with vessels from the port of San Blas, Mexico. The economic development of California might appear somewhat cautious, but it must be remembered that the colonization of California was an attempt to stem foreign aggression and a cooperative effort between three frontier institutions—presidio, mission, and pueblo—each with a specific task. The California frontier was viewed as a self-sufficient holding action and a Christianizing effort rather than as a supplier of trade goods and raw materials that would increase the Spanish treasury.

The initial procedure to support Spain's colonizing efforts in California was to send supplies by ship from San Blas, Mexico, to the military, who would allocate goods to the missions. Needless to say, this procedure caused friction between the military and clerics and was changed in 1774 to allow the missions direct access to the supply ship. The missions worked out a system whereby orders for supplies were sent to their home college of San Fernando in Mexico, where a representative would purchase the items and have them shipped to individual missions, economically independent of the military.

The economic separation of presidio and mission soon led to an intricate trade scheme that encouraged internal trade and reduced direct Spanish government support of California. Greater familiarity with local environments enabled the missions to produce substantial surpluses of agricultural products. These surpluses were used to expand the number of missions and increase the size of the neophyte population, which increased the size of the labor force and, in turn, produced more surpluses. Rather than continue to incur high transportation costs, the government allowed the military to purchase needed supplies from the missions by issuing warrants, or chits. The missions would send military warrants to the college of San Fernando where they would be redeemed at the treasury and credited to their accounts. The missions then could purchase needed manufactured goods in Mexico against their accounts.

The inefficient and sporadic nature of the supply system between Mexico and California, and the inability of the missions to consistently produce surpluses, especially during the 1770s and 1780s, led to the founding of civil communities to supplement military needs. Pueblos, founded at government expense, were supported by annual government stipends to individual colonists. Payment consisted of supplying the military with surplus agricultural products. Each presidio was to have a store where colonists could purchase manufactured goods; however, items requested by the colonists were consistently in short supply, and when supplies were available, the military charged high prices for them. The colonists found themselves in a similar position as the missions—buying high from the military and selling low to the only market available, the military.


California State Library

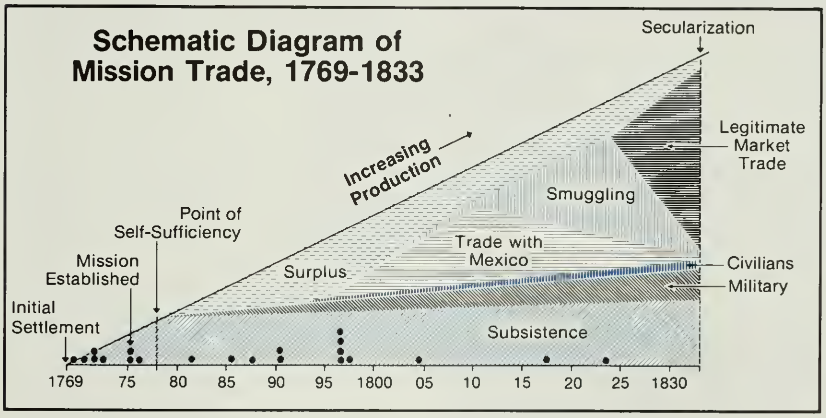
Ship sailing into Monterey Bay

In 1786, private trading was allowed in California, but was restricted to sea otter pelts, which were exchanged in the Orient for quicksilver. The venture was soon dropped because of the difficulty in obtaining large quantities of pelts and the lack of skilled people in California to prepare them for shipment. Undiscouraged, missions took notice of other commercial opportunities and began to ship small quantities of sea otter pelts, hides, tallow, and hemp to Mexico aboard the yearly supply vessel. Between 1795 and 1805 the missions were producing such large surpluses that the amount of space allotted on the supply vessel to each mission was totally inadequate for the amount the missions could export. Mission products such as shawls, blankets, fleece, hides, and tallow could have found markets in Mexico, but restricted cargo space and high transportation charges levied by the government stifled the flow of large quantities of California mission products to the Mexican market.

Agriculture and livestock grazing were

not functions of the presidios, although soldiers made some attempts to plant crops and graze cattle. Thus, much of the missions' surplus found its way to the presidios. By 1790 presidios were not requesting the supply vessel to bring food supplies or items that could be manufactured at the missions; instead, they wanted luxury items and assorted manufactured goods that could be traded to the missions. The military became the missions' only consistent market, and in time the military became dependent on the missions for food, clothing, and assorted leather goods.

The volume of trade between missions and presidios gradually increased until 1810, when the military, and to some extent the civilian population, had to rely on the missions for their survival. The year 1810 marked the beginning of Mexico's struggle for independence from Spain and the end to the regular visits of supply ships. Isolated and without wages or means to support themselves, the military extracted what they could from the missions by issuing warrants that the missions could not collect on. Civilian colonists, although more independent than the military, also became indebted to the missions. By 1815 the missions were the sole supporters of Spain's scheme to colonize its farthest frontier.



Wooden plow drawn by oxen

California State Library

By the end of Spanish rule in 1821, the California missions occupied the dual role of acculturating the Indians and satisfying the economic needs of frontier California. Out of necessity, missionaries became farmers, manufacturers, traders, bankers, and financial advisors.

In 1823 the missions were allowed to trade freely and contracted with a trading company to supply all of their hides and tallow in exchange for manufactured goods. With vast herds of cattle, the missions were able to supply large quantities of hides and tallow, which encouraged trading houses in England and the United States to engage in the California trade. By 1830 many of the missions' resources were devoted to caring for livestock for the hide and tallow trade, instead of attempting to stem the decline of the neophyte population. Missions were rapidly shifting from agrarian, self-sufficient communities to commercial farms that were land extensive and labor short.

The commercial success of the missions brought them under scrutiny from the growing civilian population. The missions held vast amounts of land in trust for their neophytes, making the new land tenure laws of Mexico almost meaningless in California. Without land to graze cattle, most civilians were kept from participating in the lucrative hide and tallow trade. The only way for the civilian population to share in California's newly found wealth was to remove the missions. Through political pressure and a liberal Mexican congress, the missions were secularized between 1834 and 1836, throwing open almost 8 million acres of prime agricultural and grazing land along the California coast.

SPANISH LAND CONCESSIONS AND MEXICAN RANCHOS

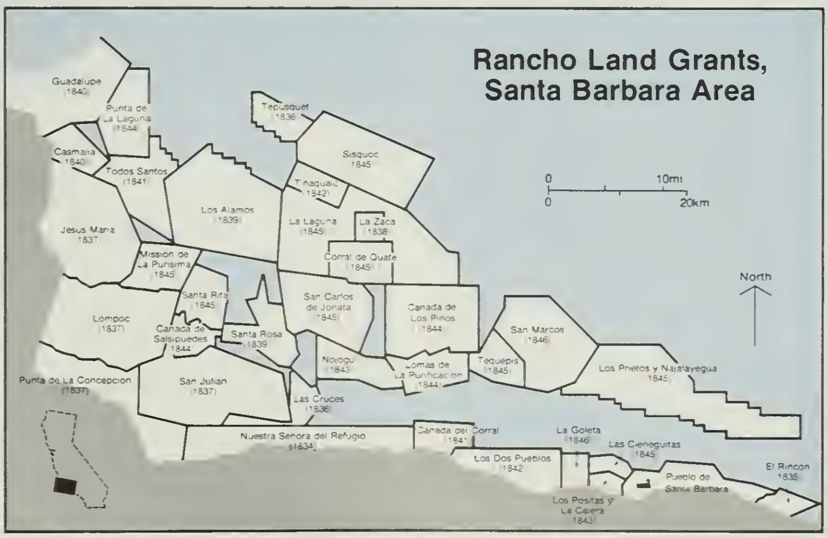
The rancho was a product of the attempts of both Spain and Mexico to colonize California. Under Spain, the rancho was not a part of the coordinated settlement scheme of mission, presidio, and pueblo. Instead, the rancho was introduced into California when former presidial soldiers petitioned the local governor for land to graze a few head of cattle. Under the Mexican Republic, however, the rancho became an integral part of a strategy to encourage settlement in California. The difference in the use of the rancho as a settlement institution by Spain and Mexico was one of ownership. Under Spain, title to California lands could be issued to individuals only on a provisional basis. In contrast, the Mexican Republic issued firm titles to individuals.

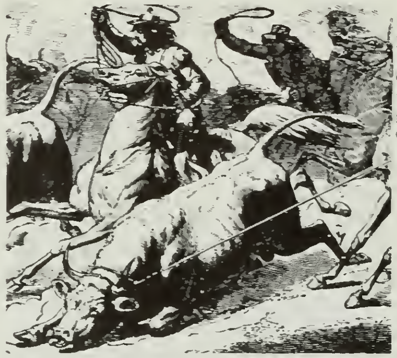
In 1784 three petitions were submitted to the governor requesting land for cattle grazing. The governor, who lacked authority to issue land concessions beyond the immediate boundaries of the existing presidios and pueblos, approved the petitions and then requested approval of his action from his superiors in Mexico. Two years later the governor's action was approved, with the condition that those receiving permits could do no injury to the existing missions, pueblos, or Indian lands. During the entire Spanish occupation of California, only 27 concessions were issued under the decision of 1786 because there was little demand for land and the missions occupied most of the best land along the coast.

In 1821 the Mexican Republic obtained all rights to the public domain that previously had been vested in the Spanish Crown. Aware of the need to stimulate agricultural development and encourage settlement along its northern frontier, Mexico opened California to trade, passed new colonization laws, and eventually secularized the missions. California residents, along with an increasing number of foreigners, mostly Anglos from the United States and England, began to take advantage of Mexico's colonization laws. By 1840 the rancho had become the predominant settlement institution in California and the most common way to acquire land.

In the years following mission secularization, the California coast was rapidly transformed into a network of livestock ranchos. Settlers living in the pueblos increasingly submitted petitions for land as did retiring soldiers, who often found it easier to obtain land than back pay. The areas in most demand were the more developed mission lands being returned to the public domain. Rancheros stocked their new land with cattle taken from the missions and used ex-mission Indians as laborers.

Approximately 800 ranchos were granted during Mexico's 25-year reign over California, most during the waning years of Mexican rule. The rancho movement began slowly, with only 20 ranchos granted between 1822 and 1832; the amount of land available for settlement was restricted because of mission settlements. Beginning with mission secularization in 1834, the number of ranchos increased rapidly; by 1836, 110 ranchos had been granted. Between 1836 and 1840 the number of ranchos expanded considerably, spreading from two nodes at Monterey and Los Angeles along the coast and into interior valleys within easy reach of the sea. By 1840 the rancho was firmly established and had spread over an area roughly equal to that controlled by the missions before secularization.

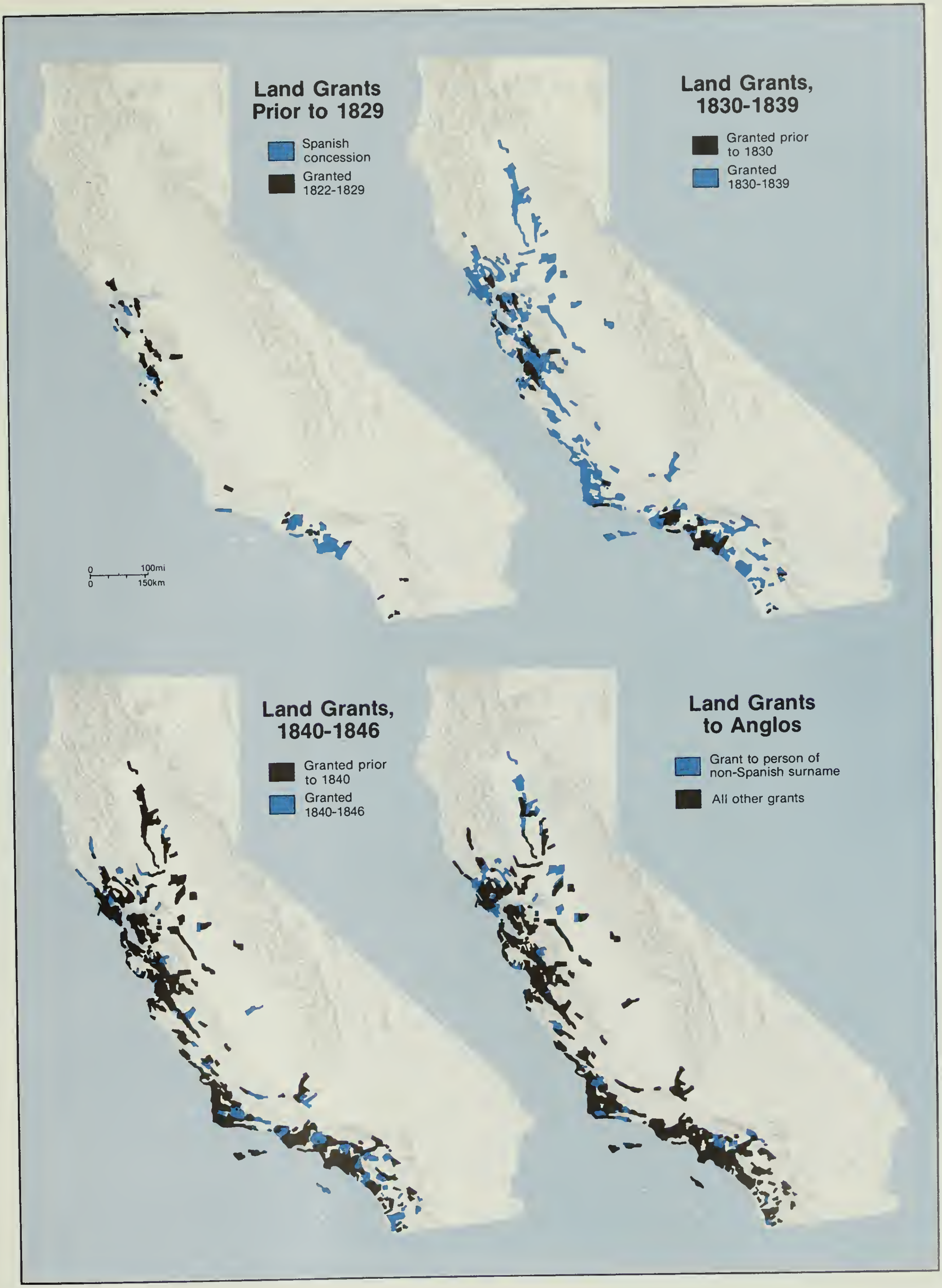




Vaqueros at spring roundup

During the last six years of Mexican rule, rancho areas increased even more rapidly, filling in the land along the coast and spreading into the Napa and Sacramento valleys. Most of this expansion can be attributed to an increased demand for land, created by a sharp rise in population and the highly profitable hide and tallow trade. Between 1840 and 1846, the non-Indian population had increased by 20 percent. Foreign immigration, especially from the United States, accounted for much of the increased population and for a significant number of rancho grants. Approximately 20 percent of all ranchos were granted to foreign immigrants.

Mexico's use of the rancho to encourage settlement marked a new, secular direction in the acquisition and ownership of land, one clearly opposite to Spain's ecclesiastical arrangement. As a settlement institution, the rancho represented a systematic attempt to impress on the land a set of cultural and economic values that would come to typify land and society in California.


Land Grants Prior to 1829
Spanish concession
Granted 1822-1829
0 100mi
0 150km
Land Grants, 1830-1839
Granted prior to 1830
Granted 1830-1839
Land Grants, 1840-1846
Granted prior to 1840
Granted 1840-1846
Land Grants to Anglos
Grant to person of non-Spanish surname
All other grants

RANCHO DISEÑOS AND THE MEXICAN LANDSCAPE

Diseños are simple sketches of rancho areas that accompanied petitions to the Mexican government for grants in California after 1828. The primary purpose of a diseño was to familiarize the governor with the area sought and to provide a basis for ascertaining that the land requested was not part of an existing rancho. Some petitioners sought new lands; others hoped to validate claims to property upon which they had already settled.

Rancho diseños demonstrate how settlers graphically represented their environments. No basic cartographic guidelines were established by the government or by practice. Sketches differed in size, averaging about 8 by 11 inches and ranging from 2 inches by 2 inches to 2 feet by 8 inches. Some diseños were drawn in ink, some in pencil, others in watercolor; a few were rendered with crayons. Map scales were omitted from many or, when included, were inconsistent among sketches.

California State Library

Rancho Piedra Blanca, San Luis Obispo County, 1840

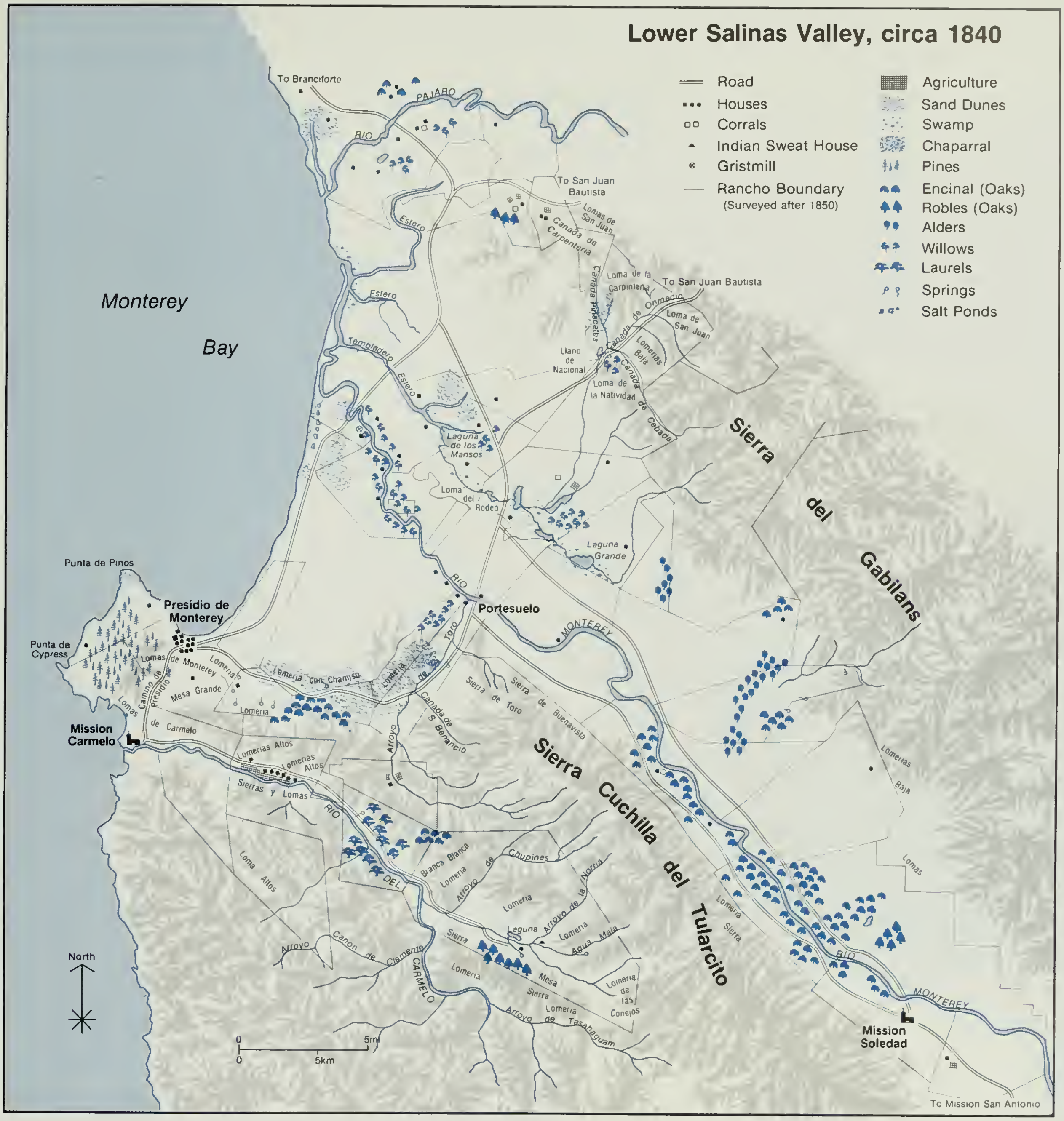
California State Library

Rancho Sespe, Ventura County, 1833

Correct reading of diseños depends on understanding the perspective used by the sketcher, who in most instances was also the petitioner. A ranchero familiar with his area probably sketched his rancho from memory, producing a map with little detail and even less organization. Many sketches were made from one or more vantage points, some resulting in the drafting of a 360-degree skyline as viewed from a central point in the rancho. Regardless of perspective, the result was an oblique view of the land embellished with words and symbols oriented to numerous vantage points, so that many diseños must be turned to both sides—end to end—or rotated, to be read.

Environmental features dominate diseños. The most frequently depicted feature, topography, usually is shown simply by an outline of hills and mountains, with more sophisticated sketches attempting graphic shading. On almost all maps, low hills were distinguished from high hills and mountains. Some elevations were depicted in three-dimensional landscape sketches that must be read upright and upside-down for views of both sides of the valley. Arroyos were usually indicated by single or double straight lines, the single lines sometimes seeming to be property boundaries. Permanent streams were usually named and illustrated by two parallel lines. Springs and other water sources were identified by name.

Vegetation types most commonly depicted on diseños were woodlands and chaparral. Woodlands were represented by tree symbols, by tree name, or both, except along wooded arroyos, where identification was usually omitted. Difficulty in interpretation results where two or more tree symbols were used for one stand. Chaparral was identified more frequently by name than by symbol. On most diseños, it is difficult to provide more than an estimate of the areal extent of vegetation types.



Cultural features, represented by symbols or letters, were far more numerous, specific, and easily interpreted than those used for physical features, in spite of the fact that almost no two rancheros used the same symbols. Common features identified include: roads, houses, gristmills (a mill where corn and wheat were made into flour), boundaries, agricultural plots, missions, watering places for livestock, and neighboring ranchos.

Despite the deficiencies and irregularities presented, diseños provide a surprising amount of information if the unique characteristics of each are carefully evaluated. Often they are the only available source that can be used to reconstruct settlement patterns. Unfortunately, some rancheros submitted no diseños, and other diseños have been lost or destroyed. However, today more than 600 remain, covering most of the Hispanic-settled area of California. All but 20 are legible to some degree and are usable in the preparation of regional maps. For example, the map of the Lower Salinas Valley, circa 1840, was prepared from 37 diseños, using an 1877 map of the area as a base and referring to current United States Geological Survey (USGS) sheets. The reconstruction is only as complete as the information available from the diseños, but it does provide new information about Mexican settlement of California. The cultural landscape appears more developed than normally reported for the period. Especially noticeable are an extensive network of roads, a large number of rancho buildings, more agriculture than expected, and numerous place names still in use today.

BIBLIOGRAPHY / HISPANIC PATTERNS

Archibald, Robert. *The Economic Aspects of the California Missions.* Washington: Academy of American Franciscan History, 1978.

Baer, Kurt. *Architecture of the California Missions.* Berkeley and Los Angeles: University of California Press, 1958.

Bannon, John Francis. "The Mission as a Frontier Institution: Sixty Years of Interest and Research," *The Western Historical Quarterly,* 10, no. 3 (July 1979).

________. *The Spanish Borderlands Frontier, 1513–1821.* New York: Holt, Rinehart and Winston, 1970.

Becker, Robert H. *Designs on the Land: Disenos of California Ranchos.* San Francisco: Book Club of California, 1969.

________. *Disenos of California Ranchos: Maps of Thirty-Seven Land Grants, 1822–1846.* San Francisco: Book Club of California, 1964.

Bolton, Herbert Eugene. "The Mission as a Frontier Institution in the Spanish-American Colonies," *American Historical Review,* 23, no. 3 (October 1917): 42–61.

________. *An Outpost of Empire: The Story of the Founding of San Francisco.* New York: Russell & Russell, 1939.

________. *Rim of Christendom: A Biography of Eusebio Francisco Kino.* New York: Macmillan, 1936.

Bolton, Herbert Eugene, ed. *Anza's California Expeditions.* 5 vols. 1930. Reprint. New York: Russell & Russell, 1966.

Bowman, J. H. "Weights and Measures of Provincial California." *The California Historical Quarterly* 30 (1964).

Campbell, Leon G. "The First Californios: Presidial Society in Spanish California, 1769–1822," *Journal of the West* 11, no. 4 (October 1972).

________. "The Spanish Presidio in Alta California During the Mission Period, 1769–1784," *Journal of the West* 16, no. 4 (October 1977).

Chapman, Charles. *The Founding of Spanish California: The Northward Expansion of New Spain, 1687–1783.* New York: Macmillan, 1916.

Cleland, Robert Glass. *The Cattle on a Thousand Hills.* San Marino, Calif.: Huntington Library, 1951.

Cook, Sherburne F. *The Conflict Between the California Indian and White Civilization.* Berkeley and Los Angeles: University of California Press, 1976.

________. "Expeditions to the Interior of California: Central Valley, 1820–1840." *University of California Anthropological Records* 2, no. 5. Berkeley, 1962.

Cook, Sherburne F., and Woodrow Borah. "Mission Registers as Sources of Vital Statistics: Eight Missions of Northern California." In *Essays in Population History: Mexico and California.* Vol. 3. Berkeley and Los Angeles: University of California Press, 1979.

Cuttler, Donald. "Spanish Explorations of California's Central Valley." Ph.D. diss., University of California, Berkeley, 1947.

Dana, Richard Henry. *Two Years Before the Mast.* 2 vols. Edited by John Haskell Kemble. Los Angeles: Ward Richie Press, 1964.

Engelhardt, Zephyrin, O. F. M. *Missions and Missionaries of California.* 2 vols. Santa Barbara, Calif.: Mission Santa Barbara. 1929.

Fages, Pedro. *A Historical, Political, and Natural Description of California.* Translated by Herbert Ingram Priestly. Berkeley and Los Angeles: University of California Press, 1937.

Francis, Jessie Davies. *An Economic and Social History of Mexican California.* New York: Arno Press, 1976.

Garr, Daniel J. "Planning, Politics and Plunder: The Missions and Indian Pueblos of Hispanic California." *Historical Society of Southern California* 54, no. 4 (1972).

________. "A Rare and Desolate Land: Population and Race in Hispanic California." *The Western Historical Quarterly* 6, no. 2 (April 1975).

Guest, Florian. "Municipal Institutions in Spanish California, 1769–1821." Ph.D. Diss., University of Southern California, 1961.

Guest, Francis F., O.F.M. "An Examination of the Thesis of S. F. Cook on the Forced Conversion of Indians in the California Missions." *Southern California Quarterly* 61, no. 1 (Spring 1979).

________. "Municipal Government in Spanish California." *California Historical Society Quarterly* 46, no. 4 (Dec. 1967).

Hornbeck, David. "Land Tenure and Rancho Expansion in Alta California." *Journal of Historical Geography* (Dec. 1978).

________. "Population of Alta California Missions." *Historical Geography,* Supplement No. 1 (Spring 1978).

Hutchinson, C. Alan. *Frontier Settlement in Mexican California: The Hijar-Padre's Colony and Its Origins, 1769–1835.* New Haven, Conn.: Yale University Press, 1969.

Kenneally, Finbar, ed. *The Writings of Fermin Francisco Lasuen.* 2 vols. Washington: Academy of American Franciscan History, 1965.

McGovern, Carolyn Gale. "Hispanic Population in Alta California: 1790 and the 1830s." Master's thesis, California State University, Northridge, 1978.

Ogden, Adele. *The California Sea Otter Trade, 1784–1848.* Berkeley and Los Angeles: University of California Press, 1941.

Oliver, Virginia L. "Foreign Images of Alta California." Master's thesis, California State University, Northridge, 1978.

Phillips, George Harwood. "Indians and the Breakdown of the Spanish Mission System in California." *Ethnohistory* 21 (1974).

Pitt, Leonard. *The Decline of the Californios: A Social History of the Spanish Speaking Californians, 1846–1890.* Berkeley and Los Angeles: University of California Press, 1966.

Servin, Manuel P. "The Secularization of the California Missions: A Reappraisal." *Southern California Quarterly* 47 (1965).

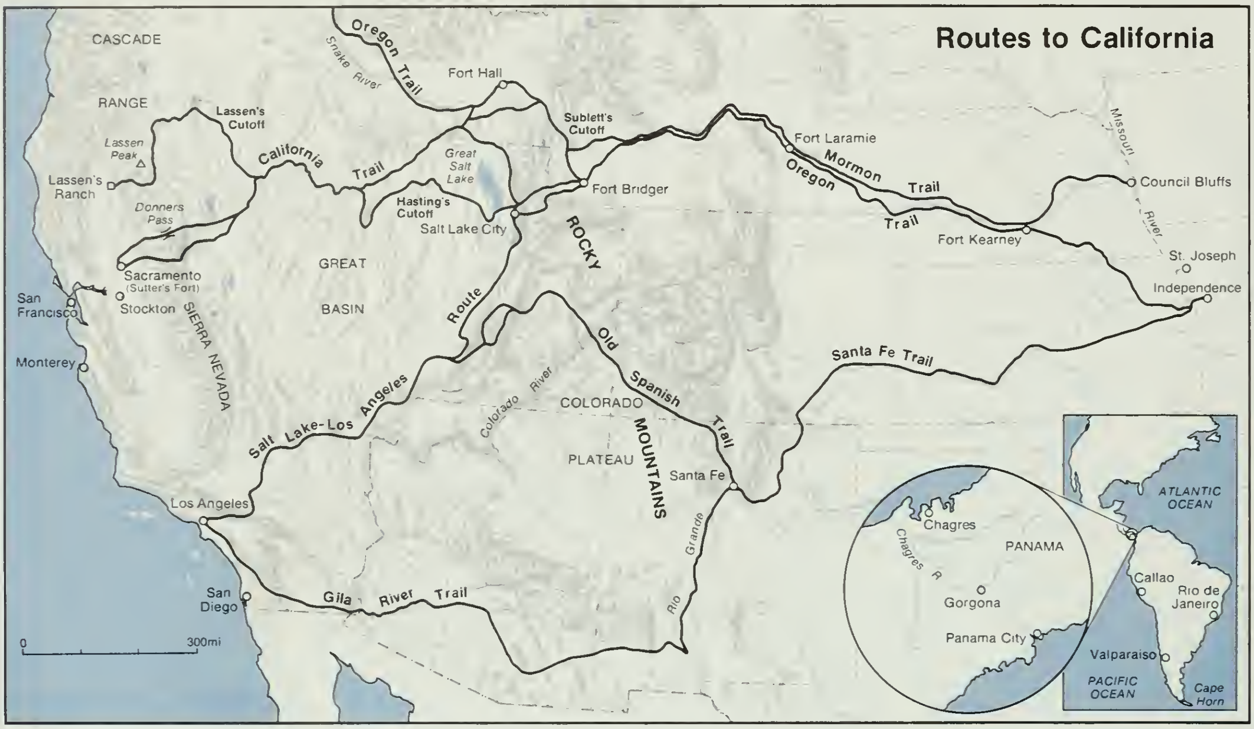
Tibesar, Antonine, ed. *The Writings of Junipero Serra.* 4 vols. Washington: Academy of American Franciscan History, 1955.

Webb, Edith Buckland. *Indian Life at the Old Missions.* Los Angeles: Warren F. Lewis, Publisher, 1952.

PART FOUR

AMERICAN PATTERNS, 1846–1981

CALIFORNIA GOLD



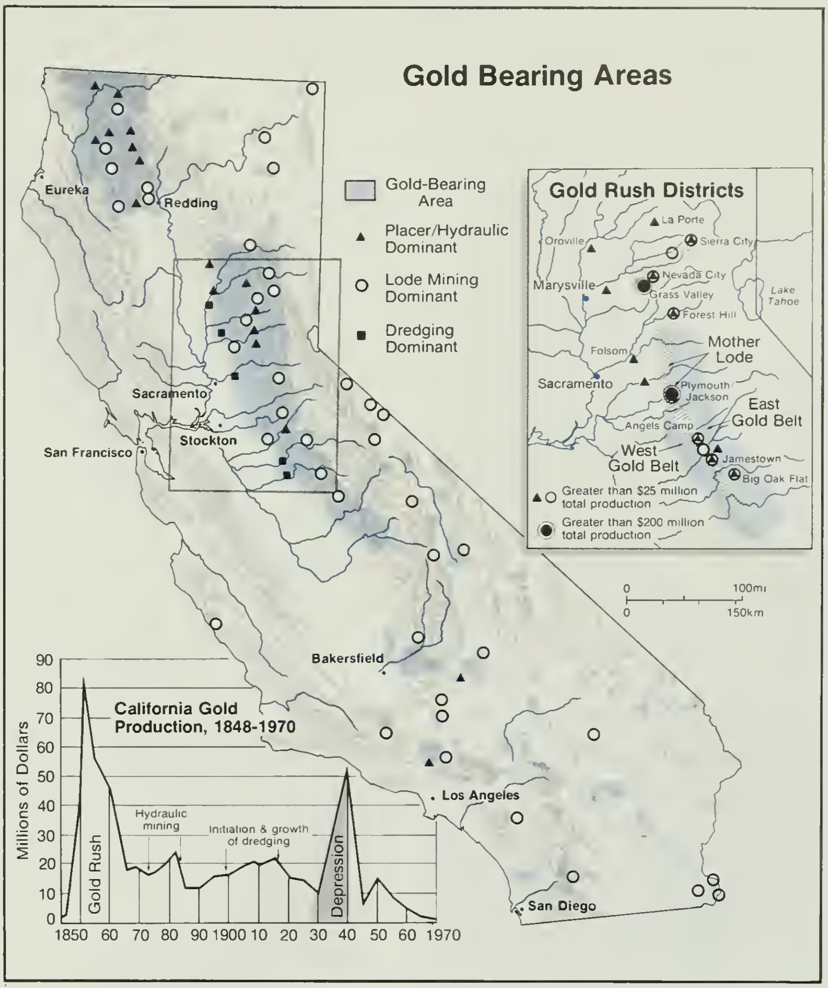
The Gold Rush has been described and analyzed from almost every point of view. Inevitably, clichéd phrases such as "staggering impact," "deluge of argonauts," "tumultuous upheavals," and "sweeping change" have been used to capture the feeling of the Gold Rush and to convey the idea that the discovery of gold signaled the beginning of a mass movement of people to California. The Gold Rush, however, did not signal the first finding of gold in California. Actually, the presence of gold in California was known before 1848; between 1778 and 1780, a full 70 years before the Gold Rush, gold was discovered along the Colorado River. Fifty years after that, in 1828, a small gold deposit was found at San Ysidro, San Diego County, and in 1842 gold was discovered in Placerita Canyon, Los Angeles County. However, these deposits were too small and localized to encourage any kind of large-scale production.

The discovery that led to the Gold Rush was made by James Marshall on January 24, 1848, during the construction of a sawmill at Coloma on the American River. At first Marshall's discovery was kept a secret, but it soon leaked out and the rush for gold was on. Extravagant stories were told of the amount and ease by which gold could be obtained. Gold was lying in the foothills of the Sierra Nevada and all anyone had to do was find a way to California and the diggings, according to these tales. Gold *was* there, but the horde of miners that converged in the Mother Lode country (the area with large veins of gold) was so enormous that only the most lucky found fortunes. Most prospectors toiled for no more than the expense of maintaining themselves in the diggings.

Exaggerated success stories, told and retold around campfires, maintained miners' hopes that tomorrow would be the day when they would find gold. It was said that 273 pounds of gold were taken in seven weeks on the Feather River. The Yuba River was even better! The first five prospectors made $75,000 in three months and later arrivals, it was told, averaged from $60 to $100 a day. On the Tuolumne River, one man took out 45 ounces the first day; another found a 12-ounce nugget; someone else dug 52 pounds of gold in eight days, and a Mexican miner with a spoon pried out of some rocks bordering the Tuolumne River so much gold that he had to get help to lift it!

These tales helped expand the gold fields as prospectors searched farther and farther afield for the shiny metal. Pearson Reading discovered gold on the Trinity River in 1848, soon after Marshall's find. In a short time discoveries were made along the Feather, Yuba, Mokelumne, Stanislaus, and Tuolumne rivers and their tributaries. By 1850 gold had been discovered at Mariposa and in Grass Valley.

New miners poured into the gold fields, moving to wherever it was rumored there was gold. In May of 1848, there were only a few hundred miners. By July the number climbed to as many as 4,000, and by year's end up to 10,000 gold seekers—mostly from California, Oregon, and Mexico—came to find their fortunes. The population of the gold fields in 1848 was minuscule compared with the number who came in the next four years. Through newspaper accounts and letters to friends and relatives, the excitement of California's gold spread to



the eastern United States and Europe. The U.S. government's official acknowledgment of the gold discovery removed the possibility that the stories of vast wealth were simply rumors and thus encouraged more people to journey west. By 1850 California's population stood at more than 100,000, and by 1852 it had increased to over 200,000.

The vast majority of gold seekers were from the United States and came by three principal routes: around Cape Horn, across the Isthmus of Panama, and overland. The sea routes were used mainly by those living along the Eastern Seaboard. On the East Coast there were many men and companies who, in addition to having a seafaring tradition, were already thoroughly familiar with the route to California due to the extensive trade that had developed between California and New England in the 1830s. Up and down the East Coast, ships were provisioned and put to sea for California. In nine months' time during 1849, 550 ships docked at San Francisco, about half of them from the United States. Of the two sea routes to California, the "easiest" was around Cape Horn, an arduous 20,000-mile journey on the high seas. The Panama route was the fastest way to the gold fields but probably the most dangerous because travelers had to make their way across the malaria- and yellow fever–infested isthmus. The sea routes to California carried nearly 40,000 Forty-Niners, 90 percent from the states east of the Appalachian Mountains.

For Americans living west of the Appalachians in the Mississippi Valley and Deep South, the overland trails were nearer at hand. There were two major overland routes to California. A southern route beginning at Corpus Christi, Texas, Fort Smith, Arkansas, or Independence, Missouri, headed southwest. Beyond Santa Fe, New Mexico, or El Paso, Texas, the trail merged with the Old Spanish Trail to Southern California. The advantages of the southern route were that civilization was close, at least part of the way, and the trail wasn't subject to closure by snow. As many as 15,000 Forty-Niners trekked across the Southwest to California, most coming from the southern states. The most popular overland route was the northern one, known as the California Trail, which crossed the Great Plains, went over the Rocky Mountains, passed through the Great Basin, and finally crossed over the Sierra Nevada into the Sacramento Valley. This was the best-known and most advertised, direct, and difficult overland route. It was also the most heavily traveled, with nearly 30,000 Forty-Niners struggling over the trail.

Once in California, the hardships of trail and ship behind them, the new miners quickly moved to the gold fields, expecting to scratch out their fortunes after a few good days of work. It was all going to be so easy! The naive and gullible were numerous, and nothing could discourage them or in any way distort their wild dreams of instant wealth. It took months, or years, of hard work in the mines for some to realize that instant wealth was not to be theirs.

By 1851 the state had been explored and most of the major gold areas were identified. The year 1852 marked the high point in the state's gold output when almost 4 million fine ounces, valued at $82 million were found. As the easily worked, rich surface deposits declined in the mid-1850s, river mining and hydraulic mining became the chief sources of gold. Hydraulic mining, the application of water under pressure through a nozzle against a gravel bank, loosened tons of mud and debris that were directed into a sluice for working out the gold. Introduced in 1853, hydraulic mining soon dominated the California gold fields, accounting for at least one-half of California's gold yields between 1853 and 1884. Hydraulic mining also changed the economic character of gold mining from a small-scale, intensely individualistic enterprise to a captial-intensive, corporate-owned enterprise that employed miners as wage laborers.

During the past 100 years, California gold production has been somewhat erratic, influenced by government regulations and spiraling costs. The last large mine in the Mother Lode shut down in 1953. In 1956, 106 years of continuous gold mining in Grass Valley ended, and the last dredging in the Folsom District was curtailed in 1962. Through 1980 California produced almost 107 million fine ounces of gold worth almost $2.5 billion, and it now ranks sixth in gold production in the United States. The major contribution of California's gold is to be measured not in ounces or dollars but in its effect on peopling the West.

FRONTIER SETTLEMENT

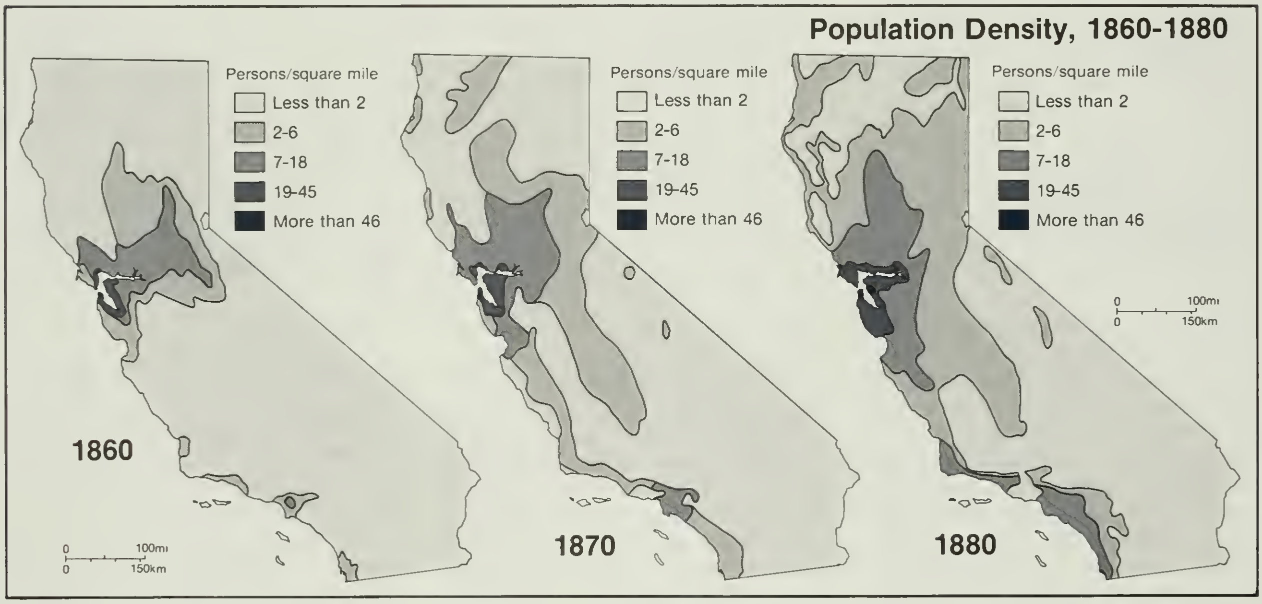
The discovery of gold triggered a large migration to California, one that is often said to be the largest movement of people to one area on the North American continent. Although California's population did increase rapidly after the discovery of gold, the numbers were not phenomenal when compared to those of other areas of frontier settlement. The land rush into Oklahoma, for example, swelled the non-Indian population from almost none in 1880 to 269,000 in 1890. Wisconsin, with a population of 30,000 in 1840, reported almost 306,000 people in 1850. The distinctive feature of California's early settlement lay not in the rapidity of population growth, but in the uneven spread of people over the land.

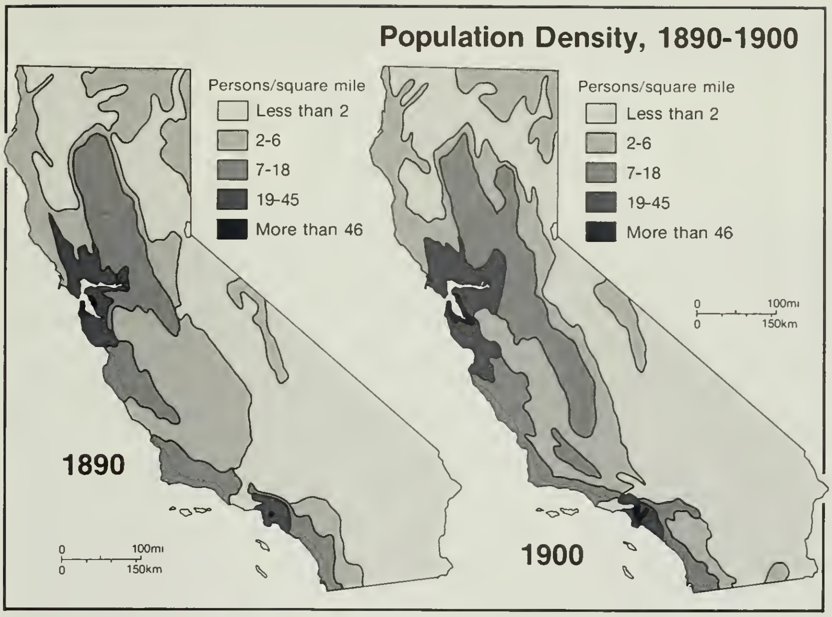
Between 1850 and 1890 vast amounts of California land were settled by immigrants from elsewhere in the United States and from Europe. Unlike other frontier settlements in the United States, however, California did not receive a continuous flow of people, leaving in their wake a uniform pattern of settlement. California's frontier settlement was complicated by large areas along the coast from San Francisco to San Diego already occupied by Hispanic settlers and by the fact that most of the early arrivals were attracted by the prospects of finding gold rather than land for farming. Topographic barriers also inhibited movement into, and the settlement of, certain areas. In addition, California's long summer drought prevented much of the interior land from being permanently settled until new crops and farming methods had been developed, along with the use of irrigation. Unique social, economic, and physical problems led California to be settled in different areas, at different times, and for different reasons. Early settlers focused on the region surrounding San Francisco and the gold mining areas of the Sierra; settlement of Southern California centered on Los Angeles in the 1870s, with the coastal valleys between San Francisco and Los Angeles settled in a piecemeal fashion, between 1850 and 1890.

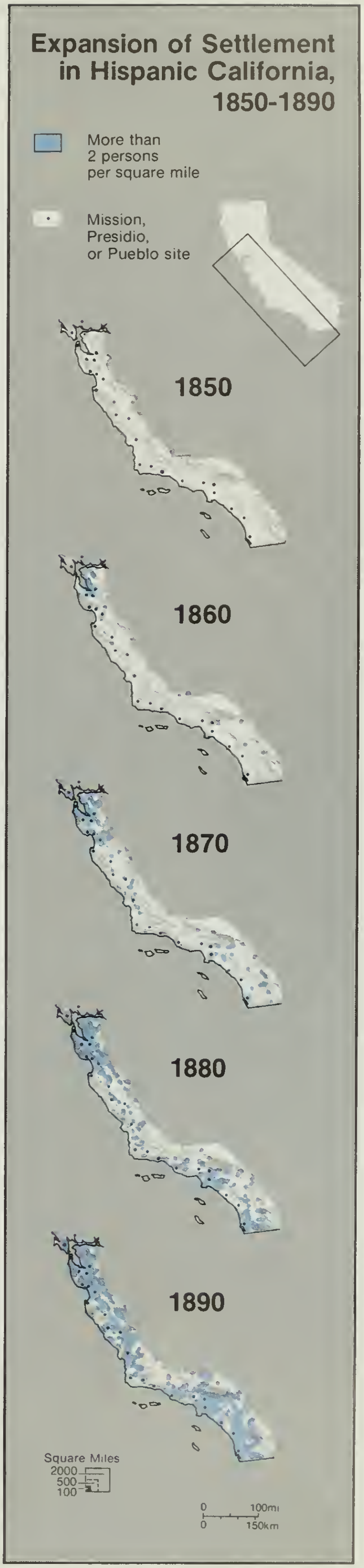
Although settlement spread throughout the state in the 1850s, the vast majority of the newcomers settled in the gold mining areas of the Sierra Nevada bordering the Sacramento and San Joaquin valleys and in towns that had been founded to service the mining regions. San Francisco was the major port of entry, the largest city, and the center of northern settlement. By the late 1850s and early 1860s the mining regions began to lose population, as miners discovered instant wealth was not to be theirs. Many of the ex-miners, along with new immigrants, began to move into areas close to San Francisco and in the Sacramento Valley where land and climate were favorable to agriculture. By 1870 the basis of Northern California settlement had shifted from mining to agriculture. The movement and rate of settlement were in response to the development of commercial crops, accessibility to markets, and new farming methods, especially irrigation. By 1890 much of the inhabitable land in the Sacramento and San Joaquin valleys had been settled and San Francisco became the social and economic hub of the area.

Between 1850 and 1870 Southern California remained outside the mainstream of California's settlement. Southern California had no large gold deposits, had a more arid climate, and was effectively isolated from Northern California settlement by the east-west trending transverse mountain range. A second American settlement frontier was not opened in Southern California until the 1870s, when Los Angeles and the southern counties began to draw large numbers of new immigrants. Settlement of Southern California, however, differed considerably from its northern counterpart: mining and agriculture were not the prime movers of settlement. Large numbers of new settlers flowed into California

Population Density, 1860-1880







because of cheap fares offered by competing railroads and an extensive propaganda campaign, (celebrating the healthful qualities of Southern California climate, inexpensive land, and the ease of being a gentleman farmer of citrus and other tropical fruits) directed toward prospective settlers living in the Midwest. By 1890 settlement of Southern California had spread considerably, and was concentrated mostly in small communities—a forerunner of the urban landscape of the twentieth century.

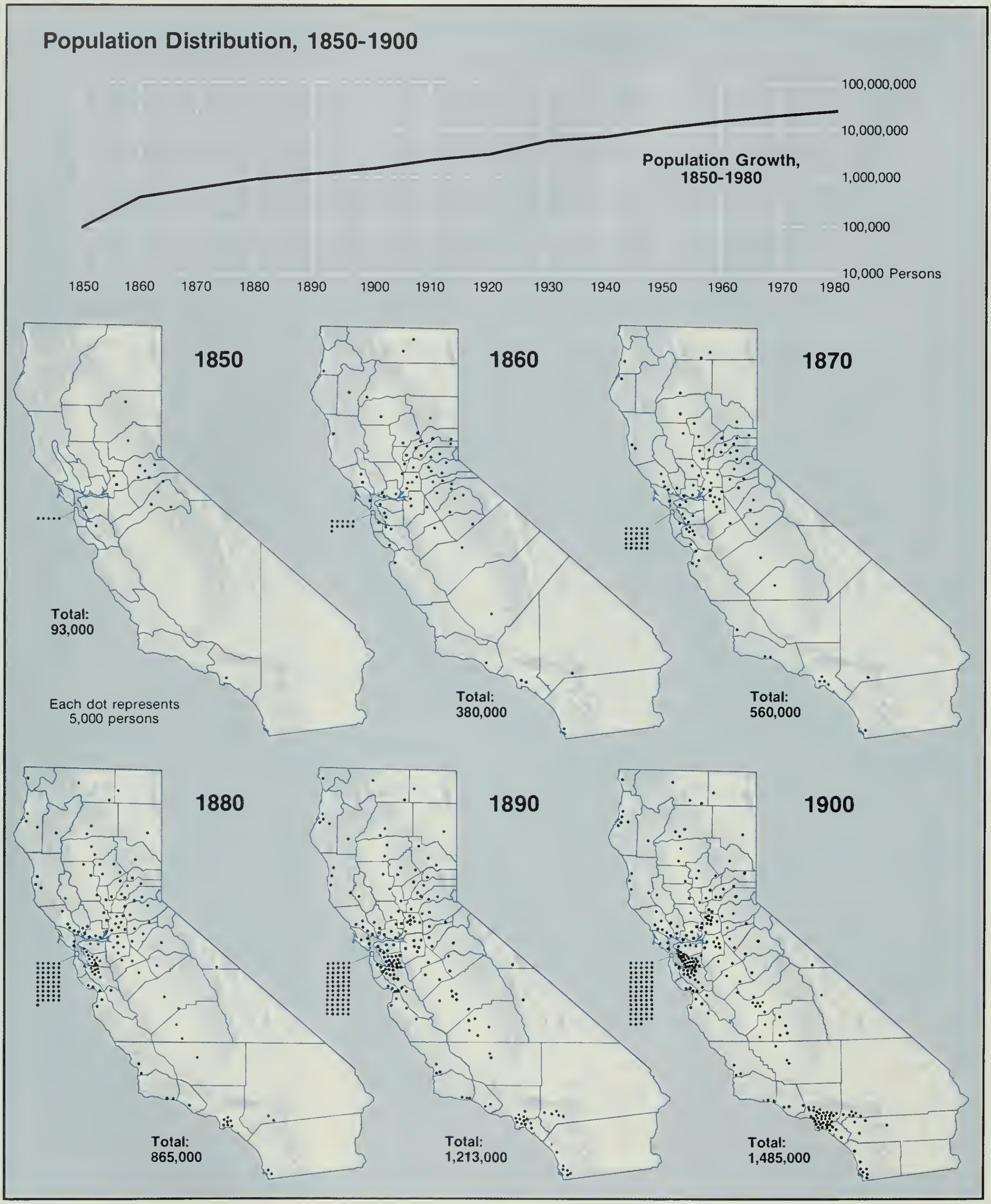
American settlement of the Hispanic area along the coast was a rather slow process, except in the area adjacent to San Francisco. Early American settlement continued mainly where presidios and pueblos had been founded, with little expansion. Few new towns were founded in the area until the late 1860s and 1870s. Inhibiting settlement was the terrain, but more important was the question of landownership of the large Mexican ranchos. Full settlement of the area awaited the adjudication of Mexican land titles in U.S. courts. Once the question of ownership was resolved in the 1870s, settlement expanded rapidly, filling most of the valleys along the coast by 1890.

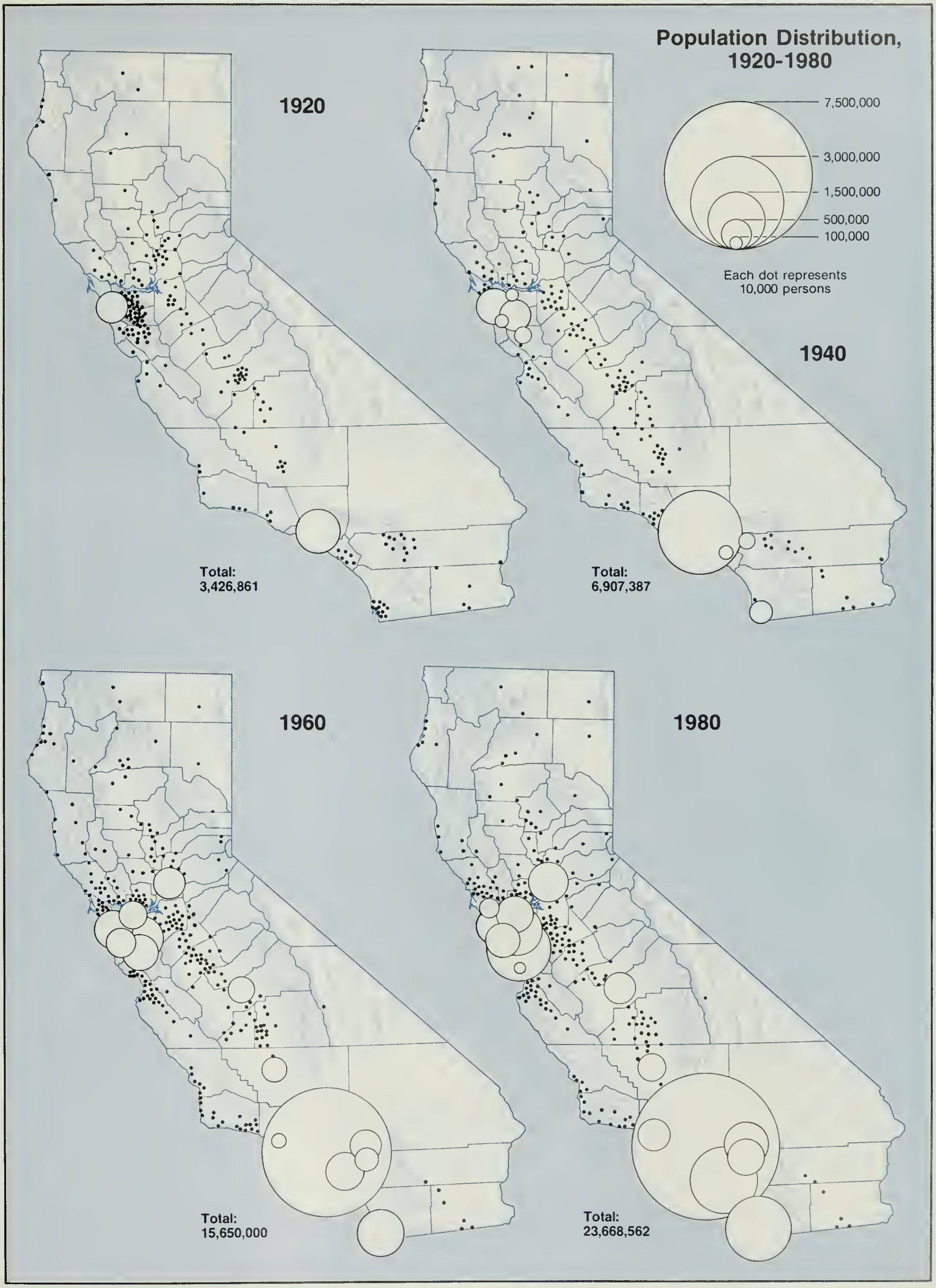
It is difficult to describe the early settlement of California without calling attention to changes in population distribution. The series of maps that follow on page 68 show the changing distribution of California's population and give some indication of the state's growth between 1850 and 1980. These maps show that the population of California has always been highly concentrated. In 1860 three-fourths of the population was located around San Francisco and in the mining region. During the decade of the 1860s, the mining areas declined in population, and most of the ex-miners moved to the San Francisco region.

The decade of the 1880s gave the first intimation of a shift in the center of population to Southern California. Between 1880 and 1890 Southern California's share of the state's population increased from 15 to 27 percent, and a southward shift in California's population was clearly underway by 1900. Whereas less than 10 percent of the state's population resided in Southern California in 1860, more than 30 percent lived there in 1900. The southern part of the state was drawing an increasingly large proportion of the state's new settlers.

The main trend in the distribution of the population since 1900 has been a continuing concentration of population in Southern California, with particularly significant growth in the San Diego area since 1970. The most rapid decade of growth was between 1950 and 1960, with over 5 million new inhabitants arriving in California. An idea of the accelerating tempo of population growth in California is gained by looking at the state's average annual increase in population. From 1850 to 1900 it fluctuated between 18,000 and 35,000 new arrivals per year. Between 1900 and 1960 the yearly average increased from 89,000 to over 500,000. During the 1970s the number of new inhabitants declined to a average of 269,000 per year. In 1980, one out of every ten Americans lived in California and one out of every fifteen lived in Southern California.

POPULATION GROWTH





Population Distribution, 1920-1980
7,500,000
3,000,000
1,500,000
500,000
100,000
Each dot represents 10,000 persons
1920
Total: 3,426,861
1940
Total: 6,907,387
1960
Total: 15,650,000
1980
Total: 23,668,562

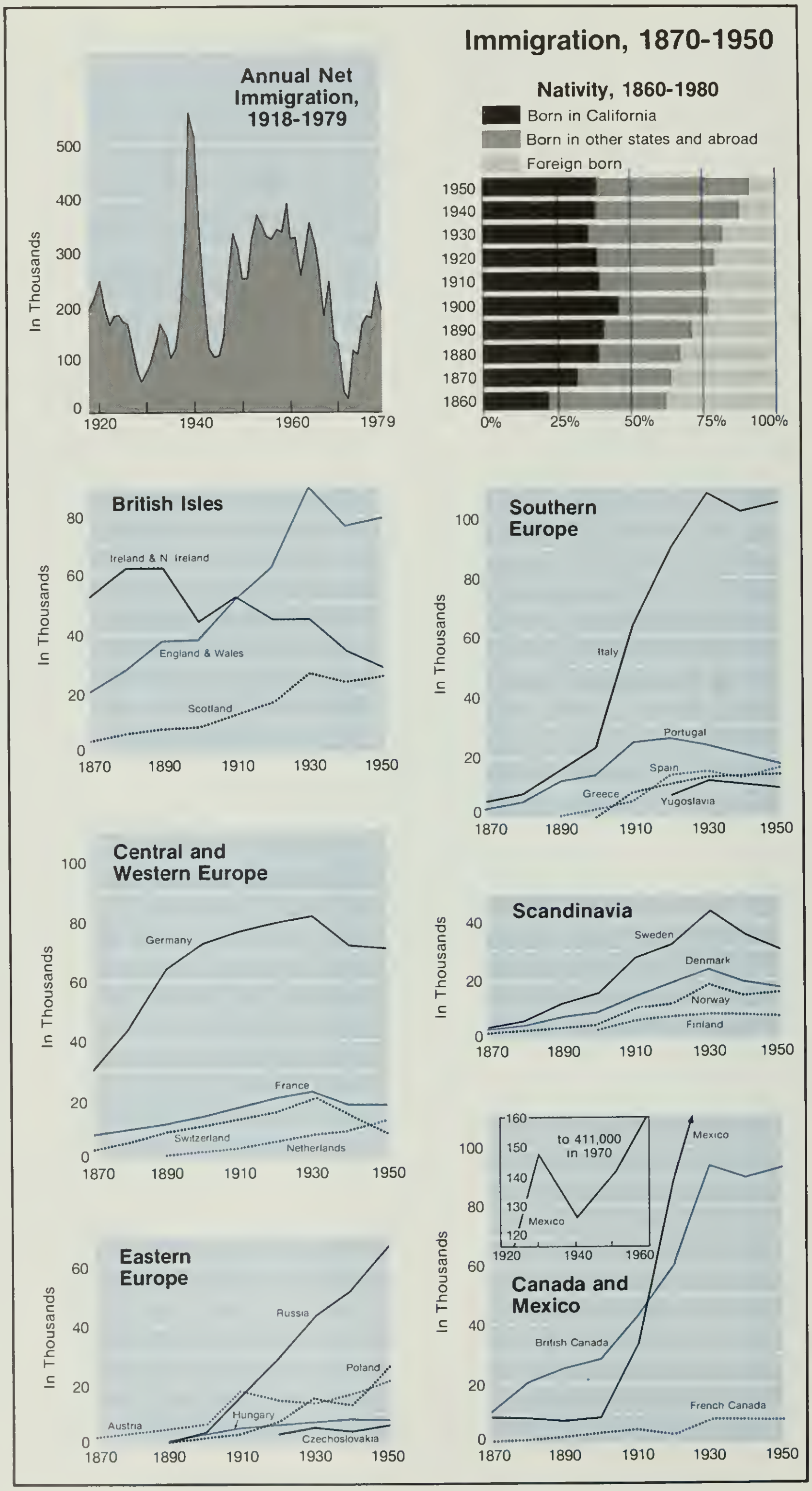
IMMIGRATION AND ETHNIC PATTERNS

For the past 180 years people around the world have regarded California as a place of exceptional opportunity. Settlers were first drawn to California in large numbers by the unparalleled chance of digging a fortune from the gold fields. Others followed to take advantage of economic opportunities in the rapidly expanding cities or for the chance to obtain land. Real and imagined opportunities have made California one of the most diverse areas in the world in terms of the origin and composition of its population.

Foreign-born immigrants have always been an important component of California's population. In 1860, the foreign born accounted for 39 percent of the total population. By 1900 the proportion of foreign born had declined to 28 percent and slowly declined further during the next eighty years. In 1980, the foreign born accounted for approximately 11 percent of the state's population.

Since 1850, great changes have occurred in the number and relative importance of various foreign-born groups. The largest foreign-born groups to arrive during the Gold Rush were Mexicans, English, Germans, French, and Irish. Together these groups accounted for 80 percent of the foreign born. During the 1850s, however, immigrants from Asia began to arrive in large numbers, especially the Chinese. By 1860 the Chinese were the largest foreign-born group in California, numbering over 35,000. The Chinese were closely followed by the Irish, Germans, English, and Mexicans. Through 1890, the Irish and Chinese were ranked as the first or second largest foreign-born group in California, followed by Germans, English, and Canadians.

The Chinese Exclusion Act, which restricted the number of Chinese immigrants, went into effect in 1882 and by 1900 had brought about a sharp decline in the number of Chinese entering California. The number of Irish immigrants had also declined substantially by 1900. With both Chinese and Irish numbers decreasing, Germans became the most numerous group in 1900 and 1910. Mexicans, who had declined in relative importance since 1880, began to increase in numbers after 1900 and by 1920 had become the largest foreign-born group for the second time, a position that was held through 1980.



Ethnic Population, 1900
Each dot represents 200 persons
Mexico
Canada
England
Ireland
Sweden
Germany
Italy
Portugal
China and Japan

Pages 70–71 have illustrated various characteristics of California's population. There is another segment of the population, however, still to be considered—California's large minority population. The composition of California's population is rather exceptional because in no other area in the United States are blacks, whites, Asians, Mexicans, and Indians found together in such significant numbers. A major problem in attempting to document the changing composition, distribution, and number of the minority population in California is the lack of consistent definitions given to each group by the U.S. Census and California state reporting agencies. Mexicans, for example, have been defined and grouped under various headings entitled "race," "foreign-born," "nonwhite," "Spanish surname," and most recently, "Spanish origin." The only nonwhite group consistently enumerated under the same heading has been the black population. Regardless of census definitions, one common experience shared by all of California's minorities is that at one time or another each group has inhabited the lowest rungs of California's occupational ladder.

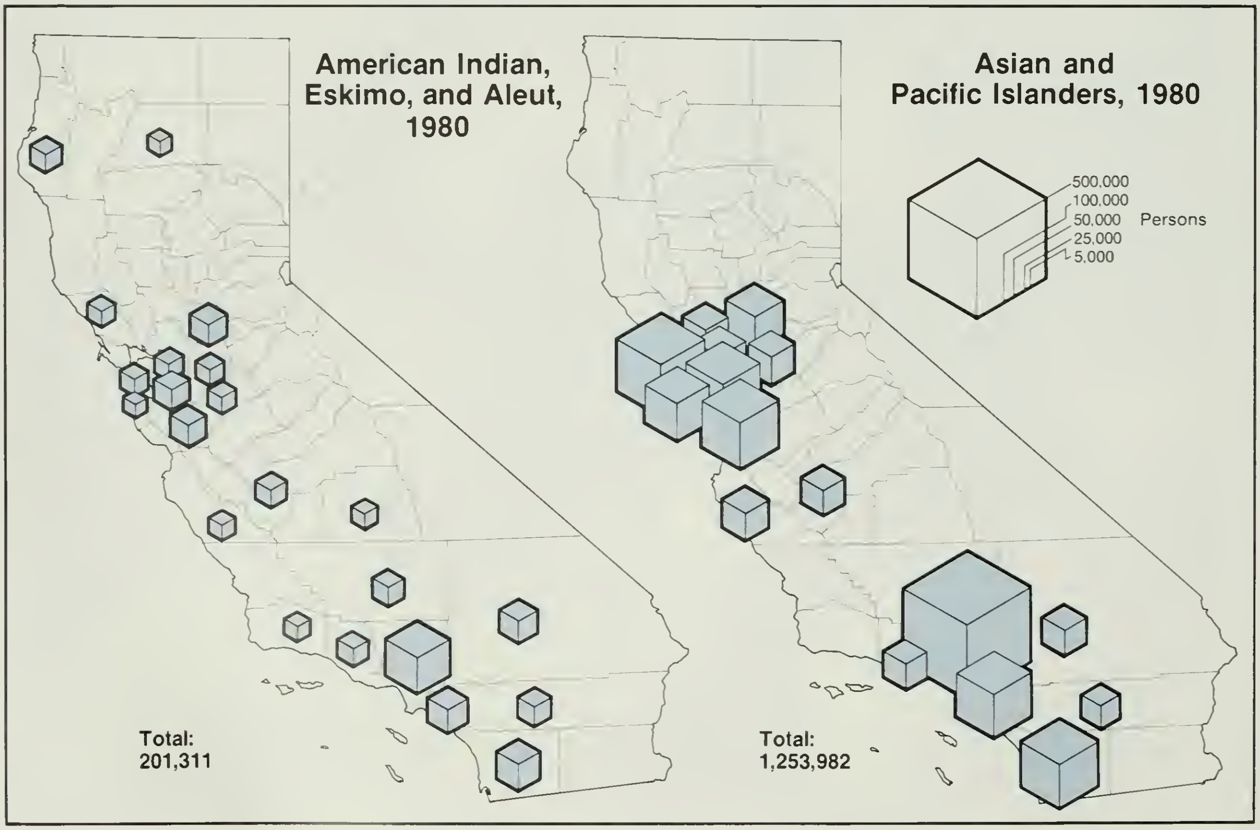
From the beginnings of Spanish settlement of California to the present time there has been a continuing need for manual labor. The Indians were the first minority group to fill this need: they were exploited until they were too few in number to remain a source of cheap labor. The Chinese, recruited at first as railroad workers and later as field workers, were the next source of laborers. As California's agriculture began to shift from grain crops to orchards in the 1880s, the demand for workers multiplied. By the turn of the century a system of farm labor had come into existence that was based on the seasonal use of alien, nonwhite workers.

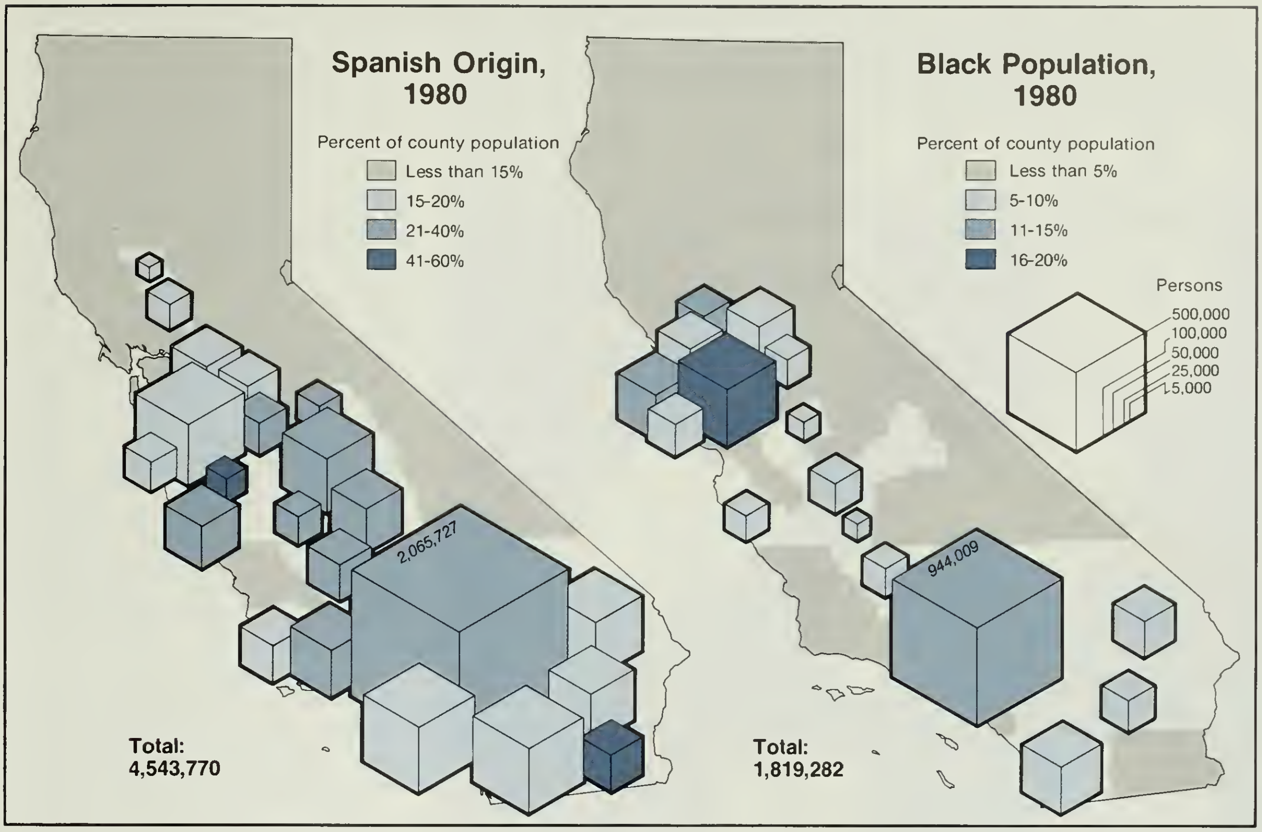
Between 1900 and 1930 a tremendous increase in irrigated agriculture occurred: orchard acreage almost doubled and the number of vegetable crops increased fourfold. With this increase, the demand for seasonal labor skyrocketed. The Japanese, Koreans, and Filipinos were recruited in large numbers to satisfy this increasing need. A great migratory farm labor circle developed to meet this seasonal demand, moving from valley to valley, crop to crop.

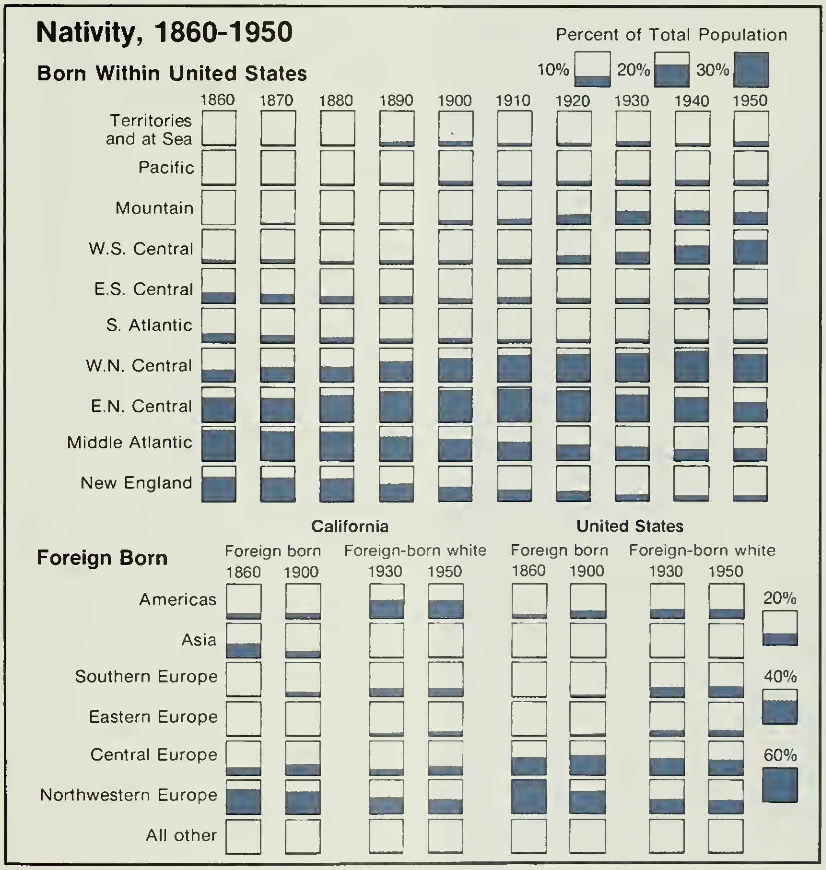
After 1930, the Mexican immigrant became the predominant seasonal field laborer, especially during World War II, when Asian immigration was restricted. After the war, California agriculture continued to expand so rapidly that the need for a permanent supply of seasonal laborers became of paramount importance to farmers and growers throughout the state. In 1947 the U.S. government, with the approval of the Mexican government, allowed growers to recruit Mexican citizens to work in the fields. The program was discontinued in 1962 but left in its wake a significantly increased Mexican population in California. From an estimated 400,000 in 1940, the Hispanic population in the state had increased to over 4.5 million in 1980.

Today the Indians, Asians, and Mexicans remain as important components of California's population. The Indian is California's smallest minority group and the least urbanized. A predominantly rural population living in nonfarm residences, Indians are California's hidden minority receiving little attention. The Asian population, for the most part, has shed its role as seasonal farm labor and, along with recent immigrants from Asia, has become highly urbanized. The Mexican population is by far the largest minority group in California; although primarily found in urban places, many Mexicans continue as seasonal farm laborers in rural areas.

Unlike other nonwhite groups in California, the black population has been continuously enumerated by the census since 1850. In addition, the blacks are



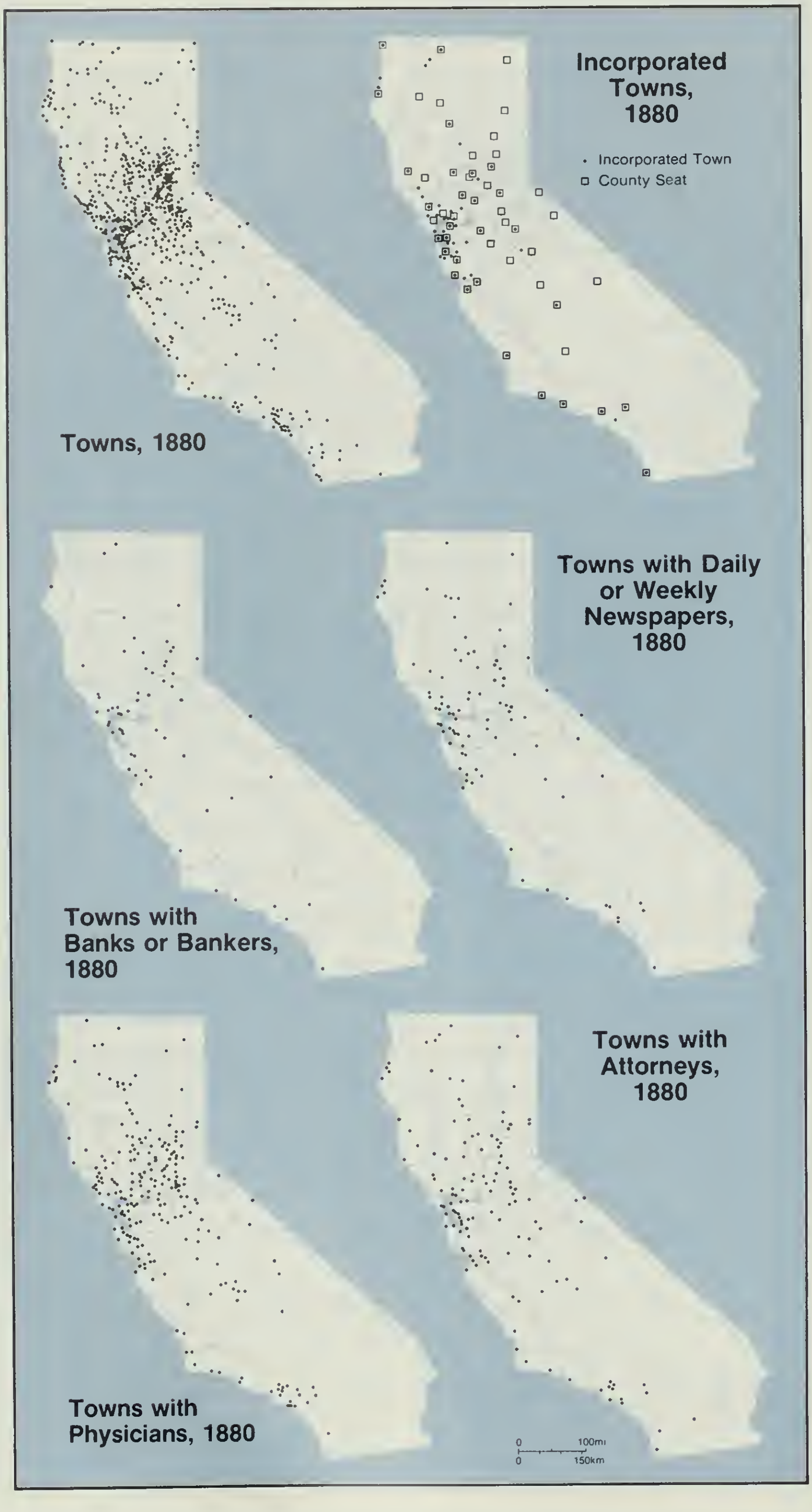




unique among nonwhite minorities because they were never extensively recruited as farm laborers, except for some feeble attempts in the late nineteenth century. Between 1900 and 1940, there was a steady growth in the black population; numbers increased from 11,000 to 124,000. Wartime employment opportunities as unskilled workers in shipyards and aircraft plants drew many blacks to the state, especially to Southern California. By 1980 the black population stood at 1,819,000. Of all the minority groups in California, blacks are the most urbanized, concentrating mostly in Los Angeles and Oakland.

Today minority groups represent a significant portion of California's population. In 1980, blacks, Asians, Indians, Hispanics, and a host of smaller groups accounted for approximately 43 percent of the population, with those of Spanish origin comprising almost 20 percent of the state's population. These groups are not evenly spread throughout the state; rather they are concentrated in the eight counties making up Southern California. While Southern California contained 58 percent of the state's population in 1980, it had 65 percent of all minority groups: specifically, 64 percent of the black population and 69 percent of Spanish origin in the 1980 U.S. Census.

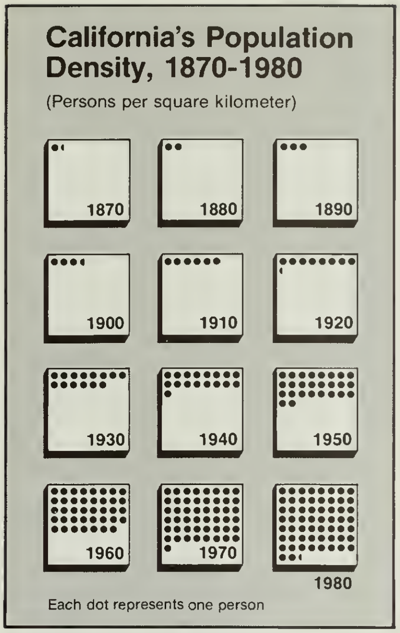
URBAN GROWTH AND DEVELOPMENT



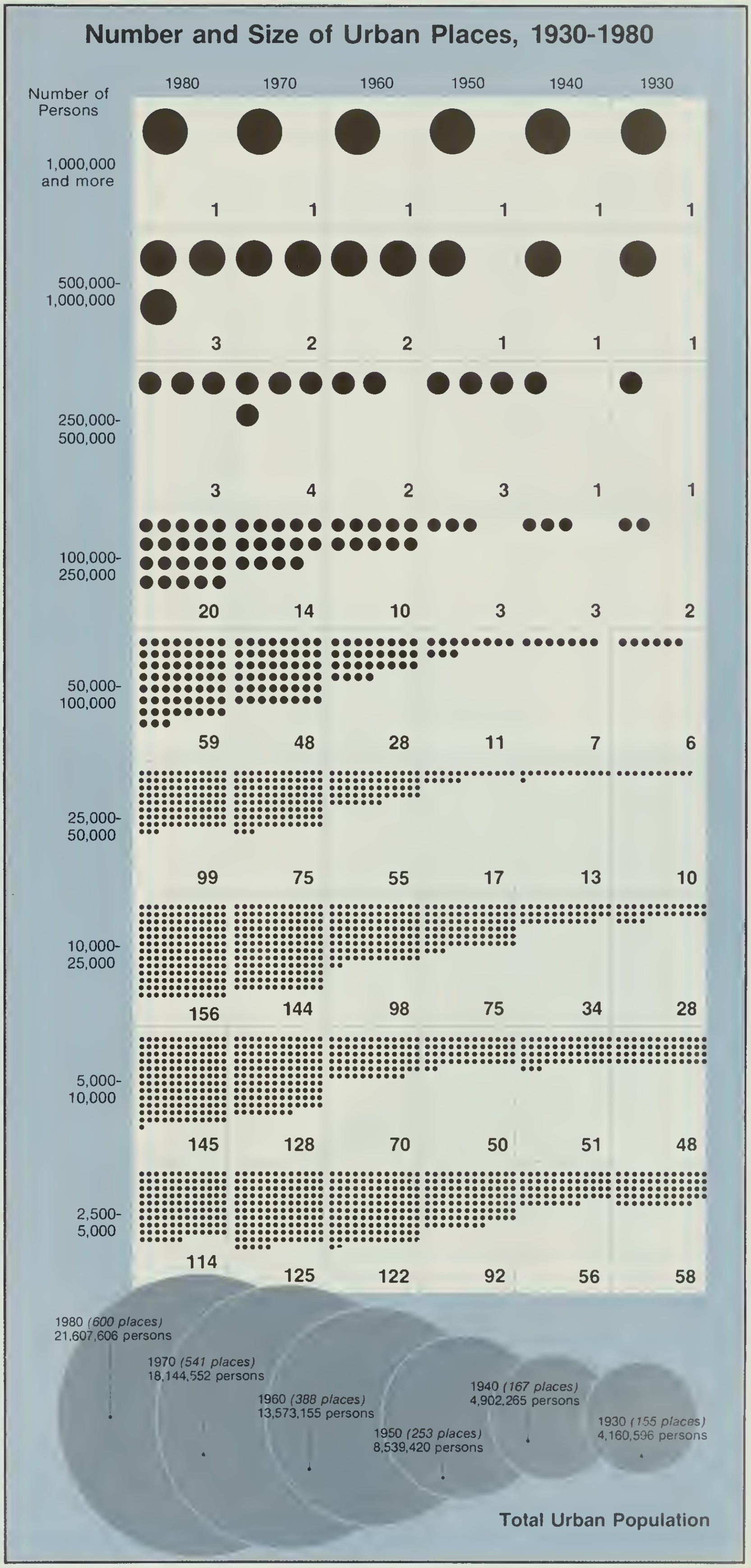
Unlike other frontiers in the United States, California had developed a large urban population by the 1850s, in part because towns played an integral role in early Gold Rush settlement. The Gold Rush flooded California with towns of all sizes and launched a period of rapid urban growth. In 1860, 20 percent of California's population resided in towns of 2,500 or more people (considered urban by census definition). During a comparable period of intense frontier settlement, only 1 percent of Ohio's population lived in urban places. Within 20 years after becoming a state in 1850, California was among the most urbanized states in the country.

California's urban development is most often linked with the Gold Rush era of almost instantaneous town growth. However, the decade of the 1870s was a period of even faster population increase; towns grew in size and number, and an integrated network of towns emerged. By 1880 almost 43 percent of California's popluation lived in urban locations, and the number of urban places had increased from 8 (prior to 1846) to 18. However, the number of towns with 2,500 or more inhabitants is only one measure of urbanization. The number and distribution of incorporated towns and towns with businesses and social and professional services measure more precisely the rapid growth of California's urban base. In 1880 the *Pacific Coast Business Directory* listed over 600 towns in California with two or more businesses. In addition, many of those towns had physicians, attorneys, newspapers, and banks. By 1880 the state legislature had incorporated 61 towns.

California's early urban growth often is explained by the availability of job opportunities in and around San Francisco, particularly after the completion of the transcontinental railroad, which encouraged early development of nonagricultural pursuits such as retailing and wholesaling, and led immigrants to live in urban areas. Other factors were equally important, however. Prior to 1860 a great many settlers were attracted to California by mining opportunities and, either by temperament or by training, were not prepared to become farmers. Also, agriculture was not easily established in California because a large proportion of



California's Population Density, 1870-1980
(Persons per square kilometer)



Number and Size of Urban Places, 1930-1980

California's land otherwise suitable for farming did not receive sufficient rainfall to support the crops with which the newcomers were familiar. In addition, preparing much of the farmland for planting required large amounts of capital, not always available to newcomers. Finally, substantial plots of farmland along the coast were not available for settlement until the late 1870s because of unclear land titles stemming from Mexico's rancho grants.

After 1880, California's population continued to increase, and many immigrants settled in urban areas. By 1900 California's urban population had increased to 52 percent of the total population; by 1980 over 90 percent of the state's inhabitants lived in urban areas.

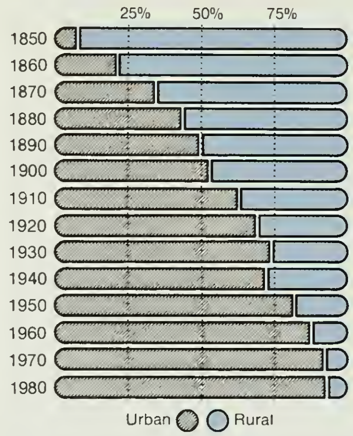
To describe California's urban growth without mentioning the rural population in the state leaves the impression that the urban population grew at the expense of the rural population. During the past 100 years the absolute number of persons living in rural areas has increased. Between 1880 and 1890 the urban population declined while the rural population increased one and one-half times. By 1930 the rural population had doubled, yet the urban population had increased fivefold. Since 1930, the rural population has steadily increased in numbers, but its growth has been masked by the tremendous surge in the urban population. Between 1970 and 1980, California's rural areas added over 250,000 persons, but the proportion of rural population declined to 8 percent of the state's total population.

To say that Californians have shown a strong preference for living in cities since the beginning of American settlement is an understatement. Since 1940, California's population has more than tripled; most of the increase has gone to coastal areas, especially around San Francisco and Los Angeles. In 1900 the San Francisco and Los Angeles metropolitan areas held 49 percent of the state's population. That number increased to 65 percent in 1930, but by 1980 it had declined slightly to 59 percent. The change in population density since 1940 reflects the increasing concentration of the urban population along the coast. Today California's population is highly concentrated: three-fourths of the population inhabit 1 percent of the land. An interesting note is that the current population distribution is similar to the pattern of aboriginal occupancy prior to European settlement.

Along with the increase in urban population the *number* of urban locations proliferated. At the turn of the century, California had only 40 urban places of 2,500 or more inhabitants. By 1940, that number had increased fourfold, and since 1940 the number of urban places has more than tripled to reach 600. As could be expected, the urban population in 1980 was highly concentrated in just a few places. The largest group of urban locations consisted of 415 places with populations between 2,500 to 25,000 inhabitants but containing only slightly more than 17 percent of the total urban population. One-third of the urban population lived in 158 places with populations ranging from 25,000 to 100,000; 27 urban areas containing more than 100,000 persons had 37 percent of the urban population. Overwhelmingly, 60 percent of the urban population was concentrated in 86 cities of 50,000 or more inhabitants.

The most important change in the distribution pattern of California's population in recent years has been occurring in metropolitan areas. There has been a very rapid centrifugal movement from the central cities to the built-up areas surrounding them. In general, the larger the city, the more pronounced this movement has been. The net effect of this pattern of movement has been to reduce the proportion of the population that lives in the central city and to increase the proportion living in the smaller cities.

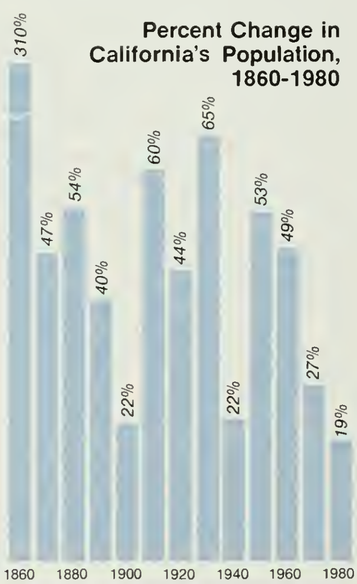
Urban and Rural Population, 1850-1980



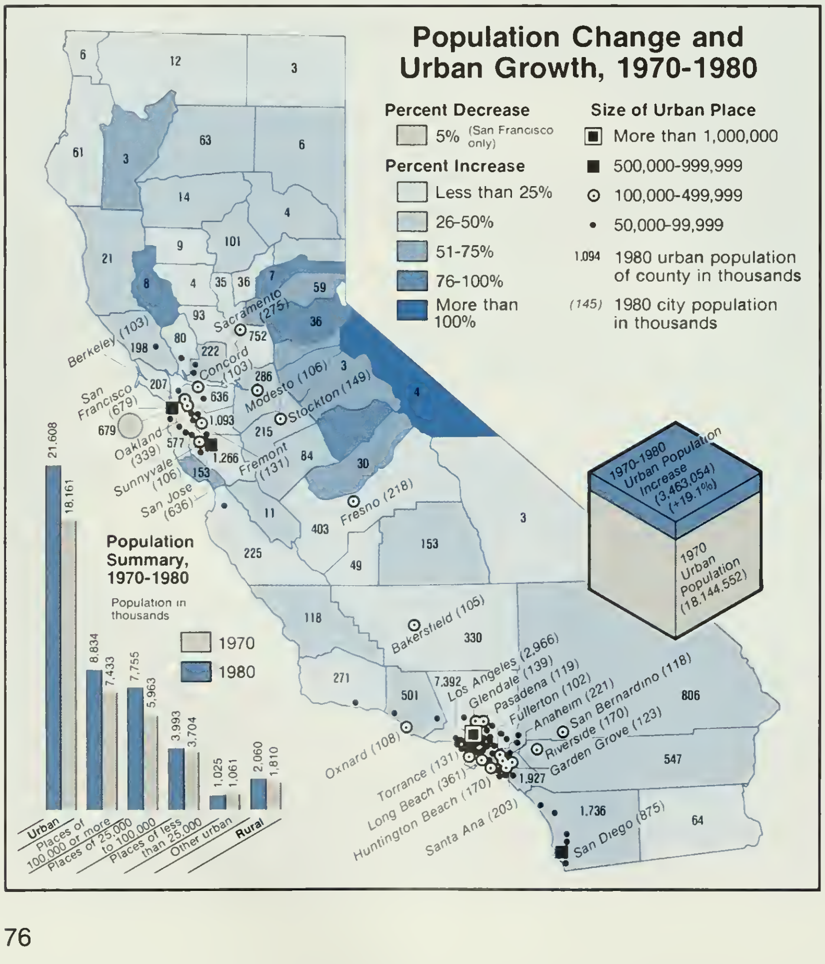
Annual Percent Change in Population, United States and California, 1940-1980

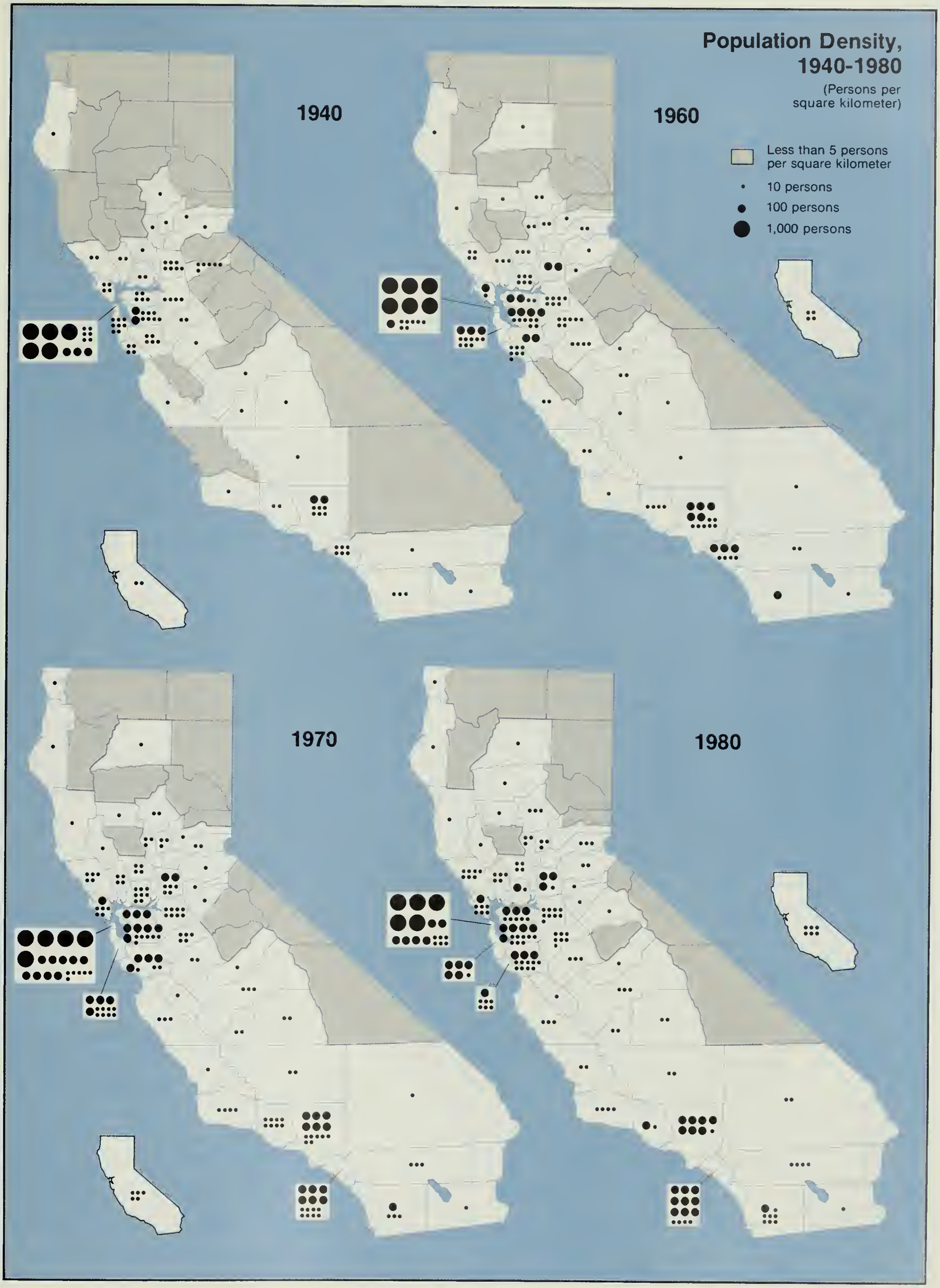
	United States	California	California Population (as % of U.S.)
1940	**Base**	**Base**	**Base**
1942	**0.7%**	**6.9%**	**5.7%**
1944	**-0.9%**	**5.2%**	**6.7%**
1946	**5.4%**	**2.3%**	**6.8%**
1948	**1.8%**	**2.4%**	**6.9%**
1950	**1.7%**	**3.0%**	**7.0%**
1952	**1.6%**	**4.6%**	**7.4%**
1954	**1.8%**	**3.4%**	**7.7%**
1956	**1.8%**	**4.4%**	**8.1%**
1958	**1.7%**	**4.0%**	**8.5%**
1960	**1.6%**	**3.8%**	**8.8%**
1962	**1.5%**	**3.3%**	**9.1%**
1964	**1.4%**	**2.8%**	**9.4%**
1966	**1.1%**	**2.0%**	**9.6%**
1968	**1.0%**	**1.3%**	**9.7%**
1970	**1.2%**	**1.4%**	**9.8%**
1972	**1.0%**	**0.9%**	**9.8%**
1974	**0.7%**	**1.2%**	**9.9%**
1976	**0.8%**	**1.6%**	**10.0%**
1978	**0.8%**	**1.9%**	**10.2%**
1980	**0.9%**	**1.7%**	**10.3%**

Percent Change in California's Population, 1860-1980



Population Change and Urban Growth, 1970-1980



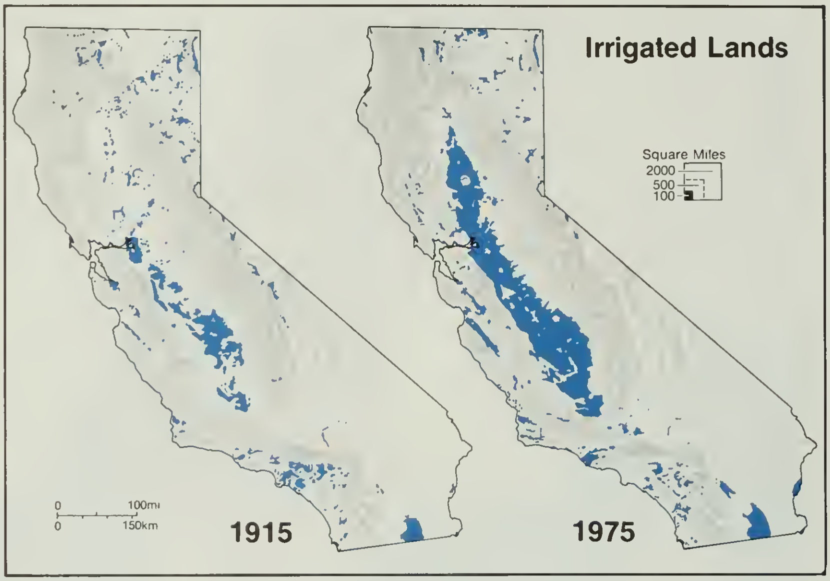

Population Density, 1940-1980
(Persons per square kilometer)
Less than 5 persons per square kilometer
10 persons
100 persons
1,000 persons
1940
1960
1970
1980

URBAN EXPANSION AND THE MODERN WATER SYSTEM

In 1980, 4 of the 20 largest cities in the United States were in California. Los Angeles ranked third behind Chicago by a very small margin (New York was first). San Diego was listed as the eighth largest city in the United States and San Francisco and San Jose were ranked thirteenth and seventeenth respectively. These four cities had a combined population of over 5 million; only 12 states, excluding California, had a larger population. Among the twenty largest U.S. cities, San Jose was the fastest growing between 1970 and 1980 with a 36 percent growth rate. San Diego, not far behind, ranked fourth, showing a 25 percent increase during the same decade. San Francisco was the only major city in California to record a decline in the 1970s, losing 6 percent of its population.

All of these statistics indicate that most Californians continue to share a high propensity for living in urban places, a trend that has had a dramatic effect on California's larger cities, particularly on their areal extent. Instead of responding to continued population increases by building skyward, as cities such as Chicago and New York have done in the past, California cities have simply spread out into the surrounding rural areas. Throughout the past few years California cities have expanded into rural areas at the rate of over 100,000 acres oer year.

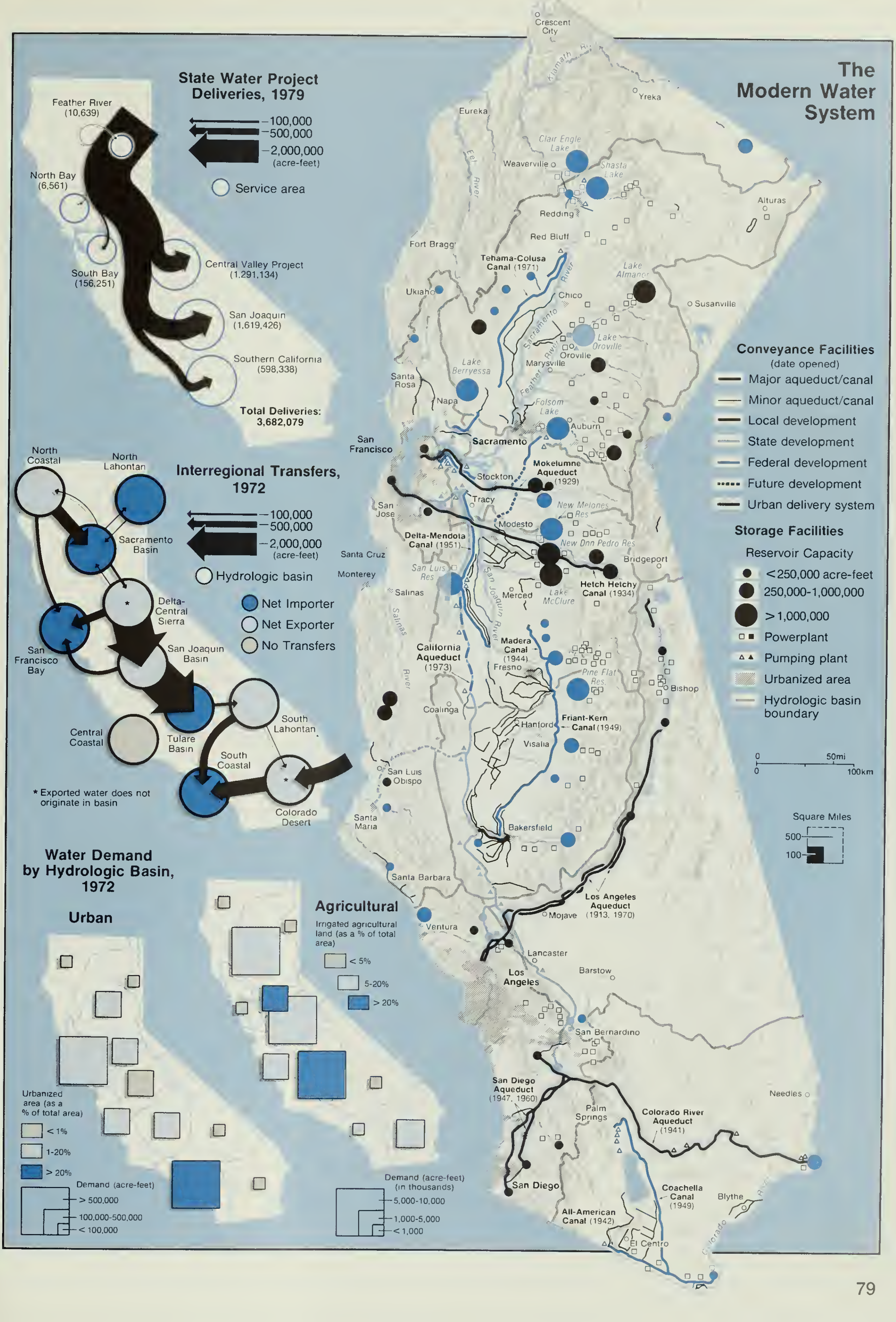
This rapid spread has been a dominant feature of urban growth in California. The main reason for the outward expansion of California cities is that California's urban areas are twentieth-century cities whose growth has been based on the use of the automobile. The early adoption of the automobile as the primary means of travel allowed Californians to live in smaller, more rural cities and towns within the urban fringe. Rural residents easily commuted to the big city for jobs and also were close enough to enjoy the social and cultural amenities of the large city. The 1930s and 1940s were the "great years" in California (especially in Southern California) when both urban and rural living were blended into what was called the California Life Style. In the latter 1940s and 1950s rapid urban development occurred as both large and small cities began to expand and merge imperceptibly into one another. Suburbs became the dominant method of coping with the growing urban population, and developers and land speculators subdivided agricultural land into housing tracts extending outward from the city along lengthening freeways.



California suburban growth has continued to the present almost unabated. More than two-thirds of the total population increase during the 1970s took place in suburban areas. For example, the share of Southern Californians living in central cities fell from 41.9 percent to 39.8 percent. A similar trend was registered in the San Francisco Bay Area, except that the city of San Francisco lost population while the surrounding region gained over 700,000 new residents, almost half moving to adjacent Contra Costa and Santa Clara counties.

While the automobile has had a direct effect on urban expansion in California, the availability of water has propelled and directed suburban growth. By the 1980s, many California cities recognized the need for a constant supply of water to sustain growth and began to build dams along local streams. However, with California's burgeoning urban population and with a diminishing supply of local water, the long-distance transfer of water became a necessity after 1900. Los Angeles began diverting water from the Owens Valley, some 240 miles away, to the San Fernando Valley in 1913. Oakland and the surrounding East Bay communities began obtaining water in 1929 from the Mokelumne River. San Francisco began importing much of its water from the Tuolumne River over the Hetch Hetchy Aqueduct in 1934. The Metropolitan Water District began diverting water from the Colorado River to Southern California communities in 1941. None of these municipal projects, however, match the scope or the amount of water transferred by the federally sponsored Central Valley Project or the California State Water Project. Both projects were designed to transfer water from surplus regions to deficit regions for irrigation, industrial, and domestic uses and to provide hydroelectric power, flood control, recreation, and fish and wildlife protection.

Through these projects and other smaller ones, urban water supplies have kept pace with demand and in general have provided water in advance of urban growth, allowing urban expansion to take place without serious concern over possible water shortages. Urban water needs are legally recognized as the highest use of water; however, the amount of water transferred in California today far exceeds urban demand. In 1980, urban uses of water accounted for only 20–25 percent of all water transferred in the state. The remainder went for nonurban needs, primarily irrigated agriculture.


The Modern Water System
State Water Project Deliveries, 1979
100,000
500,000
2,000,000
(acre-feet)
Service area
Feather River (10,639)
North Bay (6,561)
South Bay (156,251)
Central Valley Project (1,291,134)
San Joaquin (1,619,426)
Southern California (598,338)
Total Deliveries: 3,682,079
Interregional Transfers, 1972
100,000
500,000
2,000,000
(acre-feet)
Hydrologic basin
Net Importer
Net Exporter
No Transfers
North Coastal
North Lahontan
Sacramento Basin
Delta-Central Sierra
San Francisco Bay
San Joaquin Basin
Central Coastal
Tulare Basin
South Lahontan
South Coastal
Colorado Desert
* Exported water does not originate in basin
Water Demand by Hydrologic Basin, 1972
Urban
Urbanized area (as a % of total area)
< 1%
1-20%
> 20%
Demand (acre-feet)
> 500,000
100,000-500,000
< 100,000
Agricultural
Irrigated agricultural land (as a % of total area)
< 5%
5-20%
> 20%
Demand (acre-feet) (in thousands)
5,000-10,000
1,000-5,000
< 1,000
Conveyance Facilities
(date opened)
Major aqueduct/canal
Minor aqueduct/canal
Local development
State development
Federal development
Future development
Urban delivery system
Storage Facilities
Reservoir Capacity
< 250,000 acre-feet
250,000-1,000,000
> 1,000,000
Powerplant
Pumping plant
Urbanized area
Hydrologic basin boundary
0 50mi
0 100km
Square Miles
500
100
Crescent City
Yreka
Eureka
Clair Engle Lake
Weaverville
Shasta Lake
Redding
Alturas
Red Bluff
Fort Bragg
Tehama-Colusa Canal (1971)
Lake Almanor
Ukiah
Chico
Susanville
Lake Oroville
Oroville
Marysville
Lake Berryessa
Santa Rosa
Napa
Folsom Lake
Auburn
San Francisco
Sacramento
Mokelumne Aqueduct (1929)
Stockton
Tracy
San Jose
New Melones Res
Modesto
Delta-Mendota Canal (1951)
New Don Pedro Res
Santa Cruz
San Luis Res
Bridgeport
Monterey
Merced
Lake McClure
Hetch Hetchy Canal (1934)
Salinas
Madera Canal (1944)
Fresno
California Aqueduct (1973)
Pine Flat Res
Bishop
Coalinga
Friant-Kern Canal (1949)
Hanford
Visalia
San Luis Obispo
Santa Maria
Bakersfield
Santa Barbara
Los Angeles Aqueduct (1913, 1970)
Mojave
Ventura
Lancaster
Barstow
Los Angeles
San Bernardino
San Diego Aqueduct (1947, 1960)
Needles
Palm Springs
Colorado River Aqueduct (1941)
San Diego
Coachella Canal (1949)
Blythe
All-American Canal (1942)
El Centro
Klamath River
Eel River
Sacramento River
Feather River
San Joaquin River
Salinas River
Colorado River

AGRICULTURAL PATTERNS

California is the leading agricultural state in the nation. In 1980, California's farmers received 10 percent of national farm revenues, or $13.7 billion. Eight of the top ten agricultural counties in the United States are located in California. Fresno County, the number one agricultural producer in 1980, earned over $2 billion in farm revenue that year. California is among the nation's leading exporters of farm products, sending over $4 billion worth of farm products to foreign nations in 1980.

From the litany of statistics it is clear that agriculture is an important economic asset to California, ranking equally with the aerospace and electronic industries as cornerstones of California's economy. Yet unlike its industrial counterparts, contemporary agriculture in California is difficult to assess and interpret because of its great diversity, its highly specialized nature, and its marked regional variation. Two factors underlie and contribute to the development of California's contemporary agricultural patterns: the nature of the physical environment and the evolution of the farming system.

California's physical environment represents a unique combination of soils, topography, and climate that has created a wide range of environmental conditions occurring within relatively short distances. These localized environments have allowed farmers to take advantage of specific environmental conditions and grow high-value specialty crops. Thus, in many instances crop patterns are influenced by the dominance of physical factors rather than by economic or market conditions. Environmental factors determine what may be grown and, in some measure, to what advantage.

While California's physical environment gives many advantages to the farmer, it also has one distinct drawback, a regional imbalance in rainfall. Most of California's rainfall occurs during the winter in Northern California and along the Sierra Nevada. The Central Valley and Southern California (containing most of the state's farmland) have insufficient rainfall for all but extensive grain crops. To compensate for inadequate rainfall and to take advantage of local environmental conditions, California farmers have turned to irrigation on a grand scale, moving water from regions of high rainfall to regions of low rainfall. California's environment may dominate agricultural patterns, but it is irrigation that makes agriculture profitable.

California's Leading Farm Products by Value (Millions of Dollars)

Farm Product	1980 Rank	1975 Rank	Gross Cash Receipts 1980	% of State Total Receipts 1980
Milk and Cream	1	1	*$1,771*	12.8%
Cattle and Calves	2	2	*1,438*	10.4%
Cotton	3	5	*1,389*	10.0%
Grapes	4	4	*1,215*	8.8%
Hay	5	6	*723*	5.2%
Nursery Products	6	10	*498*	3.6%
Almonds	7	18	*473*	3.4%
Rice	8	9	*423*	3.1%
Flowers & Foliage	9	14	*398*	2.9%
Lettuce	10	11	*382*	2.8%
Eggs	11	7	*370*	2.7%
Wheat	12	12	*357*	2.6%
Tomatoes (processing)	13	3	*326*	2.4%
Chickens	14	22	*229*	1.7%
Oranges	15	13	*224*	1.6%
Strawberries	16	19	*201*	1.5%
Sugar Beets	17	8	*182*	1.3%
Turkeys	18	20	*178*	1.3%
Peaches (all)	19	16	*176*	1.3%
Walnuts	20	24	*168*	1.2%
Top 20 Farm Products			*$11,131*	80.6%
Total State			*$13,700*	100%

Selected Agricultural Products in Which California Leads the United States

Farm Product	California's Share of U.S. Production
1. ***Ladino Clover Seed***	100%
2. ***Olives***	100%
3. ***Plums***	100%
4. ***Prunes***	100%
5. ***Pomegranates***	99%
6. ***Almonds***	99%
7. ***Nectarines***	98%
8. ***Apricots***	97%
9. ***Broccoli***	96%
10. ***Pistachios***	95%
11. ***Walnuts***	95%
12. ***Grapes***	91%
13. ***Safflower***	90%
14. ***Avocados***	84%
15. ***Tomatoes***	79%
16. ***Cauliflower***	78%
17. ***Strawberries***	77%
18. ***Lettuce***	72%
19. ***Honeydew Melons***	70%
20. ***Cantaloupes***	66%
21. ***Dates***	65%
22. ***Figs***	65%
23. ***Celery***	64%
24. ***Peaches***	63%
25. ***Lima Beans***	59%

Despite the seeming ease with which California farmers produce high-value crops, the patterns of contemporary agriculture are the result of a continuous process of refinement and adjustment to both environmental and market situations. For decades after the Gold Rush, California farmers floundered in confusion and uncertainty in unsuccessful attempts to apply agricultural customs, techniques, and crops brought with them from the humid East to the western land. Such efforts, which were successful in climates with adequate rainfall, had no application to arid California and resulted in many failures of various kinds.

Confronted by an unusual environment and isolated from markets for produce, California farmers experimented with many exotic crops such as tea, bananas, and mulberries, but in the early years following the Gold Rush, American farmers usually opted to follow the Mexican example and graze cattle.

A shift to commercial grain farming began in the 1860s in response to increased demands for wheat in England and in continental Europe. The acres planted with wheat increased so rapidly in California that for five of the years between 1872 and 1884 California was the nation's leading wheat producer. The peak was reached in 1884 when California produced almost 40 million bushels of wheat on more than 3 million acres of farmland.

The wheat boom lasted through the 1890s but had virtually disappeared by 1910. In its wake, however, the wheat boom left California farmers with a new type of agriculture. Wheat's dominance established important precedents that remain as part of contemporary agricultural patterns: absentee ownership, large farms, international markets and financing, and most important of all, a penchant for mechanization.

The turn of the century marked a shift in emphasis of California agriculture from extensive, livestock–grain farming to diversified, intensive specialty-crop farming. The emergence of specialty crops, however, was not as sudden as it might appear. By the 1860s many California farmers were experimenting with a variety of fruit, nut, and vegetable crops; isolated from Eastern markets, farmers were unable to establish a profitable base for their crops outside California.

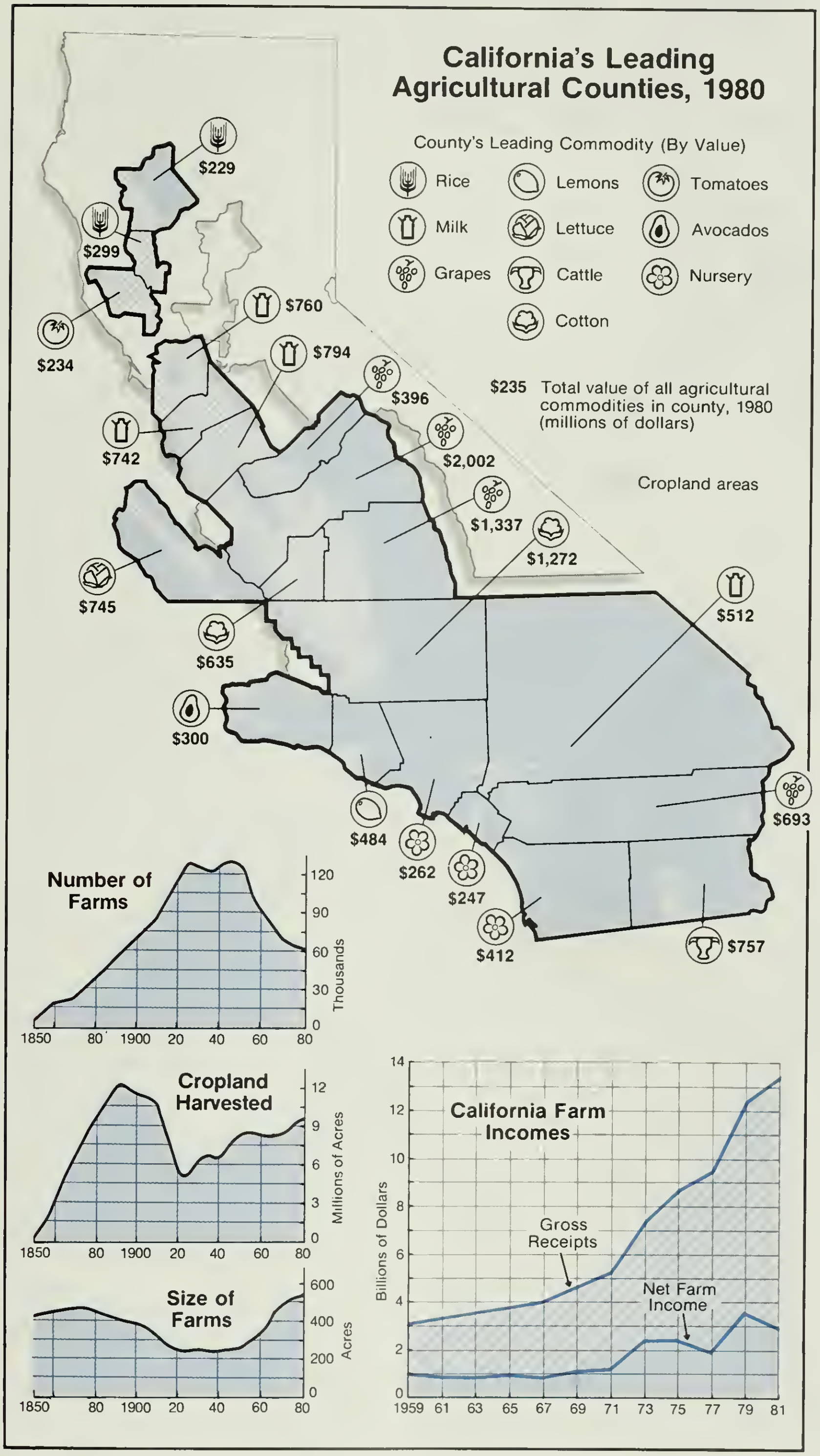
However, with the completion of the transcontinental rail network and the subsequent increase in the urban population in California during the 1880s and 1890s, the transition from wheat to commercially viable specialty crops was assured. Also vitally important to the change in crop patterns were advances in food-preservation techniques, especially the refrigerated railcar, the development of efficient farm implements, and the growth of a large canning industry in California.

By 1910 the foundation of contemporary agricultural patterns and procedures had been established. In less than 50 years California farmers had shifted from cattle to wheat to specialty crops. Almost from the beginning of agricultural development in the state, California farming had been regarded as a commercial pursuit rather than merely as a means of subsistence; this was particularly evident in the movement to specialty-crop farming. Agriculture is highly capitalistic in that large amounts of money and labor are needed to develop and operate farms, to establish perennial plantings, and to purchase specialized equipment. While the use of capital has in large measure fostered and maintained specialized farming in California, the vitality and commercial success of California agriculture have depended on the use of marketing cooperatives to control market supply and reduce costs and on the use of irrigation to increase yields.

The early, simple agricultural patterns have evolved through the years to become quite refined and specialized today. California farmers can boast of one of the most elaborate and costly irrigation systems in the world. Today, California contains almost 8 million acres of irrigated land, 20 percent of the total farmland irrigated in the United States. More than 400 cooperatives move the flow of individual crops from farmer to consumer over a highly efficient transportation system that easily makes Europe and Asia a part of the farmer's immediate market area. Government research has aided farmers in solving a host of problems ranging from crop disease to poor soil fertility.

The spectrum of commercial production has broadened, indeed, from dates to pistachios to kiwi fruit. Along with the demand for specialty crops, changes in farm size have also occurred: farm size declined between 1880 and 1940 but has increased almost every year since 1940. The number of farms also increased through 1950, indicating that most California farms during this period were small. Since 1950 the trend has been toward consolidation of farms into highly mechanized units, a process that has led to an interesting disparity between farmers.

Today two-thirds of the California farms are 100 acres or less in size, yet 10 percent of the farms account for three-fourths of total farm revenue. While the small specialty farms continue to be the typical farm in California, the number of



farms having more than 1,000 acres now totals more than 5,200. The label given to these large farms is *agribusiness*—meaning they engage in the production, processing, and distribution of agricultural crops, often only a single crop.

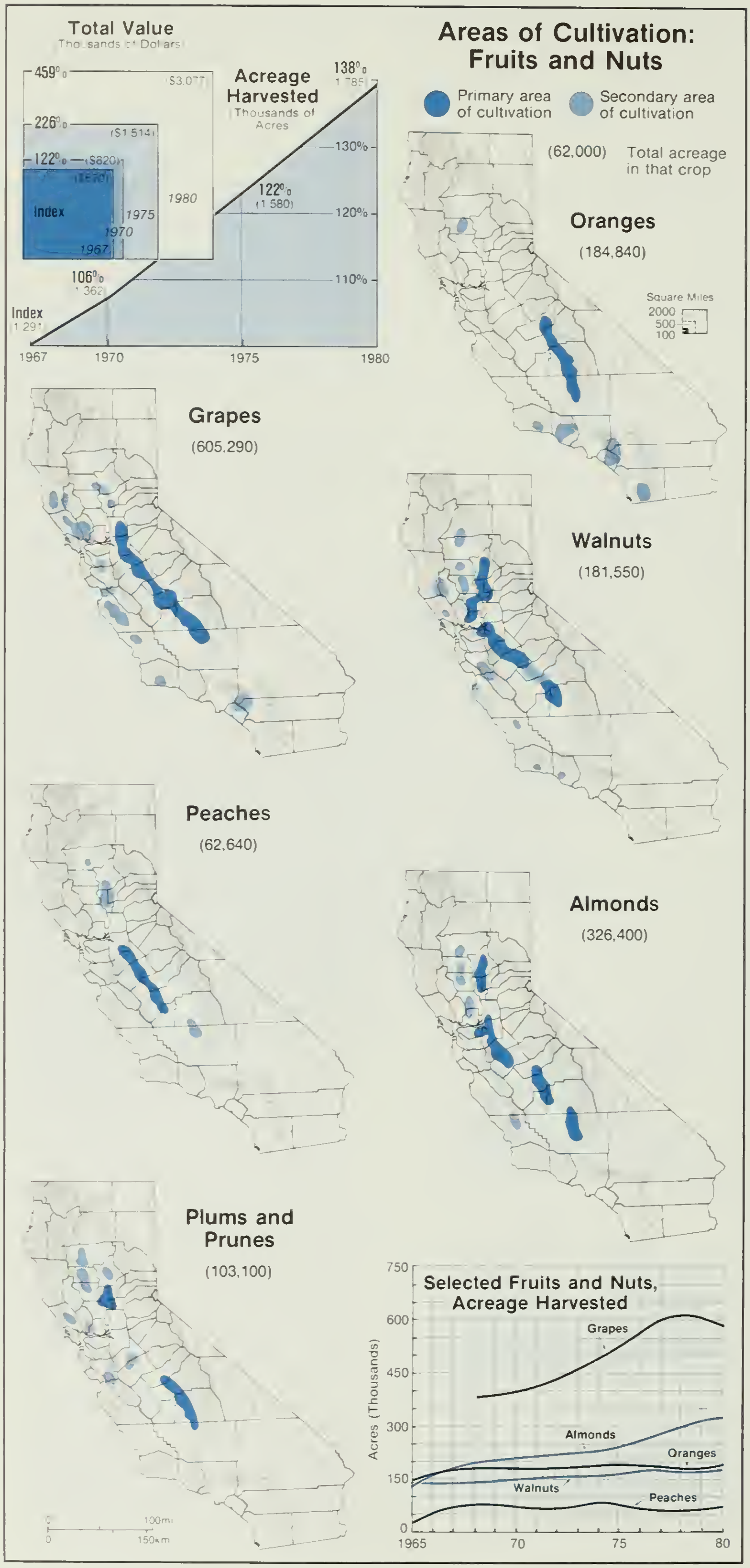
So far this discussion has centered on the development, diversity, and specialized nature of California agriculture. In most agricultural regions differences in crops and farming methods adequately identify, or at least differentiate, specific agricultural patterns. The complexity and discontinuous nature of California specialty crops, however, forestall any effort to generalize about patterns except at the most obvious levels.

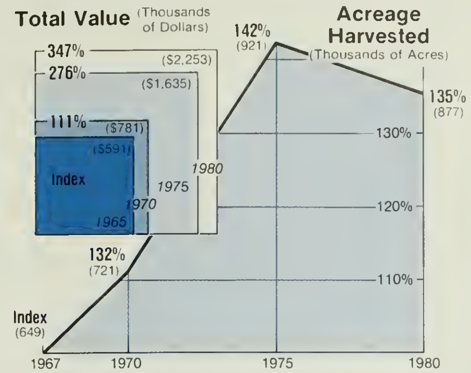
The crop and livestock distributions shown here display many patterns. A diversity of different types of crops can be found in the same area to the total exclusion of other crops. The tendency toward concentration of specific crops in widely separated areas is apparent, but it is expected, considering the varied environment and multitude of crops grown.

California's urban population and industrial economy have grown tremendously since 1940 and have placed considerable pressure on land and water resources. In response to increased demand and fewer resources, farmers have introduced new, higher-yielding crops, improved farming methods, refined marketing systems, developed new technology, and in some cases, changed locations to take advantage of specific environmental conditions that would improve output.

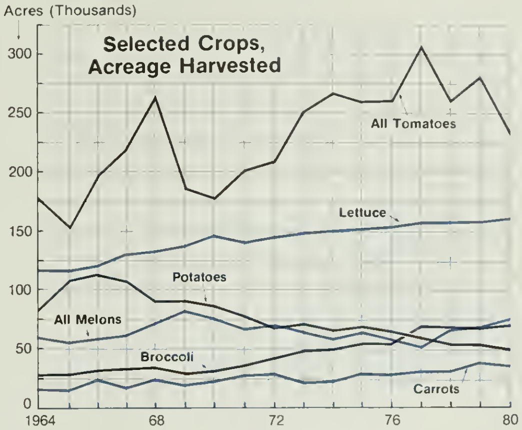
The California farm also underwent changes in organization, management, and ownership. Many California farms increased in size, focused on one crop, became incorporated, and were managed by nonfarmers whose interest in agriculture was limited to the spread between costs and market price.

The move to large corporate-operated farms has brought substantial economies of scale and improved the output per farm, but success in farming now requires large capital investments in land and equipment. The trend toward large, specialized, capital-intensive farms in the past forty years shows no sign of abating in the near future and will probably intensify in the form of even larger farms requiring more capital to operate. In 1980 the average California farm comprised 538 acres and was valued at $503,500. Nationally, the average farm had 450 acres and was valued at $251,000. Today, farming in California is a business to be operated like any other profit-making enterprise.

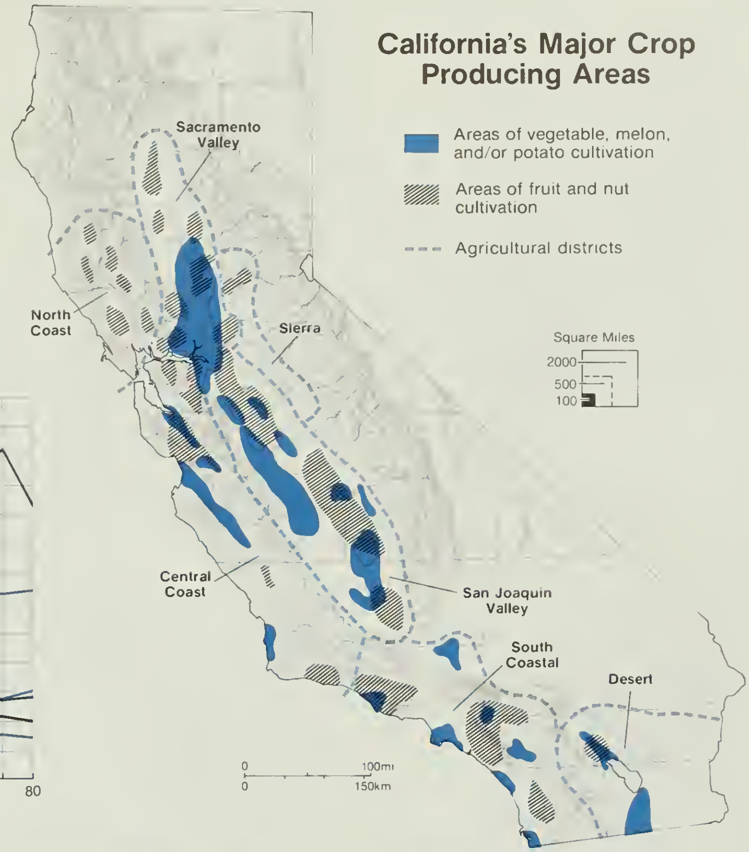




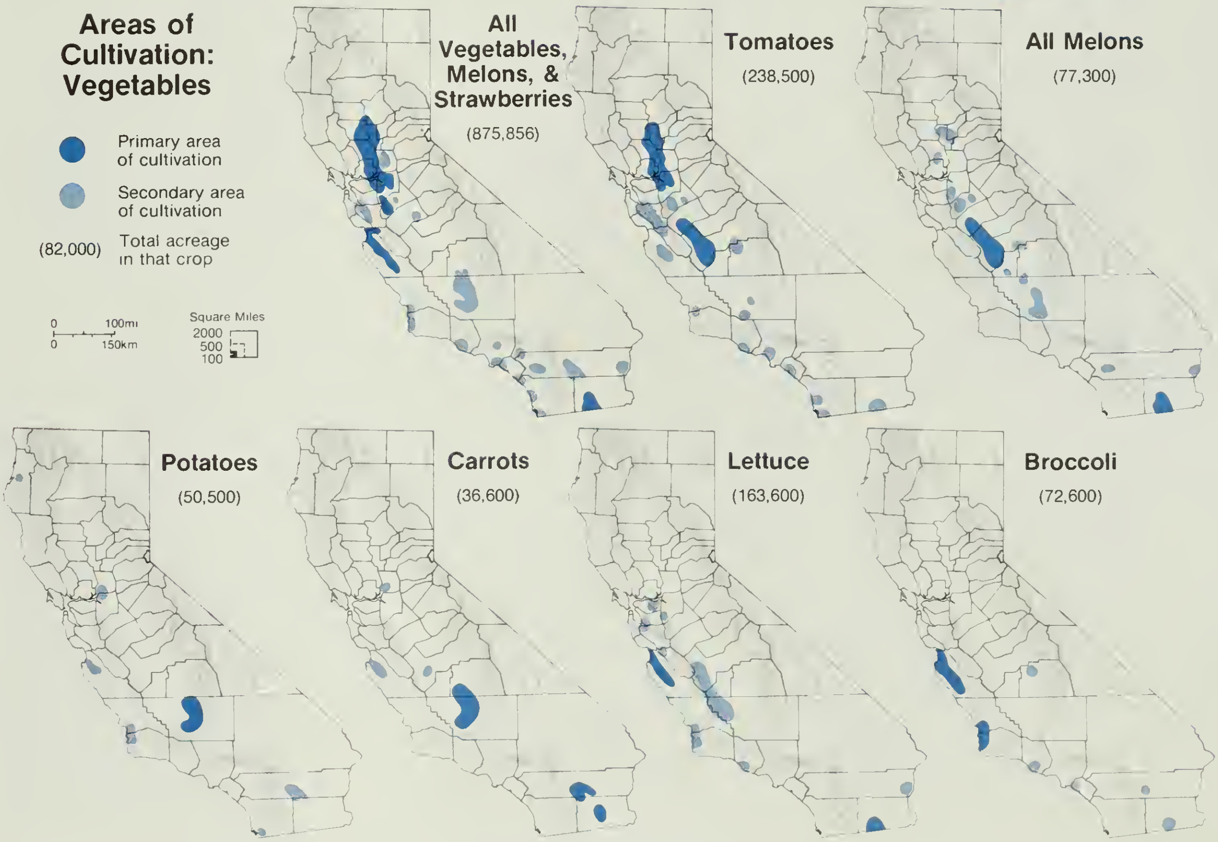
Total Value (Thousands of Dollars)
347%
($2,253)
276%
($1,635)
111%
($781)
($591)
Index
1965
1970
1975
1980
Acreage Harvested
(Thousands of Acres)
142%
(921)
135%
(877)
130%
120%
110%
132%
(721)
Index
(649)
1967
1970
1975
1980



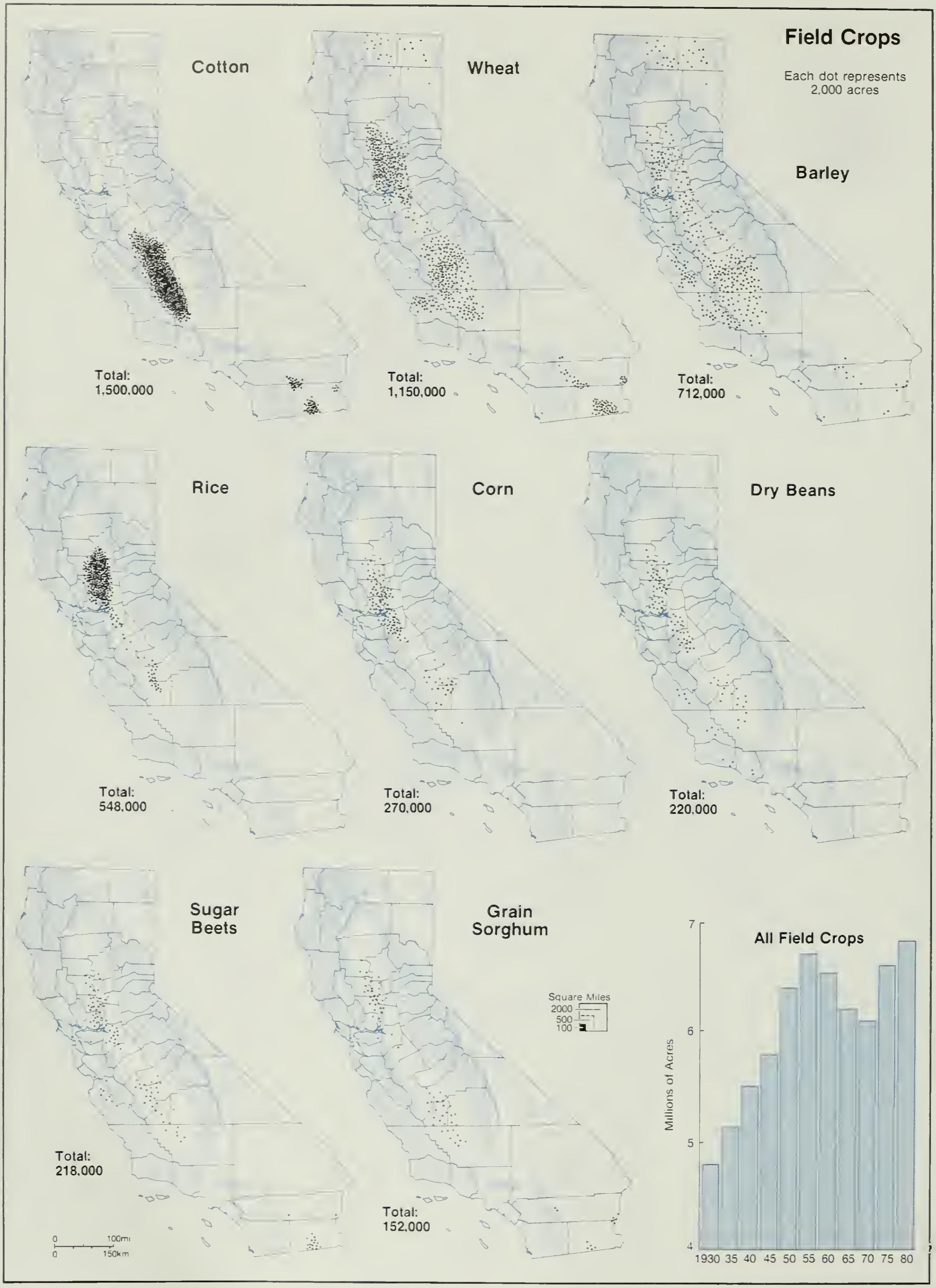
Acres (Thousands)
Selected Crops, Acreage Harvested
300
250
200
150
100
50
0
All Tomatoes
Lettuce
Potatoes
All Melons
Broccoli
Carrots
1964
68
72
76
80



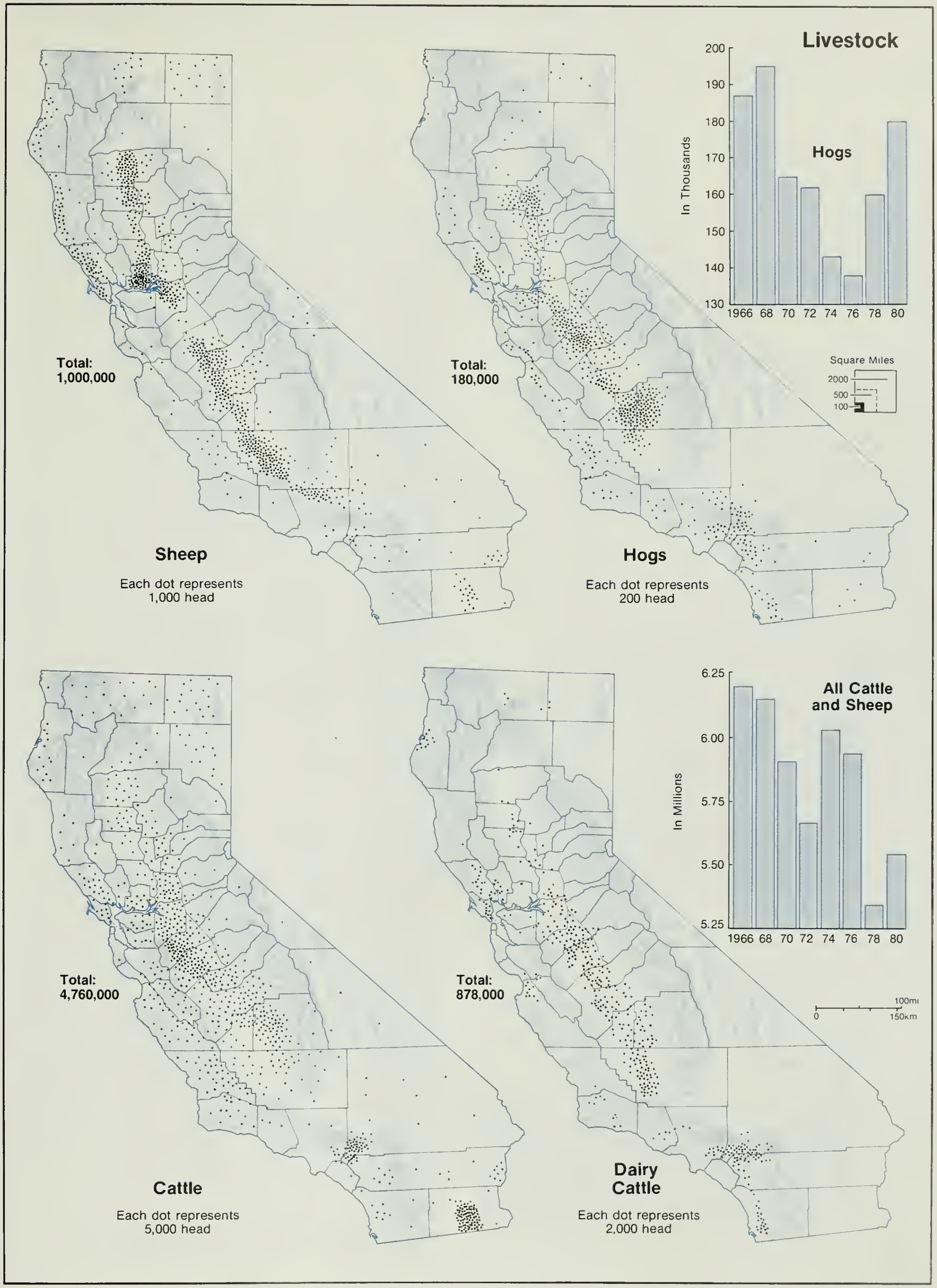
California's Major Crop Producing Areas
Areas of vegetable, melon, and/or potato cultivation
Areas of fruit and nut cultivation
Agricultural districts
Sacramento Valley
North Coast
Sierra
Central Coast
San Joaquin Valley
South Coastal
Desert
Square Miles
2000
500
100
0
100mi
0
150km



Areas of Cultivation: Vegetables
Primary area of cultivation
Secondary area of cultivation
(82,000) Total acreage in that crop
0
100mi
0
150km
Square Miles
2000
500
100
All Vegetables, Melons, & Strawberries
(875,856)
Tomatoes
(238,500)
All Melons
(77,300)
Potatoes
(50,500)
Carrots
(36,600)
Lettuce
(163,600)
Broccoli
(72,600)



Field Crops
Each dot represents 2,000 acres
Cotton
Total: 1,500,000
Wheat
Total: 1,150,000
Barley
Total: 712,000
Rice
Total: 548,000
Corn
Total: 270,000
Dry Beans
Total: 220,000
Sugar Beets
Total: 218,000
Grain Sorghum
Total: 152,000
Square Miles
2000
500
100
0 100mi
0 150km
All Field Crops
Millions of Acres
7
6
5
4
1930 35 40 45 50 55 60 65 70 75 80


Livestock
Hogs
In Thousands
200
190
180
170
160
150
140
130
1966 68 70 72 74 76 78 80
Square Miles
2000
500
100
Total:
1,000,000
Sheep
Each dot represents
1,000 head
Total:
180,000
Hogs
Each dot represents
200 head
All Cattle
and Sheep
In Millions
6.25
6.00
5.75
5.50
5.25
1966 68 70 72 74 76 78 80
100mi
0
150km
Total:
4,760,000
Cattle
Each dot represents
5,000 head
Total:
878,000
Dairy
Cattle
Each dot represents
2,000 head

ECONOMIC PATTERNS AND TRENDS

California has a highly diversified economy, one that gives the state a leading role in the United States and in the world. California is the nation's foremost producer of aerospace, electronics, and entertainment-related products, as well as being the most important agricultural state in the country. If the state were an independent nation, it would rank eighth in gross domestic product and thirteenth in terms of international trade. The robust economy is centered on an industrial mix that includes few of the older, durable-goods industries characteristic of eastern manufacturing states and more on emerging technological companies. California-based companies with sales over $1 billion are not uncommon. In 1981 the top 100 companies in California had a combined total revenue of more than $200 billion.

California's economy is more than a list of facts and figures that measure total value of manufactured goods. It is a union of giant corporations and basement entrepreneurs searching for tomorrow's technology. One can analyze California from many points of view—regional, historical, or environmental—and still not fully understand the mystery that surrounds its spectacular rise to a world economy. The problem with many assessments of California's economic growth is that they invariably focus on single causes or sole determinants such as energy availability, resources, labor force, markets, capital, or transportation, all of which undoubtedly played and continue to play a role in the success of the economy. But it soon becomes apparent that *people* are the common element in California's vital economy. It has been California's good fortune to have citizens possessing the imagination, daring, and skill to create new industries and to invent social, political, and economic institutions that facilitated and encouraged growth.

The real trademark of the state's economy is growth, a legacy inherited from the exuberance of the nineteenth century. After the Gold Rush, California's economy was shaped by its abundant and diverse resources, and by a group of people who were unconstrained by convention or tradition. The resources and emerging economy were fluid enough to fit local needs, and there were unlimited opportunities for people willing to take chances. The economy became specialized and at the same time diversified; spectacular success and colossal failure were commonplace. The nineteenth-century economy was not planned; it was an experiment. The economy reflected the newness and diversity of a people who sprang from all parts of the world and looked to the future with excitement. What made California vibrant was the great fusion of ideas, cultures, and skills organized to satisfy human needs, and a belief in the motto "Bring Me Men to Match My Mountains."

Moving from nineteenth-century California to the 1980s, we see that the same enthusiasm and vibrancy remain, regardless of the rising inflation rate, the high interest rates, or increasing unemployment. California continues to be a world community and shares with the nineteenth century certain expectations of the future: tomorrow means new opportunities for affluence and the pursuit of a quality of life that cannot be found elsewhere. The California economy, then, is people believing in themselves and sharing dreams of tomorrows.

Defining California's economy is much easier than trying to describe it. Many measures and variables can be used, but the one that is most reflective of the state's economy is nonagricultural wage and salary employment, because it is also a measure sensitive to economic growth. Over the past 30 years California's employment has tended to expand vigorously. Between 1950 and 1980 California employment increased by 200 percent—from 3.2 million to 9.8 million workers. Total employment registered spectacular gains in the 1950s and 1960s, mirroring the rapid increase in population, increasing in some years by as much as 6 to 7 percent. In the early 1970s, however, employment stagnated as a nationwide recession combined with reductions in federal spending reduced employment growth to less than 1 percent a year in California. In 1975 the economy began to recover, and between 1977 and 1979 employment increased 12 percent.

The service sector (health, business, tourism) is the largest single employment category in California, providing 22 percent of the state's jobs. Between 1950 and 1980, workers employed in services increased almost 400 percent, with the largest gains made during the 1970s. The second largest employment category is manufacturing, with 20 percent of California workers employed in this sector. Perhaps the most distinctive feature of the state's manufacturing is that much of it is considered light industry, centered on high-technology products such as computers, aerospace products, and scientific instruments. High-technology companies provide about 30 percent of the state's employment in manufacturing compared with 12 percent in the rest of the United States.

While nonagricultural employment provides a good indication of the structure and diversity of California's economy, a view of employment by SMSAs (Standard Metropolitan Statistical Areas) illustrates the regional character of the economy. In 1980, Los Angeles–Long Beach was by far the leading employment center in California, containing almost one-third of the state's employed, with manufacturing and services the two leading categories. San Francisco–Oakland was the second largest employment center with 16 percent of the total workers in the state. Services was the predominant employment category in the Bay Area. In general, employment in manufacturing and services dominated in the large urban centers while government and trade were more evident in smaller centers.

The unemployment rate is possibly the most well known gauge of employment performance and indirectly reflects the condition of the economy. During the 1970s the unemployment rate indicated a rather unstable economy in California. There was a rapid rise in unemployment during 1974–1975 and a downward trend in the second half of the decade. The trend ended in 1979, and the jobless rate again increased swiftly. At the end of 1981, the unemployment rate was 7.2 percent; it had increased to over 9 percent in early 1982.

The high unemployment rate coupled with reduced tax revenues caused by Proposition 13 has caused California's economic growth to slow somewhat since 1978. The high unemployment rate was a delayed reaction to depressed condi-

Employment

Number of Nonagricultural Workers by Major Industry, 1980

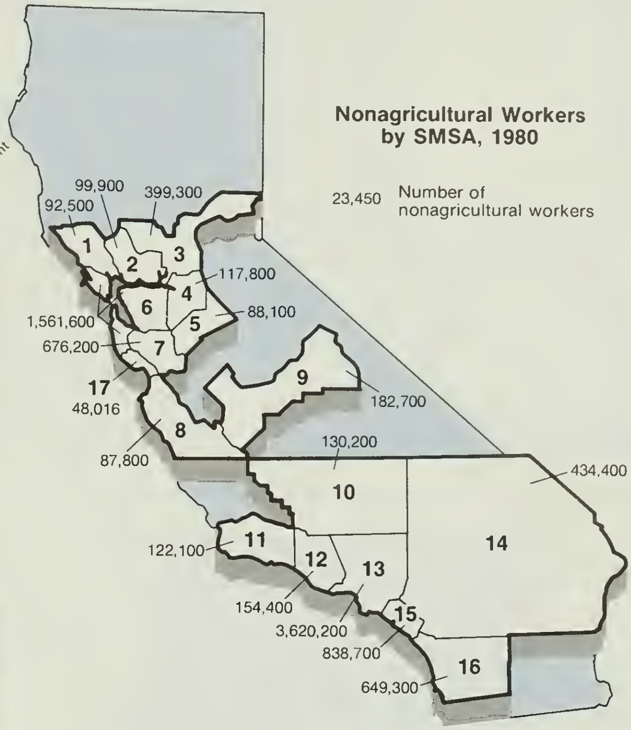
Number of workers as a percent of total SMSA workforce
- Less than 10%
- 10-20%
- More than 20%

25 Number of workers (in thousands)

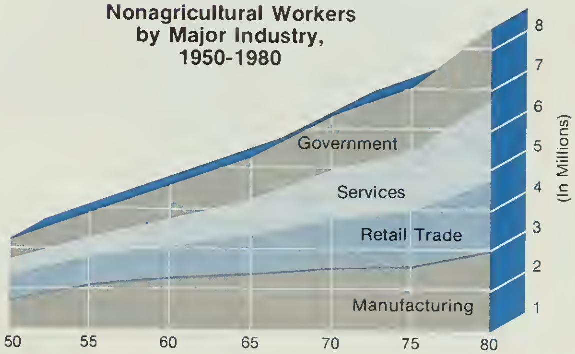
SMSA	Mining	Construction	Manufacturing	Transportation & Public Utilities	Wholesale Trade	Retail Trade	Finance, Insurance & Real Estate	Services	Government
1. Santa Rosa	.4	6	15	5	4	19	6	18	20
2. Vallejo-Fairfield-Napa	1	5	11	5	2	19	3	19	35
3. Sacramento	1	19	27	22	17	77	22	73	141
4. Stockton	1	5	18	7	6	17	4	20	23
5. Modesto	.1	6	19	4	5	17	3	17	17
6. San Francisco-Oakland	.2	5	13	8	7	17	9	22	19
7. San Jose	.2	25	242	22	29	99	27	153	80
8. Salinas-Seaside-Monterey	5	4	10	6	4	22	5	22	27
9. Fresno	1	6	13	6	7	19	6	20	22
10. Bakersfield	11	8	9	8	8	26	5	24	33
11. Santa Barbara-Santa Maria-Lompoc	2	5	16	5	4	26	6	34	25
12. Oxnard-Simi Valley-Ventura	3	9	24	7	7	30	8	31	38
13. Los Angeles-Long Beach	13	119	916	199	269	549	233	831	492
14. Riverside-San Bernardino	2	26	64	26	15	91	19	90	100
15. Anaheim-Santa Ana-Garden Grove	2	50	222	28	40	161	57	173	106
16. San Diego	1	36	108	28	24	124	39	149	141
17. Santa Cruz	No Data Available								

Nonagricultural Workers by SMSA, 1980

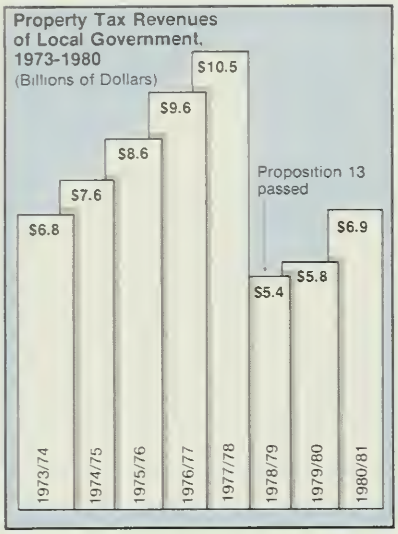
23,450 Number of nonagricultural workers



Nonagricultural Workers by Major Industry, 1950-1980



Unemployment Rate, 1972-1982

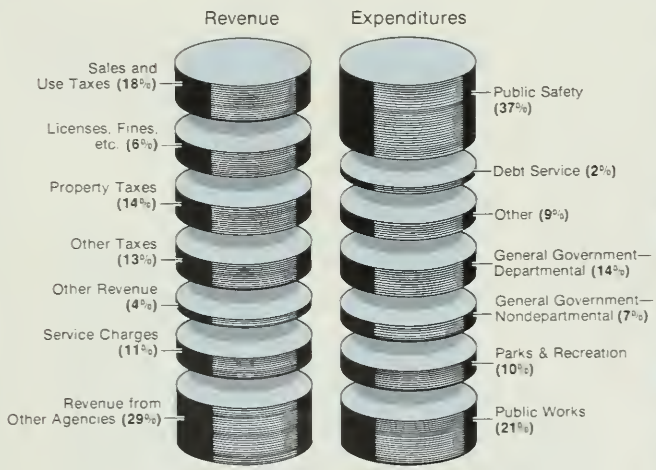


tions throughout the United States, but the reduction of tax revenues was stimulated by an inordinately high tax structure. During the 1970s, the climate for business in the state seemed inhospitable because of the tax structure, tough environmental standards, and a perception by business people that state government was becoming more and more hostile to business. Also, high inflation and property taxes were increasing at an alarming rate. In response, a popularly qualified initiative—Proposition 13—to reduce property tax was approved by the voters in 1978.

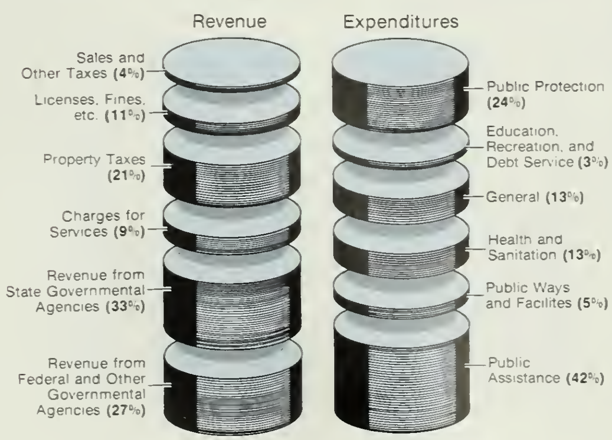
The passage of Proposition 13 dramatically altered the state's tax structure. Over $7 billion in revenues were lost to the state in 1979. Proposition 13 accomplished its main purpose (relieving homeowners from skyrocketing property taxes), but the business sector was the main beneficiary. Over one-half of the tax revenues lost to the state in 1979 accrued to business. The new tax structure lowered the total tax burden on corporations more than enough to offset the state's tax rate on corporate income, which is the highest in the nation. The effective tax rate on business dropped 40 percent after Proposition 13 was approved. Initially, the proposition had the effect of boosting the economy because it placed more disposable income in the hands of consumers and business, but the increase soon dissipated because of inflation.

The direct effect of Proposition 13 was to drastically reduce revenues from the very taxes upon which local govern-

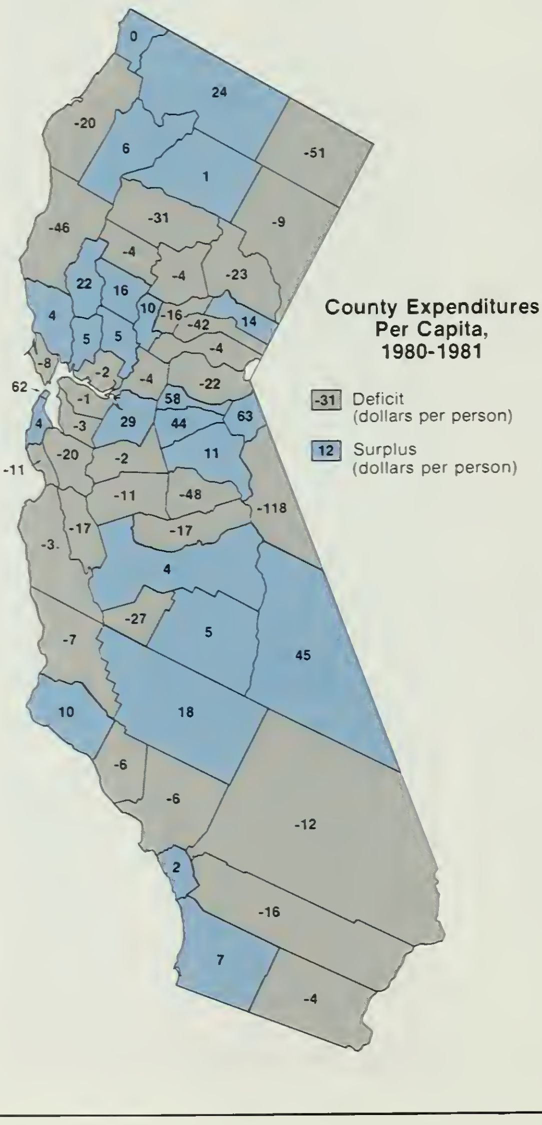
City Revenues and Expenditures, 1980-1981 (All Cities)



County Revenues and Expenditures, 1980-1981 (All Counties)



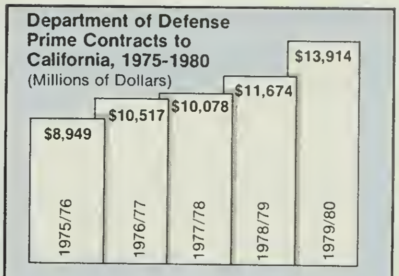
County Expenditures Per Capita, 1980-1981

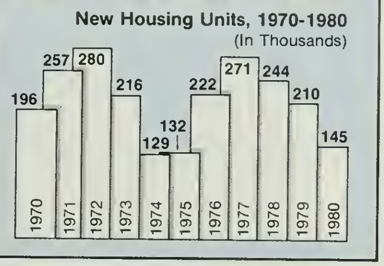


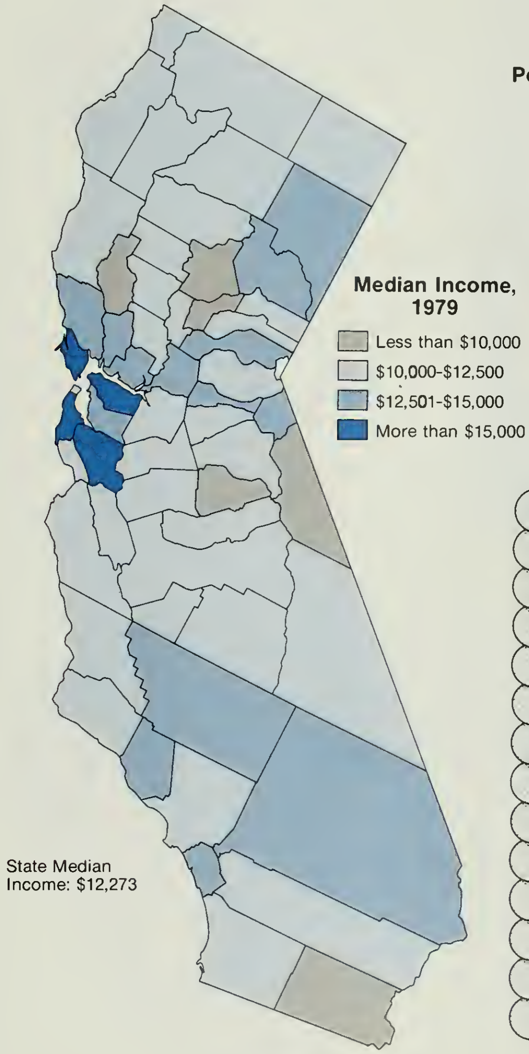
ments had been dependent. County governments were particularly hard hit, and by 1980–1981 they were beginning to run deficit budgets. In general, counties with smaller populations were most affected; with property taxes reduced by 50 percent, local governments could not generate needed revenues and the deficit was partially made up from state revenues. Prior to Proposition 13, the state gave $9.8 billion to local agencies; in 1980–1981 the amount had increased to almost $15 billion. Revenues from other government agencies now account for 60 percent of all county revenues and about 30 percent of all city revenues. Nearly one-half of the money spent by California counties and cities now comes from state government.

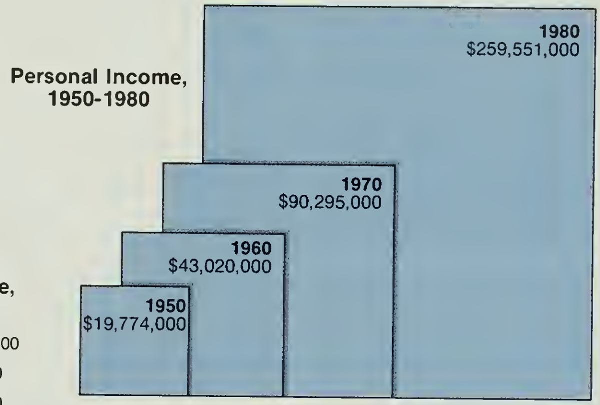
In the private sector, the economy has continued to grow since Proposition 13, although more slowly than expected. One of the worst aspects of the economy in 1981–1982 appeared to be the failure of the supply of housing to keep pace with demand. High interest rates and high home values have hit the home construction business hard. The housing market in California has recently shown signs of being the worst in the United States. Building permits, which had reached a peak of over 146,000 in 1977, slumped to 105,000 by 1981.

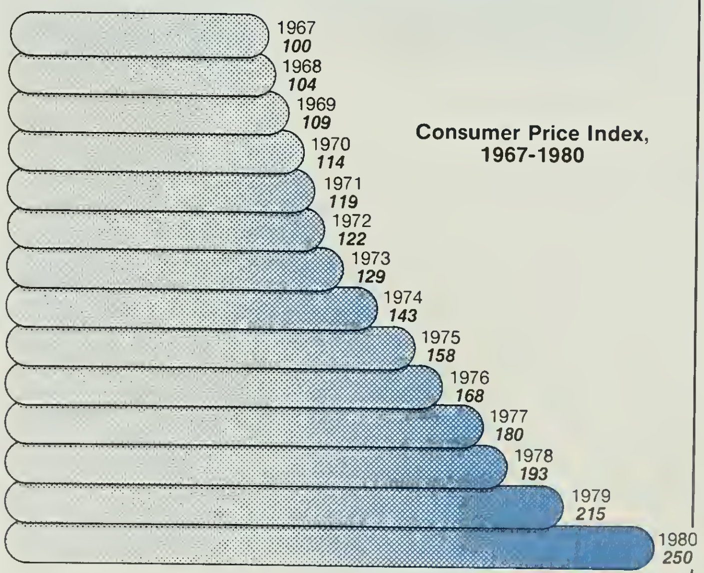
While the housing market was depressed, the combined income of the leading 100 industrial firms in California rose 4 percent in 1981, the smallest percentage of growth since 1974–1975. The top five industrial firms, all petroleum companies, increased only 2 percent.



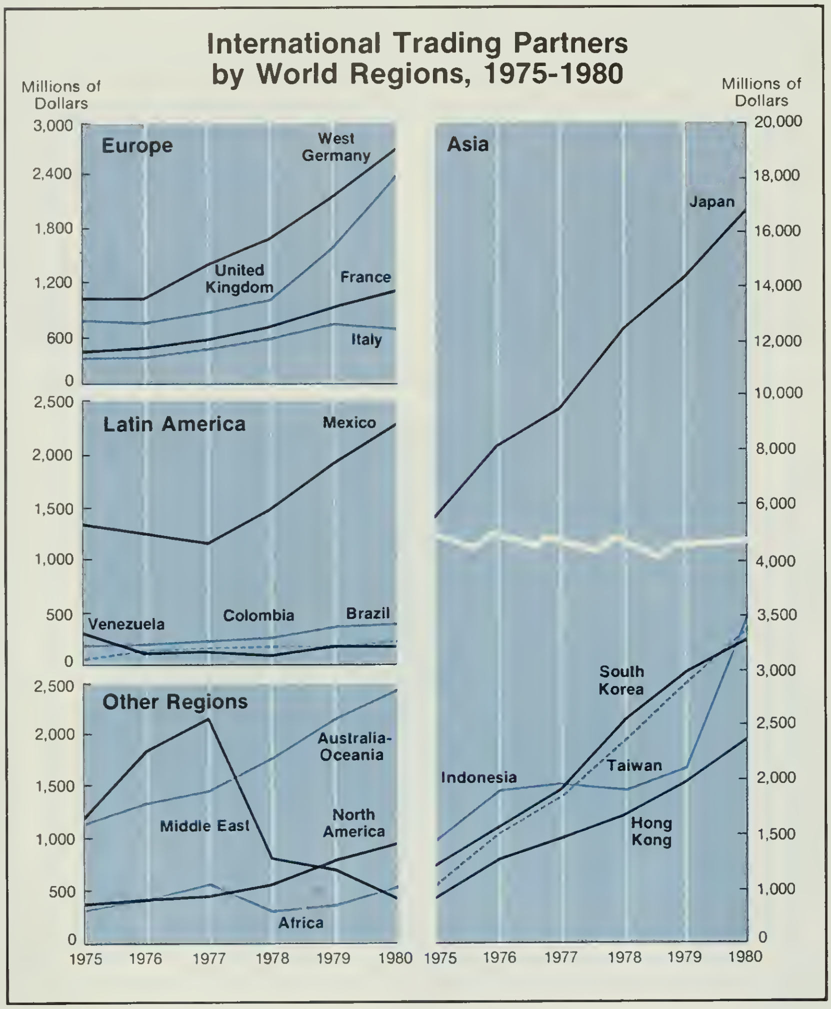








INTERNATIONAL TRADE



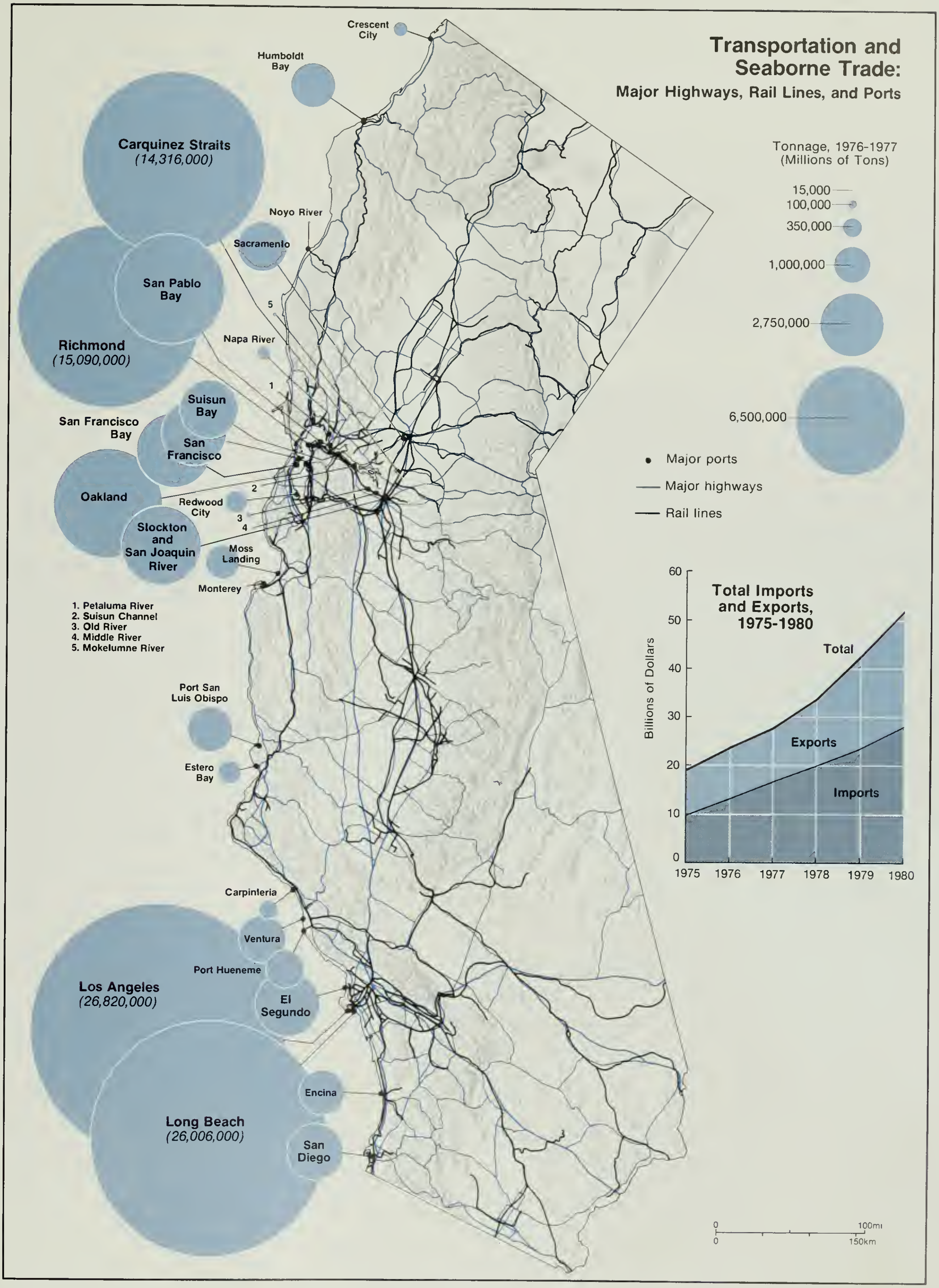
California's highly diversified economy, large market, and location have made it an important supplier and buyer on the world trade scene. In terms of national exports, California accounted for 12 percent of all goods and services going to international markets in 1980. Through California customs districts flow, on the average, 41 percent of the nation's textile and fiber products, 29 percent of the fruits and nuts, and 39 percent of the electrical machines. The long list of products from all over the United States shipped to foreign countries through California ports is valued at billions of dollars. In its own right, California produces a wide array of commodities and manufactured goods for the international market and, in turn, is a lucrative market for foreign products, particularly those manufactured in Asia. California has taken full advantage of its location by becoming the gateway for United States trade with developing Asian countries.

Not all commodities passing through California are destined for or originate in the state, but nonetheless they must pass through one of three customs districts: Los Angeles, San Francisco, or San Diego. Los Angeles is the third largest customs district in the United States and, on the average, accounts for 63 percent of California's international trade. San Francisco ranks as the eighth largest customs district and usually handles 33 percent of the international trade. San Diego is the smallest of the three, accounting for only 4–5 percent of the products shipped to or from foreign markets. San Diego, however, is unusual in that its trade pattern is dominated by Latin America, especially Mexico. In 1980 Latin America accounted for 85 percent of San Diego's international trade, of which 83 percent was with Mexico.

California produces a number of important products for the international market. In 1980 agricultural commodities were the leading export by value, totaling $3.5 billion, almost all shipped from the San Joaquin Valley through San Francisco. Raw cotton was California's leading agricultural export; over $1 billion of cotton was exported by California in 1980, accounting for 54 percent of the nation's total raw cotton exports. The next most valuable exports (in terms of dollars) were the $2.3 billion worth of machinery and mechanical equipment exported in 1980. Aerospace products ranked third in 1980, with a value of $1.4 billion. California's international trade increased from about $30 billion in 1977 to almost $60 billion in 1980; this remarkable performance has left California with little or no trade deficit.

California's leading trading area is Asia. Over one-third of the products shipped through the state are destined for or originate in Asia and were valued in 1980 at $20 billion. Japan is California's leading Asian trading partner, accounting for almost one-half of the Asian trade and approximately one-fifth of the state's total international trade. Automobiles dominated the trade with Japan, leaving California a net importer of Japanese products. While all other Asian countries were dwarfed by the Japanese trade, they proved to be net importers of California's products, primarily agricultural.

Europe followed Asia as California's second largest trading partner in 1980 and accounted for 18 percent of the state's international trade. However, the recent slumping European economies have decreased imports from California. West Germany is California's leading European trade partner, with transportation equipment (motor vehicles) constituting two-thirds of the trade. For the most part, California provides West Germany and the other European countries with high-technology products, primarily electronics and computers.


Transportation and Seaborne Trade:
Major Highways, Rail Lines, and Ports
Tonnage, 1976-1977
(Millions of Tons)
15,000
100,000
350,000
1,000,000
2,750,000
6,500,000
Major ports
Major highways
Rail lines
Crescent City
Humboldt Bay
Carquinez Straits
(14,316,000)
Noyo River
Sacramento
San Pablo Bay
5
Richmond
(15,090,000)
Napa River
1
Suisun Bay
San Francisco Bay
San Francisco
Oakland
2
Redwood City
3
4
Stockton and San Joaquin River
Moss Landing
Monterey
1. Petaluma River
2. Suisun Channel
3. Old River
4. Middle River
5. Mokelumne River
Port San Luis Obispo
Estero Bay
Carpinteria
Ventura
Port Hueneme
El Segundo
Los Angeles
(26,820,000)
Long Beach
(26,006,000)
Encina
San Diego
Total Imports and Exports, 1975-1980
Billions of Dollars
60
50
40
30
20
10
0
1975
1976
1977
1978
1979
1980
Total
Exports
Imports
0
100mi
0
150km

California Crop and Livestock Reporting Service. *California Annual Vegetable Summary, 1982.* Sacramento, 1980.

________ . *California Fruit and Nuts Statistics, 1980–81.* Sacramento, 1981.

California Department of Finance. *California Economic Indicators.* Sacramento, May 1982.

________ . *California Statistical Abstract.* Sacramento, 1981.

California Division of Mines and Geology. *Mineral Resources of California.* Bulletin 191. Sacramento, 1966.

California State Controller. *Annual Report of Financial Transactions Concerning Cities of California: Fiscal Year 1980–81.* Sacramento, 1981.

________ . *Annual Report of Financial Transactions Concerning Counties of California: Fiscal Year 1980–81.* Sacramento, 1981.

Chinn, Thomas W., ed. *A History of Chinese in California.* San Francisco: Chinese Historical Society of America, 1969.

Collins, Keith E. *Black Los Angeles: The Maturing of the Ghetto, 1940–1950.* San Francisco: R & E Research Associates, 1979.

Donley, Michael W., Stuart Allen, Patricia Caro, and Clyde E. Patton. *Atlas of California.* Culver City, Calif.: Pacific Book Center, 1979.

Gregor, Howard F. "Spatial Disharmonies in California's Population Growth." *Geographical Review* 53 (1963): pp. 100–22.

Hornbeck, David, and Mary Tucey. "Agriculture in Hispanic California." *California Geographer* 15 (1975): pp. 52–59.

Jelinek, Lawrence J. *Harvest Empire: A History of California Agriculture,* San Francisco: Boyd & Fraser, 1979.

Kahrl, William L., ed. *The California Water Atlas.* Prepared by the Governor's Office of Planning and Research in cooperation with the California Department of Water Resources. Sacramento, 1978.

Kelley, Robert L. *Gold vs. Grain: The Hydraulic Mining Controversy in California's Sacramento Valley, a Chapter in the Decline of the Concept of Laissez-Faire.* Glendale, Calif.: Arthur H. Clark, 1959.

Kimble, John Haskell. *The Panama Route, 1848–1869.* Berkeley and Los Angeles: University of California Press, 1943.

McWilliams, Carey. *California, the Great Exception.* Santa Barbara, Calif.: Peregrine Smith, 1973.

May, Philip Ross. *Origins of Hydraulic Mining in California.* Oakland, Calif.: Holmes Book Co., 1970.

Morrison, P. A. *The Role of Migration in California's Growth.* Santa Monica, Calif.: Rand Corporation, 1971.

Nelson, Howard J. "The Spread of an Artificial Landscape Over Southern California." *Annals of the Association of American Geographers* 49, supplement (September 1959): pp. 80–100.

Oliver, Virginia. "California's Urban Hierarchy During the 1870s." Paper presented at the annual meeting of the Association of American Geographers, Los Angeles, 1981.

Orse, Richard J. *A List of References for the History of Agriculture in California.* Agricultural History Center, University of California, Davis, 1974.

Paul, Rodman W. *California Gold: The Beginning of Mining in the Far West.* Lincoln: University of Nebraska Press, 1947.

Pryde, Phillip R., ed. *San Diego: An Introduction to the Region.* 2nd ed. Dubuque, Iowa: Kendall-Hunt, 1979.

Security Pacific National Bank. *Taxes and Other Revenue of State and Local Government in California: An Analysis of Data for the Fiscal Years 1969–70 through 1980—81.* Los Angeles, January 1982.

Selvin, David F. *Skyfull of Storm: A Brief History of California Labor.* Berkeley: Institute of Industrial Relations, University of California, 1966.

Starr, Kevin. *Americans and the California Dream, 1850–1915.* New York: Oxford University Press, 1973.

Steiner, Rodney. *Los Angeles: The Centrifugal City.* Dubuque, Iowa: Kendall-Hunt, 1981.

Taugher, Michael Frederick. "Settlement Frontier of Hispanic California to 1890." Master's thesis, California State University, Northridge, 1979.

Thompson, Warren S. *Growth and Changes in California's Population.* Los Angeles: The Haynes Foundation, 1955.

Trzyna, Thaddeus C. *The California Handbook: A Comprehensive Guide to Sources of Current Information and Action, with Selected Background Material.* Claremont: California Institute of Public Affairs, 1981.

U.S. Bureau of the Census. *Census Reports Volume I. Twelfth Census of the United States, taken in the Year 1900. Population. Part I.* Washington, 1901.

________ . *1980 Census of Population and Housing, California.* Washington, 1981.

________ . *1980 Census of Population: Number of Inhabitants, California, Part 6.* Washington, 1982.

________ . *Population of the United States in 1860 Compiled from the Original Returns of the Eighth Census.* Washington, 1864.

________ . *Seventh Census of the United States, Part I.* Washington, 1853.

________ . *Report on Population of the United States at the Eleventh Census, 1890, Part I.* Washington, 1895.

________ . *Seventh Census of the United States, Statistical View.* Washington, 1853.

________ . *Statistics of the Population of the United States . . . , the Ninth Census, Part I.* Washington, 1872.

________ . *Statistics of the Population of the United States at the Tenth United States Census.* Washington, 1883.

Wright, Doris M. "The Making of Cosmopolitan California." *California Historical Society Quarterly* 19 (December 1940): pp. 323–343.

APPENDIXES

POPULATION OF CALIFORNIA COUNTIES, 1850–1980

	1850	1860	1870	1880	1890	1900	1910
Alameda		8,927	24,237	62,976	93,864	130,197	246,131
Alpine			685	539	667	509	309
Amador		10,930	9,582	11,384	10,320	11,116	9,086
Butte	3,574	12,106	11,403	18,721	17,939	17,117	27,301
Calaveras	16,884	16,299	8,895	9,094	8,882	11,200	9,171
Colusa	115	2,274	6,165	13,118	14,640	7,364	7,732
Contra Costa		5,328	8,461	12,525	13,515	18,046	31,674
Del Norte		1,993	2,022	2,584	2,592	2,408	2,417
El Dorado	20,057	20,562	10,309	10,683	9,232	8,986	7,492
Fresno		4,605	6,336	9,478	32,026	37,862	75,657
Glenn						5,150	7,172
Humboldt		2,694	6,140	15,512	23,469	27,104	33,857
Imperial							13,591
Inyo			1,956	2,928	3,544	4,377	6,974
Kern			2,925	5,601	9,808	16,480	37,715
Kings						9,871	16,230
Lake			2,969	6,596	7,101	6,017	5,526
Lassen			1,327	3,340	4,239	4,511	4,802
Los Angeles	3,530	11,333	15,309	33,381	101,454	170,298	504,131
Madera						6,368	8,368
Marin	323	3,334	6,903	11,324	13,072	15,702	25,114
Mariposa	4,379	6,243	4,572	4,339	3,787	4,720	3,956
Mendocino	55	3,967	7,545	12,800	17,612	20,465	23,929
Merced		1,141	2,807	5,656	8,085	9,215	15,148
Modoc				4,399	4,986	5,076	6,191
Mono			430	7,499	2,002	2,167	2,042
Monterey	1,872	4,739	9,876	11,302	18,637	19,380	24,146
Napa	450	5,521	7,163	13,235	16,411	16,451	19,800
Nevada		16,446	19,134	20,823	17,369	17,789	14,955
Orange					13,589	19,696	34,436
Placer		13,270	11,357	14,232	15,101	15,786	18,237
Plumas		4,363	4,489	6,180	4,933	4,657	5,259
Riverside						17,897	34,696
Sacramento	9,087	24,142	26,830	34,390	40,339	45,915	67,806
San Benito				5,584	6,412	6,633	8,041
San Bernardino		5,551	3,988	7,786	25,497	27,929	56,706
San Diego	798	4,324	4,951	8,618	34,987	35,090	61,665
San Francisco		56,802	149,473	233,959	298,887	342,782	416,912
San Joaquin	3,647	9,435	21,050	24,349	28,629	35,452	50,731
San Luis Obispo	336	1,782	4,772	9,142	16,072	16,637	19,383
San Mateo		3,214	6,635	8,669	10,087	12,094	26,585
Santa Barbara	1,185	3,543	7,784	9,513	15,754	18,934	27,738
Santa Clara		11,912	26,246	35,039	48,005	60,216	83,539
Santa Cruz	643	4,944	8,743	12,802	19,270	21,512	26,140
Shasta	378	4,360	4,173	9,492	12,133	17,318	18,920
Sierra	11,387	5,619	6,623	5,051	4,017	4,098	4,098
Siskiyou		7,629	6,848	8,610	12,163	16,962	18,801
Solano	580	7,169	16,871	18,475	20,946	24,143	27,559
Sonoma	560	11,867	19,819	25,926	32,721	38,480	43,394
Stanislaus		2,245	6,499	8,751	10,040	9,550	22,522
Sutter	3,444	3,390	5,030	5,159	5,469	5,886	6,328
Tehama		4,044	3,587	9,301	9,916	10,996	11,401
Trinity	1,635	5,125	3,213	4,999	3,719	4,383	3,301
Tulare		4,638	4,533	11,281	24,574	18,375	35,440
Tuolumne	8,351	16,229	8,150	7,848	6,082	11,166	9,979
Ventura				5,073	10,071	14,367	18,347
Yolo	1,086	4,716	9,899	11,772	12,684	13,618	13,926
Yuba	9,673	13,668	10,851	11,284	9,636	8,620	10,042
All Counties	92,597	379,994	560,247	864,694	1,213,398	2,377,549	2,377,549

APPENDIX A

	1920	1930	1940	1950	1960	1970	1980
Alameda	344,177	474,883	513,011	740,315	893,560	1,071,446	1,105,379
Alpine	243	241	323	241	370	484	1,097
Amador	7,793	8,494	8,973	9,151	9,970	11,821	19,314
Butte	30,030	34,093	42,840	64,930	81,940	101,969	143,851
Calaveras	6,183	6,008	8,221	9,902	10,190	13,585	20,710
Colusa	9,290	10,258	9,788	11,651	12,090	12,430	12,791
Contra Costa	53,889	78,608	100,450	298,984	404,100	556,116	657,252
Del Norte	2,759	4,739	4,745	8,078	17,480	14,580	18,217
El Dorado	6,426	8,325	13,229	16,207	29,280	43,833	85,812
Fresno	128,779	144,379	178,565	276,515	368,490	413,329	515,013
Glenn	11,853	10,935	12,195	15,448	17,210	17,521	21,350
Humboldt	37,413	43,233	45,812	69,241	105,170	99,692	108,024
Imperial	43,453	60,903	59,740	62,975	71,030	74,492	92,110
Inyo	7,031	6,555	7,625	11,658	11,710	15,571	17,895
Kern	54,843	82,570	132,124	228,309	341,100	330,234	403,089
Kings	22,031	25,385	35,168	49,900	68,300	66,717	73,738
Lake	5,402	7,166	8,069	13,680	24,100	19,548	36,366
Lassen	8,507	12,589	14,479	18,474	13,560	16,796	21,661
Los Angeles	936,455	2,208,492	2,785,653	4,151,687	6,011,140	7,041,980	7,477,657
Madera	12,203	17,164	23,314	36,964	40,420	41,519	63,116
Marin	27,342	41,648	52,907	85,619	146,050	208,652	222,952
Mariposa	2,775	3,233	5,605	5,145	5,090	6,015	11,108
Mendocino	24,116	23,505	27,864	40,854	50,850	51,101	66,738
Merced	24,579	36,748	46,988	69,780	90,380	104,629	134,560
Modoc	5,425	8,038	8,713	9,678	8,360	7,469	8,610
Mono	960	1,360	2,299	2,115	2,160	4,016	8,577
Monterey	27,980	53,705	73,032	130,498	197,870	247,450	290,444
Napa	20,678	22,897	28,503	46,603	65,620	79,140	99,199
Nevada	10,850	10,596	19,283	19,888	21,050	26,346	51,645
Orange	61,375	118,674	130,760	216,224	708,940	1,421,233	1,931,570
Placer	18,584	24,468	28,108	41,649	56,960	77,632	117,247
Plumas	5,681	7,913	11,548	13,519	11,630	11,707	17,340
Riverside	50,297	81,024	105,524	170,046	303,360	456,916	663,923
Sacramento	91,029	141,999	170,333	277,140	502,770	634,373	783,381
San Benito	8,995	11,311	11,392	14,370	15,300	18,226	25,005
San Bernardino	73,401	133,900	161,108	281,642	501,130	682,233	893,157
San Diego	112,248	209,659	289,348	556,808	1,033,380	1,357,854	1,861,846
San Francisco	506,676	634,394	634,536	775,357	729,180	715,674	678,974
San Joaquin	79,905	102,940	134,207	200,750	248,850	291,073	347,342
San Luis Obispo	21,893	29,613	33,246	51,417	80,670	105,690	155,345
San Mateo	36,781	77,405	111,782	235,659	441,490	557,361	588,164
Santa Barbara	41,097	65,167	70,555	98,220	168,520	264,324	298,660
Santa Clara	100,676	145,118	174,949	290,547	642,160	1,065,313	1,295,071
Santa Cruz	26,269	37,433	45,057	66,534	82,410	123,790	188,141
Shasta	13,361	13,927	28,800	36,413	59,290	77,640	115,715
Sierra	1,783	2,422	3,025	2,410	1,980	2,365	3,073
Siskiyou	18,545	25,480	28,598	30,733	32,980	33,225	39,732
Solano	40,602	40,834	49,118	104,833	134,030	171,989	235,203
Sonoma	52,090	62,222	69,052	103,405	146,550	204,885	299,827
Stanislaus	43,557	56,641	74,866	127,231	156,700	194,506	265,902
Sutter	10,115	14,618	18,680	26,239	33,350	41,935	52,246
Tehama	12,882	13,886	14,316	19,276	25,450	29,517	38,888
Trinity	2,551	2,809	3,970	5,087	10,040	7,615	11,858
Tulare	59,031	77,442	107,152	149,264	166,150	188,322	245,751
Tuolumne	7,768	9,271	10,887	12,584	14,060	22,169	33,920
Ventura	28,274	54,976	69,685	114,647	199,270	378,497	529,899
Yolo	17,105	23,644	27,243	40,640	66,040	91,788	113,374
Yuba	10,375	11,331	17,034	24,420	33,880	44,736	49,733
All Counties	3,426,861	5,677,251	6,907,387	10,586,223	15,650,000	19,971,069	23,668,562

CALIFORNIA STATE PARKS, RESERVES, HISTORIC PARKS, AND RECREATION AREAS, 1981

Name	County	Area (acres)
Total		1,005,080.45
Admiral William Standley SRA	Mendocino	45.22
Ahjumawi Lava Springs SP	Shasta	*
Ahwahnee Roundhouse Project	Madera	9.61
Alamitos Beach	Orange	0.90
American River Bikeway Project	Sacramento	54.79
Andrew Molera SP	Monterey	4,785.88
Angel Island SP	Marin-San Francisco	757.71
Annadel SP	Sonoma	4,913.31
Ano Nuevo SR	San Mateo	1,191,74
Antelope Valley California Poppy Reserve	Kern	1,744.90
Anza-Borrego Desert SP	Imperial-San Diego	522,317.93
Armstrong Redwoods SR	Sonoma	680.00
Asilomar SB	Monterey	105.44
Atascadero SB	San Luis Obispo	75.07
Auburn SRA	Placer	Not available
Austin Creek SRA	Sonoma	4,235.59
Avila SB	San Luis Obispo	10.01
Azalea SR	Humboldt	30.00
Bale Grist Mill SHP	Napa	0.75
Bean Hollow SB	San Mateo	44.00
Benbow Lake SRA	Humboldt	625.58
Benicia Capitol SHP	Solano	0.86
Benicia SRA	Solano	367.04
Bethany Reservoir SRA	Alameda	Not available
Bidwell Mansion SHP	Butte	5.65
Bidwell River Park Project	Butte	180.00
Big Basin Redwoods SP	Santa Cruz	15,647.04
Bodie SHP	Mono	320.00
Bolsa Chica SB	Orange	164.32
Border Field SP	San Diego	679.80
Bothe-Napa Valley SP	Napa	1,915.86
Brannan Island SRA	Sacramento	335.70
Burton Creek SP	Placer	1,781.29
Butano SP	San Mateo	2,186.49
Calaveras Big Trees SP	Calaveras-Tuolumne	5,993.77
Candlestick Point SRA	San Francisco	12.65
Cardiff SB	San Diego	24.52
Carlsbad SB	San Diego	13.56
Carmel River SB	Monterey	106.10
Carnegie Cycle Prk. Project	San Joaquin, Alameda	1,539.82
Carpinteria SB	Santa Barbara	50.39
Caspar Headlands SB	Mendocino	2.95
Caspar Headlands SR	Mendocino	2.70
Castaic Lake SRA	Los Angeles	2,409.63
Castle Crags SP	Shasta-Siskiyou	6,217.70
Castle Rock SP	Santa Cruz	2,644.62
Caswell Memorial SP	San Joaquin	258.12
Cayucos SB	San Luis Obispo	15.63
China Camp SP	Marin	1,478.00
Chumash Painted Caves SRA	Santa Barbara	7.50
Clay Pit SVRA	Butte	*
Clear Lake SP	Lake	564.94
Colonel Allensworth SHP	Tulare	234.84
Columbia SHP	Tuolumne	272.56
Colusa-Sacramento River SRA	Colusa	66.50
Corona del Mar SB	Orange	30.28
Crystal Cove SP	Orange	*
Cuyamaca Rancho SP	San Diego	24,623.82
D.L. Bliss SP	El Dorado	1,236.93
Del Norte Coast Redwoods SP	Del Norte	6,375.02
Dockweiler SB	Los Angeles	90.88
Doheny SB	Orange	62.02
Donner Memorial SP	Nevada-Placer	352.53
Drum Barracks Project	Los Angeles	0.55

Name	County	Area (acres)
Dry Lagoon SP	Humboldt	1,036.45
Durham Ferry SRA	San Joaquin	*
El Capitan SB	Santa Barbara	132.84
El Matador Beach Project	Los Angeles	15.46
El Pescador Beach Project	Los Angeles	10.23
El Presidio de Santa Barbara SHP	Santa Barbara	1.53
El Pueblo de Los Angeles SHP	Los Angeles	5.42
Emerald Bay SP	El Dorado	592.59
Emma Wood SB	Ventura	115.86
Empire Mine SHP	Nevada	788.19
Folsom Lake SRA	El Dorado-Placer-Sacramento	17,717.86
Forest of Nisene Marks SP, The	Santa Cruz	9,959.59
Fort Humboldt SHP	Humboldt	11.78
Fort Ross SHP	Sonoma	819.34
Fort Tejon SHP	Kern	205.38
Franks Tract SRA	Contra Costa	3,515,52
Fremont Ford SRA	Merced	114.00
Fremont Peak SP	Monterey-San Benito	244.23
Garcia Property	Santa Cruz	144.41
Gaviota SP	Santa Barbara	2,775.52
George J. Hatfield SRA	Merced	46.50
Governor's Mansion	Sacramento	None given
Gray Whale Cove SB	San Mateo	3.10
Grizzly Creek Redwoods SP	Humboldt	234.25
Grover Hot Springs SP	Alpine	538.54
Half Moon Bay SB	San Mateo	380.43
Hearst San Simeon SHM	San Luis Obispo	149.08
Hendy Woods SP	Mendocino	611.20
Henry Cowell Redwoods SP	Santa Cruz	4,082.45
Henry W. Coe SP	Santa Clara	13,119.26
Hollister Hills SVRA	San Benito	3,321.74
Humboldt Redwoods SP	Humboldt	47,728.70
Hungry Valley SVRA	Los Angeles, Ventura	*
Huntington SB	Orange	78.48
Indian Grinding Rock SHP	Amador	135.79
Jack London SHP	Sonoma	981.97
Jedediah Smith Redwoods SP	Del Norte	9,188.05
John Little SR	Monterey	21.00
Jug Handle SR	Mendocino	732.94
Julia Pfeiffer Burns SP	Monterey	3,543.50
Kings Beach SRA	Placer	7.74
Kruse Rhododendron SB	Sonoma	317.00
Lake del Valle SRA	Alameda	3,344.59
Lake Elsinore SRA	Riverside	2,954.40
Lake Oroville SRA	Butte	12,069.27
Lake Perris SRA	Riverside	5,239.98
Lake Purisima Mission SHP	Santa Barbara	966.82
Las Tunas SB	Los Angeles	2.40
Leo Carrillo SB	Los Angeles	1,601.82
Leucadia SB	San Diego	10.60
L.A. County Riding & Hiking Trails Project	Los Angeles	1.76
Little River SB	Humboldt	112.36
Los Angeles State and County Arboretum SR	Los Angeles	111.00
Los Banos Creek Project	Merced	2,475.00
Los Encinos SHP	Los Angeles	4.73
Los Osos Oaks SR	San Luis Obispo	85.10
MacKerricher SP	Mendocino	1,582.03

APPENDIX B

Name	County	Area (acres)
Mailliard Redwoods SR	Mendocino	242.00
Malakoff Diggins SHP	Nevada	2,700.28
Malibu Creek SP	Los Angeles	4,008.30
Malibu Lagoon SB	Los Angeles	75.81
Manchester SB	Mendocino	1,098.15
Manhattan SB	Los Angeles	44.33
Manresa SB	Santa Cruz	68.28
Marina Beach Project	Monterey	130.80
Marshall Gold Discovery SHP	El Dorado	263.28
McArthur-Burney Falls Memorial SP	Shasta	768.05
McConnell SRA	Merced	74.26
McGrath SB	Ventura	294.52
Mendocino Headlands SP	Mendocino	346.71
Mendocino Woodlands Project	Mendocino	720.00
Millerton Lake SRA	Fresno-Madera	6,552.52
Montana de Oro SP	San Luis Obispo	7,328.23
Montara SB	San Mateo	12.60
Monterey SB	Monterey	13.56
Monterey SHP	Monterey	7.39
Montgomery Woods SR	Mendocino	1,142.36
Moonlight SB	San Diego	13.65
Morro Bay SP	San Luis Obispo	2,035.43
Morro Strand SB	San Luis Obispo	33.81
Moss Landing SB	Monterey	54.58
Mount Diablo SP	Contra Costa	12,557.51
Mount San Jacinto SP	Riverside	13,515.93
Mount Tamalpais SP	Marin	6,217.45
Natural Bridges SB	Santa Cruz	65.17
New Brighton SB	Santa Cruz	93.67
Ocotillo Wells SVRA	San Diego	14,531.71
Old Sacramento SHP	Sacramento	14.42
Old Town San Diego SHP	San Diego	13.04
Otterbein SRA	Los Angeles	580.00
Palomar Mountain SP	San Diego	1,897.38
Patrick's Point SP	Humboldt	632.11
Paul M. Dimmick WC	Mendocino	11.81
Pelican SB	Del Norte	5.15
Pescadero SB	San Mateo	162.77
Petaluma Adobe SHP	Sonoma	41.16
Pfeiffer Big Sur SP	Monterey	821.70
Picacho SRA	Imperial	4,881.36
Pio Pico SHP	Los Angeles	3.42
Pismo Dunes SVRA	San Luis Obispo	851.35
Pismo SB	San Luis Obispo	1,331.16
Placerita Canyon SP	Los Angeles	341.72
Plumas-Eureka SP	Plumas	6,749.14
Point Dume SB	Los Angeles	64.29
Point Lobos SR	Monterey	1,324.58
Point Mugu SP	Ventura	14,979.53
Point Sal SB	Santa Barbara	48.93
Pomponio SB	San Mateo	101.53
Portola SP	San Mateo	2,010.76
Prairie Creek Redwoods SP	Del Norte-Humboldt	12,544.32
Providence Mountains SRA	San Bernardino	5,250.46
Redondo SB	Los Angeles	26.05
Red Rock Canyon SP	Kern	3,978.81
Refugio SB	Santa Barbara	155.24
Reynolds WC	Mendocino	375.00
Richardson Grove SP	Humboldt	872.02
Rincon Point Project	Santa Barbara-Ventura	3.25
Ritter Canyon SRA	Los Angeles	Not available
Robert Louis Stevenson SP	Napa-Lake-Sonoma	3,177.78
Robert W. Crown Memorial SB	Alameda	130.60
Royal Palms SB	Los Angeles	18.07
Russian Gulch SP	Mendocino	1,300.37

Name	County	Area (acres)
Saddleback Butte SP	Los Angeles	2,874.87
Salinas River SB	Monterey	245.94
Salton Sea SRA	Riverside-Imperial	17,899.65
Salt Point SP	Sonoma	4,444.52
Samuel P. Taylor SP	Marin	2,708.41
San Buenaventura SB	Ventura	113.51
San Clemente SB	Orange	109.89
San Elijo SB	San Diego	38.59
San Gregorio SB	San Mateo	171.60
San Juan Bautista SHP	San Benito	6.12
San Luis Reservoir SRA	Merced	23,551.00
San Onofre SB	San Diego	3,036.00
San Pasqual Battlefield SHP	San Diego	10.70
San Simeon SB	San Luis Obispo	541.38
Santa Cruz County Trails Project	Santa Cruz	125.21
Santa Cruz Mission SHP	Santa Cruz	1.16
Santa Monica SB	Los Angeles	49.15
Seacliff SB	Santa Cruz	85.35
Shasta SHP	Shasta	13.24
Silver Strand SB	San Diego	427.72
Silverwood Lake SRA	San Diego	2,201.00
Sinkyone Wilderness SP	Mendocino	3,576.15
Smithe Redwoods SR	Mendocino	622.22
Sonoma Coast SB	Sonoma	3,770.57
Sonoma SHP	Sonoma	63.62
South Carlsbad SB	San Diego	134.62
South Yuba River Project	Nevada	860.02
Standish-Hickey SRA	Mendocino	1,020.11
State Indian Museum	Sacramento	Included in Sutter's Ft.
Stone Lake Project	Sacramento	1,089.55
Sugarloaf Ridge SP	Napa-Sonoma	2,261.71
Sugar Pine Point SP	El Dorado	2,011.03
Sunset SB	Santa Cruz	323.93
Sutter's Fort SHP	Sacramento	5.80
Tahoe SRA	Placer	56.51
Tao House Project	Contra Costa	13.19
Thornton SB	San Mateo	49.70
Tomales Bay SP	Marin	1,830.54
Topanga SP	Los Angeles	9,180.70
Topanga SB	Los Angeles	31.21
Torrey Pines SB	San Diego	41.23
Torrey Pines SR	San Diego	1,082.37
Trinidad SB	Humboldt	158.67
Tule Elk SR	Kern	945.66
Turlock Lake SRA	Stanislaus	408.00
Twin Lakes SB	Santa Cruz	109.85
Van Damme SP	Mendocino	2,162.94
Watts Tower Project	Los Angeles	0.11
Weaverville Joss House SHP	Trinity	3.23
Westport Union Landing SB	Mendocino	40.95
Wilder Ranch SP	Santa Cruz	61.38
Will Rogers SB	Los Angeles	78.59
Will Rogers SHP	Los Angeles	189.52
William B. Ide Adobe SHP	Tehama	2.91
William Randolph Hearst Memorial SB	San Luis Obispo	8.14
Willowbrook SRA	Los Angeles	40.09
Woodland Opera House SHP	Yolo	0.26
Woodson Bridge SRA	Tehama	413.54
Zmudowski SB	Monterey	176.41

SB: State Beach.
SP: State Park.
SR: State Reserve.
SHM: State Historical Munument
SHP: State Historic Park.
SRA: State Recreation Area.
SVRA: State Vehicular Recreation Area
WC: Wayside Campgrounds.
*Classified units not yet under the Department of Parks and Recreation's management.

Department of Parks and Recreation

LAND AND WATER AREAS OF CALIFORNIA COUNTIES

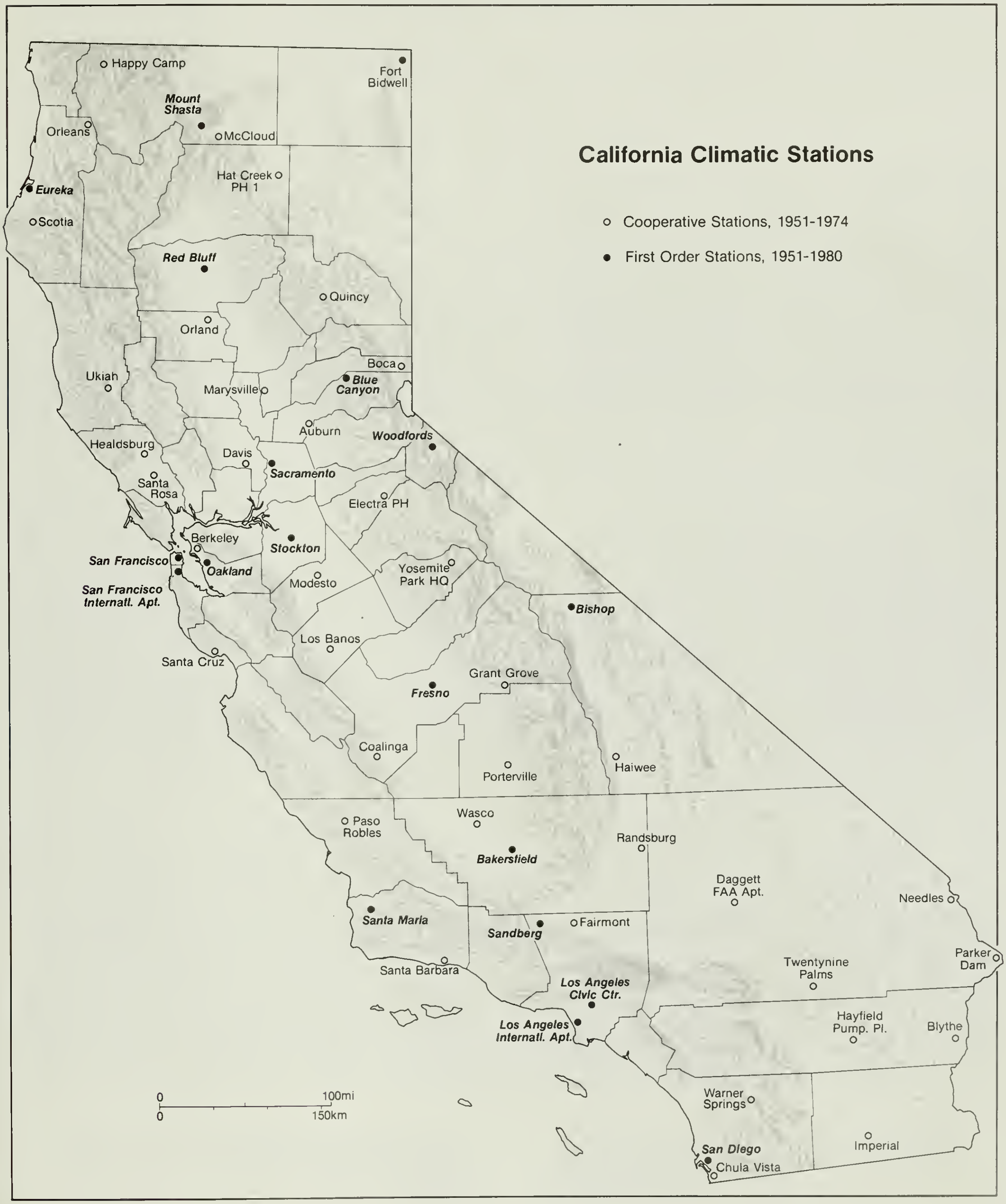
APPENDIX C

County	Water area [a]		Land area [a]		Total area [a]	
	Acres	Square miles	Acres	Square miles	Acres	Square miles
Total	1,356,780	2,120.5	100,206,720	156,573.0	101,563,500	158,693.2
Alameda	59,150	92.4	469,120	733.0	528,270	825.4
Alpine	2,310	3.6	462,720	723.0	465,030	726.6
Amador	5,290	8.3	379,520	593.0	384,810	601.3
Butte	1,170	1.8	1,064,320	1,663.0	1,065,490	1,664.8
Calaveras	6,010	9.4	657,280	1,027.0	663,290	1,036.4
Colusa	1,820	2.8	737,920	1,153.0	739,740	1,115.8
Contra Costa	40,920	63.9	469,760	734.0	510,680	797.9
Del Norte	—	—	641,920	1,003.0	641,920	1,003.0
El Dorado	58,080	90.8	1,096,960	1,714.0	1,155,040	1,804.8
Fresno	21,860	34.2	3,816,960	5,964.0	3,838,820	5,998.2
Glenn	1,280	2.0	842,880	1,317.0	844,160	1,319.0
Humboldt	16,970	26.5	2,286,720	3,573.0	2,303,690	3,599.5
Imperial	200,580	313.4	2,741,760	4,284.0	2,942,340	4,597.4
Inyo	4,400	6.9	6,458,240	10,091.0	6,462,640	10,097.9
Kern	11,720	18.3	5,217,280	8,152.0	5,229,000	8,170.3
Kings	25,990	40.6	892,800	1,395.0	918,790	1,435.6
Lake	45,120	70.5	803,840	1,256.0	848,960	1,326.5
Lassen	91,700	143.3	2,910,080	4,547.0	3,001,780	4,690.3
Los Angeles	12,330	19.3	2,598,400	4,060.0	2,610,730	4,079.3
Madera	2,000	3.1	1,372,160	2,144.0	1,374,160	2,147.1
Marin	43,500	68.0	332,800	520.0	376,300	588.0
Mariposa	3,490	5.5	931,200	1,455.0	934,690	1,460.5
Mendocino	2,360	3.7	2,244,480	3,507.0	2,246,840	3,510.4
Merced	16,450	25.7	1,268,480	1,982.0	1,284,930	2,007.7
Modoc	158,990	248.4	2,618,880	4,092.0	2,777,870	4,340.4
Mono	48,030	75.0	1,937,920	3,028.0	1,985,950	3,103.0
Monterey	70	1	2,127,360	3,324.0	2,127,430	3,324.1
Napa	24,890	38.9	485,120	758.0	510,010	796.9
Nevada	9,090	14.2	625,920	978.0	635,010	992.2
Orange	1,960	3.1	500,480	782.0	502,440	785.1
Placer	52,780	82.5	911,360	1,424.0	964,140	1,506.5
Plumas	30,980	48.4	1,644,800	2,570.0	1,675,780	2,618.4
Riverside	42,260	66.0	4,593,280	7,177.0	4,635,540	7,243.0
Sacramento	20,660	32.3	629,120	983.0	649,780	1,015.3
San Benito	710	1.1	893,440	1,396.0	894,150	1,397.1
San Bernardino	21,120	33.0	12,883,840	20,131.0	12,904,960	20,164.0
San Diego	16,360	25.6	2,723,200	4,255.0	2,739,560	4,280.6
San Francisco	29,500	46.1	28,800	45.0	58,300	91.1
San Joaquin	17,420	27.2	901,760	1,409.0	919,180	1,436.2
San Luis Obispo	6,560	10.2	2,122,240	3,316.0	2,128,800	3,326.2
San Mateo	49,130	76.8	290,560	454.0	339,690	530.8
Santa Barbara	4,260	6.7	1,752,320	2,738.0	1,756,580	2,744.7
Santa Clara	8,880	13.9	833,280	1,302.0	842,160	1,315.9
Santa Cruz	400	0.6	280,960	439.0	281,360	439.6
Shasta	33,420	52.2	2,430,720	3,798.0	2,464,140	3,850.2
Sierra	380	1.0	613,120	958.0	613,500	959.0
Siskiyou	4,030	6.3	4,039,680	6,312.0	4,043,710	6,318.3
Solano	28,930	45.2	529,280	827.0	558,210	872.2
Sonoma	11,900	18.6	1,010,560	1,579.0	1,022,460	1,597.6
Stanislaus	13,580	21.2	960,000	1,500.0	973,580	1,521.2
Sutter	—	—	388,480	607.0	388,480	607.0
Tehama	—	—	1,904,640	2,976.0	1,904,640	2,976.0
Trinity	20,260	31.6	2,042,240	3,191.0	2,062,500	3,222.6
Tulare	4,390	6.9	3,096,320	4,838.0	3,100,710	4,844.9
Tuolumne	11,960	18.7	1,455,360	2,274.0	1,467,320	2,292.7
Ventura	8,040	12.6	1,184,640	1,851.0	1,192,680	1,863.6
Yolo	—	—	661,760	1,034.0	661,760	1,034.0
Yuba	1,340	2.1	407,680	637.0	409,020	639.1

[a] Components for counties rounded to nearest 10 acres and tenths of square miles. Sources California Regional Framework Study, Base year 1965. Prepared by California Regional Framework Study Committee for Pacific Southwest Inter-Agency Committee Water Resources Council. *Department of Water Resources*

CALIFORNIA CLIMATE STATIONS/DATA

APPENDIX D



Normals, Means, and Extremes

BAKERSFIELD, CA — **KERN COUNTY AIR TERMINAL** — **PACIFIC** — **35° 25' N** — **119° 03' W** — **475 FT.** — **1976**

Month	Temp °F Normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F: Heating	Cooling	Precipitation in inches, Water equivalent: Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets: Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				39		39					30		39		39		39		39	
J	57.5	37.4	47.5	79	1976	23	1963	543	0	0.95	2.87	1943	T	1972	1.30	1956	T	1973	T	1973
F	63.3	41.4	52.4	82	1943	26	1949	353	0	1.03	4.42	1962	0.03	1967	1.19	1962	T	1953	T	1953
M	68.6	44.5	56.6	92	1959	31	1966	286	8	0.83	4.61	1938	T	1972	1.58	1938	1.5	1974	1.5	1974
A	75.9	49.9	62.7	98	1965	35	1955	140	41	0.85	2.65	1967	0.00	1966	1.00	1963	0.0		0.0	
M	83.8	56.2	69.8	107	1970	40	1950	22	171	0.19	2.39	1971	0.00	1973	1.40	1971	0.0		0.0	
J	91.9	62.3	76.9	114	1976	45	1953	0	362	0.06	1.11	1972	0.00	1975	1.10	1972	0.0		0.0	
J	99.1	68.7	83.9	115	1950	53	1941	0	586	0.02	0.30	1963	0.00	1975	0.30	1963	0.0		0.0	
A	96.3	66.6	81.6	112	1950	52	1962	0	515	0.01	0.17	1964	0.00	1976	0.18	1964	0.0		0.0	
S	91.1	62.1	76.6	112	1955	45	1948	0	343	0.08	1.06	1976	0.00	1976	0.56	1950	0.0		0.0	
O	80.9	53.3	66.9	103	1967	29	1971	35	114	0.29	1.82	1974	0.00	1967	1.31	1963	0.0		0.0	
N	67.8	44.2	56.0	91	1949	28	1961	276	5	0.69	3.34	1950	0.00	1959	1.54	1950	0.0		0.0	
D	57.4	38.4	47.9	82	1939	21	1962	530	0	0.76	1.80	1952	T	1962	1.15	1976	T	1959	T	1968
YR	77.7	52.1	64.9	115	JUL 1950	20	JAN 1963	2183	2179	5.72	4.61	MAR 1938	0.00	JUL 1975	1.58	MAR 1938	1.5	MAR 1974	1.5	MAR 1974

Month	Relative humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind: Mean speed m.p.h.	Prevailing direction	Fastest mile: Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility 1/4 mile or less	Temperatures °F Max: (b) 90° and above	32° and below	Min: 32° and below	0° and below	Average station pressure mb. Elev. 492 feet m.s.l.
(a)	13	13	13	13	37	13	28	28			31	36	36	36	39	39	39	39	13	13	13	13	6
J	83	76	60	77	5.2	NW	35	02	1950		7.2	9	5	15	8	0	*	9	0	0	9	0	1003.3
F	77	65	49	69	5.8	ENE	44	29	1950		6.7	8	8	12	6	0	*	3	0	0	1	0	1001.8
M	78	56	39	60	6.6	NW	38	36	1973		6.2	11	9	11	6	*	*	*	*	0	*	0	998.9
A	86	45	32	52	7.2	NW	40	29	1959		5.2	13	10	7	5	0	*	*	2	0	0	0	998.5
M	63	37	24	39	8.0	NW	33	32	1951		2.9	19	8	4	2	0	*	*	11	0	0	0	995.3
J	51	34	23	39	8.0	NW	41	15	1972		1.5	24	4	2	*	0	*	0	19	0	0	0	994.0
J	48	32	22	33	7.2	NW	25	29	1950		1.2	27	3	1	*	0	*	*	29	0	0	0	994.3
A	52	35	22	37	6.8	NW	30	06	1972		1.1	27	3	1	*	0	*	*	26	0	0	0	995.1
S	56	42	27	43	6.3	WNW	35	14	1976		1.4	23	4	1	1	0	*	*	17	0	0	0	996.5
O	63	49	33	53	5.5	NW	31	32	1970		2.8	25	7	4	2	0	*	*	6	0	*	0	998.3
N	79	65	51	72	5.1	ENE	30	34	1975		4.8	12	8	13	3	0	*	3	*	0	*	0	1001.5
D	84	75	62	79	4.9	ENE	35	17	1976		6.3	8	7	16	5	0	*	8	0	0	9	0	1003.8
YR	65	50	37	56	6.4	NW	44	29	FEB 1950		3.8	232	79	84	36	*	3	22	110	0	11	0	998.3

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 118 in July 1939; lowest temperature 13 in December 1935; maximum monthly snowfall 4.3 in December 1932; maximum snowfall in 24 hours 4.0 in December 1932.

BISHOP, CA — **BISHOP AIRPORT** — **PACIFIC** — **37° 22' N** — **118° 22' W** — **4108 FT.** — **1976**

Month	Temp °F Normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F: Heating	Cooling	Precipitation in inches, Water equivalent: Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets: Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				29		29					29		29		29		28		28	
J	53.6	20.3	37.0	77	1948	-7	1974	865	0	1.20	9.93	1969	0.00	1973	3.32	1952	23.2	1969	18.3	1969
F	57.9	25.3	41.6	78	1951	-2	1959	655	0	0.96	5.01	1969	T	1967	3.06	1969	34.9	1969	14.2	1969
M	63.7	28.8	46.3	87	1966	4	1971	592	0	0.43	2.09	1952	0.00	1972	1.49	1970	14.5	1952	7.3	1952
A	71.9	34.8	53.4	92	1969	15	1953	337	10	0.41	2.26	1958	0.00	1973	1.47	1958	8.8	1958	8.8	1958
M	80.7	43.3	62.2	101	1951	25	1964	145	93	0.27	1.30	1962	T	1975	1.05	1953	2.3	1964	2.3	1964
J	89.7	49.7	69.7	109	1954	29	1957	38	179	0.09	0.55	1953	0.00	1976	0.26	1963	0.0		0.0	
J	97.5	55.7	76.6	109	1972	40	1959	0	360	0.07	1.47	1976	0.00	1975	0.85	1976	0.0		0.0	
A	95.3	52.9	74.1	106	1972	37	1959	3	287	0.10	0.88	1955	0.00	1957	0.38	1961	0.0		0.0	
S	88.7	46.2	67.5	106	1950	26	1948	44	116	0.13	1.14	1973	0.00	1972	1.19	1973	T	1959	T	1959
O	77.2	37.2	57.2	95	1964	15	1971	250	15	0.29	1.96	1957	0.00	1973	1.09	1957	5.2	1957	5.2	1957
N	63.8	27.5	45.7	84	1950	5	1958	579	0	0.55	2.59	1960	0.00	1975	1.70	1950	3.9	1964	3.9	1964
D	55.4	22.3	38.9	73	1959	-4	1967	809	0	1.29	9.79	1955	0.00	1975	3.39	1966	13.2	1967	8.7	1967
YR	74.6	37.2	55.9	109	JUL 1972	-7	JAN 1974	4313	1037	5.72	9.93	JAN 1969	0.00	NOV 1975	3.36	FEB 1969	34.9	FEB 1969	18.3	JAN 1969

Month	Relative humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind: Mean speed m.p.h.	Prevailing direction	Peak gust: Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility 1/4 mile or less	Temperatures °F Max: (b) 90° and above	32° and below	Min: 32° and below	0° and below	Average station pressure mb. Elev. 4125 feet m.s.l.
(a)		29	25				2	2			24	24	24	24	29	29	17	17	29	29	29	29	
J		65	34				67		1974		5.1	12	8	11	4	1	0	*	0	1	29	*	875.9
F		62	27				55		1975		4.8	12	8	8	4	1	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	874.8
M		52	22				59		1975		4.8	13	9	9	4	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	872.7
A		22	17				59		1975		4.3	14	8	8	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	871.3
M		21	16				53		1975		4.1	15	11	5	3	[illegible]	2	[illegible]	3	0	[illegible]	0	871.3
J		19	13				60		1975		3.6	22	7	3	1	0	2	0	13	0	0	0	871.3
J		19	14				46		1976		2.9	24	5	2	2	0	3	0	30	0	0	0	872.0
A		20	12				46		1976		2.1	23	6	2	2	0	3	0	27	0	0	0	873.4
S		21	14				63		1975		1.9	24	4	2	2	0	2	0	14	0	[illegible]	0	874.2
O		25	18				68		1975		2.9	20	6	5	2	0	1	0	1	0	8	0	875.1
N		34	26				56		1975		4.0	15	5	9	2	*	*	*	0	0	23	*	875.7
D		43	33				66		1975		4.5	14	8	9	3	0	0	*	0	*	29	*	877.4
YR		28	21				73		AUG 1976		3.6	203	89	73	29	2	13	*	95	1	144	*	873.7

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature -15 in January 1916; maximum monthly precipitation 9.67 in January 1914; maximum monthly snowfall 59.0 in January 1916.

BLUE CANYON, CA — **BLUE CANYON AIRPORT** — **PACIFIC** — **39° 17' N** — **120° 42' W** — **5280 FT.** — **1976**

Month	Temp °F Normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F: Heating	Cooling	Precipitation in inches, Water equivalent: Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets: Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				33		33					37		37		37		36		36	
J	42.9	29.3	36.1	71	1952	3	1950	887	0	13.06	33.86	1970	1.27	1975	9.10	1963	178.2	1952	38.5	1952
F	46.2	30.5	37.4	73	1954	0	1949	773	0	9.42	23.21	1962	0.82	1964	8.30	1960	128.6	1969	33.2	1959
M	52.9	33.1	38.0	72	1966	5	1956	837	0	8.59	19.86	1970	1.66	1956	4.46	1971	146.8	1952	34.0	1952
A	51.7	36.1	43.9	78	1948	17	1972	633	0	5.47	15.55	1958	0.33	1966	4.17	1962	118.6	1948	33.7	1959
M	58.8	42.7	51.3	86	1950	21	1950	425	0	3.46	13.87	1957	0.12	1974	5.15	1957	26.1	1964	15.1	1962
J	67.8	50.6	59.1	92	1950	28	1952	197	20	0.99	3.56	1967	0.00	1973	1.96	1971	8.0	1950	5.5	1950
J	77.5	58.7	68.1	95	1972	40	1974	27	123	0.13	5.86	1974	0.00	1972	4.79	1974	0.0		0.0	
A	75.6	57.1	66.3	93	1971	35	1968	38	114	0.27	3.04	1970	0.00	1975	2.71	1968	0.0		0.0	
S	72.9	53.1	62.9	93	1955	27	1970	128	43	0.52	3.78	1959	0.00	1974	3.29	1959	T	1971	T	1971
O	62.6	45.3	54.0	83	1969	17	1971	341	5	4.14	22.32	1962	0.00	1966	7.93	1962	22.0	1956	10.8	1973
N	51.7	37.3	44.5	78	1976	13	1965	615	0	9.36	28.36	1973	T	1959	8.06	1950	98.2	1973	20.7	1969
D	45.6	32.6	39.1	73	1958	3	1972	803	0	12.24	43.12	1955	0.36	1976	9.33	1964	194.1	1952	29.0	1952
YR	58.2	42.0	50.1	95	JUL 1972	3	DEC 1972	5704	302	67.38	43.12	DEC 1955	0.00	SEP 1974	9.33	DEC 1964	178.2	JAN 1952	38.5	JAN 1952

Month	Relative humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind: Mean speed m.p.h.	Prevailing direction	Fastest mile: Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility 1/4 mile or less	Temperatures °F Max: (b) 90° and above	32° and below	Min: 32° and below	0° and below	Average station pressure mb. Elev. 5283 feet m.s.l.
(a)	1	28	1	1	9		19	19			29	31	31	31	37	33	24	23	33	33	33	33	6
J	62	59	65	61	9.9		67	20	1963		6.7	9	5	17	12	7	*	13	0	5	19	0	832.0
F	60	59	67	61	9.3		78	17	1976		6.4	8	3	17	12	7	*	9	0	3	17	0	838.6
M	59	57	62	59	8.5		67	07	1961		6.8	9	5	17	13	8	1	11	0	3	19	0	836.0
A	60	52	53	65	7.8		50	20	1963		5.8	10	7	13	12	5	1	7	0	2	12	0	837.6
M	60	47	33	47	7.9		37	22	1960		4.9	12	8	11	7	2	3	5	0	0	4	0	838.7
J	62	42	31	45	7.7		49	07	1960		3.5	16	8	6	3	*	2	2	0	0	1	0	839.0
J	60	33	29	45	6.9		32	09	1960		1.6	26	4	1	1	0	1	0	0	0	0	0	841.6
A	58	32	46	51	7.0		30	07	1960		1.8	25	4	2	1	0	1	*	0	0	0	0	841.4
S	50	33	49	38	7.6		45	29	1959		2.2	22	4	3	2	0	1	1	0	0	0	0	840.4
O	63	42	38	45	8.5		56	05	1958		3.9	17	5	8	6	1	1	3	0	*	3	0	841.0
N	39	52	39	39	8.6		54	18	1976		5.9	10	5	15	10	4	*	6	0	1	10	0	840.3
D	32	33	30	32	9.2		51	07	1960		6.4	9	5	17	12	6	3	10	0	*	16	0	841.1
YR	49	42	43	51	8.3		78	17	FEB 1976		4.6	175	64	126	84	40	12	68	1	18	101	0	839.3

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half.
T Trace.

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1964.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

% Through 1964. The station did not operate 24 hours daily. Fog and thunderstorm data may be incomplete.
§ Record for 1949-1951, 1958-1962 and 1976 to date.
\# Gust recorder commissioned 8/22/74.
$ Beginning 1976.

EUREKA, CA — POST OFFICE BLDG. — PACIFIC — 40° 48' N — 124° 10' W — 43 FT. — 1976

Month	Temp °F Normal Daily maximum	Normal Daily minimum	Normal Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year	Relative humidity pct Hour	Hour	Hour	Hour	Wind Mean speed m.p.h. c	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms %	Heavy fog, visibility ½ mile or less %	Temperatures °F Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 60 feet m.s.l.
(a)				66		66					66		66		66		66		66						54	54	66	66		66	34	66	66	66	66	66	54	54	66	66	66	66	
J	53.5	41.1	47.3	75	1943	25	1937	549	0	7.42	13.92	1969	1.63	1949	4.42	1912	3.0	1935	3.0	1935					6.9	SE	54	S	1955	42	7.3	6	6	19	17	*	1	4	0	0	2	0	
F	54.4	42.3	48.4	85	1930	27	1962	465	0	5.15	13.94	1938	0.50	1923	4.88	1959	0.8	1955	0.8	1955					7.2	SE	48	SW	1960	46	7.4	6	5	17	14	0	1	3	0	0	1	0	
M	54.1	42.5	48.3	78	1914	29	1917	518	0	4.83	13.97	1938	0.07	1926	4.02	1975	1.0	1966	1.0	1966					7.6	N	48	SW	1953	50	7.3	6	7	18	15	0	*	2	0	0	*	0	
A	54.9	44.4	49.7	79	1918	32	1929	459	0	2.95	10.88	1963	0.31	1956	2.58	1963	T	1975	T	1975					8.0	N	49	N	1915	55	7.0	6	9	15	12	0	*	2	0	0	*	0	
M	57.2	47.8	52.5	84	1939	36	1954	388	0	2.11	6.05	1960	0.03	1955	2.23	1943	0.0		0.0						7.9	N	40	NW	1955	55	6.9	7	9	15	8	0	*	1	0	0	0	0	
J	59.6	50.7	55.2	85	1945	41	1966	294	0	0.66	2.57	1954	0.00	1917	1.73	1943	0.0		0.0						7.4	N	39	NW	1949	57	6.5	7	10	13	5	0	*	2	0	0	0	0	
J	60.4	52.1	56.3	76	1931	45	1924	270	0	0.14	1.34	1916	0.00	1967	1.18	1916	0.0		0.0						6.8	N	35	N	1921	52	6.7	6	11	14	2	0	*	3	0	0	0	0	
A	61.2	52.7	57.0	82	1968	44	1935	248	0	0.27	1.98	1968	0.00	1940	0.93	1965	0.0		0.0						5.8	NW	34	N	1920	47	6.8	6	10	15	2	0	*	5	0	0	0	0	
S	61.9	51.2	56.6	85	1958	41	1946	252	0	0.65	3.56	1925	0.00	1929	1.32	1966	0.0		0.0						5.5	N	44	N	1941	52	6.0	9	8	13	4	0	*	7	0	0	0	0	
O	60.4	48.4	54.4	82	1917	32	1971	329	0	3.23	13.04	1950	0.00	1917	5.83	1950	0.0		0.0						5.6	N	56	SW	1962	49	6.4	8	9	14	9	0	*	9	0	0	*	0	
N	57.9	45.5	51.7	77	1930	29	1935	399	0	5.77	16.58	1973	T	1929	4.55	1926	0.0		0.0						6.0	SE	43	S	1946	42	7.3	6	7	17	13	0	1	7	0	0	*	0	
D	54.8	42.6	48.6	77	1963	21	1972	508	0	6.58	12.87	1941	0.52	1976	4.17	1939	1.9	1972	1.9	1972					6.4	SE	56	S	1931	40	7.4	6	6	19	15	*	1	4	0	0	1	0	
YR	57.5	46.8	52.2	85	SEP 1958	21	DEC 1972	4879	0	39.76	16.58	NOV 1973	0.00	JUL 1967	5.83	OCT 1950	3.0	JAN 1935	3.0	JAN 1935					6.8	N	56	SW	OCT 1962	50	6.9	79	97	189	117	*	5	49	0	0	5	0	

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature 20 in January 1888; maximum monthly precipitation 19.49 in February 1902; maximum monthly snowfall 6.9 in January 1907; maximum snowfall in 24 hours 3.4 in January 1907.

FRESNO, CA — FRESNO AIR TERMINAL — PACIFIC — 36° 46' N — 119° 43' W — 328 FT. — 1976

Month	Temp °F Normal Daily maximum	Normal Daily minimum	Normal Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year	Relative humidity pct Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile # Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ½ mile or less	Temperatures °F Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 327 feet m.s.l.
(a)				27		27					27		27		27		27		27		13	13	13	13	27	14	26	26		27	27	27	27	27	27	27	27	27	13	13	13	13	*
J	54.8	35.8	45.3	75	1974	19	1963	611	0	1.84	8.56	1969	0.04	1976	2.59	1969	2.2	1962	1.5	1962	91	84	67	89	5.3	SE	32	SE	1952	51	7.1	6	7	18	8	*	*	12	0	0	10	0	1009.6
F	60.8	39.0	49.9	76	1967	25	1971	423	0	1.72	5.97	1962	T	1964	1.99	1969	T	1976	T	1976	91	77	56	85	5.7	NW	38	W	1951	66	6.0	8	8	12	7	0	*	7	0	0	*	0	1007.6
M	66.6	41.2	53.9	90	1972	26	1966	344	0	1.62	5.79	1958	0.00	1972	1.63	1958	T	1973	T	1973	87	64	45	76	6.7	NW	41	NW	1964	79	5.1	12	8	11	6	0	1	2	*	0	1	0	1004.7
A	74.3	46.2	60.3	95	1965	32	1975	182	41	1.24	4.41	1967	0.02	1962	1.23	1969	0.0		0.0		83	53	35	64	7.1	NW	36	NW	1973	85	4.2	15	7	8	5	0	1	*	2	0	*	0	1004.5
M	82.9	51.9	67.4	104	1974	36	1975	51	125	0.32	1.56	1957	T	1976	0.96	1957	0.0		0.0		73	42	25	50	7.9	NW	38	N	1952	89	3.1	19	7	5	2	0	1	*	11	0	0	0	1001.1
J	90.3	57.5	73.9	110	1964	44	1955	9	276	0.06	0.60	1972	0.00	1975	0.60	1972	0.0		0.0		68	40	24	46	8.1	NW	34	W	1950	94	1.8	23	5	2	1	0	1	0	18	0	0	0	999.6
J	98.2	62.9	80.6	111	1972	50	1955	0	484	0.00	0.04	1969	0.00	1973	0.04	1969	0.0		0.0		64	39	23	43	7.1	NW	25	NE	1958	96	1.1	27	3	1	*	0	*	0	29	0	0	0	1000.1
A	96.0	60.6	78.3	108	1971	49	1966	0	412	0.02	0.25	1964	0.00	1972	0.25	1964	0.0		0.0		70	43	26	48	6.6	NW	31	S	1961	96	1.2	27	3	1	*	0	*	*	26	0	0	0	1001.0
S	91.0	56.5	73.8	105	1971	37	1950	0	267	0.07	1.19	1976	0.00	1974	0.81	1959	0.0		0.0		75	46	29	55	5.9	NW	29	SW	1958	94	1.5	25	3	2	1	0	1	*	17	0	0	0	1000.7
O	79.8	48.6	64.2	100	1959	27	1972	90	66	0.42	1.55	1976	0.00	1966	1.55	1976	T	1974	T	1974	80	53	35	67	5.2	NW	40	NE	1959	89	2.7	20	6	5	2	0	1	1	4	0	*	0	1004.3
N	66.1	40.8	53.5	89	1949	26	1975	345	0	1.22	3.50	1972	0.00	1959	1.35	1953	0.0		0.0		89	74	57	84	4.7	NW	29	NW	1974	67	5.2	11	8	11	5	0	*	6	0	0	3	0	1007.7
D	54.6	36.9	45.8	76	1958	21	1967	595	0	1.71	6.73	1955	0.07	1960	1.76	1955	1.2	1968	1.2	1968	93	86	70	90	5.0	SE	43	NW	1949	47	6.8	7	6	16	7	*	*	11	0	*	11	0	1009.6
YR	76.3	46.2	62.3	111	JUL 1972	19	JAN 1963	2650	1671	10.24	8.56	JAN 1969	0.00	JUN 1975	2.59	JAN 1969	2.2	JAN 1962	1.5	JAN 1962	80	58	41	66	6.3	NW	43	NW	DEC 1949	82	3.8	200	71	94	44	*	6	40	107	*	29	0	1004.3

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperature 115 in July 1905; lowest temperature 17 in January 1913; maximum precipitation in 24 hours 2.86 in November 1900; maximum monthly snowfall 2.5 in January 1930; maximum snowfall in 24 hours 2.5 in January 1930; fastest mile of wind 54 from Northwest in March 1916.

LONG BEACH, CA — LONG BEACH AIRPORT — PACIFIC — 33° 49' N — 118° 09' W — 25 FT. — 1976

Month	Temp °F Normal Daily maximum	Normal Daily minimum	Normal Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs #	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year	Relative humidity pct Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ½ mile or less	Temperatures °F Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 40 feet m.s.l.
(a)				24		24					32		32		32		33		33		16	16	16	16	17	4	18	18			19	19	19	19	32	33	33	33	16	16	16	16	4
J	65.2	43.2	54.2	91	1976	25	1963	339	0	2.26	11.24	1969	0.00	1976	6.86	1956	T	1962	T	1962	72	56	50	70	5.6	WNW	37	17	1964		5.0	12	9	10	5	0	*	6	0	0	*	0	1017.7
F	66.2	44.8	55.5	91	1971	33	1965	273	7	2.16	7.88	1962	0.00	1964	3.59	1963	0.0		0.0		76	60	52	72	6.2	W	40	18	1959		5.3	10	7	11	5	0	1	4	*	0	0	0	1017.4
M	67.7	46.7	57.2	89	1976	33	1964	247	0	1.50	4.20	1958	0.00	1959	2.13	1958	0.0		0.0		78	60	53	72	6.9	W	35	32	1961		5.3	11	10	10	5	0	1	4	0	0	*	0	1014.7
A	70.5	50.6	60.6	99	1966	38	1975	148	16	0.89	4.42	1965	T	1973	1.49	1958	0.0		0.0		79	56	50	71	7.5	W	44	29	1963		4.4	13	10	7	3	0	*	3	1	0	0	0	1014.8
M	73.8	54.3	64.1	103	1967	40	1964	71	43	0.07	0.67	1971	0.00	1952	0.37	1971	0.0		0.0		80	61	55	79	7.3	S	30	27	1961		5.1	10	13	8	1	0	*	2	1	0	0	0	1013.2
J	76.8	57.8	67.3	108	1973	47	1967	23	92	0.04	0.52	1963	0.00	1958	0.52	1963	0.0		0.0		81	64	56	76	7.0	S	21	27	1962		4.7	11	13	6	1	0	*	2	2	0	0	0	1011.6
J	82.8	61.6	72.2	105	1959	51	1960	0	226	0.00	0.05	1969	0.00	1972	0.04	1968	0.0		0.0		81	61	53	75	6.7	WNW	23	18	1967		3.4	17	12	2	*	0	*	3	3	0	0	0	1012.2
A	84.0	62.5	73.3	105	1967	52	1951	0	260	0.02	0.22	1972	0.00	1975	0.22	1972	0.0		0.0		80	60	52	75	6.5	WNW	23	27	1961		3.2	19	11	1	*	0	*	4	6	0	0	0	1012.6
S	83.3	60.2	71.8	110	1963	50	1965	7	211	0.09	1.45	1976	0.00	1974	1.21	1976	0.0		0.0		81	60	54	76	6.1	WNW	23	33	1967		4.1	14	11	5	1	0	*	4	5	0	0	0	1011.9
O	78.3	55.3	66.8	111	1961	39	1972	48	107	0.19	2.08	1941	0.00	1969	0.70	1941	0.0		0.0		80	57	52	75	5.9	WNW	37	32	1961		4.4	13	12	6	2	0	*	6	4	0	0	0	1014.0
N	72.7	48.4	60.6	101	1966	34	1958	155	23	1.38	6.05	1965	T	1962	3.14	1967	0.0		0.0		78	59	54	74	5.8	WNW	35	34	1966		4.6	12	8	10	3	0	*	7	1	0	0	0	1015.8
D	66.9	44.1	55.5	92	1958	31	1974	295	0	1.65	5.98	1941	T	1963	3.43	1974	0.0		0.0		76	59	52	73	5.2	WNW	39	32	1959		4.8	13	9	9	5	0	*	7	0	0	*	0	1017.5
YR	74.0	52.5	63.3	111	OCT 1961	25	JAN 1963	1606	985	10.25	11.24	JAN 1969	0.00	JAN 1976	6.86	JAN 1956	T	JAN 1962	T	JAN 1962	78	60	53	74	6.4	WNW	44	29	APR 1963		4.5	155	125	85	30	0	4	53	22	0	1	0	1014.5

Precipitation data for partial years 1941, 1943, 1954, and 1955 considered in extracting extremes in table above.

LOS ANGELES, CA — INTERNATIONAL AIRPORT — PACIFIC — 33° 56' N — 118° 24' W — 97 FT. — 1976

Month	Temp °F Normal Daily maximum	Normal Daily minimum	Normal Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year	Relative humidity pct Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ½ mile or less	Temperatures °F Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 104 feet m.s.l.
(a)				41		41					41		41		41		41		41		17	17	17	17	28	28	28	28			28	41	41	41	41	41	36	44	17	17	17	17	4
J	63.5	45.4	54.5	88	1976	23	1937	331	5	2.52	9.60	1969	0.00	1976	6.19	1956	T	1974	T	1974	68	53	58	69	6.7	W	48	SW	1951		5.1	12	9	10	6	0	*	5	0	0	*	0	1015.1
F	64.1	47.0	55.6	92	1963	32	1942	270	7	2.32	11.07	1962	T	1964	4.16	1962	T	1951	T	1951	73	56	62	71	7.3	W	57	N	1953		5.1	12	5	11	6	0	*	4	*	0	0	0	1014.7
M	64.3	48.6	56.5	88	1964	34	1939	267	0	1.71	5.98	1958	0.00	1959	3.54	1968	0.0		0.0		78	61	65	74	8.0	W	62	W	1952		5.1	11	9	11	5	0	*	4	0	0	0	0	1012.1
A	65.9	51.7	58.8	95	1966	39	1942	195	9	1.10	4.52	1965	0.00	1962	1.88	1960	0.0		0.0		79	60	63	76	8.5	WSW	59	N	1957		4.8	11	9	10	4	0	*	3	*	0	0	0	1012.1
M	68.4	55.3	61.9	97	1956	43	1938	114	17	0.08	0.56	1958	0.00	1943	0.56	1958	0.0		0.0		82	66	66	79	8.2	WSW	45	N	1953		5.3	10	11	10	1	0	*	2	*	0	0	0	1010.6
J	70.3	58.6	64.5	100	1957	48	1950	71	56	0.03	0.29	1964	0.00	1971	0.29	1964	0.0		0.0		85	70	68	82	7.9	WSW	32	W	1954		5.2	9	11	10	1	0	*	2	*	0	0	0	1009.0
J	74.8	62.1	68.5	97	1959	49	1942	19	127	0.01	0.15	1969	0.00	1973	0.15	1969	0.0		0.0		86	68	68	83	7.6	WSW	29	W	1954		4.1	12	13	6	1	0	*	2	*	0	0	0	1009.6
A	75.8	63.2	69.5	98	1955	51	1948	15	154	0.02	0.30	1961	0.00	1971	0.21	1961	0.0		0.0		86	68	69	83	7.6	WSW	33	SE	1955		3.9	13	12	6	*	0	*	3	*	0	0	0	1010.2
S	75.7	61.6	68.7	110	1963	47	1948	23	134	0.07	4.39	1939	0.00	1968	4.20	1939	0.0		0.0		83	66	68	81	7.2	WSW	28	SW	1972		4.3	13	10	7	1	0	*	4	1	0	0	0	1009.3
O	72.9	57.5	65.2	106	1961	41	1942	77	83	0.22	2.34	1936	0.00	1969	1.77	1972	0.0		0.0		79	59	64	77	6.8	W	46	W	1974		4.4	13	10	8	2	0	*	5	2	0	0	0	1011.5
N	69.6	51.3	60.5	101	1966	34	1939	158	23	1.76	7.92	1946	0.00	1956	5.60	1967	0.0		0.0		75	58	64	74	6.5	W	55	N	1953		4.5	14	8	8	3	0	*	6	*	0	0	0	1013.3
D	66.5	47.3	56.9	94	1958	32	1968	267	0	1.75	6.57	1936	T	1963	3.01	1951	T	1971	T	1971	70	54	61	70	6.5	W	49	S	1952		4.6	13	8	10	5	0	*	6	0	0	*	0	1014.9
YR	69.2	54.1	61.7	110	SEP 1963	23	JAN 1937	1819	615	11.59	11.07	FEB 1962	0.00	JAN 1976	6.19	JAN 1956	T	JAN 1974	T	JAN 1974	79	62	65	77	7.4	W	62	W	MAR 1952		4.7	143	115	107	35	0	3	44	5	0	*	0	1011.9

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half
T Trace

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

$ Through 1963.
c Through 1964.
% Through 1964. The station did not operate 24 hours daily. Fog and thunderstorm data may be incomplete.
# Based on measurements at 6-hour intervals through Nov. 1976.

@ Through 1975.

LOS ANGLES, CA — CIVIC CENTER — PACIFIC — 34° 03' N — 118° 14' W — 270 FT. — 1976

Month	Temp. Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				36		36					36		36		36		36		36	
J	65.5	46.8	56.7	95	1971	28	1949	268	10	3.00	14.94	1969	0.00	1976	6.11	1956	0.3	1949	0.3	1949
F	67.6	48.5	58.1	91	1971	34	1949	207	14	2.77	12.42	1941	T	1964	4.02	1944	T	1951	T	1951
M	66.6	49.8	58.2	94	1972	35	1976	190	10	2.19	8.14	1941	0.00	1959	3.41	1943	0.0		0.0	
A	70.5	52.9	61.7	99	1959	38	1975	124	25	1.27	6.02	1965	0.00	1973	2.05	1956	0.0		0.0	
M	73.2	56.1	64.7	102	1967	45	1964	80	51	0.13	1.43	1955	0.00	1975	1.07	1955	0.0		0.0	
J	76.5	59.5	68.0	106	1973	51	1953	25	115	0.03	0.32	1964	0.00	1975	0.32	1964	0.0		0.0	
J	82.9	63.5	73.2	103	1959	54	1952	0	258	0.00	0.03	1969	0.00	1976	0.03	1969	0.0		0.0	
A	83.7	64.4	74.1	103	1967	53	1943	0	282	0.04	0.39	1958	0.00	1975	0.38	1958	0.0		0.0	
S	82.5	62.9	72.7	110	1955	51	1949	5	236	0.17	2.82	1976	0.00	1975	1.83	1976	0.0		0.0	
O	78.0	58.7	68.4	104	1955	41	1971	35	140	0.27	1.53	1941	0.00	1970	0.62	1941	0.0		0.0	
N	73.2	52.1	62.7	100	1966	39	1976	113	44	2.02	8.89	1965	0.00	1975	4.07	1970	0.0		0.0	
D	68.0	48.1	58.1	89	1958	32	1951	218	0	2.16	6.57	1971	T	1963	3.92	1965	T	1967	T	1967
YR	74.3	55.3	64.8	110	SEP 1955	28	JAN 1949	1245	1185	14.05	14.94	JAN 1969	0.00	JUL 1976	6.11	JAN 1956	0.3	JAN 1949	0.3	JAN 1949

Month	Relative humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog visibility ¼ mile or less	Temperatures °F Max 90° and above (b)	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. feet m.s.l.
(a)	17	10	23	11	24	23	35	35		32	34	34	34	34	36	36	23	23	36	36	36	36	
J	63	51	50	67	6.8	NE	49	N	1945	69	4.4	14	8	9	5	0	1	2	*	0	*	0	
F	74	54	52	70	6.9	W	40	NW	1961	72	4.7	12	7	9	5	0	1	2	*	0	0	0	
M	74	52	52	72	7.0	W	47	NW	1964	73	4.7	13	9	9	6	0	1	1	*	0	0	0	
A	79	53	54	76	6.6	W	40	NW	1955	70	4.7	12	10	8	4	0	1	1	1	0	0	0	
M	81	56	55	79	6.3	W	39	NW	1945	66	4.9	11	12	8	1	0	*	1	1	0	0	0	
J	85	59	56	78	5.7	W	32	N	1949	65	4.3	14	10	6	1	0	*	1	1	0	0	0	
J	84	54	53	79	5.4	W	21	W	1947	82	2.7	21	9	1	*	0	*	1	6	0	0	0	
A	84	56	55	79	5.3	W	24	E	1945	83	2.6	22	8	1	1	0	*	1	4	0	0	0	
S	78	52	54	74	5.3	W	27	NW	1961	78	3.0	18	9	3	1	0	*	1	5	0	0	0	
O	76	55	55	74	5.7	W	48	N	1959	73	3.8	16	9	6	2	0	*	3	3	0	0	0	
N	81	45	49	62	6.4	W	42	N	1946	74	3.7	17	7	5	3	0	1	2	1	0	0	0	
D	82	45	50	62	6.6	NE	44	SE	1943	71	4.2	15	8	6	5	0	1	2	0	0	*	0	
YR	75	53	53	72	6.2	W	49	N	JAN 1946	73	4.0	185	105	74	34	0	6	17	20	0	*	0	

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Maximum monthly precipitation 15.80 in December 1889; maximum precipitation in 24 hours 7.36 in December 1933; maximum monthly snowfall 2.0 in January 1932; maximum snowfall in 24 hours 2.0 in January 1932.

MOUNT SHASTA, CA — FOREST SERVICE BLDG. — PACIFIC — 41° 19' N — 122° 19' W — 3535 FT. — 1976

Month	Temp. Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				34		34					34		34		28		34		28	
J	41.8	25.4	33.6	65	1961	-2	1962	973	0	6.65	14.82	1959	0.48	1976	6.97	1974	119.8	1952	34.9	1966
F	47.3	28.3	37.8	71	1953	1	1950	762	0	5.51	17.60	1958	0.21	1971	4.44	1958	83.7	1969	29.1	1956
M	51.0	29.8	40.4	80	1966	11	1945	763	0	4.03	11.91	1949	0.29	1956	3.52	1958	67.0	1952	26.5	1952
A	58.5	34.0	46.3	84	1947	14	1955	561	0	3.09	9.67	1945	0.13	1966	3.05	1958	50.2	1967	29.5	1955
M	66.6	40.0	53.3	91	1973	21	1954	371	8	1.87	5.28	1957	0.01	1936	2.09	1957	16.4	1967	14.2	1960
J	74.0	46.0	60.0	96	1974	25	1952	179	29	1.08	3.25	1947	0.00	1973	1.53	1968	T	1975	T	1975
J	84.9	50.6	67.8	100	1946	31	1947	37	124	0.32	1.77	1958	0.00	1970	0.73	1961	0.0		0.0	
A	83.4	48.6	66.0	103	1972	34	1969	64	95	0.31	2.55	1976	0.00	1970	1.86	1954	0.0		0.0	
S	77.8	44.5	61.2	103	1955	25	1965	145	31	0.69	6.83	1957	T	1975	5.90	1957	0.0		0.0	
O	64.9	37.9	51.4	92	1952	19	1946	422	0	2.54	13.85	1950	T	1966	4.70	1950	7.1	1971	5.5	1971
N	51.6	31.7	41.7	80	1949	12	1976	699	0	5.09	17.22	1973	T	1939	3.88	1973	41.9	1970	29.0	1961
D	43.7	27.3	35.5	72	1958	-5	1972	915	0	6.25	17.45	1955	0.40	1936	4.95	1960	137.7	1952	37.4	1952
YR	62.1	37.0	49.6	103	AUG 1972	-5	DEC 1972	5890	286	37.49	17.60	FEB 1958	0.00	JUN 1973	6.97	JAN 1974	137.7	DEC 1952	37.4	DEC 1952

Month	Relative humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog visibility ¼ mile or less	Temperatures °F Max 90° and above (b)	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 3587 feet m.s.l.
(a)	5	24	31	6							16	22	22	22	34	34	22	16	34	34	34	34	4
J	78	75	69	78							6.9	9	6	16	12	6	*	2	0	4	26	*	894.9
F	77	69	61	75							6.4	8	7	13	11	3	*	1	0	1	21	0	892.6
M	76	62	52	70							6.6	8	8	15	11	4	*	*	0	*	21	0	893.5
A	72	54	43	64							5.6	10	10	10	9	2	1	*	0	0	13	0	892.2
M	69	50	41	55							5.1	12	9	10	7	*	3	0	*	0	3	0	892.2
J	70	48	37	53							3.6	15	7	7	5	0	3	*	2	0	*	0	892.4
J	68	40	29	49							1.5	25	4	2	2	0	3	0	9	0	*	0	893.0
A	69	41	29	52							2.1	24	5	2	2	0	2	0	7	0	0	0	893.3
S	63	43	32	52							2.5	21	5	4	3	0	1	*	3	0	1	0	893.4
O	71	54	47	66							4.3	14	8	9	6	*	*	*	*	0	6	0	894.4
N	81	69	63	79							6.0	9	8	13	10	2	*	1	0	*	18	0	894.3
D	81	74	69	81							6.7	7	8	15	12	4	*	2	0	2	25	*	896.4
YR	73	57	48	64							4.9	163	85	117	90	21	13	7	21	7	136	*	893.3

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature -8 in December 1932; maximum monthly precipitation 21.73 in February 1902; maximum monthly snowfall 150.0 in January 1916.

OAKLAND, CA — INTERNATIONAL AIRPORT — PACIFIC — 37° 44' N — 122° 12' W — 6 FT. — 1976

Month	Temp. Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				48		48					48		48		48		49		48	
J	54.5	42.7	48.6	75	1962	24	1937	508	0	4.03	8.90	1967	0.29	1976	3.38	1967	T	1971	T	1971
F	58.0	45.7	51.9	82	1930	25	1929	367	0	2.83	8.85	1969	0.02	1953	2.41	1945	1.0	1976	1.0	1976
M	60.2	47.2	53.7	85	1952	32	1953	350	0	2.32	5.09	1958	0.04	1956	2.76	1940	T	1976	T	1976
A	62.8	49.4	56.1	89	1966	31	1929	270	0	1.58	4.60	1963	T	1949	2.21	1974	0.0		0.0	
M	65.4	52.4	58.9	98	1974	36	1938	193	0	0.55	3.42	1957	T	1976	1.45	1931	0.0		0.0	
J	68.5	55.2	61.9	107	1960	41	1929	114	21	0.14	1.21	1927	0.00	1959	1.03	1934	0.0		0.0	
J	69.7	56.4	63.1	102	1931	45	1935	80	21	0.01	0.80	1974	0.00	1971	0.78	1974	0.0		0.0	
A	70.2	56.8	63.5	95	1962	47	1935	74	28	0.03	0.74	1976	0.00	1973	0.42	1976	0.0		0.0	
S	72.3	56.6	64.5	102	1932	41	1951	59	44	0.18	3.27	1959	0.00	1974	3.23	1959	0.0		0.0	
O	68.7	53.4	61.1	95	1961	34	1935	135	14	1.08	8.56	1962	T	1956	5.45	1962	0.0		0.0	
N	62.0	48.5	55.3	86	1932	27	1931	291	0	2.37	7.42	1973	0.00	1933	2.67	1973	0.0		0.0	
D	55.5	44.2	49.9	74	1958	23	1930	468	0	3.57	11.29	1955	0.25	1975	3.21	1931	0.4	1932	0.2	1932
YR	64.0	50.7	57.4	107	JUN 1960	23	DEC 1930	2909	128	13.69	11.29	DEC 1955	0.00	SEP 1974	5.45	OCT 1962	1.0	FEB 1976	1.0	FEB 1976

Month	Relative humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog visibility ¼ mile or less	Temperatures °F Max 90° and above (b)	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 7 feet m.s.l.
(a)	13	13	13	13	29	21	28	28			33	45	46	46	46	48	46	45	13	13	13	13	4
J	83	77	71	80	6.7	SE	46	16	1964		6.2	9	7	15	11	0	*	*	0	0	*	0	1021.1
F	82	76	69	79	7.3	W	49	36	1953		6.1	8	7	13	10	*	*	2	0	0	*	0	1019.5
M	80	72	66	76	9.0	W	45	20	1949		5.7	10	9	12	9	0	*	1	0	0	0	0	1017.3
A	81	69	63	76	9.5	W	35	25	1950		5.0	11	10	9	6	0	*	*	0	0	0	0	1017.9
M	83	71	65	79	10.0	W	33	27	1949		4.7	13	11	7	3	0	*	*	*	0	0	0	1015.9
J	85	73	67	82	10.0	W	42	27	1950		4.0	15	10	5	1	0	*	0	1	0	0	0	1014.5
J	87	76	68	84	9.3	WNW	28	27	1951		3.5	17	11	3	*	0	*	0	*	0	0	0	1014.9
A	88	77	68	84	9.0	WNW	29	27	1968		3.8	15	12	4	1	0	*	0	0	0	0	0	1015.2
S	83	74	65	81	7.9	WNW	33	02	1959		3.5	16	10	4	1	0	*	*	1	0	0	0	1014.4
O	81	72	63	78	6.8	WNW	43	25	1950		4.2	14	9	8	4	0	*	2	0	0	0	0	1016.9
N	82	75	68	78	6.3	WNW	46	02	1952		5.7	11	8	11	7	0	*	3	0	0	0	0	1019.5
D	82	75	70	79	6.5	E	48	23	1951		6.0	9	8	14	10	0	*	4	0	3	1	0	1021.6
YR	83	74	67	80	8.2	W	49	36	FEB 1953		4.9	149	112	105	63	*	2	16	2	*	1	0	1017.4

RED BLUFF, CA — MUNICIPAL AIRPORT — PACIFIC — 40° 09' N — 122° 15' W — 342 FT — 1976

Month	Temp. Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				32		32					32		32		32		32		32	
J	53.6	36.7	45.2	79	1948	20	1975	614	0	4.48	8.63	1956	0.22	1976	3.05	1959	13.6	1950	9.9	1950
F	59.5	40.4	50.0	83	1947	23	1949	420	0	3.17	11.38	1958	0.02	1964	2.86	1959	2.5	1949	1.5	1962
M	63.8	42.5	53.2	92	1960	26	1966	368	0	2.51	8.33	1949	0.01	1956	2.01	1952	8.0	1976	8.0	1976
A	71.6	47.3	59.5	98	1947	31	1967	218	13	1.79	5.70	1948	0.05	1964	2.26	1953	T	1975	T	1975
M	80.6	54.2	67.4	108	1950	35	1970	64	139	0.98	4.04	1956	0.00	1969	1.78	1958	0.0		0.0	
J	89.3	61.7	75.5	114	1950	42	1952	8	323	0.47	1.28	1948	0.00	1949	1.10	1962	0.0		0.0	
J	98.0	66.6	82.3	119	1972	52	1964	0	536	0.04	0.89	1974	0.00	1976	0.42	1958	0.0		0.0	
A	95.7	64.1	79.9	118	1971	52	1959	0	462	0.18	1.56	1968	0.00	1973	1.01	1968	0.0		0.0	
S	90.6	60.0	75.3	114	1950	42	1971	0	309	0.31	2.47	1957	0.00	1974	1.52	1964	0.0		0.0	
O	78.3	51.7	65.0	104	1952	32	1946	82	82	1.17	4.30	1957	T	1966	2.37	1962	T	1971	T	1971
N	64.0	43.3	53.7	93	1949	27	1975	339	0	3.05	8.42	1970	T	1959	4.00	1956	1.9	1955	1.9	1955
D	54.7	38.1	46.4	81	1958	20	1972	577	0	3.91	10.09	1952	T	1958	3.69	1960	10.7	1972	9.2	1972
YR	75.0	50.6	62.8	119	JUL 1972	20	JAN 1975	2688	1904	22.06	11.38	FEB 1958	0.00	JUL 1976	4.00	NOV 1956	13.6	JAN 1950	9.9	JAN 1950

Month	Relative humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog visibility ¼ mile or less	Temperatures °F Max 90° and above (b)	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 353 feet m.s.l.
(a)	32	32	32	32	32	15	32	32		32	32	32	32	32	32	32	32	32	32	32	32	32	4
J	80	72	59	77	9.1	SSE	59	SE	1952	54	6.6	8	6	17	11	*	*	6	0	*	10	0	1008.3
F	79	66	51	73	9.3	SSE	61	SE	1956	63	6.4	8	5	15	9	*	1	2	0	0	3	0	1006.1
M	74	57	44	67	9.9	SSE	63	SE	1953	68	5.1	9	7	15	9	*	1	1	*	0	1	0	1003.2
A	81	46	35	58	9.7	SSE	50	SE	1961	79	5.3	11	8	11	7	0	1	*	1	0	*	0	1003.5
M	84	40	28	50	9.3	SSE	48	S	1973	84	4.4	15	7	9	4	0	2	*	7	0	0	0	1000.6
J	55	35	23	41	9.3	SSE	38	NW	1947	89	3.1	19	6	5	3	0	2	0	16	0	0	0	997.7
J	50	30	18	37	8.0	SSE	38	N	1966	95	1.3	27	3	1	1	0	1	0	29	0	0	0	999.3
A	52	32	20	39	7.6	SSE	30	SW	1961	94	1.8	24	5	2	1	0	1	0	25	0	0	0	1000.1
S	52	34	21	42	7.9	SSE	50	NE	1965	92	2.1	23	4	3	2	0	1	*	17	0	0	0	1000.0
O	62	44	32	54	8.4	NW	68	SE	1962	81	4.0	16	7	8	5	0	1	*	4	0	*	0	1003.6
N	75	61	50	70	8.3	NW	58	SE	1970	61	6.0	10	5	15	9	*	*	2	*	0	1	0	1006.3
D	81	72	61	78	8.4	NW	60	SE	1952	52	6.8	7	6	18	10	*	*	6	0	*	7	0	1009.2
YR	68	49	37	57	8.8	SSE	68	SE	OCT 1962	78	4.5	177	69	119	70	1	10	18	99	*	22	0	1003.2

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature 17 in January 1937 and earlier; maximum monthly precipitation 20.71 in January 1878; maximum precipitation in 24 hours 8.12 in September 1918; maximum monthly snowfall 15.0 in January 1937 and earlier; maximum snowfall in 24 hours 11.4 in December 1924

(a) Length of record, years, through the current year unless otherwise noted, based on January data
(b) 70° and above at Alaskan stations
* Less than one half
T Trace

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees

% Through 1964. The station did not operate 24 hours daily. Fog and thunderstorm data may be incomplete.
S Broken record. Summary includes data for complete calendar years only
c Through 1964.

SACRAMENTO, CA — EXECUTIVE AIRPORT — PACIFIC — 38° 31' N — 121° 30' W — 17 FT. — 1976

Month	Temp °F normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal degree days base 65 °F: Heating	Cooling	Precip. water equivalent: Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, ice pellets: Maximum monthly	Year	Maximum in 24 hrs	Year	Relative humidity pct, hour 04 (local time)	Hour 10	Hour 16	Hour 22	Wind: Mean speed m.p.h.	Prevailing direction	Fastest mile: Speed m.p.h.	Direction	Year	Pct of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ½ mile or less	Temperatures Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb, Elev 25 feet m.s.l.
(a)				26		26					37		37		28		28		28		16	16	16	16	28	14	28	28		28	26	28	28	28	37	26	28	28	26	26	26	26	4
J	53.0	37.1	45.1	70	1976	23	1963	617	0	3.73	8.30	1969	0.38	1976	3.41	1967	T	1974	T	1974	90	86	70	88	7.8	SE	60	SE	1954	47	7.0	7	6	18	10	0	*	10	0	*	7	0	1020.3
F	59.1	40.4	49.8	76	1964	26	1972	426	0	2.68	8.77	1962	0.15	1964	2.31	1958	2.0	1976	2.0	1976	87	79	61	81	7.9	SSE	51	SE	1959	61	6.2	8	6	14	9	*	*	6	0	0	1	0	1018.5
M	64.1	41.9	53.0	88	1966	26	1971	372	0	2.17	5.02	1958	0.14	1966	2.07	1963	0.0		0.0		82	68	51	75	9.0	SW	66	S	1952	71	5.5	11	8	12	8	0	1	2	0	0	1	0	1015.5
A	71.3	45.3	58.3	92	1951	32	1953	227	26	1.54	4.76	1941	0.00	1949	2.22	1958	0.0		0.0		80	58	43	72	9.1	SW	45	SW	1955	80	4.6	13	9	8	6	0	1	*	*	0	*	0	1015.6
M	78.8	49.8	64.3	104	1976	36	1974	120	98	0.51	3.13	1948	T	1973	0.78	1957	0.0		0.0		80	51	36	70	9.4	SW	35	S	1957	87	3.6	17	9	5	3	0	*	*	5	0	0	0	1012.5
J	86.6	54.6	70.5	115	1961	41	1952	20	183	0.10	0.83	1933	0.00	1973	0.63	1933	0.0		0.0		77	47	31	64	10.0	SW	47	SW	1950	92	2.2	22	5	3	1	0	*	0	12	0	0	0	1011.0
J	92.9	57.5	75.2	114	1972	49	1953	0	316	0.01	0.79	1974	0.00	1976	0.78	1974	0.0		0.0		76	47	28	61	9.2	SSW	36	SW	1956	97	1.0	27	3	1	*	0	*	0	23	0	0	0	1011.2
A	91.3	56.9	74.1	108	1971	49	1966	0	288	0.05	0.83	1976	0.00	1973	0.65	1965	0.0		0.0		76	49	28	62	8.7	SW	38	SW	1954	96	1.4	26	4	1	*	0	*	*	21	0	0	0	1011.9
S	87.7	55.3	71.5	108	1955	43	1971	5	200	0.19	1.81	1959	0.00	1974	1.56	1959	0.0		0.0		76	50	31	64	7.8	SW	42	NW	1963	93	1.7	24	4	2	1	0	1	*	13	0	0	0	1011.5
O	77.1	49.5	63.3	101	1970	36	1971	101	48	0.99	7.31	1962	0.00	1966	5.59	1962	0.0		0.0		78	57	39	69	6.8	SW	68	SE	1950	89	3.2	20	5	6	3	0	*	2	2	0	0	0	1015.1
N	63.6	42.4	53.0	87	1960	26	1961	360	0	2.13	7.41	1970	0.02	1959	2.93	1970	0.0		0.0		88	76	60	81	6.4	NNW	70	SE	1953	63	5.7	10	7	13	7	0	*	6	0	0	1	0	1018.4
D	53.3	38.3	45.8	72	1967	20	1972	595	0	3.12	12.04	1955	0.17	1956	3.64	1955	T	1972	T	1972	89	85	71	86	7.1	SSE	70	SE	1952	48	6.7	8	6	17	9	0	*	9	0	*	6	0	1020.9
YR	73.2	47.4	60.3	115	JUN 1961	20	DEC 1972	2843	1159	17.22	12.04	DEC 1955	0.00	JUL 1976	5.59	OCT 1962	2.0	FEB 1976	2.0	FEB 1976	81	63	46	73	8.3	SW	70	SE	NOV 1953	79	4.1	193	72	100	57	*	3	35	77	*	17	0	1015.2

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature 17 in December 1932; maximum monthly precipitation 15.04 in January 1862; maximum precipitation in 24 hours 7.24 in April 1880.

SANDBERG, CA — TOP OF BALD MOUNTAIN — PACIFIC — 34° 45' N — 118° 44' W — 4517 FT. — 1976

Month	Temp °F normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal degree days base 65 °F: Heating	Cooling	Precip. water equivalent: Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, ice pellets: Maximum monthly	Year	Maximum in 24 hrs	Year	Relative humidity pct, hour 04 (local time)	Hour 10	Hour 16	Hour 22	Wind: Mean speed m.p.h.	Prevailing direction	Fastest mile: Speed m.p.h.	Direction	Year	Pct of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets 1.0 inch or more	Thunderstorms %	Heavy fog, visibility ½ mile or less %	Temperatures Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb, Elev 4323 feet m.s.l.
(a)				42		42					42		42		43		43		44		8	33	8	8	30	14	21	21			27	40	40	40	42	42	32	32	42	42	42	42	2
J	46.4	33.9	40.2	71	1969	3	1937	769	0	2.15	10.62	1933	0.00	1948	4.09	1933	64.0	1933	38.5	1933	51	56	52	55	17.0	ENE	64	20	1969		5.1	12	8	11	6	2	*	10	0	2	13	0	862.7
F	49.1	35.3	42.2	72	1972	13	1962	638	0	2.45	11.36	1973	0.02	1965	4.87	1962	57.0	1944	34.0	1944	50	57	51	57	16.4	N	77	32	1960		5.2	10	7	11	6	1	*	12	0	1	11	0	863.2
M	51.5	35.7	43.6	80	1966	13	1971	663	0	1.33	6.18	1941	0.00	1972	2.97	1938	43.0	1952	21.5	1952	65	57	51	62	16.7	NNW	74	34	1975		5.2	11	9	11	6	1	*	12	0	*	11	0	859.8
A	58.3	40.1	49.2	85	1949	22	1971	474	0	1.12	4.11	1967	0.00	1966	2.01	1936	31.2	1965	15.0	1953	67	52	51	64	16.4	NNW	64	36	1957		4.4	13	9	8	4	1	1	9	0	*	6	0	862.1
M	65.8	45.6	55.7	94	1951	26	1964	288	0	0.25	1.13	1932	0.00	1952	0.86	1956	7.0	1964	3.9	1964	64	46	43	58	15.9	NNW	59	34	1957		3.5	17	8	6	2	*	1	7	*	0	2	0	862.0
J	75.0	53.0	64.0	99	1972	30	1967	116	86	0.03	0.54	1963	0.00	1974	0.49	1963	0.0		0.0		38	36	37	30	15.1	NNW	64	34	1959		1.8	23	5	2	*	0	*	3	3	0	*	0	866.3
J	85.1	62.9	74.0	102	1934	40	1940	7	286	0.03	0.49	1965	0.00	1973	0.49	1965	0.0		0.0		42	26	29	39	12.8	NNW	48	34	1961		1.5	25	5	1	*	0	1	*	8	0	0	0	864.2
A	84.2	61.8	73.0	102	1934	40	1960	10	258	0.06	0.63	1945	0.00	1971	0.62	1945	0.0		0.0		45	27	30	43	12.6	NNW	40	34	1974		1.4	26	4	1	1	0	1	1	7	0	0	0	863.3
S	79.2	58.5	68.9	98	1950	35	1948	33	130	0.21	3.40	1939	0.00	1974	2.68	1976	T	1952	T	1952	47	30	36	49	12.9	NNW	45	35	1973		1.7	24	4	2	1	0	1	2	3	0	0	0	863.2
O	67.8	49.8	58.8	89	1971	21	1971	212	20	0.34	3.53	1936	0.00	1967	1.86	1936	1.0	1949	1.0	1949	55	39	42	51	14.9	NNW	53	34	1967		2.9	20	6	5	2	*	*	5	0	0	1	0	863.5
N	55.4	41.1	48.3	80	1955	21	1964	501	0	2.05	9.80	1965	0.00	1956	6.87	1970	16.1	1964	14.0	1964	57	47	48	53	16.1	ENE	62	34	1963		4.2	15	7	8	4	*	*	6	0	*	5	0	863.7
D	48.0	35.8	41.9	72	1937	11	1972	716	0	1.95	10.26	1971	T	1962	3.41	1974	39.2	1971	24.0	1945	62	54	55	59	16.4	ENE	53	34	1968		5.1	12	7	12	6	1	*	10	0	1	11	0	864.7
YR	63.8	46.1	55.0	102	AUG 1934	3	JAN 1937	4427	800	11.97	11.36	FEB 1973	0.00	SEP 1974	6.87	NOV 1970	64.0	JAN 1933	38.5	JAN 1933	56	44	44	53	15.3	NNW	77	32	FEB 1960		3.5	208	79	78	40	7	4	79	20	3	59	0	863.2

SAN DIEGO, CA — LINDBERGH FIELD — PACIFIC — 32° 44' N — 117° 10' W — 13 FT. — 1976

Month	Temp °F normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal degree days base 65 °F: Heating	Cooling	Precip. water equivalent: Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, ice pellets: Maximum monthly	Year	Maximum in 24 hrs	Year	Relative humidity pct, hour 04 (local time)	Hour 10	Hour 16	Hour 22	Wind: Mean speed m.p.h.	Prevailing direction	Fastest mile: Speed m.p.h.	Direction	Year	Pct of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ½ mile or less	Temperatures Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb, Elev 28 feet m.s.l.
(a)				36		36					36		36		36		36		36		16	16	16	16	36	13	33	33		36	36	36	36	36	36	36	36	36	16	16	16	16	4
J	64.6	45.8	55.2	88	1953	29	1949	314	10	1.88	6.26	1943	T	1976	2.65	1943	T	1949	T	1949	67	53	54	68	5.6	NE	39	SW	1955	71	4.9	13	8	10	6	0	*	4	0	0	*	0	1017.9
F	65.6	47.8	56.7	88	1954	36	1949	237	0	1.48	3.40	1976	0.00	1967	1.82	1976	0.0		0.0		72	56	57	71	6.3	WNW	35	S	1969	72	5.1	11	7	10	6	0	*	3	0	0	0	0	1017.7
M	66.0	50.1	58.1	88	1959	39	1971	219	0	1.55	5.89	1941	T	1972	2.40	1932	0.0		0.0		73	59	58	71	7.2	WNW	46	SW	1943	71	5.2	11	10	10	7	0	*	2	0	0	0	0	1015.4
A	67.6	53.8	60.7	92	1960	41	1945	144	15	0.81	3.58	1965	T	1966	1.40	1965	0.0		0.0		74	58	58	71	7.7	WNW	37	S	1958	65	5.2	10	10	10	3	0	*	1	*	0	0	0	1015.2
M	69.4	57.2	63.3	96	1953	48	1967	79	26	0.15	0.95	1971	0.00	1952	0.42	1957	0.0		0.0		76	64	63	74	7.6	WNW	27	SW	1947	58	5.7	9	11	11	2	0	*	1	*	0	0	0	1013.6
J	71.1	59.9	65.5	97	1957	51	1967	32	67	0.05	0.38	1972	0.00	1946	0.28	1972	0.0		0.0		80	69	66	78	7.5	SSW	26	S	1948	56	5.5	9	12	9	1	0	*	1	*	0	0	0	1011.9
J	75.3	63.9	69.6	93	1959	55	1946	6	149	0.01	0.13	1968	0.00	1964	0.10	1968	0.0		0.0		81	69	66	79	7.1	WNW	23	NW	1966	67	4.6	13	13	5	*	0	*	1	*	0	0	0	1012.6
A	77.3	65.4	71.4	98	1955	57	1944	0	201	0.07	0.87	1945	0.00	1970	0.83	1931	0.0		0.0		80	67	66	78	7.0	WNW	23	SW	1945	69	4.1	13	12	4	*	0	*	1	*	0	0	0	1012.9
S	76.5	63.2	69.9	111	1963	51	1948	16	163	0.13	1.90	1963	0.00	1964	0.90	1963	0.0		0.0		78	63	65	77	6.7	NW	25	W	1955	67	4.1	15	9	6	1	0	*	2	1	0	0	0	1012.0
O	73.8	58.4	66.1	107	1961	43	1971	43	77	0.34	2.90	1941	0.00	1967	1.20	1941	0.0		0.0		74	58	61	73	6.3	WNW	31	N	1961	67	4.2	15	9	7	2	0	*	4	1	0	0	0	1014.2
N	70.1	51.5	60.8	97	1976	38	1964	140	14	1.25	5.82	1965	0.00	1956	2.44	1944	0.0		0.0		73	57	62	73	5.6	NE	31	SE	1944	74	4.1	15	8	7	3	0	*	4	*	0	0	0	1016.1
D	66.1	47.2	56.7	88	1963	33	1960	237	0	1.73	7.60	1943	0.03	1953	3.07	1943	T	1967	T	1967	70	54	57	70	5.4	NE	34	S	1951	72	4.6	14	8	9	6	0	*	4	0	0	0	0	1017.6
YR	70.3	55.4	62.9	111	SEP 1963	29	JAN 1949	1507	722	9.45	7.60	DEC 1943	0.00	AUG 1970	3.07	DEC 1943	T	DEC 1967	T	DEC 1967	75	61	61	73	6.7	WNW	51	SE	NOV 1944	67	4.8	130	117	98	41	0	3	27	3	0	*	0	1014.6

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature 25 in January 1913; maximum monthly precipitation 9.26 in December 1921; maximum precipitation in 24 hours 3.62 in December 1940; fastest mile of wind 53 from Southeast in February 1938.

SAN FRANCISCO, CA — INTERNATIONAL AIRPORT — PACIFIC — 37° 37' N — 122° 23' W — 8 FT. — 1976

Month	Temp °F normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal degree days base 65 °F: Heating	Cooling	Precip. water equivalent: Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, ice pellets: Maximum monthly	Year	Maximum in 24 hrs	Year	Relative humidity pct, hour 04 (local time)	Hour 10	Hour 16	Hour 22	Wind: Mean speed m.p.h.	Prevailing direction	Fastest mile: Speed m.p.h.	Direction	Year	Pct of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ½ mile or less	Temperatures Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb, Elev 18 feet m.s.l.
(a)				49		49					49		49		49		49		49		17	17	17	17	49	36	27	27			35	49	49	49	49	49	49	39	17	17	17	17	4
J	55.3	41.2	48.3	72	1948	24	1928	318	0	4.37	10.43	1967	0.31	1948	4.58	1967	1.5	1962	1.5	1962	86	78	66	81	7.1	WNW	38	16	1963		6.1	9	8	14	11	*	*	4	0	0	2	0	1020.3
F	58.6	43.8	51.2	78	1930	25	1929	386	0	3.04	9.52	1958	T	1953	2.31	1945	T	1976	T	1976	84	74	65	79	8.5	WNW	52	25	1960		6.0	8	7	13	10	0	*	3	0	0	0	0	1016.7
M	61.0	44.9	53.0	85	1952	30	1929	372	0	2.34	9.01	1958	T	1934	2.11	1940	T	1976	T	1976	81	69	62	76	10.3	WNW	40	20	1967		5.6	10	9	12	9	0	*	*	0	0	*	0	1016.6
A	63.5	47.0	55.3	88	1947	31	1929	291	0	1.59	6.36	1958	T	1949	2.66	1958	0.0		0.0		81	65	60	77	12.1	WNW	46	16	1953		5.0	11	10	9	6	0	*	*	0	0	0	0	1017.1
M	66.6	49.9	58.3	96	1976	36	1929	210	0	0.41	3.81	1957	T	1976	1.34	1957	0.0		0.0		84	65	60	79	13.2	W	41	30	1969		4.5	14	9	8	3	0	*	*	*	0	0	0	1015.2
J	70.2	53.0	61.6	106	1961	41	1932	120	18	0.13	0.86	1967	0.00	1928	0.83	1967	0.0		0.0		85	64	59	80	13.9	W	44	28	1969		3.8	16	9	5	1	0	*	*	1	0	0	0	1013.9
J	70.9	54.0	62.5	104	1931	43	1928	93	16	0.01	0.23	1974	0.00	1930	0.23	1974	0.0		0.0		87	66	61	83	13.5	NW	38	27	1950		3.0	21	7	3	*	0	*	*	1	0	0	0	1014.3
A	71.6	54.3	63.0	98	1968	42	1935	84	22	0.03	0.66	1976	T	1974	0.36	1976	0.0		0.0		87	67	62	83	12.8	NW	36	27	1974		3.3	19	9	3	1	0	*	*	*	0	0	0	1014.6
S	73.6	54.5	64.1	103	1971	38	1929	66	39	0.16	2.30	1959	T	1975	2.30	1959	0.0		0.0		84	66	59	78	11.0	NW	38	28	1968		3.1	18	9	3	1	0	*	1	1	0	0	0	1013.8
O	70.3	51.6	61.0	95	1961	34	1929	137	13	0.98	7.30	1962	T	1966	3.74	1962	0.0		0.0		81	68	59	76	9.2	WNW	44	25	1950		4.0	16	9	6	4	0	*	2	*	0	0	0	1016.1
N	63.3	47.2	55.3	85	1967	25	1931	291	0	2.29	7.94	1973	0.00	1929	2.39	1973	0.0		0.0		84	74	64	78	7.2	WNW	47	20	1953		5.4	11	9	10	7	0	*	3	0	0	0	0	1016.7
D	56.5	42.9	49.7	75	1958	20	1932	474	0	3.96	12.30	1955	0.21	1975	3.33	1955	1.0	1932	1.0	1932	85	78	68	80	6.8	WNW	47	18	1955		6.0	9	8	14	10	*	*	4	0	0	1	0	1020.7
YR	65.1	48.7	56.9	106	JUN 1961	20	DEC 1932	3042	108	19.53	12.30	DEC 1955	0.00	JUL 1930	4.58	JAN 1967	1.5	JAN 1962	1.5	JAN 1962	84	69	62	79	10.5	WNW	38	16	JAN 1963		4.7	162	103	100	62	*	2	17	4	0	3	0	1016.7

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half
T Trace

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

% Through 1964. The station did not operate 24 hours daily. Fog and thunderstorm data may be incomplete.

LOS ANGLES, CA — CIVIC CENTER — PACIFIC — 34° 03' N — 118° 14' W — 270 FT. — 1976

Month	Temp. Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Degree days (Base 65 °F) Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				36		36					36		36		36		36		36	
J	66.5	46.8	56.7	95	1971	28	1949	288	10	3.00	14.94	1969	0.00	1976	6.11	1956	0.3	1949	0.3	1949
F	67.6	48.5	58.1	91	1971	34	1949	207	14	2.77	12.42	1941	T	1964	4.02	1944	T	1951	T	1951
M	68.6	49.8	59.2	94	1972	35	1976	190	10	2.19	8.14	1941	0.00	1959	3.41	1943	0.0		0.0	
A	70.5	52.9	61.7	99	1966	39	1975	124	25	1.27	6.02	1965	0.00	1973	2.05	1956	0.0		0.0	
M	73.2	56.1	64.7	102	1967	46	1964	60	51	0.13	1.43	1955	0.00	1970	1.07	1955	0.0		0.0	
J	76.5	59.5	68.0	106	1973	50	1953	25	115	0.03	0.32	1964	0.00	1975	0.32	1964	0.0		0.0	
J	82.9	63.5	73.2	103	1959	54	1952	0	238	0.00	0.03	1969	0.00	1976	0.03	1969	0.0		0.0	
A	83.7	64.4	74.1	103	1967	53	1943	0	282	0.04	0.39	1958	0.00	1975	0.38	1958	0.0		0.0	
S	82.5	62.8	72.7	110	1955	51	1948	5	236	0.17	2.82	1976	0.00	1975	1.83	1976	0.0		0.0	
O	78.0	58.7	68.4	104	1958	41	1971	35	140	0.27	1.53	1941	0.00	1970	0.62	1941	0.0		0.0	
N	73.2	52.1	62.7	100	1966	39	1976	113	44	2.02	9.68	1965	0.00	1975	4.07	1970	0.0		0.0	
D	68.0	48.1	58.1	89	1958	32	1951	218	0	2.16	6.57	1971	T	1963	3.92	1965	T	1947	T	1947
YR	74.3	55.3	64.8	110	SEP 1955	28	JAN 1949	1245	1185	14.05	14.94	JAN 1969	0.00	JUL 1976	6.11	JAN 1956	0.3	JAN 1949	0.3	JAN 1949

Month	Relative humidity pct Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F Max: 90° and above (b)	32° and below	Min: 32° and below	0° and below	Average station pressure mb (Elev. feet m.s.l.)
(a)	17	10	23	11	24	23	35	35		32	34	34	34	34	36	36	23	23	36	36	36	36	
J	63	51	50	67	6.8	NE	49	N	1946	69	4.4	14	8	9	5	0	1	2	*	0	*	0	
F	71	54	52	70	6.9	W	40	NW	1961	72	4.7	12	7	9	5	0	1	2	*	0	0	0	
M	74	52	52	72	7.0	W	47	NW	1964	73	4.7	13	9	9	6	0	1	1	*	0	0	0	
A	78	53	54	74	6.6	W	40	NW	1959	70	4.7	12	10	8	4	0	1	1	1	0	0	0	
M	81	56	55	75	6.3	W	39	NW	1945	66	4.9	11	12	8	1	0	*	1	1	0	0	0	
J	85	59	56	78	5.7	W	32	N	1949	65	4.3	14	10	6	1	0	*	1	1	0	0	0	
J	84	54	53	79	5.4	W	21	W	1947	82	2.7	21	9	1	*	0	*	1	4	0	0	0	
A	84	56	55	79	5.3	W	24	E	1945	83	2.6	22	8	1	1	0	*	1	4	0	0	0	
S	78	52	54	76	5.3	W	27	NW	1941	79	3.0	18	9	3	1	0	*	1	5	0	0	0	
O	76	55	58	74	5.7	W	48	N	1959	73	3.8	16	9	6	2	0	*	3	3	0	0	0	
N	61	45	49	62	6.4	W	42	N	1946	74	3.7	17	7	6	3	0	1	2	1	0	0	0	
D	62	45	50	62	6.6	NE	44	SE	1943	71	4.2	15	8	8	5	0	1	2	0	0	*	0	
YR	75	53	53	72	6.2	W	49	N	JAN 1946	73	4.0	185	106	74	34	0	6	17	20	0	*	0	

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Maximum monthly precipitation 15.80 in December 1889; maximum precipitation in 24 hours 7.36 in December 1933; maximum monthly snowfall 2.0 in January 1932; maximum snowfall in 24 hours 2.0 in January 1932.

MOUNT SHASTA, CA — FOREST SERVICE BLDG. — PACIFIC — 41° 19' N — 122° 19' W — 3535 FT. — 1976

Month	Temp. Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Degree days (Base 65 °F) Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				34		34					34		34		28		34		28	
J	41.8	25.4	33.6	65	1961	-2	1962	973	0	6.65	14.82	1959	0.48	1976	6.97	1974	119.8	1952	34.9	1966
F	47.3	28.3	37.8	71	1953	1	1950	762	0	5.61	17.60	1958	0.21	1971	4.44	1958	83.7	1969	29.1	1958
M	51.0	29.8	40.4	80	1966	11	1945	763	0	4.03	11.91	1949	0.29	1956	3.52	1958	67.0	1952	26.5	1952
A	58.5	34.0	46.3	84	1947	14	1955	561	0	3.05	9.67	1948	0.13	1964	3.05	1958	50.2	1967	29.5	1958
M	66.6	40.0	53.3	91	1973	21	1954	371	8	1.87	5.28	1957	0.01	1954	2.09	1957	16.4	1960	14.2	1960
J	74.0	46.0	60.0	98	1974	25	1952	178	28	1.08	3.25	1947	0.00	1973	1.63	1968	T	1975	T	1975
J	84.9	50.6	67.8	100	1946	31	1947	37	124	0.32	1.77	1958	0.00	1970	0.73	1961	0.0		0.0	
A	83.4	48.6	66.0	103	1972	34	1968	64	95	0.31	2.55	1976	0.00	1970	1.86	1954	0.0		0.0	
S	77.8	44.5	61.2	103	1955	25	1965	145	31	0.69	6.83	1957	T	1975	5.90	1957	0.0		0.0	
O	64.9	37.9	51.4	92	1952	19	1946	422	0	2.54	13.88	1950	T	1966	4.70	1950	7.1	1971	5.5	1971
N	51.6	31.7	41.7	80	1949	12	1976	699	0	5.09	17.22	1973	T	1959	3.88	1973	41.9	1970	29.0	1961
D	43.7	27.3	35.5	72	1958	-5	1972	915	0	6.25	17.48	1955	0.40	1956	4.95	1960	137.7	1952	37.4	1952
YR	62.1	37.0	49.6	103	AUG 1972	-5	DEC 1972	5890	286	37.49	17.60	FEB 1958	0.00	JUN 1973	6.97	JAN 1974	137.7	DEC 1952	37.4	DEC 1952

Month	Relative humidity pct ($) Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset (c)	Mean number of days, Sunrise to sunset (c): Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms (%)	Heavy fog, visibility ¼ mile or less (%)	Temperatures °F Max: 90° and above (b)	32° and below	Min: 32° and below	0° and below	Average station pressure mb (Elev. 3587 feet m.s.l.)
(a)	5	24	21	8							16	22	22	22	34	34	22	16	34	34	34	34	4
J	79	75	69	78							6.9	9	6	16	12	6	*	2	0	4	26	*	894.9
F	77	69	61	75							6.4	8	7	13	11	3	*	1	0	1	21	0	892.6
M	78	62	52	70							6.6	8	8	15	11	4	*	*	0	*	21	0	890.5
A	72	54	43	64							5.8	10	10	10	9	2	1	*	0	0	13	0	892.2
M	69	50	41	55							5.1	12	9	10	7	*	3	0	*	0	3	0	892.2
J	70	48	37	53							3.8	16	7	7	5	0	3	0	2	0	*	0	892.4
J	68	40	29	49							1.5	25	4	2	2	0	3	0	9	0	*	0	893.0
A	69	41	29	52							2.1	24	5	2	2	0	2	0	7	0	0	0	893.3
S	63	43	32	52							2.5	21	5	4	3	0	1	*	3	0	1	0	893.4
O	71	54	47	66							4.3	14	8	9	6	*	*	*	*	0	6	0	894.4
N	81	69	63	79							6.0	9	8	13	10	2	*	1	0	*	19	0	894.3
D	81	74	69	81							6.7	7	8	16	12	4	*	2	0	2	25	*	896.4
YR	73	57	48	64							4.8	163	85	117	90	21	13	7	21	7	136	*	893.3

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature -8 in December 1932; maximum monthly precipitation 21.73 in February 1902; maximum monthly snowfall 150.0 in January 1916.

OAKLAND, CA — INTERNATIONAL AIRPORT — PACIFIC — 37° 44' N — 122° 12' W — 6 FT. — 1976

Month	Temp. Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Degree days (Base 65 °F) Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				48		48					48		48		48		48		48	
J	54.5	42.7	48.6	75	1962	24	1937	508	0	4.03	8.90	1967	0.29	1976	3.38	1967	T	1971	T	1971
F	58.0	45.7	51.9	82	1930	25	1929	367	0	2.83	8.85	1969	0.02	1953	2.41	1945	1.0	1976	1.0	1976
M	60.2	47.2	53.7	85	1952	32	1953	350	0	2.32	5.69	1958	0.04	1956	2.76	1940	T	1976	T	1976
A	62.8	49.4	56.1	88	1966	31	1929	270	0	1.58	4.60	1963	T	1949	2.21	1974	0.0		0.0	
M	65.4	52.4	58.9	98	1975	36	1938	193	0	0.55	3.42	1957	T	1976	1.45	1931	0.0		0.0	
J	68.5	55.2	61.9	107	1960	41	1929	114	21	0.14	1.21	1927	0.00	1959	1.03	1934	0.0		0.0	
J	69.7	56.4	63.1	102	1931	46	1935	80	21	0.01	0.80	1974	0.00	1971	0.78	1974	0.0		0.0	
A	70.2	56.8	63.5	95	1962	47	1935	74	28	0.03	0.74	1976	0.00	1973	0.42	1976	0.0		0.0	
S	72.3	56.6	64.5	102	1932	41	1951	59	44	0.18	3.27	1959	0.00	1974	3.23	1959	0.0		0.0	
O	68.7	53.4	61.1	95	1961	34	1935	135	14	1.09	8.56	1962	T	1968	5.45	1962	0.0		0.0	
N	62.0	48.5	55.3	86	1932	27	1931	291	0	2.37	7.42	1973	0.00	1933	2.67	1973	0.0		0.0	
D	55.5	44.2	49.9	74	1958	23	1930	488	0	3.57	11.29	1955	0.28	1975	3.21	1931	0.4	1932	0.2	1932
YR	64.0	50.7	57.4	107	JUN 1960	23	DEC 1930	2909	128	18.69	11.29	DEC 1955	0.00	SEP 1974	5.45	OCT 1962	1.0	FEB 1976	1.0	FEB 1976

Month	Relative humidity pct Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F Max: 90° and above (b)	32° and below	Min: 32° and below	0° and below	Average station pressure mb (Elev. 7 feet m.s.l.)
(a)	13	13	13	13	29	21	28	28			33	46	46	46	46	46	46	46	13	13	13	13	4
J	83	77	71	80	6.7	SE	40	16	1964		6.2	9	7	15	11	0	*	4	0	0	*	0	1021.1
F	82	76	69	79	7.3	W	49	36	1953		6.1	8	7	13	10	*	*	2	0	0	*	0	1019.5
M	80	72	66	76	9.0	W	45	20	1949		5.7	10	9	12	9	0	*	1	0	0	0	0	1017.3
A	80	68	63	76	9.5	W	35	25	1960		5.0	11	10	9	6	0	*	*	0	0	0	0	1017.9
M	83	71	65	79	10.0	W	38	27	1949		4.7	13	11	7	3	0	*	*	*	0	0	0	1015.9
J	85	73	67	82	10.0	W	42	27	1950		4.0	15	10	5	1	0	*	0	1	0	0	0	1014.5
J	87	76	68	84	9.3	WNW	28	27	1961		3.5	17	11	3	*	0	*	0	*	0	0	0	1014.9
A	88	77	68	84	9.0	WNW	29	27	1968		3.8	15	12	4	1	0	*	0	0	0	0	0	1015.2
S	83	74	65	81	7.8	WNW	33	02	1959		3.5	16	10	4	1	0	*	*	1	0	0	0	1014.4
O	81	72	63	78	6.8	WNW	43	25	1950		4.2	14	9	8	4	0	*	2	0	0	0	0	1016.9
N	82	75	69	78	6.3	WNW	46	02	1952		5.7	11	8	11	7	0	*	3	0	0	0	0	1019.5
D	82	75	70	79	6.5	E	48	23	1951		6.0	9	8	14	10	0	*	4	0	0	1	0	1021.6
YR	83	74	67	80	8.2	W	49	36	FEB 1953		4.9	148	112	105	63	*	2	18	2	0	1	0	1017.4

RED BLUFF, CA — MUNICIPAL AIRPORT — PACIFIC — 40° 09' N — 122° 15' W — 342 FT — 1976

Month	Temp. Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Degree days (Base 65 °F) Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year
(a)				32		32					32		32		32		32		32	
J	53.6	36.7	45.2	79	1948	20	1975	614	0	4.48	8.63	1956	0.22	1976	3.05	1959	13.6	1950	9.9	1950
F	59.5	40.4	50.0	83	1947	23	1949	420	0	3.17	11.38	1958	0.02	1964	2.66	1959	2.5	1949	1.5	1962
M	63.8	42.5	53.2	92	1960	28	1966	366	0	2.51	8.33	1949	0.01	1956	2.01	1952	8.0	1976	8.0	1976
A	71.8	47.3	59.5	98	1947	31	1967	218	53	1.79	5.79	1948	0.05	1964	2.28	1953	T	1975	T	1975
M	80.6	54.2	67.4	108	1950	35	1970	64	139	0.98	4.04	1956	0.00	1969	1.78	1956	0.0		0.0	
J	89.3	61.7	75.5	114	1950	42	1952	8	323	0.47	1.26	1948	0.00	1949	1.10	1962	0.0		0.0	
J	98.0	66.6	82.3	119	1972	52	1964	0	536	0.04	0.69	1974	0.00	1976	0.42	1958	0.0		0.0	
A	95.7	64.1	79.9	118	1971	52	1959	0	462	0.18	1.56	1965	0.00	1973	1.01	1968	0.0		0.0	
S	90.6	60.0	75.3	114	1950	42	1971	0	309	0.31	2.47	1957	0.00	1974	1.52	1964	0.0		0.0	
O	78.3	51.7	65.0	104	1952	32	1946	82	82	1.17	4.30	1957	T	1966	2.57	1962	T	1971	T	1971
N	64.0	43.3	53.7	93	1949	27	1975	339	0	3.05	8.42	1970	T	1959	4.00	1954	1.9	1955	1.9	1955
D	54.7	38.1	46.4	81	1958	20	1972	577	0	3.91	10.09	1952	T	1958	3.69	1960	10.7	1972	9.2	1972
YR	75.0	50.6	62.8	119	JUL 1972	20	JAN 1975	2688	1904	22.08	11.38	FEB 1958	0.00	JUL 1976	4.00	NOV 1954	13.6	JAN 1950	9.9	JAN 1950

Month	Relative humidity pct Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days, Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F Max: 90° and above (b)	32° and below	Min: 32° and below	0° and below	Average station pressure mb (Elev. 353 feet m.s.l.)
(a)	32	32	32	32	32	15	32	32		32	32	32	32	32	32	32	32	32	32	32	32	32	4
J	80	72	59	77	9.1	SSE	59	SE	1952	54	6.6	8	6	17	11	*	*	6	0	*	10	0	1008.3
F	79	66	51	73	9.3	SSE	61	SE	1956	63	6.4	8	5	15	9	*	1	2	0	0	3	0	1006.1
M	74	57	44	67	9.9	SSE	63	SE	1953	68	6.1	9	7	15	9	*	1	1	*	0	1	0	1003.2
A	68	46	35	58	9.7	SSE	50	SE	1961	79	5.3	11	8	11	7	0	1	*	1	0	*	0	1003.8
M	64	40	28	50	9.3	SSE	46	S	1973	84	4.4	15	7	9	4	0	2	*	7	0	0	0	1000.6
J	55	35	23	41	9.3	SSE	38	NW	1947	89	3.1	19	6	5	3	0	2	0	18	0	0	0	997.7
J	50	30	18	37	8.0	SSE	38	N	1966	96	1.3	27	3	1	1	0	1	0	28	0	0	0	999.3
A	52	32	20	39	7.6	SSE	30	SW	1961	94	1.8	24	5	2	1	0	1	0	25	0	0	0	1000.1
S	52	34	21	42	7.9	SSE	50	NE	1965	92	2.1	23	4	3	2	0	1	*	17	0	0	0	1000.0
O	62	44	32	54	8.4	NW	68	SE	1962	81	4.0	16	7	8	5	0	1	*	4	0	*	0	1003.6
N	75	61	50	70	8.5	NW	58	SE	1970	61	6.0	10	5	15	9	*	*	2	*	0	1	0	1006.3
D	81	72	61	78	8.4	NW	60	SE	1952	52	6.8	7	6	18	10	*	*	6	0	*	7	0	1009.2
YR	66	49	37	57	8.8	SSE	68	SE	OCT 1962	78	4.5	177	89	119	70	1	10	18	99	*	22	0	1003.2

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature 17 in January 1937 and earlier; maximum monthly precipitation 20.71 in January 1878; maximum precipitation in 24 hours 6.12 in September 1918; maximum monthly snowfall 15.0 in January 1937 and earlier; maximum snowfall in 24 hours 11.4 in December 1924.

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half.
T Trace.

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

% Through 1964. The station did not operate 24 hours daily. Fog and thunderstorm data may be incomplete.
$ Broken record. Summary includes data for complete calendar years only.
c Through 1964.

SACRAMENTO, CA — EXECUTIVE AIRPORT — PACIFIC — 38° 31' N — 121° 30' W — 17 FT. — 1976

Month	Temp °F Normal Daily maximum	Normal Daily minimum	Normal Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year	Rel. humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 25 feet m.s.l.
(a)				28		26					37		37		28		28		28		16	16	16	16	28	14	28	28		28	28	28	28	28	37	28	28	28	26	26	26	26	4
J	53.0	37.1	45.1	70	1976	23	1963	617	0	3.73	8.30	1969	0.38	1976	3.41	1967	T	1974	T	1974	90	86	70	88	7.8	SE	60	SE	1954	47	7.0	7	6	18	10	0	*	10	0	*	7	0	1020.3
F	59.1	40.4	49.8	78	1964	20	1972	428	0	2.68	8.77	1962	0.15	1964	2.31	1958	2.0	1976	2.0	1976	87	79	61	81	7.9	SSE	51	SE	1959	61	6.2	8	6	14	9	*	*	6	0	0	1	0	1018.5
M	64.1	41.9	53.0	88	1966	26	1971	372	0	2.17	5.82	1958	0.14	1966	2.07	1963	0.0		0.0		82	88	51	73	9.0	SW	68	S	1952	71	5.5	11	8	12	8	0	1	2	0	0	1	0	1015.5
A	71.3	45.3	58.3	92	1951	32	1953	227	26	1.54	4.78	1941	0.00	1949	2.22	1958	0.0		0.0		80	58	43	72	9.1	SW	45	SW	1955	80	4.6	13	9	8	6	0	1	*	*	0	*	0	1015.6
M	78.8	49.8	64.3	104	1976	36	1974	120	48	0.51	3.13	1948	T	1975	0.78	1957	0.0		0.0		80	51	36	70	9.4	SW	39	S	1957	87	3.6	17	9	5	3	0	*	*	3	0	0	0	1012.5
J	86.4	54.8	70.9	115	1961	41	1952	20	185	0.10	0.63	1953	0.00	1973	0.63	1953	0.0		0.0		77	47	31	64	10.0	SW	47	SW	1950	92	2.2	22	5	3	1	0	*	0	12	0	0	0	1011.0
J	92.9	57.5	75.2	114	1972	49	1955	0	318	0.01	0.79	1974	0.00	1976	0.78	1974	0.0		0.0		78	47	28	61	9.2	SSW	36	SW	1958	97	1.0	27	3	1	*	0	*	0	23	0	0	0	1011.2
A	91.3	56.9	74.1	108	1971	49	1966	0	286	0.05	0.89	1976	0.00	1973	0.65	1969	0.0		0.0		78	49	28	62	8.7	SW	38	SW	1954	96	1.4	26	4	1	*	0	*	*	21	0	0	0	1011.9
S	87.7	55.3	71.5	108	1955	43	1971	5	200	0.19	1.81	1959	0.00	1974	1.36	1959	0.0		0.0		78	50	31	64	7.8	SW	42	NW	1963	93	1.7	24	4	2	1	0	1	*	13	0	0	0	1011.5
O	77.1	49.5	63.3	101	1970	36	1971	101	48	0.99	7.51	1962	0.00	1966	5.59	1962	0.0		0.0		78	57	39	69	6.8	SW	68	SE	1950	85	3.2	20	5	6	3	0	*	2	2	0	0	0	1015.1
N	63.8	42.4	53.0	87	1960	26	1961	360	0	2.13	7.41	1970	0.02	1959	2.99	1970	0.0		0.0		88	76	60	81	6.4	NNW	70	SE	1953	63	5.7	10	7	13	7	0	*	6	0	0	1	0	1018.4
D	53.3	38.3	45.8	72	1967	20	1972	595	0	3.12	12.84	1955	0.17	1956	3.64	1955	T	1972	T	1972	89	85	71	88	7.1	SSE	70	SE	1952	48	6.7	8	6	17	9	0	*	9	0	*	6	0	1020.9
YR	73.2	47.4	60.3	115	JUN 1961	20	DEC 1972	2843	1159	17.22	12.84	DEC 1955	0.00	JUL 1976	5.59	OCT 1962	2.0	FEB 1976	2.0	FEB 1976	81	63	46	73	8.3	SW	70	SE	NOV 1953	79	4.1	193	72	100	57	*	5	35	77	*	17	0	1015.2

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature 17 in December 1932; maximum monthly precipitation 15.04 in January 1862; maximum precipitation in 24 hours 7.24 in April 1880.

SANDBERG, CA — TOP OF BALD MOUNTAIN — PACIFIC — 34° 45' N — 118° 44' W — 4517 FT. — 1976

Month	Temp °F Normal Daily maximum	Normal Daily minimum	Normal Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year	Rel. humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms %	Heavy fog, visibility ¼ mile or less %	Temperatures °F Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 4523 feet m.s.l.
(a)				42		42					42		42		43		43		44		8	35	8	8	30	14	21	21			27	40	40	40	42	42	32	32	42	42	42	42	2
J	46.4	33.9	40.2	71	1969	3	1937	769	0	2.19	10.62	1933	0.00	1948	4.09	1933	64.0	1933	38.5	1933	51	56	52	55	17.0	ENE	64	20	1969		5.1	12	8	11	6	2	*	10	0	2	13	0	862.7
F	49.1	35.3	42.2	72	1972	13	1962	638	0	2.45	11.36	1973	0.02	1969	4.87	1962	37.0	1944	34.0	1944	56	57	51	57	16.4	N	77	32	1980		5.2	10	7	11	6	1	*	12	0	1	11	0	863.2
M	51.9	35.7	43.8	80	1966	13	1971	663	0	1.33	6.18	1941	0.00	1972	2.97	1938	45.0	1952	21.9	1952	65	57	51	62	16.7	NNW	74	34	1975		5.2	11	9	11	6	1	*	12	0	*	11	0	859.8
A	58.3	40.1	49.2	89	1949	22	1971	474	0	1.12	4.11	1967	0.00	1966	2.01	1936	31.2	1969	19.0	1935	67	52	51	64	16.4	NNW	64	36	1957		4.4	13	9	8	4	1	1	9	0	*	6	0	862.1
M	65.8	45.6	55.7	94	1951	26	1964	288	0	0.25	1.13	1932	0.00	1952	0.86	1936	7.0	1964	3.9	1964	64	46	49	58	15.9	NNW	59	34	1937		3.5	17	6	6	2	*	1	7	*	0	2	0	862.0
J	75.0	53.0	64.0	99	1972	30	1967	118	96	0.03	0.54	1963	0.00	1974	0.49	1963	0.0		0.0		58	36	37	50	15.1	NNW	64	34	1959		1.8	23	5	2	*	0	*	3	3	0	*	0	866.3
J	83.1	62.9	74.0	102	1934	40	1940	7	286	0.03	0.49	1969	0.00	1973	0.49	1969	0.0		0.0		42	26	29	39	12.8	NNW	48	34	1961		1.9	25	5	1	*	0	1	*	8	0	0	0	864.2
A	84.2	61.8	73.0	102	1934	40	1968	10	258	0.06	0.65	1945	0.00	1971	0.62	1945	0.0		0.0		45	27	30	43	12.6	NNW	40	34	1974		1.4	26	4	1	1	0	1	1	7	0	0	0	863.5
S	79.2	58.5	68.9	98	1950	35	1948	33	150	0.21	3.40	1939	0.00	1974	2.68	1976	T	1952	T	1952	47	30	36	49	12.9	NNW	45	35	1973		1.7	24	4	2	1	0	1	2	3	0	0	0	863.2
O	67.8	49.8	58.8	89	1971	21	1971	212	20	0.34	3.55	1936	0.00	1967	1.86	1936	1.0	1949	1.0	1949	55	39	42	51	14.9	NNW	53	34	1967		2.9	20	6	5	2	*	*	5	0	0	1	0	863.5
N	55.4	41.1	48.3	80	1955	21	1964	501	0	2.05	9.80	1969	0.00	1962	6.87	1970	18.1	1964	14.0	1984	57	47	48	53	16.1	ENE	62	34	1963		4.2	15	7	8	4	*	*	6	0	*	5	0	863.7
D	48.0	35.8	41.9	72	1937	11	1972	716	0	1.95	10.26	1971	T	1962	3.41	1974	39.2	1971	24.0	1945	62	54	55	59	16.4	ENE	53	34	1968		5.1	12	7	12	6	1	*	10	0	1	11	0	864.7
YR	63.8	46.1	55.0	102	AUG 1934	3	JAN 1937	4427	800	11.97	11.36	FEB 1973	0.00	SEP 1974	6.87	NOV 1970	64.0	JAN 1933	38.5	JAN 1933	56	44	44	53	15.3	NNW	77	32	FEB 1960		3.5	208	79	78	40	7	4	79	20	5	59	0	863.2

SAN DIEGO, CA — LINDBERGH FIELD — PACIFIC — 32° 44' N — 117° 10' W — 13 FT. — 1976

Month	Temp °F Normal Daily maximum	Normal Daily minimum	Normal Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year	Rel. humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 28 feet m.s.l.
(a)				36		36					36		36		36		36		36		16	16	16	16	36	13	33	33		36	36	36	36	36	36	36	36	36	16	16	16	16	4
J	64.6	45.8	55.2	88	1953	29	1949	314	10	1.88	6.26	1943	T	1976	2.05	1943	T	1949	T	1949	67	53	54	68	5.6	NE	39	SW	1959	71	4.9	13	8	10	6	0	*	4	0	0	*	0	1017.9
F	65.6	47.8	56.7	88	1954	36	1949	237	0	1.46	5.40	1976	0.00	1967	1.82	1976	0.0		0.0		72	56	57	71	6.3	WNW	35	S	1969	72	5.1	11	7	10	6	0	*	3	0	0	0	0	1017.7
M	66.0	50.1	58.1	88	1959	39	1971	219	0	1.39	5.89	1941	T	1972	2.40	1952	0.0		0.0		73	59	58	71	7.2	WNW	46	SW	1945	71	5.2	11	10	10	7	0	*	2	0	0	0	0	1015.4
A	67.6	53.8	60.7	92	1960	41	1945	144	13	0.81	3.36	1965	T	1966	1.40	1965	0.0		0.0		74	58	58	71	7.7	WNW	37	S	1958	65	5.2	10	10	10	5	0	*	1	*	0	0	0	1015.2
M	69.4	57.2	63.3	96	1953	48	1967	79	26	0.15	0.95	1971	0.00	1952	0.42	1957	0.0		0.0		76	64	63	74	7.6	WNW	27	SW	1947	58	5.7	9	11	11	2	0	*	1	*	0	0	0	1013.6
J	71.1	59.9	65.5	97	1957	51	1967	32	67	0.05	0.38	1972	0.00	1946	0.28	1972	0.0		0.0		80	69	66	76	7.5	SSW	26	S	1948	56	5.5	9	12	9	1	0	*	1	*	0	0	0	1011.9
J	73.3	63.9	69.6	93	1959	55	1948	6	149	0.01	0.13	1968	0.00	1964	0.10	1968	0.0		0.0		81	69	66	79	7.1	WNW	23	NW	1966	67	4.6	13	13	5	*	0	*	1	*	0	0	0	1012.6
A	77.3	65.4	71.4	98	1955	57	1944	0	201	0.07	0.87	1945	0.00	1970	0.83	1951	0.0		0.0		80	67	66	78	7.0	WNW	23	SW	1945	69	4.1	13	12	4	*	0	*	1	*	0	0	0	1012.9
S	76.5	63.2	69.9	111	1963	51	1948	16	163	0.13	1.90	1963	0.00	1964	0.90	1963	0.0		0.0		78	69	65	79	6.7	NW	23	W	1959	67	4.1	15	9	6	1	0	*	2	1	0	0	0	1012.0
O	73.0	58.4	66.1	107	1961	43	1971	43	77	0.34	2.90	1941	0.00	1967	1.20	1941	0.0		0.0		74	59	61	73	6.3	WNW	31	N	1961	67	4.2	15	9	7	2	0	*	4	*	0	0	0	1014.2
N	70.1	51.5	60.8	97	1976	38	1964	140	14	1.25	3.82	1965	0.00	1936	2.44	1944	0.0		0.0		73	57	62	73	5.6	NE	31	SE	1944	74	4.1	15	8	7	5	0	*	4	0	0	0	0	1016.1
D	66.1	47.2	56.7	88	1963	35	1960	257	0	1.73	7.60	1943	0.03	1953	3.07	1943	T	1967	T	1967	70	54	57	70	5.4	NE	34	S	1951	72	4.6	14	8	9	6	0	*	4	0	0	0	0	1017.6
YR	70.3	55.4	62.9	111	SEP 1963	29	JAN 1949	1507	722	9.45	7.60	DEC 1943	0.00	AUG 1970	3.07	DEC 1943	T	DEC 1967	T	DEC 1967	75	61	61	73	6.7	WNW	51	SE	NOV 1944	67	4.8	150	117	98	41	0	3	27	3	0	*	0	1014.8

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Lowest temperature 25 in January 1913; maximum monthly precipitation 9.26 in December 1921; maximum precipitation in 24 hours 3.62 in December 1980; fastest mile of wind 53 from Southeast in February 1938.

SAN FRANCISCO, CA — INTERNATIONAL AIRPORT — PACIFIC — 37° 37' N — 122° 23' W — 8 FT. — 1976

Month	Temp °F Normal Daily maximum	Normal Daily minimum	Normal Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precip. Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs	Year	Rel. humidity pct. Hour 04	Hour 10	Hour 16	Hour 22 (Local time)	Wind Mean speed m.p.h.	Prevailing direction	Fastest mile Speed m.p.h.	Direction	Year	Pct of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F Max (b) 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure mb Elev. 18 feet m.s.l.
(a)				49		49					49		49		49		49		49		17	17	17	17	49	36	27	27			35	49	49	49	49	49	49	39	17	17	17	17	4
J	55.3	41.2	48.3	72	1948	24	1928	518	0	4.37	10.43	1967	0.31	1948	4.56	1967	1.5	1962	1.5	1962	86	76	66	81	7.1	WNW	58	16	1963		6.1	9	8	14	11	*	*	4	0	0	2	0	1020.3
F	58.6	43.8	51.2	78	1930	25	1929	386	0	3.04	9.52	1958	T	1953	2.31	1949	T	1976	T	1976	84	74	65	79	8.5	WNW	52	25	1960		6.0	8	7	13	10	0	*	3	0	0	0	0	1018.7
M	61.0	44.9	53.0	85	1952	30	1929	372	0	2.54	9.01	1958	T	1934	2.11	1940	T	1976	T	1976	81	69	62	76	10.3	WNW	40	20	1967		5.6	10	9	12	9	0	*	*	0	0	*	0	1016.6
A	63.9	47.0	55.3	88	1947	31	1929	291	0	1.59	6.36	1958	T	1949	2.66	1958	0.0		0.0		81	65	60	77	12.1	WNW	46	16	1955		5.0	11	10	9	6	0	*	*	0	0	0	0	1017.1
M	66.6	49.9	58.3	96	1976	36	1929	210	0	0.41	3.01	1957	T	1976	1.54	1957	0.0		0.0		84	65	60	79	13.2	W	41	30	1969		4.5	14	9	8	3	0	*	*	*	0	0	0	1015.2
J	70.2	53.0	61.6	106	1961	41	1932	120	18	0.13	0.86	1967	0.00	1928	0.83	1967	0.0		0.0		85	64	59	80	13.9	W	44	28	1969		3.8	16	9	5	1	0	*	*	1	0	0	0	1013.9
J	70.9	54.0	62.5	104	1931	43	1928	93	16	0.01	0.23	1974	0.00	1930	0.23	1974	0.0		0.0		87	66	61	83	13.5	NW	38	27	1950		3.0	21	7	3	*	0	*	*	1	0	0	0	1014.3
A	71.6	54.3	63.0	98	1968	42	1935	84	22	0.03	0.66	1976	T	1974	0.36	1976	0.0		0.0		87	67	62	83	12.6	NW	36	27	1974		3.3	19	9	3	1	0	*	*	*	0	0	0	1014.6
S	73.6	54.5	64.1	103	1971	38	1929	66	39	0.16	2.30	1959	T	1975	2.30	1959	0.0		0.0		84	66	59	78	11.0	NW	38	28	1966		3.1	18	9	3	1	0	*	1	1	0	0	0	1013.8
O	70.3	51.6	61.0	95	1961	34	1929	137	13	0.96	7.30	1962	T	1966	3.74	1962	0.0		0.0		81	66	59	76	9.2	WNW	44	25	1950		4.0	16	9	6	4	0	*	2	*	0	0	0	1016.1
N	63.3	47.2	55.3	85	1967	29	1931	291	0	2.29	7.94	1973	0.00	1929	2.39	1973	0.0		0.0		84	74	64	78	7.2	WNW	47	20	1953		5.4	11	9	10	7	0	*	3	0	0	0	0	1018.7
D	56.9	42.9	49.7	75	1958	20	1932	474	0	3.98	12.30	1955	0.21	1975	3.33	1955	1.0	1932	1.0	1932	85	76	68	80	6.8	WNW	47	18	1955		6.0	9	8	14	10	*	*	4	0	0	1	0	1020.7
YR	65.1	48.7	56.9	106	JUN 1961	20	DEC 1932	3042	108	19.53	12.30	DEC 1955	0.00	JUL 1930	4.56	JAN 1967	1.5	JAN 1962	1.5	JAN 1962	84	69	62	79	10.5	WNW	58	16	JAN 1963		4.7	162	103	100	62	*	2	17	4	0	3	0	1016.7

(a) Length of record, years, through the current year unless otherwise noted, based on January data
(b) 70° and above at Alaskan stations.
* Less than one half
T Trace

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees

% Through 1964. The station did not operate 24 hours daily. Fog and thunderstorm data may be incomplete.

ELECTRA POWER HOUSE, CA — 1951 - 1974 — 38° 20' N — 120° 40' W — 715 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	56.6	34.8	45.8	76	53	30	18	62	22	0	0	13	0	5.93	12.26	69	2.80	51	18	.1	3.0	62	3.0	62	21	8	4	2
FEB	62.0	37.2	49.6	78*	71	12	22	62	27	0	0	8	0	4.06	11.04	62	2.89	60	8	.1	3.0	69	1.0	69	23	6	3	1
MAR	65.2	39.0	52.2	85*	72	16	26*	66	3	0	0	4	0	4.05	8.63	58	2.89	70	1	.0						8	3	1
APR	71.7	42.3	57.0	91	62	13	28	55	3	0	0	1	0	3.07	10.09	67	3.03	53	27	.2	4.0	67				5	2	1
MAY	80.5	47.4	64.0	100*	73	30	31	65	7	5	0	0	0	1.00	4.40	57	1.99	56	4	.0						2	1	0
JUN	89.8	52.5	71.2	113*	61	22	39*	66	2	19	0	0	0	.34	1.26	70	.90	70	9	.0						1	0	0
JULY	97.9	56.8	77.4	114*	72	15	41*	63	2	28	0	0	0	.14	3.09	74	2.47	74	9	.0						0	0	0
AUG	96.4	55.7	76.1	110	55	31	43	73	23	27	0	0	0	.07	.99	65	.85	65	12	.0						0	0	0
SEPT	90.8	52.2	71.5	111	55	3	39	71	27	18	0	0	0	.31	2.59	59	2.10	59	18	.0						1	0	0
OCT	79.8	46.2	63.0	102	52	2	26	71	29	4	0	0	0	1.43	5.99	62	2.24	63	11	.0						2	1	1
NOV	65.9	40.1	53.0	89	66	2	26*	61	17	0	0	4	0	3.74	7.01	70	2.78	68	3	.0						6	3	1
DEC	56.5	35.5	46.0	78	58	3	18	72	9	0	0	12	0	5.52	17.53	55	4.83	55	23	.1	2.0	68				7	4	2
YEAR	76.1	45.0	60.6	114*	72	JUL 15	18*	72	DEC 9	97	0	42	0	29.66	DEC 17.53	55	DEC 4.83	55	23	.5	APR 4.0	67	JAN 3.0	62	21	46	21	9

COALINGA, CA — 1951 - 1974 — 36° 09' N — 120° 21' W — 671 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	56.9	35.1	46.0	77*	74	15	10*	63	13	0	0	13	0	1.65	5.69	69	1.83	74	7	.2	5.0	57	5.0	57	27	4	1	0
FEB	62.7	38.6	50.7	81	63	4	23*	72	1	0	0	6	0	1.35	6.43	69	2.28	69	24	.0						3	1	0
MAR	67.9	40.2	54.1	88*	72	18	24	53	2	0	0	3	0	.86	3.90	58	1.54	52	15	.0						3	0	0
APR	74.8	44.9	59.9	95*	73	27	30	55	19	2	0	0	0	.68	2.08	67	1.41	55	30	.0						2	0	0
MAY	83.8	51.6	67.7	105*	69	29	35*	67	1	9	0	0	0	.24	1.62	55	1.53	55	7	.0						1	0	0
JUN	91.8	58.4	75.1	112*	61	21	42	52	12	19	0	0	0	.02	.27	57	.27	57	9	.0						0	0	0
JULY	99.1	64.1	81.6	112*	72	14	48	56	2	29	0	0	0	.02	.26	66	.26	66	30	.0						0	0	0
AUG	97.3	62.6	80.0	109*	71	10	47	57	30	28	0	0	0	.01	.12	64	.12	64	31	.0						0	0	0
SEPT	91.5	57.1	74.3	111	55	2	41	65	20	19	0	0	0	.10	.63	58	.52	58	7	.0						0	0	0
OCT	80.6	48.6	64.7	100	52	2	31	71	30	5	0	0	0	.26	1.30	68	.91	68	13	.0						1	0	0
NOV	66.9	40.0	53.5	87	64	4	24	58	16	0	0	4	0	1.10	4.80	65	1.58	53	14	.0						3	1	0
DEC	57.4	35.3	46.3	79*	56	15	18	67	14	0	0	11	0	1.31	4.16	55	1.98	66	6	.0						3	1	0
YEAR	77.6	48.1	62.8	112*	72	JUL 14	18*	67	DEC 14	111	0	37	0	7.60	FEB 6.43	69	FEB 2.28	69	24	.2	JAN 5.0	57	JAN 5.0	57	27	20	4	0

FAIRMONT, CA — 1951 - 1974 — 34° 42' N — 118° 26' W — 3060 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	52.6	35.8	44.2	76	62	8	13	63	13	0	0	9	0	3.38	14.40	69	4.74	52	16	4.0	25.0	62	23.0	74	5	4	2	1
FEB	56.4	38.0	47.2	77*	71	14	22*	71	26	0	0	6	0	2.98	14.69	69	6.34	69	25	.4	3.6	51	5.0	57	1	3	1	1
MAR	59.0	38.7	49.3	82	64	31	22	52	8	0	0	4	0	1.74	7.67	52	2.04	52	7	1.0	17.9	52	9.0	52	8	3	1	0
APR	64.7	44.4	54.5	81	61	4	20	67	30	0	0	1	0	1.43	6.01	65	2.17	58	3	.0	.3	63				2	1	0
MAY	72.4	50.4	61.4	99	51	26	32	67	1	1	0	0	0	.33	2.20	55	1.59	55	1	.0						1	0	0
JUN	81.2	58.6	69.9	106	72	30	40*	74	18	8	0	0	0	.04	.46	63	.29	72	6	.0						0	0	0
JULY	90.5	67.5	79.0	110	72	15	51*	69	7	19	0	0	0	.03	.29	69	.28	65	30	.0						0	0	0
AUG	90.2	66.5	78.4	104*	71	10	48	66	21	19	0	0	0	.06	.64	61	.34	61	23	.0						0	0	0
SEPT	85.3	60.8	73.1	105	71	14	41	52	12	11	0	0	0	.23	2.15	63	.88	67	19	.0						0	0	0
OCT	74.5	52.4	63.5	98	63	1	28	71	30	1	0	0	0	.25	1.49	57	1.02	57	21	.0						1	0	0
NOV	61.3	42.8	52.1	88	60	2	23*	64	19	0	0	2	0	2.46	13.06	65	5.42	70	29	.3	7.0	64	6.0	64	18	3	1	1
DEC	53.7	36.6	45.2	80	56	5	16	72	12	0	0	7	0	2.26	8.36	71	4.92	57	16	2.8	23.0	71	18.0	71	20	3	2	1
YEAR	70.2	49.5	59.8	110	72	JUL 15	13	63	JAN 13	59	0	29	0	14.79	FEB 14.69	69	FEB 6.34	69	25	8.5	JAN 25.0	62	JAN 23.0	74	5	20	8	4

DAGGETT FAA AIRPORT — 1951 - 1974 — 34° 52' N — 116° 47' W — 1915 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	60.6	35.0	47.8	83	71	20	8	63	13	0	0	12	0	.45	1.97	54	1.03	54	12	.2	5.0	57	2.0	57	29	1	0	0
FEB	65.9	39.6	52.8	86	72	28	19*	55	21	0	0	4	0	.27	1.50	69	.70	69	25	.0	.3	53				1	0	0
MAR	71.1	44.1	57.6	91*	72	6	23	66	4	0	0	2	0	.29	1.01	68	.88	68	8	.0						1	0	0
APR	78.2	49.8	64.0	99	61	4	31	53	9	3	0	0	0	.27	1.83	65	.65	65	12	.0						1	0	0
MAY	87.4	57.8	72.6	110	51	26	42*	53	2	15	0	0	0	.08	.49	69	.37	62	16	.0						0	0	0
JUN	97.0	65.6	81.3	116	72	30	46	54	10	25	0	0	0	.09	1.24	72	.45	72	7	.0						0	0	0
JULY	103.8	72.8	88.4	117	72	14	57	56	3	31	0	0	0	.32	1.12	52	.96	57	10	.0						1	0	0
AUG	101.5	71.6	86.6	113	70	10	55*	59	21	30	0	0	0	.51	3.22	58	2.06	58	7	.0						1	0	0
SEPT	94.9	64.6	79.8	111*	71	14	48	58	29	24	0	0	0	.39	2.31	63	1.11	63	18	.0						1	0	0
OCT	82.9	53.9	68.4	100*	64	5	29	71	30	7	0	0	0	.20	1.01	63	.66	63	18	.0						1	0	0
NOV	69.2	42.7	55.9	88	55	10	21*	57	30	0	0	3	0	.34	1.74	65	1.08	64	17	.1	2.4	64	2.0	64	18	1	0	0
DEC	60.8	35.4	48.1	83	58	12	17*	68	22	0	0	10	0	.41	2.14	51	1.01	65	9	.6	13.0	67	7.0	67	15	1	0	0
YEAR	81.1	52.8	66.9	117	72	JUL 14	8	63	JAN 13	135	0	31	0	3.82	AUG 3.22	58	AUG 2.06	58	7	.9	DEC 13.0	67	DEC 7.0	67	15	10	0	0

FORT BIDWELL, CA — 1951 - 1974 — 41° 51' N — 120° 08' W — 4498 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	40.1	20.5	30.3	65	71	18	-20	62	23	0	5	26	2	2.39	5.12	70	2.05	72	22	15.1	43.5	52	23.0	52	21	8	1	0
FEB	46.1	24.6	35.3	69	68	26	-12	56	1	0	1	23	1	1.75	3.04	60	1.32	60	8	8.2	26.0	69	11.0	62	8	6	1	0
MAR	51.6	26.7	39.2	80	66	30	-5	71	1	0	0	24	0	1.39	4.87	71	2.39	71	12	6.2	34.0	52	12.0	52	16	6	0	0
APR	60.3	30.8	45.6	82*	66	1	10	64	23	0	0	18	0	1.01	2.95	63	.68	74	1	3.2	22.0	67	3.0	67	24	4	0	0
MAY	69.4	37.8	53.6	91	54	18	19*	68	6	0	0	6	0	1.11	4.30	71	.93	71	29	1.0	6.0	53				4	0	0
JUN	77.4	43.5	60.5	96	67	30	26	62	4	3	0	1	0	.93	2.07	58	.75	53	7	.0						3	0	0
JULY	86.5	47.8	67.2	99*	68	28	34	55	2	11	0	0	0	.37	2.50	58	1.23	58	23	.0						1	0	0
AUG	85.5	45.4	65.8	100	61	4	31*	64	29	8	0	0	0	.34	1.75	68	1.10	65	11	.0						1	0	0
SEPT	78.8	39.8	59.3	100	55	3	17	70	14	2	0	4	0	.56	1.93	73	.87	72	27	.0						2	0	0
OCT	67.3	32.7	50.0	88*	70	4	5	71	29	0	0	15	0	1.10	5.69	62	1.80	62	13	1.5	11.0	69	3.0	69	15	3	1	0
NOV	51.6	26.8	39.2	75*	67	1	-2	60	28	0	0	22	0	2.08	5.79	70	1.90	57	13	4.3	16.0	55	8.0	55	16	6	1	0
DEC	41.9	21.7	31.8	66	58	11	-26	72	9	0	4	27	1	2.68	8.04	64	2.18	55	23	13.7	35.0	70	13.0	70	2	8	1	0
YEAR	63.0	33.2	48.2	100*	55	SEP 3	-26*	72	DEC 9	29	10	166	4	16.11	DEC 8.04	64	MAR 2.39	71	12	55.2	JAN 43.5	52	JAN 23.0	52	21	52	5	0

DAVIS 2 WSW EXP FARM, CA — 1951 - 1974 — 38° 32' N — 121° 46' W — 60 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	52.7	37.2	45.0	77	62	9	19	68	3	0	0	8	0	4.20	9.60	69	3.29	63	31	.1	1.1	73	1.0	74	4	7	3	1
FEB	59.6	40.3	50.0	76	68	28	20*	66	14	0	0	3	0	2.58	9.08	58	2.92	58	19	.0						5	2	1
MAR	64.7	41.3	53.0	85	72	17	26	66	4	0	0	1	0	1.80	4.75	74	1.92	74	1	.0						5	1	0
APR	71.5	44.4	58.0	93	59	30	29	53	8	0	0	0	0	1.30	4.11	58	1.72	58	3	.0						3	1	0
MAY	79.6	49.2	64.4	102	51	26	35*	64	6	5	0	0	0	.37	1.78	57	.62	55	8	.0						1	0	0
JUN	87.6	54.1	70.9	110	61	16	40	52	12	12	0	0	0	.15	.95	67	.47	53	6	.0						1	0	0
JULY	93.9	55.3	74.6	113	72	15	44	55	6	22	0	0	0	.03	.63	74	.46	74	8	.0						0	0	0
AUG	92.1	54.6	73.4	109	71	11	44	61	17	21	0	0	0	.04	.51	65	.51	65	12	.0						0	0	0
SEPT	88.1	53.1	70.6	110*	55	3	40	65	20	13	0	0	0	.22	1.83	59	1.42	59	18	.0						1	0	0
OCT	78.1	48.3	63.2	100	52	3	30	61	23	3	0	0	0	.99	7.93	62	3.50	62	13	.0						2	1	0
NOV	64.1	41.9	53.0	87	55	10	24	61	17	0	0	2	0	2.36	6.87	70	2.21	70	29	.0						5	2	0
DEC	53.5	37.8	45.7	76	67	27	21*	72	12	0	0	7	0	3.28	11.87	55	3.01	55	19	.0						6	2	1
YEAR	73.8	46.5	60.1	113	72	JUL 15	19	68	JAN 3	76	0	21	0	17.32	DEC 11.87	55	OCT 3.50	62	13	.1	JAN 1.1	73	JAN 1.0	74	4	36	12	3

* ALSO ON EARLIER DATES

HAT CREEK PH NO 1, CA — 1951 - 1974 — 40° 56' N — 121° 33' W — 3015 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	45.3	21.3	33.3	65	59	12	-6+	74	8	0	1	28	1	3.46	7.08	74	2.34	67	21	12.6	48.9	52	24.0	52	16	8	2	1
FEB	51.3	24.3	37.8	73	53	28	-1	72	2	0	0	25	0	2.14	5.19	60	1.83	72	24	4.1	23.0	69	20.0	68	2	6	1	0
MAR	56.1	26.9	41.5	81	66	31	9+	69	10	0	0	25	0	2.15	6.24	74	1.95	71	12	4.5	22.0	52	14.0	63	28	6	1	0
APR	63.9	31.2	47.5	86	73	27	18+	66	22	0	0	19	0	1.09	3.44	67	1.07	63	7	1.0	8.0	61	7.0	61	23	4	0	0
MAY	73.1	37.4	55.3	98	51	27	22	64	6	1	0	6	0	1.27	3.16	71	1.82	63	30	.1	2.0	64	1.0	59	3	3	1	0
JUN	81.9	42.9	62.4	102+	74	30	27	66	4	7	0	1	0	.96	3.38	70	.99	38	12	.0						3	1	0
JULY	91.5	45.2	68.4	108	72	16	32	66	2	20	0	0	0	.25	1.50	58	1.10	52	29	.0						1	0	0
AUG	89.9	42.7	66.3	110	72	8	31	57	29	16	0	0	0	.25	1.50	65	.90	65	12	.0						1	0	0
SEPT	83.5	37.1	60.3	106	55	4	22+	72	23	8	0	6	0	.51	2.23	72	1.43	72	27	.1	3.0	71	2.0	71	30	1	0	0
OCT	71.0	31.2	51.1	94	52	2	14+	71	29	1	0	19	0	1.24	7.88	62	2.60	62	12	.0	.5	72				3	1	0
NOV	55.6	26.9	41.3	82	66	1	8	61	17	0	0	24	0	2.31	5.96	60	2.60	60	26	1.8	14.0	60	8.0	60	28	6	1	0
DEC	46.0	22.4	34.3	64	59	3	-20	72	9	0	1	27	0	3.47	8.32	55	1.78	64	22	7.7	25.5	67	18.0	68	24	8	2	1
YEAR	67.4	32.5	50.0	110	AUG 72	8	-20	DEC 72	9	59	2	180	1	19.12	DEC 8.32	55	OCT 2.60	62	12	31.9	JAN 48.9	52	JAN 24.0	52	16	50	10	2

HAYFIELD PUMPING PL, CA — 1951 - 1974 — 33° 42' N — 115° 38' W — 1370 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	65.2	38.5	51.9	86+	71	21	17	74	3	0	0	7	0	.39	1.79	74	1.30	52	16	.0						1	0	0
FEB	69.7	42.3	56.0	88+	72	29	23+	64	27	0	0	2	0	.15	.88	58	.63	58	4	.0						0	0	0
MAR	74.1	45.6	59.9	94	69	31	24	62	1	1	0	1	0	.23	.95	54	.83	73	9	.0						1	0	0
APR	81.3	52.2	66.8	102	61	5	36+	68	16	6	0	0	0	.07	.83	65	.43	65	3	.0						0	0	0
MAY	89.2	59.1	74.2	110	51	27	39	67	1	17	0	0	0	.03	.24	51	.21	51	15	.0						0	0	0
JUN	98.4	66.8	82.6	118	70	26	49	64	10	26	0	0	0	.03	.53	52	.53	52	3	.0						0	0	0
JULY	104.4	76.0	90.2	118	60	17	58	66	14	31	0	0	0	.16	2.56	66	1.15	68	5	.0						0	0	0
AUG	102.7	74.9	88.8	119	69	5	56+	54	26	30	0	0	0	.38	2.25	55	2.01	55	18	.0						1	0	0
SEPT	98.4	67.0	82.7	115+	55	5	50+	71	26	27	0	0	0	.15	1.28	67	.82	63	17	.0						0	0	0
OCT	87.5	56.4	72.0	104+	64	7	29	71	31	15	0	0	0	.29	1.54	72	.83	58	23	.0						1	0	0
NOV	74.3	46.1	60.2	92+	67	3	27	52	28	1	0	1	0	.26	1.39	52	1.10	60	6	.0						1	0	0
DEC	66.2	39.3	52.8	86	58	4	19	68	22	0	0	6	0	.36	2.60	59	1.42	59	23	.1	1.5	67	1.0	67	19	1	0	0
YEAR	84.3	59.4	69.8	118+	JUL 60	17	19	DEC 68	22	154	0	17	0	2.58	DEC 2.60	59	AUG 2.01	55	18	.1	DEC 1.5	67	DEC 1.0	67	19	6	0	0

HEALDSBURG, CA — 1951 - 1974 — 38° 37' N — 122° 52' W — 102 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	56.6	38.2	47.4	85	62	8	23+	63	12	0	0	7	0	10.92	25.24	70	5.60	54	16	.0	.2	71				10	6	4
FEB	62.5	40.8	51.7	82	64	19	25+	72	2	0	0	2	0	6.41	23.34	58	4.51	62	13	.0						7	4	2
MAR	66.1	41.5	53.8	90+	72	16	28	55	1	0	0	1	0	4.46	12.17	74	3.29	63	27	.0						7	3	1
APR	71.4	43.9	57.6	96	65	26	29	53	8	1	0	0	0	2.80	6.89	63	3.25	53	27	.0						4	2	1
MAY	77.7	48.0	62.9	104	70	31	37+	74	18	4	0	0	0	.60	4.36	57	1.39	51	4	.0						2	0	0
JUN	84.4	52.1	68.3	113	61	14	37	52	12	9	0	0	0	.32	2.17	67	2.07	67	2	.0						1	0	0
JULY	89.1	52.2	70.7	116	72	13	40	54	6	14	0	0	0	.08	1.71	74	1.59	74	8	.0						0	0	0
AUG	88.7	52.4	70.5	109	71	10	41+	55	29	14	0	0	0	.23	3.17	54	2.03	54	28	.0						0	0	0
SEPT	86.6	51.6	69.1	114	71	13	38	52	10	11	0	0	0	.49	4.52	59	4.52	59	18	.0						1	0	0
OCT	78.1	48.0	63.1	105	70	1	30	71	29	4	0	0	0	2.42	10.83	62	4.09	62	12	.0						3	2	1
NOV	65.8	42.9	54.4	96	67	2	27	61	17	0	0	1	0	6.36	21.20	73	3.34	72	13	.0						7	4	2
DEC	56.9	38.8	47.9	83	67	26	19	72	9	0	0	7	0	8.45	22.34	55	4.28	64	22	.0						9	5	3
YEAR	73.7	45.9	59.8	116	JUL 72	13	19	DEC 72	9	57	0	18	0	43.36	JAN 25.24	70	JAN 5.60	54	16	.0	JAN .2	71	.0	00		51	26	14

GRANT GROVE, CA — 1951 - 1974 — 36° 44' N — 118° 58' W — 6600 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	43.0	24.3	33.7	84+	69	7	1	57	27	0	4	27	0	8.77	38.18	69	7.51	69	19	35.3	101.0	52	105.0	52	29	7	4	3
FEB	44.3	24.8	34.6	67	51	9	-14	62	20	0	3	24	0	6.37	23.61	62	6.85	63	1	33.3	134.0	69	150.0	69	28	6	3	2
MAR	45.0	25.3	35.2	67	52	26	0	51	3	0	3	26	0	5.98	18.49	58	4.58	74	2	42.1	168.0	52	179.0	69	13	7	3	2
APR	49.4	29.0	39.2	73	54	18	8	53	8	0	2	20	0	4.51	14.81	67	4.02	58	3	30.9	143.0	67	127.0	58	5	6	3	2
MAY	57.0	35.9	46.4	82	51	29	17	67	1	0	0	10	0	1.50	5.28	57	5.10	57	19	6.0	31.0	64	77.0	52	1	3	1	0
JUN	66.4	43.6	55.0	87+	72	30	23	55	1	0	0	1	0	.47	2.16	69	1.22	54	9	.5	7.5	54	3.0	53	2	1	0	0
JULY	75.2	50.5	62.9	90+	72	16	35	53	6	0	0	0	0	.08	.61	70	.41	70	10	.0						0	0	0
AUG	74.3	49.1	61.7	86+	71	11	28	59	21	0	0	0	0	.09	.50	65	.41	67	26	.0						0	0	0
SEPT	69.2	45.0	57.1	87	55	5	26	52	11	0	0	1	0	.63	2.25	58	1.42	67	19	.2	4.0	65	2.0	65	19	1	1	0
OCT	59.8	38.4	49.1	79+	63	2	11	71	29	0	0	7	0	1.28	3.39	73	2.66	51	25	2.0	11.0	74	11.0	74	28	2	1	0
NOV	49.9	30.5	40.2	72	55	10	9+	58	17	0	1	17	0	4.93	13.99	65	3.88	71	12	19.0	57.0	72	36.0	72	17	5	3	2
DEC	44.5	25.7	35.1	70	58	4	-4	72	9	0	4	24	0	7.80	28.32	55	10.09	66	6	29.6	79.7	71	58.0	70	22	7	4	3
YEAR	56.5	35.2	45.9	90+	JUL 72	16	-4	DEC 72	9	0	17	157	0	42.41	JAN 38.18	69	DEC 10.09	66	6	198.9	MAR 168.0	52	MAR 179.0	69	13	49	23	14

HAIWEE, CA — 1951 - 1974 — 36° 08' N — 117° 57' W — 3825 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	50.5	28.8	39.7	78	69	8	9	74	3	0	1	23	0	1.16	6.01	69	2.13	52	16	3.1	25.5	74	22.0	74	8	2	1	0
FEB	56.4	32.3	44.4	75+	72	29	17+	72	4	0	0	13	0	.97	4.85	62	2.04	62	19	.3	5.0	62	4.0	62	20	2	1	0
MAR	61.6	36.0	48.9	81+	72	19	17	64	6	0	0	9	0	.63	3.53	52	1.05	52	16	1.6	29.5	52	11.0	52	9	1	1	0
APR	68.9	43.1	56.0	89	66	2	18	63	21	0	0	2	0	.40	2.65	65	1.13	36	13	.3	6.0	65	3.0	65	12	1	0	0
MAY	78.1	50.6	64.4	99	51	27	31	64	5	2	0	0	0	.19	.99	71	.68	71	7	.0						1	0	0
JUN	87.7	59.1	73.4	107	61	21	39	71	1	14	0	0	0	.10	.95	63	.46	63	12	.0						0	0	0
JULY	94.6	65.8	80.3	110+	72	16	51	63	29	27	0	0	0	.28	1.30	65	.64	68	28	.0						1	0	0
AUG	93.0	64.0	78.5	105	72	8	49	73	27	24	0	0	0	.26	1.42	63	1.18	63	8	.0						1	0	0
SEPT	86.5	57.3	72.0	101+	71	15	41+	71	28	11	0	0	0	.18	1.37	63	.64	63	19	.0						1	0	0
OCT	75.1	47.4	61.3	93	63	1	26+	71	31	1	0	1	0	.17	1.12	63	.82	63	18	.0						0	0	0
NOV	60.7	36.6	48.7	80	66	1	20+	58	18	0	0	8	0	.83	3.64	65	1.95	60	6	.3	5.0	52	3.0	52	16	2	0	0
DEC	51.8	29.8	40.8	78	64	24	11	70	20	0	0	21	0	.92	6.50	66	3.13	66	6	1.2	14.0	70	12.0	70	19	2	1	0
YEAR	72.1	45.9	59.0	110+	JUL 72	16	9	JAN 74	3	79	1	79	0	6.09	DEC 6.50	66	DEC 3.13	66	6	6.8	MAR 29.5	52	JAN 22.0	74	8	14	4	0

HAPPY CAMP RANGER STA, CA — 1951 - 1974 — 41° 48' N — 123° 22' W — 1150 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: .10 or MORE	.50 or MORE	1.00 or MORE
JAN	45.4	31.2	38.3	63	70	23	8	72	30	0	0	18	0	13.43	23.98	53	4.60	74	16	14.3	69.3	69	40.0	69	30	13	8	3
FEB	53.9	33.3	43.6	76+	68	29	15	62	27	0	0	14	0	7.36	21.88	58	4.32	58	21	3.3	15.0	56	25.0	69	1	9	5	2
MAR	60.0	33.9	47.0	85	60	25	22+	60	1	0	0	13	0	6.75	13.51	57	2.94	72	2	3.7	29.0	52	9.0	71	1	10	3	2
APR	68.5	37.1	52.8	93+	51	12	26+	68	21	0	0	6	0	2.88	9.36	63	2.25	74	1	.1	2.5	61	1.0	61	22	8	2	1
MAY	77.8	42.7	60.3	102	73	30	29	68	6	5	0	1	0	1.54	5.45	60	2.20	60	28	.0						4	1	0
JUN	86.2	48.5	67.4	111	61	16	34	54	1	12	0	0	0	.66	4.00	58	1.19	52	14	.0						2	0	0
JULY	95.9	52.2	74.1	110+	72	16	37	74	11	23	0	0	0	.24	1.21	65	.99	65	1	.0						1	0	0
AUG	94.2	51.1	72.7	111+	71	12	38	74	20	24	0	0	0	.45	2.66	68	1.48	68	28	.0						1	0	0
SEPT	87.8	45.6	66.7	110	55	3	31+	70	24	19	0	0	0	.87	3.59	57	2.26	57	27	.0						2	1	0
OCT	72.4	40.7	56.5	100+	71	9	18	74	26	2	0	3	0	3.71	11.48	62	3.15	73	22	.0						8	2	1
NOV	55.1	36.6	45.9	81	59	1	20	61	17	0	0	8	0	8.33	22.17	73	4.04	53	22	2.2	32.5	55	14.0	55	16	10	5	2
DEC	46.1	33.0	39.5	69	58	12	-2	72	10	0	0	15	0	12.00	30.39	64	5.25	64	22	9.4	35.0	70	18.0	70	5	13	8	5
YEAR	70.3	40.3	55.4	111+	AUG 71	12	-2	DEC 72	10	85	0	78	0	58.46	DEC 30.39	64	DEC 5.25	64	22	33.0	JAN 69.3	69	JAN 40.0	69	30	77	37	19

+ ALSO ON EARLIER DATES

MC CLOUD, CA — 1951 - 1974 — 41° 16' N — 122° 08' W — 3300 FT.

MONTH	TEMPERATURE (°F) MEANS DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX 90° AND ABOVE	MAX 32° AND BELOW	MIN 32° AND BELOW	MIN 0° AND BELOW	PRECIPITATION TOTALS (INCHES) MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS 10 or MORE	50 or MORE	1.00 or MORE
JAN	44.2	22.6	33.5	67+	71	27	-8	62	22	0	1	27	0	10.95	22.76	70	4.62	74	15	35.6	80.0	54	63.0	52	14	11	7	4
FEB	49.0	25.4	37.2	70	70	27	1	56	1	0	0	24	0	7.54	22.52	56	4.08	56	21	14.3	70.0	56	59.0	69	25	8	4	3
MAR	52.1	26.8	39.5	80	60	25	4	74	8	0	0	26	0	5.81	13.73	58	4.27	58	21	14.4	60.6	52	52.0	69	1	8	4	2
APR	60.4	30.2	45.3	86+	51	13	14	53	8	0	0	20	0	3.63	11.12	65	2.77	65	16	6.5	35.5	58	23.0	58	6	4	3	1
MAY	69.8	36.4	53.1	94	54	19	20+	64	6	1	0	9	0	2.20	7.02	57	2.80	60	24	.5	7.0	60	7.0	60	24	4	1	0
JUN	78.5	42.6	60.6	101+	74	30	24+	55	1	5	0	2	0	.95	4.55	58	1.44	58	2	.0						3	0	0
JULY	87.6	45.8	66.7	103	73	27	31	55	17	14	0	0	0	.27	2.75	58	.75	74	9	.0						1	0	0
AUG	86.1	44.2	65.1	107	72	8	28	51	31	12	0	0	0	.46	3.76	54	2.12	54	28	.0						1	0	0
SEPT	80.5	39.0	59.8	106	55	4	24	72	24	5	0	4	0	.92	7.65	57	4.45	57	27	.0						1	1	0
OCT	68.4	33.2	50.8	92+	52	3	14	55	31	0	0	14	0	3.01	12.57	62	3.69	62	12	.1	2.0	71	2.0	71	31	4	2	1
NOV	53.8	28.6	41.2	83	66	2	4	55	15	0	0	22	0	7.87	16.62	73	4.68	61	25	7.9	37.5	55	22.0	70	28	8	5	3
DEC	46.0	24.4	35.2	72	58	3	1	67	13	0	1	27	0	9.44	22.03	55	4.96	55	22	22.5	96.1	52	48.0	52	27	10	6	4
YEAR	64.7	33.3	49.0	107	AUG 72	8	-8	JAN 62	22	37	2	175	0	53.05	22.76	JAN 70	4.96	DEC 55	22	101.8	96.1	DEC 52	63.0	JAN 52	14	66	33	18

IMPERIAL, CA — 1951 - 1974 — 32° 51' N — 115° 34' W — -64 FT.

MONTH	TEMPERATURE (°F) MEANS DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX 90° AND ABOVE	MAX 32° AND BELOW	MIN 32° AND BELOW	MIN 0° AND BELOW	PRECIPITATION TOTALS (INCHES) MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS 10 or MORE	50 or MORE	1.00 or MORE
JAN	69.3	41.1	55.2	90	71	19	23+	71	7	0	0	2	0	.36	1.60	55	.74	62	24	.0						1	0	0
FEB	73.8	45.2	59.5	92	54	25	28	62	28	0	0	1	0	.16	1.24	56	.64	58	4	.0						1	0	0
MAR	78.4	49.4	63.9	98	71	30	32+	71	3	2	0	0	0	.18	.83	70	.61	70	1	.0						1	0	0
APR	85.1	55.2	70.2	103+	61	4	41+	56	2	10	0	0	0	.09	.72	65	.56	65	3	.0						0	0	0
MAY	93.2	61.9	77.5	111+	74	26	45	64	7	22	0	0	0	.01	.13	58	.13	58	10	.0						0	0	0
JUN	101.7	69.0	85.4	119	70	25	51	63	10	28	0	0	0	.00	.00	74	.00	74		.0						0	0	0
JULY	106.4	77.4	92.0	117	58	9	63+	51	3	31	0	0	0	.08	1.31	66	1.17	66	6	.0						0	0	0
AUG	104.9	77.6	91.2	117	69	4	60	56	3	31	0	0	0	.21	1.79	51	1.13	51	27	.0						1	0	0
SEPT	101.0	71.3	86.2	115	71	12	54	54	30	29	0	0	0	.20	1.31	67	1.14	67	2	.0						0	0	0
OCT	90.4	60.7	75.6	108	52	3	36	71	30	18	0	0	0	.23	2.04	57	1.44	72	6	.0						0	0	0
NOV	77.6	49.3	63.5	94+	67	1	32	56	17	1	0	0	0	.24	1.51	69	1.12	67	26	.0						0	0	0
DEC	69.6	41.9	55.8	90	58	3	26	53	25	0	0	1	0	.29	1.09	65	1.06	65	16	.0						1	0	0
YEAR	87.6	58.3	73.0	119	JUN 70	25	23+	JAN 71	7	172	0	4	0	2.07	2.04	OCT 57	1.44	OCT 72	6	.0	.0	00	.0	00		5	0	0

MODESTO, CA — 1951 - 1974 — 37° 39' N — 121° 00' W — 91 FT.

MONTH	TEMPERATURE (°F) MEANS DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX 90° AND ABOVE	MAX 32° AND BELOW	MIN 32° AND BELOW	MIN 0° AND BELOW	PRECIPITATION TOTALS (INCHES) MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS 10 or MORE	50 or MORE	1.00 or MORE
JAN	53.7	37.2	45.3	71+	70	16	22+	63	13	0	0	8	0	2.30	4.36	67	1.74	67	21	.1	1.5	62				6	1	0
FEB	60.7	40.3	50.3	75+	72	27	24	72	2	0	0	3	0	1.69	5.86	62	1.15	56	18	.0						4	1	0
MAR	66.5	41.8	54.2	89	60	20	27	71	2	0	0	1	0	1.49	4.02	56	1.45	58	15	.0						4	1	0
APR	73.1	45.6	59.4	94+	62	23	34	65	11	1	0	0	0	1.27	4.69	58	2.01	58	2	.0						3	1	0
MAY	80.7	50.3	65.3	103	70	16	37	64	4	3	0	0	0	.30	1.43	57	.82	58	22	.0						1	0	0
JUN	88.2	55.3	71.8	112	61	15	42	66	2	13	0	0	0	.06	.46	67	.35	53	6	.0						0	0	0
JULY	94.6	58.9	76.8	111	72	14	47	64	4	25	0	0	0	.05	.69	74	.65	74	9	.0						0	0	0
AUG	92.6	58.0	75.3	106	71	10	46	57	30	22	0	0	0	.04	.74	65	.48	65	11	.0						0	0	0
SEPT	87.7	54.9	71.3	106	55	2	43+	65	20	12	0	0	0	.16	2.08	59	1.66	59	18	.0						0	0	0
OCT	77.9	48.6	63.3	98+	61	15	32	66	14	3	0	0	0	.59	2.43	73	1.75	73	7	.0						1	0	0
NOV	64.2	41.4	52.8	85	66	1	25	61	17	0	0	2	0	1.66	6.03	70	2.25	70	28	.0						4	1	0
DEC	53.7	37.4	45.5	73	58	4	22+	72	11	0	0	6	0	2.17	6.34	55	1.30	74	3	.0	.3	72				5	1	0
YEAR	74.5	47.5	61.0	112	JUN 61	13	22+	DEC 72	11	81	0	22	0	11.80	6.34	DEC 55	2.25	NOV 70	28	.1	1.5	JAN 62	.0	00		28	6	0

LOS BANOS, CA — 1951 - 1974 — 37° 03' N — 120° 52' W — 120 FT.

MONTH	TEMPERATURE (°F) MEANS DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX 90° AND ABOVE	MAX 32° AND BELOW	MIN 32° AND BELOW	MIN 0° AND BELOW	PRECIPITATION TOTALS (INCHES) MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS 10 or MORE	50 or MORE	1.00 or MORE
JAN	54.9	35.9	45.4	74	53	9	19+	63	13	0	0	11	0	1.77	4.68	69	1.21	69	19	.1	1.5	62	1.0	62	22	5	1	0
FEB	62.2	38.9	50.6	79	68	29	24+	72	2	0	0	6	0	1.47	5.26	62	1.88	58	19	.0						4	1	0
MAR	68.1	40.8	54.5	89	68	30	24	71	2	0	0	2	0	1.00	4.04	56	1.35	38	16	.0						3	0	0
APR	75.1	44.9	60.0	96	54	17	30	53	9	2	0	0	0	.87	3.03	67	.96	52	10	.0						2	0	0
MAY	82.7	50.3	66.3	106	51	26	35	64	4	7	0	0	0	.23	1.16	57	.63	71	28	.0						1	0	0
JUN	90.3	55.6	73.0	112	61	15	39	52	12	16	0	0	0	.04	.39	64	.36	64	9	.0						0	0	0
JULY	97.5	59.4	78.3	112+	61	11	46	51	4	28	0	0	0	.03	.43	74	.43	74	10	.0						0	0	0
AUG	95.8	58.4	77.1	108+	60	12	46	53	26	27	0	0	0	.01	.28	65	.16	65	12	.0						0	0	0
SEPT	90.5	54.8	72.7	110	55	3	42+	71	28	17	0	0	0	.18	1.49	69	1.17	69	7	.0						0	0	0
OCT	80.0	48.0	64.0	100+	61	15	28	71	30	4	0	0	0	.47	2.69	64	1.36	64	30	.0						1	0	0
NOV	65.7	40.5	53.1	85	56	10	24+	58	17	0	0	4	0	1.33	4.99	72	1.73	65	17	.0						3	1	0
DEC	54.9	36.3	45.6	74+	58	4	21	56	22	0	0	10	0	1.58	5.47	55	1.60	55	24	.0						4	1	0
YEAR	76.5	47.0	61.8	112+	JUL 61	11	19+	JAN 63	13	101	0	33	0	8.98	5.47	DEC 55	1.88	FEB 58	19	.1	1.5	JAN 62	1.0	JAN 62	22	23	4	0

NEEDLES FAA AIRPORT, CA — 1951 - 1974 — 34° 46' N — 114° 37' W — 913 FT.

MONTH	TEMPERATURE (°F) MEANS DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX 90° AND ABOVE	MAX 32° AND BELOW	MIN 32° AND BELOW	MIN 0° AND BELOW	PRECIPITATION TOTALS (INCHES) MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS 10 or MORE	50 or MORE	1.00 or MORE
JAN	62.9	40.7	51.8	85	71	20	23+	70	4	0	0	3	0	.37	1.92	55	.65	55	16	.0						1	0	0
FEB	69.0	44.7	56.9	88	72	28	26	62	28	0	0	1	0	.31	1.02	58	.64	66	8	.0						1	0	0
MAR	75.3	49.1	62.2	95+	72	10	30	62	1	2	0	0	0	.36	1.69	54	1.15	65	11	.0						1	0	0
APR	83.6	56.6	70.1	104	61	4	39+	53	9	8	0	0	0	.23	2.61	65	1.65	65	3	.0						1	0	0
MAY	93.4	66.0	79.7	115	68	28	44	64	8	22	0	0	0	.06	.66	58	.64	58	11	.0						0	0	0
JUN	103.3	75.2	89.3	121+	70	26	56	35	1	28	0	0	0	.03	.41	72	.23	72	6	.0						0	0	0
JULY	108.6	83.0	95.8	122	67	2	63	54	12	31	0	0	0	.45	2.21	74	2.11	74	19	.0						1	0	0
AUG	105.8	81.1	93.5	119+	69	3	62	57	31	31	0	0	0	.73	4.20	51	2.55	51	28	.0						3	0	0
SEPT	100.3	73.3	86.8	115	71	12	53	65	20	28	0	0	0	.27	1.99	69	1.03	63	17	.0						1	0	0
OCT	87.6	60.9	74.3	107	63	3	34	71	30	15	0	0	0	.33	1.65	63	1.08	63	18	.0						1	0	0
NOV	72.3	49.0	60.7	90+	67	1	30+	53	21	0	0	0	0	.38	1.72	65	.76	60	5	.0						1	0	0
DEC	63.0	41.6	52.3	81+	58	3	23	68	22	0	0	2	0	.43	2.45	65	.85	65	9	.0						1	0	0
YEAR	85.4	60.1	72.8	122	JUL 67	2	23+	DEC 68	22	165	0	6	0	3.97	4.20	AUG 51	2.55	AUG 51	28	.0	.0	00	.0	00		11	0	0

MARYSVILLE, CA — 1951 - 1974 — 39° 09' N — 121° 35' W — 60 FT.

MONTH	TEMPERATURE (°F) MEANS DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX 90° AND ABOVE	MAX 32° AND BELOW	MIN 32° AND BELOW	MIN 0° AND BELOW	PRECIPITATION TOTALS (INCHES) MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS 10 or MORE	50 or MORE	1.00 or MORE
JAN	53.5	37.3	45.4	76	62	9	20	68	3	0	0	8	0	4.75	9.47	52	2.76	64	20	.0						8	3	1
FEB	60.3	40.9	50.8	78	68	28	27+	71	3	0	0	1	0	3.11	8.08	58	1.78	73	28	.0						6	2	1
MAR	66.0	42.9	54.5	86+	72	18	26	71	2	0	0	1	0	2.29	4.98	74	1.78	63	28	.0						5	1	0
APR	73.2	46.9	60.1	94	51	11	32+	67	1	1	0	0	0	1.71	4.71	63	1.76	63	14	.0						4	1	0
MAY	81.5	52.6	67.1	104	73	30	38+	74	19	6	0	0	0	.45	1.49	57	.75	56	4	.0						2	0	0
JUN	89.9	58.0	74.0	113	61	16	45+	66	2	16	0	0	0	.28	1.20	58	1.10	58	13	.0						1	0	0
JULY	96.8	60.9	78.9	111+	72	15	43	56	2	27	0	0	0	.07	1.68	74	1.45	74	8	.0						0	0	0
AUG	95.1	59.7	77.4	109+	71	11	49	66	31	25	0	0	0	.08	1.00	65	.93	65	12	.0						0	0	0
SEPT	90.1	56.4	73.3	110	55	5	43+	72	25	17	0	0	0	.31	1.68	59	1.64	59	18	.0						1	0	0
OCT	79.2	50.0	64.6	100+	58	3	34	71	29	4	0	0	0	1.40	9.31	62	4.24	62	13	.0						2	1	0
NOV	64.8	42.6	53.7	89	55	10	27	58	17	0	0	1	0	2.95	7.38	73	2.36	70	29	.0						5	2	1
DEC	54.3	37.8	46.1	79	53	28	20	72	9	0	0	7	0	3.36	11.30	55	2.27	55	19	.0	.5	72	1.0	72	13	7	3	1
YEAR	75.4	48.8	62.2	113	JUN 61	16	20+	DEC 72	9	96	0	18	0	20.96	11.30	DEC 55	4.24	OCT 62	13	.0	.5	DEC 72	1.0	DEC 72	13	41	13	4

+ ALSO ON EARLIER DATES

PASO ROBLES, CA — 1951 - 1974 — 35° 38' N — 120° 41' W — 700 FT.

MONTH	TEMPERATURE (°F)													PRECIPITATION TOTALS (INCHES)														
	MEANS			EXTREMES						MEAN NUMBER OF DAYS										SNOW, SLEET						MEAN NUMBER OF DAYS		
										MAX		MIN																
	DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	90° AND ABOVE	32° AND BELOW	32° AND BELOW	0° AND BELOW	MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	10 or MORE	50 or MORE	1.00 or MORE
JAN	60.7	32.8	46.8	78	53	31	11	60	2	0	0	17	0	3.49	13.43	69	4.15	69	19	.0						5	2	1
FEB	65.0	36.0	50.5	83	53	27	18	53	20	0	0	11	0	2.31	9.12	69	2.93	69	24	.0						4	2	1
MAR	68.0	37.2	52.6	91	72	16	20	71	2	0	0	8	0	1.65	6.35	58	1.74	52	13	.0						3	1	0
APR	73.6	39.5	56.6	98	54	17	25	53	9	1	0	3	0	1.37	5.22	58	1.73	58	1	.0						3	1	0
MAY	79.9	43.2	61.6	103+	74	26	30+	68	8	5	0	1	0	.25	1.45	56	1.23	56	8	.0						1	0	0
JUN	87.0	47.3	67.1	111	57	24	31	73	15	13	0	0	0	.03	.37	57	.23	57	9	.0						0	0	0
JULY	93.9	50.1	72.0	113	60	20	37	56	15	23	0	0	0	.02	.25	69	.25	69	13	.0						0	0	0
AUG	93.6	49.6	71.6	108	69	3	37+	68	26	23	0	0	0	.03	.38	58	.33	58	16	.0						0	0	0
SEPT	88.9	48.5	68.2	111+	55	1	33+	70	14	17	0	0	0	.13	1.20	58	.75	58	7	.0						0	0	0
OCT	81.6	40.8	61.3	105	52	1	19	71	30	6	0	3	0	.44	1.83	68	.95	72	15	.0						1	0	0
NOV	69.2	35.4	52.3	95	65	1	14	58	17	0	0	12	0	1.86	6.43	65	2.36	63	20	.0						4	1	0
DEC	61.7	31.9	46.8	87	58	4	15+	74	24	0	0	18	0	2.62	8.60	66	5.25	66	6	.0						4	2	1
YEAR	77.0	40.9	59.0	113	JUL 60	20	11	JAN 60	2	86	0	73	0	14.22	13.43	JAN 69	5.25	DEC 66	6	.0	.0	00	.0	00		25	9	3

ORLAND, CA — 1951 - 1974 — 39° 45' N — 122° 12' W — 254 FT.

MONTH	TEMPERATURE (°F)													PRECIPITATION TOTALS (INCHES)														
	MEANS			EXTREMES						MEAN NUMBER OF DAYS										SNOW, SLEET						MEAN NUMBER OF DAYS		
										MAX		MIN																
	DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	90° AND ABOVE	32° AND BELOW	32° AND BELOW	0° AND BELOW	MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	10 or MORE	50 or MORE	1.00 or MORE
JAN	53.0	35.3	44.2	78	62	9	20	73	7	0	0	12	0	4.37	8.51	70	2.39	69	13	.3	5.0	73	3.0	73	8	7	3	1
FEB	59.6	38.8	49.3	80	68	28	23+	57	4	0	0	4	0	2.95	11.90	58	3.20	59	16	.0						5	2	1
MAR	64.7	41.0	52.8	89	60	24	24	66	3	0	0	2	0	1.64	3.93	56	1.61	52	15	.0						5	1	0
APR	72.2	45.4	58.8	95	51	9	26	55	2	1	0	1	0	1.32	3.87	63	1.59	53	27	.0						3	1	0
MAY	81.1	51.8	66.5	102	73	29	34	64	2	7	0	0	0	.53	1.60	56	.67	58	12	.0						2	0	0
JUN	89.5	58.6	74.1	114	61	16	42	52	12	15	0	0	0	.37	1.41	67	.67	67	2	.0						1	0	0
JULY	96.4	61.4	78.9	115+	72	16	49+	73	21	27	0	0	0	.11	1.32	74	.74	74	6	.0						0	0	0
AUG	94.6	59.4	77.0	117	71	11	49+	73	23	25	0	0	0	.20	1.88	68	1.76	68	21	.0						0	0	0
SEPT	89.7	55.7	72.8	110	53	10	39	71	30	16	0	0	0	.35	2.71	57	1.68	57	27	.0						1	0	0
OCT	78.5	48.8	63.7	101	70	2	32	56	31	4	0	0	0	1.13	5.22	57	2.11	62	12	.0						2	1	0
NOV	63.8	41.4	52.6	93	66	1	25	52	28	0	0	3	0	3.18	7.14	73	2.76	54	9	.0						5	2	1
DEC	53.8	36.3	45.0	77+	67	28	18	65	21	0	0	9	0	3.61	11.95	52	2.20	55	19	.1	2.0	72	2.0	72	13	8	2	1
YEAR	74.7	47.8	61.3	117	AUG 71	11	18	DEC 65	21	95	0	31	0	19.96	11.95	DEC 52	3.20	FEB 59	16	.4	5.0	JAN 73	3.0	JAN 73	8	37	12	4

PORTERVILLE, CA — 1951 - 1974 — 36° 04' N — 119° 01' W — 393 FT.

MONTH	TEMPERATURE (°F)													PRECIPITATION TOTALS (INCHES)														
	MEANS			EXTREMES						MEAN NUMBER OF DAYS										SNOW, SLEET						MEAN NUMBER OF DAYS		
										MAX		MIN																
	DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	90° AND ABOVE	32° AND BELOW	32° AND BELOW	0° AND BELOW	MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	10 or MORE	50 or MORE	1.00 or MORE
JAN	56.3	35.8	46.1	77	74	16	21+	63	14	0	0	10	0	2.17	7.92	69	1.82	69	20	.2	5.0	62	3.0	62	21	5	1	0
FEB	62.6	39.5	51.2	79+	63	8	24	62	27	0	0	4	0	1.61	6.55	62	2.72	69	25	.0						4	1	0
MAR	68.5	42.3	55.4	91	68	30	28+	71	2	0	0	1	0	1.53	5.30	52	1.04	52	16	.0						4	1	0
APR	75.4	46.8	61.1	97	65	30	29	53	9	2	0	0	0	1.30	4.76	67	1.23	51	29	.0						3	1	0
MAY	83.8	52.6	68.2	106	51	27	37+	65	6	9	0	0	0	.46	2.93	71	1.83	71	27	.0						1	0	0
JUN	91.9	58.8	75.4	112+	61	22	30	71	1	18	0	0	0	.06	.46	63	.24	63	11	.0						0	0	0
JULY	98.6	64.5	81.6	115	72	16	48	55	6	29	0	0	0	.01	.10	65	.08	65	31	.0						0	0	0
AUG	96.9	62.5	79.7	109	71	12	46	68	25	28	0	0	0	.01	.13	63	.13	63	8	.0						0	0	0
SEPT	91.7	56.9	74.3	109	55	3	37	68	21	20	0	0	0	.16	1.06	58	.69	67	19	.0						0	0	0
OCT	81.4	45.1	63.3	100	54	16	33+	61	30	6	0	0	0	.62	2.55	72	2.13	72	19	.0						1	1	0
NOV	67.4	41.3	54.4	88	66	2	27+	64	20	0	0	2	0	1.31	3.50	60	1.61	70	26	.0						3	1	0
DEC	56.2	36.1	46.1	78	62	15	20	62	26	0	0	9	0	1.72	5.60	66	2.34	66	6	.0						4	1	0
YEAR	77.6	48.8	63.2	113	JUL 72	16	20	DEC 62	26	112	0	26	0	11.16	7.92	JAN 69	2.72	FEB 69	25	.2	5.0	JAN 62	3.0	JAN 62	21	35	7	0

ORLEANS, CA — 1951 - 1974 — 41° 18' N — 123° 32' W — 403 FT.

MONTH	TEMPERATURE (°F)													PRECIPITATION TOTALS (INCHES)														
	MEANS			EXTREMES						MEAN NUMBER OF DAYS										SNOW, SLEET						MEAN NUMBER OF DAYS		
										MAX		MIN																
	DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	90° AND ABOVE	32° AND BELOW	32° AND BELOW	0° AND BELOW	MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	10 or MORE	50 or MORE	1.00 or MORE
JAN	49.2	34.8	41.9	67+	74	15	18+	63	13	0	0	11	0	11.35	22.48	70	4.20	53	17	1.8	13.5	58	3.0	71	13	13	8	4
FEB	56.2	37.0	46.6	71+	73	21	18	62	27	0	0	8	0	6.96	18.18	58	6.80	58	20	1.0	10.5	59	9.0	59	10	10	5	2
MAR	61.4	37.5	49.5	85	60	24	22	53	2	0	0	6	0	6.61	13.51	57	5.00	72	2	.5	5.0	51	4.0	51	4	10	5	2
APR	69.4	39.8	54.6	93+	54	16	29+	72	18	1	0	2	0	3.05	9.78	63	2.13	74	1	.0						7	2	1
MAY	76.9	44.4	60.7	88	73	28	29	54	1	4	0	0	0	1.88	7.41	53	1.66	60	25	.0						5	1	0
JUN	85.2	48.7	67.0	111	66	14	33	54	1	11	0	0	0	.65	2.44	52	.98	71	25	.0						2	0	0
JULY	94.4	52.7	73.6	112	72	13	40+	55	6	23	0	0	0	.13	.70	56	.41	52	31	.0						1	0	0
AUG	93.2	52.7	72.9	115	58	7	40+	63	14	22	0	0	0	.45	3.46	68	1.45	62	7	.0						1	0	0
SEPT	88.0	48.1	68.1	113	55	3	35+	58	24	14	0	0	0	.91	3.61	73	2.00	57	27	.0						2	1	0
OCT	72.4	44.1	58.2	96	58	1	24	71	29	1	0	1	0	3.64	11.55	62	3.23	62	9	.0						5	3	1
NOV	57.1	40.3	48.7	75+	66	2	20	52	24	0	0	4	0	8.42	22.20	73	4.10	63	8	.8	16.0	55	8.0	55	15	11	8	3
DEC	49.7	35.8	42.8	66	64	22	7	72	10	0	0	9	0	11.06	28.84	64	7.38	64	22	1.7	17.0	72	13.0	72	12	13	8	4
YEAR	71.1	43.0	57.1	115	AUG 58	7	7	DEC 72	10	76	0	41	0	55.31	28.84	DEC 64	7.38	DEC 64	22	5.8	17.0	DEC 72	13.0	DEC 72	12	80	39	17

QUINCY, CA — 1951 - 1974 — 39° 55' N — 120° 57' W — 3408 FT.

MONTH	TEMPERATURE (°F)													PRECIPITATION TOTALS (INCHES)														
	MEANS			EXTREMES						MEAN NUMBER OF DAYS										SNOW, SLEET						MEAN NUMBER OF DAYS		
										MAX		MIN																
	DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	90° AND ABOVE	32° AND BELOW	32° AND BELOW	0° AND BELOW	MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	10 or MORE	50 or MORE	1.00 or MORE
JAN	45.3	22.6	33.9	67	62	9	-6	62	22	0	1	26	1	9.30	22.77	69	4.51	69	21	19.9	90.3	52	53.0	52	19	10	6	3
FEB	51.9	25.6	38.8	72	53	27	-7	62	27	0	0	22	0	5.91	17.15	62	4.68	62	10	10.9	38.5	69	34.0	52	20	7	4	2
MAR	57.1	27.5	42.3	83	66	31	0+	55	1	0	0	25	0	5.15	16.20	74	3.58	71	26	9.2	45.0	67	28.0	52	20	8	3	1
APR	64.5	30.8	47.7	86	61	3	16	53	7	0	0	20	0	3.07	9.28	63	2.66	65	16	3.5	14.0	53	10.0	67	18	6	2	1
MAY	73.7	36.5	55.1	95+	67	22	32+	64	6	2	0	8	0	1.63	5.43	57	2.10	56	4	.5	6.0	64	2.0	64	3	4	1	0
JUN	82.5	41.6	62.1	104+	61	21	25	55	1	8	0	2	0	.77	3.05	67	1.14	69	18	.0	1.0	67	1.0	67	1	2	0	0
JULY	91.3	42.8	67.1	106	60	19	29+	55	5	20	0	1	0	.18	1.88	74	1.10	74	8	.0						1	0	0
AUG	90.0	40.2	65.1	108+	71	11	25+	55	26	18	0	3	0	.35	3.47	65	2.22	65	12	.0						1	0	0
SEPT	84.7	35.3	60.0	105	55	3	15	72	28	10	0	10	0	.62	3.73	59	2.18	59	18	.0						1	0	0
OCT	72.2	30.5	51.4	95	70	3	15	71	29	1	0	19	0	2.65	17.05	62	6.10	62	13	.0						3	1	1
NOV	55.5	27.7	41.6	83	65	1	7	61	17	0	0	22	0	5.38	18.70	73	4.29	73	11	2.3	14.0	55	6.0	67	30	7	4	2
DEC	45.5	23.9	34.7	64	59	3	-24	72	12	0	1	27	0	7.90	25.57	55	5.33	64	22	11.8	49.5	71	30.0	72	8	8	5	3
YEAR	67.9	32.1	50.0	108+	AUG 71	11	-24	DEC 72	12	59	2	185	1	43.31	25.57	DEC 55	6.10	OCT 62	13	58.1	90.3	JAN 52	53.0	JAN 52	19	58	26	13

PARKER RESERVOIR, CA — 1951 - 1974 — 34° 17' N — 114° 10' W — 738 FT.

MONTH	TEMPERATURE (°F)													PRECIPITATION TOTALS (INCHES)														
	MEANS			EXTREMES						MEAN NUMBER OF DAYS										SNOW, SLEET						MEAN NUMBER OF DAYS		
										MAX		MIN																
	DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	90° AND ABOVE	32° AND BELOW	32° AND BELOW	0° AND BELOW	MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	10 or MORE	50 or MORE	1.00 or MORE
JAN	64.1	42.2	53.2	88	71	21	27+	71	8	0	0	1	0	.50	1.68	54	.71	51	30	.0						1	0	0
FEB	69.8	46.6	58.2	88+	72	29	30	56	3	0	0	0	0	.36	1.45	58	1.20	65	7	.0						1	0	0
MAR	75.4	51.9	63.7	96+	71	31	34	56	13	2	0	0	0	.50	2.15	73	1.29	70	1	.0						2	0	0
APR	83.7	59.1	71.4	103	62	15	41	65	11	8	0	0	0	.22	1.75	65	.92	65	4	.0						1	0	0
MAY	92.9	67.3	80.1	114	51	27	45	64	5	22	0	0	0	.07	.75	51	.63	51	15	.0						0	0	0
JUN	102.3	76.0	89.2	122	70	26	58+	62	15	28	0	0	0	.07	1.30	72	.65	72	8	.0						0	0	0
JULY	107.8	83.3	95.6	121+	60	17	70+	73	29	31	0	0	0	.23	1.02	53	.98	53	18	.0						1	0	0
AUG	105.8	82.1	94.0	118	72	1	64	51	27	31	0	0	0	.60	4.68	51	3.05	51	29	.0						1	0	0
SEPT	101.1	75.6	88.3	116	71	13	57	65	20	28	0	0	0	.39	1.40	60	1.20	59	13	.0						1	0	0
OCT	89.4	64.3	76.9	108+	64	7	40	71	30	18	0	0	0	.38	1.92	72	.93	58	25	.0						1	0	0
NOV	74.1	51.4	62.8	94+	65	2	35	53	21	1	0	0	0	.50	2.08	65	1.60	65	23	.0						1	0	0
DEC	64.7	43.3	54.0	83	58	4	28	72	12	0	0	0	0	.55	2.79	65	1.48	65	10	.0						1	0	0
YEAR	85.9	61.0	74.0	122	JUN 70	26	27+	JAN 71	8	169	0	1	0	4.37	4.68	AUG 51	3.05	AUG 51	29	.0	.0	00	.0	00		11	0	0

+ ALSO ON EARLIER DATES

SANTA ROSA, CA — 1951 - 1974 — 38° 27' N — 122° 42' W — 167 FT.

MONTH	Temp. (°F) Means: Daily Maximum	Daily Minimum	Monthly	Extremes: Record Highest	Year	Day	Record Lowest	Year	Day	Mean No. of Days Max: 90° and Above	Max: 32° and Below	Min: 32° and Below	Min: 0° and Below	Precipitation Totals (Inches): Mean	Greatest Monthly	Year	Greatest Daily	Year	Day	Snow, Sleet: Mean	Maximum Monthly	Year	Greatest Depth	Year	Day	Mean No. of Days: .10 or More	.50 or More	1.00 or More
JAN	50.7	35.0	46.3	85	62	9	21	63	14	0	0	12	0	7.38	15.89	70	5.04	66	5	.0						10	5	2
FEB	62.4	38.3	50.4	83	64	20	23	62	26	0	0	7	0	4.21	11.94	58	4.00	60	8	.0						7	3	1
MAR	65.5	38.5	52.0	88	52	25	26*	66	4	0	0	5	0	3.38	6.87	58	2.21	63	28	.0						7	2	1
APR	69.8	41.1	55.5	95	65	27	29	53	8	0	0	1	0	2.36	6.72	67	2.57	53	27	.3	6.5	63	7.0	63	26	5	2	0
MAY	74.7	45.2	60.0	99	70	31	34	58	3	2	0	0	0	.53	3.93	57	1.39	57	18	.0						2	0	0
JUN	80.6	49.2	64.9	109	60	3	37	52	12	5	0	0	0	.30	1.94	67	1.65	67	2	.0						1	0	0
JULY	84.2	50.3	67.3	110	72	14	41	55	5	6	0	0	0	.07	1.61	74	1.33	74	8	.0						0	0	0
AUG	84.7	50.5	67.6	104*	70	9	41*	55	25	8	0	0	0	.17	1.68	68	1.37	68	21	.0						0	0	0
SEPT	84.1	49.3	66.7	110*	71	14	37*	65	22	8	0	0	0	.30	3.16	59	2.82	59	18	.0						1	0	0
OCT	77.5	45.0	61.3	102*	70	1	30	70	27	4	0	0	0	1.87	9.47	62	4.67	62	12	.0						5	1	1
NOV	65.9	38.8	52.9	92	67	2	23	61	17	0	0	4	0	4.13	13.23	73	2.77	54	9	.0						7	3	1
DEC	57.2	36.7	47.0	83	67	26	16	72	9	0	0	10	0	5.91	17.89	55	3.80	55	22	.0						9	4	2
YEAR	71.9	43.3	57.7	110+	71	SEP 14	16	72	DEC 9	33	0	39	0	30.72	17.89	DEC 55	5.04	JAN 66	5	.3	6.5	APR 63	7.0	APR 63	26	52	30	8

RANDSBURG, CA — 1951 - 1974 — 35° 22' N — 117° 39' W — 3570 FT.

MONTH	Temp. (°F) Means: Daily Maximum	Daily Minimum	Monthly	Extremes: Record Highest	Year	Day	Record Lowest	Year	Day	Mean No. of Days Max: 90° and Above	Max: 32° and Below	Min: 32° and Below	Min: 0° and Below	Precipitation Totals (Inches): Mean	Greatest Monthly	Year	Greatest Daily	Year	Day	Snow, Sleet: Mean	Maximum Monthly	Year	Greatest Depth	Year	Day	Mean No. of Days: .10 or More	.50 or More	1.00 or More
JAN	53.6	35.5	44.6	75*	71	20	13	63	13	0	0	10	0	1.06	4.02	69	1.51	54	19	1.4	8.3	55	7.0	62	22	2	1	0
FEB	58.6	38.4	48.5	77*	63	7	19*	62	27	0	0	5	0	.91	4.76	69	1.48	69	25	.2	2.0	62	1.0	69	24	2	1	0
MAR	63.7	40.4	52.1	88	66	31	17	73	27	0	0	4	0	.52	2.30	52	1.04	52	7	.8	6.0	52	5.0	52	7	2	0	0
APR	71.4	46.1	58.8	93	61	3	39*	67	1	0	0	1	0	.41	2.73	65	.91	65	4	.1	1.0	65	1.0	67	16	1	0	0
MAY	81.4	53.3	67.4	105	51	26	30	65	7	6	0	0	0	.07	.74	51	.74	51	14	.0						0	0	0
JUN	91.4	61.7	76.6	111	73	8	40*	71	1	19	0	0	0	.03	.22	63	.17	65	16	.0						0	0	0
JULY	99.0	68.9	84.0	111*	72	15	51	72	21	30	0	0	0	.13	.87	74	.87	74	23	.0						0	0	0
AUG	97.0	67.2	82.1	108	71	13	49	59	20	28	0	0	0	.13	.60	63	.49	68	7	.0						1	0	0
SEPT	89.5	61.7	75.6	106	55	4	42	64	7	16	0	0	0	.17	1.17	63	.55	59	13	.0						1	0	0
OCT	76.9	53.0	65.0	95*	64	5	27	71	29	2	0	0	0	.23	1.60	63	1.11	63	18	.0						1	0	0
NOV	62.5	42.5	52.5	81*	69	4	21*	58	17	0	0	3	0	.71	5.62	65	1.20	65	17	.2	2.5	64	3.0	64	17	2	1	0
DEC	54.2	36.3	45.2	77	58	4	14	72	11	0	0	8	0	.69	2.70	65	2.13	65	30	.6	8.2	67	7.0	67	16	2	0	0
YEAR	74.9	50.4	62.7	111*	72	JUL 15	13	63	JAN 13	101	0	31	0	5.06	4.76	FEB 69	2.13	DEC 65	30	3.3	8.3	JAN 55	7.0	DEC 67	16	14	3	0

SCOTIA, CA — 1951 - 1974 — 40° 29' N — 124° 06' W — 139 FT.

MONTH	Temp. (°F) Means: Daily Maximum	Daily Minimum	Monthly	Extremes: Record Highest	Year	Day	Record Lowest	Year	Day	Mean No. of Days Max: 90° and Above	Max: 32° and Below	Min: 32° and Below	Min: 0° and Below	Precipitation Totals (Inches): Mean	Greatest Monthly	Year	Greatest Daily	Year	Day	Snow, Sleet: Mean	Maximum Monthly	Year	Greatest Depth	Year	Day	Mean No. of Days: .10 or More	.50 or More	1.00 or More
JAN	53.8	38.3	46.6	70	62	31	23	62	22	0	0	5	0	10.75	19.75	58	4.36	58	8	.1	1.3	62	1.0	72	25	13	7	4
FEB	56.9	40.6	48.8	79	64	21	25	62	27	0	0	2	0	7.54	21.54	58	4.23	58	15	.0	.3	62				10	5	2
MAR	56.9	40.8	48.9	85	55	9	29*	71	2	0	0	2	0	6.23	12.42	67	2.21	67	16	.0	.1	66				11	4	1
APR	58.6	43.0	50.8	89*	66	4	32	71	21	0	0	0	0	3.45	12.38	63	2.76	65	15	.0						7	2	1
MAY	62.1	46.9	54.5	91	56	17	35	54	1	0	0	0	0	1.47	5.01	53	1.44	60	26	.0						4	1	0
JUN	65.5	50.1	57.8	98	70	1	40	66	3	0	0	0	0	.54	1.83	58	1.05	58	9	.0						2	0	0
JULY	68.0	51.7	59.9	87	74	26	41	62	20	0	0	0	0	.05	.16	64	.08	74	10	.0						0	0	0
AUG	69.5	53.3	61.0	96	68	31	41	57	31	0	0	0	0	.30	1.74	54	1.01	54	29	.0						1	0	0
SEPT	70.3	50.3	60.3	98	64	25	38*	70	14	0	0	0	0	.76	2.88	57	2.01	57	27	.0						1	0	0
OCT	66.4	47.1	56.8	93	52	2	38	71	29	0	0	0	0	2.77	9.14	62	2.23	56	30	.0						5	2	1
NOV	59.9	44.0	52.0	80	66	1	38	58	16	0	0	1	0	7.43	21.53	73	4.12	71	10	.0						10	5	3
DEC	54.6	40.8	47.5	75	65	31	19	72	9	0	0	3	0	9.76	22.88	55	5.39	55	22	.1	2.5	72	1.0	72	8	12	6	3
YEAR	61.0	45.5	53.7	98*	64	SEP 25	19	72	DEC 9	0	0	13	0	51.04	22.88	DEC 55	5.39	DEC 55	22	.2	2.5	DEC 72	1.0	DEC 72	8	76	32	15

SANTA BARBARA FAA AP, CA — 1951 - 1974 — 34° 26' N — 119° 50' W — 9 FT.

MONTH	Temp. (°F) Means: Daily Maximum	Daily Minimum	Monthly	Extremes: Record Highest	Year	Day	Record Lowest	Year	Day	Mean No. of Days Max: 90° and Above	Max: 32° and Below	Min: 32° and Below	Min: 0° and Below	Precipitation Totals (Inches): Mean	Greatest Monthly	Year	Greatest Daily	Year	Day	Snow, Sleet: Mean	Maximum Monthly	Year	Greatest Depth	Year	Day	Mean No. of Days: .10 or More	.50 or More	1.00 or More
JAN	63.0	40.3	51.6	86	62	7	26	63	13	0	0	2	0	3.81	12.25	69	4.03	67	24	.0						3	2	1
FEB	64.4	42.6	53.5	85	53	6	30*	72	3	0	0	0	0	2.97	13.62	62	2.91	63	9	.0						4	3	1
MAR	65.0	44.0	54.5	94	72	4	30	66	3	0	0	0	0	1.97	6.70	52	3.09	68	7	.0						5	1	1
APR	66.7	47.1	56.9	95	66	15	36	60	24	0	0	0	0	1.50	9.79	65	1.70	60	26	.0						5	1	0
MAY	68.5	49.9	59.2	101	68	26	39*	60	23	0	0	0	0	.18	1.11	71	.92	57	18	.0						0	0	0
JUN	70.8	55.2	62.0	98	62	25	41	55	1	0	0	0	0	.02	.31	63	.25	63	11	.0						0	0	0
JULY	73.7	56.8	65.3	101	54	7	46	55	4	0	0	0	0	.00	.04	71	.03	69	12	.0						0	0	0
AUG	74.8	58.0	66.4	105	72	22	49*	60	31	0	0	0	0	.01	.18	63	.18	63	8	.0						0	0	0
SEPT	74.9	55.6	65.3	103	63	26	44	55	29	1	0	0	0	.07	.92	63	.48	58	7	.0						0	0	0
OCT	72.6	50.5	61.6	100	61	14	31	71	29	1	0	0	0	.30	1.49	68	.70	68	14	.0						1	0	0
NOV	68.7	44.6	56.7	96	56	8	30	58	17	0	0	0	0	2.22	6.92	65	2.46	66	7	.0						3	2	1
DEC	64.5	40.9	52.4	89	58	3	25	67	14	0	0	2	0	2.51	5.86	55	2.58	74	3	.0						4	2	1
YEAR	69.0	48.6	58.8	105	72	AUG 22	25	67	DEC 14	2	0	4	0	15.57	13.62	FEB 62	4.03	JAN 67	24	.0	.0	00	.0	00		23	10	5

TWENTYNINE PALMS, CA — 1951 - 1974 — 34° 08' N — 116° 02' W — 1975 FT.

MONTH	Temp. (°F) Means: Daily Maximum	Daily Minimum	Monthly	Extremes: Record Highest	Year	Day	Record Lowest	Year	Day	Mean No. of Days Max: 90° and Above	Max: 32° and Below	Min: 32° and Below	Min: 0° and Below	Precipitation Totals (Inches): Mean	Greatest Monthly	Year	Greatest Daily	Year	Day	Snow, Sleet: Mean	Maximum Monthly	Year	Greatest Depth	Year	Day	Mean No. of Days: .10 or More	.50 or More	1.00 or More
JAN	62.9	34.8	48.9	85	71	20	13	74	3	0	0	12	0	.33	1.53	55	.88	52	18	.5	9.5	57	5.0	57	29	1	0	0
FEB	68.2	38.7	53.5	89	57	13	18*	72	3	0	0	5	0	.13	.90	58	.73	58	4	.0	1.0	56				0	0	0
MAR	73.7	42.0	57.9	95	66	31	23	71	1	1	0	3	0	.21	.80	68	.80	68	8	.0						1	0	0
APR	81.2	48.6	65.0	101	61	4	24	70	27	5	0	0	0	.10	.80	65	.48	65	5	.0						0	0	0
MAY	90.2	56.4	73.3	110	51	27	35*	64	7	18	0	0	0	.07	.66	69	.34	69	5	.0						0	0	0
JUN	99.6	64.5	82.1	117*	61	20	43*	70	9	27	0	0	0	.02	.15	50	.11	50	30	.0						0	0	0
JULY	105.2	72.3	88.8	118	61	11	54	68	6	31	0	0	0	.60	2.34	55	2.34	55	19	.0						1	0	0
AUG	103.1	70.9	87.0	113*	69	6	53	59	20	31	0	0	0	.66	2.07	61	2.16	61	15	.0						2	0	0
SEPT	97.4	63.4	80.4	113	55	6	38	71	29	26	0	0	0	.31	1.74	63	1.43	54	1	.0						1	0	0
OCT	85.7	52.5	69.1	102	52	5	24	71	30	12	0	0	0	.29	2.74	63	2.59	63	18	.0	.2	71				1	0	0
NOV	71.3	42.0	56.7	91	55	10	21	58	18	0	0	3	0	.27	1.09	65	.82	60	6	.1	2.0	64	1.0	64	18	1	0	0
DEC	62.6	35.5	49.1	86	55	23	16*	72	12	0	0	10	0	.35	2.03	65	1.08	65	16	.5	10.0	67	6.0	67	17	1	0	0
YEAR	83.4	51.8	67.7	118	61	JUL 11	13	74	JAN 3	151	0	33	0	3.34	2.07	AUG 61	2.59	OCT 63	18	1.1	10.0	DEC 67	6.0	DEC 67	17	9	0	0

SANTA CRUZ, CA — 1951 - 1974 — 36° 59' N — 122° 01' W — 125 FT.

MONTH	Temp. (°F) Means: Daily Maximum	Daily Minimum	Monthly	Extremes: Record Highest	Year	Day	Record Lowest	Year	Day	Mean No. of Days Max: 90° and Above	Max: 32° and Below	Min: 32° and Below	Min: 0° and Below	Precipitation Totals (Inches): Mean	Greatest Monthly	Year	Greatest Daily	Year	Day	Snow, Sleet: Mean	Maximum Monthly	Year	Greatest Depth	Year	Day	Mean No. of Days: .10 or More	.50 or More	1.00 or More
JAN	59.0	38.3	48.7	81	62	8	22	63	14	0	0	6	0	6.68	14.80	69	4.65	63	30	.1	3.0	57	2.0	57	28	8	4	2
FEB	62.3	40.1	51.2	85	54	7	25	62	27	0	0	3	0	4.62	13.86	58	2.99	69	11	.0						6	3	2
MAR	64.0	40.4	52.2	88	66	31	28*	71	2	0	0	2	0	3.79	10.06	58	3.56	74	28	.0						7	2	1
APR	67.0	41.9	54.5	91	64	14	31*	63	21	0	0	0	0	2.91	8.26	67	3.46	53	27	.0						5	1	1
MAY	70.6	45.5	58.0	98*	73	28	34*	74	18	1	0	0	0	.53	4.03	57	1.48	57	18	.0						1	0	0
JUN	73.8	48.4	61.1	104	73	20	36	55	1	1	0	0	0	.22	1.51	67	.95	67	1	.0						1	0	0
JULY	75.0	50.4	62.7	109	50	10	40*	73	24	1	0	0	0	.14	2.09	74	2.51	74	9	.0						0	0	0
AUG	75.2	50.6	62.9	105	62	27	39	53	23	1	0	0	0	.08	.55	68	.55	68	19	.0						0	0	0
SEPT	77.1	48.5	63.3	107	71	14	38*	70	15	3	0	0	0	.39	4.40	59	2.71	59	18	.0						1	0	0
OCT	73.9	46.2	60.1	102*	65	1	30	71	30	2	0	0	0	1.23	5.34	57	2.49	57	13	.0						2	1	0
NOV	66.0	42.0	54.0	92	56	9	27*	61	17	0	0	1	0	3.93	10.94	72	3.10	73	6	.0						6	3	1
DEC	60.1	38.7	49.4	87	58	3	23	72	9	0	0	5	0	5.70	21.07	55	4.91	55	6	.0						7	4	2
YEAR	68.7	44.3	56.5	107	71	SEP 14	22	63	JAN 14	9	0	17	0	29.78	21.07	DEC 55	4.65	JAN 63	30	.1	3.0	JAN 57	2.0	JAN 57	28	44	18	9

* ALSO ON EARLIER DATES

WOODFORDS, CA — 1951 - 1974 — 38° 47' N — 119° 49' W — 5671 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: 10 or MORE	50 or MORE	1 00 or MORE
JAN	43.5	23.0	33.3	68	69	6	-9	62	23	0	4	26	1	4.00	12.83	69	3.92	63	31	21.4	63.8	52	44.0	52	19	8	3	1
FEB	47.4	29.2	38.3	71	51	9	-8	62	27	0	1	23	0	2.34	8.77	62	2.80	62	9	13.8	64.4	69	26.0	69	24	4	2	1
MAR	51.1	27.2	39.2	75+	72	5	2	52	13	0	1	23	0	2.05	4.97	67	2.28	67	16	16.9	65.2	52	31.0	52	19	5	1	0
APR	58.0	32.0	45.1	81	66	1	11+	63	17	0	0	15	0	1.21	3.96	63	1.67	53	27	7.2	40.0	58	24.0	58	8	8	1	0
MAY	66.9	39.6	53.2	88	72	28	16	74	18	0	0	6	0	.97	3.56	71	1.85	56	4	2.0	13.0	64	3.0	71	21	2	1	0
JUN	76.5	46.8	61.7	97+	72	30	26+	55	1	2	0	0	0	.54	2.06	69	1.31	72	6	.0	1.0	53				2	0	0
JULY	85.1	53.3	69.2	97+	73	29	28	74	11	6	0	0	0	.59	2.24	52	1.26	67	15	.0						2	0	0
AUG	83.7	52.4	68.1	98	72	10	29	60	23	5	0	0	0	.59	3.66	65	1.21	73	4	.0						1	0	0
SEPT	76.5	46.3	61.4	94+	55	1	23+	65	17	0	0	1	0	.73	3.61	59	2.80	59	18	.0	.1	68				2	1	0
OCT	65.2	38.0	51.6	89	62	1	8	71	29	0	0	7	0	1.16	4.04	62	1.73	62	13	.8	6.5	71	5.0	58	28	8	1	0
NOV	52.3	30.0	41.2	75	58	8	4	58	17	0	1	17	0	2.72	7.02	70	2.73	70	25	8.9	20.3	51	20.0	70	29	5	2	1
DEC	45.0	24.0	34.5	73	58	3	-10	72	9	0	3	25	0	4.00	18.17	55	6.19	55	23	18.6	51.8	52	26.0	70	2	5	3	1
YEAR	62.6	36.9	49.6	98	AUG 72	10	-10	DEC 72	9	18	10	143	1	20.88	18.17	DEC 55	6.19	DEC 55	23	89.6	83.2	MAR 52	44.0	JAN 52	19	40	15	4

YOSEMITE PARK HQ, CA — 1951 - 1974 — 37° 45' N — 119° 35' W — 3970 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: 10 or MORE	50 or MORE	1 00 or MORE
JAN	47.0	25.9	36.5	69	62	6	7	57	27	0	1	27	0	6.63	22.34	69	5.77	63	31	16.1	49.0	55	31.0	64	23	8	4	3
FEB	54.7	28.7	41.7	79+	71	12	10	62	27	0	0	22	0	5.02	17.24	62	4.60	63	1	12.5	89.0	69	48.0	69	27	6	3	2
MAR	59.2	30.8	45.0	89	66	29	10	51	3	0	0	21	0	4.55	11.53	67	2.88	52	15	16.2	67.0	52	52.0	69	1	7	3	1
APR	65.6	35.4	50.5	89+	66	1	20+	67	16	0	0	11	0	3.46	12.10	67	2.87	58	3	9.3	81.0	67	80.0	67	19	6	2	1
MAY	73.2	41.6	57.4	91+	70	17	26+	67	2	1	0	2	0	1.49	4.85	57	1.90	71	12	.4	7.0	64	2.0	60	14	4	1	0
JUN	81.6	47.8	64.7	102	61	24	30+	71	2	6	0	0	0	.65	1.62	69	1.05	70	9	.0						2	0	0
JULY	89.9	53.4	71.7	104	72	15	38	65	19	18	0	0	0	.37	1.65	56	1.00	74	10	.0						1	0	0
AUG	90.0	52.1	71.1	104	72	8	32+	68	23	18	0	0	0	.28	1.31	65	.73	65	15	.0						1	0	0
SEPT	85.4	46.8	66.1	102	55	2	28	71	29	9	0	0	0	.68	5.17	59	3.20	59	18	.0						1	0	0
OCT	74.2	38.6	56.4	98	65	8	21+	71	30	1	0	5	0	1.36	4.64	69	2.30	69	16	.0	.5	56				2	1	0
NOV	58.0	30.6	44.3	86	66	1	16	58	16	0	0	21	0	4.67	12.99	65	3.44	73	12	3.5	20.6	55	12.0	55	17	6	3	2
DEC	46.4	26.3	36.4	65	69	4	-14	72	12	0	1	27	0	6.89	29.78	55	6.92	55	23	14.7	51.0	71	23.0	72	8	7	4	3
YEAR	68.8	38.2	53.5	104+	AUG 72	8	-14	DEC 72	12	53	2	136	0	36.05	29.78	DEC 55	6.92	DEC 55	23	72.7	89.0	FEB 69	52.0	MAR 69	1	51	21	12

UKIAH, CA — 1951 - 1974 — 39° 09' N — 123° 12' W — 623 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: 10 or MORE	50 or MORE	1 00 or MORE
JAN	56.6	35.6	46.2	81	62	8	19+	63	12	0	0	13	0	9.49	23.52	70	5.66	74	16	.4	5.0	52	3.0	60	15	11	6	3
FEB	62.2	37.9	50.1	83	71	11	19	62	28	0	0	7	0	5.70	19.49	58	4.65	58	24	.0						8	4	2
MAR	65.0	38.4	51.7	90	66	31	24	53	2	0	0	5	0	4.86	9.96	74	3.56	74	29	.0	1.0	53	1.0	53	1	8	3	1
APR	70.9	41.1	56.1	97	51	10	30+	67	2	1	0	1	0	2.43	7.61	63	2.02	53	27	.0						5	2	0
MAY	77.7	46.0	61.9	101+	73	17	32	65	3	4	0	0	0	.81	4.67	57	1.20	57	18	.0						2	1	0
JUN	85.3	51.3	68.3	114	61	14	37	52	12	10	0	0	0	.29	1.41	52	1.30	67	2	.0						1	0	0
JULY	93.8	54.2	74.0	114	72	14	41+	60	11	22	0	0	0	.06	.84	74	.73	74	8	.0						0	0	0
AUG	92.9	53.6	73.3	111+	71	10	44	57	30	22	0	0	0	.18	1.35	68	.53	65	11	.0						0	0	0
SEPT	89.3	50.1	69.8	115	55	3	36	58	24	16	0	0	0	.41	3.51	57	2.25	57	27	.0						1	0	0
OCT	78.5	44.6	61.6	105	52	1	24	71	29	5	0	1	0	1.95	7.74	62	3.19	62	12	.0						3	1	1
NOV	64.6	39.8	52.3	92+	67	1	22	58	16	0	0	5	0	5.51	16.38	73	3.22	61	25	.0						8	4	2
DEC	57.1	36.3	46.7	80	58	3	13	72	9	0	0	11	0	8.14	21.05	64	6.18	64	22	.0						10	5	2
YEAR	74.5	44.1	59.3	115	SEP 55	3	13	DEC 72	9	80	0	48	0	59.33	23.52	JAN 70	6.18	DEC 64	22	.4	5.0	JAN 52	3.0	JAN 60	15	57	26	11

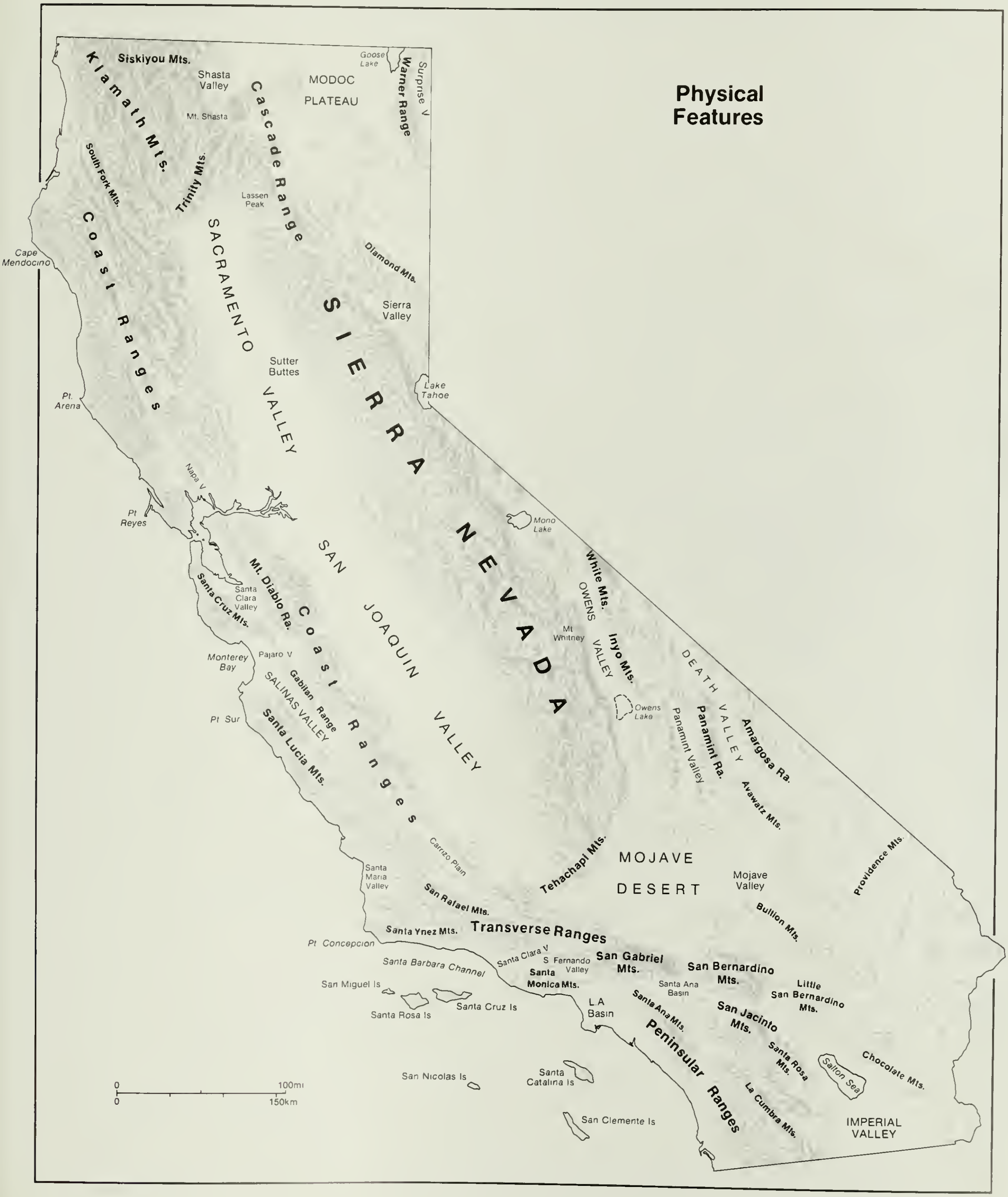
WARNER SPRINGS, CA — 1951 - 1974 — 33° 17' N — 116° 38' W — 3180 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: 10 or MORE	50 or MORE	1 00 or MORE
JAN	59.6	28.9	44.3	84	71	18	11	63	13	0	0	21	0	2.56	10.71	69	3.35	74	7	.4	8.5	55	5.0	55	10	5	2	1
FEB	62.6	29.8	46.3	84	63	3	14+	72	8	0	0	19	0	1.99	6.65	69	2.78	63	10	.1	8.0	51	1.0	51	27	4	2	0
MAR	64.4	32.4	48.4	89	72	15	17	66	3	0	0	16	0	2.11	7.80	58	1.89	58	16	.8	9.7	52	5.0	52	16	4	1	1
APR	69.8	35.2	52.5	92+	73	26	19	53	9	0	0	9	0	1.37	5.09	65	1.52	58	7	.0						3	1	0
MAY	76.9	39.6	58.3	102	73	30	25+	67	5	2	0	2	0	.47	2.41	71	.90	71	27	.0						2	0	0
JUN	85.2	44.9	65.1	106	61	15	27	67	2	11	0	0	0	.07	1.02	72	.67	72	6	.0						0	0	0
JULY	94.0	53.0	73.5	110	73	3	34	56	4	25	0	0	0	.43	1.61	54	.94	65	30	.0						1	0	0
AUG	93.4	52.7	73.1	105+	62	15	28	68	22	25	0	0	0	1.01	5.20	55	1.98	67	31	.0						3	1	0
SEPT	89.0	47.4	68.2	105+	71	13	28+	71	30	16	0	0	0	.37	2.11	63	1.11	63	18	.0						1	0	0
OCT	79.0	40.1	59.6	97	64	6	22	71	31	4	0	3	0	.61	2.41	57	1.08	74	29	.0						1	1	0
NOV	67.6	34.1	50.9	88	60	1	15	58	17	0	0	13	0	1.55	8.14	65	3.25	65	23	.1	3.2	64				3	1	0
DEC	61.2	29.6	45.4	84	58	3	9	68	21	0	0	21	0	2.01	6.53	66	2.60	51	30	.3	7.0	67	6.0	67	18	5	2	0
YEAR	75.2	39.0	57.1	110	JUL 73	3	9	DEC 68	21	83	0	104	0	14.55	10.71	JAN 69	3.35	JAN 74	7	1.7	9.7	MAR 52	6.0	DEC 67	18	29	11	2

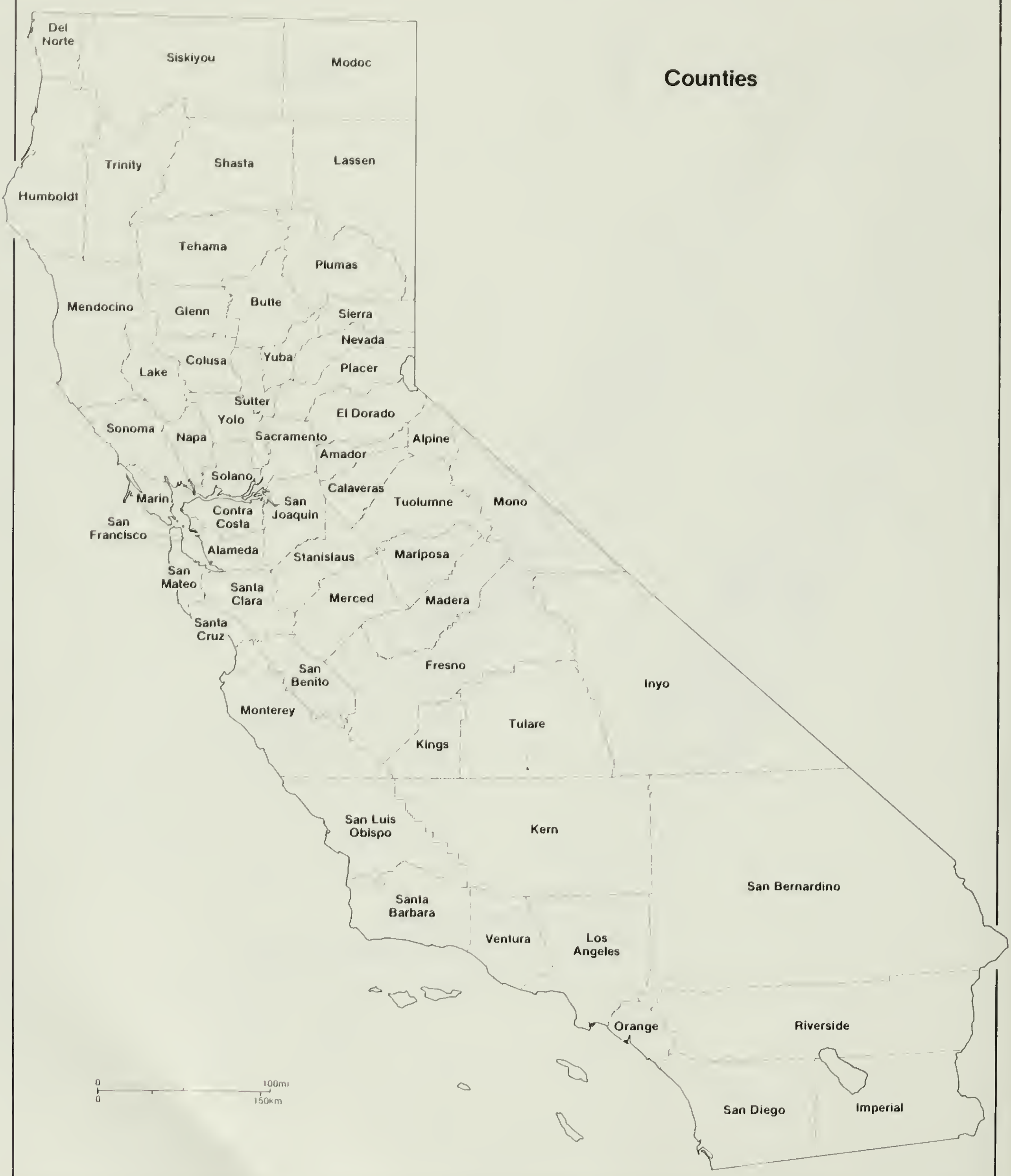
WASCO, CA — 1951 - 1974 — 35° 36' N — 119° 20' W — 333 FT.

MONTH	TEMPERATURE (°F) MEANS: DAILY MAXIMUM	DAILY MINIMUM	MONTHLY	EXTREMES: RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MEAN NUMBER OF DAYS MAX: 90° AND ABOVE	MAX: 32° AND BELOW	MIN: 32° AND BELOW	MIN: 0° AND BELOW	PRECIPITATION TOTALS (INCHES): MEAN	GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW, SLEET: MEAN	MAXIMUM MONTHLY	YEAR	GREATEST DEPTH	YEAR	DAY	MEAN NUMBER OF DAYS: 10 or MORE	50 or MORE	1 00 or MORE
JAN	55.6	35.2	45.4	77	74	16	19	63	13	0	0	11	0	1.23	4.68	69	1.33	69	20	.1	3.0	62	3.0	62	21	4	1	0
FEB	62.7	39.0	50.9	79	61	11	22	53	21	0	0	5	0	1.10	5.71	62	1.40	62	10	.0						3	1	0
MAR	68.9	42.8	55.9	92	64	30	26	56	7	0	0	1	0	.89	3.01	58	.91	74	8	.0						2	0	0
APR	75.7	47.9	61.8	97	65	29	35+	55	3	2	0	0	0	.75	2.42	67	1.04	64	2	.0						2	0	0
MAY	84.4	54.1	69.3	106	51	27	40	64	2	9	0	0	0	.29	2.15	71	1.52	71	27	.0						1	0	0
JUN	92.6	60.5	76.5	113	61	16	43+	71	2	19	0	0	0	.07	.74	63	.51	63	11	.0						0	0	0
JULY	99.3	65.8	82.6	114	72	16	49	56	2	30	0	0	0	.02	.22	65	.20	69	13	.0						0	0	0
AUG	97.4	63.9	80.7	109+	71	3	51+	60	28	28	0	0	0	.01	.09	64	.09	64	19	.0						0	0	0
SEPT	91.6	58.5	75.1	109	55	4	44	52	11	19	0	0	0	.06	.62	58	.39	58	8	.0						0	0	0
OCT	81.2	49.3	65.3	100	52	3	29+	71	30	5	0	0	0	.29	1.76	74	1.14	74	3	.0						1	0	0
NOV	66.9	40.6	53.8	87+	73	11	24	56	21	0	0	3	0	.79	2.75	60	1.05	60	6	.0						3	0	0
DEC	55.6	35.2	45.4	78	54	3	16	56	22	0	0	11	0	.79	1.84	71	.77	51	30	.0						2	0	0
YEAR	77.7	49.4	63.6	114	JUL 72	16	16	DEC 56	22	112	0	31	0	6.25	5.71	FEB 62	1.52	MAY 71	27	.1	3.0	JAN 62	3.0	JAN 62	21	18	2	0

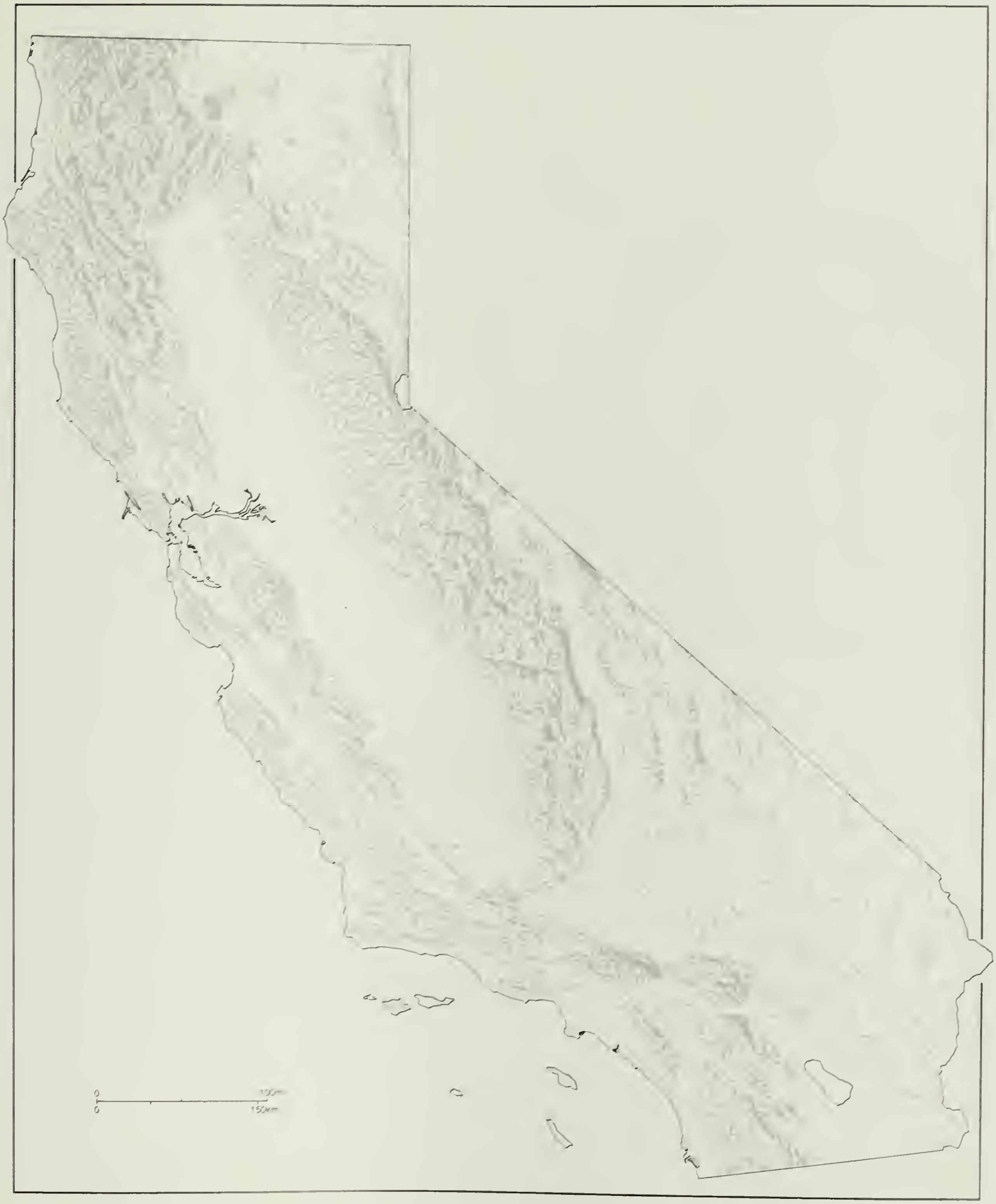
+ ALSO ON EARLIER DATES

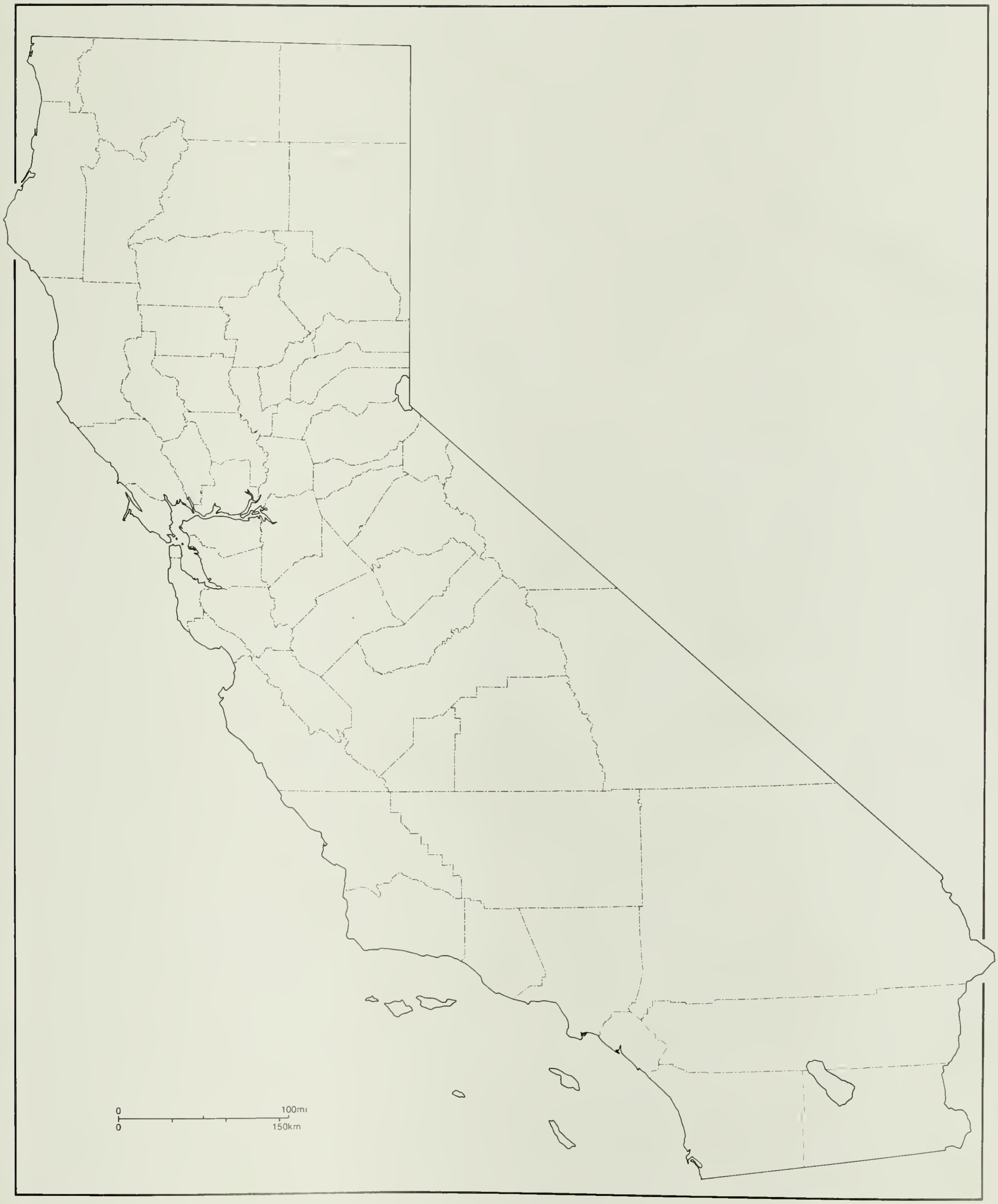

Physical Features
Siskiyou Mts.
Klamath Mts.
Shasta Valley
Mt. Shasta
MODOC PLATEAU
Goose Lake
Warner Range
Surprise V
Cascade Range
South Fork Mts.
Trinity Mts.
Lassen Peak
Coast Ranges
SACRAMENTO VALLEY
Cape Mendocino
Diamond Mts.
Sierra Valley
SIERRA NEVADA
Sutter Buttes
Lake Tahoe
Pt. Arena
Napa V
Pt Reyes
Mono Lake
SAN JOAQUIN VALLEY
Mt. Diablo Ra.
Santa Cruz Mts.
Santa Clara Valley
White Mts.
OWENS VALLEY
Mt Whitney
Inyo Mts.
DEATH VALLEY
Monterey Bay
Pajaro V
Gabilan Range
SALINAS VALLEY
Owens Lake
Panamint Valley
Panamint Ra.
Amargosa Ra.
Pt Sur
Santa Lucia Mts.
Avawatz Mts.
Carrizo Plain
Tehachapi Mts.
MOJAVE DESERT
Mojave Valley
Providence Mts.
Santa Maria Valley
San Rafael Mts.
Bullion Mts.
Santa Ynez Mts.
Transverse Ranges
Pt Concepcion
Santa Barbara Channel
Santa Clara V
S Fernando Valley
San Gabriel Mts.
San Bernardino Mts.
Santa Monica Mts.
Santa Ana Basin
Little San Bernardino Mts.
San Miguel Is
Santa Cruz Is
Santa Rosa Is
LA Basin
Santa Ana Mts.
San Jacinto Mts.
Peninsular Ranges
Santa Rosa Mts.
Salton Sea
Chocolate Mts.
San Nicolas Is
Santa Catalina Is
La Cumbra Mts.
San Clemente Is
IMPERIAL VALLEY
0 100mi
0 150km

APPENDIX F



Counties
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Mendocino
Glenn
Butte
Sierra
Nevada
Lake
Colusa
Yuba
Placer
Sutter
Yolo
El Dorado
Sonoma
Napa
Sacramento
Alpine
Amador
Solano
Calaveras
Marin
Contra Costa
San Joaquin
Tuolumne
Mono
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
San Benito
Fresno
Inyo
Monterey
Tulare
Kings
San Luis Obispo
Kern
San Bernardino
Santa Barbara
Ventura
Los Angeles
Orange
Riverside
San Diego
Imperial
0 100mi
0 150km


0
0


0
100mi
0
150km

CALIFORNIA PATTERNS: A GEOGRAPHICAL AND HISTORICAL ATLAS traces the changing patterns of California's human and physical landscape from geologic formation to the present day. One hundred twenty-five new maps take you on a colorful tour through Spanish missions and Mexican ranchos, teeming Gold Rush towns and frontier villages, massive irrigated farmlands of the Imperial Valley, and fast-paced metropolitan areas.

ABOUT THE AUTHORS

DAVID HORNBECK is professor of geography at California State University, Northridge. He received his Ph.D. in geography from the University of Nebraska. He is past president of the Association of Borderland Scholars and the Western Social Science Association. He has written extensively on Hispanic California.

DAVID L. FULLER is a staff cartographer at California State University, Northridge. He was the principal cartographer for *The California Water Atlas, Coronado's Children,* and *The World Rushed In.*

PHILLIP KANE, a professor of geography at California State University, Northridge, received his Ph.D. in 1975 from the University of California, Berkeley. He is interested especially in California's Pleistocene geomorphology and has authored a book on Lassen Volcanic National Park, *Through Vulcan's Eye.*

ALSO FROM MAYFIELD

CALIFORNIA: THE GEOGRAPHY OF DIVERSITY
by Crane Miller and Richard Hyslop

This lively account of the geography of California shows how the landforms, climate, and natural resources have played an integral role in making California the unique state it is and how California's geography is shaping its future. A perfect companion to our California atlas.

MAYFIELD PUBLISHING COMPANY

0-87484-583-1