NOAA Technical Memorandum NWS WR-225

CLIMATE OF SANTA BARBARA, CALIFORNIA

Gary Ryan
Weather Service Office
Santa Maria, California

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Santa Maria, California

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UNITED STATES
DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary

National Oceanic and
Atmospheric Administration
D. James Baker, Under Secretary
and Administrator

National Weather Service
Elbert W. Friday, Jr., Assistant
Administrator for Weather Services

This publication has been reviewed
and is approved for publication by
Scientific Services Division,
Western Region

Kenneth B. Mielke, Chief
Scientific Services Division
Salt Lake City, Utah

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THE CLIMATE OF SANTA BARBARA, CALIFORNIA

Gary Ryan
National Weather Service
Santa Maria, California

ABSTRACT

The city of Santa Barbara, California has a moderate Mediterranean climate regime in general, with some surprising and unique features. The United States Weather Bureau last issued a climatology of Santa Barbara in 1962. This paper represents an effort, to update that study and assemble the latest relevant climatological data for the city of Santa Barbara. Within this paper, long-term temperature records are analyzed, precipitation trends are fully discussed, and research into the causes and effects of downslope wind events are outlined. Tables of daily temperature and precipitation values (averages and extremes) are also included.

I. INTRODUCTION

November 1962: In San Francisco, C. Robert Elford, the United States Weather Bureau's State Climatologist, completed a climate summary entitled "The Climate of Santa Barbara." Mr. Elford, with his assistant, Max R. McDonough, wrote a three page climate analysis for the city of Santa Barbara, along with a more extensive 30-page report on Santa Barbara County climate. This 1962 Santa Barbara climatology, until now the most recent U.S. Weather Service survey of the subject, was based on two sources: (1) the official downtown weather station record from 1931 to 1960 and (2) a relatively short record of aviation observations from Santa Barbara Airport in Goleta.

There have been sweeping changes in the monitoring of weather parameters in the Santa Barbara area since 1962. Today, several departments maintain weather observing equipment within and just outside of the city. These agencies include the National Weather Service, Federal Aviation Administration, U.S. Forest Service, State of California Department of Water Resources, County of Santa Barbara Flood Control and Water Conservation District, and County of Santa Barbara Air Pollution Control District. Corporations, educational institutions, and private citizens are also engaged in weather and climate monitoring, for a wide variety of reasons. As a result of this activity, the climatological information database for the Santa Barbara area has been greatly expanded.

This paper represents an effort to assemble the latest relevant climatological data for the city of Santa Barbara from as many sources as possible. The result is designed to be

an overview of the local climate. The reader is invited to contact the individual agencies noted in this report for more detailed information.

The city of Santa Barbara has a long-term official weather record dating from just after the Civil War. The general weather regime described by that record is a tranquil one, as befits a southern California coastal community. But in its extremes, Santa Barbara weather is unique, surprising and, at times, even awesome.

II. THE CITY OF SANTA BARBARA

On the southern California coast, 90 miles northwest of Los Angeles, beneath the ridges and canyons of the Santa Ynez Mountains, lies the city of Santa Barbara (Figs. 1 and 2). The city is located on an east-west oriented section of coastline facing the Santa Barbara Channel and the Channel Islands to the south. The 1993 population of the city was 87,500; the population of the city and its environs was 191,367. Goleta, Santa Barbara's sister city and the site of Santa Barbara Airport, is located eight miles west of Santa Barbara.

Santa Barbara and Goleta are built on a narrow, one-to-five mile wide coastal plain which rises precipitously to the Santa Ynez Mountain ridgeline. Elevations along the ridgeline, which extends to within five miles of the city of Santa Barbara, range from 2224 feet at San Marcos Pass, 10 miles northwest of the city, to 4299 feet at Santa Ynez Peak, 19 miles west northwest of downtown. La Cumbre Peak, at 3985 feet, is only six miles north of Santa Barbara.

Gibraltar Reservoir, in the upper Santa Ynez River Valley, lies eight miles north of Santa Barbara. To the east of the city are the communities of Montecito and Summerland. Carpinteria, at the Ventura County line, is 14 miles east. Located to the west are El Capitan Beach (20 miles), Gaviota Pass (34 miles) and Point Conception (46 miles).

III. HISTORY

Chumash Indians occupied the area near Santa Barbara as early as 10,000 years ago. This Native American culture was flourishing and relatively advanced when Juan Rodrigues Cabrillo claimed the California coast for Spain in 1542. Sebastian Vizcaino anchored near Santa Barbara on December 4, 1602, the feast day of Saint Barbara, and named the channel and shoreline in honor of the patron saint of mariners.

In April 1782, Father Junipero Serra conducted ceremonies establishing the Santa Barbara Presidio Real (Royal Fortress). Jose Francisco Ortega was appointed commandante of the first permanent outpost in the district. By the late 1780s, the population of the settlement stood at 4,200, of which 4,000 were Native Americans.

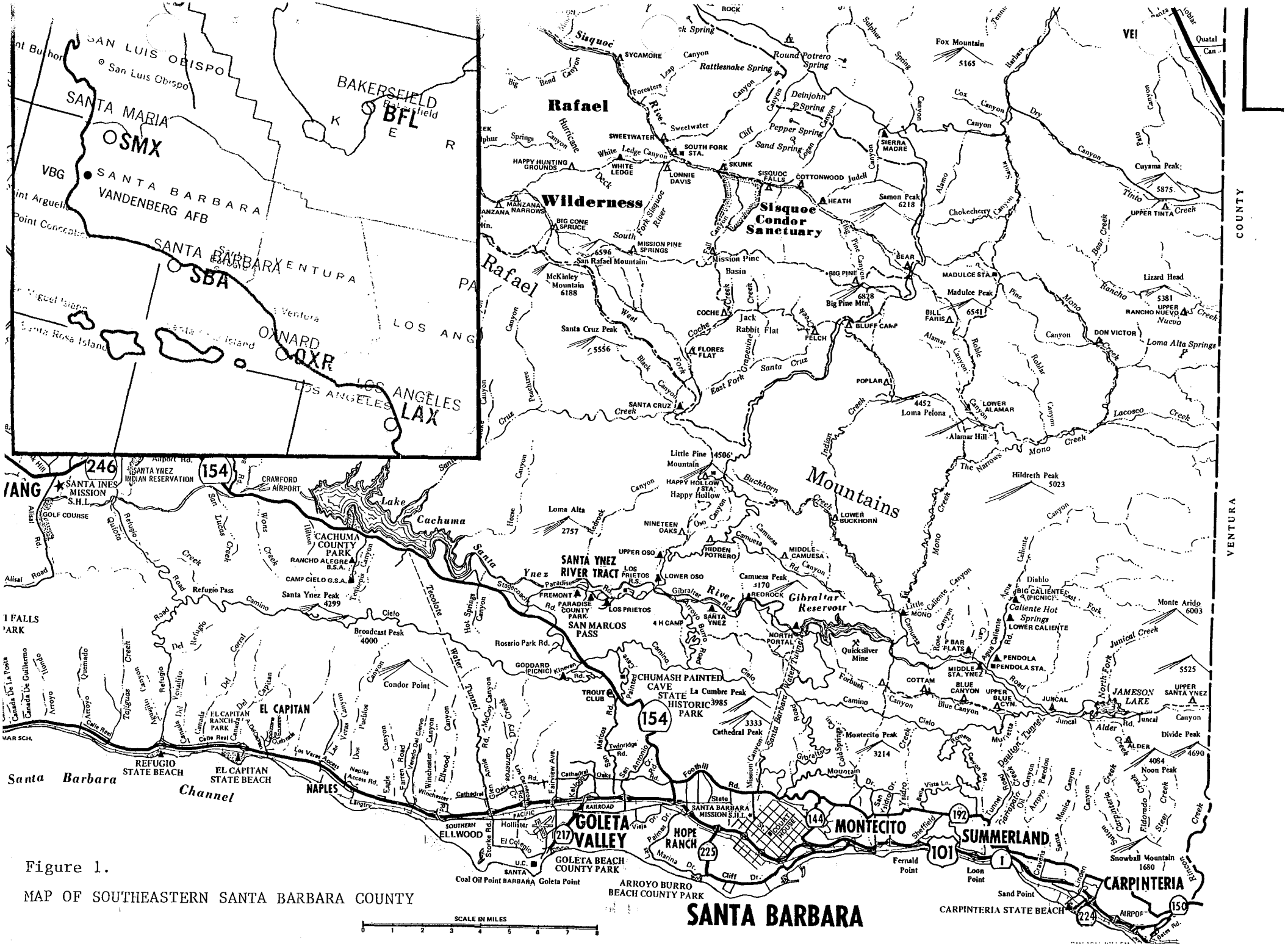
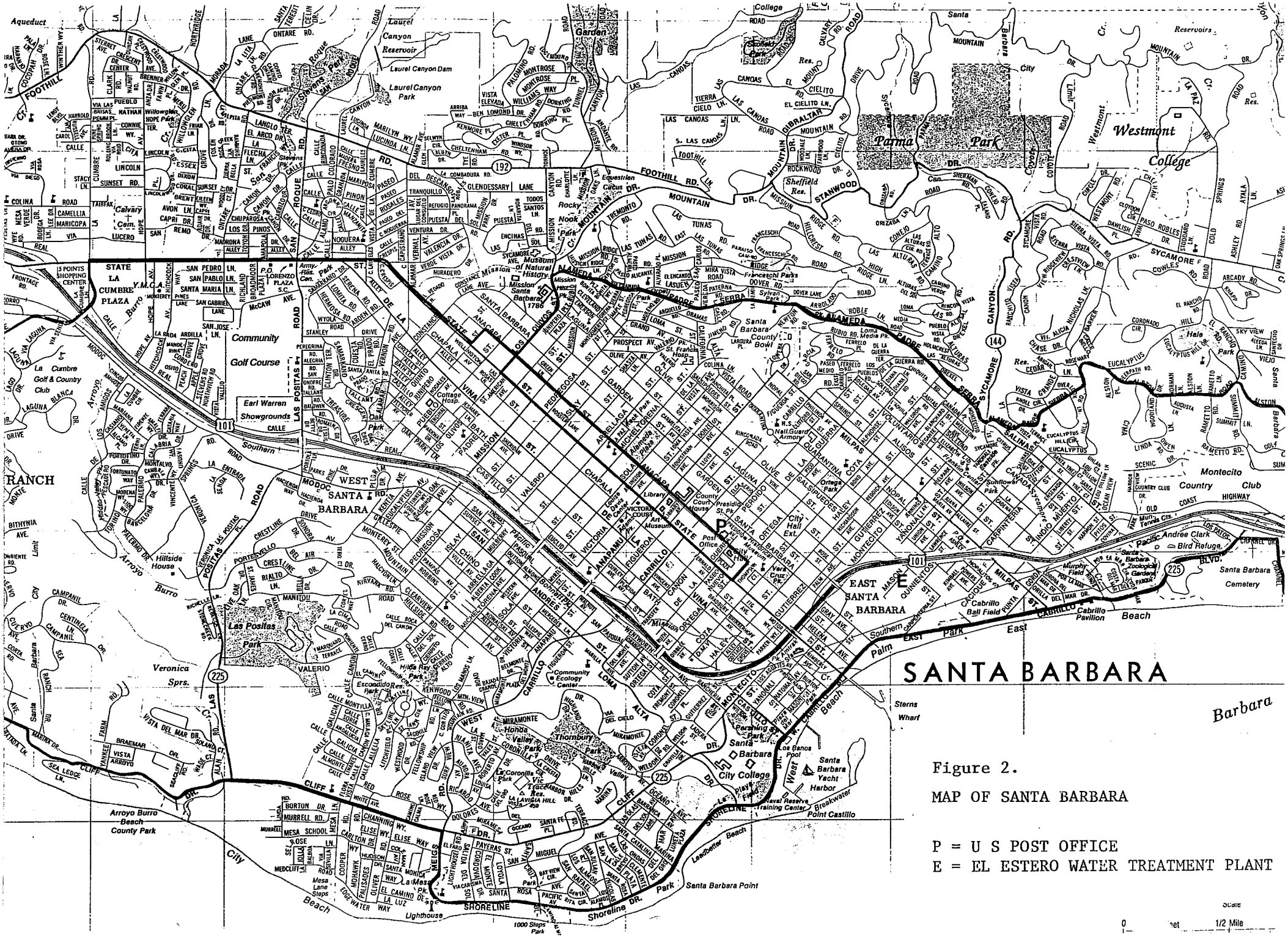


Figure 1.

MAP OF SOUTHEASTERN SANTA BARBARA COUNTY


SANTA BARBARA
Figure 2.
MAP OF SANTA BARBARA
P = U S POST OFFICE
E = EL ESTERO WATER TREATMENT PLANT
Scale
0
1/2 Mile

On December 21, 1812, the worst earthquake in California history destroyed most of the settlement at Santa Barbara. In 1820, the Santa Barbara Mission (which stands today) was completed to replace the facility destroyed in the earthquake. In 1822, the Mexican Revolution initiated a period of instability resulting in the establishment of military rule, which lasted until 1826. In the War with Mexico, U.S. forces seized Santa Barbara and in 1850 established civilian jurisdiction.

The late nineteenth century was an age of rapid change for the city. Stearns Wharf was completed in 1872, changing the character of the community into a port city. The Arlington Hotel opened in 1876, bringing tourists into the area. Electric street lights were installed and railroad service was established in 1877. The following year, State Street was paved. By the turn of the century the city population had reached 6,587.

The foundation for Gibraltar Dam was laid in 1913. A severe earthquake occurred on June 29, 1925, killing 11 and damaging many buildings. A new courthouse was finished in 1929 at a cost of $1.5 million. By 1950, the population of Santa Barbara had reached 44,759. The dam at Cachuma Lake, holding the current water supply for the city, was completed in 1953 and took five years to spill. La Cumbre Plaza was finished in 1967. In 1969, a giant oil slick caused environmental damage to Santa Barbara Channel.

Santa Barbara today is, arguably, one of the most beautiful cities in the United States. The community has attempted to maintain a Spanish colonial image and merge that with modern American lifestyle.

IV. SANTA BARBARA WEATHER RECORDS

Outside of early settlers' general remarks and notes about weather and climate, the first weather record in the Santa Barbara area dates from June 1859. In the winter of 1861-62, journals recorded severe flooding in the district, followed by the worst drought in historic times.

Regularly scheduled weather observations began in Santa Barbara on July 1, 1867, with the establishment of a daily precipitation record. This was more than three years before the United States government first organized a national meteorological service.

A station history was compiled circa 1962 by Max R. McDonough, Assistant State Climatologist. An unedited version of the original handwritten document is presented herewith:

SANTA BARBARA
STATION HISTORY

> Precipitation record at Santa Barbara date [sic] back to July 1, 1867. A standard rain gage was located at the residence of Prof. Hugh D. Vail, 1325 Chapala St., 1/2 mile west of the present Post Office. The elevation was 92 feet.

On January 1, 1897, temperature record became part of the observation program with the addition of a Cotton Region Shelter and max & min thermometers. Professor Vail remained the observer until July 1, 1900. On this date the station was relocated 4/10 of a mile northwest to the home of James A. Dodge. The Dodge residence was at 116 W. Islay St., 9/10 mile WNW of the Post Office at an elevation of 128 ft.

Mr. Dodge continued as observer until November 1, 1906 when the station was again moved 4/10 of a mile west to the residence of Mr. George W. Russell, 2135 Castillo St; 1.3 miles WNW of Post Office, elevation 121 ft. The climate station remained at this location through October 31, 1931. Mr. Russell was succeeded by his wife Mrs. Ella M. Russell on May 1, 1925, who carried on the observational work until the appointment of Mrs. Edythe Hensel. On November 1, 1931, the station was relocated approximately sixty yards southwest to the Hensel Residence, at 427 Los Olivos St., elevation now 118 ft.

In May 1940, a [recording rain gage] was added, to remain part of the observational program to the present date. Mrs. Hensel retired in February 1948. On February 5, 1948, Mr. August F. Grimm was appointed, and the station was moved to the Rose Garden Nursery, 606 W. Pueblo St., two tenths (2/10) mile west, 1-1/2 mile WNW of Post Office, elevation 120 ft. Mr. Grimm's association was terminated in December 1954 when the nursery property was purchased by the State Division of Highways. On December 22, the move was to the Santa Barbara Fire Dept. residential substation (Firehouse no. 3) at 415 E. Sola St. New location one and four tenths (1.4) miles ENE of the Post Office, elevation 100 feet. Observation duties were performed by on-duty personnel at the fire station. Thus, continuing a long and homogeneous weather record from the city of Santa Barbara.

As with those who preceded them, the continuous published record they have furnished and the original forms they have prepared stand as a monument to their contribution to the climatological and hydrologic [sic] data of this community and state. This is that effort that makes this publication possible.

The McDonough record is fine in its broad outline through 1954, but requires some correction and augmentation. It is not certain who started the original precipitation record at Santa Barbara in 1867. Historical documents suggest that it was the work of Dr. J. B. Shaw. Dr. Shaw utilized a Smithsonian model rain gage. His

logbooks contain original precipitation records, and it is likely that the records he maintained were copied by Professor Vail and others in the 1880's.

Temperature data were collected by Dr. L. N. Dimmick beginning in 1875 and continuing through 1879. Dr. Dimmick wished to establish temperature averages for Santa Barbara. In the fashion of the day, he diligently read the thermometer three times a day (at 7 a.m., 2 p.m. and 9 p.m.) and averaged the three readings. This average was considered at the time to be quite scientific; the average annual temperature computed from this method was roughly two degrees F. higher than the modern calculation.

Dr. Shaw continued this temperature analysis from 1879 to 1883. In January 1883, William Field obtained "maximum and minimum self-registering thermometers" and recorded official high and low temperatures at the Arlington Hotel until 1885. At that time, Professor Vail took responsibility for the weather observation program.

The Vail record continued through July 31, 1900. James A. Dodge's name appears on Santa Barbara records beginning in August 1900. In January 1901, the meteorological forms used by the Department of Agriculture (Weather Bureau) underwent significant revision.

The weather records of George W. Russell and his wife Ella spanned 25 years from 1906 to 1931. Their records were complete and were accompanied by substantial annotation --- frequently regarding agriculture. One of George Russell's records appears as Table 2.

The Weather Bureau operated the official substation at the fire department at 415 E. Sola Street beginning on December 22, 1954. It was located 1.5 miles inland from the harbor and 0.6 miles north-northwest of the post office, not 1.4 miles east-northeast of the post office, as in the McDonough report. The site was judged excellent for precipitation measurement but only "fair" for temperature shelter exposure.

In 1964, the Fire Department decided to blacktop the backyard of Fire Station No. 3. The Weather Bureau judged this change in exposure to be unsatisfactory, and moved the substation once again. The substation was relocated to its present site at the Santa Barbara (El Estero) Water Treatment Plant at 402 E. Mason Street on March 25, 1964. This location is 0.9 miles east-southeast of the post office, close to the 101 Freeway and the ocean, at an elevation of five feet MSL.

Upon moving the observing site to El Estero in 1964, a Weather Bureau report cautioned "...it is thought that maximum temperatures may be somewhat lower at the new location due to its proximity to the Pacific Ocean." Santa Barbara maximum (and minimum) temperatures have indeed exhibited a pronounced ocean-influenced moderation since 1964, which will be addressed in this report within the section concerning temperature analysis.

The El Estero station, number 04-7902-6, is located at 34° 25' N and 119° 41' W. The observation site is equipped with a Fischer & Porter rain gage, an eight-inch standard rain gage, and a cotton region shelter enclosing a standard maximum and minimum thermometer. Observations are taken daily at midnight.

On March 17, 1938, the Federal Aviation Administration established an airport weather station (station number 04-7905, WBAN number 23190) in an operations building at Santa Barbara Airport in Goleta. The same site is still in use today. The station is located one mile from the ocean and eight miles west of the Santa Barbara city center, at an elevation of nine feet MSL. Map coordinates are 34 degrees 26 minutes north latitude and 119 degrees 50 minutes west longitude.

Daily temperature records from Santa Barbara Airport began January 1, 1941. On September 1, 1942, a standard eight-inch rain gage was added to station equipment. Maximum and minimum thermometers were installed on May 9, 1947. An HO83 electronic hygrothermometer was commissioned in March 1986, resulting in some (undetermined) dampening of high and low temperature data.

Flight Service Station personnel provided hourly and special aviation weather observations through the years at Santa Barbara Airport. Then, beginning in March 1993, the station was staffed with private contractor weather observers, operating on a 24-hour basis. Observations are currently taken on standard federal forms, which are checked for accuracy by officials at the National Climatic Data Center in Asheville, North Carolina.

V. CHARACTERISTICS OF SANTA BARBARA CLIMATE

Santa Barbara is noted for its moderate climate. Under the modified Koppen climate classification system, the Santa Barbara climate is categorized as "Csb," or Mediterranean, with cool, dry summers (Trewartha and Horn, 1980). There are pronounced seasonal changes in rainfall, but relatively modest seasonal transitions in temperature.

The mean annual temperature at Santa Barbara is 60°F. The average daily high temperature is 71°F and the average low is 49°F.

Rainfall is concentrated during the winter season, primarily from November through April. Significant precipitation events from May through October are unusual. The average annual precipitation is 17.91 inches.

The eastern Pacific high pressure area, a semi-permanent feature of the general atmospheric circulation pattern in the Northern Hemisphere, controls weather along the California coast for much of the year. Prevailing wind along the state's coastline is generally from the northwest or west, although surface wind patterns show some complexity due to terrain. In the Santa Barbara area, the northwest wind flow is normally blocked by the Santa Ynez Mountains, creating daytime sea-breeze

conditions with winds blowing from the south or west quadrant. Wind speeds average four to five mph annually, with peak winds on most days of about 10 to 15 mph.

A pronounced marine layer exists along the coast in the summer months through mid-October. In this season, low clouds and fog frequently occur from late at night to about midday, then "burn off" to a clear but somewhat hazy sky. Dense fog occurs from time to time in the late summer and early fall, but is not as frequent at Santa Barbara as it is along the coastline north of Point Conception.

Severe weather is uncommon. Winter storms occasionally bring gusty southeast winds to about 40 mph to the district with locally heavy rain. These storms can cause flooding within the city of Santa Barbara. Generally, however, winter storms are migratory; so wet and dry periods tend to alternate, albeit with considerable irregularity in timing and duration.

Northwesterly downslope winds, known locally as "sundowners," occur within the city on an average of two or three times each year. Sundowner winds, usually warm and dry, can locally reach speeds in excess of 40 miles per hour and cause a variety of public safety hazards.

VI. TEMPERATURE

Historical temperature data at Santa Barbara present problems for climatologists. The official Santa Barbara observation site has been in at least seven different locations since it was established in 1867. Until 1964, the point of observation was near the city center at elevations between 82 feet and 130 feet MSL. Temperature records from those locations may be considered homogeneous and reliable. In March 1964, the official observation site was moved to the El Estero Water Treatment Plant near the ocean and at an elevation of five feet MSL. Temperature averages since 1964 manifest a predictable maritime-influenced moderation. The average daily maximum temperature decreased 1.1°F in the post-1964 period, while the average daily minimum temperature increased 2.2°F.

High and low daily temperature records at Santa Barbara were set at the rate of 1.63 per month during the 1940s, but that frequency dropped to 0.26 per month during the 1980s. Airport records indicate 1.80 daily record temperature extremes registered per month during the 1940s and 1.29 records per month in the 1980s. Such changes in comparative data suggest an inhomogeneity in Santa Barbara city records. El Estero temperature records should be employed with caution and probably should not be used in computing long-term temperature averages for the city.

For the purposes of statistical analysis, Santa Barbara city temperature data are utilized only through 1960, and data from El Estero are not considered. For all-time daily record computations, the entire existing continuous record from January 1883 to November 1993

was used, in addition to some fragmentary records beginning in 1875. The complete city temperature record was utilized, including El Estero, because there was no clear alternative. It has been noted that it has been demonstrably more difficult to set daily temperature records at Santa Barbara since 1964. Therefore, for the sake of comparison, Santa Barbara Airport all-time daily temperature records are included within this report.

Because of inhomogeneities within the historic temperature record at Santa Barbara, the station data support no conclusions in regard to long-term temperature trends. However, regional trends have been described by Fritts (1991) and others engaged in dendro-climatologic research, which indicate that warming has been occurring across the Santa Barbara area during the twentieth century. Temperatures during this period have averaged slightly warmer than the 30-year normal ending in 1900.

The average annual temperature at the city of Santa Barbara, based on data from 1901-1960, is 60.1°F. This compares with 66°F at Los Angeles and 57°F at the San Francisco Airport. Santa Barbara's average daily high temperature is 71.4°F and the average daily low is 48.8°F. Average daily maximum temperatures peak in August and September at 78°F, dropping to 64°F in late December and early January. Average daily minimum temperatures peak at 57°F in July and August and drop to 40°F for a short time around New Year's Day. At the Santa Barbara Airport, daily maximum temperatures average 2.1°F cooler and daily minimum temperatures average 0.2°F warmer than Santa Barbara city readings.

Temperature transitions between seasons is gradual and smooth, as reflected in daily normal temperature tables. The most significant warming occurs during a sixty day period in May and June, when average daily temperatures rise by 6°F. Cooling in the fall occurs more sharply; average temperatures drop by 6°F in a 35-day period between late October and late November.

Although moderate temperatures are the rule at Santa Barbara due to the marine influence, temperature extremes can and do occur. The official high temperature record of 115°F occurred during a desiccating downslope windstorm on June 17, 1917. The coldest temperature reported in the city, 20°F, occurred twice during the record cold month of January 1949. The highest temperature recorded unofficially at Santa Barbara was an incredible 136°F on Friday, June 17, 1859. A description of that event is included in the chapter on downslope "sundowner" winds.

Hot Temperatures

Santa Barbara has a southerly exposure at the base of the Santa Ynez Range, and is subject to warming downslope winds which cross the crest of the Santa Ynez Range from the north. Therefore, the city can become quite warm at any time of year. Maximum temperatures have been recorded in

excess of 90°F in every month of the year. The temperature reaches 90°F or higher on an average of 4.5 times per year. Temperatures of 100°F or more have occurred historically in the months from April through October. Maxima of 100°F or higher occur in about one year in three. The average annual maximum temperature recorded at Santa Barbara is 97°F. The month in which the annual maximum temperature is most likely to occur is September.

Very high temperatures are sometimes caused by and accompanied by gusty downslope winds, which are known locally as "sundowners." These winds can reach gale force within the city limits, but such conditions are rare. Hot temperatures are not always associated with downslope windstorms, however. Sometimes the heat occurs with light winds, when a strong high pressure ridge aloft phases with surface high pressure to the east of the district, creating a light offshore wind pattern. In this situation temperatures along the Santa Barbara littoral can reach to from 100-110°F.

Cold Temperatures

Cold weather outbreaks have historically dropped temperatures into the 30s°F at Santa Barbara in all months except June, July, and August. These incidents of cold temperatures are usually caused when strong high pressure areas push northward from the eastern Pacific into the Gulf of Alaska, which results in cold air from the Canadian Arctic moving southward into the western United States. When offshore pressure gradients are light and low-level winds are quiescent, temperatures can cool rapidly at Santa Barbara in the relatively dry air and clear skies.

The winter of 1948-49, which featured below normal temperatures throughout the western United States, marked the century's benchmark cold outbreak at Santa Barbara. From September through February, 50 daily low temperature records were established; these records have endured for almost a half century. Sixteen daily low temperature records were set in January 1949 alone. The average daily low temperature for that January was 30.5°F, 10.9°F below normal, and the only time on record when a monthly minimum temperature averaged below freezing. The all-time record low of 20°F was set on January 4 and equalled on January 10.

Freezing temperatures are uncommon at Santa Barbara, occurring on an average of four times per season, twice in December and twice in January. In 38 percent of the winter seasons, the lowest observed temperature is above freezing --- 33°F or higher. In 53 percent of winter seasons, the lowest temperature ranges from 28-32°F, and in nine percent of winter seasons, the lowest temperatures are colder than 28°F. Freezing temperatures have occurred as early as November 12 and as late as April 28, based on the 110-year continuous temperature record.

Elford (1962), in a study prepared with 1931-1960 data, indicated an average first freeze date (32°F) at Santa

Barbara of December 31 and a last freeze date of January 23, with a resultant growing season of 342 days. This study is based on data reflecting a high degree of homogeneity, and is valid for the area near the city center. An analysis of Santa Barbara Airport temperatures (1951-1974) yields an average first freeze date of December 20, a last freeze date of January 20, and a growing season of 334 days. The heating degree day seasonal average (base 65°F) for the city for the 1931-1960 period stands at 2086.

Even during California's coldest overall synoptic patterns, daily high temperatures at Santa Barbara usually climb into the 50s and 60s°F. The coolest daytime high temperature ever recorded in the city occurred on January 6, 1913, when the mercury managed to rise to only 44°F.

TABLE 1.
DAILY TEMPERATURE MEANS BY MONTH AT SANTA BARBARA, CA

MONTH	MAXIMUM	MINIMUM	MEAN	DEGREE DAYS HEATING	DEGREE DAYS COOLING
JANUARY	64.7	41.4	53.1	384	0
FEBRUARY	65.5	43.2	54.3	308	0
MARCH	67.3	44.8	56.0	282	0
APRIL	69.1	47.6	58.3	198	0
MAY	70.5	49.9	60.2	140	0
JUNE	73.1	52.8	63.0	75	24
JULY	76.9	56.4	66.7	28	55
AUGUST	77.5	56.7	67.1	22	91
SEPTEMBER	77.5	54.8	66.2	36	95
OCTOBER	75.3	50.7	63.0	84	24
NOVEMBER	72.3	45.1	58.7	210	0
DECEMBER	67.0	42.3	54.7	319	0
ANNUAL	71.4	48.8	60.1	2086	289

Sources: Temperature data, Santa Barbara city 1901-1960.
Heating degree days, Santa Barbara city 1931-1960.
Cooling degree days, Santa Barbara Airport 1961-1990.
Data: °F.

Form No. 1078 A—Met'l.

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU.

Station, Santa Barbara County, Santa Barbara State, Cal

Latitude, ... Longitude, ... Elevation, 130 feet.

Data, Mean Temperature

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Annual.	Authority. Max	Min
1885	53.2	56.7	59.1	60.7	60.0	62.4	61.1	68.0	66.9	63.0	58.9	57.2	60.6		
6	55.0	59.6	53.1	55.7	60.5	62.0	66.3	68.2	63.8	(62.3)	(57.4)	55.8	(60.0)		
7	54.7	50.4	57.0	58.4	60.1	63.7	64.6	64.8	66.0	65.0	58.9	(54.8)	(59.9)		
8	49.0	53.8	53.0	59.9	62.8	64.4	67.0	66.3	67.9	63.5	59.1	55.8	60.2		
9	53.0	55.4	59.0	59.9	60.0	62.5	62.2	67.3	68.8	63.9	59.6	54.2	60.5		
1890	48.4	52.6	55.6	56.6	60.0	62.4	67.3	67.9	66.5	64.0	63.3	58.4	60.2		
1	54.4	52.6	56.6	56.3	59.0	62.4	67.2	69.1	69.3	63.3	58.8	51.9	60.1	96	33
2	54.5	53.7	55.3	57.8	60.3	61.0	63.5	66.3	64.2	62.0	60.3	54.4	59.4	98	38
3	55.7	53.4	53.1	57.0	59.2	62.2	64.6	66.1	62.7	62.0	57.0	58.0	59.2	88	38
4	49.7	50.9	53.4	57.1	58.0	61.4	62.8	65.9	65.9	62.6	57.4	54.1	58.3	94	33
5	51.7	55.8	53.6	57.5	60.5	62.5	65.0	65.0	65.6	63.4	59.9	55.1	59.6	91	38
6	56.4	61.2	57.6	55.3	61.4	64.3	66.9	67.5	64.7	63.3	58.7	58.1	61.3	98	36
7	54.6	52.8	52.7	59.6	59.5	63.0	65.3	71.9	67.0	61.0	58.6	54.4	59.6	93	32
8	50.7	55.9	54.4	60.2	58.3	64.0	65.5	68.6	66.0	61.8	59.1	55.6	60.0	95	34
9	54.8	54.2	56.6	56.8	56.4	61.4	64.6	65.6	66.0	62.4	60.4	57.1	59.7	93	29
1900	57.5	58.0	58.3	56.0	60.8	63.8	65.9	65.0	65.2	62.8	64.3	59.8	61.4	96	38
01	54.6	56.4	59.0	55.0	57.8	61.6	65.3	67.2	61.6	63.6	59.2	57.4	59.9	96	34
02	54.8	54.8	54.0	57.2	59.0	62.8	65.3	65.4	66.0	61.8	57.6	54.2	59.4	90	35
03	56.4	51.1	54.6	57.0	58.4	63.4	65.2	66.1	66.1	64.8	62.1	57.6	60.2	95	32
04	55.0	54.6	56.0	58.4	59.1	64.4	64.8	69.0	69.2	65.0	63.1	58.4	61.4	95	33
05	56.6	56.8	59.1	58.2	58.5	61.0	65.6	66.2	66.5	64.4	59.8	55.8	60.7	96	35
06	54.8	58.4	56.4	57.8	58.2	65.1	67.9	66.4	67.3	65.6	56.4	55.1	60.8	98	34
07	51.0	59.0	54.0	58.2	60.2	62.8	67.8	65.5	64.1	63.1	58.6	56.0	60.0	108	34
08	54.6	52.2	55.9	59.0	58.2	60.2	65.8	66.5	64.9	59.6	56.2	51.5	58.7	91	32
09	53.6	52.8	52.6	56.4	56.2	60.8	63.4	66.0	62.1	62.0	55.8	51.8	57.8	100	33
Sums															
Means	53.8	54.9	55.1												

REMARKS.

TABLE 2.

AN EARLY SANTA BARBARA TEMPERATURE RECORD

Courtesy: Jim Goodridge

VII. PRECIPITATION

City of Santa Barbara precipitation data published by the National Weather Service and by Santa Barbara County Flood Control and Water Conservation District were checked against the original historical record. The data were remarkably consistent from 1867 through 1977. Then, beginning in 1978, significant divergence occurred in the reprinting of the El Estero data.

Precipitation data published in this report represent, as far as can be determined, official figures noted in original source material; the entire corrected monthly city precipitation record is published herein for the first time (Table 4). Statistical analysis of the Santa Barbara precipitation record is based on data from July 1867 (the Shaw record) through June 1993, inclusive, except as noted.

Since rainfall in the Santa Barbara area is generally a winter season phenomenon occurring from November through April, statistics are frequently presented on a "water year" basis, as opposed to a calendar year format. The water year displays a more coherent picture of rainfall data. The National Weather Service computes the water year from July 1 through June 30. Santa Barbara Flood Control and Water Conservation District reckons water year boundaries from September 1 through August 31. This bookkeeping difference is unimportant because noteworthy rainfall rarely falls at Santa Barbara during July and August. In fact, some of the earliest weather observers in Santa Barbara did not include any July or August rainfall data at all as part of the annual totals; a ten-month water year was started on September 1 and ended on June 30! This may account for what appears to be an unusual string of no-precipitation totals during the months of July and August from 1867 to 1894.

The annual average precipitation at Santa Barbara, based on a continuous and homogeneous 126-year record from 1867-1993, is 17.91 inches. The airport average (1961-1990) is 16.25 inches. The monthly average at Santa Barbara for January is 3.92 inches. By mid-summer, rainfall is scanty. The average July precipitation is only 0.03 inches, and what moisture does fall is most often associated with a deep layer of marine air, up to about 4,000 feet thick, which causes widespread drizzle and local areas of fog.

Most of the season's rains occur during the months from November through April. Only eight percent of total seasonal rainfall normally occurs from May through October and less than one percent of the total occurs during the three-month period from June through August.

Heaviest rains are associated with storms approaching California from the west or southwest which frequently tap a moisture supply from the subtropics. These storms often produce south or southeast low-level winds, which provide pronounced orographic lifting (and thus, rain enhancement) in the Santa Barbara area. Extremely heavy rains, up to 15 inches in one day, have been recorded near the crest of the

Santa Ynez Range just a few miles north of the city. Within the city, the heaviest daily rainfall on record is 6.95 inches, which occurred on January 25, 1914. Probable maximum precipitation at Santa Barbara is plotted in graph form (Fig. 5); a rainfall depth/duration/frequency analysis is found in Tables 6 and 7.

Thunderstorms are unusual in Santa Barbara. Sometimes accompanied by small hail and gusty winds, they occur on an average of 2.4 days per year. Thunderstorms can develop during the winter or early spring, usually spawned by or accompanying rapidly moving cold fronts that swing southeastward across California from the Gulf of Alaska. Summer thunderstorms have a different origin; they tend to drift into the Santa Barbara area from the south. This happens when the so-called southwest monsoon brings moist subtropical air into southern California.

Snowfall is extremely rare. The Weather Bureau historically included occurrences of hail and ice pellets with snowfall data, so that statistics relating to "snow" may not describe "snowflakes." Using the inclusive Weather Bureau definition of snow, some form of frozen precipitation (presumably mostly ice pellets) has fallen in Santa Barbara during the months from December through April. Snowfall depths have never reached more than trace levels within the city -- that is, any snow or ice that has fallen has never accumulated to a depth of a half-inch or more. A documented snowfall occurred at Santa Barbara in 1882. An account of the snowfall was given by Dr. J. B. Shaw in his weather logbook as follows:

> January 12, 1882. This morning all the hills, down to the houses in town [are] being covered with snow. The streets in Los Angeles, Lompoc, and Los Alamos [are] being covered with snow: such an event was never known before.

And from The Daily Press of the same date:

> Flakes of snow fell in the streets of Santa Barbara today. We believe this to be totally unprecedented. The boys of Santa Barbara were wild with excitement this morning, and many of them made a beeline for the top of the foothill, in search of a genuine snowball. Some of them, California-born, have never before had the opportunity to roll this delightfully chilly article into a missile and grasped the chance and the snow with avidity.

Trends and Fluctuations in the Rainfall Record

Attempts have been made to find evidence of periodicity in historic rainfall patterns in the Santa Barbara area. A computer analysis by Rossman (Fig. 4a) graphed 10-year rolling precipitation means at 5-year intervals for the entire historic record beginning in 1867. Solid vertical lines represent 30-year intervals beginning in 1870. Dashed lines mark low points in the

rainfall record. This smoothing revealed an apparent dry period of about 30 years. This periodicity had been noted by several others working with this and other rainfall data from the area.

This pattern was still extant in another graphic study, completed in December 1993 by Jim Goodridge, using the same base data (Fig. 4b). Goodridge combined continuous nine-year rolling means with an individual data plot. He considered the resultant pattern "remarkable," but concluded that the dry period is not cyclic because of the random wavelength displayed in the raw data plot. Moreover, statistical analysis of such a relatively short (by planetary time standards) rainfall record cannot be taken as conclusive evidence of cycling. In a well-done tree ring study of southern California climate, Michaelsen et al., (1990) reconstructed annual streamflow patterns (and by extension, precipitation patterns) from the year 1460 to the present. He found that the patterns are approximately "random and stationary" and "do not show long-term trends." The flow of the nearby Santa Ynez River has averaged near the 500-year normal since 1900. Michaelsen noted very wet and very dry climatic cycles before 1800, which have not been matched in the record since 1800.

This is not to say that dramatic changes in precipitation frequency have not occurred in historic times. The floods of 1861-62 were followed immediately by the worst drought the Santa Barbara area has known. O. H. O'Neill (1939) reported that after a "50-inch" rainfall during the winter of 1861-62...

> The Dry Spell began in the fall of 1862 and lasted to the winter of 1864-65. The rainfall for the season of 1862-63 did not exceed four inches. In the fall of 1863 a few showers fell, but not enough to start the grass.

The severe drought that hit the county in the early 1860s wiped out the local cattle industry and closed the Matanza (slaughterhouse), which had been established in the city. Lacking the infrastructure and emergency water supply of the modern era, the early cattle owners had no choice but to watch their stock perish. One account mentioned that "there was no available grass within 400 miles of Santa Barbara." Reliable reports state that of 300,000 head of cattle in Santa Barbara County in 1862, less than 500 were alive after the winter of 1864.

TABLE 3.
RAINFALL STATISTICS BY MONTH FOR THE CITY OF SANTA BARBARA, CA

MONTH	AVERAGE	MAXIMUM (YEAR)	MAX DAILY (DATE)
JANUARY	3.92	17.22 (1916)	6.95 (1914/25)
FEBRUARY	3.77	17.33 (1962)	4.25 (1914/18)
MARCH	2.95	12.38 (1978)	3.80 (1952/15)
APRIL	1.22	6.55 (1965)	3.14 (1926/ 4)
MAY	0.36	2.96 (1977)	1.60 (1949/18)
JUNE	0.09	1.62 (1884)	1.13 (1963/11)
JULY	0.03	0.81 (1950)	0.63 (1950/ 9)
AUGUST	0.04	1.48 (1983)	0.78 (1983/19)
SEPTEMBER	0.33	7.15 (1904)	4.50 (1904/25)
OCTOBER	0.60	8.65 (1889)	2.45 (1907/22)
NOVEMBER	1.57	9.84 (1885)	3.90 (1902/10)
DECEMBER	3.03	12.67 (1867)	5.32 (1977/28)
ANNUAL	17.91	45.21 (1940-41)	6.95 (1/25/1914)

Sources: Santa Barbara city record, Station 7902, from 1 July 1867 through 30 June 1993 (126 years).
Data: Rainfall in inches. Daily records reflect gage reading at time of daily observation, which varies through the historic period.

TABLE

CITY OF SANTA BARBARA, CALIFORNIA
MONTHLY AND SEASONAL PRECIPITATION

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1867-68	0.00	0.00	0.00	0.00	2.31	12.67	3.97	2.00	1.08	2.44	0.72	0.00	25.19
1868-69	0.00	0.00	0.00	0.00	1.25	4.26	3.26	2.12	4.22	0.46	0.20	0.00	15.77
1869-70	0.00	0.00	0.00	0.30	0.65	0.57	0.25	5.87	0.83	0.99	0.74	0.07	10.27
1870-71	0.00	0.00	0.00	1.04	0.27	1.41	0.86	2.92	0.02	2.02	0.37	0.00	8.91
1871-72	0.00	0.00	0.00	0.09	1.83	6.56	2.53	1.81	0.18	1.80	0.00	0.14	14.94
1872-73	0.00	0.00	0.05	0.00	0.00	4.34	0.58	5.48	0.05	0.00	0.00	0.00	10.50
1873-74	0.00	0.02	0.00	0.00	0.27	5.26	4.54	3.17	0.78	0.28	0.14	0.00	14.46
1874-75	0.00	0.00	0.00	1.91	1.30	0.00	14.84	0.18	0.38	0.10	0.00	0.00	18.71
1875-76	0.00	0.00	0.00	0.00	6.53	0.31	7.56	5.67	2.73	0.27	0.00	0.00	23.07
1876-77	0.00	0.00	0.00	0.32	0.00	0.00	2.72	0.00	0.82	0.18	0.45	0.00	4.49
1877-78	0.00	0.00	0.00	0.00	1.32	3.12	7.17	11.73	2.47	3.34	0.29	0.07	29.51
1878-79	0.00	0.00	0.00	0.32	0.00	5.16	5.24	0.71	0.34	1.60	0.21	0.00	13.58
1879-80	0.00	0.00	0.00	0.41	1.62	4.57	1.30	10.86	1.15	5.73	0.00	0.00	25.64
1880-81	0.00	0.00	0.00	0.25	0.28	9.73	2.83	0.30	1.25	0.59	0.00	0.00	15.23
1881-82	0.00	0.00	0.44	1.47	0.33	0.95	1.13	2.38	5.74	1.63	0.00	0.20	14.27
1882-83	0.00	0.00	0.00	0.37	0.77	0.10	2.18	2.92	3.64	0.29	2.79	0.35	13.41
1883-84	0.00	0.00	0.00	1.32	0.00	2.76	6.33	9.68	9.77	2.60	0.39	1.62	34.47
1884-85	0.00	0.00	0.00	1.02	0.79	6.62	1.23	0.07	0.35	3.00	0.00	0.00	13.08
1885-86	0.00	0.00	0.00	0.19	9.84	2.47	5.12	1.19	2.03	3.40	0.00	0.00	24.24
1886-87	0.00	0.00	0.00	0.39	0.87	0.86	0.31	8.64	0.13	1.43	0.33	0.03	12.99
1887-88	0.00	0.00	0.38	0.31	1.10	4.43	10.15	1.30	3.86	0.16	0.02	0.00	21.71
1888-89	0.00	0.00	0.03	0.07	5.62	5.59	0.29	1.29	7.31	0.49	0.76	0.13	21.58
1889-90	0.00	0.00	0.00	8.65	3.21	10.64	5.32	2.96	1.10	0.31	0.18	0.00	32.37
1890-91	0.00	0.00	1.50	0.05	0.48	3.53	0.45	7.92	1.56	1.57	0.30	0.00	17.36
1891-92	0.00	0.00	0.15	0.00	0.00	2.43	1.10	2.55	2.95	0.46	1.12	0.00	10.76
1892-93	0.00	0.00	0.00	0.26	4.27	6.66	4.41	3.10	7.80	0.38	0.09	0.00	26.97
1893-94	0.00	0.00	0.00	0.82	0.07	2.94	0.99	0.76	0.29	0.24	0.91	0.00	7.02
1894-95	0.12	0.00	1.36	0.68	0.07	4.67	6.25	0.67	1.99	0.46	0.02	0.05	16.34
1895-96	0.00	0.00	0.00	0.55	0.77	0.93	6.84	0.00	2.37	1.78	0.08	0.05	13.37
1896-97	0.40	0.00	0.00	0.92	3.51	2.92	4.35	3.65	2.73	0.02	0.00	0.00	18.50
1897-98	0.00	0.00	0.00	1.44	0.00	0.00	0.63	1.39	0.28	0.00	1.25	0.00	4.99
1898-99	0.00	0.00	3.17	0.14	0.00	0.36	4.48	0.02	2.78	0.64	0.00	0.78	12.37
1899-00	0.00	0.00	0.00	2.06	1.97	2.35	2.32	0.05	1.58	0.42	1.90	0.01	12.66

TABLE 4.

CITY OF SANTA BARBARA, CALIFORNIA
MONTHLY AND SEASONAL PRECIPITATION

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1900-01	0.02	0.00	0.04	0.15	3.99	0.02	4.86	3.65	0.16	2.07	0.34	0.10	15.40
1901-02	0.06	0.09	0.36	2.42	1.16	0.00	1.36	4.40	2.89	1.40	0.07	0.00	14.21
1902-03	0.00	0.00	0.00	1.48	4.01	2.24	2.06	1.63	6.12	2.91	0.27	0.02	20.74
1903-04	0.00	0.00	0.00	0.00	0.05	0.00	0.46	4.69	4.40	1.89	0.09	0.00	11.58
1904-05	0.00	0.10	7.15	0.51	0.00	1.53	3.73	8.22	6.40	0.51	1.44	0.05	29.64
1905-06	0.18	0.00	0.03	0.16	1.14	0.07	4.26	3.67	9.96	0.83	2.40	0.00	22.70
1906-07	0.00	0.04	0.00	0.00	0.35	6.46	12.46	2.34	5.64	0.27	0.00	0.16	27.72
1907-08	0.00	0.03	0.00	6.23	0.00	1.80	4.29	5.96	0.21	0.49	0.20	0.00	19.21
1908-09	0.00	0.00	1.16	0.20	1.84	2.48	15.67	7.92	6.91	0.00	0.03	0.08	36.29
1909-10	0.00	0.01	0.17	0.57	2.34	9.53	2.91	0.08	3.62	0.39	0.00	0.00	19.62
1910-11	0.02	0.00	2.56	0.29	0.33	0.75	14.21	4.92	7.76	1.02	0.03	0.05	31.94
1911-12	0.00	0.00	0.12	0.28	0.02	2.33	0.42	0.00	9.48	2.12	1.58	0.00	16.35
1912-13	0.00	0.00	0.00	0.28	0.21	0.00	3.14	6.58	0.64	1.04	0.19	0.50	12.58
1913-14	0.09	0.07	0.17	0.00	3.43	2.71	15.91	7.30	0.95	0.70	0.03	0.16	31.52
1914-15	0.05	0.00	0.00	0.12	0.04	4.38	4.94	8.03	1.15	0.97	1.57	0.00	21.25
1915-16	0.00	0.00	0.05	0.00	0.65	4.06	17.22	1.89	1.71	0.30	0.00	0.00	25.88
1916-17	0.00	0.11	1.90	2.82	0.10	6.12	3.25	7.61	0.28	0.28	0.09	0.00	22.56
1917-18	0.00	0.03	0.05	0.00	0.17	0.03	0.51	10.47	10.37	0.05	0.00	0.00	21.68
1918-19	0.25	0.58	2.13	0.02	3.64	0.83	1.20	1.95	2.62	0.17	1.07	0.00	14.46
1919-20	0.00	0.00	0.84	0.27	0.23	2.11	0.33	5.81	4.20	0.81	0.00	0.08	14.68
1920-21	0.00	0.00	0.00	0.40	0.56	1.51	5.32	1.58	1.77	0.38	2.69	0.10	14.31
1921-22	0.00	0.00	0.24	0.32	0.02	7.25	4.64	3.48	2.73	0.09	0.45	0.00	19.22
1922-23	0.00	0.00	0.00	0.37	1.98	8.70	1.96	0.91	0.00	3.29	0.00	0.03	17.24
1923-24	0.00	0.03	0.13	0.25	0.00	0.08	1.63	0.06	3.56	0.62	0.00	0.00	6.36
1924-25	0.00	0.00	0.00	0.85	1.20	1.20	0.60	1.45	2.79	1.89	2.23	0.05	12.26
1925-26	0.05	0.00	0.00	0.71	0.80	2.57	2.08	4.28	0.25	6.13	0.00	0.00	16.87
1926-27	0.00	0.00	0.00	0.36	6.84	0.62	1.94	9.86	2.28	0.78	0.00	0.00	22.68
1927-28	0.00	0.05	0.11	3.48	1.49	3.28	0.00	1.95	2.46	0.17	0.50	0.05	13.54
1928-29	0.00	0.00	0.00	0.10	2.46	4.41	1.53	2.28	2.39	1.17	0.00	0.20	14.54
1929-30	0.00	0.00	0.05	0.00	0.00	0.00	5.82	1.21	4.93	0.95	0.63	0.12	13.71

TABLE 4.

CITY OF SANTA BARBARA, CALIFORNIA
MONTHLY AND SEASONAL PRECIPITATION

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1930-31	0.00	0.00	0.01	0.04	2.64	0.00	4.25	4.07	0.00	1.43	2.11	0.00	14.55
1931-32	0.00	0.23	0.01	0.00	2.81	9.84	2.40	6.17	0.23	0.35	0.09	0.00	22.13
1932-33	0.00	0.00	0.11	0.10	0.00	0.67	6.42	0.00	0.30	0.20	0.11	0.75	8.66
1933-34	0.00	0.00	0.00	0.88	0.11	6.28	1.49	3.67	0.00	0.00	0.00	1.00	13.43
1934-35	0.00	0.00	0.04	1.89	3.48	3.63	4.10	1.58	3.16	3.32	0.00	0.00	21.20
1935-36	0.07	0.27	0.02	0.78	0.71	1.46	0.73	10.49	1.97	0.65	0.01	0.01	17.17
1936-37	0.01	0.70	0.00	1.86	0.00	6.93	3.09	7.99	4.79	0.03	0.11	0.00	25.51
1937-38	0.00	0.00	0.00	0.16	0.09	4.40	1.90	8.20	10.26	1.09	0.00	0.00	26.10
1938-39	0.00	0.00	0.19	0.14	0.08	4.94	2.84	1.27	3.62	0.17	0.10	0.00	13.35
1939-40	0.00	0.00	0.26	0.09	0.02	1.41	6.39	4.87	0.82	1.06	0.02	0.00	14.94
1940-41	0.00	0.00	0.00	0.75	0.43	8.92	9.68	8.21	11.71	5.50	0.01	0.00	45.21
1941-42	0.03	0.01	0.00	0.89	0.44	5.00	0.80	0.75	1.76	3.19	0.00	0.00	12.87
1942-43	0.00	0.00	0.03	1.44	0.62	1.36	12.84	4.21	2.92	0.92	0.03	0.00	24.37
1943-44	0.00	0.00	0.00	0.39	0.12	5.57	1.44	7.05	1.74	1.57	0.01	0.06	17.95
1944-45	0.00	0.00	0.00	0.00	2.66	1.23	0.60	5.87	4.87	0.00	0.00	0.00	15.23
1945-46	0.00	0.00	0.06	0.73	0.37	6.35	0.40	0.72	2.69	0.00	0.05	0.02	11.39
1946-47	0.00	0.00	0.00	0.89	5.95	3.17	0.60	0.76	1.80	0.10	0.08	0.00	13.35
1947-48	0.00	0.01	0.05	0.22	0.00	0.37	0.00	1.71	4.29	2.01	0.43	0.17	9.26
1948-49	0.00	0.00	0.00	0.08	0.00	2.64	1.40	1.35	2.78	0.24	2.43	0.03	10.95
1949-50	0.00	0.00	0.00	0.02	1.72	4.16	2.54	2.76	1.29	0.61	0.05	0.01	13.16
1950-51	0.81	0.02	0.41	1.21	1.88	0.50	2.53	1.21	1.20	1.45	0.01	0.01	11.24
1951-52	0.00	0.06	0.00	0.49	2.04	4.80	13.89	0.71	7.37	1.79	0.00	0.08	31.23
1952-53	0.03	0.01	0.04	0.10	3.60	5.26	1.78	0.03	0.71	1.42	0.17	0.29	13.44
1953-54	0.00	0.00	0.01	0.00	2.08	0.09	5.98	2.95	3.81	0.44	0.06	0.02	15.44
1954-55	0.00	0.02	0.00	0.03	2.03	3.60	4.39	2.29	0.70	3.45	0.40	0.01	16.92
1955-56	0.00	0.01	0.00	0.00	1.36	6.07	7.19	1.15	0.00	2.42	1.64	0.00	19.84
1956-57	0.00	0.00	0.00	0.11	0.00	0.14	5.39	3.74	0.54	2.31	1.57	0.06	13.86
1957-58	0.00	0.00	0.00	1.41	0.51	4.51	3.71	9.84	6.20	5.43	0.33	0.00	31.94
1958-59	0.00	0.00	0.27	0.00	0.11	0.04	2.68	5.05	0.00	0.89	0.02	0.00	9.06
1959-60	0.00	0.00	0.01	0.01	0.00	1.01	3.12	3.39	0.63	2.64	0.00	0.01	10.82

TABLE 4.

CITY OF SANTA BARBARA, CALIFORNIA
MONTHLY AND SEASONAL PRECIPITATION

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1960-61	0.00	0.00	0.00	0.09	6.57	0.41	1.81	0.02	0.80	0.20	0.09	0.00	9.99
1961-62	0.00	0.01	0.04	0.00	3.74	1.47	2.18	17.33	1.41	0.00	0.00	0.00	26.18
1962-63	0.00	0.00	0.00	0.42	0.00	0.12	1.79	5.39	4.09	2.42	0.29	1.21	15.73
1963-64	0.00	0.07	0.91	0.88	3.56	0.00	1.45	0.00	2.33	0.84	0.10	0.05	10.19
1964-65	0.00	0.00	0.01	0.80	2.59	4.94	0.76	0.46	2.33	6.55	0.02	0.00	18.46
1965-66	0.00	0.00	0.05	0.00	8.26	3.53	1.51	0.78	0.06	0.02	0.12	0.01	14.34
1966-67	0.01	0.00	0.04	0.04	3.31	5.63	7.61	0.50	2.57	5.18	0.00	0.00	24.89
1967-68	0.00	0.00	0.23	0.00	4.05	1.09	1.44	2.02	4.22	0.62	0.00	0.00	13.67
1968-69	0.00	0.02	0.00	1.03	0.65	1.81	15.55	8.35	1.00	1.92	0.06	0.08	30.47
1969-70	0.02	0.00	0.05	0.07	2.03	0.20	3.23	3.80	2.48	0.00	0.00	0.00	11.88
1970-71	0.02	0.00	0.00	0.05	4.54	4.67	1.21	0.88	0.82	0.73	1.10	0.00	14.02
1971-72	0.00	0.00	0.00	0.00	0.48	7.33	0.12	0.53	0.00	0.15	0.02	0.01	8.64
1972-73	0.01	0.00	0.01	0.13	5.47	0.84	6.37	7.38	3.01	0.05	0.03	0.03	23.33
1973-74	0.00	0.03	0.01	0.70	1.75	1.54	8.04	0.00	4.93	0.28	0.00	0.05	17.33
1974-75	0.00	0.00	0.05	0.90	0.09	7.21	0.00	5.27	3.86	0.80	0.00	0.00	18.18
1975-76	0.00	0.03	0.00	0.03	0.20	0.07	0.00	5.61	1.25	0.79	0.01	0.20	8.19
1976-77	0.00	0.00	4.01	0.12	1.06	0.94	4.01	0.19	1.59	0.00	2.96	0.10	14.98
1977-78	0.00	0.50	0.00	0.00	0.00	7.04	9.35	9.62	12.38	1.98	0.00	0.05	40.92
1978-79	0.00	0.00	1.22	0.00	3.18	1.70	4.30	4.82	6.47	0.05	0.00	0.00	21.74
1979-80	0.00	0.00	1.07	0.45	0.20	1.21	6.71	11.11	3.05	0.56	0.23	0.00	24.59
1980-81	0.36	0.03	0.02	0.00	0.00	1.70	3.60	2.67	6.00	0.65	0.00	0.00	15.03
1981-82	0.00	0.00	0.00	0.50	2.10	0.69	2.94	0.47	5.79	2.57	0.01	0.04	15.11
1982-83	0.00	0.00	2.04	0.62	4.64	2.49	10.45	8.67	4.68	4.45	0.18	0.03	38.25
1983-84	0.00	1.48	3.66	0.83	3.07	4.66	0.21	0.12	0.54	0.12	0.00	0.01	14.70
1984-85	0.01	0.16	0.67	0.35	1.99	4.17	1.57	2.19	1.87	0.02	0.00	0.00	13.00
1985-86	0.01	0.00	0.09	0.58	3.50	0.88	2.07	7.94	6.20	0.87	0.00	0.00	22.14
1986-87	0.00	0.00	1.45	0.00	1.35	0.12	1.56	3.00	3.66	0.16	0.00	0.17	11.47
1987-88	0.13	0.00	0.00	2.45	1.08	3.12	2.43	2.19	0.02	3.97	0.04	0.02	15.45
1988-89	0.02	0.00	0.17	0.00	1.01	3.64	0.35	2.53	0.90	0.34	0.39	0.05	9.40
1989-90	0.00	0.00	0.08	0.55	0.63	0.00	2.01	2.36	0.00	0.09	0.80	0.00	6.52
1990-91	0.00	0.00	0.06	0.00	0.15	0.05	2.26	3.55	11.05	0.03	0.00	0.44	17.59
1991-92	0.00	0.18	0.02	0.50	0.09	3.24	2.38	8.74	4.16	0.02	0.27	0.00	19.61
1992-93	0.51	0.01	0.00	0.87	0.00	4.97	9.29	7.45	3.05	0.00	0.05	0.71	26.90

SANTA BARBARA PRECIPITATION 1868-1990

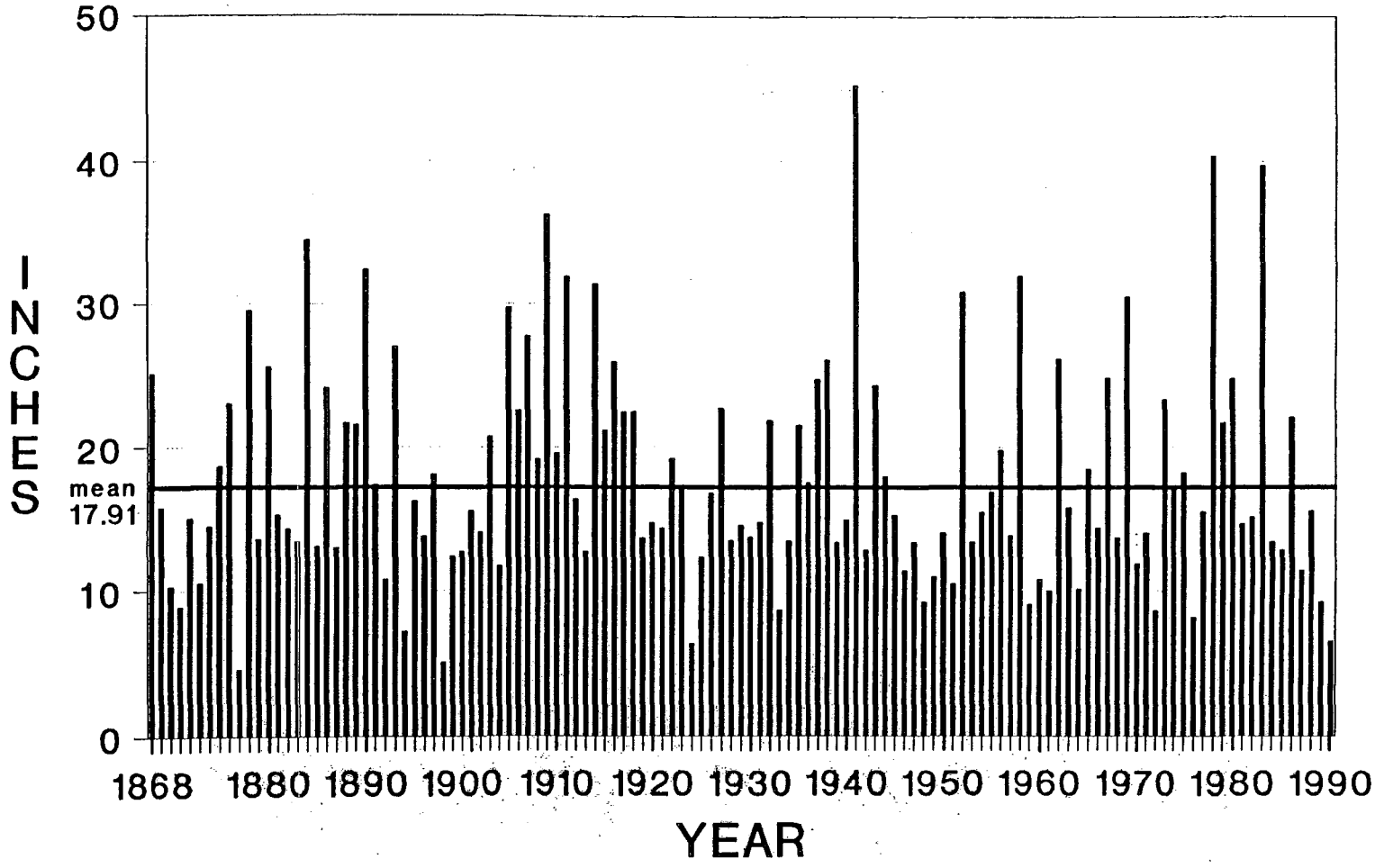
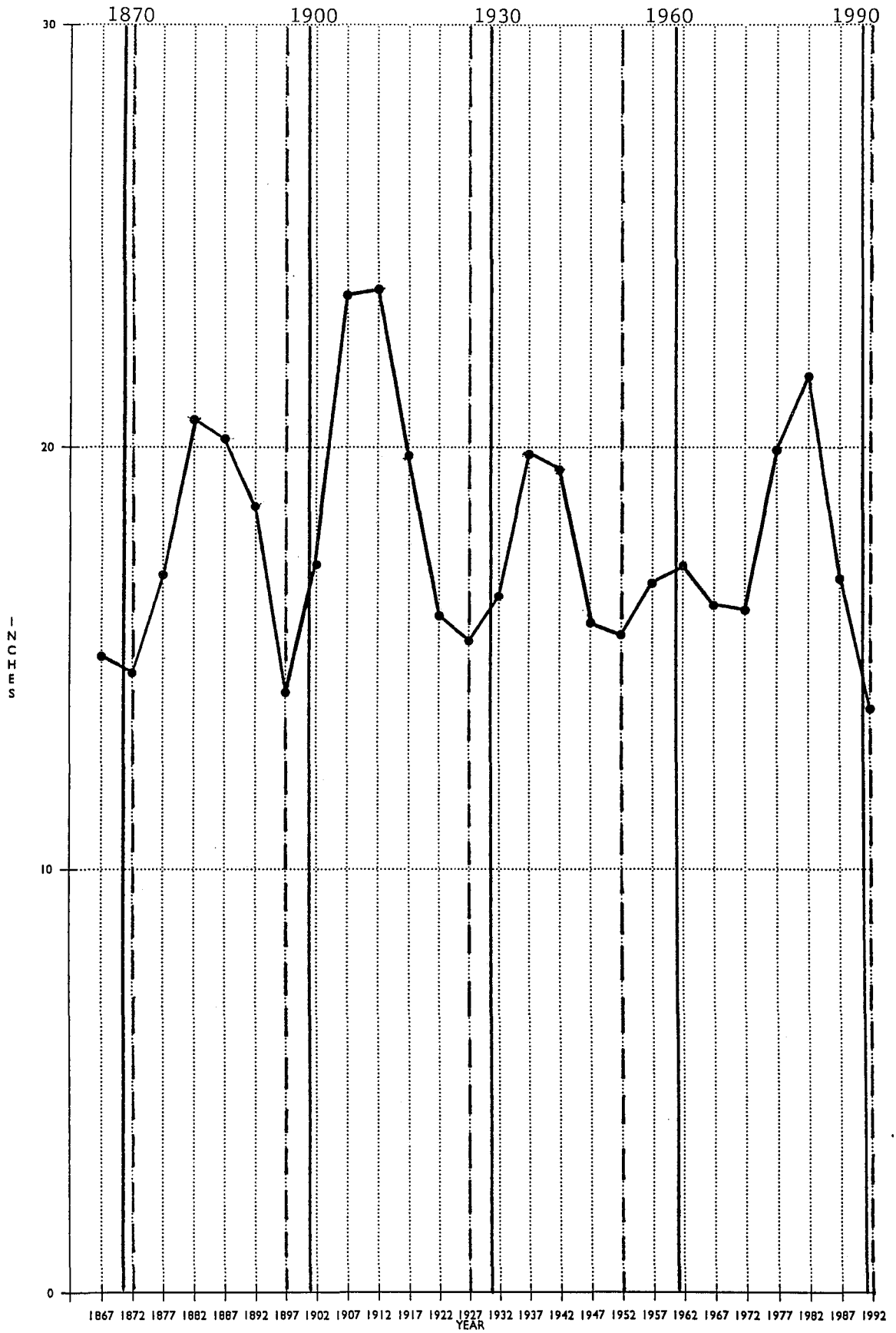


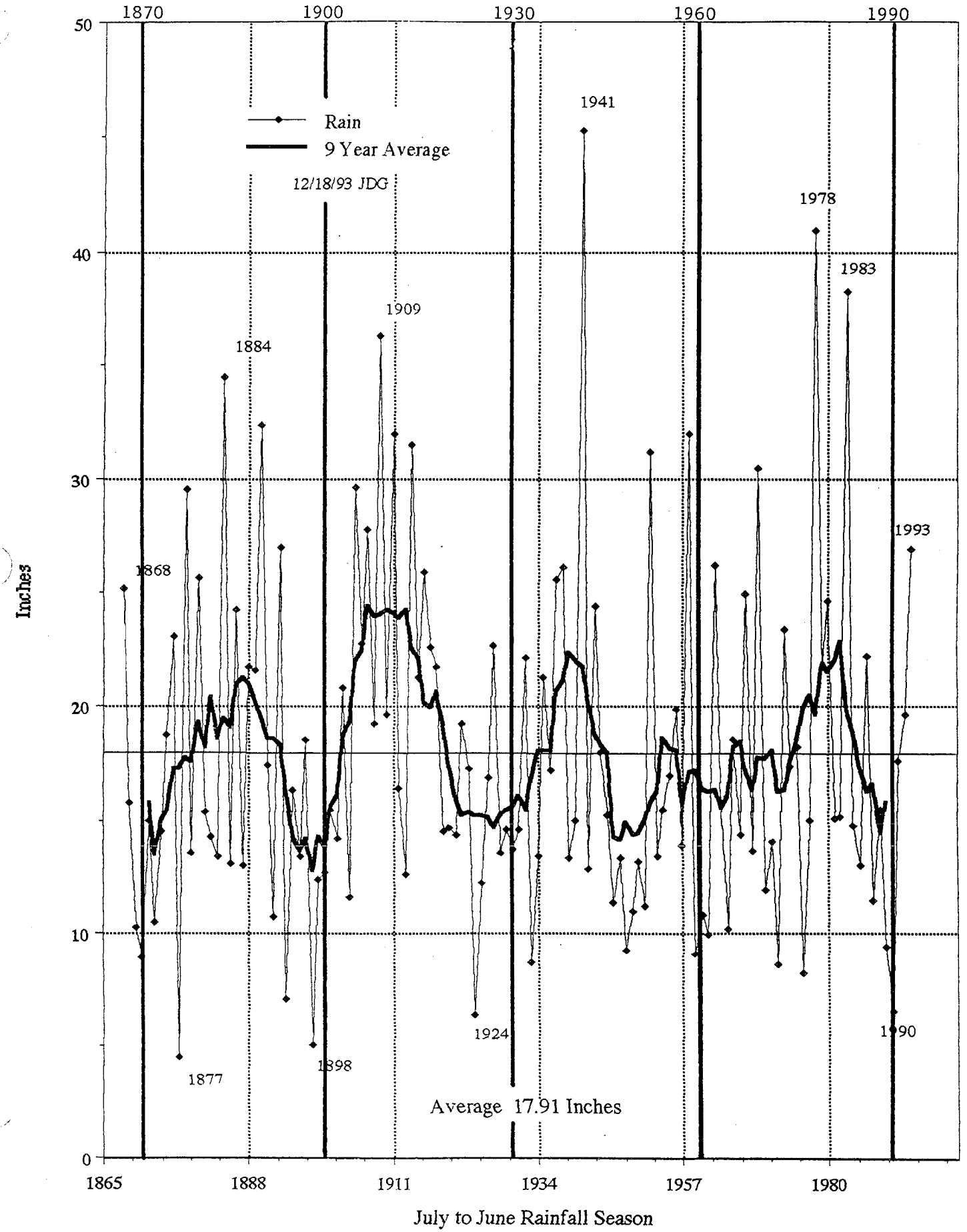
Figure 3.
Source: Santa Barbara County Flood Control and Water Conservation District

Figure 4a. PRECIPITATION TRENDS AT SANTA BARBARA, CA (1867-1992)



Courtesy: Corey Rossman

Figure 4b. Average Rainfall for Santa Barbara



Courtesy: Jim Goodridge

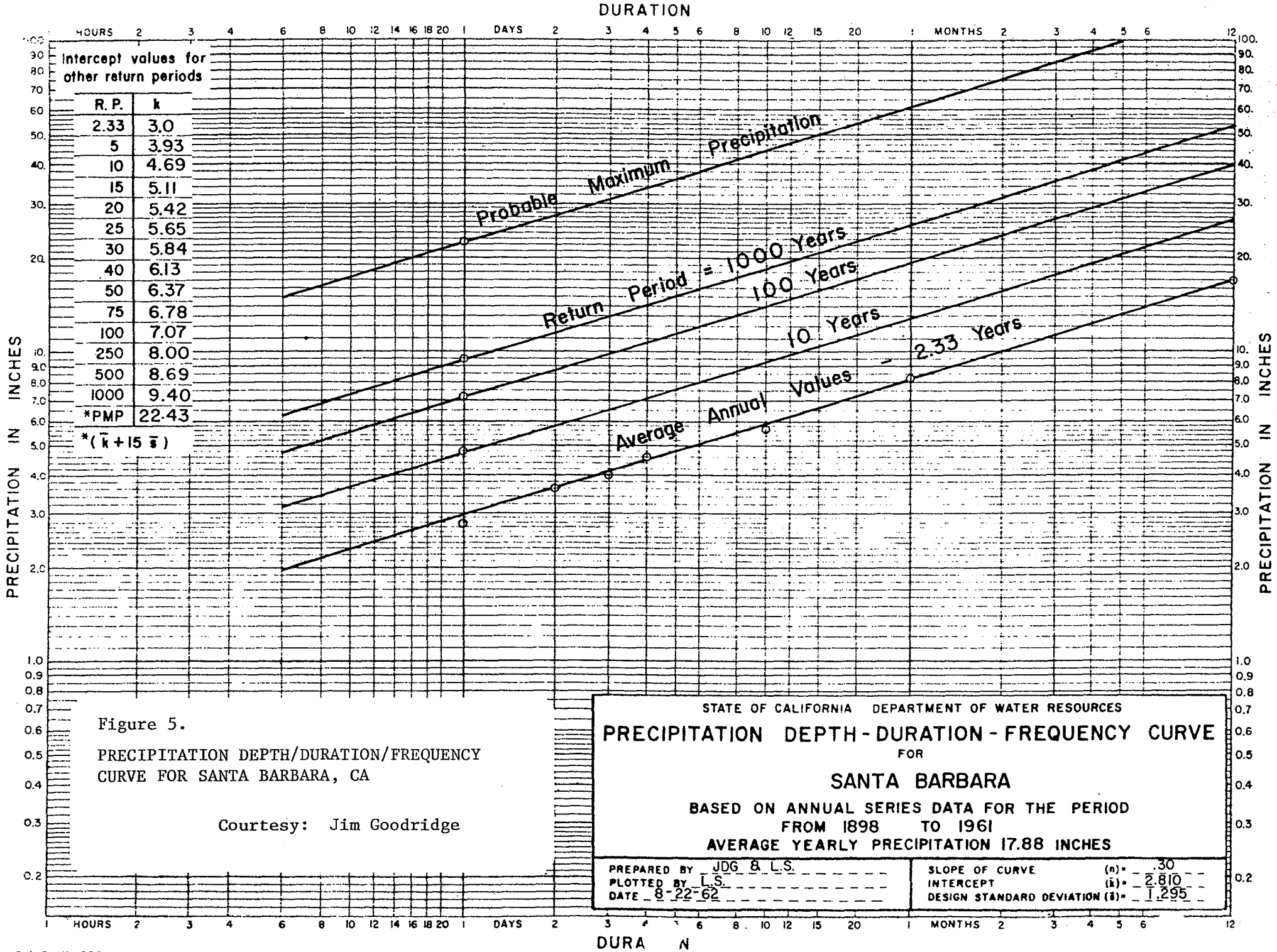


Figure 5.

PRECIPITATION DEPTH/DURATION/FREQUENCY CURVE FOR SANTA BARBARA, CA

Courtesy: Jim Goodridge

D W R. No 535

VIII. FLOODING

The city of Santa Barbara lies within Santa Barbara County's south coast watershed, which encompasses a drainage basin of 289 square miles. Streams flowing through the watershed generally originate on the orographically favored steep south-facing slopes of the Santa Ynez Mountain Range. The streams, coursing southward through gravelly alluvial fans, are relatively short in length and respond swiftly and dramatically to heavy rainfall.

The U.S. Army Corps of Engineers has identified four creeks that subject the city of Santa Barbara to flooding: Sycamore, Mission, Arroyo Burro, and San Roque (Fig. 6). These streams drain an area of 29.7 square miles; Mission Creek having the largest drainage area with 11.5 square miles. Mission Creek parallels the 101 Freeway from Oak Park through the central business district, crossing under the freeway near the Amtrak station. There is an additional section, the Central Drainage Area, covering 2.5 square miles north and east of lower State Street, which is inadequately drained and is subject to frequent urban and street flooding.

Streamflow within the city of Santa Barbara is negligible, except during and immediately following precipitation. Neither climate nor watershed type is supportive of continuous runoff within the district.

Heavy rains can occur locally in combination with areas of compacted or impervious soils, steep channel gradients, burned-over sections, and man-made projects and obstructions. Downpours can then translate rapidly into intense, debris-laden floods within the city. The U.S. Army Corps of Engineers (1975) has cautioned that "even worse flooding" is possible in the future.

There is evidence that flooding has occurred periodically in the Santa Barbara area far back into prehistoric times. The Santa Barbara littoral is itself constructed of alluvium deposited from the Santa Ynez Mountains.

Michaelsen and Haston (1988) studied tree ring growth and reconstructed river flow data for the nearby Santa Ynez River watershed. This record indicates that remarkable flooding likely occurred in Santa Barbara County in 1565 and 1568. The 1568 event was extreme throughout southern California and may have signalled monthly rainfall rates approaching 10,000-year return period projections. The very heavy streamflows in the late sixteenth century predate European settlement in the area; thus no written record is available, but confidence is high that such events did occur. Excessive streamflow values in 1868 that had been projected by Michaelsen and Haston correlate well with the modern record December rainfall, 12.67 inches, observed by Dr. Shaw at Santa Barbara in 1867.

Flooding was mentioned by Spanish missionaries in the eighteenth and early nineteenth centuries. In the

modern era, flooding was reported at Santa Barbara in 1862, 1867, 1875, 1877, 1888, 1907, 1909, 1911, 1914, 1918, 1938, 1941, 1943, 1952, 1964, 1967, 1969, 1971, 1978, and 1983.

Beginning on December 24, 1861 and continuing through the end of January 1862, a five week period of heavy rains caused some of the largest flood discharges ever experienced in California. Measurable rain fell in nearby Ventura for 60 consecutive days. O'Neill (1939) stated that "immense slides of earth and rocks took place in the mountains [of Santa Barbara County], resulting in considerable change in the appearance of the country." The silting of the relatively shallow harbor at Goleta effectively ended its usefulness as a port.

On January 21, 1909, a record daily rainfall of 6.40 inches was recorded by observer George W. Russell, which flooded some of the Oak Park neighborhood where Mr. Russell lived, and also flooded lower State Street to a depth of three feet. The flooding at Oak Park was exacerbated by street improvements that were underway in the area at that time.

In January 1914, a 48-hour rainfall total of 8.20 inches, part of a heavy monthly rainfall of 15.91 inches, caused damage or destruction to a dozen houses, several commercial establishments, and six bridges in the Mission Creek area. In his official Weather Bureau record, George W. Russell wrote that "the enormous rainfall of 6.95 [inches] in 24 hours on the 25th followed by heavy damage to entire lower end of county." Newspaper accounts told of four and a half inches of rain in four hours within the city on the afternoon of January 25. If correct, these reports would document a rainfall with a return record of 500 years. During the event, the official daily rainfall record established on that day, 6.95 inches, has stood through the 1992-93 water year.

In 1940-41, the wettest water year on record at Santa Barbara, 45.21 inches of rain was recorded. There were reports of "flooding and silt deposition" within the city, but the rainfall was spread relatively evenly from December into April, mitigating damage.

In January 1952, Mission Creek flooded on two separate occasions. Many homes were damaged, and water one or two feet in depth flooded the lower State Street area (Fig. 8). In January 1967 and again in January 1969, heavy rains caused mudslides, debris deposition, and erosion. Within the city, the 1967 event caused considerable property damage and stream overflows. The 1969 flood, while generally much worse in the county, caused only relatively minor damage in the Oak Park area.

In February and March 1978, flooding occurred once again in the city as 22 inches of precipitation fell in the two-month period. Mudslides did millions of dollars of damage to residences, as the heavy rains occurred after the destructive Sycamore Fire, which had occurred in the summer of 1977.

Quasi-stationary storms, such as the January 1969 rainstorm that inundated the adjacent communities of Montecito and Carpinteria, have the potential to wreak havoc in Santa Barbara. Strong orographic uplifting along the precipitous slopes of the mountains just north of the city helps create a serious short-fused flood danger. High velocity water movements can move large quantities of debris through the city, blocking bridges and clogging channels.

A 100-year flood (the 1914 event approaches a 100-year storm) would be capable of creating such high stream velocities, resultant severe erosion and, in overflow areas, heavy deposition of debris and mud. Stream velocities of 3 to 15 feet per second (2 to 10 mph) would occur in main channels, except in lined sections of Mission Creek, where velocities could reach 33 feet per second. After the onset of heavy rains, flood stage is reached within the Santa Barbara Stream Group in 1.5 hours, and extreme flood peaks occur in about 3.5 hours. (Stage hydrograph, page 32. Note that an intermediate regional flood approximates a 100-year flood.) This allows for only a very short-fused warning time: Flood control and warning agencies must be extremely vigilant preceding and during heavy precipitation events.

A fire, such as the 1990 Painted Cave Fire, creates an additional flood hazard. With protective vegetation cover eliminated, ash and fine silt can combine to create a clay-like surface that promotes almost immediate runoff during moderate or heavy precipitation episodes. Such flooding occurred in November 1964, following the Coyote Fire. In that event, a wall of mud and debris up to 25 feet high was reported to have rushed through San Antonio Creek, just west of the city of Santa Barbara.

TABLE 5.
CUMULATIVE FREQUENCY DISTRIBUTION OF ANNUAL PRECIPITATION FOR SANTA BARBARA, CA

Probability of receiving less than the value indicated, values in inches. (based on data from 1931-1960)

Probability %								
5	10	25	33	50	67	75	90	95
6.9	8.7	12.0	13.5	16.6	20.0	22.0	28.3	32.4

TABLE 6.
RAINFALL DEPTH/DURATION/FREQUENCY AT SANTA BARBARA, CA
MAXIMUM RAINFALL FOR INDICATED NUMBER OF CONSECUTIVE MINUTES

Return Period (Yrs)	5min	15min	30min	1hr	3hr	12hr	24hr	W/Y
RP2	0.15	0.31	0.48	0.68	1.18	2.27	2.79	16.72
RP5	0.21	0.44	0.69	0.97	1.70	3.27	4.02	24.05
RP10	0.26	0.54	0.85	1.20	2.10	4.03	4.95	28.86
RP25	0.31	0.64	1.00	1.42	2.47	4.76	5.84	34.77
RP50	0.34	0.72	1.13	1.59	2.79	5.36	6.58	39.03
RP100	0.38	0.80	1.25	1.77	3.09	5.94	7.29	43.13
RP200	0.42	0.88	1.37	1.93	3.38	6.51	7.99	47.15
RP500	0.47	0.98	1.53	2.15	3.77	7.25	8.90	52.35
RP1000	0.50	1.05	1.65	2.32	4.06	7.81	9.60	56.21
RP10000	0.62	1.29	2.03	2.86	5.00	9.61	11.81	68.83

Source: Jim Goodridge
Based on rainfall statistics from 1940-1992
Data: Precipitation in inches; RP = return period in years

TABLE 7.
RAINFALL DEPTH/DURATION/FREQUENCY AT SANTA BARBARA, CA
MAXIMUM RAINFALL FOR INDICATED MONTH

	RP2	RP10	RP50	RP100	RP500	RP1000	RP10000
JANUARY	3.02	8.59	13.69	15.83	21.37	22.80	29.62
FEBRUARY	3.11	8.79	13.43	15.30	19.11	21.23	26.35
MARCH	2.49	6.37	9.54	10.83	13.38	14.87	18.32
APRIL	0.86	3.01	5.02	5.87	8.39	8.65	11.78
MAY	0.12	1.19	2.41	2.95	4.55	4.81	6.76
JUNE	0.00	0.36	0.91	1.17	1.84	2.29	2.84
JULY	0.00	0.15	0.46	0.61	0.90	1.15	1.50
AUGUST	0.00	0.18	0.59	0.79	1.45	1.53	2.27
SEPTEMBER	0.00	1.27	3.25	4.20	7.18	7.54	11.10
OCTOBER	0.38	1.62	2.79	3.29	4.65	4.94	6.59
NOVEMBER	1.28	3.74	5.76	6.57	8.40	9.14	11.96
DECEMBER	2.61	6.45	9.51	10.74	13.47	14.59	18.20
SEASON	16.50	28.53	38.36	42.33	51.11	54.87	66.90

Source: Jim Goodridge and Santa Barbara County Flood Control
Based on rainfall statistics from 1868-1993
Data: Precipitation in inches; RP = return period in years

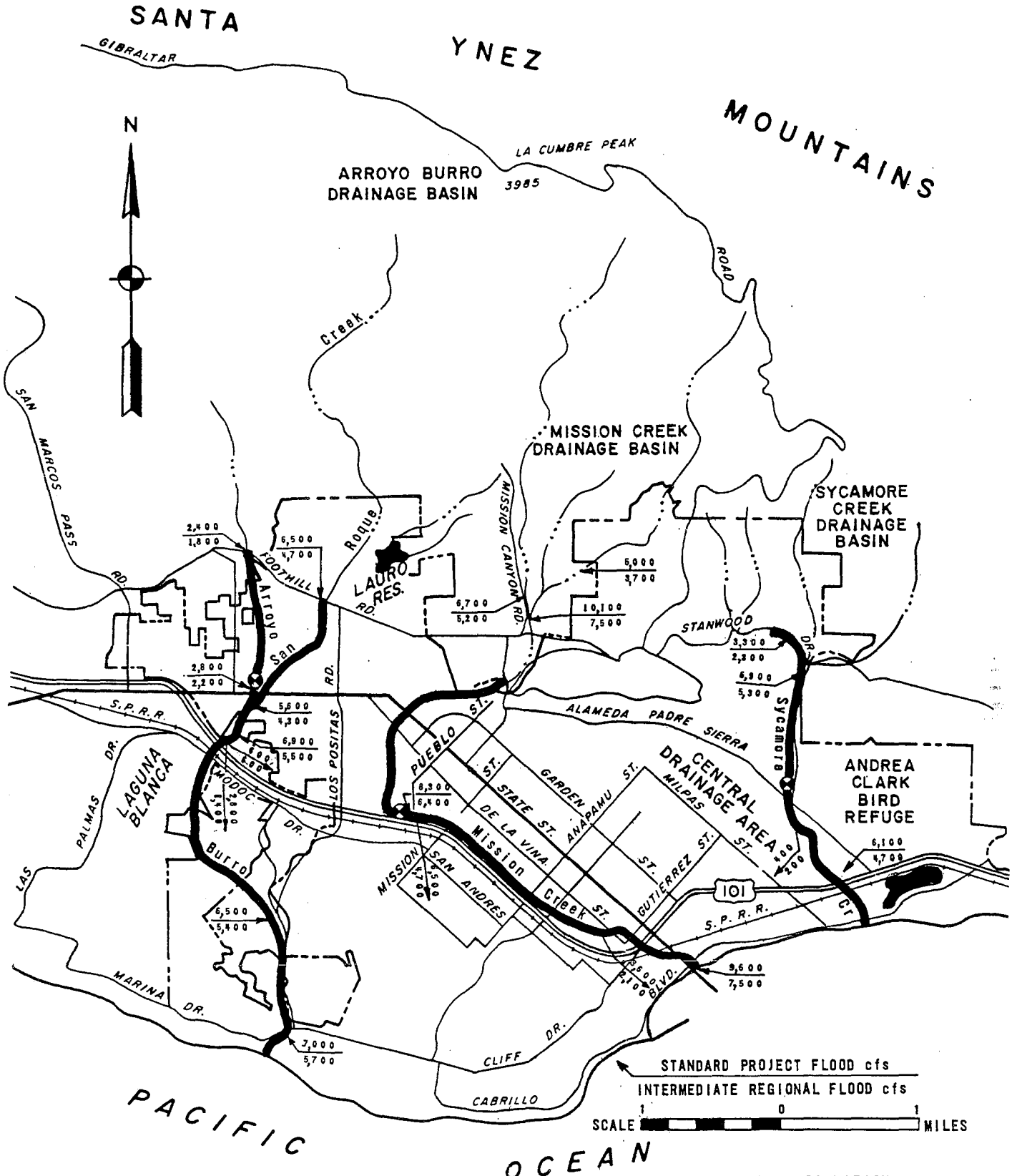
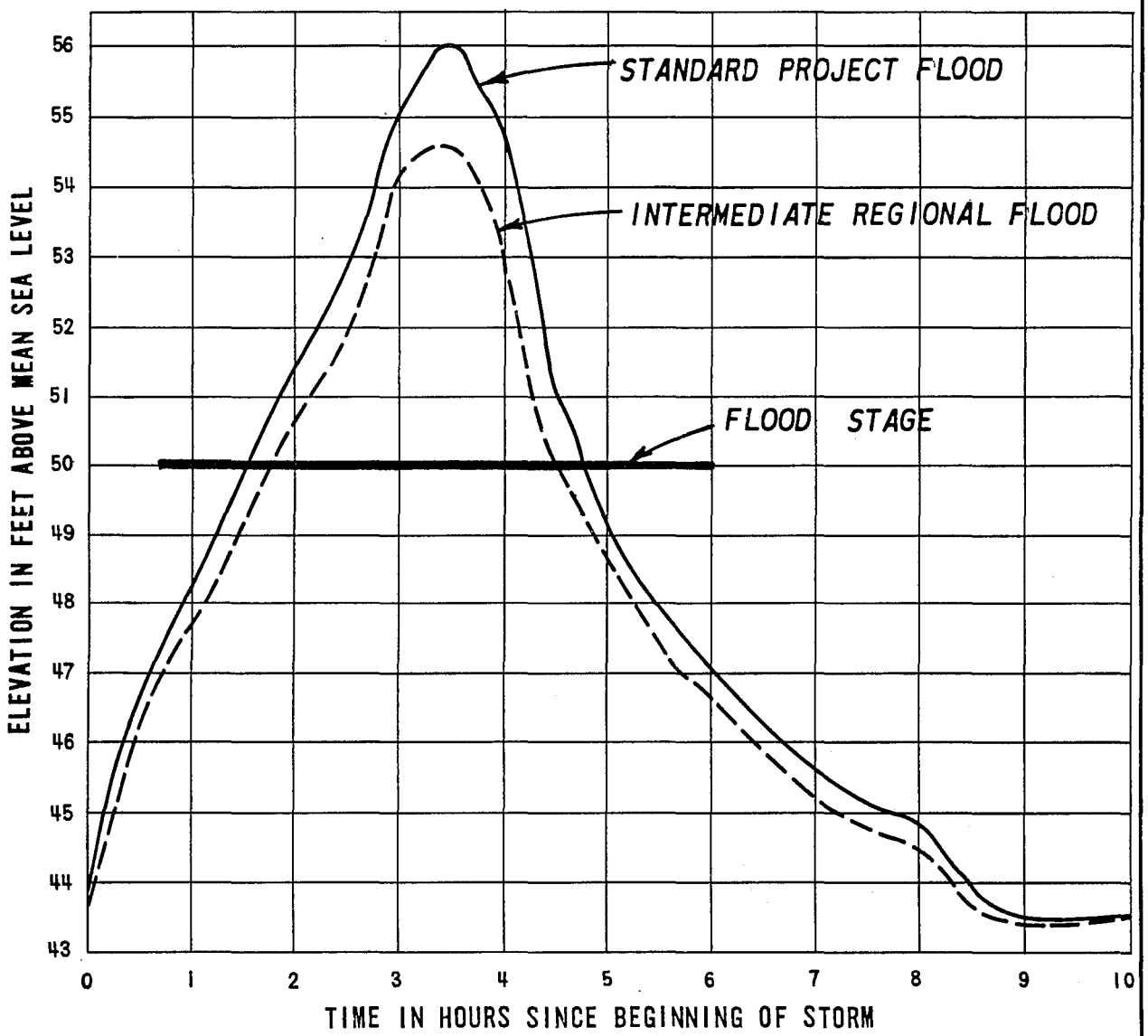


Figure 6.

SANTA BARBARA FLOOD PLAIN INFORMATION MAP

FLOOD PLAIN INFORMATION
SANTA BARBARA STREAM GROUP
PEAK DISCHARGES
APRIL 1975

Source: US Army Corps of Engineers



NOTE
1. BASED ON COMPUTED DATA

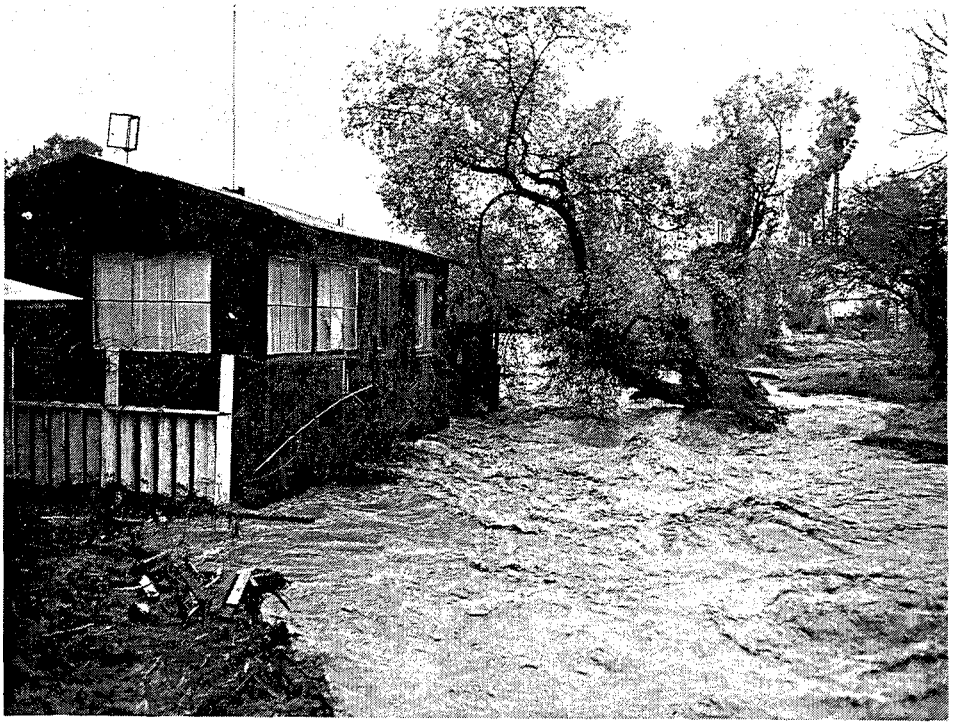
Figure 7.

STAGE HYDROGRAPH FOR ARROYO BURRO CREEK
SANTA BARBARA STREAM GROUP

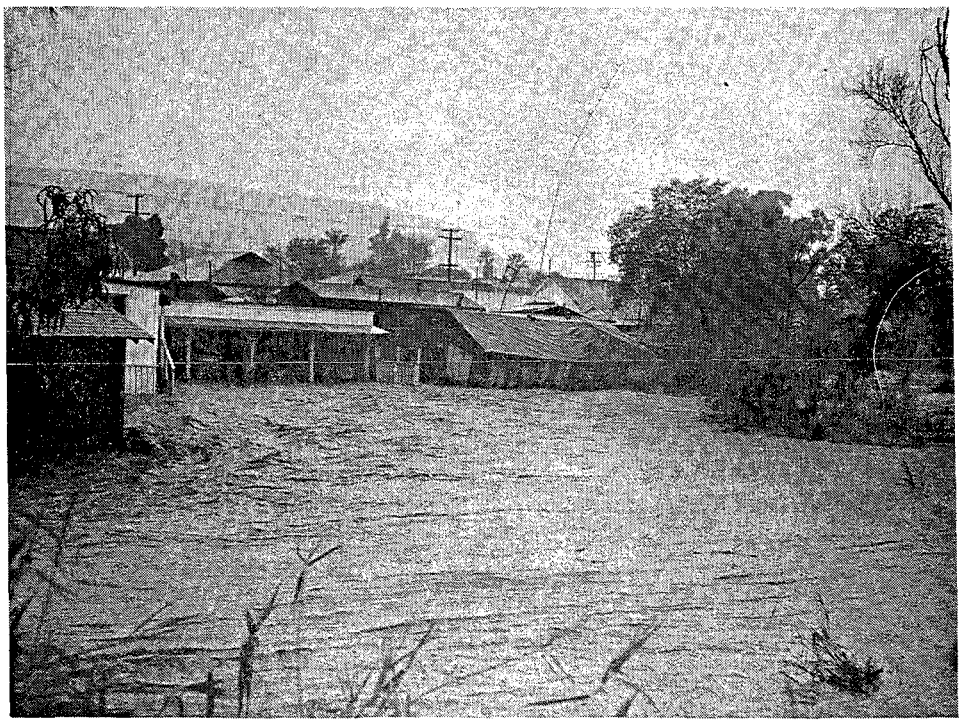
Source: US Army Corps of Engineers

ARROYO BURRO
AT RIVER MILE 1.25
STAGE HYDROGRAPH

PAST FLOODS



The 1952 Flood on Mission Creek perils this house near Gutierrez Street. . .



. . .and the house is finally destroyed by the rampaging floodwaters.

Figure 8.

Source: US Army Corps of Engineers

IX. WIND

Reliable, long-term wind data for the city of Santa Barbara do not exist. However, statistical data are available for Santa Barbara Airport, and some very good automated stations have been installed close to Santa Barbara since the mid-1980s.

Elford (1962) utilized an FAA study of surface winds at Santa Barbara Airport conducted between August 1936 and August 1940. These data showed that light wind (three mph or less) occurred 37 percent of the time. Wind speeds of 4-15 mph occurred 60 percent of the time and speeds greater than 15 mph were noted three percent of the time. The predominant wind direction, when winds measured four mph or more, was from the south or southwest. But when winds were stronger, 16 mph or more, the predominant direction was from the west or northwest.

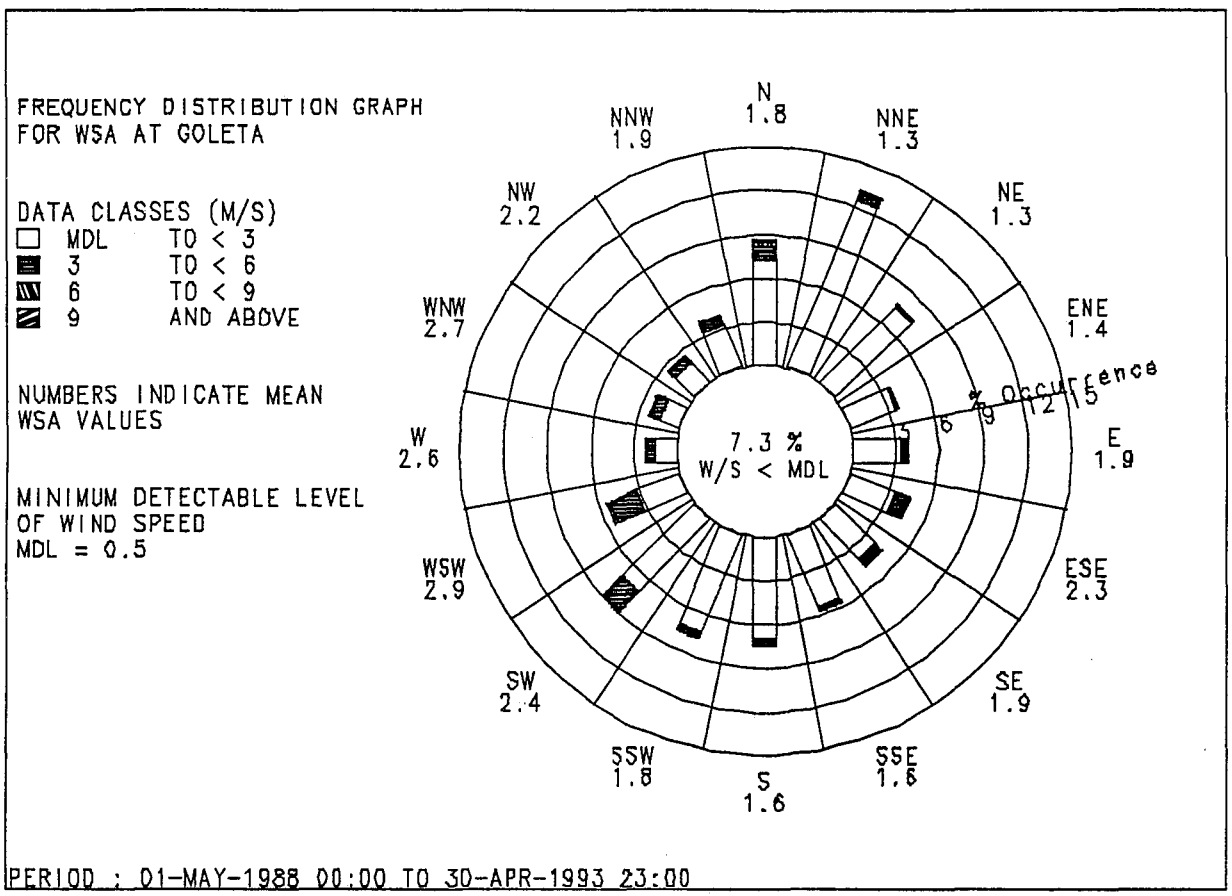
Wind roses from Santa Barbara County Air Pollution Control District sites at Goleta, about nine miles west of the city of Santa Barbara, are included in this report (Fig. 9). The Exxon 10 site is at the ocean while the Goleta sensors are two miles inland. Both locations manifest a light nighttime drainage wind from the north-northeast.

Recent (1988-1991) data yield an average annual wind speed at Santa Barbara Airport of 6.1 mph. Concurrent data from the California Department of Water Resources suggest an average annual wind speed of 4.5 mph for the city of Santa Barbara. Highest average daily wind speeds, 6-8 mph, tend to be noted during the time from March into early June. Winds are lighter than average from July through October.

Strong winds, 40 mph or more, occur at Santa Barbara from three sources: (1) significant winter storms that approach the district from the Pacific Ocean, causing gusty winds to blow from the southeast across the Santa Barbara coastal strip; (2) the eastern Pacific high pressure area, as it pushes up against relatively low pressure over the Colorado River Basin and sets up a strong west wind in the Santa Barbara area; and (3) downslope, so-called "sundowner", winds, from the north or northwest, which can strongly affect sections of the city.

Elford (1962) estimated that a peak wind of 60 mph at Santa Barbara might be experienced "as often as once in 50 years" and that a peak wind of 80 mph might occur "once in 100 years." If and when such extreme winds are measured in Santa Barbara, they would most likely fit into the category of downslope winds.

Wind Rose at Goleta and Exxon 10 - West Campus



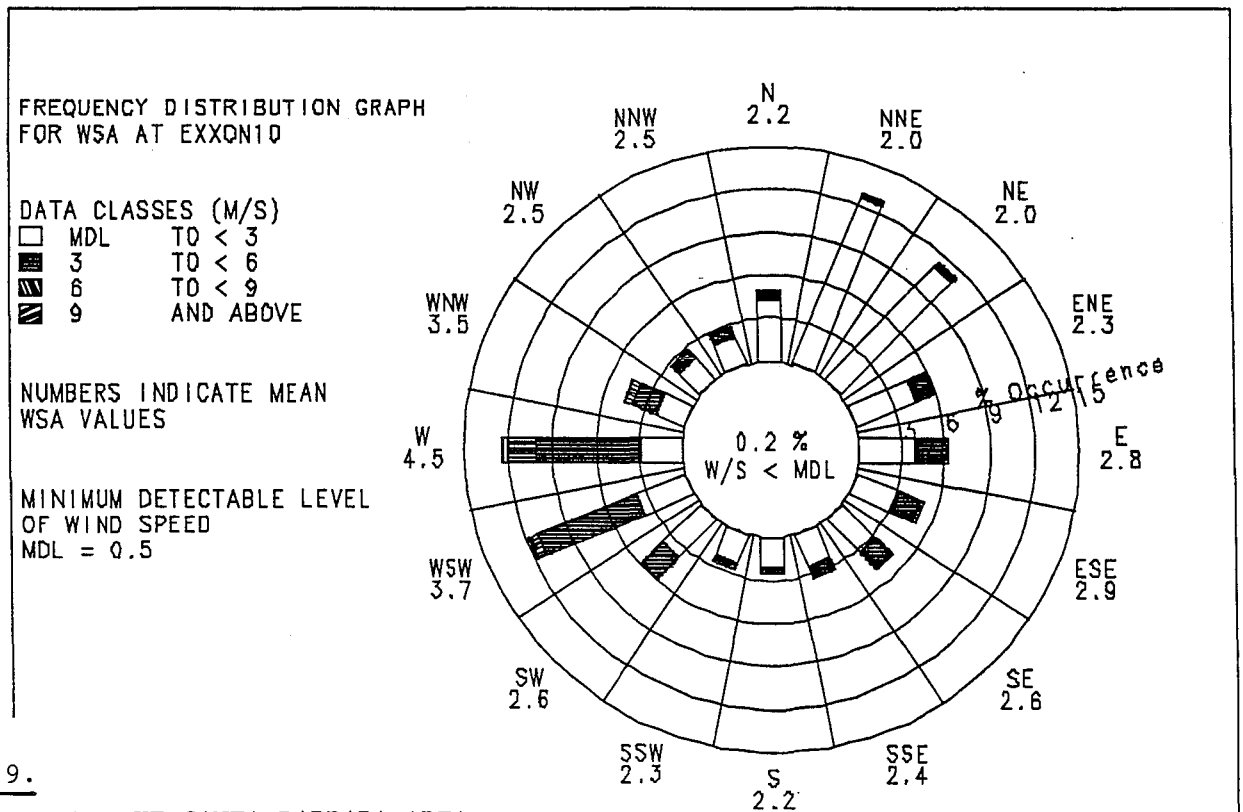


Figure 9.

WIND ROSES IN THE SANTA BARBARA AREA

Courtesy: Richard Hallerman

X. DOWNSLOPE WINDS

The Santa Barbara area's unique downslope winds, somewhat analogous to the Santa Ana winds that occur near Los Angeles, are known locally as "sundowners." Sundowners often occur during evening hours, hence the name.

Sundowners, like most downslope winds, occur in various degrees of severity. Light sundowner conditions create irregular rises in temperature at Santa Barbara with gentle offshore breezes. Stronger episodes, occurring about two or three times per year, result in sharp temperature increases and localized gusty winds. Rarely, perhaps only a few times in a century, a severe sundowner episode occurs, resulting in very strong and hot winds descending along the south-facing slopes of the Santa Ynez Range into the city of Santa Barbara. In these events, winds can reach gale force or higher within the city and downslope heating can make temperatures soar to well over 100°F.

The most phenomenal sundowner struck the city on Friday, June 17, 1859. Very hot north to northwest winds caused a severe dust storm that frightened the inhabitants of Santa Barbara. A United States Survey ship was anchored in Goleta Harbor that day and measured the temperature at 133°F at 2 p.m. The survey report, written in 1869 and quoted by Tompkins, stated:

> No human being could withstand such heat out of doors. All betook themselves to their dwellings and closed every door and window, the thick adobe walls giving admirable protection. Calves, rabbits and cattle died on their feet.

Another report on the 1859 sundowner comes from an historical text on the History and Resources of Santa Barbara published in 1876 and quoted later in the *Santa Barbara Morning Press*:

> On the 17th day of June, 1859, a hot wind, like a sirocco, visited the city of Santa Barbara. The wind was from the northwest and blew furiously, with a dense cloud of dust. The temperature rose to 136 Fahrenheit's scale. It commenced blowing about noon and continued until about half past three in the afternoon. Birds, rabbits, and tender lambs were killed; the leaves on the side toward the wind were scorched and died, and some fruit was blasted.

The temperature reading of 136°F (57.8° C) at Santa Barbara, if it were validated, would tie the record high temperature for the earth, set in Libya, North Africa, in 1922. Because of unique atmospheric mountain wave activity that occurs during downslope wind events near Santa Barbara, it is indeed possible that temperatures in the 130s°F could be reached within the city. Consistency within the historical source material inspires further confidence in the 1859 observations. However, the temperature measurements taken in that

exceptional event are well outside of the official Santa Barbara temperature record, both statistically and temporally. Also, weather observation techniques were not standardized by the U.S. Government until the 1870's. Therefore, the observed 136°F and 133°F readings are considered to be possibly accurate, but not official.

Not quite as powerful as the 1859 downslope windstorm, another severe sundowner struck Santa Barbara on Saturday night and Sunday, June 16-17, 1917. Fires burned throughout the district, whipped by strong winds. The situation was especially serious at Carpinteria, where residents carried their property to the beaches to avoid an advancing canyon fire. In Santa Barbara, strong winds created a dust storm (Fig. 10) "such as had never been known in this city before." The winds blew at gale force from 6 p.m. on Saturday until 2 a.m. Sunday. The winds returned at 2 p.m. Sunday, when the temperature reached its all-time modern record of 115°F and the four-day heat wave peaked. George W. Russell wrote in the official log (Fig. 11):

> The hottest day ever recorded on the 17th. A hot wind during night 16th with velocity of 35 to 45 miles per hour, damaged fruit & other trees. Nuts are damaged, beans seem to have escaped.

Another spectacular sundowner windstorm occurred on June 27, 1990. Winds gusting at 40 to 70 mph caused the Painted Cave Fire to race from near the ridgeline of the Santa Ynez Mountains to across the 101 Freeway within the city limits of Santa Barbara. Temperatures reached 112°F in the area during the holocaust, as 5,000 acres and over 500 structures were burned (Fig. 13).

Although local meteorologists have long appreciated the forces at work in the downslope winds that affect Santa Barbara, many advances in understanding the atmospheric dynamics involved in sundowner activity have been made only in the past few years. As late as 1982, an Independent Insurance Agent's report on the devastating Sycamore Fire (another wind-driven blaze) made the following observations:

> The sundowner is of a much more local nature [than the Santa Ana wind]. Not much is known about sundowners at present. It is thought that in the Santa Barbara area they normally start over the ocean west of the Lompoc-Guadaloupe area and move until they are behind the Santa Ynez Mountains. When it drops to the ground, [the air] heats up and the humidity is very low. As it rushes down the mountainsides and through the canyons in the late afternoons and evenings it creates the winds known as "sundowners," lasting only a few hours. Wind speeds may be 40 to 50 mph but can be 80 mph or more [Fig. 12].

At this writing, the dynamics of Santa Barbara downslope winds are under continuing investigation. It is believed that these conditions are caused by a combination of factors including (1) differences in atmospheric pressures between Santa Barbara and the portion of the county north of the Santa Ynez Mountains and (2) the formation of an atmospheric wave on the leeward side of the Santa Ynez Mountains. It is during the months of June and July that Santa Barbara is most vulnerable to the combination of severe downslope winds and heating.

The forecasting of sundowner winds at Santa Barbara has been enhanced in the past few years by research into these events, although some forecast techniques have been used for decades. The National Weather Service issues local forecasts for the city of Santa Barbara and environs, and routinely checks the potential for downslope windstorms. Using present technology, sundowners may be predicted as much as several days in advance.

XI. MISCELLANY

Relative Humidity.

Humidity is an indicator of the amount of water vapor in the air. Relative humidity is a ratio between the amount of water vapor actually in the air at a certain temperature and the amount of water vapor present when the air is saturated at the same temperature. This is expressed as a percentage.

Relative humidity averages 67 percent at Santa Barbara on an annual basis. The average daily maximum relative humidity is 82 percent, generally occurring in the early morning hours around sunrise. The average daily minimum relative humidity is 55 percent, usually occurring in the early afternoon.

Humidities are higher than the annual average, by 10 to 20 percent, during the time from June through early October. Lowest levels of the atmosphere tend to be drier in the Santa Barbara area during the winter season; relative humidities are generally 10 to 20 percent below the annual average from November through April. Moist conditions are common in Santa Barbara. Relative humidities are frequently near 100 percent during late night and morning hours in the summer "marine layer" season.

Dry air with very low relative humidity is not frequently observed. Relative humidities of less than 20 percent occur with warming downslope (offshore) winds, when the district is under the influence of a large high pressure area. These conditions are most likely to be found from November through May, and probably occur on an average of from 10 to 15 days per year. Relative humidities as low as five percent have been measured with reliable instrumentation at Santa Barbara.

Evapotranspiration.

The term evapotranspiration refers to the total transfer of moisture from the soil to the air in a field growing a well-

Weather Observer Says Relief Will Come Soon; Many Go to Beach

Never in the history of Santa Barbara has there been such heat as that prevailing since the Ojai and Carpinteria fires started. Weather Observer George W. Russell's reports show that the nearest heat record to that which yesterday set a new top notch at 115 degrees, was in September, 1914, when the mercury climbed to 108. That heat, also, was occasioned by the presence of a fire, the Hope Park district then being in the grasp of the flames.

While a part of the heat was due to desert winds, it is stated that the high record was forced through the heat from the forest fires. The severity of the winds, also, are attributed to the fires, and normal weather conditions are expected when the fires which now are raging in the Ojai and above Carpinteria, have been extinguished.

In Santa Barbara a dust storm prevailed Saturday night, such as has never been known in this city before. The winds whipped papers from bill boards, lashed numerous American flags, left flying over the stores, into shreds, and drove the finest dust into dwellings and stores, no place being too securely closed to prevent the particles from sifting through.

The heat through the evening sent thousands to the beach. Last night the number was materially diminished, as a breeze from the ocean set in just before midnight, and gave a cool night to the city.

Never before have such numbers of people sought the surf to cool off, hundreds of surf bathers spent most of the Sunday either in the water or lolling on the beach, taking an occasional plunge to keep cool. The bath house yesterday served 750 bathers, and there were many others who used their automobiles in which to don their bathing suits, it being estimated that during the day, from Graham's on the east, to far beyond Castle Rock, over 1000 people took to the water during the day.

HEROISM

and Jack Ballard were work
road from Shepard's In
he coast highway was fille
mobiles and wagons carry
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heat of this district wa
led by the heat on the Ven
road from Foster Park o
stricken town. Scores o
s drove over this highwa
ld to the persons still a
rying residents to the coast
ile this side of Ojai a fres
broken out at four o'cloc
y-up call had been sent t
r aid. Ventura's resource
e rapidly being used up fo
calls for men also for wor
on and for a blaze south o

Ojai in Ruins

noted resort town, was
desolation yesterday. Th
black with the burnt stub
handsome residences wer
ruins. Here and there b
of good luck a home ha
fire but half the residence
were gone.
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the water supply ha
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grace. The men we
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hting fresh fires a
spread of the older con-
At five o'clock yesterday
flames which had ap-
in control a few hours
nned by new gusts of
was sent to Ventura
throughout the

Musical Program at High School

A musical program, to which the public has been invited, will be given at the High School tonight. Three
...ented
... late
...Carol
...Mar-
...low-
...
...man
...
...John
...and Robert Foxen
Aria from La Traviata, Verdi
Miss Gertrude Masters

Figure 10.
SANTA BARBARA MORNING PRESS FEATURE
Monday, 18 June 1917
Headline: "HEAT RECORDS SET FOR CITY BY FIRES AND WIND"
Courtesy: Mary Compton

HAPPY HOME C
"NO PLACE LIKE

Monday, June 18, 1917.

Steadfast, unmovable—for as
your labor is not in vain in the Lor

THE COMMONPL

God bless the commonplace!
Through wearisome and unpr
Striving to carve new destinie

A trail through unaccustomed la
The feverish years possess us,
In our tense seeking for untro
The common heritage, nor care
Altars to dear familiar things.
When shadows lengthen and t
Of life falls faintly on the half-he
With vision dimmed and feeble

Back to the homely joys of bygo
Love and a hearthstone and a d
And through our tears we bless

Form No. 1009—Met'l.

U. S. Department of Agriculture, Weather Bureau.

COOPERATIVE OBSERVERS' METEOROLOGICAL RECORD:

Month of June JUNE, 1917 Station, Santa Barbara; County, Santa Barbara

State, California Latitude, 34° 25'; Longitude, 119° 15'; Hour of Observation, 6am 7pm; Time used on this form,

Date	Temperature: Maximum	Minimum	Range	Set Max.	Precipitation: Time of Beginning	Time of Ending	Amount	Snowfall, in Inches	Depth of Snow on Ground at Time of Observation	Prevailing Wind Direction	Character of Day	Miscellaneous Phenomena
1	70	48	22							N	Clear	Fog to 10
2	70	53	17							N	"	" " 9
3	70	52	18							N	"	" " 8
4	67	44	23							N	"	" " 10
5	67	45	22							N	"	10
6	65	45	20							N	"	" 9
7	65	50	15							N	"	" 11
8	65	50	15							"	"	" 10
9	66	50	16							"	"	" 11
10	63	50	13							"	"	" 12
11	70	46	24							"	"	" 11
12	78	45	33							"	"	" 9
13	80	48	32							"	"	" 7.30
14	95	48	47							"	"	[illegible] "
15	105	57	48								"	Hot & dry
16	107	58	49							NE	"	Strong winds fire
17	115	62	53							NE	"	" " "
18	80	65	15							E	"	Fog early
19	76	60	16							N	"	[illegible] fog
20	75	60	15							N	"	"
21	73	58	15							N	"	" 8
22	73	59	14							N	"	" 9
23	75	59	14							N	"	7.30
24	76	50	26							N	"	
25	76	55	21							N	"	
26	76	58	18							"	"	1
27	78	56	22							"	"	" [illegible]
28	84	56	28							E	"	
29	86	54	32							E	"	
30	87	55	32							E	"	
31												
Sum	2332	1599	731						Max 33.20 / 4.5+h	W		

George W. Russell, Cooperative Observer.

Post Office, Santa Barbara

MONTHLY SUMMARY.

TEMPERATURE.

Mean maximum, 77.8

Mean minimum, 53.2

Mean, 65.5

Maximum, 115; date, 17th

Minimum, ~~44~~ 45; date, [illegible] 4

Greatest daily range, 53 - 17

PRECIPITATION.

Total, 0 inches.

Greatest in 24 hours, 0; date,

SNOW.

Total fall, 0 inches; on ground 15th, inches; at end of month, inches.

NUMBER OF DAYS.

With .01 inch or more precipitation, 0

Clear, 30; partly cloudy, 0; cloudy, 0

DATES OF—

Killing frost,

Thunderstorms,

Hail,

Sleet,

Auroras,

REMARKS.

The hottest day ever recorded on the 17th. A hot wind during night 16th with velocity of 35 to 45 miles per hour, damaged fruit & other trees. Nut trees damaged, beans seem to have escaped.

Figure 11.

COPY OF GEORGE W. RUSSELL WEATHER LOG
JUNE 1917

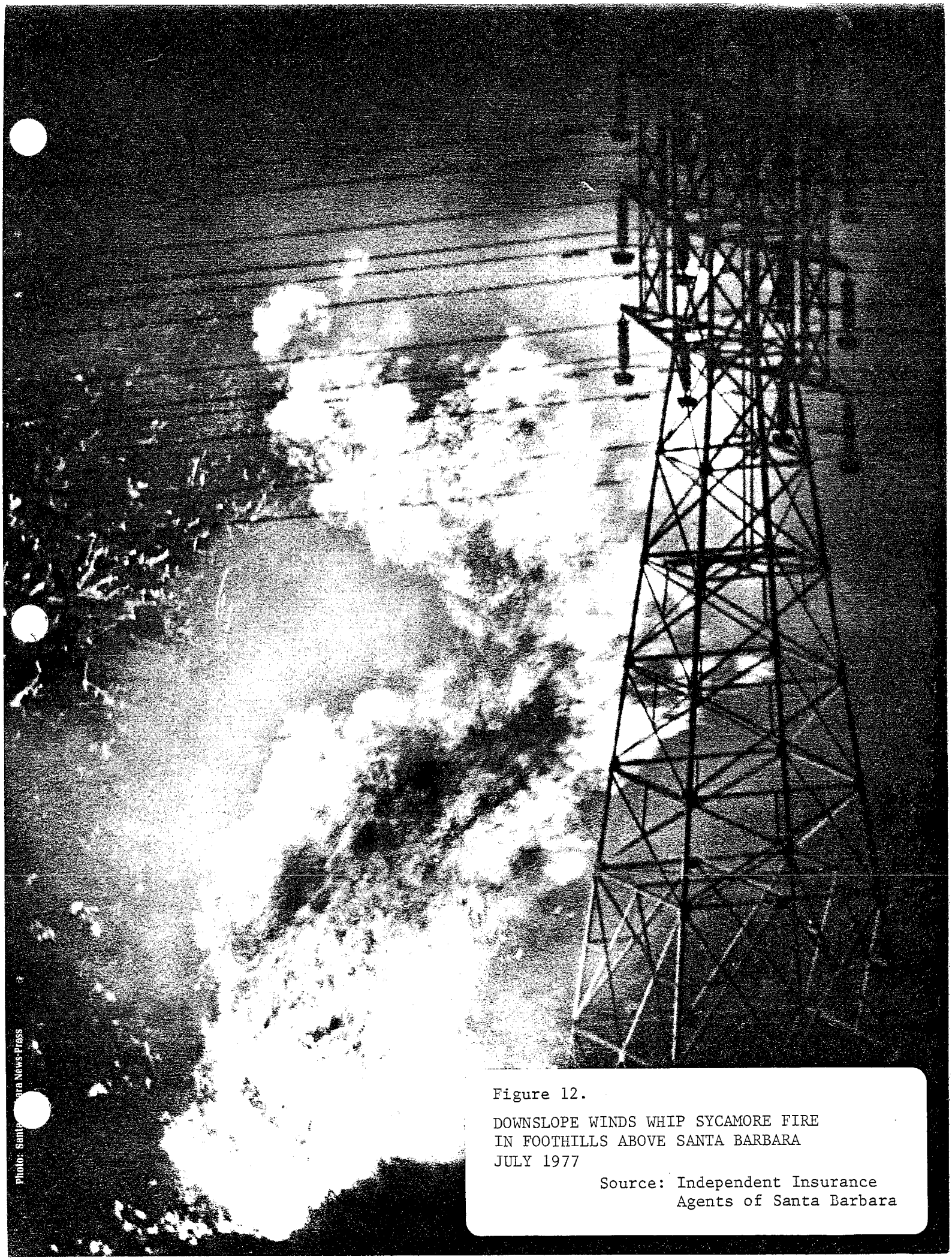

Figure 12.

DOWNSLOPE WINDS WHIP SYCAMORE FIRE
IN FOOTHILLS ABOVE SANTA BARBARA
JULY 1977

Source: Independent Insurance
Agents of Santa Barbara

Figure 13. Santa Barbara resident waters roof with garden hose as downslope winds gusting to 70 mph spread flames across city, June 1990. The home was engulfed by flames just after this picture was taken.

Courtesy: Santa Barbara News-Press

established crop. Some of the water loss is by evaporation from the surface of the soil while other moisture is carried upward and transpired from the leaves and other surfaces of the plants. At the State of California Department of Water Resources site at Santa Barbara, evapotranspiration is measured for a grassy surface, which has good coverage and is well irrigated.

At Santa Barbara, the average annual evapotranspiration is 45.3 inches. The average daily evapotranspiration rate is 0.124 inches, with a range from 0.07 inches per day in January to 0.18 inches per day in May and June.

The estimated average date of exhausting soil moisture reserves after the wet season at Santa Barbara is June 5. This is the "dry date," the date when range grasses stop growing.

Average annual evaporation, as measured from a standard four-foot pan, is 69.0 inches per year. The monthly average ranges from 3.7 inches in February to 8.1 inches in July. Approximately two-thirds of the total annual evaporation occurs in the months from May through October.

Sky Cover, Clouds, and Fog.

Nineteenth century data that purported to measure cloud cover and fog was based on observations that were too imprecise to be of any scientific value. In fact, the early weather journals frequently reflected a desire on the part of the authors to prove that Santa Barbara's climate was superior to that of Boston or Philadelphia or Oakland.

An attempt was made between 1936 and 1938 to study the incidence of clouds and fog at the airport in Goleta. The study was of too short a duration to provide reliable climatological data.

Long-term aviation weather observations at Santa Barbara Airport, and the addition of solar radiation measurements at California Department of Water Resources sites, have helped to clarify sky cover patterns at Santa Barbara.

Dense fog, visibilities of 1/4 mile or less, occurs on an average of approximately 14 days per year. Dense fog resulting from airmass advection is typically observed from late August through the middle of October. September averages 2.9 days with dense fog and October averages 3.3 days. A typical statistical analysis indicates that February also has a significant number of dense fog days (2.8), but this anomaly is the result of including precipitation and fog together as an obstruction of vision due to fog. This yields a fog/day result that is excessive and unrepresentative.

Santa Barbara is a mostly sunny place. The city averages 255 clear days per year (with zero to three tenths sky covered by clouds). There are an average of 50 partly cloudy days (four to seven tenths sky cover) and 60 cloudy days (eight tenths or more sky cover).

Elford (1962) discussed general cloud cover patterns at Santa Barbara:

> Cloudiness associated with migrating storms is minimal in Santa Barbara County, but there is a considerable amount of stratus cloudiness along the immediate coast. Sunshine averages around 60% to 70% of possible at Santa Barbara, increasing to near 80% during the fall period of the year.

More precise statistics on measured solar radiation are now available. Solar radiation has been monitored at Santa Barbara Airport since March 1988 by the Department of Water Resources at CIMIS station #67. This station received an annual average of 56.8 percent of the extra terrestrial radiation (ETR). The average daily solar radiation at Santa Barbara Airport is 412 Langleys per day (Ly/dy) (calories per square centimeter) for the four years from 1989 through 1992. The monthly average solar radiation ranges from 226 Ly/dy in December to 578 Ly/dy in June.

Solar radiation in California varies from a low of 45 percent of ETR at Caspar Creek on the North Coast to a high of 70 percent of ETR at Lancaster in the high desert of Los Angeles County.

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APPENDIX

TABLE 8.

SANTA BARBARA, CALIFORNIA
WEATHER RECORDS, MEANS AND EXRTREMES
1867-1993

34 deg 25' N Lat, 119 deg 42' W Long, elevation 130 feet

TEMPERATURE (deg F)			
Mean Annual Temperature		60.1	
Average Daily High		71.4	
Average Daily Low		48.8	
January Average Daily High		64.7	
January Average Daily Low		41.4	
August Average Daily High		77.5	
August Average Daily Low		56.7	
Highest Temperature All-Time		115 on 17 June 1917	
Lowest Temperature All-Time		20 on 4 and 10 January 1949	
Average Annual Heating Degree Days		2086	
Average Annual Cooling Degree Days		289	
Average Growing Season (Above 32 deg)		342 days	
PRECIPITATION (inches)			
Average annual		17.91	
Average January		3.91	
Average July		0.03	
Maximum Precipitation in:	15 minutes	1.18	(1978)
	1 hour	1.70	(1982-83)
	1 day	6.95	(25 Jan 1914)
	1 month	17.33	(Feb 1962)
	1 season	45.21	(1940-41)
	calendar yr	41.48	(1941)
Least Precipitation in:	1 season	4.49	(1876-77)
	calendar yr	3.99	(1947)
Ave no of days/year rainfall 0.10 or more		25	
Ave no of days/year rainfall 1.00 or more		5	
THUNDERSTORMS			
Ave no of days/year with thunder		2.4	
WIND (miles per hour)			
Average annual wind speed		4.5	
Prevailing direction		from southwest	
Maximum wind speed		data unavailable	
RELATIVE HUMIDITY (percent)			
Averge annual		67	
Average daily maximum		82	
Average daily minimum		55	
BAROMETRIC PRESSURE			
Average station pressure		29.97 inches (1014.8 mb)	

TABLE 9.

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF JANUARY

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	64	40	.12	5.72
02	64	40	.12	5.84
03	64	40	.12	5.96
04	64	40	.12	6.08
05	64	41	.12	6.20
06	64	41	.12	6.32
07	64	41	.12	6.44
08	64	41	.12	6.56
09	64	41	.12	6.68
10	65	41	.12	6.80
11	65	41	.12	6.92
12	65	41	.12	7.04
13	65	41	.12	7.16
14	65	41	.13	7.29
15	65	41	.13	7.42
16	65	42	.13	7.55
17	65	42	.13	7.68
18	65	42	.13	7.81
19	65	42	.13	7.94
20	65	42	.13	8.07
21	65	42	.13	8.20
22	65	42	.13	8.33
23	65	42	.13	8.46
24	65	42	.13	8.59
25	65	42	.13	8.72
26	65	42	.13	8.85
27	65	42	.13	8.98
28	65	42	.13	9.11
29	65	42	.13	9.24
30	65	42	.14	9.38
31	65	42	.14	9.52

AVE DAILY MAX TEMP: 64.7
AVE DAILY MIN TEMP: 41.4
MEAN MONTHLY TEMP: 53.1

AVE MONTHLY PRECIP: 3.92 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF FEBRUARY

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	65	42	.14	9.66
02	65	42	.14	9.80
03	65	42	.14	9.94
04	65	42	.14	10.08
05	65	42	.14	10.22
06	65	42	.14	10.36
07	65	43	.14	10.50
08	65	43	.14	10.64
09	65	43	.14	10.78
10	65	43	.14	10.92
11	65	43	.14	11.06
12	65	43	.14	11.20
13	65	43	.14	11.34
14	66	43	.14	11.48
15	66	43	.13	11.61
16	66	43	.13	11.74
17	66	44	.13	11.87
18	66	44	.13	12.00
19	66	44	.13	12.13
20	66	44	.13	12.26
21	66	44	.13	12.39
22	66	44	.13	12.52
23	66	44	.13	12.65
24	66	44	.13	12.78
25	66	44	.13	12.91
26	66	44	.13	13.04
27	66	44	.13	13.17
28	66	44	.12	13.29

AVE DAILY MAX TEMP: 65.5
AVE DAILY MIN TEMP: 43.2
MEAN MONTHLY TEMP: 54.3

AVE MONTHLY PRECIP: 3.77 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

NOTE: NO NORMAL VALUES FOR FEBRUARY 29TH ARE INCLUDED; IN COMMON PRACTICE THE NORMAL VALUES FOR THE 28TH ARE USED FOR THE 29TH IN EACH LEAP YEAR. FEBRUARY TEMPERATURE AND PRECIPITATION MONTHLY VALUES ARE NOT ADJUSTED FOR LEAP YEARS.

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF MARCH

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	67	44	.12	13.41
02	67	44	.12	13.53
03	67	44	.12	13.65
04	67	44	.12	13.77
05	67	44	.11	13.88
06	67	44	.11	13.99
07	67	44	.11	14.10
08	67	44	.11	14.21
09	67	44	.11	14.32
10	67	45	.11	14.43
11	67	45	.11	14.54
12	67	45	.10	14.64
13	67	45	.10	14.74
14	67	45	.10	14.84
15	67	45	.10	14.94
16	67	45	.10	15.04
17	67	45	.10	15.14
18	67	45	.09	15.23
19	67	45	.09	15.32
20	67	45	.09	15.41
21	67	45	.09	15.50
22	67	45	.08	15.58
23	67	45	.08	15.66
24	68	45	.08	15.74
25	68	45	.08	15.82
26	68	45	.07	15.89
27	68	45	.07	15.96
28	68	45	.07	16.03
29	68	46	.07	16.10
30	68	46	.07	16.17
31	68	46	.07	16.24

AVE DAILY MAX TEMP: 67.3
AVE DAILY MIN TEMP: 44.8
MEAN MONTHLY TEMP: 56.0

AVE MONTHLY PRECIP: 2.95 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF APRIL

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	68	46	.06	16.30
02	68	46	.06	16.36
03	68	47	.06	16.42
04	68	47	.06	16.48
05	68	47	.06	16.54
06	68	47	.06	16.60
07	69	47	.05	16.65
08	69	47	.05	16.70
09	69	47	.05	16.75
10	69	47	.05	16.80
11	69	47	.05	16.85
12	69	47	.05	16.90
13	69	47	.05	16.95
14	69	47	.04	16.99
15	69	47	.04	17.03
16	69	48	.04	17.07
17	69	48	.04	17.11
18	69	48	.04	17.15
19	69	48	.04	17.19
20	69	48	.03	17.22
21	70	48	.03	17.25
22	70	48	.03	17.28
23	70	48	.03	17.31
24	70	48	.03	17.34
25	70	48	.02	17.36
26	70	49	.02	17.38
27	70	49	.02	17.40
28	70	49	.02	17.42
29	70	49	.02	17.44
30	70	49	.02	17.46

AVE DAILY MAX TEMP: 69.1
AVE DAILY MIN TEMP: 47.6
MEAN MONTHLY TEMP: 58.3

AVE MONTHLY PRECIP: 1.22 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF MAY

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	70	49	.02	17.48
02	70	49	.02	17.50
03	70	49	.02	17.52
04	70	49	.02	17.54
05	70	49	.02	17.56
06	70	49	.01	17.57
07	70	49	.01	17.58
08	70	49	.01	17.59
09	70	49	.01	17.60
10	70	49	.01	17.61
11	70	49	.01	17.62
12	70	49	.01	17.63
13	70	49	.01	17.64
14	70	49	.01	17.65
15	70	49	.01	17.66
16	70	50	.01	17.67
17	71	50	.01	17.68
18	71	50	.01	17.69
19	71	50	.01	17.70
20	71	50	.01	17.71
21	71	50	.01	17.72
22	71	50	.01	17.73
23	71	50	.01	17.74
24	71	51	.01	17.75
25	71	51	.01	17.76
26	71	51	.01	17.77
27	71	51	.01	17.78
28	71	51	.01	17.79
29	71	52	.01	17.80
30	71	52	.01	17.81
31	72	52	.01	17.82

AVE DAILY MAX TEMP: 70.5
AVE DAILY MIN TEMP: 49.9
MEAN MONTHLY TEMP: 60.2

AVE MONTHLY PRECIP: 0.36 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF JUNE

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	72	52	.00	17.82
02	72	52	.00	17.82
03	72	52	.00	17.82
04	72	52	.00	17.82
05	72	52	.00	17.82
06	72	52	.00	17.82
07	72	52	.00	17.82
08	72	52	.00	17.82
09	72	52	.00	17.82
10	72	52	.01	17.83
11	72	52	.01	17.84
12	72	52	.01	17.85
13	73	52	.01	17.86
14	73	52	.01	17.87
15	73	53	.01	17.88
16	73	53	.01	17.89
17	73	53	.01	17.90
18	73	53	.01	17.91
19	73	53	.00	17.91
20	73	53	.00	17.91
21	73	53	.00	17.91
22	74	53	.00	17.91
23	74	54	.00	17.91
24	74	54	.00	17.91
25	74	54	.00	17.91
26	75	54	.00	17.91
27	75	54	.00	17.91
28	75	54	.00	17.91
29	76	54	.00	17.91
30	76	55	.00	17.91

AVE DAILY MAX TEMP: 73.1
AVE DAILY MIN TEMP: 52.8
MEAN MONTHLY TEMP: 63.0

AVE MONTHLY PRECIP: 0.09 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF JULY

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	76	55	.01	0.01
02	76	55	.01	0.02
03	76	55	.01	0.03
04	77	55	.00	0.03
05	77	56	.00	0.03
06	77	56	.00	0.03
07	77	56	.00	0.03
08	77	56	.00	0.03
09	77	56	.00	0.03
10	77	56	.00	0.03
11	77	56	.00	0.03
12	77	56	.00	0.03
13	77	56	.00	0.03
14	77	56	.00	0.03
15	77	56	.00	0.03
16	77	57	.00	0.03
17	77	57	.00	0.03
18	77	57	.00	0.03
19	77	57	.00	0.03
20	77	57	.00	0.03
21	77	57	.00	0.03
22	77	57	.00	0.03
23	77	57	.00	0.03
24	77	57	.00	0.03
25	77	57	.00	0.03
26	77	57	.00	0.03
27	77	57	.00	0.03
28	77	57	.00	0.03
29	77	57	.00	0.03
30	77	57	.00	0.03
31	77	57	.00	0.03

AVE DAILY MAX TEMP: 76.9
AVE DAILY MIN TEMP: 56.4
MEAN MONTHLY TEMP: 66.7

AVE MONTHLY PRECIP: 0.03 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF AUGUST

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	77	57	.00	0.03
02	77	57	.00	0.03
03	77	57	.00	0.03
04	77	57	.00	0.03
05	77	57	.00	0.03
06	77	57	.00	0.03
07	77	57	.00	0.03
08	77	57	.00	0.03
09	77	57	.00	0.03
10	77	57	.00	0.03
11	77	57	.00	0.03
12	77	57	.00	0.03
13	77	57	.00	0.03
14	77	57	.00	0.03
15	77	57	.00	0.03
16	77	57	.00	0.03
17	78	57	.00	0.03
18	78	57	.00	0.03
19	78	57	.00	0.03
20	78	57	.00	0.03
21	78	57	.00	0.03
22	78	57	.00	0.03
23	78	56	.00	0.03
24	78	56	.00	0.03
25	78	56	.00	0.03
26	78	56	.00	0.03
27	78	56	.00	0.03
28	78	56	.01	0.04
29	78	56	.01	0.05
30	78	56	.01	0.06
31	78	56	.01	0.07

AVE DAILY MAX TEMP: 77.5
AVE DAILY MIN TEMP: 56.7
MEAN MONTHLY TEMP: 67.1

AVE MONTHLY PRECIP: 0.04 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF SEPTEMBER

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	78	56	.01	0.08
02	78	56	.01	0.09
03	78	56	.01	0.10
04	78	56	.01	0.11
05	78	56	.01	0.12
06	78	56	.01	0.13
07	78	56	.01	0.14
08	78	56	.01	0.15
09	78	56	.01	0.16
10	78	56	.01	0.17
11	78	56	.01	0.18
12	78	55	.01	0.19
13	78	55	.01	0.20
14	78	55	.01	0.21
15	78	55	.02	0.23
16	77	55	.02	0.25
17	77	55	.02	0.27
18	77	55	.01	0.28
19	77	55	.01	0.29
20	77	54	.01	0.30
21	77	54	.01	0.31
22	77	54	.01	0.32
23	77	54	.01	0.33
24	77	54	.01	0.34
25	77	54	.01	0.35
26	77	53	.01	0.36
27	77	53	.01	0.37
28	77	53	.01	0.38
29	77	53	.01	0.39
30	77	53	.01	0.40

AVE DAILY MAX TEMP: 77.5
AVE DAILY MIN TEMP: 54.8
MEAN MONTHLY TEMP: 66.2

AVE MONTHLY PRECIP: 0.33 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF OCTOBER

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	77	53	.01	0.41
02	77	53	.01	0.42
03	77	53	.01	0.43
04	76	53	.01	0.44
05	76	53	.01	0.45
06	76	53	.01	0.46
07	76	53	.01	0.47
08	76	53	.01	0.48
09	76	52	.01	0.49
10	76	52	.01	0.50
11	76	52	.01	0.51
12	76	52	.01	0.52
13	76	52	.01	0.53
14	76	51	.01	0.54
15	76	51	.01	0.55
16	75	51	.01	0.56
17	75	51	.02	0.58
18	75	51	.02	0.60
19	75	50	.02	0.62
20	75	50	.02	0.64
21	75	50	.02	0.66
22	75	50	.02	0.68
23	75	49	.03	0.71
24	74	49	.03	0.74
25	74	49	.03	0.77
26	74	49	.03	0.80
27	74	48	.04	0.84
28	74	48	.04	0.88
29	74	48	.04	0.92
30	74	47	.04	0.96
31	74	47	.04	1.00

AVE DAILY MAX TEMP: 75.3
AVE DAILY MIN TEMP: 50.7
MEAN MONTHLY TEMP: 63.0

AVE MONTHLY PRECIP: 0.60 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF NOVEMBER

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	74	47	.04	1.04
02	74	47	.04	1.08
03	74	47	.04	1.12
04	74	47	.05	1.17
05	74	47	.05	1.22
06	74	47	.05	1.27
07	74	47	.05	1.32
08	74	46	.05	1.37
09	74	46	.05	1.42
10	73	46	.05	1.47
11	73	46	.05	1.52
12	73	46	.05	1.57
13	73	46	.05	1.62
14	73	45	.05	1.67
15	73	45	.05	1.72
16	72	45	.05	1.77
17	72	45	.06	1.83
18	72	45	.06	1.89
19	72	45	.06	1.95
20	72	44	.06	2.01
21	71	44	.06	2.07
22	71	44	.06	2.13
23	71	44	.06	2.19
24	71	43	.05	2.24
25	71	43	.05	2.29
26	71	43	.05	2.34
27	70	43	.05	2.39
28	70	43	.06	2.45
29	70	43	.06	2.51
30	70	43	.06	2.57

AVE DAILY MAX TEMP: 72.3
AVE DAILY MIN TEMP: 45.1
MEAN MONTHLY TEMP: 58.7

AVE MONTHLY PRECIP: 1.57 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

CITY OF SANTA BARBARA, CALIFORNIA
DAILY AND MONTHLY WEATHER NORMALS

MONTH OF DECEMBER

DAY	HIGH	LOW	PCPN	SEASON/DATE
01	70	43	.07	2.64
02	70	43	.07	2.71
03	69	43	.07	2.78
04	69	43	.07	2.85
05	69	43	.08	2.93
06	69	43	.08	3.01
07	69	43	.08	3.09
08	69	43	.09	3.18
09	68	43	.09	3.27
10	68	43	.09	3.36
11	68	43	.09	3.45
12	68	43	.09	3.54
13	67	43	.10	3.64
14	67	43	.10	3.74
15	67	43	.10	3.84
16	67	43	.10	3.94
17	67	43	.10	4.04
18	67	43	.10	4.14
19	66	43	.10	4.24
20	66	42	.10	4.34
21	66	42	.10	4.44
22	66	42	.11	4.55
23	66	42	.11	4.66
24	65	42	.11	4.77
25	65	41	.11	4.88
26	65	41	.12	5.00
27	65	41	.12	5.12
28	65	41	.12	5.24
29	65	40	.12	5.36
30	64	40	.12	5.48
31	64	40	.12	5.60

AVE DAILY MAX TEMP: 67.0
AVE DAILY MIN TEMP: 42.3
MEAN MONTHLY TEMP: 54.7

AVE MONTHLY PRECIP: 3.03 IN.

TEMPERATURES BASED ON 1901-1960 DATA
PRECIPITATION BASED ON 1867-1993 DATA

TABLE 10.

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF JANUARY

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	78	1898	27	1919
02	78	1893/1930	25	1924
03	81	1893	23	1949
04	84	1902	20 X,Y	1949
05	85	1924	23	1949
06	80	1902/03/62	25	1949
07	89	1962	29	1950
08	86	1923	26	1949
09	91 X	1923	25	1937
10	80	1908/61	20 X,Y	1949
11	83	1961	27	1949
12	85	1928	25	1949
13	82	1948	29	1950/63
14	83	1975	29	1932
15	83	1975	30	1947
16	86	1920	27	1949
17	86	1920/61	25	1949
18	85	1975	31	1937/43/47
19	85	1971	31	1910/43/47
20	87	1975	29	1922/37
21	80	1976	26	1937
22	81	1950	26	1937
23	80	1968	25	1937
24	81	1951	27	1949
25	84	1951	32	1932
26	79	1931/47	27	1949
27	82	1928	28	1949
28	84	1931	29	1957
29	82	1931	28	1949
30	85	1883	29	1949
31	82	1935/53	29	1937/49

-COOLEST MAXIMUM: 44 ON 06 JAN 1913
-WARMEST MINIMUM: 65 ON 30 JAN 1883

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF FEBRUARY

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	85	1935	29	1919/49
02	87	1954	27 X	1939
03	89	1963	28	1883
04	83	1963	29	1948/49
05	81	1963	29	1949
06	87	1953	29	1899
07	88	1954	31	1883
08	85	1907	27 X	1949
09	82	1907	27 X	1929
10	82	1907	30	1929/49
11	85	1886	32	1929
12	86	1924	27 X	1949
13	90	1924	28	1949
14	86	1943	28	1949
15	82	1916	28	1949
16	87	1930	30	1990
17	89	1930	32	1956
18	87	1924	33	1949
19	82	1896/1928	33	1945
20	81	1961	34	1951
21	82	1961	35	1953
22	84	1961	33	1897
23	85	1954	35	1897/1939
24	90	1921	33	1942
25	94 X	1921	33	1942
26	85	1926/32	33	1935
27	89	1926	34	1935
28	87	1926	32	1951/62
29	80	1924/36	35	1948
30				
31				

-COOLEST MAXIMUM: 46 ON 23 FEB 1913
-WARMEST MINIMUM: 64 ON 22 FEB 1900

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF MARCH

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	87	1963	34	1948/71
02	86	1936	32	1948/53/87
03	86	1931	30 X	1953
04	82	1959/68	31	1987
05	91	1972	33	1948
06	85	1899/1914	36	1939
07	92	1904	34	1945
08	82	1906/14/16/46	35	1925
09	87	1916	32	1935
10	89	1934	37	1935
11	91	1916	33	1935
12	86	1926	33	1893
13	89	1926	34	1954
14	88	1926	33	1944
15	88	1915	32	1917
16	90	1915	35	1927
17	88	1914	35	1898
18	87	1914	34	1898
19	90	1925	35	1886
20	92	1931	35	1935
21	90	1931	35	1935/48/52
22	90	1926	32	1935
23	95	1926	34	1936
24	86	1930/44/88	34	1929/33
25	94	1988	33	1948
26	96 X	1988	35	1948
27	87	1923/32	37	1942/48
28	87	1956	36	1884/1945
29	89	1879	36	1884
30	86	1918	33	1938
31	87	1989	33	1977

-COOLEST MAXIMUM: 46 ON 23 MAR 1935
-WARMEST MINIMUM: 60 ON 23 MAR 1931 (ALSO 25 MAR 1988)

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF APRIL

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	90	1985	36	1936/38
02	91	1950	33	1973
03	92	1961	36	1945
04	96	1989	37	1945/48
05	97	1989	40	1928/46/75
06	101 X	1989	36	1921
07	89	1989	34	1929
08	85	1932	37	1929
09	89	1932	36	1922
10	90	1968	35	1927/45
11	92	1940	38	1927/45
12	96	1940	36	1927
13	95	1888/98	37	1945
14	98	1925	39	1913/22
15	97	1966	38	1921/45
16	92	1931	36	1917/22
17	88	1889	34	1917/44
18	90	1924	38	1933
19	93	1924	38	1927
20	94	1958	38	1896
21	94	1958	37	1896
22	96	1910	39	1904/32/44
23	97	1910	38	1932/61
24	90	1898	39	1883
25	90	1898/1965	38	1944
26	89	1965	40	1900/52
27	93	1921	39	1904
28	97	1921	30 X	1970
29	90	1959	37	1948
30	85	1916/29	40	1937/62
31				

-COOLEST MAXIMUM: 53 ON 11 APR 1912
-WARMEST MINIMUM: 67 ON 15 APR 1914 (ALSO 21 APR 1958)

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF MAY

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	88	1916	40	1920/22/76
02	88	1929	41	1991
03	92	1984	40	1991
04	90	1948	39	1920/91
05	92	1928/53	38	1991
06	94	1941	38	1933
07	98	1941	39	1921
08	98	1941	39	1930
09	101 X	1923	42	1930
10	92	1934	44	1948
11	92	1926	41	1922
12	88	1926	42	1944
13	95	1979	42	1908/33
14	97	1979	41	1908
15	94	1956	39	1883
16	99	1970	40	1908
17	97	1967	38	1991
18	98	1892	37	1991
19	89	1942	39	1991
20	94	1883	36 X	1991
21	90	1911	42	1923/39/48
22	85	1930	40	1908
23	90	1930	40	1908
24	92	1927	40	1908
25	98	1896	40	1921
26	101 X	1968	40	1953
27	96	1960	45	1917/24/29
28	91	1960	45	1917
29	87	1973	44	1953
30	92	1909	41	1988
31	94	1909	40	1923

-COOLEST MAXIMUM: 55 ON 03 MAY 1909
-WARMEST MINIMUM: 71 ON 02 MAY 1987

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF JUNE

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	87	1909	40 X	1916
02	95	1904	42	1923
03	90	1898	42	1933
04	97	1883	43	1908
05	98	1883	44	1939
06	93	1890	41	1922
07	92	1890	44	1923/45
08	90	1906	43	1908
09	91	1894	44	1909
10	102	1979	43	1924
11	102	1877	45	1913
12	103	1979	45	1917
13	90	1979	42	1943
14	95	1917	44	1887/1943/44
15	105	1917	45	1944/91
16	107	1917	45	1962/91
17	115 X,Y	1917	45	1920/44/50
18	100	1957	46	1916
19	100	1929	46	1923/40
20	98	1929	45	1923
21	102	1973	48	1943
22	92	1929	44	1923
23	88	1931	45	1912
24	98	1976	46	1912/15
25	100	1976	45	1912
26	90	1990	46	1943
27	103	1990	46	1923
28	96	1976	45	1950
29	92	1976	49	1935/45/47/49
30	101	1937	49	1912/38/55
31				

-COOLEST MAXIMUM: 59 ON 13 JUN 1983
-WARMEST MINIMUM: 67 ON 25 JUN 1931

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF JULY

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	108 X	1937	49	1936/38
02	105	1985	50	1919/35/47/55
03	108 X	1907	47	1935/38
04	96	1907	48	1948/51/55
05	96	1907	45	1948
06	96	1954	44 X	1948
07	101	1954	49	1908/48
08	89	1954	47	1948
09	89	1959	46	1944
10	98	1959	47	1944
11	92	1953	48	1991
12	100	1925	50	1937/41/52
13	104	1925	47	1932
14	97	1930	50	1914
15	97	1925	50	1943/44/46
16	105	1978	49	1940
17	98	1925	49	1924/43
18	95	1936	45	1944
19	96	1992	45	1924
20	90	1936	45	1924
21	93	1960	47	1943
22	91	1960	50	1928/34
23	96	1900	50	1928/47
24	94	1948	46	1948
25	97	1891	47	1913/24
26	92	1891/1943	48	1913
27	107	1889	51	1935
28	90	1931	50	1916
29	100	1930	51	1885/1940
30	99	1930	48	1948
31	93	1930	45	1956

-COOLEST MAXIMUM: 62 ON 06 JUL 1978
-WARMEST MINIMUM: 82 ON 19 JUL 1992

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF AUGUST

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	90	1946	50	1911
02	93	1918	49	1944
03	87	1920/29	49	1944/53
04	90	1917	50	1935
05	90	1983	49	1935/50
06	96	1983	45 X	1923
07	91	1983	50	1923
08	91	1936	48	1950
09	90	1965	49	1939
10	99 X	1978	49	1948/50
11	90	1922	50	1892/1919/32
12	90	1898	51	1913/47
13	91	1965	49	1917
14	91	1929	48	1924
15	91	1889	49	1934
16	93	1890	50	1918/24/49
17	94	1890	50	1910/13/18/40
18	98	1890	46	1924
19	91	1986	46	1924
20	90	1930	48	1947
21	89	1891	49	1947
22	91	1925/59	48	1947
23	93	1968	49	1944/47
24	95	1931	49	1944
25	93	1931	50	1944/47/49
26	94	1931	48	1940/53
27	98	1883	50	1947
28	97	1883	48	1908
29	96	1905	49	1910/12/42
30	98	1915	48	1945/46
31	98	1955	49	1947

-COOLEST MAXIMUM: 63 ON 31 AUG 1914
-WARMEST MINIMUM: 69 ON 20 AUG 1961 (ALSO 10 AUG 1984 AND 19 AUG 1984)

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF SEPTEMBER

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	103	1955	50	1928/51
02	103	1955	47	1942
03	94	1945	48	1914/42
04	99	1961	49	1921/33
05	93	1961	46	1933
06	92	1928	46	1933
07	95	1944	49	1911/21
08	97	1944	46	1946
09	97	1984	48	1953
10	90	1983	47	1943
11	95	1983	44	1946
12	91	1959	46	1952
13	98	1971	46	1915
14	97	1909	46	1915/52
15	100	1909	47	1921
16	103	1913	49	1907/08/36
17	108 X	1913	46	1908
18	102	1939	45	1947
19	102	1912	44	1947
20	104	1939	45	1944
21	104	1885/1939	43	1944
22	103	1939/43	45	1944
23	102	1939/44	45	1923/24
24	102	1978	45	1923/48
25	105	1978	43	1948
26	105	1963	38 X	1948
27	103	1963	41	1948
28	101	1963	43	1948
29	98	1924	42	1948
30	93	1945	42	1950
31				

-COOLEST MAXIMUM: 60 ON 08 SEP 1914
-WARMEST MINIMUM: 74 ON 29 SEP 1917

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF OCTOBER

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	98	1931	42	1950
02	98	1945	42	1950
03	101	1958	41	1983
04	99	1933	43	1908
05	101	1953	44	1908
06	100	1930	41	1937
07	100	1971	42	1916
08	99	1971	43	1937
09	98	1909	42	1941
10	94	1909/88	40	1916
11	96	1976	37	1924
12	95	1940	36	1924
13	97	1939	40	1924
14	103 X	1950	42	1923/28
15	102	1961	43	1934/48
16	102	1961	40	1921/84
17	95	1958/67	40	1938
18	99	1933	39	1938/49
19	100	1921	41	1932
20	95	1964/65	36	1920
21	98	1929	37	1920
22	98	1929/39	39	1920
23	99	1959	40	1935
24	95	1965	37	1935
25	94	1968	38	1935
26	91	1983	38	1954
27	94	1935	41	1920/49
28	94	1931	40	1919
29	97	1931	41	1946/56
30	96	1931/39	36	1971
31	92	1918	34 X	1935

-COOLEST MAXIMUM: 55 ON 28 OCT 1942
-WARMEST MINIMUM: 67 ON 08 OCT 1905

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERATURES

MONTH OF NOVEMBER

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	94	1966	34	1971
02	91	1926	38	1936
03	94	1921	35	1935
04	95	1921	34	1935
05	91	1941	35	1935
06	93	1956	35	1935
07	94	1956	36	1938
08	98 X	1914	36	1936/38
09	97	1956	35	1948
10	97	1956	34	1948
11	88	1930/42	35	1948
12	90	1900	30	1938
13	89	1974	29	1938
14	89	1949	32	1938
15	86	1932	34	1938
16	90	1919	34	1938
17	89	1936	32	1958
18	92	1932/36	36	1941/58
19	88	1895/1932	35	1941/48
20	92	1917	34	1941
21	88	1924	32	1947
22	89	1924	33	1948
23	90	1933	32	1931
24	92	1933	28 X	1931
25	88	1956	32	1931
26	88	1956	35	1906
27	88	1903	32	1948
28	85	1977	30	1919
29	88	1977	31	1948
30	87	1956	32	1948
31				

-COOLEST MAXIMUM: 55 ON 30 NOV 1975 (ALSO EARLIER DATES)
-WARMEST MINIMUM: 74 ON 02 NOV 1992

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

CITY OF SANTA BARBARA, CALIFORNIA
RECORD HIGH AND LOW TEMPERTURES

MONTH OF DECEMBER

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	89	1959	32	1948
02	89	1958	34	1913/36
03	92 X	1958	33	1948
04	85	1939	33	1909
05	87	1940	29	1948
06	84	1893/1900/38	34	1920/42
07	90	1938	32	1948
08	91	1938	34	1960/71
09	86	1957	29	1951
10	86	1921	31	1951
11	84	1921/58	32	1923/47
12	88	1956	29	1949
13	85	1953	32	1931/67
14	82	1953	31	1945
15	82	1942	26	1948
16	82	1904	31	1948
17	85	1929	32	1916/33
18	86	1929	27	1924
19	84	1929	27	1924
20	81	1904/53/60	30	1948
21	80	1906	29	1968
22	80	1960	28	1990
23	81	1960	28	1990
24	83	1929	26	1948
25	85	1925	23 X	1924
26	82	1925/47/56	24	1924
27	84	1956	27	1924
28	86	1956	30	1926/48/84
29	86	1956	28	1987
30	85	1917	27	1987
31	82	1980	26	1987

-COOLEST MAXIMUM: 45 ON 26 DEC 1916
-WARMEST MINIMUM: 68 ON 05 DEC 1989

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM JANUARY 1883
DATE OF COMPUTATION: NOVEMBER 1993

TABLE 11.

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF JANUARY

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	73	1969	25 X	1976
02	79	1980	26	1976
03	75	1994	28	1976
04	79	1953/69	27	1949
05	75	1954/58	27	1949
06	78	1964	27	1961
07	86 X	1962	29	1950
08	82	1941	28	1989
09	83	1948	30	1944
10	75	1990	26	1949
11	82	1986	30	1987
12	79	1986	29	1989
13	86 X	1991	26	1963
14	82	1991	30	1962/89
15	81	1991	30	1989
16	81	1976	29	1987
17	79	1975	26	1987
18	80	1994	28	1987
19	79	1965	30	1943
20	77	1944	30	1987
21	86 X	1942	31	1963/76/90
22	83	1950	31	1991
23	78	1953	32	1945
24	79	1951	31	1949
25	79	1951	32	1950
26	82	1947	31	1950/89
27	78	1986	30	1950
28	81	1976	30	1957/75
29	82	1953	29	1975
30	81	1962	31	1968
31	82	1953	31	1946/85

-COOLEST MAXIMUM: 45 ON 11 JAN 1945
-WARMEST MINIMUM: 59 ON 25 JAN 1969 (ALSO 11 JAN 1980)

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: FEBRUARY 1994

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF FEBRUARY

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	79	1954/76	32	1946
02	83	1954	33	1946/51
03	84	1963	30	1972
04	80	1954	32	1948/88
05	80	1953	30	1988
06	85	1953	25 X	1989
07	83	1954	29	1989
08	84	1954	33	1948
09	76	1988	33	1942
10	82	1988	33	1965
11	80	1971	33	1966
12	83	1943	32	1944/48
13	84	1943	33	1942/48
14	82	1943	31	1949
15	86 X	1977	26	1990
16	79	1977	32	1944/90
17	82	1953	33	1975
18	79	1981	32	1944
19	78	1982	34	1955/61/88/90
20	76	1982	33	1951/53/90
21	78	1948	32	1987
22	82	1992	34	1945/53/55
23	84	1968	33	1975
24	82	1986	32	1942/87
25	80	1992	32	1987
26	79	1992	33	1987
27	85	1976	30	1961
28	82	1976	32	1951
29	72	1968/72	36	1956
30				
31				

-COOLEST MAXIMUM: 49 ON 23 FEB 1951
-WARMEST MINIMUM: 58 ON 09 FEB 1962 (ALSO 01 FEB 1963, 16 FEB 1990 AND 18 FEB 1990)

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: OCTOBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF MARCH

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	87	1963	34	1962
02	86	1972	32	1971
03	86	1972	30 X	1966
04	94 X	1972	33	1966/76
05	78	1993	35	1948/67
06	80	1979/93	35	1971/82
07	78	1955	33	1961
08	80	1946	33	1961
09	81	1944	33	1961
10	84	1984	38	1951/58/60
11	82	1947	36	1951/88
12	78	1993	34	1950
13	80	1989	34	1954
14	84	1951	31	1954
15	84	1964	35	1944/73
16	83	1964	34	1991
17	87	1947	36	1963
18	82	1950	37	1954
19	82	1989	37	1982
20	80	1988/90	34	1982
21	78	1976	35	1942
22	78	1950	34	1944
23	86	1988	37	1952
24	83	1988	38	1957
25	87	1988	38	1942/48/67
26	90	1988	36	1961
27	85	1988	33	1942
28	84	1989	36	1944/72
29	77	1944	35	1961
30	80	1944	37	1949
31	90	1989	37	1951

-COOLEST MAXIMUM: 51 ON 02 MAR 1976 (ALSO 17 MAR 1982)
-WARMEST MINIMUM: 62 ON 20 MAR 1972

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: OCTOBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF APRIL

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	87	1959	38	1975
02	91	1950	39	1967/75
03	88	1950/89	33 X	1945
04	94	1989	39	1945
05	96 X	1989	37	1976
06	96 X	1989	39	1955/75
07	91	1989	40	1955/75
08	81	1987/89	41	1967/72/78/91
09	81	1980	34	1945
10	84	1955/68	40	1976
11	87	1947	39	1945
12	88	1947	39	1976
13	90	1947	37	1961
14	88	1964	40	1972
15	95	1966	40	1970
16	81	1958	38	1975
17	79	1948/92	35	1944
18	79	1992	37	1968
19	86	1958	39	1972
20	94	1958	37	1961
21	87	1987	37	1968
22	86	1987	38	1968/70
23	82	1966	37	1961
24	87	1985	36	1960
25	88	1948	40	1960/64/67
26	88	1993	39	1989
27	85	1991	38	1984
28	85	1981	41	1944
29	83	1959/81	39	1948
30	80	1993	40	1990
31				

-COOLEST MAXIMUM: 52 ON 01 APR 1967
-WARMEST MINIMUM: 67 ON 15 APR 1966

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: OCTOBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF MAY

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	83	1952/61	43	1950/54/55/67/88/90
02	85	1970	38 X	1991
03	88	1984	41	1942
04	90	1948	40	1965
05	89	1953	39	1975
06	86	1991	40	1975
07	81	1991	40	1964
08	86	1984	41	1988
09	89	1943	43	1957/64
10	80	1950/53	41	1982
11	78	1979/88	44	1942/82/85/68
12	92	1988	42	1944/67/70/85/89
13	91	1979	44	1989
14	90	1970	42	1961
15	91	1967/70	43	1955/68
16	89	1956	44	1953/60/86
17	87	1955/71	42	1953
18	85	1978	40	1991
19	87	1959	39	1944
20	86	1942	41	1948
21	78	1989	42	1948
22	77	1949	42	1961
23	82	1949	39	1960
24	89	1989	42	1957
25	90	1968	42	1953/89
26	101 X	1968	39	1953
27	95	1960	44	1980/87
28	85	1978	44	1991
29	81	1989	41	1953
30	82	1943	42	1944/61
31	84	1943	44	1988

-COOLEST MAXIMUM: 56 ON 18 MAY 1949 (ALSO ON 19 MAY 1972)
-WARMEST MINIMUM: 62 ON 11 MAY 1992

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: OCTOBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF JUNE

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	87	1949	41 X	1955
02	84	1951	43	1955/67
03	83	1990	44	1953/80
04	84	1981	45	1942
05	86	1946	41 X	1943
06	79	1954/85	45	1943/80
07	82	1958	42	1988
08	84	1984	44	1988
09	95	1979	44	1952
10	96	1979	45	1952/64
11	88	1946	46	1953/54
12	90	1981	44	1977
13	92	1956	45	1943
14	92	1981	44	1943
15	95	1981	46	1955/62
16	100	1981	45	1962
17	96	1957	46	1950
18	95	1957	48	1978
19	86	1971	48	1978
20	96	1973	46	1975
21	89	1973	47	1943
22	96	1976	47	1991
23	97	1976	47	1991
24	95	1976	48	1991
25	98	1962	46	1943
26	103	1990	45	1943
27	109 X,Y	1990	47	1955
28	83	1992	47	1963
29	95	1960	48	1949/63/64
30	87	1976	48	1943/55
31				

-COOLEST MAXIMUM: 61 ON 03 JUN 1973
-WARMEST MINIMUM: 67 ON 09 JUN 1945

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: OCTOBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF JULY

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	97	1985	49	1955
02	109 X,Y	1985	48	1963
03	102	1985	50	1955/56/78/87
04	88	1957	46	1955
05	92	1990	47	1955
06	99	1954	49	1948/55
07	101	1954	49	1966
08	89	1992	50	1944
09	84	1959/92	47	1944
10	95	1971	49	1944
11	88	1964	50	1952
12	85	1953/90	49	1978
13	86	1990	48	1941
14	87	1978	48	1941
15	105	1978	49	1941
16	82	1946/92	50	1941/43
17	84	1992	50	1943/66
18	84	1992	45 X	1944
19	106	1992	46	1944
20	98	1992	49	1943/87
21	87	1960	47	1943
22	92	1960	51	1965
23	85	1943	51	1987
24	82	1943/59/60	49	1948
25	89	1943/77	52	1972/86
26	96	1977	50	1965
27	97	1947	50	1965
28	86	1947	49	1949
29	81	1947/54/60	51	1987
30	88	1947	52	1948/49/70
31	93	1977	50	1942/70

-COOLEST MAXIMUM: 64 ON 01 JUL 1968 (ALSO ON 02 JUL 1979)
-WARMEST MINIMUM: 68 ON 12 JUL 1992 (ALSO ON 13 JUL 1992)

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: OCTOBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF AUGUST

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	87	1947	48	1944
02	82	1943/45	50	1942/44/56
03	82	1945	50	1953
04	86	1976	49	1956
05	85	1961	48	1950
06	91	1983	50	1951
07	86	1983	50	1944
08	89	1962	49	1950
09	87	1962	51	1941/50
10	84	1971	48	1944
11	85	1965	51	1949
12	88	1941	53	1947/49/52/88
13	88	1941	49	1988
14	87	1992	49	1985
15	85	1992	50	1949/88
16	84	1962	50	1949/86
17	85	1992	51	1949/55/78
18	90	1945	49	1960
19	89	1986	50	1943
20	84	1941	50	1944
21	85	1972	43 X	1941
22	105 X	1972	49	1987
23	90	1968	49	1944/87
24	85	1979/85	48	1944
25	85	1985	48	1944
26	86	1977	48	1944
27	98	1971	48	1975
28	92	1971	49	1942
29	96	1971	49	1946
30	101	1984	49	1941/57
31	94	1955	48	1941

-COOLEST MAXIMUM: 64 ON 21 AUG 1950
-WARMEST MINIMUM: 68 ON 13 AUG 1965 (ALSO ON 23 AUG 1972 AND 18 AUG 1983)

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: OCTOBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF SEPTEMBER

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	99	1955	48	1941
02	97	1955	47	1942
03	100	1982	46	1942
04	102	1988	51	1962/70
05	89	1961	49	1970
06	97	1955	46	1973
07	93	1955	47	1989
08	92	1984	46	1946
09	95	1984	47	1953
10	94	1956	45	1943
11	89	1959/83	45	1946
12	88	1971	47	1985
13	93	1963	47	1956/66
14	86	1959	46	1952/66
15	93	1979	45	1970
16	90	1979	48	1970/86
17	88	1979	47	1946
18	104 X	1979	45	1947
19	95	1984	45	1947
20	95	1984	45	1986
21	85	1942	44	1944
22	91	1987	44	1944
23	97	1944	42 X	1941
24	100	1978	48	1944/45/53
25	98	1978	47	1941
26	103	1963	43	1948
27	99	1963	46	1970
28	93	1963	45	1988
29	91	1945	44	1955
30	90	1980	42 X	1950
31				

-COOLEST MAXIMUM: 62 ON 23 SEP 1955
-WARMEST MINIMUM: 81 ON 18 SEP 1979

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: OCTOBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF OCTOBER

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	92	1965	42	1950
02	91	1945/91	42	1950
03	98	1958	42	1950
04	103 X	1987	42	1989
05	98	1971	45	1955/57
06	97	1971	42	1941
07	93	1951	42	1954
08	92	1976	42	1970
09	93	1988	40	1941
10	93	1969	42	1953
11	85	1983/91	42	1990
12	83	1950	43	1960
13	99	1950	39	1981
14	100	1961	41	1960
15	98	1961	40	1941/60/66
16	92	1971	39	1960
17	92	1971	40	1966/71
18	89	1970	41	1971
19	94	1964	42	1949
20	94	1964	37	1949
21	93	1942	38	1949
22	93	1965	40	1949
23	97	1959	40	1953/75
24	95	1965	36	1975
25	90	1965	37	1975
26	90	1993	38	1954
27	86	1993	39	1970/89
28	85	1979	35	1970
29	84	1958/73	31 X	1971
30	85	1962/80	34	1971
31	88	1949	37	1971

-COOLEST MAXIMUM: 59 ON 28 OCT 1942
-WARMEST MINIMUM: 64 ON 01 OCT 1963 (ALSO 03 OCT 1963
08 OCT 1972, 14 OCT 1976 AND 24 OCT 1982)

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: NOVEMBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF NOVEMBER

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	91	1966	36	1971
02	97 X	1992	38	1943/71/89
03	90	1945/50/93	37	1943/89
04	93	1976	35	1943
05	87	1976	37	1981
06	83	1941	37	1973
07	90	1956	36	1947/61/90
08	93	1956	37	1990
09	96	1956	34	1943
10	92	1990	35	1943
11	86	1942	34	1943
12	84	1986	36	1985
13	84	1949	35	1985
14	86	1949	34	1943
15	85	1949	35	1956/85
16	79	1977/89	34	1958/64
17	82	1948	30 X	1958
18	85	1949	34	1964
19	82	1992	31	1941
20	82	1989	30 X	1988
21	84	1954/59	31	1979
22	83	1954	34	1988
23	90	1950	32	1941
24	82	1956/79	31	1941
25	85	1953/77	33	1941
26	89	1977	34	1980/84
27	90	1977	32	1990
28	90	1977	32	1989
29	82	1988	30 x	1989
30	87	1977	32	1975
31				

-COOLEST MAXIMUM: 53 ON 11 NOV 1978
-WARMEST MINIMUM: 62 ON 09 NOV 1958

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: NOVEMBER 1993

RECORD HIGH AND LOW TEMPERATURES
SANTA BARBARA, CALIFORNIA (AIRPORT)

MONTH OF DECEMBER

DAY	HIGHEST	YEAR	LOWEST	YEAR
01	85	1958	31	1991
02	82	1959	33	1989/91
03	89 X	1958	33	1957/90
04	78	1977	33	1989
05	82	1962	32	1968
06	83	1990	32	1959/78
07	82	1989	29	1978
08	80	1975	29	1960/78
09	82	1957	28	1956
10	81	1958	28	1951
11	78	1958	33	1976/80
12	86	1956	31	1949/85
13	82	1953	25	1967
14	79	1953/83	25	1967
15	82	1942	27	1967
16	82	1980	28	1975
17	76	1973	29	1990
18	77	1950	31	1975
19	79	1953	32	1975/92
20	80	1953	32	1967/91
21	80	1953	28	1968
22	76	1989	20 X,Y	1990
23	77	1950	21	1990
24	80	1989	22	1990
25	81	1947	25	1990
26	82	1947	27	1987/90
27	83	1975	26	1988
28	81	1956	28	1990
29	79	1945/56/80	31	1962/69
30	83	1980	29	1969
31	72	1957/58/63/80	28	1990

-COOLEST MAXIMUM: 47 ON 18 DEC 1970
-WARMEST MINIMUM: 60 ON 21 DEC 1943 (ALSO 24 DEC 1964 AND 27 DEC 1977)

X - RECORD FOR MONTH Y - RECORD ALL TIME

PERIOD OF RECORD: CONTINUOUS FROM 01 JANUARY 1941
DATE OF COMPUTATION: OCTOBER 1993

TABLE 12.

SUNRISE AND SUNSET AT SANTA MARIA, CALIFORNIA

NO. 1046

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 10	5 01	7 01	5 31	6 32	5 57	5 49	6 23	5 11	6 47	4 49	7 10	4 52	7 19	5 11	7 05	5 34	6 29	5 56	5 46	6 22	5 08	6 51	4 50
2	7 10	5 02	7 00	5 32	6 30	5 58	5 48	6 24	5 10	6 48	4 49	7 11	4 52	7 19	5 12	7 04	5 35	6 27	5 57	5 45	6 23	5 07	6 52	4 50
3	7 10	5 03	6 59	5 33	6 29	5 59	5 46	6 24	5 09	6 48	4 49	7 11	4 52	7 19	5 13	7 03	5 36	6 26	5 58	5 43	6 24	5 06	6 53	4 50
4	7 10	5 04	6 58	5 34	6 28	6 00	5 45	6 25	5 08	6 49	4 48	7 12	4 53	7 19	5 13	7 02	5 36	6 25	5 59	5 42	6 25	5 05	6 54	4 50
5	7 10	5 05	6 58	5 35	6 26	6 01	5 44	6 26	5 07	6 50	4 48	7 12	4 53	7 19	5 14	7 01	5 37	6 23	5 59	5 41	6 26	5 04	6 55	4 50
6	7 10	5 05	6 57	5 36	6 25	6 02	5 42	6 27	5 06	6 51	4 48	7 13	4 54	7 19	5 15	7 00	5 38	6 22	6 00	5 39	6 27	5 03	6 55	4 50
7	7 10	5 06	6 56	5 37	6 24	6 03	5 41	6 28	5 05	6 52	4 48	7 13	4 54	7 19	5 16	6 59	5 39	6 20	6 01	5 38	6 28	5 02	6 56	4 50
8	7 10	5 07	6 55	5 38	6 22	6 03	5 40	6 28	5 04	6 52	4 48	7 14	4 55	7 18	5 16	6 58	5 39	6 19	6 02	5 36	6 29	5 02	6 57	4 50
9	7 10	5 08	6 54	5 39	6 21	6 04	5 38	6 29	5 04	6 53	4 48	7 14	4 55	7 18	5 17	6 57	5 40	6 18	6 03	5 35	6 30	5 01	6 58	4 50
10	7 10	5 09	6 53	5 40	6 20	6 05	5 37	6 30	5 03	6 54	4 48	7 15	4 56	7 18	5 18	6 56	5 41	6 16	6 03	5 34	6 31	5 00	6 59	4 51
11	7 10	5 10	6 52	5 41	6 18	6 06	5 35	6 31	5 02	6 55	4 47	7 15	4 57	7 17	5 19	6 55	5 42	6 15	6 04	5 32	6 32	4 59	6 59	4 51
12	7 10	5 11	6 51	5 42	6 17	6 07	5 34	6 32	5 01	6 56	4 47	7 16	4 57	7 17	5 19	6 54	5 42	6 13	6 05	5 31	6 33	4 59	7 00	4 51
13	7 10	5 12	6 50	5 43	6 16	6 08	5 33	6 32	5 00	6 56	4 47	7 16	4 58	7 17	5 20	6 53	5 43	6 12	6 06	5 30	6 34	4 58	7 01	4 51
14	7 10	5 13	6 49	5 44	6 14	6 08	5 32	6 33	4 59	6 57	4 47	7 17	4 58	7 16	5 21	6 51	5 44	6 10	6 07	5 29	6 35	4 57	7 01	4 52
15	7 09	5 14	6 48	5 45	6 13	6 09	5 30	6 34	4 59	6 58	4 47	7 17	4 59	7 16	5 22	6 50	5 44	6 09	6 07	5 27	6 36	4 57	7 02	4 52
16	7 09	5 15	6 47	5 45	6 11	6 10	5 29	6 35	4 58	6 59	4 48	7 17	5 00	7 15	5 22	6 49	5 45	6 08	6 08	5 26	6 37	4 56	7 03	4 52
17	7 09	5 16	6 46	5 46	6 10	6 11	5 28	6 36	4 57	7 00	4 48	7 18	5 00	7 15	5 23	6 48	5 46	6 06	6 09	5 25	6 38	4 55	7 03	4 52
18	7 08	5 17	6 45	5 47	6 09	6 12	5 26	6 36	4 56	7 00	4 48	7 18	5 01	7 14	5 24	6 47	5 47	6 05	6 10	5 24	6 39	4 55	7 04	4 53
19	7 08	5 17	6 44	5 48	6 07	6 13	5 25	6 37	4 56	7 01	4 48	7 18	5 02	7 14	5 25	6 46	5 47	6 03	6 11	5 22	6 40	4 54	7 05	4 53
20	7 08	5 18	6 42	5 49	6 06	6 13	5 24	6 38	4 55	7 02	4 48	7 18	5 02	7 13	5 25	6 44	5 48	6 02	6 12	5 21	6 41	4 54	7 05	4 54
21	7 07	5 19	6 41	5 50	6 04	6 14	5 23	6 39	4 54	7 03	4 48	7 19	5 03	7 13	5 26	6 43	5 49	6 00	6 13	5 20	6 42	4 53	7 06	4 54
22	7 07	5 20	6 40	5 51	6 03	6 15	5 22	6 40	4 54	7 03	4 49	7 19	5 04	7 12	5 27	6 42	5 50	5 59	6 13	5 19	6 43	4 53	7 06	4 55
23	7 06	5 21	6 39	5 52	6 02	6 16	5 20	6 40	4 53	7 04	4 49	7 19	5 05	7 11	5 28	6 41	5 50	5 58	6 14	5 18	6 44	4 53	7 07	4 55
24	7 06	5 23	6 38	5 53	6 00	6 17	5 19	6 41	4 53	7 05	4 49	7 19	5 05	7 11	5 28	6 39	5 51	5 56	6 15	5 16	6 45	4 52	7 07	4 56
25	7 05	5 24	6 37	5 54	5 59	6 17	5 18	6 42	4 52	7 05	4 49	7 19	5 06	7 10	5 29	6 38	5 52	5 55	6 16	5 15	6 46	4 52	7 07	4 56
26	7 05	5 25	6 35	5 55	5 57	6 18	5 17	6 43	4 52	7 06	4 50	7 19	5 07	7 09	5 30	6 37	5 53	5 53	6 17	5 14	6 46	4 52	7 08	4 57
27	7 04	5 26	6 34	5 56	5 56	6 19	5 16	6 44	4 51	7 07	4 50	7 19	5 07	7 09	5 31	6 35	5 53	5 52	6 18	5 13	6 47	4 51	7 08	4 58
28	7 03	5 27	6 33	5 57	5 55	6 20	5 15	6 44	4 51	7 07	4 50	7 19	5 08	7 08	5 31	6 34	5 54	5 50	6 19	5 12	6 48	4 51	7 09	4 58
29	7 03	5 28	6 33	5 57	5 53	6 21	5 14	6 45	4 50	7 08	4 51	7 19	5 09	7 07	5 32	6 33	5 55	5 49	6 20	5 11	6 49	4 51	7 09	4 59
30	7 02	5 29			5 52	6 21	5 12	6 46	4 50	7 09	4 51	7 19	5 10	7 06	5 33	6 31	5 56	5 48	6 21	5 10	6 50	4 51	7 09	5 00
31	7 01	5 30			5 50	6 22			4 50	7 09			5 10	7 05	5 34	6 30			6 22	5 09			7 09	5 00

Add one hour for Daylight Saving Time if and when in use.

I certify that the above data are the result of an accurate and true computation by the Nautical Almanac Office, United States Naval Observatory, an agency charged by Federal Statute (9 Stat. L. 374, 375) with the duty of making such computations and publishing the results.

E. W. WOOLARD
Director Nautical Almanac
U. S. Naval Observatory

C. G. CHRISTIE
Captain, USN
Superintendent
U. S. Naval Observatory

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