Technical Memorandum NWS WR-126

CLIMATE OF SAN FRANCISCO

George T. Pericht

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First Revision

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125 Statistical Guidance on the Prediction of Eastern North Pacific Tropical Cyclone Motion - Part II. Preston W. Leftwich and Charles J. Neumann, August 1977. (PB 273 155/AS)
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CLIMATE OF SAN FRANCISCO

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San Francisco, California

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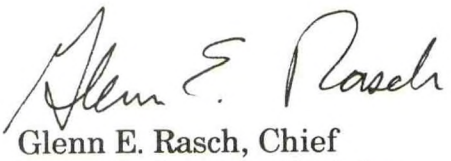

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CLIMATE OF SAN FRANCISCO

ABSTRACT

The purpose of this paper is to revise, update, and expand an earlier summary of the climate of San Francisco written by E. Jan Null in 1978. In addition to the revision of tables to include data through 1987, the following changes have been incorporated: 1) the geographical and climatological summary has been revised to include more details of the microclimates of San Francisco and to include information on sea surface temperatures; 2) corrected data to replace erroneous data from the malfunctioning rain gage from 1973 into 1982, 3) reasons behind the move of the observing site from the roof of the old Federal Building to Mission Dolores in 1982, and 4) revised normal temperatures reflecting the much improved exposure at Mission Dolores.

I. GEOGRAPHICAL AND CLIMATOLOGICAL SUMMARY

San Francisco is located at the northern end of a narrow peninsula which separates San Francisco Bay from the Pacific Ocean. It is roughly seven miles wide (Ocean to Bay) and seven miles long. Surrounded on three sides by cool bodies of water, it is known as the air conditioned city with cool summers and mild winters. Flowers bloom throughout the year, and warm clothing may be needed at times during any month.

The climate is classified as Mediterranean (Etesian), which is relatively rare, and is typical of the region bordering the Mediterranean Sea, central Chile, the west coast of Australia, and the west coast of South Africa. This climate is characterized by mild temperatures with dry summers and wet winters.

Precipitation averages about 19 inches a year with a markedly dry summer and a contrastingly wet winter, although winter rainfall varies greatly from year to year. About 80 percent of the rainfall occurs from November through March. Snow is extremely rare, having occurred in measurable amounts only three times this century. On the average, only two days per year have thunderstorms, typically occurring in the cold unstable air behind a vigorous Pacific front. The average annual wind speed is 9 mph with the lighter winds (6 to 7 mph) in the winter and stronger winds (10 to 11 mph) in the summer.

San Francisco probably has more climatic variability with respect to temperature, cloudiness, and sunshine within its 49 square miles than any other urban area in the country. Likewise, the greater San Francisco Bay area has more variability than San Francisco itself.

Sea fogs and low stratus clouds (both called fog by the locals) are probably the most notable features of the climate of San Francisco. They are more common in the summertime, but may occur at any time of the year. The temperature of the Pacific Ocean near the California coast tends to be colder than the ocean temperature several hundred miles farther offshore especially in the summer. This is caused by a phenomenon called upwelling

whereby colder water from the ocean bottom is brought to the surface. As the prevailing westerly winds bring the warmer and more humid air over the cooler water near the coast, moisture condenses to form fog. This fog is then drawn inland by the sea breezes which are enhanced by the temperature differential between the cold air over the ocean and the hot air over the Central Valley of California. In extreme cases the fog is carried inland 100 miles to the Sacramento Delta.

Sea surface temperatures of the adjacent ocean and bay, as might be expected, exert a strong influence not only on San Francisco's temperature but also on the development of coastal stratus. At a distance of 30 miles offshore the average sea surface temperature varies little during the year, ranging from 52 degrees in the spring to 57 in the fall. At the Golden Gate the temperature varies from 51 in January to 60 in September. Inside the Bay, the range is from 51 in January to 66 in late summer. Actual water temperatures can vary by several degrees from the above. The averages listed represent 30 year averages during the period from 1955 to 1984. The latest 10 year period shows averages of about one degree higher, and during a very warm month, water temperatures can be up to 4 degrees higher than the 30 year normal. Extreme temperature ranges vary from the mid 40s to around 70 at the Golden Gate. When sea surface temperatures are abnormally warm, not only do San Francisco temperatures rise (both maximum and minimum), but there is a marked decrease in the amount of coastal stratus observed. The opposite effect is noted with abnormally low water temperatures.

The complex topography of San Francisco (see map page 8) causes correspondingly complex patterns of fog and cloud, as well as significant temperature variability. A range of hills with elevations of up to nearly 1000 feet above sea level bisects the city from north to south. This range partially blocks the inland movement of the fog, especially during the day. Nevertheless, gaps in the hills let varying amounts of fog through, depending on the base height of the fog, its thickness, and other factors. In certain cases the fog will roll through the Golden Gate, down along the East Bay Hills, and into San Jose, a distance of 50 miles, while the area to the lee of the highest hills in San Francisco remains mostly clear.

Mostly because of the variation in fog, sunshine varies greatly from one part of the city to another. On a typical early afternoon in summer, the downtown area will have bright sunshine with a temperature near 70 while just to the west it will be overcast with temperatures only in the upper 50s. It is not unusual to find this contrast within a distance of only a few blocks, just to the lee of the higher hills. Spring and fall are the sunniest seasons. In the summer the sunniest area is a triangular shaped area to the lee of Twin Peaks and extending east-southeastward to the Potrero Hill district. In this area, summer sunshine averages 70 to 80 percent, gradually diminishing to 25 to 35 percent at the ocean. In the spring and fall sunshine is about the same in the sunniest areas but increases to the 45 to 55 percent range near the ocean.

On a typical summer day fog covers the entire city at sunrise and winds are light or calm. During the late forenoon the skies become sunny in the eastern part of the city while some partial clearing occurs in the western sections, perhaps reaching as far west as the ocean for a couple of hours in the early afternoon. By early afternoon the winds pick up to the 10 to 20 m.p.h. range and by late afternoon the fog is ready to roll in again. During most of the afternoon hours the fog bank can be seen from eastern parts of the city perched along the crest of the hills just to the west. This is frequently a dramatic sight with the brilliantly white and sharply outlined fog bank contrasting with the deep blue sky above. Winds reach a maximum in the early evening with gusts to 30 m.p.h. not uncommon on the windiest days. The fog gradually overspreads the entire city during the evening; the winds die down by midnight, and the process begins again.

In the winter, relatively little difference in climate is noted from one part of the city to another. This is due to the lack of temperature contrast between the ocean and the land and to the relatively frequent passage of Pacific frontal systems. However, a small difference in the amount of sunshine does occur during the winter months in the opposite pattern from the summer. In the winter, the main source region for fog is the Central Valley. During the frequent periods of Central Valley fog, the wind blows from the northeast out of the Valley toward the ocean. When this occurs, it is not unusual to find fog in the eastern half of the city (at least overnight and in the morning), while the bisecting range of hills protects the areas near the ocean from fog. Another factor that tends to produce more sunshine near the ocean during the winter is the stability that the relatively cool ocean water exerts in preventing convective clouds from forming after the passage of a weak to moderate cold front. The area near the ocean tends to be clear while inland, as the land heats up, instability clouds form causing a partly cloudy condition. During the winter, sunshine averages 50 to 60 percent in the east half of the city and 55 to 65 percent in the west.

Temperature patterns follow those of sunshine. In the winter there is little variation with average maximums from 55 to 60 degrees and minimums in the mid to upper 40s. Average temperatures rise until June then remain nearly constant through August with average maximums in the lower 60s near the ocean and to about 70 in the warmest area of Potrero Hill. Summer minimums range from 50 to 55. The warmest time of the year is September and October when the fog greatly diminishes and some of the heat from the Central Valley flows westward. At this time of the year average maximums are in the mid 60s near the ocean and in the mid 70s in the warmest areas. Average minimums are about the same as in the summer. In the two month period from mid-October to mid-December, average temperatures drop about 10 degrees making this the most pronounced "seasonal change" of the year. This is especially true also because of the transition from very dry weather to the winter rainy season.

II. HISTORY OF WEATHER OBSERVATIONS

The first weather observations in San Francisco were taken at the Presidio of San Francisco in 1847 but were of an intermittent nature. Consecutive records were begun two years later by Mr. Thomas Tennet during the California Gold Rush. Mr. Tennet began rainfall records on August 14, 1849 and temperature records on September 1 of that year.

In 1871 the U.S. Army Signal Corps (the forerunner of the present National Weather Service) took over the observations on an official basis, and from that time to the present, the U.S. Government has maintained continuous observations, although a short gap (from April 18 to May 1, 1906) in observations occurred as a result of the 1906 earthquake and fire. Very complete observations were taken until the early 1970s when, unfortunately, many important readings, including wind and sunshine, were discontinued. A minor malfunction in the official rain gage began in 1973 but was not noticed until January 4 of 1982, by which date it had already become a major problem since reported amounts of rain averaged only about 70 percent of actual. The problem was finally rectified and a new gage installed in April of 1982 at a new location. Rainfall data from a local television station located just two blocks away from the old location were substituted for the bad data and are contained herein. These data are believed to be highly accurate. The National Climatic Data Center (NCDC), however, has not published these data (although they have archived them) so the reader is advised to be wary of possible conflicts when San Francisco rainfall data are obtained from other sources.

Another continuing problem that had existed since 1871 was the rooftop exposure problem. All sites since 1871 have been on high rooftops, which are known to be very poor sites for temperature measurement. Although these sites were selected for ease of access and freedom from vandalism, they remained poor choices for temperature observation sites. (Rooftop exposures are occasionally found at various places around the country, particularly in urban settings. The reader is cautioned against comparing these data with non-rooftop data.) It was found through experiment that it was typical on a sunny day to have a 5 to 7 degrees lower temperature on the roof of the old Federal Building than at the standard observing level of about 4.5 feet above the ground. The opposite problem occurred at night. It tended to be warmer on the roof, particularly on clear nights with light winds, due to the formation of a ground based temperature inversion.

Because of these considerations, the observation site was moved 1.3 miles southwest to Mission Dolores where the exposure is just 10 feet above ground level. Observations have been taken at this site from April 1982 to the present. Although, as expected, maximum temperatures are higher than at the old Federal Building location and minimum temperatures are lower, the average annual temperatures at the two sites agree within 0.5 degrees (F). New, estimated normal temperatures are included herein. These normals are somewhat different than published normals of the past which were based on the poorly exposed rooftop site. In general the biggest differences are the summer maximums which are higher at the new site and winter minimums which are lower. Again, the reader is cautioned

to be aware of differences between the normals contained herein and those from other sources as it will be quite a few years before the 30 year normals published by the NCDC are based only on data from the new site. Because the values of certain parameters published by NCDC are directly based on temperature data from older sites, they are not contained herein. These include Heating Degree Days (although the yearly average of 3071 is probably good), Cooling Degree Days (old average of 56 much too low), and Average Number of Days over 90 degrees (old value of 2 is too low). Other parameters based on past data that are no longer measured, but are considered good and useful, are contained on page 40.

III. COMPARISON WITH SAN FRANCISCO AIRPORT DATA

San Francisco Airport is located in San Mateo County about 10 miles south of San Francisco. Because it carries the name "San Francisco," there is a tendency to assume that it has the same climate and weather as San Francisco, but it differs in many important aspects which will be pointed out below. In fact, probably the only data element that can be used for both locations without concern for significant error is pressure.

The temperature sensors at San Francisco Airport are located on filled-in land in San Francisco Bay, just a few hundred feet from the waters of the bay between the main runways. In the winter months this causes a cold bias in daytime temperatures as the frequent easterly breezes flowing from the cold Bay waters cause unrepresentively low temperatures to be reported. Because of this proximity to the water, the Airport temperatures are not even representative of nearby cities such as San Bruno, Milbrae, and South San Francisco. At night the Airport temperatures are usually several degrees lower than those in the city because of the lack of any urban heat island effect.

Another problem with temperature occurs during the spring through fall when the winds are light easterly until early afternoon, when the sea breeze pushes inland. In the mornings, airport temperatures will be much lower than just a very short distance inland from the bay due to the cooling effect of the light easterly winds on areas along the bayshore. Then, as the sea breeze arrives, the temperature will shoot up as air warmed over the land to the westnorthwest passes over the thermometer. This warming is shortlived, however, for within an hour the warmer air has passed by, and the cooler air from the ocean causes a rapid drop in temperature. This strange temperature pattern with too low temperatures in the morning, a rapid warming in the early afternoon, and an equally rapid cooling soon afterward is only representative of areas within a few hundred yards of the bayshore.

Winds, too, tend to be higher at the airport, especially in the summer due to the funneling effect of the San Bruno Gap just to the northwest. This is the largest and deepest gap in the coastal hills, and, consequently, winds tend to be stronger at San Francisco Airport than anywhere else in the San Francisco Bay area, except in the Bay itself from the Golden Gate to the Carquinez Straits.

Cloud cover varies significantly also. In the late spring and early fall the Airport frequently develops a stratus overcast during the late night and early morning hours while the eastern part of San Francisco is clear. In the summer, however, this pattern is reversed and the airport remains clear while even the eastern parts of the city only clear for a few hours or do not clear at all. This, of course, influences the temperatures too.

IV. BIBLIOGRAPHY

Byers, Horace R., 1930: Summer Sea Fog of the Central California Coast. University of California Publications in Geography, Vol. 3, No. 5, 291-331.

Felton, Ernest, 1950: Prevailing Wind Direction and Mean Speed Data for San Francisco and the San Francisco Bay Area. Weather Bureau Memorandum, San Francisco, California.

Loffman, Tom, 1975: The History of Temperature Observations in the City of San Francisco - 1850-1880. Unpublished.

Loffman, Tom, 1975: An Introduction to the Seasonal and Annual Variations of Temperature - 1850-1974. Unpublished.

Null, E. Jan, 1978: Climate of San Francisco. NOAA Technical Memorandum NWS WR-126.

Patton, Clyde Perry, 1956: Climatology of Summer Fog in the San Francisco Bay Area. University of California Publications in Geography, Vol. 10, 113-200.

U.S. Weather Bureau, National Weather Service, 1849-1986: Local Climatological Record, San Francisco, California. Archived National Climatic Data Center, Asheville, North Carolina, National Weather Service, Redwood City, California.

STATION LOCATION

SAN FRANCISCO, CALIFORNIA
MISSION DOLORES

	Location	Occupied from	Occupied to	Airline distance and direction from previous location	Latitude North	Longitude West	Elevation above Sea level: Ground at temperature site	Elevation above Ground: Wind instruments	Extreme thermometers	Psychrometer	Sunshine Switch	Tipping bucket rain gage	Weighing rain gage	8" rain gage	Hygrothermometer	Automatic Observing Equipment *	Remarks
	COOPERATIVE																
1	NE Corner Union and Dupont Streets	8/14/49	7/01/51		37° 48'	122° 24'	125										Rainfall measurements were made at the first six locations by Mr. Thomas Tennant. Rain gage consisted of a 6-inch square top receiver with 2-inch vertical sides. Water drained by funnel into a container large enough to hold 4 inches of rainfall. Gage had exposures within 10 feet of the ground, except at the 6th location where the gage was on a roof 50-55 feet above the ground. All ground elevations, first six locations, are approximate.
2	Corner of Stockton and California Streets	7/01/51	7/1862	0.6 mi.SSW	37° 48'	122° 24'	175										
3	Powell Street between Pacific and Broadway	7/1862	Summer 1863	1/3 mi.NNW	37° 48'	122° 25'	120										
4	Sacramento Street Between Taylor & Jones	Summer 1863	7/1864	0.4 mi. SW	37° 48'	122° 25'	330										
5	East side Leavenworth Street, between Pine & California Streets	7/1864	7/1866	800 ft. SW	37° 47'	122° 25'	260										
6	Battery Street between Washington & Jackson	7/1866	2/01/71	0.9 mi.ENE	37° 48'	122° 24'	14										
	CITY																
7	Merchants Exchange Bldg. Sacramento & Leidesdorff Streets	2/02/71	9/03/90	0.2 mi. SW	37° 48'	122° 24'	15		48	48		75		75			
8	Phelan Building Market, Grant & O'Farrell Streets	9/04/90	10/31/92	0.5 mi. SW	37° 47'	122° 24'	41	109	109	109		101		101			
9	Mills Building 220 Montgomery Street	11/01/92	4/18/06	0.3 mi. NE	37° 48'	122° 24'	25	167	161	161		154		154			
10	Residence 3018 Clay Street	5/01/06	9/30/06	3.1 mi. W	37° 47'	122° 27'	257	42	29	29				40			Temporary quarters in private residence following earthquake and fire 4/18/06. Improvised exposure of instruments.
11	Merchants Exchange Bldg. 465 California Street	10/01/06	10/21/14	3.0 mi. E	37° 48'	122° 24'	17	204	200	200		191		191			
	Merchants Exchange Bldg. 465 California Street	10/22/14	4/21/19	No Change	37° 48'	122° 24'	17	213	209	209		200		200			Instruments relocated on new tower.
	Merchants Exchange Bldg. 465 California Street	4/22/19	5/12/36	No Change	37° 48'	122° 24'	17	243	208	208		202		202			Instruments moved to new tower. Thermometer readings probably affected at times by nearby ventilators. Several high buildings affected wind recordings.
12	Federal Office Building 50 Fulton Street	5/13/36	4/18/83	1.0 mi. SW	37° 47'	122° 25'	52	132 A	112 A	112 A	129 B C	104 B	NA	104 A	a112 B	NA	Exposure good except tall buildings NNE shields winds somewhat from NE. a - Temp. sensor added 12/6/53. A - Removed 4/3/73. B - Remote readout at airport Weather Service Office effective 4/3/73. C - Decommissioned Dec. 1974.
13	Mission Dolores 16th & Dolores Streets	4/18/83	Present	1.3 mi. SW	37° 46'	122° 26'	75	NA	NA	NA	NA	10	NA	NA	b10	NA	b - Bristol Thermograph.

* Type
M = AMOS
T = AUTOB

Numbers refer to map locations on page 8

NUMBERS REFER TO LOCATIONS ON PAGE 7

SAN FRANCISCO

Observation Sites

Countour Interval = 50 meters

Figure 1.

SUNRISE AND SUNSET AT SAN FRANCISCO, CALIFORNIA

NO. 104

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 25	5 02	7 14	5 33	6 42	6 03	5 55	6 32	5 14	7 00	4 49	7 26	4 51	7 35	5 13	7 19	5 39	6 39	6 05	5 53	6 35	5 11	7 06	4 51
2	7 25	5 02	7 13	5 34	6 40	6 04	5 54	6 33	5 13	7 01	4 49	7 26	4 52	7 35	5 14	7 18	5 40	6 38	6 06	5 52	6 36	5 10	7 07	4 51
3	7 26	5 03	7 12	5 35	6 39	6 05	5 52	6 34	5 12	7 02	4 49	7 27	4 52	7 35	5 14	7 17	5 41	6 36	6 07	5 50	6 37	5 09	7 08	4 51
4	7 26	5 04	7 11	5 36	6 37	6 06	5 51	6 35	5 11	7 03	4 48	7 28	4 53	7 35	5 15	7 15	5 42	6 35	6 08	5 49	6 38	5 08	7 09	4 51
5	7 26	5 05	7 10	5 38	6 36	6 07	5 49	6 36	5 10	7 04	4 48	7 28	4 53	7 35	5 16	7 14	5 43	6 33	6 09	5 47	6 39	5 07	7 10	4 51
6	7 26	5 06	7 09	5 39	6 35	6 08	5 48	6 37	5 09	7 04	4 48	7 29	4 54	7 35	5 17	7 13	5 44	6 32	6 09	5 46	6 40	5 06	7 11	4 51
7	7 26	5 07	7 08	5 40	6 33	6 09	5 46	6 38	5 08	7 05	4 48	7 29	4 54	7 34	5 18	7 12	5 44	6 30	6 10	5 44	6 41	5 05	7 12	4 51
8	7 26	5 08	7 07	5 41	6 32	6 10	5 45	6 39	5 07	7 06	4 47	7 30	4 55	7 34	5 19	7 11	5 45	6 29	6 11	5 43	6 42	5 04	7 12	4 51
9	7 25	5 09	7 06	5 42	6 30	6 11	5 43	6 40	5 06	7 07	4 47	7 30	4 55	7 34	5 20	7 10	5 46	6 27	6 12	5 41	6 43	5 03	7 13	4 51
10	7 25	5 10	7 05	5 43	6 29	6 12	5 42	6 41	5 05	7 08	4 47	7 31	4 56	7 33	5 20	7 09	5 47	6 26	6 13	5 40	6 44	5 02	7 14	4 51
11	7 25	5 10	7 04	5 44	6 27	6 13	5 41	6 41	5 04	7 09	4 47	7 31	4 57	7 33	5 21	7 08	5 48	6 24	6 14	5 38	6 45	5 02	7 15	4 51
12	7 25	5 11	7 03	5 45	6 26	6 14	5 39	6 42	5 03	7 10	4 47	7 32	4 57	7 33	5 22	7 06	5 49	6 23	6 15	5 37	6 47	5 01	7 16	4 51
13	7 25	5 12	7 02	5 46	6 24	6 15	5 38	6 43	5 02	7 11	4 47	7 32	4 58	7 32	5 23	7 05	5 50	6 21	6 16	5 35	6 48	5 00	7 16	4 51
14	7 24	5 13	7 01	5 47	6 23	6 16	5 36	6 44	5 01	7 12	4 47	7 33	4 59	7 32	5 24	7 04	5 50	6 19	6 17	5 34	6 49	4 59	7 17	4 52
15	7 24	5 15	7 00	5 49	6 21	6 17	5 35	6 45	5 00	7 12	4 47	7 33	4 59	7 31	5 25	7 03	5 51	6 18	6 18	5 33	6 50	4 59	7 18	4 52
16	7 24	5 16	6 59	5 50	6 20	6 18	5 34	6 46	4 59	7 13	4 47	7 33	5 00	7 31	5 26	7 01	5 52	6 16	6 19	5 31	6 51	4 58	7 18	4 52
17	7 23	5 17	6 57	5 51	6 18	6 19	5 32	6 47	4 58	7 14	4 47	7 34	5 01	7 30	5 27	7 00	5 53	6 15	6 20	5 30	6 52	4 57	7 19	4 52
18	7 23	5 18	6 56	5 52	6 17	6 20	5 31	6 48	4 58	7 15	4 47	7 34	5 02	7 30	5 27	6 59	5 54	6 13	6 21	5 28	6 53	4 56	7 20	4 53
19	7 23	5 19	6 55	5 53	6 15	6 20	5 29	6 49	4 57	7 16	4 47	7 34	5 02	7 29	5 28	6 58	5 55	6 12	6 22	5 27	6 54	4 56	7 20	4 53
20	7 22	5 20	6 54	5 54	6 14	6 21	5 28	6 50	4 56	7 17	4 48	7 35	5 03	7 28	5 29	6 56	5 55	6 10	6 23	5 26	6 55	4 55	7 21	4 54
21	7 22	5 21	6 52	5 55	6 12	6 22	5 27	6 51	4 55	7 17	4 48	7 35	5 04	7 28	5 30	6 55	5 56	6 09	6 24	5 24	6 56	4 55	7 21	4 54
22	7 21	5 22	6 51	5 56	6 11	6 23	5 25	6 52	4 55	7 18	4 48	7 35	5 05	7 27	5 31	6 54	5 57	6 07	6 25	5 23	6 57	4 54	7 22	4 55
23	7 20	5 23	6 50	5 57	6 09	6 24	5 24	6 52	4 54	7 19	4 48	7 35	5 05	7 26	5 32	6 52	5 58	6 05	6 26	5 22	6 58	4 54	7 22	4 55
24	7 20	5 24	6 48	5 58	6 08	6 25	5 23	6 53	4 53	7 20	4 49	7 35	5 06	7 25	5 33	6 51	5 59	6 04	6 27	5 21	6 59	4 53	7 23	4 56
25	7 19	5 25	6 47	5 59	6 06	6 26	5 21	6 54	4 53	7 21	4 49	7 35	5 07	7 25	5 33	6 49	6 00	6 02	6 28	5 19	7 00	4 53	7 23	4 56
26	7 19	5 26	6 46	6 00	6 04	6 27	5 20	6 55	4 52	7 21	4 49	7 36	5 08	7 24	5 34	6 48	6 01	6 01	6 29	5 18	7 01	4 52	7 24	4 57
27	7 18	5 28	6 44	6 01	6 03	6 28	5 19	6 56	4 52	7 22	4 50	7 36	5 09	7 23	5 35	6 47	6 01	5 59	6 30	5 17	7 02	4 52	7 24	4 58
28	7 17	5 29	6 43	6 02	6 01	6 29	5 18	6 57	4 51	7 23	4 50	7 36	5 09	7 22	5 36	6 45	6 02	5 58	6 31	5 16	7 03	4 52	7 24	4 58
29	7 16	5 30	6 43	6 03	6 00	6 30	5 17	6 58	4 51	7 24	4 50	7 36	5 10	7 21	5 37	6 44	6 03	5 56	6 32	5 15	7 04	4 52	7 25	4 59
30	7 16	5 31			5 58	6 31	5 15	6 59	4 50	7 24	4 51	7 36	5 11	7 20	5 38	6 42	6 04	5 55	6 33	5 14	7 05	4 51	7 25	5 00
31	7 15	5 32			5 57	6 31			4 50	7 25			5 12	7 19	5 39	6 41			6 34	5 12			7 25	5 01

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

SAN FRANCISCO-WARMEST AND COLDEST MONTHS

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN'L
TOP THREE	61.7	64.7	68.2	70.2	69.5	71.9	72.1	74.2	81.2	73.6	68.9	63.8	67.0
WARMEST	1986	1986	1926	1987	1931	1985	1984	1983	1984	1987	1986	1958	1986
AVERAGE													
MAXIMUM	61.6	64.5	67.8	68.4	69.4	71.0	72.1	74.1	76.4	73.0	68.8	61.3	66.8
TEMPERA	1948	1986	1986	1985	1987	1929	1985	1984	1983	1959	1929	1953	1987
TURES													
WITH YEAR	60.3	64.0	67.3	67.3	69.0	69.7	71.4	70.7	75.0	72.6	68.2	61.0	66.0
	1976	1924	1931	1931	1984	1935	1983	1987	1958	1983	1932	1940	1984
TOP THREE	56.5	58.9	60.6	60.5	61.8	63.9	64.1	65.9	69.4	65.5	61.1	57.5	60.1
WARMEST	1986	1986	1934	1987	1931	1985	1983	1984	1967	1967	1950	1958	1986
AVERAGE													
TEMPERA	54.8	58.4	60.6	59.8	61.5	63.0	63.9	63.5	67.1	65.2	60.9	55.8	59.4
TURES	1972	1963	1926	1985	1936	1929	1984	1987	1983	1959	1926	1969	1987
WITH YEAR													
	54.7	57.4	60.4	59.2	61.2	62.5	63.4	62.5	66.8	65.1	60.8	55.4	58.9
	1948	1970	1986	1930	1941	1958	1983	1976	1958	1987	1923	1979	1983
TOP THREE	38.6	42.6	43.9	45.6	46.9	48.6	49.3	50.6	50.7	50.8	47.2	41.9	48.5
COLDEST	1937	1903	1897	1901	1899	1908	1901	1955	1910	1916	1916	1932	1893
AVERAGE													
MINIMUM	38.8	43.3	44.3	46.2	48.0	49.2	50.0	50.9	51.3	51.0	47.7	42.6	48.7
TEMPERA	1949	1949	1917	1967	1898	1901	1893	1893	1899	1971	1897	1908	1908
TURES													
WITH YEAR	40.8	43.5	44.8	46.3	48.1	49.3	50.3	50.9	52.2	51.1	47.8	42.8	48.8
	1917	1894	1894	1891	1909	1893	1899	1910	1955	1949	1931	1972	1898
TOP THREE	43.6	47.8	48.9	50.8	52.6	55.0	55.6	56.4	57.6	56.6	53.1	47.0	54.3
COLDEST	1937	1887	1897	1967	1898	1911	1901	1955	1910	1881	1897	1908	1893
AVERAGE													
MONTHLY	44.7	48.3	49.2	51.6	52.6	55.4	55.9	56.4	58.2	56.9	53.2	47.2	54.6
TEMPERA	1949	1949	1911	1896	1899	1908	1899	1901	1899	1916	1882	1972	1898
TURES													
WITH YEAR	46.2	48.4	49.3	51.8	53.4	55.9	56.0	56.5	58.3	57.6	53.4	47.4	54.9
	1890	1894	1880	1901	1964	1910	1962	1911	1962	1893	1896	1932	1880

SAN FRANCISCO
ABSOLUTE MONTHLY TEMPERATURE EXTREMES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN'L
ABSOLUTE MAXIMUM	79 1962	81 1986	86 1914	90 1987	97 1887	101 1961	99 1931	96 1968	101 1971	102 1987	86 1966	76 1958	102 10/1987
ABSOLUTE MINIMUM	29 1888	33 1887	33 1896	40 1891	42 1906	46 1908	47 1953	46 1903	47 1900	43 1935	38 1919	27 1932	27 12/1932
LOWEST MAXIMUM	39 1888	42 1889	45 1896	48 1875	51 1950	53 1911	55 1970	54 1954	54 1910	52 1899	48 1896	35 1932	35 12/1932
HIGHEST MINIMUM	60 1970	60 1930	67 1914	68 1947	69 1943	70 1949	66 1905	70 1894	75 1904	69 1961	66 1945	63 1937	75 9/1904

SAN FRANCISCO

	HOTTEST DAYS				COLDEST DAYS			
1	102	OCT	5	1987	27	DEC	11	1932
2	101	SEP	8	1904	29	JAN	14	1888
3	101	SEP	16	1913	29	JAN	15	1888
4	101	JUN	14	1961	30	JAN	8	1937
5	101	SEP	14	1971	30	JAN	21	1937
6	100	JUN	29	1891	30	DEC	9	1972
7	100	SEP	7	1904	31	JAN	16	1888
8	100	SEP	21	1928	31	JAN	10	1972
9	100	SEP	8	1984				
10	100	OCT	4	1987				
	NO OTHER READINGS OF 100 OR GREATER				NO OTHER READINGS OF LESS THAN 32			

LONGEST HOT PERIODS

CONSECUTIVE DAYS	NO.	DATES	TEMPERATURES
90 OR ABOVE	4	6 SEP - 9 SEP 1904	92 100 101 90
	4	20 SEP - 23 SEP 1939	97 97 97 96
	3	20 JUN - 22 JUN 1929	90 95 94
	3	13 SEP - 15 SEP 1971	99 101 94
	3	30 SEP - 2 OCT 1980	91 97 96
	3	5 OCT - 7 OCT 1987	100 102 90
85 OR ABOVE	8	16 SEP - 23 SEP 1939	86 87 88 89 97 97 97 96
	5	12 SEP - 16 SEP 1909	86 90 89 93 92
	5	8 JUN - 12 JUN 1877	87 88 86 92 88
	5	24 SEP - 28 SEP 1970	86 87 92 89 87
80 OR ABOVE	8	16 SEP - 23 SEP 1939	86 87 88 89 97 97 97 96
	6	2 OCT - 7 OCT 1986	80 84 86 83 80 81
	6	23 JUN - 28 JUN 1976	88 95 90 87 94 83
	6	24 SEP - 29 SEP 1970	86 87 92 89 87 87
	6	11 OCT - 16 OCT 1959	81 83 87 84 82 88
	6	11 SEP - 16 SEP 1909	82 86 90 89 93 92
	6	18 OCT - 23 OCT 1887	82 86 87 84 80 80
	6	24 OCT - 29 OCT 1890	82 82 83 86 86 84
75 OR ABOVE	10	20 OCT - 29 OCT 1890	76 82 76 77 82 82 83 86 86 84
	9	14 JUN - 22 JUN 1981	77 88 78 78 79 83 75 85 78
	9	15 SEP - 23 SEP 1939	79 86 87 88 89 97 97 97 96
	8	27 OCT - 3 NOV 1930	75 76 78 76 79 79 79 75
	7	MANY OCCURRENCES	

LONGEST COLD PERIODS

CONSECUTIVE DAYS	NO.	DATES	TEMPERATURES
32 OR BELOW	4	14 JAN - 17 JAN 1888	29 29 31 32
	2	9 DEC - 10 DEC 1972	30 32
	2	8 JAN - 9 JAN 1937	30 32
	2	20 JAN - 21 JAN 1937	32 30
	2	11 DEC - 12 DEC 1932	27 31
35 OR BELOW	4	8 DEC - 11 DEC 1972	34 30 32 34
	4	14 JAN - 17 JAN 1888	29 29 31 32
	4	9 DEC - 12 DEC 1932	34 33 27 31
	3	9 JAN - 11 JAN 1949	35 32 33 LAST OF SEVERAL OCCURRENCES
40 OR BELOW	10	7 JAN - 16 JAN 1929	30 40 38 40 38 36 36 37 40 40
	10	19 JAN - 28 JAN 1949	40 38 40 39 35 36 38 36 38 39
	10	7 DEC - 16 DEC 1972	38 34 30 32 34 36 35 35 36 40
	9	19 JAN - 27 JAN 1937	37 32 30 34 36 30 36 40 38
	8	31 DEC - 7 JAN 1961 1960	40 39 40 37 37 35 35 37 LAST OF SEVERAL OCCURENCES
45 OR BELOW	63	19 DEC - 19 FEB 1949 1948	TOO NUMEROUS TO LIST
	44	15 DEC - 27 JAN 1917 1916	TOO NUMEROUS TO LIST
	39	27 DEC - 3 FEB 1937 1936	TOO NUMEROUS TO LIST

SAN FRANCISCO (Records began in 1875)

JANUARY

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms* (est)
1	70	1976	36	1950	58	1963	47	1932	57/44
2	63	1984	37	1924	54	1948	42	1910	57/44
3	63	1985	36	1950	53	1927	43	1924	57/44
4	67	1934	35	1950	55	1948	44	1974	57/44
5	70	1887	35	1961	54	1965	41	1913	57/44
6	73	1887	33	1912	56	1887	43	1961	57/44
7	68	1911	34	1937	53	1941	42	1968	57/44
8	79	1962	30	1937	57	1940	42	1937	57/44
9	73	1962	32	1937	57	1962	40	1913	57/44
10	68	1932	32	1949	56	1959	41	1949	57/44
11	66	1920	33	1949	55	1959	43	1947	57/44
12	67	1948	36	1929	61	1980	45	1937	57/44
13	67	1967	35	1949	58	1980	45	1929	57/44
14	66	1967	29	1888	56	1909	40	1888	57/44
15	68	1966	29	1888	56	1909	39	1888	57/44
16	70	1920	31	1888	56	1970	43	1917	57/44
17	70	1920	32	1888	58	1986	45	1907	57/44
18	70	1920	34	1922	56	1986	44	1922	57/44
19	70	1976	32	1922	57	1969	44	1883	57/44
20	68	1976	32	1937	56	1969	41	1937	58/45
21	71	1976	30	1937	60	1970	43	1937	58/45
22	74	1968	34	1962	58	1970	44	1937	58/45
23	75	1948	35	1949	53	1970	45	1969	58/45
24	74	1948	36	1949	55	1886	47	1954	58/45
25	74	1899	36	1937	55	1942	46	1893	58/45
26	78	1899	36	1949	60	1899	46	1893	58/45
27	75	1899	37	1937	58	1899	46	1968	58/45
28	72	1984	36	1957	55	1986	45	1969	58/45
29	71	1899	36	1922	57	1967	42	1922	59/46
30	72	1899	36	1923	58	1881	45	1923	59/46
31	73	1976	37	1917	56	1963	46	1971	59/46
MONTH	79	1962	29	1888	61	1980	39	1888	57/44

*NOTE: (Applies to all months) All daily normals estimated by adjusting the 30 year normals (1951-80) to agree with the 5 years (1983-87) of temperature data from the new observing site at Mission Dolores. This has resulted in higher normal maximums (especially in summer) and lower normal minimums (especially in winter) but virtually no change in mean annual temperatures. See text for more details.

SAN FRANCISCO (Records began in 1875)

FEBRUARY

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	70	1976	36	1950	58	1963	47	1932	59/46
2	71	1976	35	1932	57	1963	45	1883	59/46
3	71	1984	35	1883	58	1963	44	1883	59/46
4	71	1963	34	1899	57	1963	42	1899	59/46
5	71	1917	33	1887	55	1940	43	1976	59/46
6	73	1987	38	1887	58	1963	44	1883	59/46
7	72	1987	35	1929	56	1960	46	1929	59/46
8	73	1987	38	1920	56	1963	48	1939	59/46
9	67	1970	38	1901	58	1987	46	1939	60/46
10	70	1886	38	1894	57	1987	48	1923	60/46
11	70	1889	36	1884	56	1970	44	1884	60/46
12	75	1889	36	1884	57	1879	46	1884	60/46
13	74	1930	36	1884	55	1986	48	1884	60/46
14	78	1930	37	1949	58	1986	47	1884	60/46
15	76	1930	37	1903	60	1930	50	1894	60/46
16	75	1930	38	1956	57	1986	48	1921	60/46
17	75	1939	38	1880	60	1986	46	1882	61/47
18	80	1899	39	1890	56	1986	46	1882	61/47
19	75	1964	38	1897	56	1986	47	1890	61/47
20	73	1965	38	1897	58	1943	48	1918	61/47
21	77	1985	36	1890	56	1936	47	1890	61/47
22	80	1985	38	1890	61	1985	49	1880	61/47
23	80	1985	38	1890	55	1968	50	1969	61/47
24	75	1947	40	1891	57	1957	50	1913	62/47
25	76	1888	38	1887	58	1968	51	1951	62/47
26	81	1986	37	1962	58	1926	47	1911	62/47
27	78	1986	38	1962	57	1940	45	1911	62/47
28	76	1986	36	1951	56	1925	46	1911	62/47
29	71	1936	42	1888	54	1968	54	1920	62/47
MONTH	81	1986	33	1887	61	1985	42	1899	61/47

SAN FRANCISCO (Records began in 1875)

MARCH

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	77	1936	39	1966	56	1925	46	1896	61/46
2	77	1984	36	1896	60	1936	45	1896	61/46
3	81	1929	33	1896	59	1901	47	1896	61/46
4	77	1984	37	1896	58	1901	49	1903	61/46
5	77	1901	40	1918	57	1884	46	1908	61/46
6	78	1892	39	1956	57	1885	48	1897	61/46
7	80	1892	40	1897	60	1892	49	1974	61/46
8	78	1892	41	1952	58	1934	50	1893	61/46
9	80	1934	40	1893	56	1943	48	1876	61/46
10	77	1916	40	1922	58	1934	50	1913	61/46
11	81	1934	35	1922	56	1905	49	1954	61/46
12	76	1926	40	1897	56	1905	50	1969	61/46
13	78	1926	40	1875	56	1941	49	1881	61/46
14	78	1926	38	1942	57	1878	50	1893	61/46
15	80	1972	41	1917	55	1941	48	1906	61/46
16	85	1914	40	1898	60	1914	47	1898	61/46
17	85	1914	42	1898	67	1914	50	1898	61/46
18	86	1914	41	1898	63	1914	52	1954	61/46
19	80	1914	40	1894	56	1916	49	1882	61/46
20	78	1915	40	1904	55	1878	51	1954	62/46
21	81	1915	41	1935	58	1915	47	1909	62/46
22	83	1926	42	1907	59	1876	46	1913	62/46
23	82	1926	41	1913	57	1876	50	1904	62/46
24	82	1926	40	1913	58	1969	50	1904	62/46
25	83	1952	38	1907	57	1928	49	1907	62/46
26	82	1930	40	1907	63	1952	51	1907	62/46
27	84	1923	42	1898	65	1930	52	1892	62/47
28	81	1986	42	1897	58	1934	53	1982	62/47
29	79	1987	39	1897	57	1906	51	1897	62/47
30	81	1987	42	1905	59	1916	50	1967	63/47
31	80	1987	42	1892	57	1970	51	1898	63/47
MONTH	86	1914	33	1896	67	1914	45	1896	62/46

SAN FRANCISCO (Records began in 1875)

APRIL

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	83	1985	43	1976	57	1889	50	1982	63/47
2	88	1985	43	1955	60	1959	53	1955	63/47
3	79	1961	44	1921	57	1961	51	1901	63/47
4	84	1985	41	1875	57	1961	52	1975	63/47
5	80	1924	41	1875	58	1924	48	1875	63/47
6	86	1924	40	1929	57	1926	51	1875	63/47
7	81	1939	40	1891	56	1957	50	1975	63/47
8	80	1904	40	1891	59	1885	52	1953	63/47
9	83	1904	43	1965	59	1904	50	1965	63/47
10	84	1904	40	1927	61	1885	51	1965	63/47
11	84	1898	40	1967	61	1904	51	1922	63/47
12	87	1898	42	1911	68	1957	52	1922	63/47
13	88	1985	43	1883	60	1947	52	1970	64/48
14	88	1888	44	1921	57	1947	51	1896	64/48
15	84	1966	43	1896	57	1966	51	1951	64/48
16	77	1966	43	1917	56	1925	53	1963	64/48
17	79	1954	42	1880	58	1923	52	1955	64/48
18	83	1914	42	1955	59	1918	52	1967	64/48
19	82	1986	41	1896	62	1918	51	1896	64/48
20	84	1931	42	1963	57	1965	52	1971	64/48
21	90	1987	42	1967	63	1982	52	1908	64/48
22	86	1910	44	1901	56	1926	54	1975	64/48
23	87	1910	43	1899	61	1910	51	1899	64/48
24	85	1926	43	1899	57	1913	53	1955	64/48
25	89	1926	44	1892	61	1926	52	1922	64/48
26	85	1965	44	1955	59	1935	51	1955	64/48
27	86	1921	42	1894	58	1921	51	1970	64/48
28	85	1957	43	1906	60	1876	50	1948	65/49
29	89	1981	46	1967	57	1981	53	1971	65/49
30	83	1916	45	1964	60	1916	51	1899	65/49
MONTH	90	1987	40	1967	68	1957	48	1875	64/48

SAN FRANCISCO (Records began in 1875)

MAY

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	86	1947	43	1899	60	1947	53	1975	65/49
2	83	1925	44	1921	56	1943	54	1950	65/49
3	79	1935	44	1950	60	1935	53	1975	65/49
4	84	1935	45	1975	65	1935	53	1935	65/49
5	93	1987	46	1965	60	1953	52	1972	65/49
6	88	1987	44	1964	67	1949	53	1972	65/49
7	91	1987	45	1879	60	1936	54	1945	65/49
8	88	1931	46	1964	63	1943	53	1945	65/49
9	88	1931	44	1922	59	1936	54	1921	65/49
10	89	1941	46	1920	64	1941	53	1894	66/50
11	89	1895	46	1909	61	1895	51	1894	66/50
12	96	1976	45	1882	63	1895	52	1898	66/50
13	87	1927	45	1882	65	1976	51	1898	66/50
14	87	1922	44	1899	59	1890	51	1950	66/50
15	91	1970	44	1899	63	1970	52	1898	66/50
16	91	1956	42	1906	62	1956	55	1974	66/50
17	84	1983	46	1899	59	1978	54	1974	66/50
18	88	1892	46	1901	59	1931	54	1974	66/50
19	90	1931	45	1876	68	1931	55	1954	67/51
20	88	1942	43	1899	64	1941	55	1957	67/51
21	86	1886	45	1899	59	1892	54	1966	67/51
22	85	1943	44	1909	69	1943	55	1899	67/51
23	91	1943	47	1909	59	1958	53	1911	67/51
24	88	1927	46	1911	61	1890	56	1899	67/51
25	87	1951	47	1953	60	1883	53	1903	67/51
26	91	1896	47	1918	63	1896	55	1972	67/51
27	93	1984	47	1911	60	1880	53	1972	67/51
28	97	1887	47	1911	60	1975	55	1974	67/51
29	93	1975	46	1893	64	1924	54	1966	68/52
30	91	1978	47	1916	59	1924	54	1965	68/52
31	87	1912	47	1971	63	1880	52	1965	68/52
MONTH	97	1887	42	1906	68	1931	51	1950	67/50

SAN FRANCISCO (Records began in 1875)

JUNE

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	88	1919	47	1955	60	1960	56	1966	68/52
2	95	1960	47	1900	60	1960	56	1972	68/52
3	90	1893	47	1909	70	1949	53	1885	68/52
4	92	1949	46	1908	65	1904	55	1970	68/52
5	95	1883	47	1908	64	1883	55	1909	68/52
6	96	1903	47	1917	70	1883	55	1913	68/52
7	85	1979	47	1917	60	1958	55	1908	68/52
8	92	1973	46	1917	65	1877	55	1911	68/52
9	91	1986	47	1893	62	1877	55	1982	68/52
10	88	1985	47	1901	63	1921	54	1943	68/52
11	92	1877	47	1911	62	1877	56	1974	68/52
12	93	1876	48	1908	64	1877	56	1895	68/53
13	91	1966	47	1916	60	1960	53	1911	68/53
14	101	1961	46	1917	64	1961	53	1911	68/53
15	89	1976	47	1917	61	1961	54	1904	68/53
16	90	1943	48	1916	62	1876	57	1777	68/53
17	86	1957	47	1901	59	1986	57	1970	68/53
18	86	1895	47	1908	61	1986	55	1977	68/53
19	92	1920	47	1893	63	1981	54	1977	68/53
20	93	1973	47	1901	61	1929	54	1911	68/53
21	95	1929	48	1911	68	1929	56	1911	68/53
22	94	1929	48	1911	61	1929	56	1911	68/54
23	94	1909	48	1908	63	1909	56	1962	68/54
24	95	1976	47	1908	70	1976	56	1899	68/54
25	90	1976	48	1908	69	1976	56	1938	68/54
26	89	1973	48	1917	63	1976	57	1898	68/54
27	94	1976	48	1917	61	1978	57	1979	68/54
28	92	1891	48	1917	60	1942	58	1970	68/54
29	100	1891	48	1919	64	1927	57	1965	68/54
30	93	1927	47	1908	67	1891	57	1974	68/54
MONTH	101	1961	46	1917	70	1976	53	1911	68/53

SAN FRANCISCO (Records began in 1875)

JULY

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	99	1985	48	1908	62	1891	56	1956	69/54
2	92	1970	48	1949	62	1970	57	1965	69/54
3	99	1931	47	1919	62	1931	56	1965	69/54
4	95	1931	47	1953	64	1931	56	1898	69/54
5	82	1921	48	1965	60	1931	55	1970	69/54
6	94	1921	47	1953	61	1921	56	1970	69/54
7	98	1905	48	1910	66	1905	55	1962	69/54
8	89	1985	48	1953	62	1905	56	1962	69/54
9	90	1985	47	1953	58	1885	56	1951	69/54
10	92	1959	47	1953	60	1884	56	1951	69/54
11	92	1983	48	1897	62	1913	56	1978	69/54
12	86	1983	48	1903	64	1931	57	1912	69/54
13	88	1972	48	1901	60	1972	58	1951	69/54
14	92	1972	48	1902	61	1984	56	1899	69/54
15	93	1888	47	1901	62	1984	55	1899	69/55
16	82	1935	48	1919	62	1888	56	1981	69/55
17	82	1961	49	1903	59	1984	56	1903	69/55
18	84	1916	48	1899	58	1942	56	1903	69/55
19	81	1961	49	1969	58	1925	57	1905	69/55
20	84	1917	48	1894	58	1925	56	1901	69/55
21	88	1917	48	1901	58	1972	57	1944	69/55
22	81	1917	48	1894	58	1945	57	1967	69/55
23	78	1917	49	1890	59	1986	56	1968	69/55
24	78	1974	49	1959	58	1969	57	1971	69/55
25	82	1973	49	1933	60	1946	57	1892	69/55
26	88	1963	49	1968	60	1902	57	1893	69/55
27	82	1923	49	1968	61	1947	55	1919	69/55
28	84	1954	48	1897	59	1954	56	1966	69/55
29	83	1977	48	1903	58	1958	55	1952	69/55
30	85	1977	48	1901	61	1977	57	1943	69/55
31	83	1987	47	1893	59	1980	54	1898	69/55
MONTH	99	1931	47	1953	66	1905	54	1898	69/55

SAN FRANCISCO (Records began in 1875)

AUGUST

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	88	1987	48	1955	60	1879	55	1954	69/55
2	83	1985	49	1910	60	1879	56	1967	69/55
3	78	1985	48	1910	58	1976	55	1910	69/55
4	83	1947	48	1903	59	1976	55	1908	69/55
5	78	1983	48	1893	57	1976	56	1911	69/55
6	93	1983	48	1916	61	1961	56	1911	69/55
7	92	1984	48	1916	59	1961	56	1909	69/55
8	82	1984	46	1903	59	1971	57	1951	69/55
9	85	1970	48	1903	58	1972	56	1955	69/55
10	81	1940	48	1903	58	1939	57	1951	69/55
11	85	1935	48	1893	60	1941	56	1955	69/55
12	84	1959	48	1893	59	1965	54	1954	69/55
13	81	1965	49	1903	59	1965	57	1924	69/55
14	81	1885	48	1969	58	1968	56	1955	69/55
15	87	1950	49	1955	59	1983	57	1944	69/55
16	82	1933	49	1955	60	1933	56	1894	69/55
17	92	1892	49	1894	60	1986	56	1894	69/55
18	88	1934	48	1898	60	1883	56	1901	69/55
19	81	1950	48	1955	62	1976	56	1970	69/55
20	84	1916	49	1955	60	1972	56	1970	69/55
21	84	1891	47	1898	64	1891	57	1907	69/55
22	92	1891	50	1970	66	1976	56	1904	69/55
23	89	1931	50	1894	64	1959	58	1955	69/55
24	88	1931	50	1911	59	1978	59	1955	69/55
25	86	1894	50	1955	58	1971	57	1887	69/55
26	91	1894	50	1955	65	1894	57	1895	69/55
27	87	1894	49	1955	70	1894	56	1946	70/55
28	86	1915	49	1955	64	1954	56	1970	70/55
29	96	1968	48	1955	62	1977	56	1970	70/55
30	89	1879	49	1911	62	1977	55	1909	70/55
31	87	1943	48	1910	62	1947	58	1909	70/55
MONTH	96	1968	46	1903	70	1894	54	1954	70/55

SAN FRANCISCO (Records began in 1875)

SEPTEMBER

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	90	1952	48	1910	61	1941	57	1960	70/55
2	88	1889	49	1910	64	1979	57	1962	70/55
3	92	1961	50	1928	70	1961	56	1909	70/55
4	90	1961	50	1910	64	1979	56	1962	70/55
5	87	1923	49	1904	60	1985	56	1964	71/55
6	92	1904	50	1920	63	1958	57	1920	71/55
7	100	1904	50	1910	67	1904	55	1975	71/55
8	101	1904	50	1946	75	1904	58	1975	71/55
9	100	1932	50	1946	66	1904	57	1977	71/55
10	92	1914	50	1970	62	1979	58	1944	71/55
11	98	1979	50	1970	67	1979	58	1944	71/55
12	98	1983	49	1970	69	1979	58	1973	71/55
13	99	1971	50	1933	64	1953	58	1879	71/55
14	101	1971	50	1933	72	1971	56	1898	71/55
15	94	1971	49	1910	65	1971	58	1890	71/55
16	101	1913	50	1910	68	1913	59	1901	72/55
17	92	1877	50	1901	65	1877	57	1937	72/55
18	94	1912	49	1960	69	1912	56	1902	72/55
19	93	1919	49	1960	64	1946	57	1960	72/55
20	97	1939	49	1917	69	1939	56	1955	72/55
21	99	1928	50	1899	74	1939	59	1880	72/55
22	97	1939	48	1910	70	1939	58	1951	72/55
23	96	1939	48	1899	65	1964	59	1910	73/55
24	96	1978	50	1962	69	1979	56	1910	73/55
25	93	1954	50	1910	66	1954	56	1910	73/55
26	92	1970	48	1955	64	1970	57	1910	73/55
27	92	1984	47	1955	70	1945	54	1910	73/55
28	95	1966	49	1968	65	1966	57	1899	73/55
29	90	1978	49	1952	69	1904	56	1903	73/55
30	91	1980	47	1900	61	1913	58	1960	73/55
MONTH	101	1971	47	1955	75	1904	54	1910	72/55

SAN FRANCISCO (Records began in 1875)

OCTOBER

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	97	1980	49	1950	67	1980	57	1916	73/55
2	96	1980	49	1955	66	1980	58	1880	73/55
3	97	1985	50	1954	65	1986	58	1970	73/55
4	100	1987	48	1916	66	1906	58	1970	73/55
5	102	1987	48	1908	66	1906	57	1924	72/54
6	92	1930	48	1908	64	1930	59	1964	72/54
7	89	1910	48	1955	63	1937	59	1973	72/54
8	94	1899	48	1895	64	1899	57	1912	72/54
9	87	1934	48	1906	66	1887	55	1906	71/54
10	87	1887	48	1890	63	1905	56	1894	71/54
11	90	1939	48	1890	61	1959	56	1890	71/54
12	91	1976	48	1924	64	1974	54	1908	71/54
13	92	1978	46	1899	65	1978	52	1899	71/54
14	89	1961	45	1881	65	1961	54	1881	70/53
15	94	1961	47	1892	69	1961	55	1909	70/53
16	89	1933	47	1892	64	1967	56	1949	70/53
17	89	1974	47	1892	63	1974	58	1905	70/53
18	88	1933	47	1949	61	1940	56	1949	70/53
19	90	1913	48	1893	66	1910	56	1977	70/53
20	87	1887	45	1949	61	1964	56	1895	69/53
21	89	1929	47	1892	62	1964	57	1916	69/53
22	90	1929	47	1949	63	1965	56	1952	69/53
23	88	1965	45	1949	67	1959	55	1913	69/53
24	90	1965	48	1949	65	1965	55	1896	69/53
25	86	1965	48	1949	66	1965	56	1882	69/53
26	86	1917	47	1893	62	1879	56	1896	69/53
27	86	1890	47	1908	62	1987	56	1946	68/52
28	86	1890	47	1971	60	1987	53	1893	68/52
29	84	1939	46	1951	60	1973	53	1906	68/52
30	84	1949	46	1935	62	1973	53	1971	68/52
31	83	1966	43	1935	60	1966	56	1965	68/52
MONTH	102	1987	43	1935	69	1961	52	1899	70/53

SAN FRANCISCO (Records began in 1875)

NOVEMBER

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	86	1966	42	1935	59	1967	53	1935	67/52
2	83	1967	45	1935	63	1966	51	1935	67/52
3	82	1986	42	1935	67	1950	54	1935	67/52
4	83	1986	42	1935	60	1976	53	1897	67/52
5	78	1976	43	1935	59	1880	52	1895	66/51
6	80	1985	45	1920	60	1941	55	1966	66/51
7	82	1955	44	1971	61	1885	52	1920	66/51
8	84	1955	46	1897	62	1885	54	1920	66/51
9	78	1955	47	1915	58	1950	50	1982	66/51
10	82	1955	45	1911	60	1976	54	1985	66/51
11	79	1930	42	1911	59	1930	52	1985	65/50
12	79	1900	43	1985	58	1900	53	1978	65/50
13	80	1933	42	1985	60	1967	51	1978	65/50
14	76	1906	43	1985	59	1967	50	1955	65/50
15	78	1923	44	1958	58	1976	53	1958	65/50
16	83	1895	42	1982	62	1895	52	1955	64/49
17	82	1932	44	1958	65	1932	51	1881	64/49
18	81	1932	45	1985	63	1932	52	1881	64/49
19	77	1936	43	1985	60	1895	54	1900	64/49
20	72	1939	41	1961	61	1950	54	1946	64/49
21	72	1962	41	1983	60	1950	52	1931	63/49
22	76	1959	42	1931	58	1959	50	1973	63/49
23	75	1959	39	1931	58	1959	52	1931	63/49
24	74	1959	41	1906	58	1956	50	1954	63/49
25	76	1975	42	1892	56	1958	50	1892	63/49
26	77	1959	41	1919	58	1959	51	1896	62/48
27	72	1954	38	1919	58	1932	48	1896	62/48
28	72	1977	40	1906	58	1932	49	1906	62/48
29	72	1977	40	1906	58	1935	51	1919	62/48
30	72	1959	42	1897	56	1921	51	1922	61/47
MONTH	86	1966	38	1919	67	1950	48	1896	64/50

SAN FRANCISCO (Records began in 1875)

DECEMBER

	Rec Hi	Year	Rec Lo	Year	Rec Hi Min	Year	Rec Lo Max	Year	Norms (est)
1	71	1959	42	1972	58	1875	51	1963	61/47
2	71	1958	40	1906	58	1987	50	1982	61/47
3	73	1958	41	1963	57	1987	47	1919	61/47
4	71	1958	34	1897	56	1970	46	1963	60/47
5	74	1929	40	1972	56	1878	48	1963	60/47
6	73	1979	40	1909	58	1925	49	1963	60/47
7	72	1979	38	1972	58	1979	48	1972	60/47
8	72	1893	34	1972	56	1893	40	1972	60/47
9	71	1940	30	1972	58	1939	37	1972	59/46
10	68	1958	32	1972	63	1937	41	1972	59/46
11	73	1958	27	1932	58	1937	35	1932	59/46
12	76	1958	31	1932	60	1929	44	1972	59/46
13	71	1911	35	1972	58	1929	45	1967	59/46
14	68	1958	35	1972	58	1929	41	1972	59/46
15	71	1980	36	1972	58	1941	42	1972	59/46
16	70	1980	37	1973	55	1929	44	1972	58/46
17	68	1968	39	1963	56	1940	45	1963	58/46
18	68	1910	36	1924	56	1884	45	1924	58/46
19	66	1929	36	1908	57	1969	44	1924	58/46
20	69	1887	35	1908	58	1969	43	1909	58/46
21	64	1969	35	1965	57	1955	42	1908	58/45
22	67	1914	37	1908	60	1964	43	1908	58/45
23	65	1885	36	1928	59	1964	44	1879	58/45
24	72	1901	34	1879	58	1884	44	1879	58/45
25	67	1967	37	1891	56	1967	45	1879	58/45
26	74	1967	36	1924	57	1892	44	1916	57/44
27	71	1953	36	1879	60	1967	44	1908	57/44
28	73	1967	37	1916	54	1977	45	1908	57/44
29	66	1975	38	1899	56	1945	45	1911	57/44
30	68	1945	36	1915	53	1886	45	1915	57/44
31	67	1958	34	1882	56	1979	42	1882	57/44
MONTH	76	1958	27	1932	63	1937	35	1932	58/45

ACCUMULATIVE NORMAL SEASONAL PRECIPITATION BY DATE (1951-1980)

DAY/MONTH	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	.01	.04	.12	.38	1.51	4.04	7.60	12.07	14.86	17.42	18.86	19.18
2	.02			.40	1.57	4.14	7.74	12.19	14.95	17.49	18.88	
3	.03			.42	1.63	4.24	7.88	12.31	15.04	17.56	18.90	
4	.04			.44	1.70	4.34	8.02	12.43	15.13	17.63	18.92	
5				.46	1.77	4.44	8.16	12.55	15.22	17.69	18.94	19.19
6				.48	1.84	4.54	8.31	12.66	15.31	17.75	18.96	19.20
7				.50	1.91	4.64	8.46	12.77	15.40	17.81	18.98	19.21
8				.52	1.98	4.74	8.61	12.88	15.49	17.87	19.00	19.22
9			.13	.54	2.06	4.84	8.76	12.99	15.58	17.93	19.02	19.23
10			.14	.57	2.14	4.94	8.91	13.09	15.67	17.99	19.03	19.24
11			.15	.59	2.22	5.05	9.06	13.19	15.76	18.05	19.04	19.25
12			.16	.63	2.30	5.16	9.21	13.29	15.85	18.10	19.05	19.26
13			.17	.66	2.38	5.27	9.36	13.39	15.94	18.15	19.06	19.27
14			.18	.69	2.46	5.38	9.51	13.49	16.03	18.20	19.07	19.28
15			.19	.72	2.54	5.49	9.66	13.59	16.11	18.25	19.08	19.29
16			.20	.75	2.63	5.60	9.81	13.69	16.19	18.30	19.09	19.30
17			.21	.78	2.72	5.71	9.96	13.78	16.27	18.35	19.10	19.31
18			.22	.82	2.81	5.82	10.11	13.87	16.35	18.40	19.11	19.32
19			.23	.86	2.90	5.94	10.26	13.96	16.43	18.44	19.12	19.33
20			.24	.90	2.99	6.06	10.41	14.05	16.51	18.48	19.13	
21			.25	.94	3.08	6.18	10.56	14.14	16.59	18.52	19.14	
22			.26	.98	3.17	6.30	10.71	14.23	16.67	18.56	19.15	
23			.27	1.02	3.26	6.42	10.85	14.32	16.75	18.60	19.16	
24		.05	.28	1.07	3.35	6.54	10.99	14.41	16.83	18.64	19.17	
25		.06	.29	1.12	3.44	6.67	11.13	14.50	16.91	18.68	19.18	
26		.07	.30	1.17	3.54	6.80	11.27	14.59	16.99	18.71		
27		.08	.31	1.22	3.64	6.93	11.41	14.68	17.07	18.74		
28		.09	.32	1.27	3.74	7.06	11.55	14.77	17.14	18.77		
29		.10	.34	1.33	3.84	7.19	11.68		17.21	18.80		
30		.11	.36	1.39	3.94	7.32	11.81		17.28	18.83		
31		.12		1.45		7.46	11.94		17.35			

LONG TERM SEASONAL NORMAL PRECIPITATION

TEN SEASON NORMALS		THIRTY SEASON NORMALS	
1851-1860	22.89	1851-1880	24.29
1861-1870	24.93	1861-1890	24.75
1871-1880	25.04	1871-1900	22.24
1881-1890	24.29	1881-1910	21.79
1891-1900	17.39	1891-1920	20.25
1901-1910	23.70	1901-1930	20.97
1911-1920	19.67	1911-1940	20.39
1921-1930	19.54	1921-1950	19.68
1931-1940	21.97	1931-1960	20.71
1941-1950	17.54	1941-1970	20.03
1951-1960	22.62	1951-1980	19.33
1961-1970	19.93		
1971-1980	19.68		

130 SEASON NORMAL = 21.48 (1850-51 THRU 1979-80)

SAN FRANCISCO PRECIPITATION RECORDS 1849 - 1987

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	SEA
NORMALS 1951-80		4.48	2.83	2.58	1.48	0.35	0.15	0.04	0.08	0.24	1.09	2.49	3.52	19.33	19.33
MAXIMUM MONTHLY	AMT	24.36	12.52	9.04	10.06	4.02	2.57	0.62	0.78	5.07	7.79	11.78	15.16	38.82	49.27
	YR	1862	1878	1983	1880	1925	1884	1974	1976	1904	1889	1885	1866	1884	1861-62
MINIMUM MONTHLY	AMT	.26	0	.03	0	0	0	0	0	0	0	0	0	9.43	7.95
	YR	1920	1864	1923	1949*	MANY	MANY	MANY	MANY	MANY	1979*	1933*	1876	1976	1975-76
MAXIMUM 24 HOUR	AMT	6.16	3.60	3.65	2.43	1.42	1.36	0.61	0.49	3.58	3.11	3.98	3.44	6.16	
		4	4-5	29-30	23-24	27-28	1-2	8	11	23-24	12-13	23	20-21	4 JAN 1982	
		1982	1887	1940	1896	1925	1967	1974	1965	1904	1962	1874	1924		
MAXIMUM DAILY	AMT	6.16	3.38	2.73	2.04	1.34	1.34	0.61	0.49	3.09	2.29	3.98	3.28	6.16	
		4	15	5	2	12	2	8	11	23	15	23	3	4 JAN 1982	
		1982	1891	1879	1958	1925	1967	1974	1965	1904	1969	1874	1915		
MAXIMUM 2 HOUR	AMT	1.17E	.91	1.24	1.09	.70	.51	.27	.22	1.29	.98	.95	1.29	1.29	
	YR	1982	1927	1912	1958	1958	1907	1974	1951	1904	1972	1918	1969	DEC 1969	
1 HOUR	AMT	.72	.64	1.07	.96	.65	.35	.18	.18	.97	.70	.92	.85	1.07	
	YR	1941	1951	1912	1958	1958	1907	1974	1951	1904	1972	1918	1987	MAR 1912	
30 MIN	AMT	.67	.54	.83	.63	.39	.20	.12	.17	.74	.58	.83	.50	.83	
	YR	1941	1940	1912	1941	1958	1907	1974	1951	1904	1950	1912	1906	NOV 1912	
15 MIN	AMT	.51	.47	.59	.47	.39	.13	.08	.15	.43	.53	.65	.57	.65	
	YR	1969	1915	1912	1941	1958	1953	1974	1951	1904	1905	1918	1969	NOV 1918	
10 MIN	AMT	.48	.37	.45	.40	.35	.10	.07	.12	.32	.41	.51	.31	.51	
	YR	1969	1940	1971	1941	1958	1953	1974	1951	1904	1950	1918	1969	NOV 1918	
5 MIN	AMT	.38	.23	.26	.26	.31	.09	.05	.10	.16	.27	.33	.29	.38	
	YR	1969	1940*	1971	1941	1958	1953	1974	1951	1904	1950	1926	1967	JAN 1969	

*LAST OF SEVERAL OCCURRENCES E-ESTIMATED 30 MIN THROUGH 5 MIN DATA 1871-1974

SAN FRANCISCO PRECIPITATION RECORDS
1849-1987

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
YEARS WITH RAIN	138	137	138	135	121	88	51	49	88	125	133	136	
YEAR W/O RAIN	0	1	0	3	17	50	86	88	49	12	4	1	
MOST DAYS WITH AT LEAST .01"	26 1916	20 1915	23 1904	17 1967	13 1957	9 1888	4 1958	4 1954	6 1960	13 1889	21 1885	24 1889	96 1957
LEAST DAYS WITH AT LEAST .01"	2 1976	0 1864	2 1934	0 1949	0 HAS OCCURRED IN MANY YEARS						0 1959	0 1876	36 1959
MOST CONSECTUTIVE DAYS OF AT LEAST .01"	14 1967	15 1936	12 1907	11 1880	7 1957	5 1947	2 1974	3 1954	5 1904	8 1972	10 1893	14 1964	
NUMBER OF DAYS 1.00" OR MORE WITH AVERAGE	157 1	104 1	79 1	39 0+	12 0+	1 0+	0 0	0 0	7 0+	28 0+	76 1	140 1	644 5
MAXIMUM SNOWFALL	.3 1952	3.7 1887	1.0 1896									3.5 1882	

ACCUMULATIVE PRECIPITATION IN INCHES-TEN WETTEST SEASONS
1849-1987

THROUGH	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	.62	.78	5.15	7.52	12.67	24.00	38.02	45.55	47.75	48.48	49.22	49.27
	1974	1976	1904	1885	1889	1889	1862	1862	1862	1862	1862	1862
2	.23	.62	2.53	7.29	12.40	19.31	33.61	38.77	43.50	44.68	45.75	45.85
	1886	1974	1918	1889	1972	1852	1890	1890	1890	1890	1890	1890
3	.20	.51	2.08	6.00	11.80	18.62	26.34	31.63	36.27	38.58	38.61	38.84
	1860	1965	1959	1972	1849	1866	1850	1973	1868	1868	1868	1868
4	.20	.44	1.52	5.80	10.73	18.00	25.31	30.98	34.26	37.70	38.17	38.17
	1975	1951	1916	1962	1984	1849	1973	1867	1973	1983	1983	1983
5	.10	.32	1.47	4.93	10.19	17.66	25.08	29.97	34.22	37.03	37.03	37.10
	1891	1916	1957	1957	1889	1885	1886	1868	1983	1982	1982	1982
6	.08	.25	1.36	3.92	9.72	17.26	23.84	29.39	34.00	35.51	36.39	36.48
	1906	1935	1986	1899	1973	1871	1868	1878	1982	1958	1958	1958
7	.07	.23	1.29	3.76	9.49	17.21	23.78	28.16	33.95	35.01	35.26	35.26
	1913	1954	1976	1876	1983	1983	1867	1872	1878	1878	1853	1853
8	.06	.23	1.25	3.51	9.26	15.94	23.27	28.11	32.64	34.97	35.17	35.18
	1966	1886	1912	1982	1874	1864	1952	1850	1850	1867	1878	1878
9	.06	.22	1.06	3.14	9.15	15.93	23.23	26.86	32.56	34.88	35.06	35.06
	1949	1975	1939	1849	1926	1972	1853	1914	1850	1853	1941	1941
10	.06	.21	1.06	2.99	9.13	15.07	22.64	26.05	30.79	34.28	34.92	34.92
	1946	1864	1898	1924	1982	1945	1956	1881	1952	1973	1867	1867

ACCUMULATIVE PRECIPITATION IN INCHES-TEN DRIEST SEASONS
1849-1987

THROUGH	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	0	0	0	0	.01	1.55	2.36	3.56	5.50	6.73	7.40	7.42
				1855	1929	1917	1918	1851	1851	1851	1851	1851
2	THERE HAS			0	.30	1.78	3.02	6.17	7.21	7.91	7.92	7.95
				1905	1958	1958	1851	1976	1976	1976	1976	1976
3	BEEN NO			.01	.33	1.89	4.21	5.81	7.56	7.75	9.19	9.38
				1932	1890	1956	1976	1920	1898	1898	1898	1898
4	PRECIPITATION			.01	.38	2.30	4.56	6.21	7.73	9.30	10.08	10.08
				1929	1880	1850	1891	1864	1864	1864	1864	1864
5	THROUGH SEP-			.02	.46	2.48	4.58	6.30	9.06	9.45	10.42	10.46
				1917	1870	1939	1920	1912	1920	1920	1920	1920
6	TEMBER IN			.02	.67	2.91	4.73	7.32	9.88	10.42	10.46	10.46
				1915	1862	1910	1957	1898	1972	1920	1959	1920
7	MANY YEARS			.02	.67	2.97	5.19	7.77	10.08	10.49	10.95	11.04
				1861	1855	1905	1898	1899	1959	1977	1972	1877
8				.03	.75	2.98	5.74	7.89	10.16	10.85	11.03	11.06
				1863	1936	1878	1959	1961	1961	1877	1877	1972
9				.03	.83	3.02	5.89	8.13	10.40	10.95	11.06	11.06
				1870	1917	1862	1911	1977	1912	1972	1977	1977
10	0	0	0	.05	.88	3.10	6.06	8.15	10.44	10.95	11.48	11.48
				1880	1911	1929	1924	1918	1977	1961	1918	1918

LONGEST RAIN PERIODS FOR VARIOUS AMOUNTS (1849-1987)

AMOUNT	CONSECUTIVE DAYS WITH INDICATED AMOUNT	PERIOD
≥1.00"	4	8 JAN 1862 - 11 JAN 1862
≥ .50"	7	16 JAN 1862 - 22 JAN 1862
≥ .25"	10	17 DEC 1884 - 26 DEC 1884
≥ .01"	15	10 FEB 1936 - 24 FEB 1936
≥ .01"	14	18 DEC 1964 - 31 DEC 1964

LONGEST DRY PERIODS

194	2 MAY 1905 - 18 NOV 1905
180	29 MAR 1909 - 25 SEP 1909
176	16 APR 1903 - 9 OCT 1903
176	20 MAY 1855 - 10 NOV 1855
164	17 MAY 1852 - 28 OCT 1852
155	12 APR 1967 - 14 SEP 1967

SAN FRANCISCO MONTHLY PRECIPITATION DATA (1849-1987)

MONTH SEASON	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1849-50	0.00	0.00	0.00	3.14	8.66	6.20	8.34	1.77	4.53	0.46	0.00	0.00	33.10
1850-51	0.00	0.00	0.33	0.00	0.92	1.05	0.72	0.54	1.94	1.23	0.67	0.02	7.42
1851-52	0.00	0.02	1.03	0.21	2.12	7.10	0.58	0.14	6.68	0.26	0.32	0.00	18.46
1852-53	0.00	0.00	0.00	0.80	5.31	13.20	3.92	1.42	4.86	5.37	0.38	0.00	35.26
1853-54	0.00	0.04	0.46	0.12	2.28	2.32	3.88	8.04	3.51	3.12	0.02	0.08	23.87
1854-55	0.00	0.01	0.15	2.43	0.34	0.87	3.67	4.77	4.64	4.99	1.88	0.00	23.76
1855-56	0.00	0.00	0.00	0.00	0.67	5.76	9.40	0.50	1.60	2.94	0.76	0.03	21.66
1856-57	0.02	0.00	0.07	0.45	2.79	3.75	2.45	8.59	1.62	0.00	0.05	0.12	19.91
1857-58	0.00	0.05	0.00	0.93	3.01	4.14	4.36	1.83	5.55	1.55	0.34	0.05	21.81
1858-59	0.05	0.16	0.00	2.74	0.69	6.14	1.28	6.32	3.02	0.27	1.55	0.00	22.22
1859-60	0.00	0.02	0.03	0.05	7.28	1.57	1.64	1.60	3.99	3.14	2.86	0.09	22.27
1860-61	0.21	0.00	0.00	0.91	0.58	6.16	2.47	3.72	4.08	0.51	1.00	0.08	19.72
1861-62	0.00	0.00	0.02	0.00	4.10	9.54	24.36	7.53	2.20	0.73	0.74	0.05	49.27
1862-63	0.00	0.00	0.00	0.52	0.15	2.35	3.63	3.19	2.06	1.61	0.23	0.00	13.74
1863-64	0.00	0.00	0.03	0.00	2.55	1.80	1.83	0.00	1.52	1.57	0.78	0.00	10.08
1864-65	0.00	0.21	0.01	0.13	6.68	8.91	5.14	1.34	0.74	0.94	0.63	0.00	24.73
1865-66	0.00	0.00	0.24	0.26	4.19	0.58	10.88	2.12	3.04	0.12	1.46	0.04	22.93
1866-67	0.00	0.00	0.11	0.00	3.35	15.16	5.16	7.20	1.58	2.36	0.00	0.00	34.92
1867-68	0.00	0.00	0.04	0.20	3.41	10.69	9.50	6.13	6.30	2.31	0.03	0.23	38.84
1868-69	0.00	0.00	0.00	0.15	1.18	4.34	6.35	3.90	3.14	2.19	0.08	0.02	21.35
1869-70	0.00	0.00	0.12	1.29	1.19	4.31	3.89	4.78	2.00	1.53	0.20	0.00	19.31
1870-71	0.00	0.00	0.03	0.00	0.43	3.38	3.07	3.76	1.31	1.89	0.23	0.01	14.11
1871-72	0.00	0.02	0.00	0.07	2.81	14.36	4.00	6.90	1.59	0.81	0.18	0.04	30.78
1872-73	0.01	0.00	0.04	0.11	2.79	5.95	1.58	3.94	0.79	0.43	0.00	0.02	15.06
1873-74	0.01	0.08	0.00	0.83	1.16	9.72	5.66	2.21	3.36	0.90	0.66	0.14	24.73

MONTH SEASON	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1874-75	0.00	0.00	0.02	2.69	6.55	0.33	8.01	0.32	1.30	0.10	0.22	1.02	20.56
1875-76	0.00	0.00	0.00	0.24	7.27	4.15	7.55	4.92	5.49	1.29	0.24	0.04	31.19
1876-77	0.01	0.01	0.38	3.36	0.25	0.00	4.32	1.18	1.08	0.26	0.18	0.01	11.04
1877-78	0.02	0.00	0.00	0.65	1.57	2.66	11.97	12.52	4.56	1.06	0.16	0.01	35.18
1878-79	0.01	0.00	0.55	1.27	0.57	0.58	3.52	4.90	8.75	1.89	2.35	0.05	24.44
1879-80	0.01	0.02	0.00	0.78	4.03	4.46	2.23	1.87	2.08	10.06	1.12	0.00	26.66
1880-81	0.00	0.00	0.00	0.05	0.33	12.33	8.69	4.65	0.90	2.00	0.22	0.69	29.86
1881-82	0.00	0.00	0.25	0.54	1.94	3.85	1.68	2.96	3.45	1.22	0.21	0.04	16.14
1882-83	0.00	0.00	0.26	2.66	4.18	2.01	1.92	1.04	3.01	1.51	3.52	0.01	20.12
1883-84	0.00	0.00	0.42	1.48	1.60	0.92	3.94	6.65	8.24	6.33	0.23	2.57	32.38
1884-85	0.00	0.04	0.33	2.55	0.26	7.68	2.53	0.30	1.01	3.17	0.04	0.19	18.10
1885-86	0.06	0.00	0.11	0.72	11.78	4.99	7.42	0.24	2.07	5.28	0.37	0.01	33.05
1886-87	0.23	0.00	0.01	1.48	0.84	2.07	1.90	9.24	0.83	2.30	0.06	0.07	19.04
1887-88	0.00	0.01	0.29	0.00	0.99	3.34	6.81	0.94	3.60	0.11	0.38	0.27	16.74
1888-89	0.01	0.01	0.98	0.13	3.99	5.80	1.28	0.72	7.78	0.96	2.17	0.03	23.86
1889-90	0.01	0.00	0.00	7.28	2.90	13.81	9.61	5.16	4.73	1.18	1.07	0.10	45.85
1890-91	0.02	0.00	0.31	0.00	0.00	3.25	0.98	7.26	1.96	2.44	1.25	0.11	17.58
1891-92	0.10	0.02	0.77	0.04	0.56	5.62	2.42	2.90	2.85	1.39	1.86	0.00	18.53
1892-93	0.00	0.00	0.02	1.65	3.91	5.08	3.05	2.75	4.08	1.03	0.15	0.03	21.75
1893-94	0.00	0.00	0.21	0.16	4.18	2.25	5.99	2.69	0.60	0.50	1.31	0.56	18.47
1894-95	0.00	0.00	1.05	1.73	0.88	9.01	6.99	2.81	1.89	1.24	0.60	0.00	25.70
1895-96	0.01	0.00	0.77	0.11	1.78	1.43	8.14	0.28	2.85	5.16	0.72	0.00	21.25
1896-97	0.04	0.09	0.52	1.55	4.56	4.34	2.26	4.41	4.56	0.27	0.61	0.22	23.43
1897-98	0.00	0.00	0.10	1.70	1.05	1.22	1.12	2.13	0.24	0.19	1.44	0.19	9.38
1898-99	0.00	0.00	1.06	0.86	0.46	1.62	3.67	0.10	7.61	0.62	0.86	0.01	16.87

MONTH SEASON	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1899-00	0.00	0.00	0.00	3.92	3.79	2.65	4.11	0.64	1.91	1.08	0.32	0.05	18.47
1900-01	0.00	0.00	0.46	1.48	3.91	1.37	5.79	5.03	0.80	1.64	0.69	0.00	21.17
1901-02	0.00	0.00	0.78	0.64	3.48	0.90	1.23	7.27	2.65	0.98	1.05	0.00	18.98
1902-03	0.00	0.00	0.00	1.70	1.98	2.32	3.73	1.76	6.23	0.56	0.00	0.00	18.28
1903-04	0.00	0.00	0.00	0.17	4.25	1.63	1.05	5.89	6.01	1.29	0.30	0.00	20.59
1904-05	0.02	0.06	5.07	2.37	1.07	1.59	4.04	2.70	3.15	1.33	2.05	0.00	23.45
1905-06	0.00	0.00	0.00	0.00	0.92	2.05	3.90	4.30	5.02	0.92	2.75	0.56	20.42
1906-07	0.08	0.11	0.18	0.03	1.59	6.90	4.41	3.20	8.42	0.11	0.04	1.28	26.17
1907-08	0.00	0.02	0.11	1.36	0.04	3.66	4.88	5.39	0.90	0.22	0.76	0.01	17.35
1908-09	0.02	0.01	0.13	0.61	1.34	2.15	10.51	7.53	3.27	0.00	0.00	0.00	25.57
1909-10	0.00	0.00	0.80	1.23	2.43	5.59	3.24	2.09	3.78	0.31	0.03	0.02	19.52
1910-11	0.00	0.00	0.05	0.65	0.48	1.73	13.79	3.02	4.57	0.89	0.28	0.03	25.49
1911-12	0.00	0.00	0.00	0.28	0.60	2.54	2.47	0.41	4.10	1.38	1.47	0.81	14.06
1912-13	0.00	0.00	1.25	0.49	1.94	1.30	3.84	0.43	1.47	0.60	0.63	0.02	11.97
1913-14	0.07	0.01	0.00	0.35	6.22	5.41	9.76	5.04	1.09	0.99	0.37	0.29	29.60
1914-15	0.02	0.00	0.00	0.29	0.70	5.49	6.74	7.36	3.02	0.62	3.17	0.00	27.41
1915-16	0.01	0.00	0.00	0.01	0.92	6.42	14.59	3.77	1.33	0.00	0.07	0.00	27.12
1916-17	0.03	0.29	1.20	0.52	1.50	4.79	1.83	3.81	1.42	0.33	0.06	0.00	15.78
1917-18	0.00	0.00	0.02	0.00	0.81	0.72	0.81	5.79	2.73	0.60	0.00	0.00	11.48
1918-19	0.00	0.00	2.53	0.17	5.60	2.62	2.57	9.31	2.74	0.10	0.00	0.00	25.64
1919-20	0.01	0.00	0.39	0.27	0.44	3.21	0.26	1.23	3.25	1.36	0.00	0.04	10.46
1920-21	0.00	0.00	0.13	1.83	2.70	7.48	6.30	1.38	2.28	0.54	0.52	0.00	23.16
1921-22	0.00	0.00	0.35	0.52	1.43	6.39	2.41	5.15	2.38	0.47	0.55	0.26	19.91
1922-23	0.00	0.00	0.00	2.95	3.77	7.77	2.84	0.77	0.03	3.92	0.06	0.07	22.17
1923-24	0.00	0.01	0.44	0.46	0.49	1.91	2.75	3.30	1.96	0.30	0.00	0.00	11.62

MONTH SEASON	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1924-25	0.00	0.01	0.00	2.98	1.50	7.37	1.62	7.90	2.63	2.73	4.02	0.04	30.81
1925-26	0.06	0.00	0.45	0.31	2.32	1.01	5.48	5.40	0.25	5.26	0.15	0.00	20.69
1926-27	0.00	0.04	0.00	1.90	7.21	1.04	3.77	6.85	2.19	1.95	0.10	0.38	25.43
1927-28	0.00	0.00	0.00	1.93	3.18	3.94	2.40	1.97	4.65	1.31	0.26	0.00	19.64
1928-29	0.00	0.00	0.03	0.13	3.35	4.89	1.32	2.14	1.56	1.01	0.01	0.86	15.30
1929-30	0.00	0.00	0.00	0.01	0.00	3.09	4.99	2.94	3.53	1.56	0.16	0.00	16.28
1930-31	0.00	0.00	0.10	0.89	1.56	0.98	5.50	1.10	1.68	0.31	1.10	0.32	13.54
1931-32	0.00	0.00	0.00	0.68	2.93	9.24	3.23	3.00	0.86	0.47	0.65	0.03	21.09
1932-33	0.00	0.00	0.00	0.01	1.00	2.75	5.68	1.12	2.93	0.06	1.36	0.01	14.93
1933-34	0.00	0.00	0.14	1.49	0.00	4.19	1.03	4.68	0.07	0.51	0.12	0.68	12.91
1934-35	0.01	0.00	0.13	0.88	3.76	4.06	6.23	2.38	2.31	3.45	0.01	0.00	23.22
1935-36	0.00	0.25	0.08	1.44	1.24	3.25	5.77	10.06	1.01	1.09	0.49	0.28	24.96
1936-37	0.03	0.02	0.00	0.69	0.01	2.94	5.26	4.88	7.05	0.86	0.06	0.59	22.39
1937-38	0.00	0.00	0.00	0.90	2.46	3.73	2.65	8.49	5.73	1.52	0.00	0.00	25.48
1938-39	0.01	0.00	0.15	1.33	0.88	1.48	3.07	1.94	2.62	0.42	0.68	0.00	12.53
1939-40	0.00	0.00	1.06	0.17	0.20	1.05	9.98	7.81	5.32	0.94	0.63	0.01	27.17
1940-41	0.00	0.00	0.59	1.05	2.22	6.25	8.24	6.71	4.75	4.05	1.18	0.01	35.05
1941-42	0.01	0.03	0.00	0.93	1.99	7.29	4.76	4.27	2.62	3.65	1.11	0.00	26.66
1942-43	0.01	0.00	0.18	0.95	4.45	2.87	6.15	1.95	3.18	1.88	0.13	0.13	21.88
1943-44	0.00	0.00	0.02	0.74	0.80	2.69	4.31	5.34	0.83	2.07	0.94	0.12	17.86
1944-45	0.01	0.02	0.00	1.70	6.24	3.97	1.33	3.43	4.15	0.32	0.64	0.01	21.82
1945-46	0.00	0.00	0.04	1.95	3.24	9.84	1.76	2.03	2.34	0.05	0.37	0.02	21.64
1946-47	0.06	0.00	0.06	0.15	2.73	2.77	1.35	2.65	3.64	0.17	0.67	0.64	14.89
1947-48	0.00	0.00	0.00	2.09	1.39	1.84	1.00	2.32	3.36	3.04	0.54	0.01	15.59
1948-49	0.02	0.02	0.09	0.20	1.18	4.75	2.20	3.04	5.85	0.00	0.93	0.00	18.28

MONTH SEASON	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1949-50	0.06	0.04	0.00	0.08	1.18	2.77	7.40	2.33	1.65	0.87	0.37	0.03	16.78
1950-51	0.00	0.00	0.00	2.72	4.96	6.01	4.41	3.00	1.32	0.89	0.75	0.04	24.00
1951-52	0.01	0.43	0.08	0.81	3.33	7.92	10.69	2.62	4.90	1.08	0.30	0.39	32.56
1952-53	0.00	0.01	0.00	0.07	2.24	9.06	3.26	0.04	1.83	3.42	0.38	0.61	21.10
1953-54	0.00	0.07	0.00	0.34	1.88	0.82	3.11	2.42	4.56	0.62	0.11	0.14	14.27
1954-55	0.03	0.20	0.00	0.24	2.55	5.67	4.05	1.18	0.29	1.49	0.04	0.00	15.74
1955-56	0.02	0.00	0.02	0.03	2.38	11.47	8.72	2.03	0.12	1.68	0.68	0.02	27.17
1956-57	0.00	0.01	0.33	1.14	0.04	0.37	2.84	3.58	2.39	1.09	3.19	0.06	15.04
1957-58	0.01	0.00	1.46	3.46	1.13	3.60	4.38	7.78	8.22	5.47	0.88	0.09	36.48
1958-59	0.05	0.00	0.04	0.12	0.09	1.48	3.96	4.04	0.30	0.36	0.02	0.00	10.46
1959-60	0.00	0.02	2.06	0.00	0.00	1.71	4.04	3.57	2.06	1.16	0.85	0.00	15.47
1960-61	0.00	0.00	0.00	0.48	3.35	2.31	2.79	0.96	2.27	0.79	0.88	0.04	13.87
1961-62	0.00	0.02	0.22	0.09	4.44	2.13	1.08	6.58	2.76	0.36	0.00	0.00	17.68
1962-63	0.00	0.07	0.22	5.51	0.60	2.81	3.35	1.92	3.87	3.35	0.45	0.00	22.15
1963-64	0.00	0.00	0.06	1.39	3.52	0.87	3.37	0.19	2.12	0.01	0.22	0.57	12.32
1964-65	0.00	0.01	0.00	1.90	3.99	5.35	3.97	0.94	2.92	3.21	0.00	0.00	22.29
1965-66	0.02	0.49	0.00	0.01	4.79	3.51	3.27	2.72	0.80	0.36	0.19	0.17	16.33
1966-67	0.06	0.10	0.10	0.01	4.80	3.87	9.49	0.22	4.35	4.90	0.09	1.42	29.41
1967-68	0.00	0.00	0.04	0.53	1.10	2.12	4.54	2.28	3.15	0.48	0.22	0.00	14.46
1968-69	0.00	0.03	0.06	0.62	2.67	3.91	7.74	7.26	1.01	1.74	0.00	0.05	25.09
1969-70	0.00	0.00	0.01	2.61	0.45	6.15	7.81	1.56	1.55	0.06	0.03	0.57	20.80
1970-71	0.00	0.00	0.00	0.84	6.44	5.39	2.04	0.26	2.91	0.72	0.19	0.00	18.79
1971-72	0.01	0.01	0.22	0.11	1.92	3.93	1.32	2.13	0.23	1.07	0.00	0.11	11.06
1972-73	0.01	0.04	0.54	5.41	6.40	3.53	9.38	6.32	2.63	0.02	0.08	0.00	34.36
1973-74	0.01	0.04	0.33	1.81	8.64	4.21	3.46	1.54	5.27	2.37	0.00	0.10	27.78

MONTH SEASON	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SEASON
1974-75	0.73	0.00	0.00	0.91	0.40	1.83	2.85	4.30	5.97	1.30	0.02	0.04	18.35
1975-76	0.20	0.02	0.00	2.75	0.43	0.50	0.31	1.96	1.04	0.70	0.01	0.03	7.95
1976-77	0.00	0.78	0.51	0.38	1.18	2.53	1.85	0.90	2.31	0.05	0.57	0.00	11.06
1977-78	0.00	0.03	0.96	0.17	2.22	3.30	6.94	4.14	5.90	4.21	0.00	0.00	27.87
1978-79	0.00	0.00	0.20	0.00	1.67	0.89	7.43	5.58	1.95	0.87	0.15	0.00	18.74
1979-80	0.07	0.00	0.01	1.94	3.69	4.12	4.63	6.79	1.73	1.29	0.23	0.02	24.52
1980-81	0.04	0.00	0.00	0.00	0.28	3.09	4.97	2.09	4.72	0.17	0.12	0.00	15.48
1981-82	0.00	0.00	0.22	2.00	5.30	5.41	9.48	3.78	7.81	3.03	0.00	0.06	37.09
1982-83	0.00	0.00	0.72	2.79	5.62	2.22	5.77	8.06	9.04	3.48	0.47	0.00	38.17
1983-84	0.01	0.06	0.68	0.26	8.20	7.72	0.50	2.34	1.32	0.92	0.16	0.30	22.47
1984-85	0.00	0.24	0.10	2.94	7.45	2.10	0.59	1.98	3.94	0.27	0.09	0.31	20.01
1985-86	0.00	0.00	0.35	0.80	4.83	2.47	4.77	8.29	6.25	0.76	0.13	0.00	28.65
1986-87	0.03	0.01	1.32	0.11	0.20	1.64	4.26	3.77	2.31	0.14	0.06	0.01	13.86
1987-88	0.00	0.00	0.00	1.07	3.09	5.09							

WETTEST AND DRIEST MONTHS (1849-1987)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
WETTEST MONTHS	24.36 1861	12.52 1878	9.04 1983	10.06 1880	4.02 1925	2.57 1884	0.62 1974	0.78 1966	5.07 1904	7.28 1889	11.78 1885	15.16 1866	24.36 1/1861
	14.59 1915	10.06 1936	8.75 1879	6.33 1884	3.52 1883	1.42 1967	0.23 1886	0.49 1965	2.53 1918	5.51 1962	8.66 1849	14.36 1871	15.16 12/1866
	13.79 1910	9.31 1919	8.42 1907	5.47 1958	3.19 1957	1.28 1907	0.20 1860	0.43 1951	2.06 1959	5.41 1972	8.64 1973	13.81 1889	14.59 1/1915
DRIEST MONTHS	0.26 1920	0.00 1864	0.03 1923	0.00 1949	IT IS A COMMON OCCURRENCE TO HAVE NO RAINFALL DURING THESE MONTHS						0.00 1959	0.00 1876	
	0.31 1976	0.04 1953	0.07 1934	0.00 1916							0.00 1933	0.33 1874	
	0.50 1984	0.10 1899	0.12 1956	0.00 1909							0.00 1929 (&1890)	0.37 1956	

CHRONOLOGICAL SUMMARY OF SNOWFALL IN SAN FRANCISCO
(1849-1987)

DATE	AMOUNT	REMARKS
25 DEC 1856	2.5"	
12 JAN 1868	2.0"	
31 DEC 1882	3.5"	Snow fell from 11:30am to 4:20pm.
7 FEB 1884	1.5"	Snow fell off and on during the day. Depths from 1 to 2".
5 FEB 1887	3.7"	Snow fell during the day. Up to 7" at the highest elevations on Twin Peaks.
16 JAN 1888	0.1"	
3 MAR 1896	1.0"	Fell as brief heavy snow at night.
11 DEC 1932	0.8"	
15 JAN 1952	0.3"	
6 FEB 1976	1.0"	Up to 5" at top of Twin Peaks.

NOTE: These are the dates of every measurable snowfall at the official observing site in San Francisco. Trace amounts have occurred on other dates but many of these were not true snow occurrences but rather small hail, associated with wintertime convective showers.

MISCELLANEOUS MEANS AND EXTREMES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
WIND													
MEAN SPEED@	6.7	7.5	8.5	9.5	10.4	10.9	11.2	10.5	9.1	7.6	6.3	6.5	8.7
PREV DIR@	N	W	W	W	W	W	W	W	W	W	W	N	
FASTEST MILE#	47	48	44	38	38	40	38	35	38	43	51	51	51
DIRECTION#	SE	S	S	W	W	W	W	W	N	SE	NE	NE	NE
YEAR#	1965	1917	1948	1965	1965	1965	1939	1929	1923	1950	1919	1923	1923
REL HUMIDITY$													
04 PST	81	83	81	82	89	89	92	93	87	81	82	80	85
10 PST	72	70	61	59	65	70	73	73	64	62	69	71	67
16 PST	63	63	61	61	68	72	74	73	66	60	63	63	66
22 PST	76	76	76	80	86	88	90	90	82	74	76	74	81
PRESSURE&													
HIGHEST	30.62	30.62	30.64	30.48	30.35	30.38	30.28	30.29	30.26	30.39	30.51	30.61	30.64
YEAR	1916	1916	1902	1902	1953	1902	1902	1902	1901	1921	1895	1901	1902
LOWEST	28.85	29.13	29.34	29.43	29.63	29.62	29.65	29.60	29.50	29.50	29.40	29.33	28.85
YEAR	1916	1891	1906	1931	1941	1892	1926	1932	1927	1951	1952	1940	1916
SUNSHINE*													
(% POSSIBLE)													
MAXIMUM	79	95	88	95	86	94	88	90	94	91	92	85	80
YEAR	1962	1964	1944	1968	1967	1919	1916	1969	1970	1912	1929	1956	1959
MINIMUM	18	25	32	43	43	50	46	46	46	43	27	32	56
YEAR	1909	1902	1906	1948	1891	1948	1914	1917	1973	1952	1973	1949	1892
MEAN	56	62	69	74	72	73	66	66	72	71	62	45	67

NOTE: UNFORTUNATELY, EXCEPT FOR PRECIPITATION, THE ABOVE PARAMETERS ARE NO LONGER MEASURED IN SAN FRANCISCO. THEY ARE PRESENTED HERE AS A MATTER OF INTEREST AND AND BECAUSE THEY ARE OF CONSIDERABLE STATISTICAL USE.

@ 1890-1964 # 1912-1972 $ 1871-1972 & 1892-1958 * 1891-1974

140 Influence of Cloudiness on Summertime Temperatures in the Eastern Washington Fire Weather district. James Holcomb, April 1979. (PB298674/AS)
141 Comparison of LFM and MFM Precipitation Guidance for Nevada During Doreen. Christopher Hill, April 1979. (PB298613/AS)
142 The Usefulness of Data from Mountaintop Fire Lookout Stations in Determining Atmospheric Stability. Jonathan W. Corey, April 1979. (PB298899/AS)
143 The Depth of the Marine Layer at San Diego as Related to Subsequent Cool Season Precipitation Episodes in Arizona. Ira S. Brenner, May 1979. (PB298817/AS)
144 Arizona Cool Season Climatological Surface Wind and Pressure Gradient Study. Ira S. Brenner, May 1979. (PB298900/AS)
146 The BART Experiment. Morris S. Webb, October 1979. (PB80 155112)
147 Occurrence and Distribution of Flash Floods in the Western Region. Thomas L. Dietrich, December 1979. (PB80 160344)
149 Misinterpretations of Precipitation Probability Forecasts. Allan H. Murphy, Sarah Lichtenstein, Baruch Fischhoff, and Robert L. Winkler, February 1980. (PB80 174576)
150 Annual Data and Verification Tabulation - Eastern and Central North Pacific Tropical Storms and Hurricanes 1979. Emil B. Gunther and Staff, EPHC, April 1980. (PB80 220486)
151 NMC Model Performance in the Northeast Pacific. James E. Overland, PMEL-ERL, April 1980. (PB80 196033)
152 Climate of Salt Lake City, Utah. Wilbur E. Figgins, Third Revision January 1987. (PB87 157194/AS)
153 An Automatic Lightning Detection System in Northern California. James E. Rea and Chris E. Fontana, June 1980. (PB80 225592)
154 Regression Equation for the Peak Wind Gust 6 to 12 Hours in Advance at Great Falls During Strong Downslope Wind Storms. Michael J. Oard, July 1980. (PB91 108367)
155 A Raininess Index for the Arizona Monsoon. John H. Ten Harkel, July 1980. (PB81 106494)
156 The Effects of Terrain Distribution on Summer Thunderstorm Activity at Reno, Nevada. Christopher Dean Hill, July 1980. (PB81 102501)
157 An Operational Evaluation of the Scofield/Oliver Technique for Estimating Precipitation Rates from Satellite Imagery. Richard Ochoa, August 1980. (PB81 108227)
158 Hydrology Practicum. Thomas Dietrich, September 1980. (PB81 134033)
159 Tropical Cyclone Effects on California. Arnold Court, October 1980. (PB81 133779)
160 Eastern North Pacific Tropical Cyclone Occurrences During Intraseasonal Periods. Preston W. Leftwich and Gail M. Brown, February 1981. (PB81 205494)
161 Solar Radiation as a Sole Source of Energy for Photovoltaics in Las Vegas, Nevada, for July and December. Darryl Randerson, April 1981. (PB81 224503)
162 A Systems Approach to Real-Time Runoff Analysis with a Deterministic Rainfall-Runoff Model. Robert J.C. Burnash and R. Larry Ferral, April 1981. (PB81 224495)
163 A Comparison of Two Methods for Forecasting Thunderstorms at Luke Air Force Base, Arizona. LTC Keith R. Cooley, April 1981. (PB81 225393)
164 An Objective Aid for Forecasting Afternoon Relative Humidity Along the Washington Cascade East Slopes. Robert S. Robinson, April 1981. (PB81 23078)
165 Annual Data and Verification Tabulation, Eastern North Pacific Tropical Storms and Hurricanes 1980. Emil B. Gunther and Staff, May 1981. (PB82 230336)
166 Preliminary Estimates of Wind Power Potential at the Nevada Test Site. Howard G. Booth, June 1981. (PB82 127036)
167 ARAP User's Guide. Mark Mathewson, July 1981, Revised September 1981. (PB82 196783)
168 Forecasting the Onset of Coastal Gales Off Washington-Oregon. John R. Zimmerman and William D. Burton, August 1981. (PB82 127051)
169 A Statistical-Dynamical Model for Prediction of Tropical Cyclone Motion in the Eastern North Pacific Ocean. Preston W. Leftwich, Jr., October 1981. (PB82195298)
170 An Enhanced Plotter for Surface Airways Observations. Andrew J. Spry and Jeffrey L. Anderson, October 1981. (PB82 153883)
171 Verification of 72-Hour 500-MB Map-Type Predictions. R.F. Quiring, November 1981. (PB82 158098)
172 Forecasting Heavy Snow at Wenatchee, Washington. James W. Holcomb, December 1981. (PB82 177783)
173 Central San Joaquin Valley Type Maps. Thomas R. Crossan, December 1981. (PB82 196064)
174 ARAP Test Results. Mark A. Mathewson, December 1981. (PB82 198103)
176 Approximations to the Peak Surface Wind Gusts from Desert Thunderstorms. Darryl Randerson, June 1982. (PB82 253089)
177 Climate of Phoenix, Arizona. Robert J. Schmidli, April 1969 (Revised December 1986). (PB87 142063/AS)
178 Annual Data and Verification Tabulation, Eastern North Pacific Tropical Storms and Hurricanes 1982. E.B. Gunther, June 1983. (PB85 106078)
179 Stratified Maximum Temperature Relationships Between Sixteen Zone Stations in Arizona and Respective Key Stations. Ira S. Brenner, June 1983. (PB83 249904)
180 Standard Hydrologic Exchange Format (SHEF) Version I. Phillip A. Pasteries, Vernon C. Bissel, David G. Bennett, August 1983. (PB85 106052)
181 Quantitative and Spacial Distribution of Winter Precipitation along Utah's Wasatch Front. Lawrence B. Dunn, August 1983. (PB85 106912)
182 500 Millibar Sign Frequency Teleconnection Charts - Winter. Lawrence B. Dunn, December 1983. (PB85 106276)
183 500 Millibar Sign Frequency Teleconnection Charts - Spring. Lawrence B. Dunn, January 1984. (PB85 111367)
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