



Climate Monitoring in the Mediterranean Coast Network 2010

2010 Annual Report

Natural Resource Report NPS/MEDN/NRR—2015/1060



ON THE COVER

View toward the ocean from the Tri-Peaks are of the Santa Monica Mountains.
Photograph by the National Park Service.

Climate Monitoring in the Mediterranean Coast Network 2010

Santa Monica Mountains National Recreation Area

Natural Resource Report NPS/MEDN/NRR—2015/1060

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Executive Summary

This report details the climate (temperature, precipitation, drought, streamflow, and wind conditions) of Santa Monica Mountains National Recreation Area (NRA) during 2010. Gridded GIS maps are used to present broad-brush conditions across the region for each month. This regional presentation is compared to detailed data from Remote Automated Weather Stations (RAWS), weather stations in the National Weather Service Cooperative Observer (COOP) Network, and data from USGS stream gages. Prior to analysis, a set of data quality control checks were performed by the author in accordance with established National Park Service protocols (Rocky Mountain Climate Working Group 2010). Calendar-year 2010 began with moderate to severe drought conditions, but drought was alleviated by March. Total annual precipitation was above the 1971 – 2000 averages across the region. Average daily maximum temperatures (Tmax) averaged across the entire year were generally near or below the 1971 – 2000 averages. Average daily minimum temperatures (Tmin) for the year were generally near or slightly above average. There was significant spatial and month to month variability in the data that provided exceptions to these generalizations, so an examination of the regional maps (Figures 3-5) are key to understanding the climatic patterns for 2010. Section 3 contains a set of narratives that provide details for each season of the year. Bulleted points within section 3 highlight key data for each month of the year. A provisional analysis of RAWS data is presented which identifies Santa Ana wind events. The computer code used in this analysis, which is available from the Mediterranean Coast Network, may have the potential to be refined into a tool for the assessment of fire danger.

Introduction

Background

This report details the climate (temperature, precipitation, drought, streamflow, and wind conditions) of Santa Monica Mountains National Recreation Area (NRA) during 2010. Climatic events are presented both from a local perspective, with data from individual weather stations, and from a regional perspective, with maps that depict broad-scale conditions across southern California during each month of the year. The climatic conditions of 2010 are also compared to a historical context, based primarily on a standard 30-year average or “normal” period (currently 1971–2000).

The content is divided into sections that discuss precipitation, temperature and drought; streamflow; and wind conditions. The section on temperature, precipitation and drought is further sub-divided into seasonal narratives that highlight key data and events. The locations of weather stations cited in this report are shown in Figure 1. Metadata for these stations can be accessed from the internet links provided in Appendix 1. Those interested in additional climate-related information for Santa Monica Mountains NRA and the surrounding areas should seek:

- Western Regional Climate Center (<http://www.wrcc.dri.edu/>)
- Drought Monitor (<http://drought.unl.edu/dm/monitor.html>)
- NOAA (National Oceanic Atmospheric Administration) National Weather Service (<http://www.cpc.ncep.noaa.gov/>)
- USGS (U.S. Geological Survey) Water National Information System (<http://waterdata.usgs.gov/nwis>)

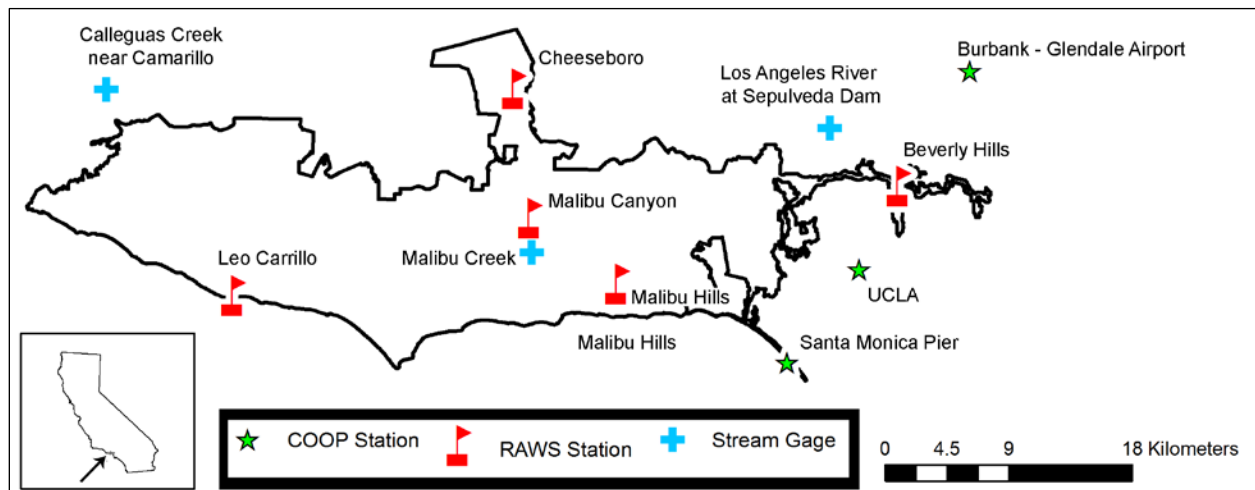


Figure 1. Map showing key climate stations and stream gauges in and near Santa Monica Mountains National Recreation Area.

Approach and Methods

Selection of Datasets

In order to place Santa Monica Mountains NRA within a regional context, grid-based estimates of precipitation and temperature were used to provide a broad overview of climatic conditions in the area. These estimates were generated via a statistical modeling technique that interpolates precipitation and temperature values between actual climate stations while also accounting for the effects of aspect and elevation. Known as the Parameter-elevation Regression on Independent Slopes Model (PRISM; <http://www.prism.oregonstate.edu/>), this approach has a long history of use in the western United States, and it has been shown to provide highly robust products in a wide variety of studies (Daly et al. 2008). Records from individual precipitation and temperature observing stations were included as a way to highlight intra-regional variability. The process of selecting specific stations included in this report is described in the Rocky Mountain Climate Protocol (Rocky Mountain Climate Working Group 2010). Generally, the selection criteria were:

1. Stations provide good spatial coverage within and near the parks of interest. In the case of Santa Monica Mountains NRA, RAWS stations were chosen because they are located within the administrative boundaries of the recreation area (Figure 1) and are routinely consulted by NPS staff. In addition, stations from the National Weather Service Cooperative Observer (COOP) network were chosen from nearby locations. COOP stations have several advantages, including their relatively long period of record (Appendix 1), and the availability of established 30-year averages that can be used to quantify the difference between the current year and “normal” conditions. For this report, COOP stations were selected along an axis of increasing distance from the Pacific Coast, with Santa Monica Pier measuring the more moderate ocean climate, and Burbank – Glendale Airport at the inland extreme (Figure 1).
2. Stations provide a sufficient length of record to provide historical context for current observations. For this report, COOP stations were not considered if they had not been in operation during the period 1971 – 2000 at a minimum.
3. Instrumentation at individual stations is relatively consistent over the life of the record.
4. Instrumentation and siting standards used in selected networks are suitable for providing consistent, continuous, and long-duration records of climate and streamflow.

As a way of presenting the integrated effects of temperature and precipitation, maps from the US Drought Monitor (<http://drought.unl.edu/dm/monitor.html>) were used to depict broad-brush conditions across the region. Even though the watercourses in the region are human-controlled and not directly tied to rainfall, USGS stream gage data (<http://waterdata.usgs.gov/nwis>) were used to contrast streamflow during the 2010 water year, which ran from October 2009 to September 2010, with average conditions during the period 1971 – 2000.

Quality Control of Coop Data

The agencies responsible for the initial data collection (e.g., National Weather Service) and the parties responsible for archiving these data (e.g., Western Regional Climate Center) performed basic quality control measures. Following guidelines from Kittel (2008) and Kittel et al. (2009), an additional series of quality checks were performed by the author of this report, involving graphing and visual inspection of the time series, evaluation of the data quality flags that accompany each observation, comparison with historical observations and observations from surrounding sites, and logical consistency tests (e.g., confirming that minimum daily temperatures were lower than the daily maximum temperatures). Point observations provided by the COOP stations were also compared to corresponding estimates from the PRISM datasets and to the original datasheets (B-91 forms) used by weather station staff. When possible, data missing in the electronic records were recovered from the original datasheets and hand entered by the author of this report. If more than 3 days of precipitation data were missing for a particular month, a monthly total was not calculated, and the entire month was instead considered missing. Similarly, if more than 5 days of mean daily maximum temperature (Tmax) or mean daily minimum temperature (Tmin) were missing, monthly average temperatures were not calculated.

Quality Control of RAWs Data

Because RAWs data are collected hourly, daily Tmax, Tmin, and precipitation values must be derived from the automated data stream. If any particular day was missing more than two hours of measurements, the entire day was considered missing. In addition, if the temperature during any day varied by less than 2 degrees Fahrenheit, data for the entire day was considered invalid and replaced with missing values. Once daily statistics had been calculated, diagnostic plots were used to screen for physically impossible measurements, which were ascribed to instrumental error and considered missing, and the missing data criteria just described for COOP stations were used to calculate monthly statistics. Even though this report focuses primarily on calendar-year 2010, quality control was performed and monthly statistics were calculated for the entire period of record at each RAWs station, so that summary data would be available to NPS staff for ancillary climate analyses. These monthly summaries appear in Appendix 2.

All the data used in the preparation of this report (including original and quality checked files) are available electronically from the Mediterranean Coast Network I&M program. These data files may be read and re-analyzed by the same software that was used to produce this report, available for download at www.YellowstoneEcology.com.

Analysis of Wind Data

Wind roses were used to present average conditions during 2010 and to contrast them with the period 2005 – 2009. In addition, wind data were used to develop tables of suspected Santa Ana events for the entire period of record at each RAWs station cited in this report (Figure 1). Santa Ana winds are caused by pressure differential between coastal and inland areas, and some authors use pressure maps to confirm that Santa Ana conditions are occurring. However, a simpler definition based exclusively on wind characteristics appears in Raphael (2003) as follows: “If wind speed averaged over four intervals during the day was greater than or equal to 20 mph, the wind direction was from the

northeast quadrant, and the relative humidity at 1630 PST (Pacific standard time) was less than 40%, it was considered to be a Santa Ana event.” Accordingly, a python script (www.python.org) was used to scan all wind data available for Santa Monica Mountains NRA and generate tables of dates that had wind and humidity characteristics matching this definition. If these tables (Appendix 3) appear to coincide with fire events or present some other practical use to park management, the source code of the python script can be obtained from the Mediterranean Coast Network I&M program. Since park staff have regular access to RAWS wind data, the algorithm might be refined and perhaps used in real-time, rather than retrospectively, to assess fire danger.

Results

Temperature, Precipitation, and Drought Status During Calendar Year 2010

The patterns described in this section are often stated as broad generalizations. In most cases there was significant variability across the region and exceptions to the patterns described here were common. In order to appreciate this variability, it is important to examine the PRISM maps and compare them to the weather station data presented in the figures.

January – April: General Patterns

Santa Monica Mountains NRA began the year in a state of drought ranging from “Abnormally Dry” (D0 in Figure 2) to “Drought Severe” (D2, Figure 2), but these dry conditions were mitigated by the beginning of March (Figure 2). There was generally above average (1971 – 2000 average) rainfall across the region in January and average to slightly above average in February (Figure 3). At the same time, average daily maximum temperatures (Tmax) and average daily minimum temperatures (Tmin) were generally near or above average during January and near-average to slightly below average during February (Figures 4, 5). March was quite dry, with precipitation generally less than 25% the 1971 – 2000 averages and temperatures generally above average (Figures 3-5), but this was compensated by a cool, wet April (Figures 3-5), which maintained the region's drought free status (Figure 2).

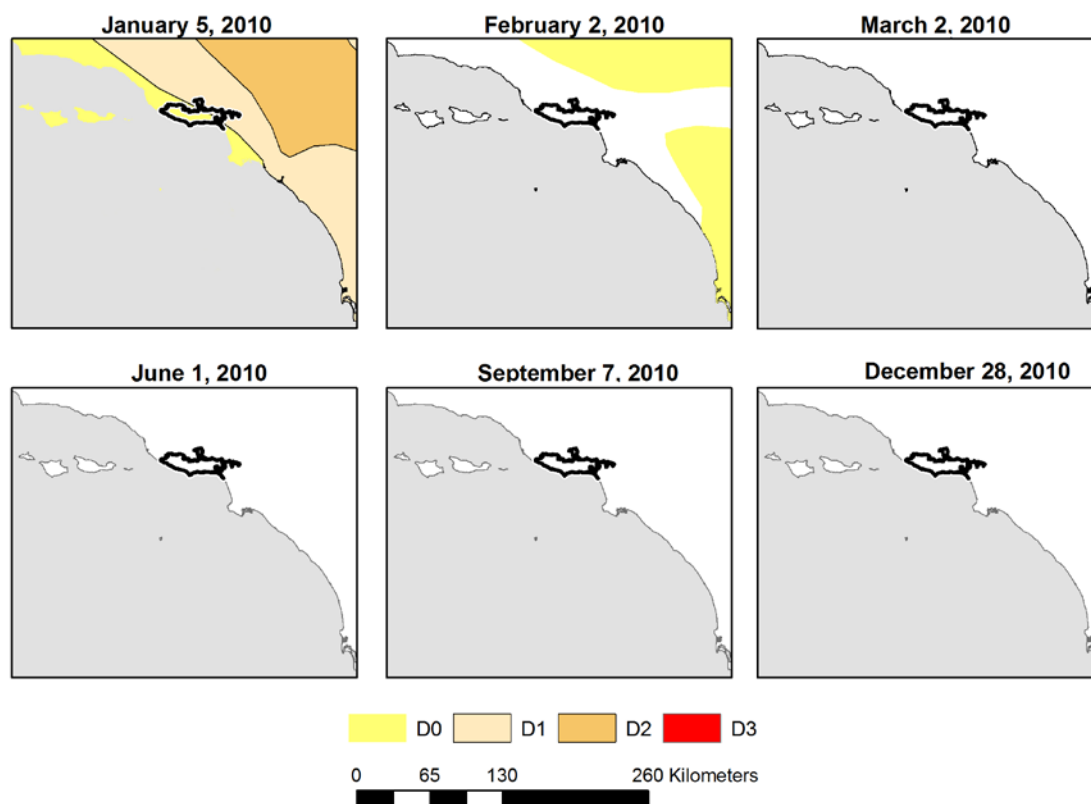


Figure 2. U.S. Drought Monitor maps for Santa Monica Mountains National Recreation Area over the course of calendar year 2010. Drought classifications range from “abnormally dry” (D0) to “exceptional drought” (D4). White areas on the map indicate lack of drought status. For more information visit: www.drought.unl.edu/dm/monitor.html.

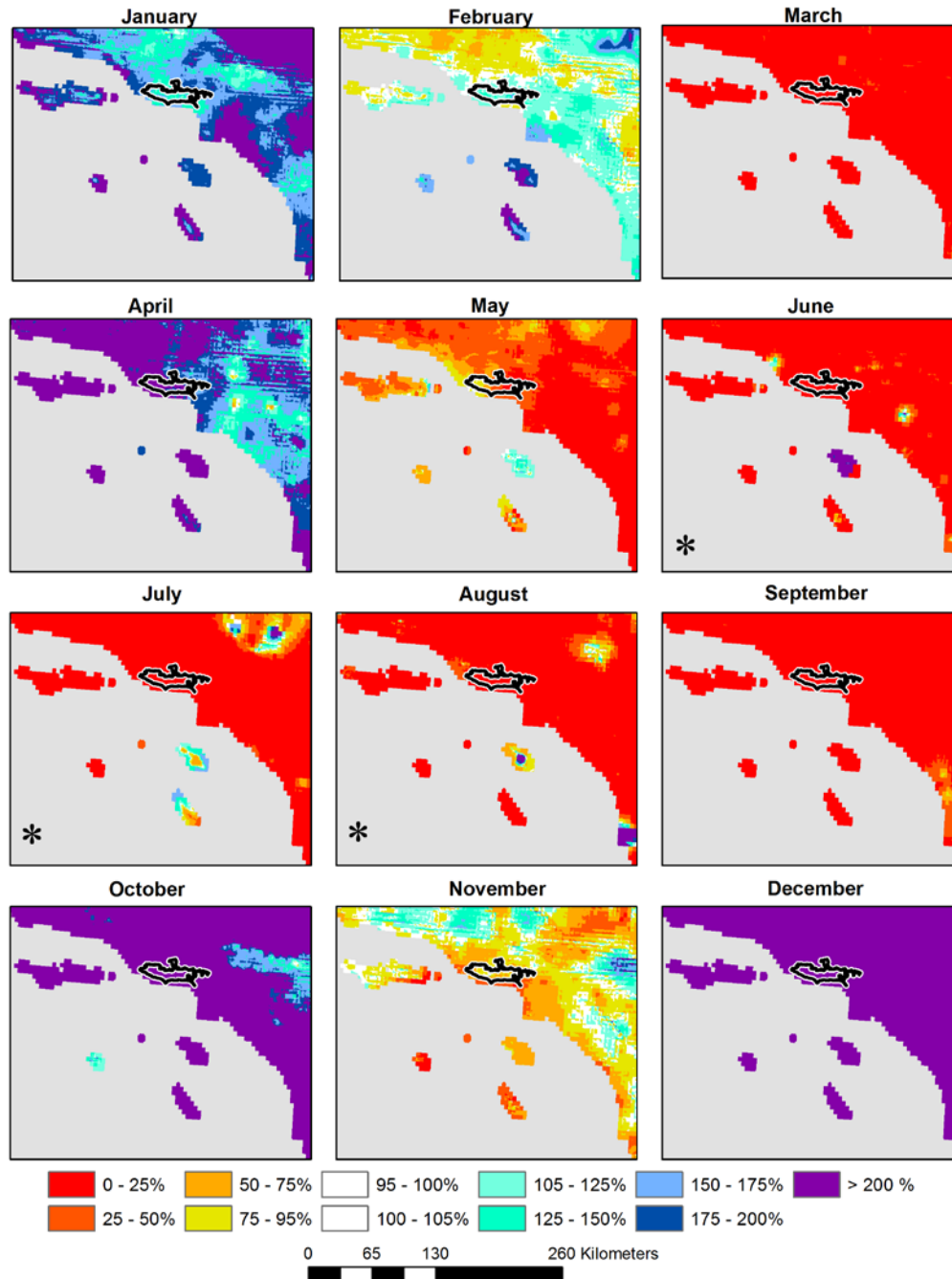


Figure 3. Maps showing percent of average precipitation relative to 1971–2000 averages for each month in calendar year 2010. Colors show estimates from the Parameter-elevation Regressions on Independent Slopes Model (PRISM). Gray areas = Pacific Ocean. Santa Monica NRA is shown as a black outline. PRISM interpolates precipitation values between actual observation stations, and corrects these interpolated estimates for changes in topography across the region. For more information, see <http://www.prism.oregonstate.edu/>. Asterisks indicate months that had very low average precipitation during 1971 – 2000. For example, key weather stations in this region have monthly average precipitation during summer months ranging 0.01 – 0.2 inches (see Figure 5). For this reason, map colors indicating 0 – 25% average precipitation may represent very small absolute departure from average (0.01 – 0.2 inches less than normal).

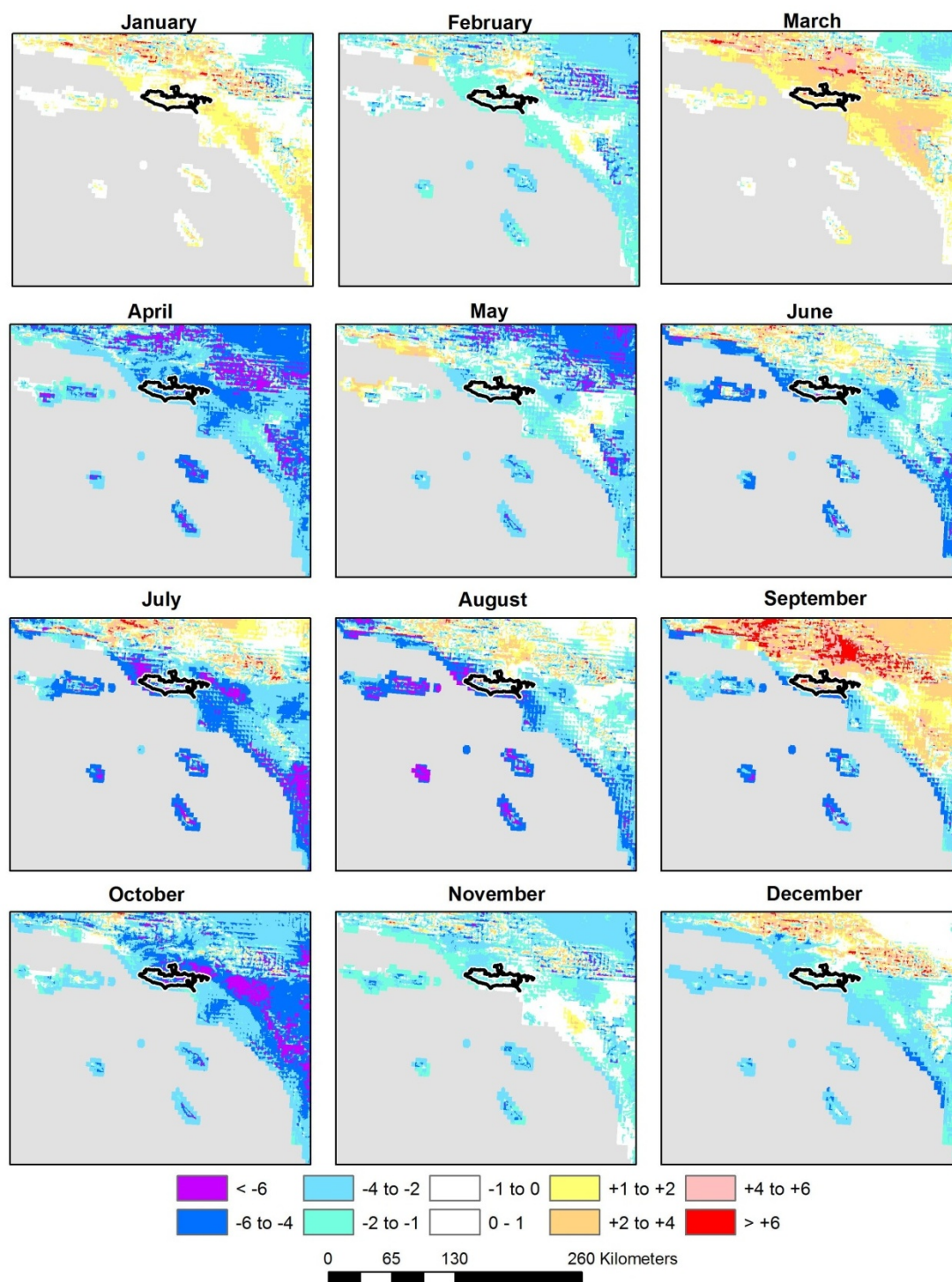


Figure 4. Maps showing departures from 1971 – 2000 average maximum daily temperatures (Tmax) for each month in calendar year 2010 versus. Departure values are reported in degrees Fahrenheit. Gray areas = Pacific Ocean. Santa Monica NRA is shown as a black outline. Maps were created using estimates from the Parameter-elevation Regressions on Independent Slopes Model (PRISM). PRISM interpolates precipitation values between actual observation stations, and corrects these interpolated estimates for changes in topography across the region. For more information, see <http://www.prism.oregonstate.edu/>.

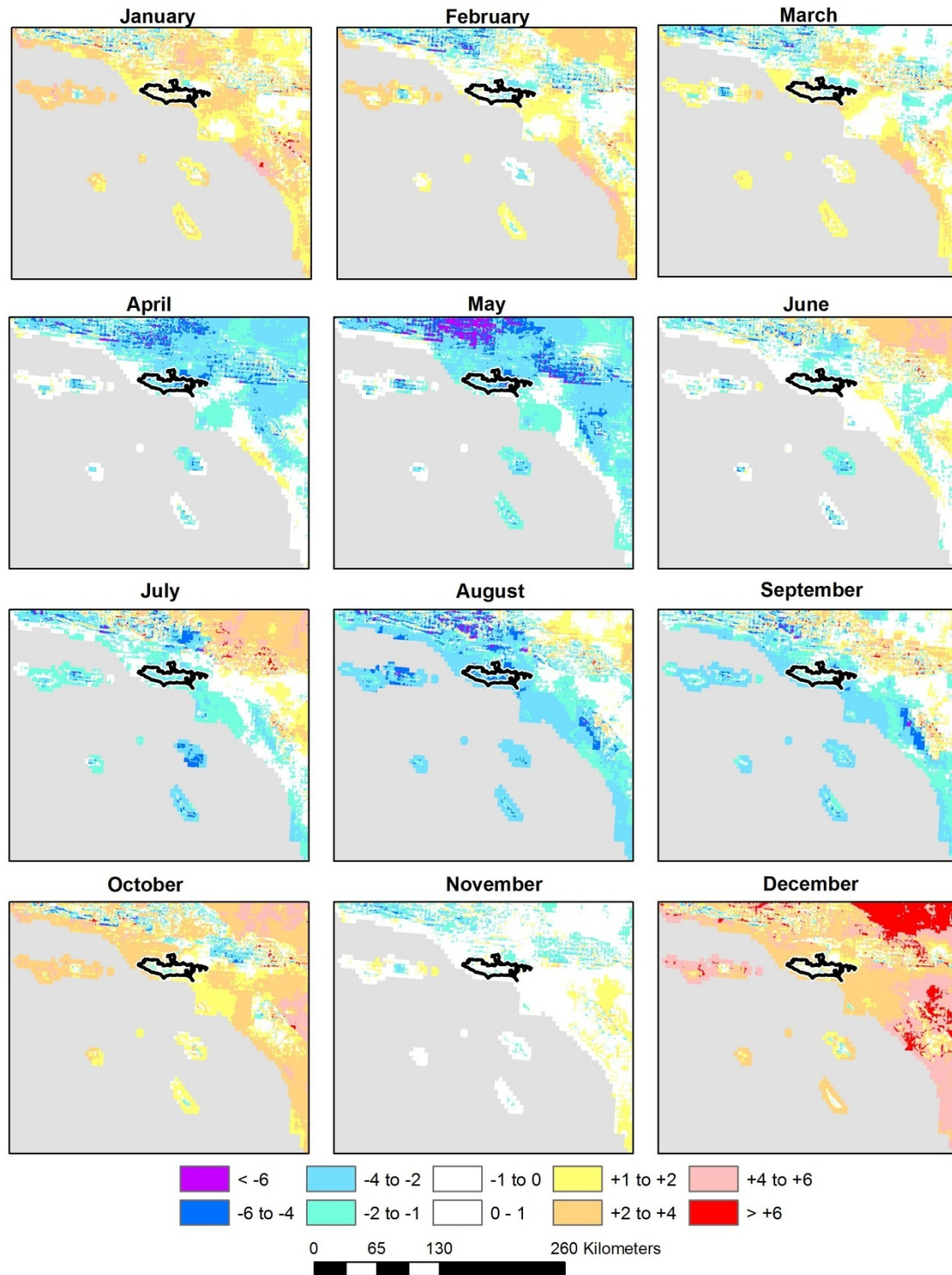


Figure 5. Maps showing departures from 1971 – 2000 average minimum daily temperatures (Tmin) for each month in calendar year. Departure values are reported in degrees Fahrenheit. Gray areas = Pacific Ocean. Santa Monica NRA is shown as a black outline. Maps were created using estimates from the Parameter-elevation Regressions on Independent Slopes Model (PRISM). PRISM interpolates precipitation values between actual observation stations, and corrects these interpolated estimates for changes in topography across the region. For more information, see <http://www.prism.oregonstate.edu/>.

January – April: Details from Weather Station Data (Tables 1, 2 Figures 6-9):

- ⤴ January precipitation ranged from 97% the 1971 – 2000 average at Santa Monica Pier to 221% at the Burbank – Glendale Airport. Tmax ranged from 1.3 degrees Fahrenheit (F) above average (Santa Monica Pier) to 2.83 (F) above average (UCLA). Tmin ranged from 1.68 (F) above average (Burbank-Glendale Airport) to 3.22 (F) above average (Santa Monica Pier).
- ⤴ February precipitation ranged from 85% average at Santa Monica Pier to 128% at UCLA. Tmax ranged from 0.31 (F) above average (UCLA) to 1.7 (F) below average (Burbank – Glendale Airport).
- ⤴ During January and February, temperature and precipitation at the RAWS stations within the national recreation area were roughly within the mid-range of previous years (gray lines, Figure 8).
- ⤴ March precipitation ranged from 1% (Santa Monica Pier) to 26% (Burbank – Glendale Airport) the 1971 – 2000 average. March Tmax ranged 1.63(F) above average (Burbank – Glendale Airport) to 3.75 (F) above average (UCLA). March Tmin ranged from 0.72 (F) below (Burbank – Glendale Airport) to 1.69 (F) above average (Santa Monica Pier).
- ⤴ April precipitation ranged from 137% average (UCLA) to 147% average (Santa Monica Pier). April Tmax ranged from 1.45 (F) below average (Santa Monica Pier) to 5.33 (F) below average (Burbank – Glendale Airport). April Tmin ranged from 0.72 (F) below average (Santa Monica Pier) to 3.71 (F) below average (Burbank – Glendale Airport).
- ⤴ During April, temperatures at the RAWS stations appeared to be relatively cool, plotting below previous years (gray lines, Figure 8).

Table 1. Total Monthly Precipitation in inches during 2010 and departure from (%) 1971 – 2000 monthly averages.

Station Name	Station Type	Station ID	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total
Burbank -	COOP	41194	7.87	4.64	1	1.45	0.07	0	0.01	0	0.02	1.61	1.29	8.24	26.2
Glendale Airport		% of 30-yr avg.	221	108	26	142	19	0	50	0	7	293	123	383	150
UCLA	COOP	49152	5.89	6.33	0.51	1.18	0.18	0.01	0.03	0	0	1.87	0.69	11.23	27.92
		% of 30-yr avg.	144	128	14	137	53	9	150	0	0	328	51	470	149
Santa Monica	COOP	47953	2.96	2.78	0.02	0.78	0.07	0	0.01	0	0.01	1.35	(-)	(-)	(-)
Pier		% of 30-yr avg.	97	85	1	147	28	0	100	0	6	375	(-)	(-)	(-)
Beverly Hills	RAWS		(-)	(-)	(-)	(-)	(-)	0	0.01	0	0	2.01	1.13	10.66	(-)
Leo Carrillo	RAWS		3.76	2.92	0.53	0.68	0.05	0	0.03	0	0	1.55	0.6	7.02	17.14
Malibu Hills	RAWS		4.24	6.08	0.14	1.6	0.12	0.01	0.03	0	0	2.05	0.79	6	21.06
Malibu Canyon	RAWS		5.67	5.37	0.42	1.54	0.03	0	0	0	0	2.04	0.87	10.89	26.83
Cheeseboro	RAWS		4.45	2.98	0.25	1.29	0.02	0	0	0	0	1.44	0.73	5.82	16.98

Notes: Departures were not calculated for RAWS stations because these stations lack established monthly averages for 1971 – 2000.

(-) = Insufficient data for an accurate calculation.

Station IDs are from National Weather Service Cooperative Observer stations. Monthly statistics are not reported if more than 3 days of data are missing. For RAWS stations, days are considered missing if more than two hours of measurement are missing.

Table 2. Average daily maximum temperatures (Tmax), Average Daily Minimum Temperatures (Tmin) during 2010 and departure from 1971 – 2000 averages expressed as +/- Degrees F.

Station Name	Station ID	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Burbank - Glendale Airport	41194													
Tmax (F)		70	67.79	72.23	69.57	73.58	78.13	81.9	85.71	86.77	75.52	73.43	67.52	75.18
Tmax departure (+/- F)		2.5	-1.71	1.63	-5.33	-3.92	-5.07	-7.03	-4.19	-0.33	-5.98	-0.07	-0.38	-2.52
Tmin (F)		43.68	43.71	45.48	45.79	51.48	58.33	60.7	59.52	58.17	55.45	45.66	44.87	51.07
Tmin departure (+/- F)		1.68	-0.59	-0.72	-3.71	-2.72	0.03	-1.45	-2.88	-1.73	1.85	0.26	3.57	-0.53
UCLA	49152													
Tmax (F)		69.13	67.21	70.45	66.9	69.39	71.23	73.8	76.71	77.73	72.65	71.63	66.48	71.11
Tmax departure (+/- F)		2.83	0.31	3.75	-2.3	-0.21	-1.97	-3.06	-1.49	-0.17	-2.55	0.93	-0.52	-0.39
Tmin (F)		52.45	50.68	51.97	50.37	53.23	58.27	60	59.26	59.13	58.68	53.93	52	55
Tmin departure (+/- F)		3.05	0.78	1.27	-2.93	-2.87	-1.03	-2.07	-3.84	-3.27	-0.22	0.03	1.9	-0.8
Santa Monica Pier	47953													
Tmax (F)		65	62.5	64.39	61.95	63.36	66.59	67.5	65.67	66.44	68.64	(-)	(-)	(-)
Tmax departure (+/- F)		1.3	-0.9	2.29	-1.45	-0.24	0.69	-1.34	-4.63	-4.06	-0.96	(-)	(-)	(-)
Tmin (F)		53.42	52.64	53.79	53.18	55.6	59.84	60.6	59.31	58.64	60.13	(-)	(-)	(-)
Tmin departure (+/- F)		3.22	1.34	1.69	-0.72	-0.9	0.44	-1.5	-3.79	-3.96	0.73	(-)	(-)	(-)
Beverly Hills	RAWS													
Tmax (F)		(-)	(-)	(-)	(-)	(-)	83.23	86.29	90.81	92.30	77.74	74.27	67.16	(-)
Tmin (F)		(-)	(-)	(-)	(-)	(-)	54.63	57.39	58.65	60.17	55.87	51.70	49.55	(-)
Leo Carrillo	RAWS													
Tmax (F)		67.65	66.14	68.48	66.57	68.06	70.93	71.58	71.39	73.40	70.19	69.20	63.42	68.92
Tmin (F)		51.81	49.89	50.58	48.90	51.10	55.73	57.03	54.87	55.67	57.29	52.00	49.58	52.87
Malibu Hills	RAWS													
Tmax (F)		66.03	64.36	69.06	66.10	72.13	74.57	78.81	85.90	86.73	72.77	69.17	64.10	72.48
Tmin (F)		51.77	48.86	49.71	47.13	50.97	53.67	57.58	61.90	63.63	56.35	52.60	50.52	53.72

Table 2. Average daily maximum temperatures (Tmax), Average Daily Minimum Temperatures (Tmin) during 2010 and departure from 1971 – 2000 averages expressed as +/- Degrees F (continued).

Station Name	Station ID	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Malibu Canyon	RAWS													
Tmax (F)		68.55	67.29	72.00	68.47	73.90	73.73	78.35	82.29	84.37	74.65	73.10	66.94	73.64
Tmin (F)		37.00	38.43	37.84	39.27	43.84	51.93	54.94	51.52	49.23	50.68	38.00	39.84	44.38
Cheeseboro	RAWS													
Tmax (F)		64.55	63.64	68.90	67.33	74.13	81.87	87.13	90.58	88.77	73.68	68.33	62.90	74.32
Tmin (F)		50.55	47.86	48.74	46.50	50.97	54.87	59.00	62.03	63.40	56.32	51.80	49.68	53.48

Notes: Departures were not calculated for RAWS stations because these stations lack established monthly averages for 1971 – 2000

(-) = Insufficient data for an accurate calculation

Station IDs are from National Weather Service Cooperative Observer stations. Monthly statistics are not reported if more than 5 days of data are missing. For RAWS stations, entire days are considered missing if more than two hours of data are missing.

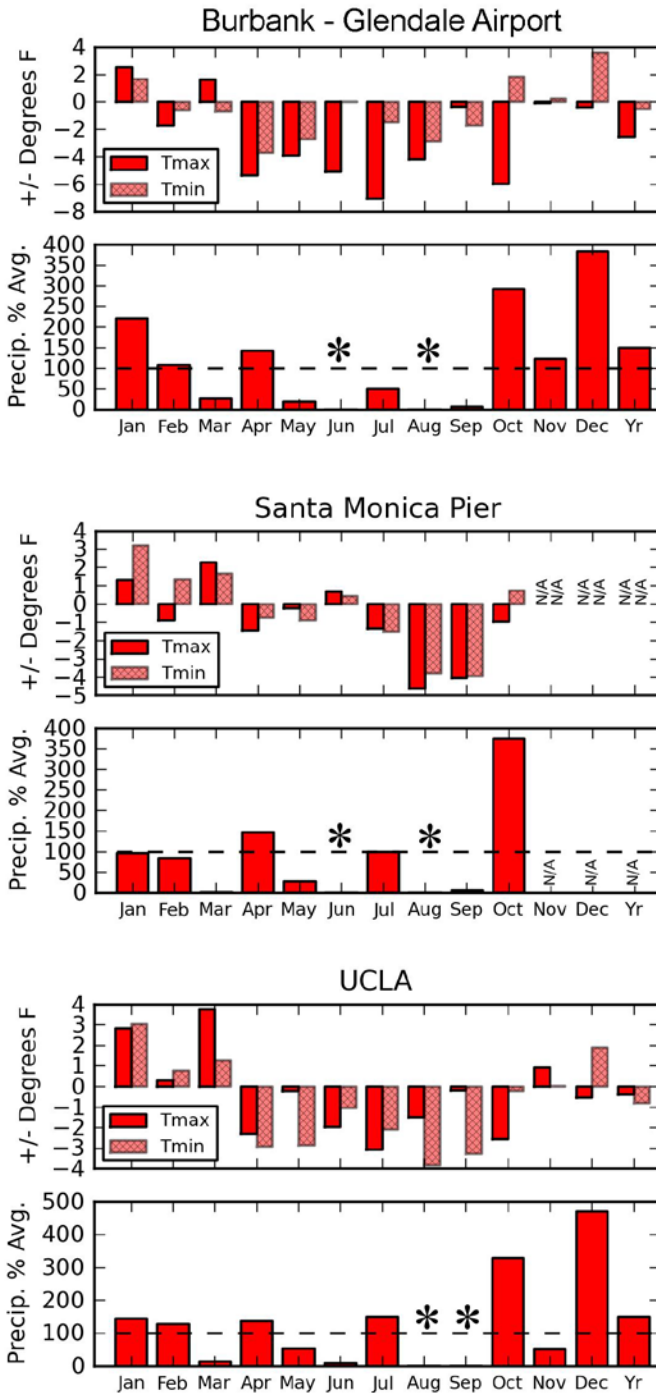


Figure 6. Departure of 2010 precipitation, average daily maximum temperature (Tmax), and average daily minimum temperature (Tmin) from 1971 – 2000 averages at key COOP stations near Santa Monica Mountains National Recreation Area. Asterisks indicate months that had less 0.2 inches average precipitation. When interpreting months that have been marked with asterisks, it is important to bear in mind that 0% average precipitation may represent a small difference in absolute precipitation departure. For example, 1971 – 2000 average precipitation for the month of July is only 0.01 inches at Santa Monica Pier. In this case, the fact that no precipitation fell during July, 2010 results in 0% average precipitation, but in absolute terms it is only 0.01 inches less than normal.

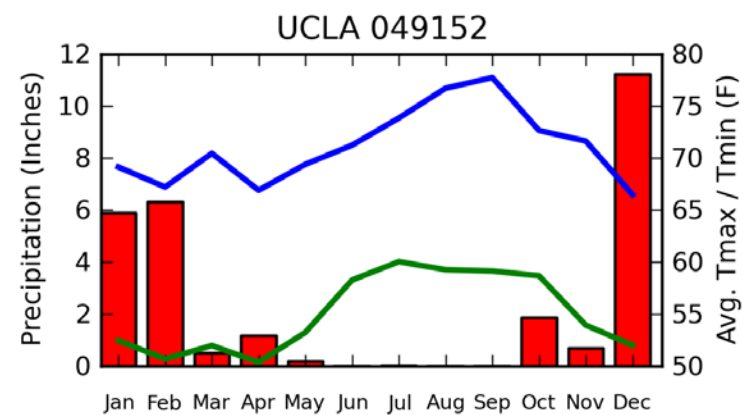
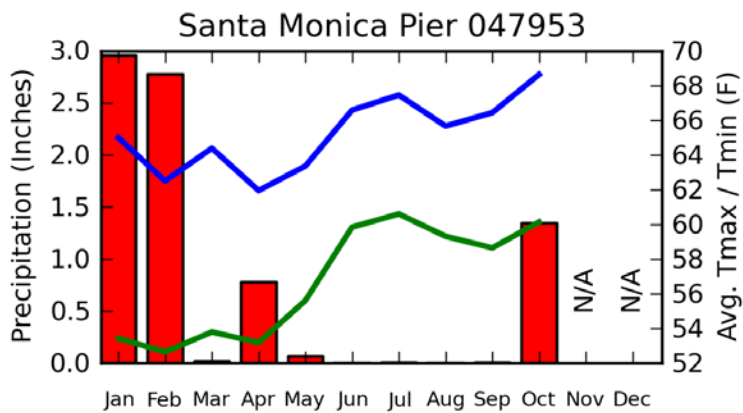
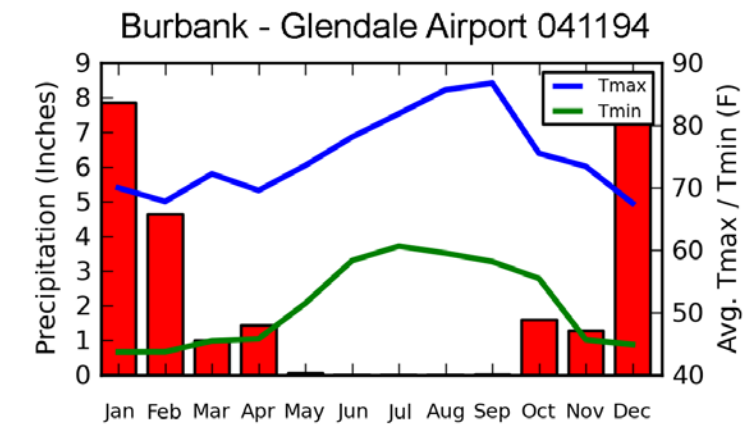


Figure 7. Total monthly precipitation, average daily maximum temperature (Tmax), and average daily minimum temperature (Tmin) during 2010 at key COOP stations near Santa Monica Mountains National Recreation Area. N/A = Insufficient data for an accurate calculation.

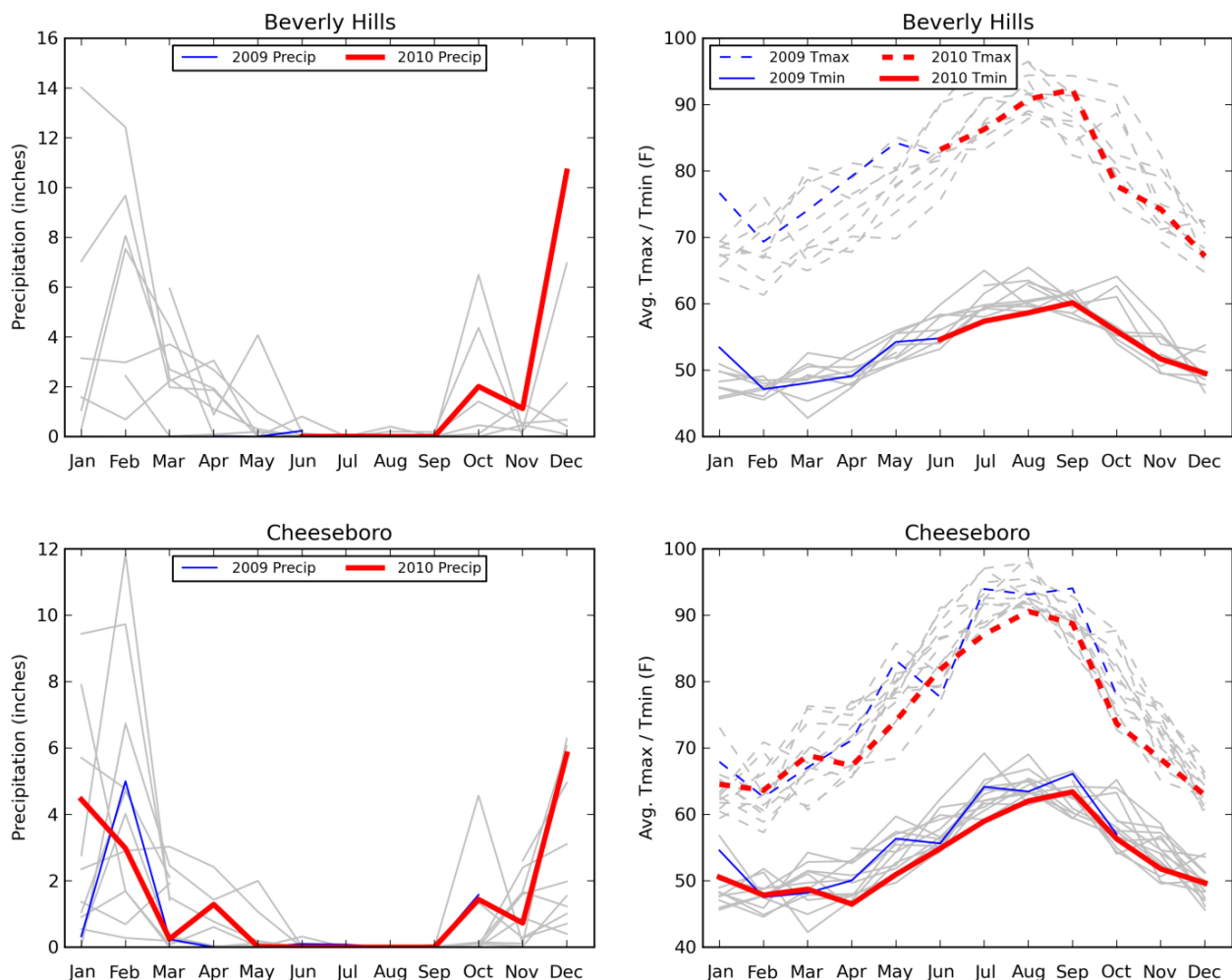


Figure 8. Total monthly precipitation, average daily maximum temperature (Tmax), and average daily minimum temperature (Tmin) for the period of record at RAWS stations in Santa Monica Mountains National Recreation Area. Calendar year 2010 is shown in red. 2009 is shown in blue. All earlier years are shown as gray lines. RAWS stations do not have officially calculated monthly normals (averages for the period 1971 – 2000), so it is not possible to exactly quantify the difference between the year 2010 and “normal” conditions. However, the difference between 2010 and previous years can be judged in a rough way from the position of the red lines relative to the gray lines. Record length for each station appears in Appendix 1.

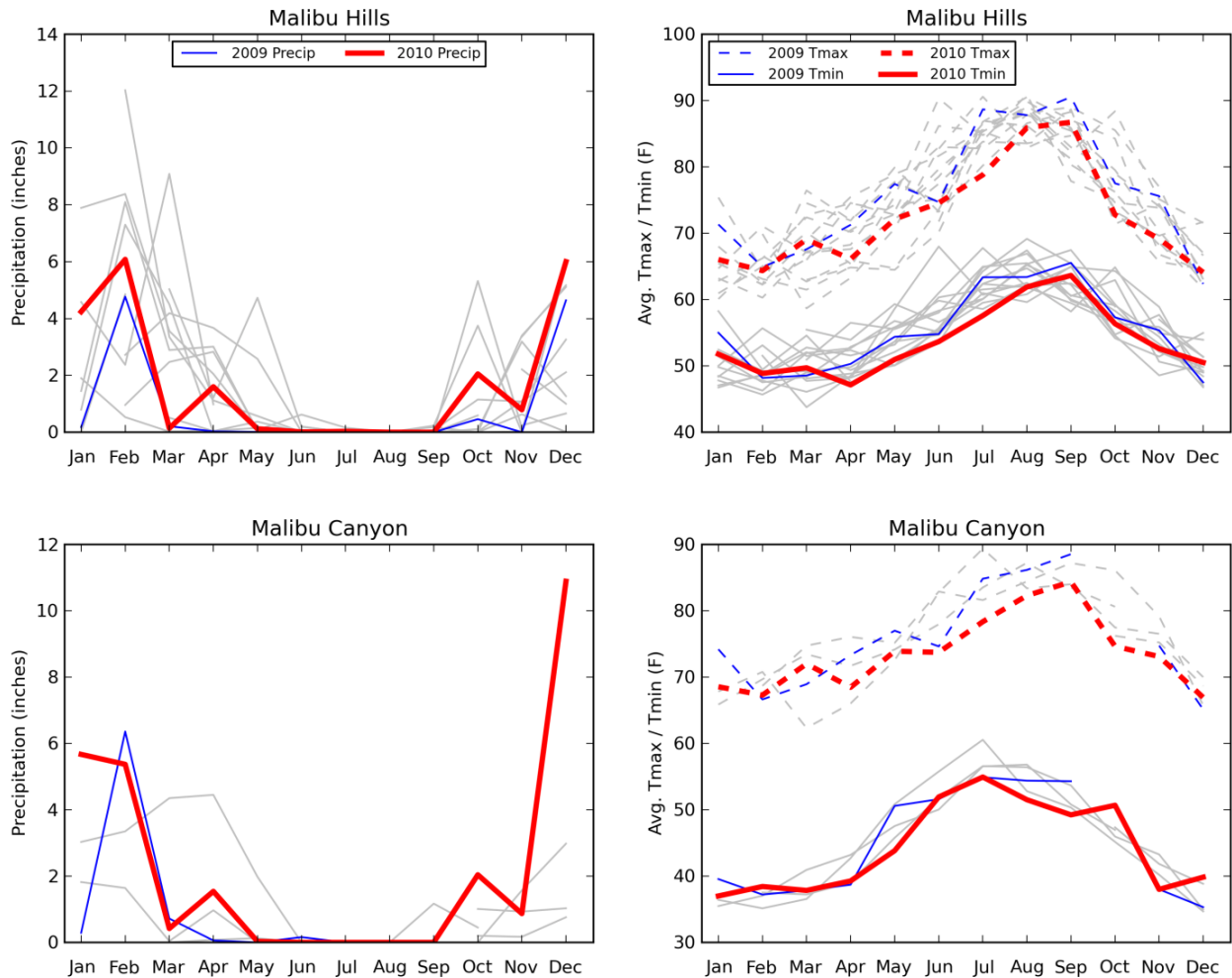


Figure 8. Total monthly precipitation, average daily maximum temperature (Tmax), and average daily minimum temperature (Tmin) for the period of record at RAWS stations in Santa Monica Mountains National Recreation Area (continued). Calendar year 2010 is shown in red. 2009 is shown in blue. All earlier years are shown as gray lines. RAWS stations do not have officially calculated monthly normals (averages for the period 1971 – 2000), so it is not possible to exactly quantify the difference between the year 2010 and “normal” conditions. However, the difference between 2010 and previous years can be judged in a rough way from the position of the red lines relative to the gray lines. Record length for each station appears in Appendix 1.

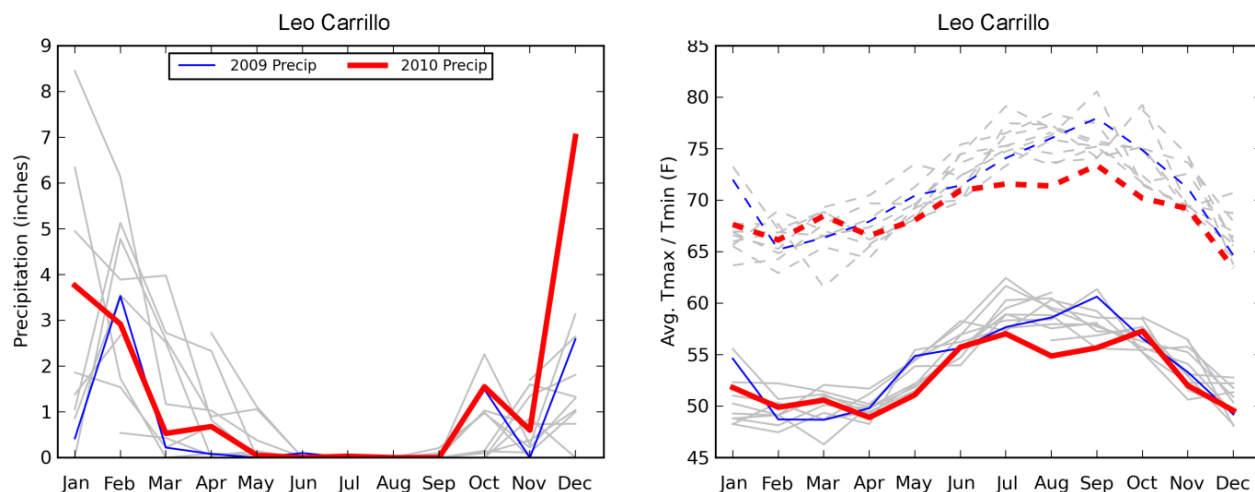


Figure 8. Total monthly precipitation, average daily maximum temperature (Tmax), and average daily minimum temperature (Tmin) for the period of record at RAWS stations in Santa Monica Mountains National Recreation Area (continued). Calendar year 2010 is shown in red. 2009 is shown in blue. All earlier years are shown as gray lines. RAWS stations do not have officially calculated monthly normals (averages for the period 1971 – 2000), so it is not possible to exactly quantify the difference between the year 2010 and “normal” conditions. However, the difference between 2010 and previous years can be judged in a rough way from the position of the red lines relative to the gray lines. Record length for each station appears in Appendix 1.

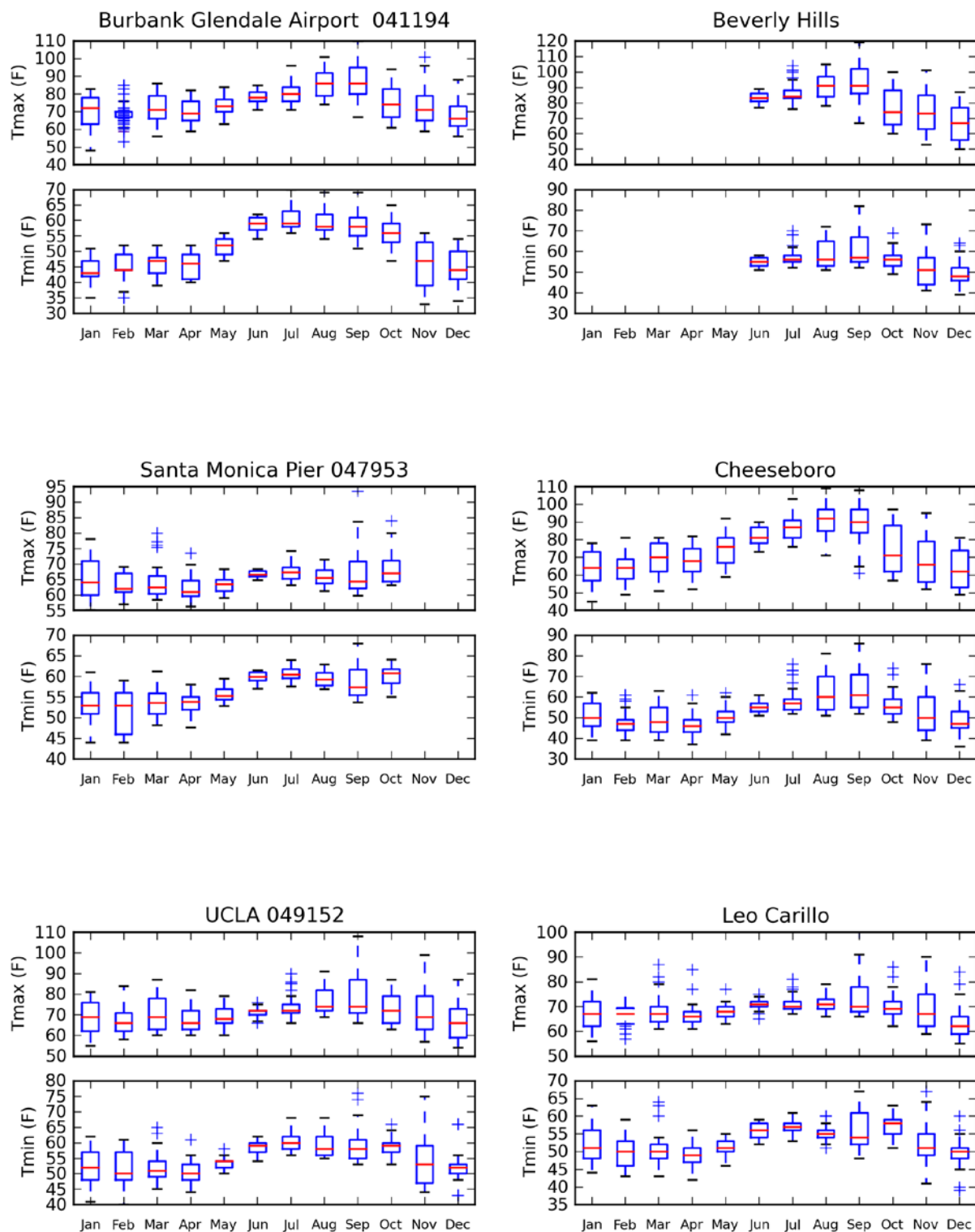


Figure 9. Boxplots of average maximum (Tmax) and average minimum (Tmin) daily temperatures at key climate stations in and near Santa Monica Mountains National Recreation Area. Horizontal lines indicate the median value. Boxes indicate the 25th and 75th percentiles. Whiskers extend 1.5 times the interquartile Range (IQR). Crosses indicate values exceeding 1.5 times the IQR.

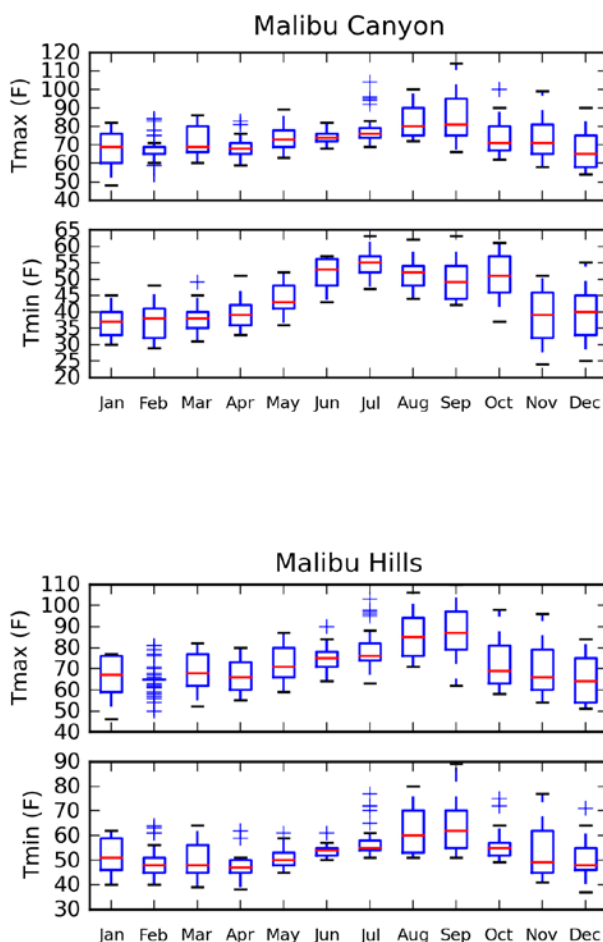


Figure 9. Boxplots of average maximum (Tmax) and average minimum (Tmin) daily temperatures at key climate stations in and near Santa Monica Mountains National Recreation Area (continued). Horizontal lines indicate the median value. Boxes indicate the 25th and 75th percentiles. Whiskers extend 1.5 times the interquartile Range (IQR). Crosses indicate values exceeding 1.5 times the IQR.

May – August: General Patterns

As characteristically low summer precipitation combined with generally below average temperatures (Figures 4, 5), May - August in and near Santa Monica Mountains NRA continued the drought – free conditions that had begun in March (Figure 2). July, in particular, saw temperatures that were lower than average (Figures 4, 5). For example, the Burbank – Glendale Airport weather station reported Tmax 7 degrees (F) below the 1971 – 2000 average.

COOP stations in the region typically experience less than 0.4 inches of precipitation during May, and even less during June – August. For example, June average precipitation for Santa Monica Pier during 1971 – 2000 was 0.04 inches, and July average precipitation at Santa Monica Pier and UCLA were 0.01 and 0.02 inches, respectively. August precipitation at the COOP stations cited in this report (Figure 1) averaged 0.13 – 0.18 inches during 1971 – 2000.

Because average (“normal”) precipitation is low during these months, care should be taken when interpreting statistics that quantify the amount (%) of normal precipitation that fell during the summer months. In the case of calendar-year 2010, PRISM maps (Figure 3) show that May – June were apparently quite dry, with precipitation often less than 25% average across the region. However, in terms of absolute difference (rather than % difference), this amounted to a small change from normal. For example, during June 2010, the UCLA weather station recorded 0.01 inches total precipitation. This was 9% of the 1971 – 2000 average, but only 0.1 inches less than normal. Since the absolute departure from average precipitation was not great, drought status was not affected (Figure 2).

May – August: Details from Weather Station Data (Tables 1, 2; Figures 6-9):

- ⤴ May Tmax ranged from 0.24 (F) to 3.92 (F) below average at Santa Monica Pier and Burbank – Glendale Airport, respectively. May Tmin ranged from 0.9 (F) below to 2.87 (F) below average at Santa Monica Pier and UCLA, respectively. RAWS stations within the NRA recorded temperatures that were cooler than most previous May temperatures for the period of record (gray lines, Figure 8).
- ⤴ June Tmax ranged from 0.69 (F) above average (Santa Monica Pier) to 5.07 (F) below average (Burbank – Glendale Airport). June Tmin ranged from 0.44 (F) above average (Santa Monica Pier) to 1.03 (F) below average (UCLA). RAWS stations recorded temperatures that were generally lower than many previous years (Figure 8).
- ⤴ July Tmax ranged from 1.34 (F) below average (Santa Monica Pier) to a striking 7.03 (F) below average (Burbank – Glendale Airport). Tmin ranged from 1.45 (F) below average (Burbank – Glendale Airport) to 2.07 (F) below average (UCLA). RAWS stations confirmed that Tmax and Tmin within the NRA were below those recorded during July in previous years (Figure 8).
- ⤴ August Tmax ranged from 1.49 (F) below average (UCLA) to 4.63 (F) below average (Santa Monica Pier). August Tmin ranged from 2.88 (F) below average (Burbank – Glendale Airport) to 3.84 (F) below average (UCLA). RAWS stations showed generally cooler temperatures relative to previous years, but Tmax appeared to be in the mid-range relative to previous years at Beverly Hills and Malibu Hills (gray lines, Figure 8).

September – December: General Patterns

Drought free conditions were maintained until the end of the year (Figure 2). October and December both had precipitation at roughly 300% or more average, which compensated for the drier than average months of September and November (Figures 3-5, Tables 2, 3). Even though November was generally drier than the 1971 – 2000 averages, it had near – average to below average temperatures. Average daily maximum temperatures (Tmax) were often below average during October and December (Figure 4), but average daily minimum temperatures were near or above average during these months (Figure 5).

September - December: Details from Weather Station Data (Tables 1, 2; Figures 6-9):

- ⤴ September precipitation ranged from 0% the 1971 – 2000 average (UCLA) to 7% (Burbank –

Glendale Airport). The normal (1971 – 2000 average) precipitation during September was 0.17, 0.3, and 0.32 inches at Santa Monica Pier, Burbank-Glendale Airport, and UCLA, respectively. Consequently, September precipitation was a maximum of 0.32 inches less than normal. September Tmax ranged from 0.17 (F) below average (UCLA) to 4.06 (F) below average (Santa Monica Pier). Tmin ranged from 1.73 (F) below average (Burbank-Glendale Airport) to 3.96 (F) below average (Santa Monica Pier).

- ⤴ October precipitation ranged from 293% (Burbank-Glendale Airport) to 375% average (Santa Monica Pier). October Tmax ranged from 0.96 (F) below average (Santa Monica Pier) to 5.98 (F) below average (Burbank-Glendale Airport). October Tmin ranged from 0.22 (F) below (UCLA) to 1.85 (F) above average (Burbank-Glendale Airport). October was not the wettest month on record at the RAWS stations within the NRA (Figure 8). Tmax at the RAWS stations agreed with the COOP data in being general below previous years (Figure 8).
- ⤴ November precipitation ranged from 51% (UCLA) to 123% (Burbank-Glendale Airport). Tmax ranged from 0.07 (F) below (Burbank-Glendale Airport) to 0.93 (F) above (UCLA). Tmin was very near average at the COOP stations.
- ⤴ December precipitation ranged from 383% (Burbank-Glendale Airport) to 470% average (UCLA) at the COOP stations. December 2010 was generally the wettest December on record at the RAWS stations (Figure 8). December Tmax ranged from 0.38 (F) below average (Burbank-Glendale Airport) to 0.52 (F) below average (UCLA). Tmin ranged from 1.9 (F) above average (UCLA) to 3.57 (F) above average (Burbank-Glendale Airport).

Accumulated Growing Degree Days, an Index of Growing Season Length

Accumulated Growing Degree Days (AGDD) are often used as an index of growing season length. They are calculated as the sum of the differences between the average temperature for each day of the year and a base temperature. This base temperature is often chosen as the threshold below which plants are thought to be metabolically inactive. In the case of AGDD 40, the base temperature is 40 degrees Fahrenheit. Consequently, 40 is subtracted from the mean temperature for each day, and these differences are added up for the entire year, giving a single number. Similarly, AGDD 50 is calculated with a base temperature of 50 (F).

When viewed from the perspective of growing season length, calendar-year 2010 was near average. AGDD 40 and AGDD 50 were within 90 – 99% of the averages calculated for the period of record at the COOP stations (Table 3).

Table 3. Accumulated Growing Degree Days (AGDD) and days above or below critical temperature thresholds during 2010.

Station Name	Station Type	Station ID	AGDD40	AGDD50	# days ≥ 80 F	# days ≥ 90 F	# days ≤ 32 F
UCLA	COOP	49152	8426	4777	49	10	0
		Avg. 1933 - 2009	8477	4841	(-)	9	0
Burbank Glendale Airport	COOP	41194	8426	4825	115	37	0
		Avg. 1939 - 2009	8825	5223	(-)	56	4
Santa Monica Pier	COOP	47953	N/A	N/A	N/A	N/A	N/A
		Avg. 1937 - present	7783	4139	(-)	1	0
Beverly Hills	RAWS		N/A	N/A	N/A	N/A	N/A
Cheeseboro	RAWS		8741	5173	125	45	0
Leo Carrillo	RAWS		7632	3984	17	2	0
Malibu Canyon	RAWS		6952	3396	77	25	26
Malibu Hills	RAWS		8447	4847	77	34	0

Notes: N/A indicates insufficient data for an accurate calculation.

(-) = 30-year average not available.

RAWS stations do not have established 30-year averages (normals).

Accumulated growing degree days (AGDD) are an index of growing season length. AGDD is calculated as the sum of the differences between daily mean temperature (Tmean) and a base temperature.

For AGDD40, the formula is $\text{Sum}(\text{Daily Tmean} - 40\text{F})$. $\text{AGDD50} = \text{Sum}(\text{Daily TMean} - 50\text{F})$.

Streamflow

Unlike other climate parameters in this report, streamflow is presented across a standard water year, which in this case runs from October 1, 2009 to September 30, 2010. This better matches the annual cycle of precipitation, which is minimal during summer months (see section 3.1). Since the rivers and creeks in and near Santa Monica Mountains NRA are all heavily influenced by human activity, including artificial dams, stream flow is as much a result of management priorities as annual climatic events. Nevertheless, it is noteworthy that the midpoint of annual discharge was as much as 7 weeks earlier than the historical average (blue vertical dashed line, Figure 10) and it coincided with heavy rainfall in late January 2010, which made headline news across southern California (See for example <http://www.signonsandiego.com/news/2010/jan/21/california-braces-for-4th-day-of-rain-wind/>).

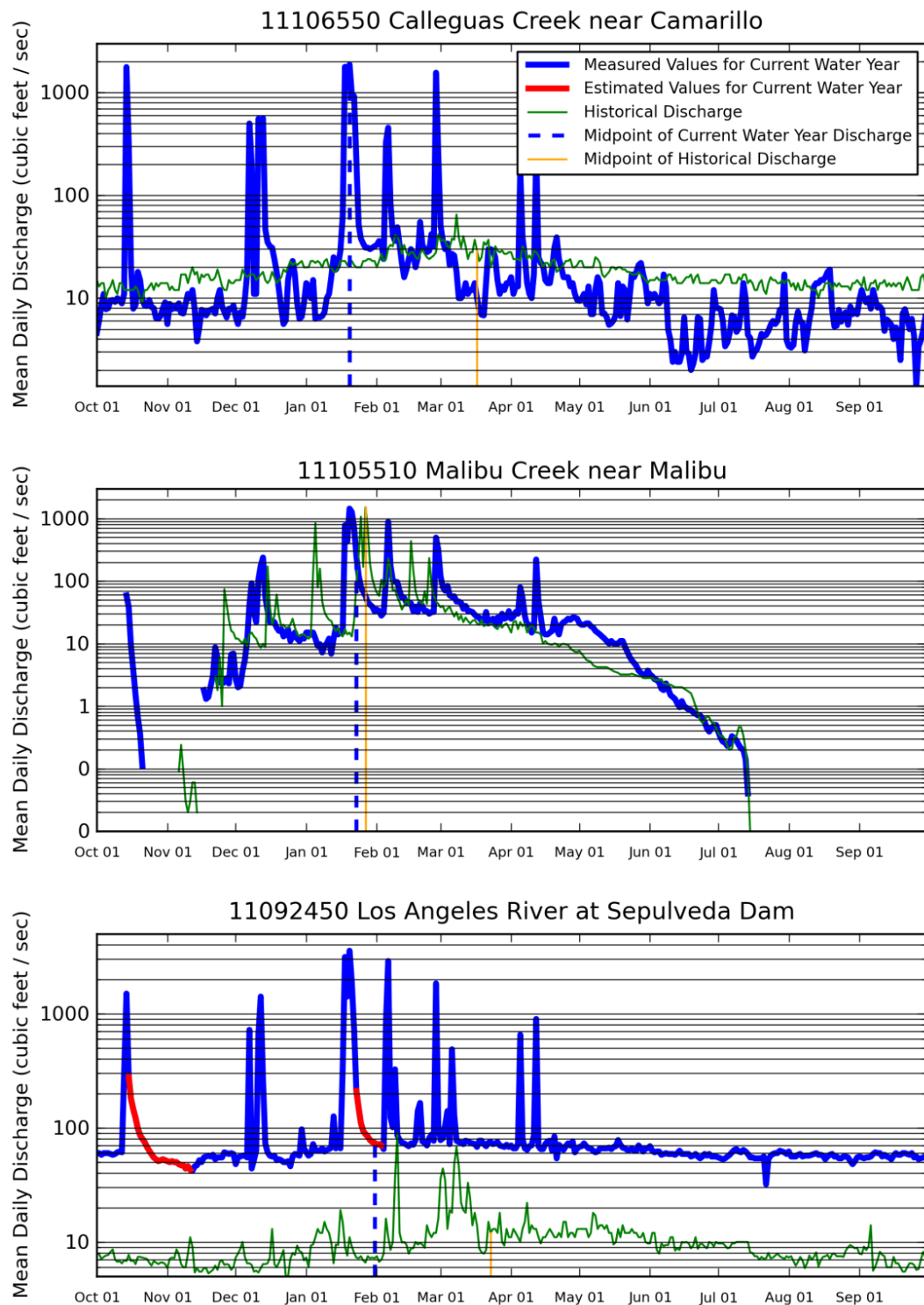


Figure 10. Streamflows from representative gauges in and near Santa Monica Mountains National Recreation Area for the 2010 water year (October 2009 through September 2010) are shown versus median daily flows. For Calleguas and Malibu Creeks, medians are calculated for the period 1971 – 2000. For the Los Angeles River, medians are based on all available data during 1943 – 2009. Data courtesy of the U.S. Geological Survey.

3.3 Wind

Summary wind data suggest that calendar-year 2010 was quite similar to 2005 – 2009, with the exception of the Cheeseboro RAWS station, which experienced fewer northerly winds during 2010 (Figure 11).

Dates that matched the profile for Santa Ana Wind events appear in Appendix 3. As a test of the python algorithm used to identify Santa Ana Winds (see Approach and Methods), frequency distributions were plotted for each RAWS station and compared to a distribution based on known occurrences from Raphael (2003). The results (Figure 12) suggest that the algorithm is accurate. RAWS data from Santa Monica Mountains NRA analyzed here agree with Raphael (2003) in having peak Santa Ana activity during December – January, with no occurrences during the summer months and intermediate activity during spring and fall (Figure 12).

The analysis presented here identified Santa Ana winds retrospectively, i.e. from data that are months - years old. However, it is possible to use the computer code from this analysis as a tool that can analyze current RAWS data. Such a procedure might be useful in assessing fire danger. The python source code can be obtained from the Mediterranean Coast Network or from the author of this report.

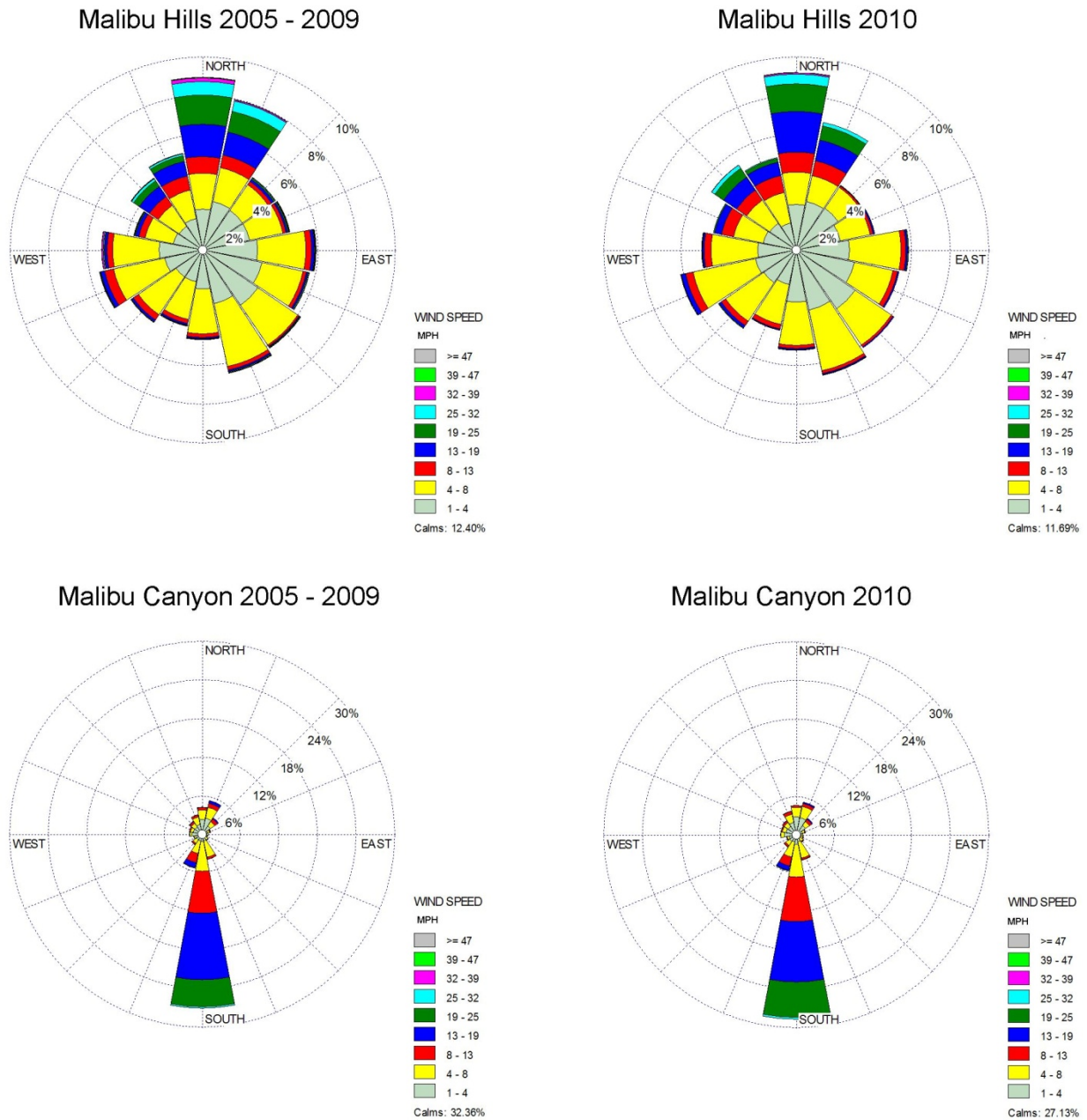


Figure 11. Wind roses for RAWs stations in Santa Monica Mountains National Recreation, contrasting calendar year 2010 to the averages for 2005 – 2009. The orientation of a spoke indicates wind direction (compass heading, degrees from which the wind originated), and the length of a spoke indicates the amount of time (%) that wind from a given direction occurred. Colors within the spokes express the amount of time (%) that wind from each direction had the indicated velocity.

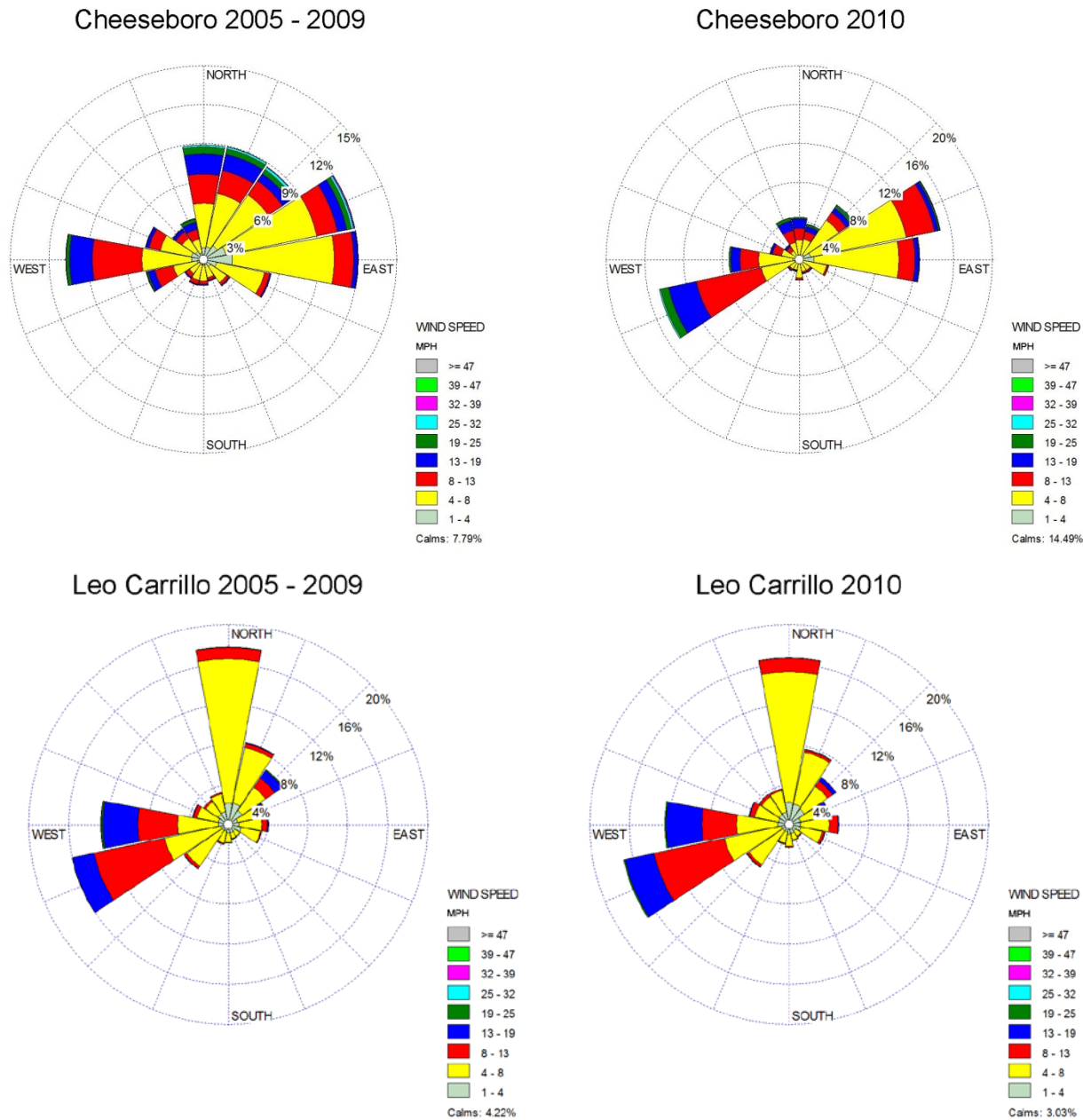


Figure 11. Wind roses for RAWS stations in Santa Monica Mountains National Recreation, contrasting calendar year 2010 to the averages for 2005 – 2009 (continued). The orientation of a spoke indicates wind direction (compass heading, degrees from which the wind originated), and the length of a spoke indicates the amount of time (%) that wind from a given direction occurred. Colors within the spokes express the amount of time (%) that wind from each direction had the indicated velocity.

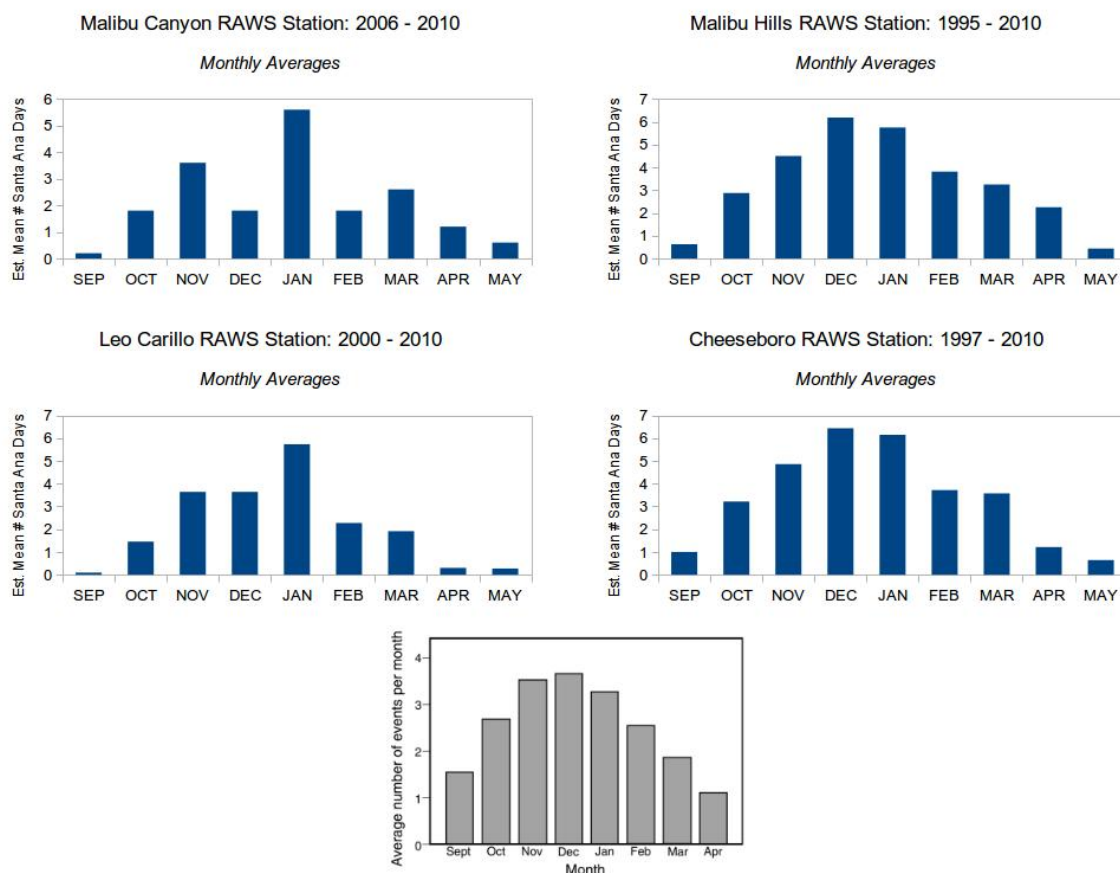


Figure 12. First 4 panels: Average number of Santa Ana wind events for each month at four RAWS weather stations in Santa Monica Mountains National Recreation Area, as estimated by a data profiling algorithm. Last panel: Average number of Santa Ana wind events for each month during the period 1968 – 1995 at Tustin, California (reproduced from Raphael 2003).

Conclusions

- ⤴ Santa Monica Mountains NRA began 2010 in a state of drought ranging from “Abnormally Dry” to “Drought Severe” (Figure 2), but these dry conditions were mitigated by the beginning of March. The region remained drought free for the rest of the year (Figure 2).
- ⤴ Large precipitation events in late-January contributed to higher flows in the region's streams, which reached their mid-point of flow for the 2009 – 2010 water year 1 – 7 weeks early (Figure 10).
- ⤴ Total precipitation measurements for the year were generally above average at the weather stations cited in this report (Table 2, Figures 3, 6). April, October, and December had precipitation that was well above the 1971 – 2000 averages for those months (Table 2, Figure 3). Summer precipitation was below average (Figure 3), but the region typically has low precipitation during May – August, so the region's drought status was not affected (Figure 2).
- ⤴ Average daily maximum temperatures (Tmax) for the year were generally near or below the 1971 – 2000 averages. Average daily minimum temperatures (Tmin) for the year were generally near or slightly above average (Table 3). April and July had notably below average temperatures. Tmax in July was 7 degrees below the 1971 – 2000 average at the Burbank-Glendale Airport. In October and December, Tmin was generally above average (Figure 5) but Tmax was generally below average during these months (Figure 4).
- ⤴ The growing season, as measured by Accumulated Growing Degree Days (AGDD) was of near average length, based on averages calculated for the periods of record at COOP stations near Santa Monica Mountains NRA.
- ⤴ A method for identifying Santa Ana Wind events using RAWS data collected from within the boundaries of Santa Monica Mountains NRA appears to produce results that agree in general terms with reported Santa Ana occurrences (Raphael 2003). This method may have the potential to be refined and used as a tool that reads current RAWS data and assesses fire danger in near - real time.

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Appendix 1. Table of climate stations used in this report.

Name	Stn type	ID	Period of Record
Burbank Valley Pump Plant AKA Burbank Glendale Airport ¹	COOP	41194	1939 - present
UCLA ²	COOP	49152	1933 - present
Santa Monica Pier ³	COOP	47953	1937 - present
Beverly Hills ⁴	RAWS		1997 - present
Leo Carrillo ⁵	RAWS		1999 - present
Malibu Hills ⁶	RAWS		1995 - present
Malibu Canyon ⁷	RAWS		2005 - present
Cheeseboro ⁸	RAWS		1995 - present
Calleguas Creek nr Camarillo ⁹	USGS Stream Gage	11106550	
Malibu Creek at Malibu California ¹⁰	USGS Stream Gage	11105510	
Los Angeles River a Sepulveda Dam ¹¹	USGS Stream Gage	11092450	

Notes: COOP = National Weather Service Cooperative Observer Network, RAWS = Remote Automated Weather Station (RAWS stations do not have ID numbers).

Detailed histories, period of record, and 30-year averages can be accessed from the links provided:

¹ <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca1194>

² <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca9152>

³ <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7953>

⁴ <http://www.wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCBEV>

⁵ <http://www.wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCLEO>

⁶ <http://www.wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCMAL>

⁷ <http://www.wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCMCN>

⁸ <http://www.wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCCHB>

⁹

http://waterdata.usgs.gov/nwis/dv/?site_no=11106550&agency_cd=USGS&referred_module=sw

¹⁰

http://waterdata.usgs.gov/nwis/dvstat/?format=sites_selection_links&search_site_no=11105510&agency_cd=USGS&referred_module=sw

¹¹

http://waterdata.usgs.gov/nwis/dvstat/?format=sites_selection_links&search_site_no=11092450&agency_cd=USGS&referred_module=sw

Appendix 2. RAWS station monthly data summaries

Table A2-1. Monthly Summary Data for Beverly Hills RAWS Station 1997 – 2010.

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
1997	11	N/A	69.32	52.40
1997	12	4.51	64.74	49.61
1998	1	3.57	65.32	48.97
1998	2	N/A	N/A	N/A
1998	3	5.95	68.42	49.03
1998	4	0.88	70.13	48.90
1998	5	4.08	69.84	51.16
1998	6	0.14	75.60	54.47
1998	7	0.00	87.48	61.58
1998	8	0.00	93.52	65.48
1998	9	0.03	82.37	60.43
1998	10	0.11	80.32	56.55
1998	11	1.32	72.00	51.83
1998	12	0.42	66.71	48.61
1999	1	1.58	68.65	49.87
1999	2	0.69	67.21	47.54
1999	3	2.23	65.00	45.35
1999	4	3.06	68.77	48.10
1999	5	0.01	73.84	51.10
1999	6	0.81	79.07	53.20
1999	7	0.00	87.13	59.58
1999	8	0.00	88.61	59.61
1999	9	0.00	84.23	58.60
1999	10	0.00	88.71	62.71
1999	11	0.47	75.00	53.93
1999	12	0.09	72.39	52.71
2000	1	1.06	67.52	50.94
2000	2	8.07	63.52	47.97
2000	3	2.70	69.00	48.52
2000	4	1.93	74.00	52.70
2000	5	0.00	77.94	55.97
2000	6	0.00	82.50	58.23
2000	7	0.00	85.23	59.10
2000	8	0.20	89.06	63.19
2000	9	0.18	86.70	61.13
2000	10	4.37	74.97	54.65
2000	11	0.00	71.20	50.60
2000	12	0.04	72.45	53.77
2001	1	7.05	63.90	47.32
2001	2	9.68	61.32	45.54
2001	3	1.98	68.55	49.29
2001	4	1.86	67.80	47.70
2001	5	0.00	77.68	55.58
2001	6	0.00	83.30	58.40

Table A2-1. Monthly Summary Data for Beverly Hills RAWS Station 1997 – 2010.

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2001	7	0.00	83.26	58.03
2001	8	0.40	87.90	60.29
2001	9	0.00	87.53	61.47
2001	10	N/A	N/A	N/A
2001	11	N/A	N/A	N/A
2001	12	N/A	N/A	N/A
2002	1	N/A	N/A	N/A
2002	2	N/A	N/A	N/A
2002	3	N/A	N/A	N/A
2002	4	N/A	N/A	N/A
2002	5	0.19	75.52	51.74
2002	6	0.00	80.73	56.10
2002	7	N/A	N/A	N/A
2002	8	N/A	N/A	N/A
2002	9	N/A	N/A	N/A
2002	10	N/A	N/A	N/A
2002	11	N/A	N/A	N/A
2002	12	N/A	N/A	N/A
2003	1	N/A	N/A	N/A
2003	2	N/A	N/A	N/A
2003	3	N/A	N/A	N/A
2003	4	N/A	N/A	N/A
2003	5	N/A	N/A	N/A
2003	6	N/A	N/A	N/A
2003	7	0.00	93.10	62.74
2003	8	0.00	96.52	63.52
2003	9	0.00	91.73	59.90
2003	10	0.46	90.03	61.06
2003	11	0.23	72.80	49.63
2003	12	2.15	68.35	47.77
2004	1	0.30	69.48	47.42
2004	2	7.54	66.90	46.03
2004	3	4.41	80.55	52.61
2004	4	0.06	78.93	51.53
2004	5	0.00	85.13	55.55
2004	6	0.00	82.67	56.07
2004	7	N/A	90.83	59.33
2004	8	0.00	89.84	58.81
2004	9	0.01	92.67	62.10
2004	10	6.50	79.03	54.00
2004	11	0.30	71.10	49.47
2004	12	6.97	68.84	49.16
2005	1	14.02	67.23	49.77
2005	2	12.43	67.96	48.46
2005	3	2.32	71.84	48.74
2005	4	1.11	76.53	49.80
2005	5	0.30	80.13	53.81

Table A2-1. Monthly Summary Data for Beverly Hills RAWS Station 1997 – 2010.

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2005	6	0.00	81.60	54.03
2005	7	0.00	90.97	59.55
2005	8	0.00	91.55	60.10
2005	9	0.10	88.13	57.83
2005	10	1.41	81.00	55.77
2005	11	0.54	79.13	55.43
2005	12	0.68	70.61	49.26
2006	1	3.15	69.29	48.29
2006	2	2.98	76.14	49.11
2006	3	3.71	66.39	42.81
2006	4	2.68	71.40	47.43
2006	5	0.98	79.06	53.74
2006	6	0.00	89.97	59.87
2006	7	0.00	97.45	65.03
2006	8	0.00	91.68	59.71
2006	9	0.00	91.37	58.53
2006	10	0.01	82.45	55.19
2006	11	0.00	80.33	55.03
2006	12	0.00	71.45	49.35
2007	1	0.01	68.48	46.00
2007	2	0.00	71.93	47.43
2007	3	0.00	78.71	50.97
2007	4	0.01	75.77	49.13
2007	5	N/A	80.65	52.65
2007	6	N/A	N/A	N/A
2007	7	N/A	N/A	N/A
2007	8	0.01	96.35	62.74
2007	9	N/A	89.07	59.43
2007	10	N/A	N/A	N/A
2007	11	N/A	N/A	N/A
2007	12	N/A	N/A	N/A
2008	1	N/A	65.56	45.70
2008	2	2.44	71.24	47.07
2008	3	0.02	78.16	50.52
2008	4	0.09	81.20	50.47
2008	5	0.19	80.19	51.97
2008	6	0.00	90.27	58.07
2008	7	0.00	92.39	59.84
2008	8	0.00	94.45	60.52
2008	9	0.00	94.37	61.63
2008	10	N/A	92.87	64.10
2008	11	N/A	82.40	57.40
2008	12	N/A	66.42	46.65
2009	1	N/A	76.70	53.43
2009	2	N/A	69.36	47.14
2009	3	N/A	74.10	48.06
2009	4	0.01	79.23	49.13

Table A2-1. Monthly Summary Data for Beverly Hills RAWS Station 1997 – 2010.

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2009	5	0.00	84.26	54.26
2009	6	0.23	82.20	54.80
2009	7	N/A	N/A	N/A
2009	8	N/A	N/A	N/A
2009	9	N/A	N/A	N/A
2009	10	N/A	N/A	N/A
2009	11	N/A	N/A	N/A
2009	12	N/A	N/A	N/A
2010	1	N/A	N/A	N/A
2010	2	N/A	N/A	N/A
2010	3	N/A	N/A	N/A
2010	4	N/A	N/A	N/A
2010	5	N/A	N/A	N/A
2010	6	0.00	83.23	54.63
2010	7	0.01	86.29	57.39
2010	8	0.00	90.81	58.65
2010	9	0.00	92.30	60.17
2010	10	2.01	77.74	55.87
2010	11	1.13	74.27	51.70
2010	12	10.66	67.16	49.55

Notes: N/A indicates either missing data or data that did not pass quality checks. Tmax = Average daily maximum temperature. Tmin = Average daily minimum temperature.

Table A2-2. Monthly Summary Data for Cheeseboro RAWS Station 1995 – 2010.

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
1995	10	N/A	79.97	58.97
1995	11	N/A	76.63	58.00
1995	12	N/A	65.65	51.32
1996	1	N/A	63.16	49.87
1996	2	N/A	N/A	N/A
1996	3	N/A	N/A	N/A
1996	4	N/A	76.77	54.93
1996	5	N/A	80.13	54.35
1996	6	N/A	89.07	57.80
1996	7	N/A	97.06	64.13
1996	8	N/A	97.94	64.94
1996	9	N/A	89.33	59.50
1996	10	N/A	82.13	56.74
1996	11	1.69	72.37	54.10
1996	12	6.06	64.32	50.03
1997	1	N/A	60.84	47.74
1997	2	N/A	66.68	48.75
1997	3	0.00	75.90	52.84
1997	4	N/A	74.93	52.97
1997	5	N/A	85.77	59.71
1997	6	N/A	81.20	56.60
1997	7	N/A	88.23	60.58
1997	8	N/A	93.74	64.45
1997	9	N/A	91.64	66.54
1997	10	N/A	80.90	59.23
1997	11	2.61	71.97	54.67
1997	12	4.96	61.65	48.52
1998	1	2.77	62.68	48.32
1998	2	11.84	58.86	44.89
1998	3	1.42	65.00	47.87
1998	4	N/A	67.43	48.03
1998	5	N/A	68.42	49.71
1998	6	N/A	77.03	54.60
1998	7	N/A	92.48	64.42
1998	8	0.00	98.81	69.06
1998	9	0.04	84.37	60.93
1998	10	0.00	78.52	57.48
1998	11	0.89	70.00	52.43
1998	12	0.40	64.32	49.16
1999	1	1.37	66.00	50.42
1999	2	0.69	63.36	47.43
1999	3	1.92	61.29	44.97
1999	4	N/A	65.73	47.80
1999	5	0.00	74.06	50.81
1999	6	0.32	82.73	54.33
1999	7	0.00	89.58	62.13
1999	8	N/A	91.71	63.45

Table A2-2. Monthly Summary Data for Cheeseboro RAWS Station 1995 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
1999	9	N/A	86.63	59.40
1999	10	N/A	87.71	65.23
1999	11	0.55	75.03	54.60
1999	12	N/A	68.55	53.61
2000	1	1.05	64.94	50.81
2000	2	4.72	60.55	47.52
2000	3	2.11	66.71	48.71
2000	4	N/A	73.17	53.17
2000	5	N/A	79.90	57.03
2000	6	N/A	86.40	59.27
2000	7	N/A	88.90	61.10
2000	8	0.00	92.26	65.42
2000	9	0.07	87.03	62.80
2000	10	N/A	72.77	54.35
2000	11	N/A	67.73	50.63
2000	12	0.01	70.16	54.10
2001	1	5.71	60.48	47.06
2001	2	4.77	57.29	44.57
2001	3	N/A	67.10	48.68
2001	4	N/A	65.57	47.63
2001	5	N/A	81.29	55.90
2001	6	N/A	86.67	59.93
2001	7	0.00	88.23	59.19
2001	8	0.00	92.65	63.13
2001	9	0.00	89.63	62.60
2001	10	0.12	82.61	58.03
2001	11	1.67	70.40	52.87
2001	12	1.23	60.71	47.06
2002	1	0.55	63.29	47.61
2002	2	0.28	70.89	51.82
2002	3	0.19	67.77	47.10
2002	4	0.02	71.43	47.77
2002	5	0.12	76.97	50.87
2002	6	0.00	85.23	56.03
2002	7	N/A	N/A	N/A
2002	8	N/A	N/A	N/A
2002	9	0.00	90.83	65.03
2002	10	0.02	74.97	54.03
2002	11	2.40	73.77	56.73
2002	12	3.11	62.00	47.45
2003	1	0.01	73.10	56.77
2003	2	6.74	63.11	47.64
2003	3	2.46	70.45	51.06
2003	4	1.43	66.97	46.10
2003	5	2.00	78.97	52.77
2003	6	0.01	79.40	55.27
2003	7	0.00	94.97	65.19

Table A2-2. Monthly Summary Data for Cheeseboro RAWS Station 1995 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2003	8	0.00	95.55	66.84
2003	9	0.00	92.83	62.33
2003	10	0.10	87.61	63.29
2003	11	0.03	67.00	49.87
2003	12	1.55	63.06	48.32
2004	1	0.32	65.32	48.16
2004	2	4.02	59.93	45.90
2004	3	0.32	76.32	54.26
2004	4	0.04	75.83	52.63
2004	5	0.00	81.23	57.42
2004	6	0.00	82.63	56.27
2004	7	0.00	91.77	61.67
2004	8	0.00	91.03	61.42
2004	9	0.00	89.60	63.73
2004	10	4.57	75.26	54.97
2004	11	0.11	65.10	49.57
2004	12	6.29	62.71	50.03
2005	1	9.44	61.77	50.13
2005	2	9.73	61.43	48.86
2005	3	1.50	66.32	49.71
2005	4	0.77	71.83	50.17
2005	5	0.19	78.39	55.45
2005	6	0.00	79.23	55.23
2005	7	0.00	92.58	63.81
2005	8	0.00	92.52	63.32
2005	9	0.02	84.40	60.23
2005	10	1.34	76.39	57.55
2005	11	0.28	73.23	57.23
2005	12	0.71	65.32	51.19
2006	1	2.35	62.84	48.97
2006	2	2.90	69.43	51.29
2006	3	3.03	60.68	42.26
2006	4	2.42	66.97	47.10
2006	5	1.07	79.32	54.39
2006	6	0.00	90.60	62.30
2006	7	0.00	97.00	69.23
2006	8	0.00	92.58	61.52
2006	9	0.02	90.00	63.13
2006	10	0.15	77.90	56.00
2006	11	0.11	75.97	56.30
2006	12	N/A	66.29	49.68
2007	1	0.91	62.19	45.97
2007	2	1.69	66.11	47.79
2007	3	0.08	73.77	51.42
2007	4	0.61	73.43	49.70
2007	5	0.02	78.74	51.87
2007	6	0.00	87.57	56.60

Table A2-2. Monthly Summary Data for Cheeseboro RAWS Station 1995 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2007	7	0.00	93.26	63.06
2007	8	0.00	94.68	65.26
2007	9	0.03	85.60	60.37
2007	10	N/A	N/A	N/A
2007	11	0.29	73.43	53.90
2007	12	1.01	60.10	45.61
2008	1	7.90	59.42	45.65
2008	2	1.69	62.97	47.72
2008	3	0.00	69.71	51.52
2008	4	0.02	77.03	50.83
2008	5	0.04	77.55	52.35
2008	6	0.00	91.17	61.10
2008	7	0.00	91.71	62.06
2008	8	0.00	91.74	63.16
2008	9	0.00	89.07	64.20
2008	10	0.00	84.84	64.00
2008	11	1.60	74.80	58.60
2008	12	1.98	60.90	46.23
2009	1	0.33	67.94	54.58
2009	2	5.00	62.61	47.54
2009	3	0.24	67.10	48.19
2009	4	0.00	71.20	50.07
2009	5	0.00	83.19	56.35
2009	6	0.10	77.70	55.63
2009	7	0.08	93.97	64.16
2009	8	0.00	93.13	63.45
2009	9	0.02	94.07	66.13
2009	10	1.58	77.97	57.03
2009	11	N/A	N/A	N/A
2009	12	2.52	61.94	46.52
2010	1	4.45	64.55	50.55
2010	2	2.98	63.64	47.86
2010	3	0.25	68.90	48.74
2010	4	1.29	67.33	46.50
2010	5	0.02	74.13	50.97
2010	6	0.00	81.87	54.87
2010	7	0.00	87.13	59.00
2010	8	0.00	90.58	62.03
2010	9	0.00	88.77	63.40
2010	10	1.44	73.68	56.32
2010	11	0.73	68.33	51.80
2010	12	5.82	62.90	49.68

Notes: N/A indicates either missing data or data that did not pass quality checks. Tmax = Average daily maximum temperature. Tmin = Average daily minimum temperature.

Table A2-3. Monthly Summary Data for Leo Carrillo RAWS Station 1999 – 2010.

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
1999	8	0.00	73.68	56.39
1999	9	0.00	74.07	56.87
1999	10	0.00	79.26	57.71
1999	11	0.86	69.33	53.10
1999	12	0.00	70.71	52.77
2000	1	1.06	66.90	51.03
2000	2	5.13	64.86	50.28
2000	3	2.73	66.52	48.71
2000	4	2.33	68.17	51.20
2000	5	0.00	71.29	54.42
2000	6	0.01	75.40	58.27
2000	7	0.00	76.52	57.32
2000	8	0.00	78.42	60.32
2000	9	0.10	77.43	59.23
2000	10	0.99	71.58	55.23
2000	11	0.00	69.47	50.63
2000	12	0.00	68.74	51.35
2001	1	4.95	65.55	48.26
2001	2	3.89	62.93	47.46
2001	3	3.98	65.45	49.35
2001	4	0.82	64.37	48.27
2001	5	0.02	69.39	55.45
2001	6	0.02	74.50	56.23
2001	7	0.00	75.29	57.58
2001	8	0.00	74.55	57.97
2001	9	0.00	75.20	57.93
2001	10	0.15	72.39	55.71
2001	11	1.60	68.50	54.10
2001	12	1.33	64.45	49.35
2002	1	N/A	65.65	48.26
2002	2	0.54	69.00	50.32
2002	3	0.43	67.03	48.68
2002	4	0.05	65.70	49.47
2002	5	0.14	68.61	51.48
2002	6	0.00	72.37	55.63
2002	7	0.00	74.94	58.94
2002	8	0.01	73.42	57.55
2002	9	0.06	75.23	58.10
2002	10	N/A	N/A	N/A
2002	11	1.70	74.30	56.33
2002	12	2.65	65.94	50.35
2003	1	0.01	73.26	55.55
2003	2	4.78	67.18	50.68
2003	3	2.58	68.94	51.16
2003	4	0.90	66.17	49.30
2003	5	1.06	68.13	52.06
2003	6	0.01	69.83	56.87

Table A2-3. Monthly Summary Data for Leo Carrillo RAWS Station 1999 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2003	7	0.00	77.48	61.68
2003	8	0.01	77.32	59.55
2003	9	0.00	74.17	58.60
2003	10	0.10	75.16	58.48
2003	11	0.38	69.50	51.57
2003	12	1.04	65.74	49.77
2004	1	0.86	66.61	48.81
2004	2	3.55	65.28	49.14
2004	3	2.52	69.32	52.06
2004	4	0.00	70.47	51.70
2004	5	0.00	73.52	54.52
2004	6	0.00	72.33	56.93
2004	7	N/A	74.73	58.33
2004	8	0.00	76.29	58.42
2004	9	0.02	80.57	61.37
2004	10	2.26	71.45	55.23
2004	11	0.28	69.40	52.27
2004	12	3.14	66.94	52.23
2005	1	8.45	66.00	52.32
2005	2	6.14	66.89	52.21
2005	3	1.17	66.55	51.42
2005	4	1.03	67.37	50.20
2005	5	0.38	69.65	53.87
2005	6	0.01	70.00	53.97
2005	7	0.00	73.35	58.90
2005	8	0.00	75.90	58.84
2005	9	0.00	75.20	55.60
2005	10	1.03	71.71	55.45
2005	11	0.73	72.57	55.77
2005	12	0.74	66.35	51.77
2006	1	1.38	67.71	50.26
2006	2	2.67	67.68	49.14
2006	3	N/A	61.55	46.29
2006	4	2.72	65.50	50.03
2006	5	1.11	68.23	54.58
2006	6	0.00	74.43	57.90
2006	7	0.00	79.13	62.45
2006	8	0.00	77.00	59.35
2006	9	0.00	75.47	57.73
2006	10	0.14	75.03	56.29
2006	11	0.11	73.67	55.23
2006	12	1.00	67.94	50.90
2007	1	1.86	66.97	49.29
2007	2	1.54	66.86	49.11
2007	3	0.22	68.87	50.97
2007	4	0.69	66.57	49.93
2007	5	0.00	69.23	52.19

Table A2-3. Monthly Summary Data for Leo Carrillo RAWS Station 1999 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2007	6	0.00	71.23	54.70
2007	7	0.00	76.32	60.29
2007	8	0.00	77.19	60.48
2007	9	0.21	75.73	57.27
2007	10	0.97	75.00	57.23
2007	11	0.22	68.90	52.93
2007	12	1.30	65.58	48.19
2008	1	6.34	63.68	48.81
2008	2	1.73	64.28	48.14
2008	3	0.00	67.71	50.10
2008	4	0.09	69.70	49.80
2008	5	0.06	69.61	51.84
2008	6	0.00	73.63	55.57
2008	7	0.00	75.29	59.52
2008	8	0.00	76.58	61.03
2008	9	N/A	N/A	N/A
2008	10	0.00	78.77	58.65
2008	11	1.35	74.37	56.47
2008	12	1.81	63.74	48.10
2009	1	0.42	72.00	54.61
2009	2	3.53	65.21	48.71
2009	3	0.22	66.35	48.68
2009	4	0.08	67.93	49.80
2009	5	0.00	70.45	54.87
2009	6	0.10	71.43	55.63
2009	7	0.00	74.10	57.68
2009	8	0.00	76.03	58.61
2009	9	0.00	77.97	60.63
2009	10	1.49	74.87	56.58
2009	11	0.00	71.17	53.30
2009	12	2.59	64.65	49.19
2010	1	3.76	67.65	51.81
2010	2	2.92	66.14	49.89
2010	3	0.53	68.48	50.58
2010	4	0.68	66.57	48.90
2010	5	0.05	68.06	51.10
2010	6	0.00	70.93	55.73
2010	7	0.03	71.58	57.03
2010	8	0.00	71.39	54.87
2010	9	0.00	73.40	55.67
2010	10	1.55	70.19	57.29
2010	11	0.60	69.20	52.00
2010	12	7.02	63.42	49.58

Notes: N/A indicates either missing data or data that did not pass quality checks. Tmax = Average daily maximum temperature. Tmin = Average daily minimum temperature.

Table A2-4. Monthly Summary Data for Malibu Canyon RAWS Station 2005 - 2010.

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2005	10	1.01	76.23	47.35
2005	11	0.93	75.23	41.83
2005	12	1.03	68.68	38.84
2006	1	3.03	67.84	36.42
2006	2	3.35	70.79	35.14
2006	3	4.35	62.32	36.55
2006	4	4.45	66.03	42.70
2006	5	1.98	72.55	50.84
2006	6	0.00	82.77	55.77
2006	7	0.00	89.35	60.55
2006	8	0.00	83.39	52.81
2006	9	N/A	84.00	50.33
2006	10	0.20	77.48	45.16
2006	11	0.17	76.53	40.20
2006	12	0.76	70.00	34.68
2007	1	1.82	65.87	35.48
2007	2	1.64	69.68	37.04
2007	3	0.04	73.45	40.94
2007	4	0.97	71.70	43.20
2007	5	0.00	74.16	47.55
2007	6	0.00	77.97	50.03
2007	7	0.00	83.52	56.55
2007	8	0.00	87.23	56.81
2007	9	1.17	83.50	50.80
2007	10	0.45	80.61	46.97
2007	11	N/A	N/A	N/A
2007	12	N/A	N/A	N/A
2008	1	N/A	N/A	N/A
2008	2	N/A	68.69	37.54
2008	3	0.00	74.74	37.23
2008	4	0.08	76.07	39.07
2008	5	0.13	75.16	45.77
2008	6	0.00	82.90	51.80
2008	7	0.00	81.61	56.58
2008	8	0.00	84.42	56.42
2008	9	0.00	87.20	53.67
2008	10	0.00	86.10	45.97
2008	11	1.57	79.17	43.27
2008	12	2.98	65.74	34.97
2009	1	0.29	74.19	39.55
2009	2	6.36	66.64	37.21
2009	3	0.72	68.94	37.84
2009	4	0.06	73.33	38.70
2009	5	0.00	77.00	50.58
2009	6	0.16	74.63	51.60
2009	7	0.00	84.84	54.90
2009	8	0.00	86.16	54.39

Table A2-4. Monthly Summary Data for Malibu Canyon RAWS Station 2005 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2009	9	N/A	88.54	54.31
2009	10	N/A	N/A	N/A
2009	11	N/A	74.74	38.00
2009	12	4.15	65.13	35.32
2010	1	5.67	68.55	37.00
2010	2	5.37	67.29	38.43
2010	3	0.42	72.00	37.84
2010	4	1.54	68.47	39.27
2010	5	0.03	73.90	43.84
2010	6	0.00	73.73	51.93
2010	7	0.00	78.35	54.94
2010	8	0.00	82.29	51.52
2010	9	0.00	84.37	49.23
2010	10	2.04	74.65	50.68
2010	11	0.87	73.10	38.00
2010	12	10.89	66.94	39.84

Notes: N/A indicates either missing data or data that did not pass quality checks. Tmax = Average daily maximum temperature. Tmin = Average daily minimum temperature.

Table A2-5. Monthly Summary Data for Malibu Hills RAWs Station 1995 - 2010.

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
1995	1	4.58	60.08	50.00
1995	2	2.37	66.57	55.68
1995	3	9.09	62.71	51.48
1995	4	0.98	65.90	52.37
1995	5	N/A	64.71	50.06
1995	6	0.63	73.57	55.70
1995	7	N/A	85.45	64.26
1995	8	N/A	89.10	69.16
1995	9	N/A	85.50	65.43
1995	10	N/A	77.65	58.97
1995	11	N/A	N/A	N/A
1995	12	N/A	N/A	N/A
1996	1	N/A	N/A	N/A
1996	2	N/A	N/A	N/A
1996	3	N/A	65.97	50.93
1996	4	N/A	74.57	56.50
1996	5	N/A	72.77	55.55
1996	6	N/A	78.53	58.03
1996	7	N/A	86.52	64.97
1996	8	0.00	88.45	65.48
1996	9	N/A	80.33	60.03
1996	10	2.30	76.23	57.29
1996	11	N/A	N/A	N/A
1996	12	N/A	N/A	N/A
1997	1	N/A	N/A	N/A
1997	2	N/A	N/A	N/A
1997	3	N/A	74.54	55.46
1997	4	0.00	71.90	53.93
1997	5	N/A	79.90	59.32
1997	6	0.05	73.23	56.60
1997	7	0.00	80.19	60.06
1997	8	0.01	86.58	65.35
1997	9	0.18	88.30	67.47
1997	10	0.00	76.10	59.29
1997	11	3.40	68.60	52.13
1997	12	5.11	61.65	49.26
1998	1	4.14	60.74	47.71
1998	2	N/A	N/A	N/A
1998	3	5.03	62.97	48.10
1998	4	1.21	64.83	48.83
1998	5	4.73	64.48	50.06
1998	6	0.19	70.17	53.57
1998	7	0.01	83.97	63.29
1998	8	0.00	90.90	67.42
1998	9	0.06	77.87	59.83
1998	10	N/A	74.97	57.35
1998	11	2.21	68.27	52.17

Table A2-5. Monthly Summary Data for Malibu Hills RAWS Station 1995 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
1998	12	1.00	64.19	49.81
1999	1	N/A	65.90	49.81
1999	2	0.96	63.11	47.79
1999	3	2.47	61.48	46.10
1999	4	2.83	64.93	48.33
1999	5	0.08	75.58	58.61
1999	6	0.62	90.33	68.00
1999	7	0.16	84.77	60.71
1999	8	0.00	88.58	62.52
1999	9	0.02	82.23	58.20
1999	10	0.00	88.39	64.87
1999	11	0.63	75.13	54.93
1999	12	0.01	71.55	53.94
2000	1	1.45	68.00	51.42
2000	2	8.10	62.48	47.52
2000	3	2.89	69.03	48.35
2000	4	3.01	75.47	52.87
2000	5	0.05	78.90	55.84
2000	6	0.01	81.67	58.33
2000	7	0.00	85.61	60.10
2000	8	0.00	89.87	65.19
2000	9	0.23	85.87	62.23
2000	10	3.75	73.26	54.16
2000	11	0.00	69.63	51.40
2000	12	0.00	71.71	54.97
2001	1	7.89	63.19	47.81
2001	2	8.38	60.29	45.68
2001	3	3.56	67.26	49.00
2001	4	2.05	68.27	48.27
2001	5	0.07	77.03	55.77
2001	6	0.01	83.00	59.83
2001	7	0.00	82.77	58.58
2001	8	0.00	87.84	62.10
2001	9	0.00	85.43	62.43
2001	10	0.11	79.52	58.29
2001	11	3.19	70.33	53.30
2001	12	1.27	62.65	48.42
2002	1	N/A	64.70	48.37
2002	2	N/A	71.07	53.11
2002	3	0.51	67.10	47.74
2002	4	0.04	67.60	48.20
2002	5	0.37	72.10	50.84
2002	6	0.00	77.47	55.33
2002	7	0.00	83.81	59.52
2002	8	0.03	83.55	60.81
2002	9	0.00	88.67	65.00
2002	10	N/A	71.38	54.72

Table A2-5. Monthly Summary Data for Malibu Hills RAWS Station 1995 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2002	11	3.36	74.40	57.70
2002	12	5.17	63.97	49.00
2003	1	0.00	75.39	58.26
2003	2	4.85	64.37	49.44
2003	3	N/A	70.13	54.58
2003	4	1.65	65.40	47.67
2003	5	N/A	N/A	N/A
2003	6	0.20	71.76	55.45
2003	7	0.00	86.81	64.81
2003	8	0.00	90.52	66.94
2003	9	0.00	87.07	60.53
2003	10	0.59	84.26	62.94
2003	11	N/A	66.80	50.63
2003	12	2.41	64.32	49.03
2004	1	0.79	65.48	48.48
2004	2	7.30	62.24	46.28
2004	3	4.50	76.45	51.94
2004	4	0.00	71.97	52.67
2004	5	0.00	77.74	56.77
2004	6	0.00	74.73	55.10
2004	7	N/A	85.33	60.97
2004	8	0.00	82.87	59.61
2004	9	0.00	85.80	63.57
2004	10	5.32	73.48	54.58
2004	11	0.16	65.70	48.57
2004	12	N/A	64.58	50.29
2005	1	N/A	65.44	52.44
2005	2	12.03	62.29	49.21
2005	3	3.35	66.13	49.19
2005	4	1.12	70.47	49.80
2005	5	0.57	74.29	53.68
2005	6	0.01	75.13	54.67
2005	7	0.00	86.94	62.35
2005	8	0.00	86.19	61.84
2005	9	0.07	81.20	59.47
2005	10	1.15	74.65	56.42
2005	11	1.08	73.83	55.87
2005	12	2.11	67.03	51.39
2006	1	N/A	N/A	N/A
2006	2	2.72	69.89	51.54
2006	3	4.19	58.68	43.77
2006	4	3.67	63.27	48.50
2006	5	2.58	70.71	53.68
2006	6	0.02	82.73	61.00
2006	7	0.00	90.58	67.77
2006	8	0.00	83.55	61.90
2006	9	0.01	84.70	63.40

Table A2-5. Monthly Summary Data for Malibu Hills RAWS Station 1995 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2006	10	N/A	N/A	N/A
2006	11	0.24	74.10	57.00
2006	12	0.66	66.65	51.32
2007	1	1.90	62.81	47.06
2007	2	0.53	66.21	48.54
2007	3	0.02	72.39	52.06
2007	4	0.01	70.20	49.37
2007	5	0.01	72.84	52.10
2007	6	0.00	79.67	55.60
2007	7	0.00	85.32	62.39
2007	8	0.00	89.00	64.71
2007	9	0.01	82.97	60.63
2007	10	0.00	79.00	59.13
2007	11	0.02	74.07	54.40
2007	12	5.83	62.06	46.77
2008	1	9.13	60.94	46.74
2008	2	N/A	65.00	48.69
2008	3	0.03	72.71	52.77
2008	4	0.05	74.50	51.57
2008	5	0.15	73.29	53.19
2008	6	0.00	86.17	60.33
2008	7	0.00	85.32	61.52
2008	8	0.00	88.10	62.06
2008	9	0.00	89.00	64.90
2008	10	0.02	85.52	64.29
2008	11	1.10	77.00	58.90
2008	12	3.26	63.03	47.00
2009	1	0.18	71.32	55.00
2009	2	4.77	64.93	48.18
2009	3	0.21	67.58	48.55
2009	4	0.03	71.27	50.30
2009	5	0.01	77.42	54.39
2009	6	0.07	74.70	54.80
2009	7	0.00	88.68	63.35
2009	8	0.00	87.81	63.39
2009	9	0.00	90.53	65.53
2009	10	0.46	77.52	57.32
2009	11	0.00	75.60	55.37
2009	12	4.64	62.35	47.52
2010	1	4.24	66.03	51.77
2010	2	6.08	64.36	48.86
2010	3	0.14	69.06	49.71
2010	4	1.60	66.10	47.13
2010	5	0.12	72.13	50.97
2010	6	0.01	74.57	53.67
2010	7	0.03	78.81	57.58
2010	8	0.00	85.90	61.90

Table A2-5. Monthly Summary Data for Malibu Hills RAWS Station 1995 – 2010 (continued).

Year	Month	Precip (Inches)	Tmax (F)	Tmin (F)
2010	9	0.00	86.73	63.63
2010	10	2.05	72.77	56.35
2010	11	0.79	69.17	52.60
2010	12	6.00	64.10	50.52

Notes: N/A indicates either missing data or data that did not pass quality checks. Tmax = Average daily maximum temperature. Tmin = Average daily minimum temperature.

Appendix 3. Dates Matching Santa Ana Wind Events (Sergius and Huntoon 1956, Raphael 2003).

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro.

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
01/06/97	15	53	16	31	30
01/07/97	8	46	17	17	18
01/17/97	14	50	38	36	36
01/29/97	22	54	80	28	27
01/30/97	12	36	36	27	27
02/13/97	19	66	52	18	18
02/14/97	7	37	52	23	22
02/15/97	15	32	46	25	23
02/22/97	4	24	13	38	37
02/23/97	23	52	55	25	22
02/24/97	21	60	47	19	19
03/04/97	12	38	66	23	23
04/02/97	18	48	56	16	22
04/25/97	13	41	61	20	23
09/21/97	6	38	46	26	29
10/12/97	22	47	26	17	17
10/13/97	24	52	31	14	15
10/14/97	19	39	10	15	16
10/25/97	23	57	12	13	13
11/01/97	12	33	10	19	19
11/02/97	12	25	10	17	17
11/22/97	4	36	5	24	27
12/10/97	16	40	59	19	18
12/11/97	23	72	52	20	21
12/12/97	22	65	72	13	13
12/15/97	9	31	14	-99999	36
12/19/97	23	74	83	18	17
12/20/97	4	45	44	39	-99999
12/22/97	14	53	60	27	27
12/24/97	15	41	54	28	29
12/25/97	24	46	44	24	24
12/27/97	6	37	70	16	15
12/28/97	12	54	32	20	20
12/29/97	16	44	0	31	31
01/21/98	6	36	1	34	-99999
03/10/98	14	36	36	28	28
03/11/98	5	29	25	23	32
09/01/98	8	30	63	23	24
10/05/98	17	46	47	8	8
10/17/98	20	44	37	9	10
10/20/98	9	30	49	28	35
10/31/98	7	31	15	28	34

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
11/12/98	13	47	11	25	26
11/19/98	17	43	61	16	17
12/09/98	22	83	55	4	4
12/10/98	12	66	43	4	5
12/15/98	18	54	3	10	10
12/16/98	24	55	40	15	15
12/17/98	16	47	4	19	15
12/21/98	16	54	22	11	12
12/23/98	22	52	11	12	11
12/25/98	7	29	14	7	11
12/27/98	10	25	18	11	13
01/01/99	11	50	22	18	9
01/02/99	9	38	4	4	4
01/03/99	18	54	33	6	7
01/08/99	14	55	12	7	7
01/09/99	14	53	25	8	9
01/14/99	9	38	42	13	14
01/22/99	5	36	17	28	30
01/28/99	10	41	37	15	13
02/02/99	4	30	6	18	20
02/11/99	23	79	27	12	10
02/22/99	13	53	3	14	14
04/10/99	4	32	3	16	18
04/14/99	4	29	73	24	-99999
04/15/99	18	45	36	8	7
10/07/99	19	51	45	13	13
10/08/99	5	42	42	13	14
10/16/99	6	37	71	5	9
10/17/99	22	53	34	4	4
10/18/99	5	45	4	8	11
10/29/99	14	53	15	8	7
11/22/99	16	55	46	11	11
11/24/99	12	32	4	9	10
11/25/99	7	29	24	13	15
12/03/99	16	62	70	9	9
12/04/99	15	70	14	9	10
12/08/99	14	59	8	8	10
12/11/99	14	48	59	13	13
12/14/99	7	39	30	9	9
12/15/99	12	40	23	12	13
12/19/99	18	58	50	10	10
12/20/99	19	48	42	11	11
12/21/99	8	56	59	14	16
12/22/99	23	79	81	7	7
12/23/99	24	51	8	10	10

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
12/24/99	21	49	27	10	11
12/25/99	12	33	55	10	10
12/27/99	20	45	29	18	19
01/06/00	11	63	52	6	7
01/29/00	4	27	74	37	38
02/07/00	4	30	81	14	14
02/18/00	4	24	56	27	32
02/19/00	11	31	71	23	22
03/10/00	7	31	3	28	37
03/11/00	4	28	8	26	21
03/17/00	7	46	63	24	38
03/20/00	12	63	55	10	10
03/21/00	11	44	64	10	11
03/31/00	14	52	47	9	23
09/13/00	5	23	67	14	15
10/22/00	22	62	36	17	19
10/23/00	10	49	52	38	-99999
11/03/00	14	59	57	15	15
11/04/00	9	36	44	19	20
11/07/00	18	51	56	14	15
11/17/00	22	42	39	16	17
11/18/00	8	48	27	11	11
12/17/00	5	50	0	12	14
12/25/00	23	67	51	11	12
12/26/00	24	59	32	9	10
01/02/01	22	69	40	10	10
01/03/01	19	38	42	8	7
01/17/01	15	57	17	20	21
01/30/01	20	51	63	16	17
01/31/01	20	55	28	17	16
02/01/01	13	49	10	18	18
02/04/01	9	31	6	23	24
02/17/01	4	30	85	-99999	39
05/03/01	12	59	65	11	11
10/12/01	13	39	44	10	9
11/14/01	5	37	59	29	35
11/27/01	24	54	23	19	18
12/06/01	15	34	4	27	32
12/07/01	20	55	47	17	16
12/08/01	6	37	66	15	15
12/12/01	4	28	1	24	-99999
12/15/01	11	44	9	21	21
12/24/01	14	50	47	25	25
01/10/02	19	53	12	19	18
01/11/02	5	26	11	10	10

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
01/18/02	7	33	58	24	25
01/20/02	6	40	11	16	17
01/23/02	19	46	0	12	10
01/24/02	10	62	6	13	14
01/30/02	8	43	4	18	19
02/03/02	4	26	1	16	17
02/04/02	16	49	26	12	13
02/05/02	6	29	5	22	21
02/09/02	24	60	54	8	7
02/10/02	22	62	21	8	9
02/12/02	7	25	63	9	10
02/25/02	4	24	64	23	-99999
03/01/02	9	50	39	6	6
03/02/02	13	39	51	10	10
03/03/02	10	31	86	7	7
03/13/02	4	34	3	22	22
03/18/02	8	40	56	15	14
05/23/02	4	26	1	27	33
10/06/02	9	33	12	-99999	11
11/03/02	5	26	31	6	6
11/11/02	14	42	10	24	25
11/14/02	16	44	60	20	21
11/15/02	16	38	54	10	12
11/19/02	14	46	67	7	7
11/20/02	16	44	57	15	17
11/25/02	18	65	57	8	7
11/26/02	24	58	51	11	11
11/27/02	23	55	16	14	15
11/28/02	17	37	35	14	14
12/23/02	9	40	74	25	28
01/01/03	16	36	6	23	21
01/05/03	17	63	59	16	15
01/06/03	24	92	49	20	20
01/07/03	20	52	79	21	21
01/15/03	11	36	31	15	15
01/25/03	15	59	20	22	22
01/30/03	6	29	34	15	17
01/31/03	5	22	4	17	19
02/03/03	12	39	42	14	16
02/05/03	14	45	72	9	8
02/08/03	8	26	73	38	36
03/02/03	14	44	10	21	33
03/28/03	22	57	60	11	11
03/29/03	22	52	52	13	13
03/30/03	10	34	62	13	-99999

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
04/07/03	4	27	32	18	31
10/24/03	7	43	50	24	30
10/25/03	17	53	48	5	5
10/26/03	18	53	51	5	5
11/22/03	11	53	12	13	13
11/23/03	15	52	9	7	8
11/27/03	13	41	39	12	13
12/15/03	9	44	27	16	17
12/22/03	5	29	42	26	27
12/27/03	7	30	2	25	31
01/21/04	23	53	47	16	16
01/22/04	18	46	0	11	11
01/23/04	7	46	39	15	25
02/05/04	11	39	43	18	19
02/06/04	6	32	18	11	20
02/09/04	14	38	41	17	17
02/10/04	20	64	52	12	12
02/12/04	11	48	26	8	9
03/03/04	15	50	29	28	30
03/07/04	14	36	29	22	21
03/10/04	17	58	49	16	15
03/11/04	12	44	36	16	22
03/16/04	7	26	68	14	15
03/28/04	10	34	38	10	9
04/11/04	5	45	39	38	37
09/04/04	5	33	65	25	27
09/21/04	21	51	27	11	11
09/22/04	5	33	34	11	12
10/12/04	11	46	56	22	29
11/01/04	18	55	47	14	13
11/13/04	5	29	61	33	-99999
11/14/04	19	55	44	29	29
11/15/04	16	39	34	31	31
11/29/04	16	61	50	16	18
12/01/04	4	29	61	20	-99999
12/02/04	15	43	9	24	25
12/03/04	18	37	2	20	21
12/15/04	11	53	40	18	16
12/16/04	24	78	17	20	18
12/17/04	19	53	14	15	13
12/18/04	14	40	43	15	14
12/22/04	6	31	6	24	25
12/23/04	16	55	29	19	20
12/24/04	6	45	1	19	19
01/17/05	15	51	0	31	32

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
01/18/05	11	39	7	33	33
01/30/05	11	40	55	33	30
01/31/05	14	51	32	31	27
02/01/05	17	58	65	27	26
02/02/05	24	69	29	20	21
02/03/05	18	59	56	19	20
02/04/05	11	31	34	25	26
02/09/05	6	29	29	33	38
03/10/05	5	27	43	27	32
03/14/05	12	64	39	16	16
03/15/05	7	33	28	20	21
03/31/05	20	71	44	16	14
04/05/05	6	23	4	20	21
09/28/05	19	58	66	16	16
10/04/05	18	45	47	14	14
10/05/05	24	46	33	9	9
10/06/05	7	29	20	8	12
10/10/05	10	45	44	33	33
10/13/05	4	23	61	12	22
10/31/05	4	23	12	19	20
11/15/05	21	50	26	19	17
11/16/05	14	46	37	13	13
11/17/05	12	42	77	14	14
11/18/05	22	45	60	8	8
11/26/05	5	49	11	35	32
11/27/05	19	51	1	15	17
12/03/05	12	38	10	39	38
12/04/05	24	52	45	18	17
12/05/05	17	36	18	16	17
12/06/05	9	27	6	15	17
12/09/05	13	31	66	24	24
12/23/05	10	42	12	34	35
12/24/05	5	41	23	27	29
01/04/06	13	33	35	-99999	39
01/08/06	13	41	6	38	31
01/09/06	7	34	24	29	28
01/16/06	15	39	82	17	17
01/21/06	13	35	0	35	37
01/22/06	14	61	68	28	25
01/23/06	23	71	59	12	13
01/24/06	20	55	65	19	19
02/06/06	12	29	25	14	13
02/07/06	11	31	9	11	10
02/08/06	24	39	65	10	9
02/09/06	14	39	80	10	10

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
02/11/06	5	23	0	16	15
02/12/06	8	27	17	12	12
02/22/06	7	23	45	28	34
09/16/06	8	30	72	10	11
09/17/06	6	28	82	14	15
10/18/06	18	41	71	14	14
10/26/06	18	34	16	7	6
10/27/06	6	28	65	7	7
11/04/06	10	27	14	19	21
11/06/06	6	25	28	14	14
11/12/06	16	39	71	11	11
11/29/06	21	52	31	10	8
11/30/06	9	43	66	4	4
12/02/06	18	46	46	6	5
12/03/06	21	44	37	6	6
12/13/06	7	36	75	37	-99999
12/18/06	18	45	70	25	26
12/23/06	12	40	76	10	11
12/28/06	12	42	68	16	17
12/29/06	11	38	29	15	17
01/01/07	18	44	68	23	23
01/02/07	16	40	82	13	13
01/05/07	9	60	3	22	22
01/07/07	21	54	8	18	20
01/08/07	23	50	48	8	9
01/12/07	4	31	4	24	27
01/13/07	11	30	50	9	10
01/14/07	5	29	63	17	22
01/15/07	24	52	59	12	12
01/16/07	18	44	87	6	7
01/18/07	24	49	70	10	10
01/19/07	14	40	78	14	16
01/21/07	12	52	64	7	7
01/22/07	14	36	24	8	8
02/16/07	6	30	83	19	19
02/17/07	16	42	67	20	20
03/01/07	6	25	4	31	37
03/02/07	15	40	69	18	16
03/03/07	20	43	41	17	17
03/04/07	4	21	71	14	12
03/10/07	8	35	13	16	22
03/11/07	14	36	41	7	9
03/22/07	9	37	72	19	19
05/06/07	15	37	64	20	19
05/07/07	11	38	60	9	14

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
10/06/07	6	29	9	16	23
10/07/07	23	44	9	7	7
10/18/07	7	34	4	20	24
10/21/07	23	63	63	7	6
11/02/07	7	26	52	17	23
11/03/07	17	35	56	11	12
11/12/07	18	35	63	22	23
11/14/07	9	27	60	17	18
11/15/07	5	28	61	20	24
11/21/07	7	24	72	14	15
11/23/07	12	49	80	10	9
11/24/07	13	34	70	6	7
11/28/07	10	38	38	10	11
12/04/07	13	41	10	10	12
12/09/07	21	43	62	33	32
12/10/07	11	33	79	20	34
12/11/07	18	34	68	22	23
12/22/07	5	37	31	14	14
12/23/07	18	38	29	15	17
12/25/07	16	62	59	9	10
12/26/07	4	28	27	36	-99999
12/27/07	13	47	0	12	13
12/31/07	14	39	7	18	19
01/13/08	11	33	62	14	15
01/14/08	15	52	72	14	16
01/16/08	13	53	37	13	14
01/17/08	14	52	0	13	14
01/18/08	11	37	46	21	22
02/05/08	4	35	58	23	26
02/12/08	5	31	63	21	20
02/14/08	14	48	50	15	15
02/15/08	8	32	9	29	30
02/26/08	10	28	72	23	23
03/02/08	17	59	8	12	12
03/03/08	12	48	3	17	18
03/05/08	11	36	6	17	15
03/17/08	6	30	8	22	23
03/21/08	6	32	4	19	16
03/27/08	5	26	4	34	34
04/11/08	4	26	37	11	15
04/12/08	13	31	44	8	8
04/27/08	8	26	71	7	10
05/13/08	7	36	3	25	26
05/15/08	7	36	41	20	20
05/16/08	6	35	64	17	17

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
09/19/08	5	28	4	29	29
10/12/08	21	36	45	10	11
10/13/08	24	63	41	11	11
10/14/08	19	48	20	9	9
10/21/08	5	27	7	11	13
10/22/08	19	37	17	4	4
11/05/08	10	36	10	18	18
11/06/08	8	37	34	14	14
11/07/08	16	45	12	18	20
11/13/08	10	31	3	11	10
11/14/08	17	45	5	12	12
11/15/08	20	47	0	6	7
11/16/08	16	29	24	8	9
11/30/08	7	42	3	19	24
12/05/08	4	27	3	17	18
12/09/08	17	54	28	8	8
12/20/08	4	23	4	31	34
01/09/09	13	58	33	11	11
01/10/09	23	62	63	12	12
01/11/09	18	51	15	7	5
01/12/09	22	42	9	9	10
01/13/09	19	47	20	9	11
01/14/09	20	36	19	7	8
01/15/09	17	34	16	8	8
01/16/09	18	34	5	12	13
01/18/09	6	25	25	14	13
01/28/09	12	33	13	16	17
01/29/09	23	47	34	11	10
01/30/09	20	44	28	14	15
02/01/09	12	35	20	11	11
02/04/09	4	26	39	12	11
02/18/09	5	21	39	37	39
03/13/09	4	23	76	38	32
03/23/09	16	40	3	24	25
03/24/09	12	33	3	13	13
03/27/09	7	28	8	11	12
03/30/09	7	34	4	10	28
04/04/09	9	33	3	32	39
04/05/09	4	22	3	11	11
04/06/09	4	22	0	11	9
04/16/09	4	27	3	33	-99999
04/19/09	5	28	49	9	12
05/06/09	4	30	0	12	11
09/11/09	4	29	80	27	29
09/22/09	13	35	31	3	3

Table A3-1. Dates that match the profile for Santa Ana wind events for Cheeseboro (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
09/23/09	6	28	35	4	10
09/30/09	11	36	0	7	7
10/01/09	6	26	14	6	6
10/25/09	9	33	4	12	12
12/16/09	6	28	34	26	22
12/18/09	10	39	42	23	22
12/19/09	11	39	24	26	26
12/31/09	4	23	4	34	34
01/01/10	4	32	3	20	19
01/14/10	14	43	38	19	18
01/15/10	5	47	77	23	23
01/28/10	14	38	63	32	38
03/14/10	9	38	23	20	21
03/15/10	12	29	62	25	23
03/23/10	10	31	84	14	33
03/27/10	13	45	7	11	13
04/07/10	15	47	37	17	16
05/29/10	12	34	66	9	15
10/10/10	8	32	48	20	17
10/13/10	4	26	23	11	17
10/27/10	13	39	8	13	13
11/01/10	7	28	8	20	22
11/02/10	4	25	78	15	17
11/11/10	19	45	60	15	14
11/12/10	6	42	47	12	12
11/13/10	14	38	30	14	16
11/14/10	12	40	18	21	18
11/25/10	21	50	24	13	13
12/11/10	8	33	42	29	30

Definition = "If wind speed averaged over four intervals during the day was greater than or equal to 20 mph, the wind direction was from the northeast quadrant, and the relative humidity at 1630 PST (Pacific standard time) was less than 40%, it was considered to be a Santa Ana event."

-99999 = missing

Table A3-2. Dates that match the profile for Santa Ana wind events for Leo Carrillo.

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
01/05/00	15	40	26	15	15
01/06/00	10	47	26	28	12
02/02/00	6	24	5	26	24
02/19/00	12	29	18	36	22
03/31/00	6	43	40	-99999	37
11/03/00	14	42	61	11	11
11/04/00	8	39	11	29	31
11/07/00	14	41	53	10	33
11/17/00	19	36	42	11	13
11/18/00	9	38	22	-99999	31
12/17/00	7	38	26	37	-99999
12/18/00	24	56	44	4	4
12/25/00	14	55	25	8	9
12/26/00	11	54	66	36	-99999
01/02/01	11	41	85	7	7
01/03/01	8	29	60	23	6
01/16/01	7	30	42	32	-99999
01/17/01	13	40	20	28	31
01/30/01	9	34	41	-99999	27
01/31/01	15	39	23	14	12
02/01/01	13	50	58	21	-99999
02/04/01	4	30	35	29	-99999
05/03/01	8	51	56	38	-99999
11/27/01	18	46	43	17	15
11/28/01	4	32	43	27	34
12/07/01	23	52	61	13	13
12/08/01	14	42	51	16	25
12/15/01	9	30	24	20	23
12/24/01	16	43	49	22	21
01/22/02	4	26	30	-99999	34
01/23/02	14	37	81	14	-99999
01/24/02	10	46	30	35	-99999
02/09/02	15	55	41	8	7
02/10/02	19	52	19	7	7
02/11/02	8	39	36	19	10
03/02/02	7	31	46	34	31
03/03/02	5	27	28	17	-99999
11/11/02	14	39	34	20	22
11/12/02	10	30	55	-99999	28
11/15/02	7	26	43	16	15
11/18/02	6	36	26	19	31
11/19/02	16	39	20	-99999	33
11/20/02	17	40	49	18	21
11/25/02	10	50	30	7	6
11/26/02	20	46	27	10	10

Table A3-2. Dates that match the profile for Santa Ana wind events for Leo Carrillo (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
11/27/02	15	39	28	39	-99999
12/22/02	15	42	59	36	36
01/01/03	20	39	9	20	21
01/02/03	12	35	23	25	-99999
01/06/03	22	100	51	17	18
01/07/03	19	100	33	18	19
01/15/03	9	34	53	-99999	15
01/16/03	10	33	34	26	27
01/25/03	10	42	46	-99999	35
02/02/03	11	42	26	12	39
02/03/03	13	100	29	25	18
02/05/03	16	41	18	8	8
03/02/03	5	100	43	-99999	29
03/28/03	24	52	34	9	9
03/29/03	12	34	43	11	18
10/26/03	11	43	65	36	-99999
12/15/03	14	34	18	17	17
12/16/03	24	42	41	10	11
12/17/03	12	34	42	28	24
01/05/04	22	53	29	14	15
01/21/04	10	40	67	14	14
01/22/04	16	41	57	10	11
02/07/04	4	31	25	-99999	36
02/09/04	10	31	57	-99999	17
02/10/04	19	45	49	12	12
02/12/04	6	100	34	27	33
03/03/04	4	35	42	37	-99999
03/07/04	7	24	5	18	17
04/23/04	8	32	49	32	-99999
09/21/04	16	45	39	15	13
11/14/04	16	34	32	19	20
11/21/04	19	41	39	28	29
11/28/04	9	100	2	36	35
11/29/04	16	53	5	9	10
12/03/04	12	35	51	34	38
12/16/04	24	53	44	14	15
12/17/04	19	39	28	10	9
12/18/04	8	29	40	11	14
12/23/04	21	35	42	12	13
12/24/04	8	31	36	-99999	19
01/17/05	15	39	39	19	23
01/18/05	22	38	54	23	23
01/19/05	8	29	40	20	26
01/30/05	5	24	29	38	26
01/31/05	13	100	15	19	22

Table A3-2. Dates that match the profile for Santa Ana wind events for Leo Carrillo (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
02/01/05	10	100	59	35	28
02/02/05	18	43	67	14	15
02/03/05	16	37	75	13	17
02/04/05	10	100	52	28	21
03/14/05	5	35	74	11	10
03/15/05	8	29	42	39	35
03/31/05	22	40	56	10	10
04/01/05	7	27	23	39	31
10/05/05	20	43	47	1	1
10/06/05	8	100	40	12	32
11/15/05	8	100	22	11	11
11/27/05	14	100	46	37	28
12/04/05	24	46	15	6	6
12/05/05	20	33	18	1	1
12/09/05	11	36	38	31	25
01/04/06	10	39	27	24	26
01/05/06	18	40	43	12	12
01/06/06	8	29	46	20	25
01/09/06	21	34	45	13	13
01/20/06	6	25	47	-99999	32
01/22/06	11	44	33	16	19
01/23/06	24	51	74	8	8
01/24/06	17	44	49	27	35
02/08/06	18	33	22	15	21
10/18/06	14	43	46	10	16
10/26/06	9	100	1	18	29
11/12/06	8	100	34	11	9
11/29/06	19	100	5	10	9
11/30/06	10	42	53	13	6
12/03/06	23	47	33	6	7
12/18/06	15	40	47	18	20
12/28/06	14	43	39	13	13
12/29/06	4	100	66	37	23
01/01/07	6	31	82	18	34
01/07/07	23	50	40	15	16
01/09/07	8	34	41	33	16
01/13/07	22	38	16	9	10
01/14/07	5	42	62	26	28
01/15/07	21	53	72	11	11
01/16/07	13	43	30	6	7
01/18/07	15	35	55	7	24
01/21/07	6	38	33	6	7
02/17/07	6	30	43	24	19
03/02/07	10	49	38	37	24
03/03/07	5	31	43	23	25

Table A3-2. Dates that match the profile for Santa Ana wind events for Leo Carrillo (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
03/05/07	4	44	81	22	27
05/06/07	11	44	43	17	31
05/07/07	5	39	60	15	14
10/07/07	18	40	59	6	16
10/21/07	23	60	40	6	6
10/22/07	24	61	52	3	4
10/23/07	12	42	30	8	9
11/12/07	10	60	49	24	25
11/15/07	4	28	32	24	37
11/24/07	10	46	78	5	5
11/28/07	12	36	37	7	8
12/09/07	15	38	39	23	26
12/10/07	15	36	55	-99999	32
12/11/07	17	32	46	17	18
12/21/07	15	39	70	17	18
12/23/07	13	37	50	13	14
12/24/07	4	33	55	35	-99999
12/25/07	13	55	47	6	7
12/27/07	10	33	64	29	35
12/31/07	10	47	51	19	17
01/01/08	23	52	37	7	7
01/02/08	10	27	15	26	12
01/13/08	22	42	40	10	11
01/14/08	10	35	61	10	16
01/16/08	8	53	38	12	12
01/17/08	14	51	68	12	18
02/05/08	8	34	81	32	-99999
02/14/08	12	45	51	12	15
03/02/08	10	48	90	9	9
03/09/08	7	46	52	-99999	24
03/23/08	4	28	43	21	19
04/27/08	5	24	47	17	16
10/12/08	10	29	38	38	35
10/13/08	19	65	23	10	10
10/14/08	8	35	49	18	29
10/22/08	10	34	44	29	5
10/23/08	7	30	35	14	17
11/05/08	10	39	58	16	-99999
11/06/08	8	35	55	21	27
11/07/08	15	36	42	17	19
11/15/08	22	42	46	6	6
12/09/08	10	39	46	-99999	8
12/27/08	4	28	46	31	-99999
01/04/09	17	33	25	11	14
01/09/09	9	47	44	11	11

Table A3-2. Dates that match the profile for Santa Ana wind events for Leo Carrillo (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from compass heading (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
01/10/09	23	45	45	10	12
01/11/09	18	45	36	6	6
01/12/09	21	41	66	9	9
01/13/09	22	54	68	10	14
01/14/09	13	35	36	5	6
01/15/09	7	36	53	19	29
01/18/09	13	30	43	13	15
01/27/09	14	39	38	13	17
01/29/09	24	41	47	9	9
01/30/09	15	39	80	-99999	16
02/02/09	4	22	36	33	-99999
02/19/09	8	26	31	38	-99999
03/24/09	7	30	46	15	21
10/01/09	4	39	32	32	31
11/15/09	7	25	46	25	9
11/24/09	20	37	53	5	5
11/30/09	6	39	40	33	20
12/19/09	13	34	23	19	21
12/23/09	4	29	17	15	27
12/28/09	11	31	29	39	-99999
01/02/10	12	42	64	17	18
01/14/10	15	38	35	14	14
02/23/10	6	31	53	30	38
03/14/10	5	42	49	-99999	26
03/27/10	13	40	75	32	-99999
03/28/10	4	25	23	-99999	38
10/28/10	7	28	23	24	23
11/11/10	18	55	27	12	13
11/14/10	6	37	27	16	17
11/25/10	22	38	55	8	10
11/29/10	19	35	28	-99999	16
12/27/10	9	36	56	-99999	36

Definition = "If wind speed averaged over four intervals during the day was greater than or equal to 20 mph, the wind direction was from the northeast quadrant, and the relative humidity at 1630 PST (Pacific standard time) was less than 40%, it was considered to be a Santa Ana event."

-99999 = missing

Table A3-3. Dates that match the profile for Santa Ana wind events for Malibu Canyon.

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
01/16/06	7	100	14	10	12
01/19/06	6	22	34	31	41
01/21/06	6	28	9	13	18
01/22/06	10	31	44	16	18
01/23/06	20	44	68	7	8
01/24/06	10	34	40	12	12
02/08/06	5	26	23	6	6
02/21/06	6	25	23	22	24
03/08/06	5	25	22	25	42
10/18/06	13	29	8	10	10
11/05/06	6	24	41	10	11
11/12/06	7	34	13	9	9
11/29/06	15	42	20	8	8
11/30/06	5	28	27	5	7
12/02/06	7	31	8	6	7
12/03/06	9	30	40	6	7
12/18/06	7	33	30	19	22
12/22/06	5	38	7	25	26
12/23/06	5	25	13	7	10
12/28/06	9	36	24	12	13
01/01/07	10	33	12	15	17
01/02/07	8	26	30	9	10
01/05/07	15	41	29	14	17
01/06/07	6	36	39	33	40
01/08/07	7	32	38	6	7
01/13/07	8	29	17	9	10
01/15/07	11	42	32	9	10
01/16/07	8	29	82	5	6
01/18/07	6	34	27	8	8
01/19/07	7	31	3	8	11
01/21/07	7	36	39	6	6
02/14/07	6	23	14	19	19
02/16/07	8	32	2	14	15
03/02/07	10	40	10	12	12
03/03/07	7	34	26	13	14
03/04/07	4	24	11	11	11
03/22/07	7	31	24	14	15
04/13/07	6	29	42	11	10
05/05/07	4	28	0	26	26
10/21/07	9	37	55	6	6
10/22/07	19	48	18	4	4
10/23/07	8	30	64	10	11
02/04/08	7	30	19	33	34
02/14/08	13	41	26	13	13
02/15/08	4	36	2	22	24

Table A3-3. Dates that match the profile for Santa Ana wind events for Malibu Canyon (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
02/26/08	4	24	16	18	19
03/02/08	11	37	25	10	11
03/03/08	4	28	38	16	17
03/09/08	10	31	18	11	25
04/26/08	5	25	23	10	9
10/12/08	13	32	27	8	9
10/13/08	14	49	0	8	9
10/14/08	10	31	20	7	7
10/22/08	8	30	20	2	3
11/05/08	8	36	16	15	19
11/07/08	8	34	8	16	19
11/14/08	8	37	38	11	12
11/15/08	6	28	4	4	6
12/09/08	8	37	15	6	7
01/09/09	12	43	51	9	11
01/10/09	14	34	40	10	11
01/11/09	8	33	37	5	5
01/12/09	8	33	69	6	9
01/13/09	8	31	23	7	10
01/14/09	5	26	48	5	7
01/27/09	7	34	16	14	16
01/28/09	4	26	14	14	16
01/29/09	8	38	13	9	8
01/30/09	7	27	12	12	13
03/23/09	10	43	19	20	21
03/24/09	8	30	30	8	9
03/27/09	6	28	32	7	8
05/07/09	6	40	22	26	20
09/22/09	6	31	19	8	6
11/15/09	4	37	23	9	12
11/23/09	4	24	70	17	19
11/24/09	7	35	63	7	8
11/25/09	7	27	28	12	14
11/29/09	7	39	29	17	20
11/30/09	5	37	19	10	13
12/23/09	6	37	30	17	23
01/14/10	7	40	19	18	19
02/22/10	7	35	42	22	19
03/23/10	5	33	23	10	28
03/27/10	7	34	21	10	11
04/06/10	8	35	19	17	18
04/07/10	8	38	71	12	13
04/29/10	4	25	21	30	22
04/30/10	5	31	11	26	29
05/29/10	5	34	40	23	18

Table A3-3. Dates that match the profile for Santa Ana wind events for Malibu Canyon (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
10/27/10	7	29	40	12	13
11/11/10	13	39	43	14	16
11/13/10	6	32	37	13	16
11/25/10	7	25	36	10	14
11/29/10	9	37	23	11	12
12/11/10	6	31	25	31	32

Definition = "If wind speed averaged over four intervals during the day was greater than or equal to 20 mph, the wind direction was from the northeast quadrant, and the relative humidity at 1630 PST (Pacific standard time) was less than 40%, it was considered to be a Santa Ana event."

-99999 = missing

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills.

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
01/01/95	10	30	1	35	38
01/17/95	8	54	12	-99999	37
01/30/95	4	54	14	39	31
01/31/95	16	47	0	29	30
02/01/95	13	47	18	21	23
02/02/95	9	49	13	-99999	23
02/03/95	5	31	7	22	21
02/17/95	5	40	0	33	28
02/18/95	21	56	4	18	18
02/19/95	21	47	10	16	16
02/20/95	8	40	33	20	19
03/27/95	11	35	19	22	20
03/28/95	12	39	17	27	25
03/30/95	19	51	9	25	27
04/09/95	16	56	31	19	22
04/15/95	5	30	13	38	-99999
04/21/95	10	44	26	34	32
04/22/95	13	47	15	21	20
10/05/95	7	27	13	17	17
12/07/95	7	43	16	37	-99999
02/12/96	5	44	0	39	-99999
03/01/96	10	38	16	36	26
03/02/96	6	44	16	27	30
03/15/96	5	28	18	-99999	30
03/26/96	6	57	0	25	26
04/04/96	16	37	28	15	19
04/05/96	20	50	9	9	10
04/19/96	5	49	26	35	38
04/20/96	9	43	0	34	33
04/25/96	4	31	13	-99999	37
04/28/96	7	45	11	33	8
04/29/96	12	40	18	8	7
10/20/96	12	47	12	23	26
10/21/96	22	59	0	2	2
10/22/96	7	40	18	15	12
10/23/96	8	45	17	31	23
10/26/96	16	60	7	9	9
10/27/96	12	57	16	37	33
11/01/96	9	30	2	25	29
11/06/96	17	63	19	5	7
12/02/96	5	58	24	15	16
03/04/97	7	48	20	11	10
03/10/97	4	42	17	10	9
03/13/97	7	34	13	21	10
04/01/97	4	42	26	30	18

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
04/02/97	20	66	7	19	15
04/13/97	6	35	12	24	22
04/21/97	8	57	0	21	25
04/22/97	8	61	0	19	25
04/23/97	6	40	5	21	23
04/25/97	7	52	15	18	14
05/01/97	7	46	13	16	18
09/21/97	5	31	43	21	21
10/11/97	6	49	1	25	22
10/12/97	15	64	15	35	12
10/13/97	22	49	17	2	2
10/14/97	18	47	7	2	2
10/25/97	19	44	9	7	6
10/30/97	4	26	21	37	-99999
11/01/97	9	35	18	11	11
11/22/97	6	40	22	20	21
12/09/97	15	55	13	30	29
12/10/97	23	63	15	11	9
12/11/97	20	61	19	12	13
12/12/97	13	41	24	29	28
12/19/97	18	57	27	13	12
12/21/97	7	47	7	38	36
12/22/97	14	70	28	18	18
12/23/97	6	46	19	34	-99999
12/24/97	18	53	33	16	17
12/25/97	21	50	19	15	15
12/26/97	21	47	14	11	11
12/27/97	11	37	15	7	7
12/28/97	15	54	19	12	12
12/29/97	16	46	21	21	21
01/05/98	19	38	15	26	25
01/21/98	11	34	20	-99999	35
02/28/98	4	31	17	-99999	39
03/07/98	10	46	14	38	34
04/16/98	6	37	13	27	25
09/01/98	5	32	24	21	24
10/05/98	21	43	21	10	10
10/17/98	15	40	38	12	12
11/04/98	7	33	13	31	26
11/12/98	10	42	5	25	34
11/19/98	20	54	15	19	19
12/05/98	5	41	16	35	34
12/07/98	12	46	16	20	20
12/08/98	9	41	4	27	33
12/09/98	19	63	15	8	9

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
12/10/98	19	52	49	9	9
12/15/98	20	58	8	14	12
12/17/98	9	42	20	19	21
12/22/98	4	37	20	36	-99999
12/23/98	17	48	19	15	16
12/25/98	7	31	18	11	11
12/26/98	9	29	5	25	26
12/27/98	12	33	7	18	16
01/01/99	6	30	25	24	23
01/02/99	12	30	16	14	12
01/03/99	17	38	13	12	13
01/08/99	13	52	24	12	11
01/09/99	17	51	23	18	13
01/14/99	12	38	15	15	17
01/22/99	5	43	7	36	39
01/27/99	7	36	34	32	34
02/10/99	9	41	22	30	32
02/11/99	22	46	32	15	14
02/21/99	8	57	9	32	34
04/10/99	6	41	10	20	19
04/15/99	14	35	13	21	20
09/28/99	6	28	21	13	10
09/30/99	5	30	24	7	9
10/07/99	19	53	9	12	12
10/17/99	22	45	13	4	4
10/18/99	4	44	8	-99999	10
10/29/99	15	40	27	7	6
10/30/99	6	35	22	6	8
11/22/99	15	54	27	13	13
11/23/99	6	35	38	16	17
11/24/99	14	41	22	12	12
12/02/99	8	41	9	23	27
12/03/99	16	73	3	11	11
12/04/99	17	51	7	12	13
12/08/99	17	55	0	17	-99999
12/10/99	11	44	7	26	26
12/14/99	13	42	19	11	12
12/19/99	14	40	21	11	13
12/20/99	15	42	8	13	15
12/21/99	8	30	6	22	39
12/22/99	22	53	22	8	8
12/23/99	21	47	13	14	15
12/24/99	17	36	41	13	15
12/25/99	4	27	12	11	13
12/27/99	11	39	23	18	22

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
01/03/00	5	45	15	19	22
01/04/00	8	41	9	27	22
01/05/00	21	53	19	20	19
01/06/00	15	49	12	13	9
02/01/00	9	37	11	25	26
02/19/00	9	32	80	23	22
03/10/00	7	37	25	-99999	38
03/11/00	5	38	11	20	18
03/20/00	14	61	15	8	11
03/21/00	14	56	3	24	22
03/31/00	18	47	28	5	6
05/11/00	12	44	10	16	27
12/18/00	7	25	6	5	6
12/25/00	14	26	12	11	11
12/26/00	6	23	7	25	9
01/17/01	7	21	24	19	20
01/30/01	6	22	12	17	18
10/12/01	13	36	10	16	19
11/27/01	22	53	9	18	18
11/28/01	6	34	9	21	26
12/06/01	18	60	3	24	25
12/07/01	22	57	23	16	15
12/15/01	14	46	0	20	19
12/16/01	6	34	18	29	36
12/24/01	16	45	27	22	23
01/10/02	15	44	20	16	14
01/11/02	6	35	30	18	23
01/20/02	10	43	15	28	30
01/23/02	20	53	33	12	12
02/01/02	8	37	6	39	-99999
02/03/02	4	37	23	-99999	15
02/04/02	18	40	8	12	11
02/09/02	22	58	39	8	7
02/10/02	22	54	35	9	9
02/11/02	11	39	17	12	9
02/22/02	5	28	5	10	14
03/02/02	6	28	18	18	17
03/03/02	6	27	5	13	13
03/13/02	7	31	6	23	21
03/18/02	9	44	20	17	16
03/19/02	4	35	15	18	18
10/06/02	13	43	27	-99999	13
10/07/02	9	100	9	19	18
11/14/02	19	45	37	18	19
11/19/02	11	100	23	7	7

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
11/20/02	20	100	32	14	15
11/21/02	9	29	31	13	18
11/25/02	10	100	18	5	6
11/27/02	14	100	10	34	-99999
11/28/02	19	39	90	14	15
12/22/02	17	100	2	37	-99999
12/23/02	22	100	14	25	26
01/01/03	15	100	2	18	19
01/04/03	4	100	13	18	18
01/25/03	16	100	4	19	20
01/26/03	6	100	15	22	23
02/02/03	11	100	6	12	11
02/03/03	10	100	26	18	21
02/05/03	12	100	18	8	7
02/10/03	10	27	87	15	15
03/18/03	11	52	1	34	33
03/19/03	4	100	0	35	32
03/27/03	13	100	15	8	8
03/29/03	12	100	27	11	10
04/06/03	5	41	16	35	-99999
04/07/03	10	100	3	22	13
10/25/03	17	42	13	5	6
10/26/03	17	100	7	6	6
11/22/03	17	52	15	15	16
11/23/03	15	100	14	9	11
12/03/03	6	43	23	17	16
12/08/03	15	49	22	19	19
12/15/03	16	50	0	18	20
12/16/03	11	47	3	12	13
12/18/03	5	23	35	14	12
12/22/03	8	26	44	29	30
12/27/03	11	100	6	25	28
12/30/03	18	35	9	34	-99999
01/04/04	5	100	7	36	36
01/05/04	16	100	3	15	16
01/06/04	4	100	6	22	20
01/14/04	8	42	13	21	25
01/21/04	19	43	49	18	19
01/22/04	16	100	23	15	15
01/23/04	7	100	20	24	20
02/04/04	7	50	15	37	-99999
02/05/04	13	100	7	19	21
02/06/04	8	40	17	26	31
02/07/04	8	57	9	22	16
02/08/04	7	55	6	24	30

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
02/10/04	17	100	5	16	16
02/11/04	4	100	8	22	18
02/12/04	5	45	19	11	11
03/07/04	11	41	12	19	20
03/09/04	5	100	9	23	27
03/10/04	19	100	15	17	17
03/11/04	7	100	27	18	23
04/23/04	14	100	21	14	17
04/27/04	11	39	10	9	9
09/20/04	4	100	44	37	38
09/21/04	17	100	39	13	9
10/12/04	6	100	27	29	24
11/01/04	20	100	4	12	13
11/12/04	6	37	16	39	-99999
11/14/04	22	48	16	23	24
11/15/04	14	39	10	28	28
11/21/04	20	100	11	39	-99999
11/28/04	17	65	23	22	23
11/29/04	14	100	18	12	11
12/03/04	14	100	27	15	17
12/05/04	6	100	82	-99999	10
12/14/04	5	26	15	-99999	27
12/15/04	10	50	9	14	-99999
12/16/04	11	100	38	15	16
12/18/04	9	48	13	-99999	12
12/23/04	8	53	12	13	13
01/16/05	8	52	8	16	18
01/17/05	18	58	18	24	27
01/18/05	15	52	23	23	25
01/30/05	16	100	13	24	25
01/31/05	17	100	1	19	20
02/01/05	20	42	15	17	19
02/02/05	20	100	5	16	17
02/03/05	13	43	26	20	18
02/04/05	17	40	23	19	20
03/15/05	9	100	22	25	20
03/16/05	4	100	5	30	31
03/26/05	7	100	4	-99999	35
03/31/05	13	100	13	12	12
04/10/05	11	100	12	30	28
04/14/05	7	100	5	31	33
05/10/05	8	40	16	38	38
09/28/05	23	46	12	13	13
10/04/05	13	100	11	15	11
10/05/05	21	100	10	7	7

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
10/10/05	4	100	29	16	17
11/13/05	6	100	46	35	26
11/14/05	5	43	18	30	29
11/15/05	20	100	31	16	15
11/16/05	11	46	10	12	10
11/17/05	13	50	27	11	12
11/18/05	22	44	15	8	8
11/26/05	7	66	28	29	31
11/27/05	15	100	10	7	9
12/04/05	15	100	11	12	11
12/07/05	4	100	9	21	25
12/08/05	4	22	19	20	20
12/24/05	6	37	19	19	21
01/12/06	4	27	49	-99999	33
01/16/06	18	100	0	11	11
01/19/06	10	39	30	36	31
01/20/06	6	100	4	20	25
01/21/06	16	50	7	13	16
01/22/06	11	100	24	17	18
01/23/06	8	100	14	8	8
01/24/06	14	100	1	13	15
02/07/06	12	35	19	7	6
02/08/06	20	100	22	7	7
02/09/06	16	39	34	9	8
02/11/06	5	100	9	15	16
02/12/06	16	41	10	7	7
02/13/06	4	100	90	11	11
03/08/06	4	40	0	24	-99999
04/19/06	5	100	34	17	24
05/28/06	8	34	16	36	38
09/16/06	5	100	10	19	13
10/26/06	17	46	1	7	7
10/27/06	13	36	17	9	9
11/06/06	10	45	13	10	11
11/07/06	5	36	25	10	11
11/12/06	19	57	10	9	11
11/18/06	5	32	4	27	29
11/29/06	21	71	16	9	8
11/30/06	23	52	11	6	6
12/01/06	5	55	23	14	13
12/02/06	18	49	14	7	7
12/03/06	21	60	17	6	7
12/07/06	6	32	3	8	8
12/13/06	11	52	5	37	-99999
12/18/06	23	48	49	22	24

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
12/22/06	7	58	1	31	30
12/23/06	15	65	19	8	10
12/24/06	4	67	27	22	14
12/28/06	15	79	0	13	14
12/29/06	10	51	7	12	13
01/01/07	13	65	1	17	19
01/02/07	16	67	4	10	11
01/05/07	10	80	0	9	8
01/06/07	12	70	5	29	14
01/07/07	15	73	5	15	16
01/08/07	19	61	8	7	8
01/13/07	22	53	11	10	10
01/15/07	20	67	2	10	11
01/16/07	17	57	25	12	11
01/18/07	21	54	2	9	9
01/19/07	13	65	11	8	12
01/21/07	13	55	17	6	7
02/04/07	5	43	4	9	7
02/14/07	16	76	58	20	20
02/15/07	6	45	21	-99999	34
02/16/07	21	53	54	15	15
02/17/07	9	132	23	16	18
02/24/07	4	45	30	37	31
03/01/07	13	75	40	32	31
03/02/07	18	74	14	22	13
03/03/07	18	75	84	18	17
03/04/07	19	37	7	10	13
03/05/07	6	40	37	9	14
03/11/07	13	46	16	7	8
03/22/07	11	54	31	23	16
03/29/07	10	33	14	19	17
04/12/07	9	45	13	16	15
04/13/07	12	77	28	11	10
05/05/07	14	74	54	21	27
05/06/07	12	59	28	14	12
10/07/07	16	82	53	6	6
10/21/07	10	64	9	6	6
10/22/07	24	61	20	4	4
10/23/07	19	63	12	10	11
11/03/07	12	36	21	9	11
11/12/07	15	62	14	21	22
11/14/07	5	37	1	16	19
11/15/07	7	39	10	18	20
11/23/07	8	50	48	8	8
11/24/07	16	59	42	4	5

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
11/25/07	7	37	14	29	28
11/28/07	15	48	4	9	10
12/09/07	23	51	25	31	33
12/10/07	9	50	10	38	-99999
12/11/07	17	38	29	22	24
12/13/07	9	34	10	29	19
12/24/07	6	45	7	25	31
12/25/07	15	78	60	8	7
12/26/07	6	58	17	24	39
12/31/07	14	63	4	19	20
01/01/08	16	57	16	8	8
01/02/08	8	42	3	11	13
01/11/08	7	41	1	27	34
01/13/08	23	74	18	12	14
01/14/08	18	51	11	10	11
01/16/08	14	65	19	13	14
01/17/08	18	74	11	12	13
01/18/08	7	33	3	21	29
01/26/08	4	40	82	39	-99999
01/30/08	7	56	0	38	-99999
01/31/08	7	42	11	31	36
02/05/08	8	55	11	24	39
02/08/08	7	30	2	29	25
02/11/08	12	35	9	27	28
02/12/08	6	32	55	27	29
02/14/08	15	55	15	14	14
02/15/08	6	51	18	12	27
03/02/08	12	46	13	12	12
03/03/08	11	42	11	15	23
03/04/08	4	37	14	31	35
03/05/08	7	38	14	-99999	19
03/09/08	14	61	3	28	20
03/17/08	8	49	2	18	16
03/21/08	5	43	8	18	14
04/12/08	4	38	7	8	9
04/26/08	10	51	12	10	9
04/27/08	8	61	19	10	10
10/13/08	20	79	18	10	10
10/14/08	16	51	11	8	10
10/22/08	16	47	36	4	4
10/23/08	5	39	7	4	4
11/06/08	6	46	13	14	16
11/07/08	21	47	6	18	21
11/08/08	4	39	14	27	31
11/12/08	10	45	15	-99999	33

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
11/13/08	6	37	66	24	18
11/14/08	14	53	10	14	13
11/15/08	21	49	22	6	7
11/16/08	11	32	11	7	10
12/09/08	14	46	18	7	8
12/26/08	9	39	7	33	35
12/27/08	5	43	6	36	38
01/04/09	17	63	10	12	14
01/09/09	17	60	1	11	11
01/10/09	19	65	40	10	11
01/11/09	15	55	0	5	5
01/12/09	22	56	32	8	10
01/13/09	19	65	16	8	8
01/14/09	22	43	13	6	6
01/15/09	12	38	30	8	10
01/16/09	14	35	22	11	14
01/18/09	14	32	12	15	15
01/27/09	16	49	12	16	17
01/28/09	15	42	11	17	18
01/29/09	23	57	33	10	9
01/30/09	20	48	11	14	16
02/01/09	8	36	14	26	20
02/19/09	13	35	16	25	26
02/28/09	7	25	2	20	21
03/24/09	12	45	15	10	11
04/04/09	6	40	1	26	21
09/22/09	7	33	0	8	2
09/30/09	5	37	19	22	25
10/15/09	5	45	18	24	24
10/20/09	4	43	12	30	32
10/28/09	12	41	2	16	21
10/29/09	11	46	36	36	25
10/31/09	4	43	7	18	16
11/19/09	7	41	8	17	17
11/23/09	12	47	24	17	18
11/24/09	18	49	16	5	6
11/25/09	18	41	14	10	12
11/30/09	16	49	5	9	10
12/17/09	16	56	18	-99999	19
12/18/09	12	47	4	19	20
12/19/09	16	44	11	22	23
01/01/10	11	43	16	21	21
01/02/10	15	70	5	22	22
01/04/10	9	35	4	15	13
01/05/10	7	39	8	21	22

Table A3-4. Dates that match the profile for Santa Ana wind events for Malibu Hills (continued).

Date	Number of hours w/gust >20 MPH and from NE quad	Max wind speed (MPH)	Max wind coming from (deg)	Rel. humidity (%) at 4pm	Rel. humidity (%) at 5pm
01/11/10	7	50	32	20	24
01/14/10	21	64	7	18	18
01/28/10	15	44	9	32	-99999
02/13/10	9	53	23	34	31
02/14/10	7	45	5	27	25
02/22/10	9	46	0	25	20
03/14/10	14	52	14	31	32
03/27/10	19	59	10	12	11
04/06/10	17	40	60	22	22
04/08/10	9	40	6	25	29
05/29/10	13	48	32	21	20
10/13/10	6	32	54	13	14
10/28/10	9	27	53	13	15
11/02/10	4	35	10	19	19
11/04/10	5	83	49	17	16
11/11/10	21	64	20	17	17
11/13/10	18	56	9	15	16
11/25/10	22	52	30	12	12
11/26/10	7	37	16	14	16
11/28/10	5	45	22	38	-99999
11/29/10	21	55	40	14	14
11/30/10	10	34	13	12	14
12/07/10	10	32	7	28	25
12/11/10	14	55	14	28	29
12/27/10	16	59	19	30	29

Definition = "If wind speed averaged over four intervals during the day was greater than or equal to 20 mph, the wind direction was from the northeast quadrant, and the relative humidity at 1630 PST (Pacific standard time) was less than 40%, it was considered to be a Santa Ana event."

-99999 = missing

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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National Park Service
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