

ONE-PAGE PLACE ASSESSMENT: SANTA BARBARA, CA

LOCATED IN THE SANTA BARBARA COASTAL SUBWATERSHED WITHIN THE CALIFORNIA WATERSHED

CLIMATE

AVERAGE HIGH & LOW TEMPERATURES¹ 1893 – 2012

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F HIGH	64.9	65.6	66.8	69.0	69.9	72.4	75.9	77.0	76.7	74.4	70.9	66.4	70.8
°F LOW	43	44.6	46.2	48.6	51.3	54.3	57.3	57.9	56.4	52.5	46.9	43.4	50.2
°C HIGH	18.3	18.7	19.3	20.6	21.1	22.4	24.4	25.0	24.8	23.6	21.6	19.1	21.6
°C LOW	6.1	7.0	7.9	9.2	10.7	12.4	14.1	14.4	13.6	11.4	8.3	6.3	10.1
RECORD HIGH ¹	115° F		46.1° C		June 17, 1917			RECORD LOW ¹	20° F		-6.7° C		January 4, 1949

SUN

MAR 21 JUN 21 SEP 21 DEC 21

LATITUDE	34.4°	DEGREES N or S of DUE EAST THE SUN RISES ²	0°	29°N	0°	28°S
ELEVATION	39 FT 11.9 m	DEGREES N or S of DUE WEST THE SUN SETS ²	0°	29°N	0°	28°S
		SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON) ^{a,2,3}	56°	79°	56°	32°
		SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO ^b	1 : 1.59		...AND AZIMUTH ^c	0°
		9AM & 3PM WINTER-SOLSTICE SHADOW RATIO ^{b,2}	1 : 3.05		...AND AZIMUTH ^{c,2}	47°

WIND

PREVAILING WIND DIRECTION^{d,4} & AVERAGE SPEED⁵ MAX SPEED⁶ 51 | 82

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
	WSW	W	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW
MPH	4.2	5.7	5.8	6.6	6.0	6.0	5.9	5.5	5.2	4.5	4.1	4.1	5.3
kmph	7	9	9	11	10	10	9	9	8	7	7	7	8.5

WATER

AVERAGE RAINFALL (GAIN)¹ 1893 – 2012

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	3.98	3.86	2.97	1.21	0.36	0.08	0.02	0.03	0.21	0.69	1.50	2.82	17.73
mm	101.1	98.0	75.4	30.7	9.1	2.0	0.5	0.8	5.3	17.5	38.1	71.6	450.3

AVERAGE PAN EVAPORATION (POTENTIAL LOSS)^{e,7} 1952–2005

INCHES	2.44	3.53	4.41	6.01	7.55	8.56	9.50	8.98	7.00	5.42	3.49	2.79	69.68
mm	62.0	89.7	112.0	152.7	191.8	217.4	241.3	228.1	177.8	137.7	88.6	70.9	1,769.9

WETTEST YEAR'S RAIN¹ 41.48 INCHES | 1,054 mm | 1941 DRIEST YEAR'S RAIN¹ 3.99 INCHES | 101 mm | 1947

LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION⁸ 214 DAYS: April 13 – November 13, 1965 RAINFALL INCOME^f 183 GPCD
694 lpcd

AREA^{g,9} 19.47 SQ MILES | 50 km² POPULATION^{g,9} 89,639 | 2012 estimate UTILITY-WATER USE¹⁰ 128 GPCD
485 lpcd

114 FT | 34.9 m | 1988 DEPTH TO GROUNDWATER^{h,11,12} 125 FT | 38.1 m | 2012

CURRENT GROUNDWATER EXTRACTION < NATURAL GROUNDWATER RECHARGE^{i,10,13}

WATERGY

of AVG CA HOMES THAT COULD BE POWERED W/kWh USED TO MOVE & TREAT SB's WATER^{i,14,15} 1,992

TOTEM SPECIES

PLANT: Gambel's Watercress (*Rorippa gambelii*) AMPHIBIAN: Arroyo Toad (*Bufo californicus*)

MAMMAL: Southern Sea Otter (*Enhydra lutris nereis*) INSECT: Kern Primrose Sphinx Moth (*Euproserpinus euterpe*)

FISH: Tidewater Goby (*Eucyclogobius newberryi*) BIRD: Light-Footed Clapper Rail (*Rallus longirostris levipes*) Plus more species online¹⁶

SANTA BARBARA PLACE-ASSESSMENT NOTES

- a. Altitude angle (a.k.a., elevation angle) refers to the number of degrees the sun is located above the horizon at a given time and date.
- b. The winter-solstice shadow ratio is the object's height : length of object's shadow cast on December 21 at given time. The longest noontime shadow of the year occurs on December 21. The shadow ratio is 1 : x, where $x = 1 \div \tan(\text{altitude angle})$. At noon on the winter solstice, the altitude angle = $90 - (\text{latitude} + 23.44)$.
- c. Azimuth is the angle formed between a reference direction (here, due south) to the point on the horizon directly below a given object.
Solar noon is the time on any day when the sun's azimuth is 0° . The 9 am & 3 pm winter-solstice azimuth indicates the sun's deviation, in degrees, east/west of due south at those times ($-/+ 3$ hours from solar noon) on December 21.
- d. The direction of a prevailing wind is the direction from which the wind blows. The maximum wind speed is highest peak gust (maximum 5-second average) in the given period of record of 1998–2008. The peak gust given here occurred on 12/27/2006.
- e. An evaporation pan holds water whose depth is measured daily as water evaporates. These data allow us to determine evaporation rates at a given location. Compare average rainfall (water gain) to potential water loss via evaporation by looking up pan-evaporation rates for your area. If pan-evaporation rates exceed rainfall rates, you are in a dryland environment, where evaporation-reducing strategies such as mulch, windbreaks, shading, and covered water storage are very important.
- f. Calculated in situ w/ average rainfall, area, & population
- g. City proper
- h. Depths to groundwater vary seasonally and annually based on many factors. This well (Site ID # 342630119442301 - 004N027W08M0055) is located in Santa Barbara, California, northwest of the intersection of State St and North Ontare Rd. This well's lowest water level during the period of record October 1987 – July 2012 was 138.93 ft below land surface on November 4, 2010; the highest water level for the same period was 39.18 ft below land surface on January 20, 2004. To minimize variations due to seasonality, both water levels given above were measured in July of their respective years. The 1988 number is the median of 62 measurements taken that month; the 2012 number is a single reading taken on July 27, 2012.
- i. According to appendix C of the 2011 County report cited in reference 12: "[Groundwater p]umpage not required due to surplus surface supplies" in the Santa Barbara Groundwater Basin. A surplus of 2,838 acre-feet was noted. This is being construed to mean that current extraction from this basin is less than natural groundwater recharge. Further, per the 2010 City report cited in reference 13, "Groundwater levels remain high in the downtown storage basin, since pumping has been less than the annual recharge rate during the past decade. Levels in the upper State Street area are lower than normal due to additional use of groundwater to meet water quality requirements.... The City used 1,273 AF of groundwater during 2010."
- j. In 2010, the Cater Water Treatment plant used 2,366,264 kWh, El Estero Wastewater Treatment Facility used 6,400,859 kWh, & 5,261,384 kWh were used to pump SB's water, a total of 14,028,507 kWh (per reference 14). The average California household used 587 kWh/month in 2009 (per reference 15), for an annual average of 7,044 kWh/household. Divide 14,028,507 kWh/year by 7,044 kWh/household/year to get 1,992 households that could have been powered with that energy.

CREDITS: Brad Lancaster, Resource concept, research, content oversight | **Megan Hartman**, Research, Resource creation

SANTA BARBARA PLACE-ASSESSMENT REFERENCES

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2. Rainwater Harvesting for Drylands & Beyond, Vol 1, or esrl.noaa.gov/gmd/grad/solcalc, accessed 7/27/2012
3. RWHDB Vol 1, or Mar 21 = $90 - \text{latitude}$, Jun 21 = $90 - (\text{latitude} - 23.44)$, Sep 21 = $90 - \text{latitude}$, Dec 21 = $90 - (\text{latitude} + 23.44)$
4. Santa Barbara AP, www.wrcc.dri.edu/htmlfiles/westwinddir.html#CALIFORNIA, accessed 7/27/2012
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