ONE-PAGE PLACE ASSESSMENT: SAN DIEGO, CALIFORNIA

LOCATED IN THE LAGUNA–SAN DIEGO COASTAL SUBWATERSHED WITHIN THE CALIFORNIA WATERSHED

CLIMATE ⚐1

AVERAGE HIGH & LOW TEMPERATURES[1] *1914–2013*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F HIGH	64.8	65.2	65.9	67.4	68.6	70.9	74.8	76.3	75.7	72.9	69.9	65.8	69.9
°F LOW	48.1	49.7	51.9	54.7	58.1	60.8	64.4	65.7	63.9	59.3	52.9	48.7	56.5
°C HIGH	18.2	18.4	18.8	19.7	20.3	21.6	23.8	24.6	24.3	22.7	21.1	18.8	21.1
°C LOW	8.9	9.8	11.1	12.6	14.5	16.0	18.0	18.7	17.7	15.2	11.6	9.3	13.6

RECORD HIGH[1] 111° F | 43.9° C | *September 26, 1963* — RECORD LOW[1] 29° F | -1.7° C | *January 4, 1949*

SUN ⚐2

LATITUDE 32.7°

ELEVATION 61 FT / 18.6 m

	MAR 21	JUN 21	SEP 21	DEC 21
DEGREES N or S of DUE EAST THE SUN RISES[2]	0°	29°N	0°	28°S
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]	57°	81°	57°	34°

SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO[b] 1 : 1.49 ...AND AZIMUTH[c] 0°

9AM & 3PM WINTER-SOLSTICE SHADOW RATIO[b,2] 1 : 2.84 ...AND AZIMUTH[c,2] 43°

WIND ⚐3

MAX SPEED[6] 64 MPH | 103 km/h

PREVAILING WIND DIRECTION (FROM WHERE)[4] & AVERAGE SPEED[5]

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
	W	W	W	W	WSW	WSW	WSW	WSW	WNW	W	W	W	
MPH	5.1	5.9	6.3	6.9	6.8	6.7	6.5	6.3	6.1	5.5	5.0	4.7	6.0
km/h	8.2	9.5	10.1	11.1	10.9	10.8	10.5	10.1	9.8	8.8	8.0	7.6	9.7

WATER ⚐4

AVERAGE RAINFALL (GAIN)[1] *1914–2013*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	2.00	1.98	1.63	0.78	0.21	0.05	0.02	0.06	0.17	0.51	0.97	1.77	10.15
mm	50.8	50.3	41.4	19.8	5.3	1.3	0.5	1.5	4.3	13.0	24.6	45.0	257.8

AVERAGE PAN EVAPORATION (POTENTIAL LOSS)[d,7] *1948–2005*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	2.81	3.45	5.03	6.06	6.76	6.96	7.63	7.48	6.21	5.02	3.58	2.78	63.77
mm	71.4	87.6	127.8	153.9	171.7	176.8	193.8	190.0	157.7	127.5	90.9	70.6	1,619.8

WETTEST YEAR'S RAIN[1] 24.93 INCHES | 633.2 mm | *1941* — DRIEST YEAR'S RAIN[1] 3.41 INCHES | 86.6 mm | *1953*

LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION[8]

182 DAYS: *April 18 – October 16, 2004*

RAINFALL INCOME[e] 117 GPCD / 444 lpcd

AREA[f,9] 325.2 SQ MILES / 842 km²

POPULATION[f,9] 1,338,348 *2012 estimate*

UTILITY-WATER USE[10] 131 GPCD / 496 lpcd

HISTORICAL | DEPTH TO GROUNDWATER[g,11] | CURRENT

CURRENT GROUNDWATER EXTRACTION | NATURAL GROUNDWATER RECHARGE[h,12]

WATERGY ⚐5

% OF CALIFORNIA'S ELECTRICITY CONSUMPTION USED FOR WATER-RELATED PURPOSES[i,13] 19%

TOTEM SPECIES ⚐6

PLANT: Salt Marsh Bird's-beak *(Cordylanthus maritimus ssp. maritimus)* MAMMAL:

FISH: MEGAFAUNA: California condor *(Gymnogyps californianus)* REPTILE:

AMPHIBIAN: California Tiger Salamander *(Ambystoma californiense)* BIRD: Western Snowy plover *(Charadrius alexandrinus nivosus)* 14

FOR MORE INFORMATION & HOW TO APPLY IT

⚐**1.** For more CLIMATE information, see the introduction, chapters 1, 2, & 4, and appendix 5 of *Rainwater Harvesting for Drylands and Beyond (RWHDB), Volume 1, 2nd Edition*

⚐**2.** For more SUN information, see chapters 2 & 4 and appendices 5 & 7

⚐**3.** For more WIND information, see chapters 2 & 4 and appendices 5 & 9

⚐**4.** For more WATER information, see the introduction, chapters 1–4, and appendices 1–5

⚐**5.** For more WATERGY information, see chapters 2 & 4 and appendix 9

⚐**6.** For more TOTEM SPECIES information: the ethics, principles, and strategies throughout *RWHDB* help us shift from a negative to a positive impact on these species and their habitats and ecosystems, on which our quality of life also depends.

SAN DIEGO 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 solar-noon winter-solstice shadow ratio is the object's height : length of object's shadow cast on December 21 at noon (the longest noontime shadow of the year). The ratio is 1 : x, where x = 1 ÷ tangent (90 - (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. 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.

e. Calculated in situ w/ average rainfall, area, & population

f. City proper

g.

h.

i. In addition to this electricity used for water-related purposes (supply & treatment, ag use, end-users & wastewater), 32% of the state's annual natural gas consumption & 88,000,000 gallons of diesel fuel were also used for these purposes in 2005 (ref. 13). Groundwater pumping can also be reduced with the on-site harvest of free on-site waters as advocated in this book. In addition, energy conservation and renewable on-site power production can reduce groundwater pumping associated with thermoelectric energy production. See appendix 9 of *RWHDB, Volume 1,* to compare costs of our water and energy options.

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

SAN DIEGO PLACE-ASSESSMENT REFERENCES

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2. Rainwater Harvesting for Drylands & Beyond, Vol 1, or esrl.noaa.gov/gmd/grad/solcalc, accessed 6/27/2013

3. RWHDB Vol 1, or Mar 21 = 90–latitude, Jun 21 = 90–(latitude–23.44), Sep 21 = 90–latitude, Dec 21 = 90–(latitude+23.44)

4. San Diego–Montgomery Field, www.wrcc.dri.edu/htmlfiles/westwinddir.html#CALIFORNIA, accessed 6/27/2013

5. San Diego—Montgomery Field, www.calclim.dri.edu/ccda/comparative/avgwind.html, accessed 6/27/2013

6. www.myforecast.com/bin/climate.m?city=12152, accessed 6/27/2013

7. Chula Vista, www.wrcc.dri.edu/htmlfiles/westevap.final.html#CALIFORNIA, accessed 6/24/2013

8. Michelle Breckner, Service Climatologist, WRCC, via phone 6/19/2013

9. Census.gov, accessed 6/25/2013

10. Chris Robbins, City of San Diego Water Conservation Supervisor, via phone, 6/28/2013

11.

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13. California Energy Commission's Final Staff Report on California's Water-Energy Relationship, 2005, www.energy.ca.gov/-2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.pdf, accessed 6/28/2013

14. ecos.fws.gov/tess_public/countySearch!speciesByCountyReport.action?fips=06083, accessed 6/28/2013