CLIMATE [?1] AVERAGE HIGH & LOW TEMPERATURES' 1914 – 2013 JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ANNUAL F. HIGH 56.5 59.8 615.6 62.8 63.9 661 65.8 666 69.8 69.1 63.7 54.5 55.5 54.4 51.0 75.3 63.6 FLOW 45.7 74.9 48.8 49.7 71.1 77.7 18.9 18.8 19.2 10.0 60.6 17.6 14.1 17.6 CLIOW 7.6 8.8 9.3 9.8 10.6 11.6 12.1 12.5 13.1 12.4 10.6 8.2 10.6 RECORD HIGH 103° F 39.4° C July 17. 1988 RECORD LOW 27° F -2.8° C December 13. 1932 LATITUDE 37.8° SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO 11:82 AND AZIMUTH 0° 30°S SOLAR-NOON WINTER-SOLSTICE SHADOW	ONE-PAGE PLACE ASSESSMENT: SAN FRANCISCO, CALIFORNIA LOCATED IN THE SAN FRANCISCO BAY SUBWATERSHED WITHIN THE CALIFORNIA WATERSHED														
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ANNUAL F HUGI 56.5 59.8 615 62.8 63.9 66.1 65.8 66.6 69.8 69.1 63.7 54.4 51.0 75.3 63.6 CHICH 13.6 16.4 17.1 17.7 18.9 18.8 19.2 21.0 20.6 7.6 14.1 17.6 CLICW 7.6 8.8 9.3 9.8 10.6 11.6 12.1 12.5 33.1 12.4 10.6 8.2 10.6 RECORD HIGH ¹ 103° F 39.4° C July 17, 1988 RECORD LOW ¹ 27° F -2.8° C December 11, 1922 LATITUDE 37.8° DEGREES N or S of DUE EAST THE SUN RISES ¹ 0° 31°N 0° 30°S Solar-NOON AITTUDE ANGLE (ABOVE HORIZON) ¹⁷⁴ 52° 76° 52° 29° 29° ELEVATION 51 f15.5 f1 50.4R															
FLOW 45.7 47.9 48.8 49.7 51.1 52.9 53.7 54.5 55.5 54.4 51.0 46.8 51.0 'C HIGH 13.6 15.4 16.4 17.1 17.7 18.9 18.8 19.2 21.0 20.6 17.6 14.1 17.6 'C HIGH 13.6 19.4 0.1 11.6 12.1 12.5 13.1 12.4 10.6 8.2 10.6 RECORD HIGH* 10.8* 39.4*°C July 17, 1988 RECORD LOW 27* F -2.8*C December 17, 1932 LATITUDE 37.8* DEGREES N or S of DUE EAST THE SUN RISES' 0* 31*N 0* 30*S SOLAR-NOON ALITITUDE ANCLE (ABOVE HORIZON)** 11:1.82 AND AZIMUTH* 0* 30*S SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO* 11:3.25 AND AZIMUTH* 0* 30*S PREVAILING WIND DIRECTION (FROM WHERE)* & AVERAGE SPED' MAX SPED' 71.14 11.5 11.6 16.6 WIND 13.2 16.4 </td <td></td> <td>JAN</td> <td>FEB</td> <td>MAR</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ANNUAL</td>		JAN	FEB	MAR										ANNUAL	
C HIGH 13.6 15.4 16.4 17.1 17.7 18.9 18.8 19.2 21.0 20.6 17.6 14.1 17.6 'C LOW 7.6 8.8 9.3 9.8 10.6 11.6 12.1 12.5 13.1 12.4 10.6 8.2 10.6 RECORD HIGH' 10.3" F 39.4" C July 17, 1988 RECORD LOW' 27" F -2.8" C December 17, 1922 SUN \$7.8" DEGREES N or S of DUE EAST THE SUN SETS' 0" 31"N 0" 30"S SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO" 11.82 AND AZIMUTH' 0" 30"S 9AM & 3PM WINTER-SOLSTICE SHADOW RATIO" 11.82 AND AZIMUTH' 42" VIND F3 AND AZIMUTH' 42" AND AZIMUTH' 42" JAN F8 MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN F8 MAR APR MAY JUN JUL AUG	[°] F нідн	56.5	59.8	61.5	62.8	63.9	66.1	65.8	66.6	69.8	69.1	63.7	57.3	63.6	
C LOW 7.6 8.8 9.3 9.8 10.6 11.6 12.1 12.4 10.6 8.2 10.6 RECORD HIGH ¹ 10.3° F 39.4° C July 17, 1988 RECORD LOW ¹ 27° F -2.8° C December 17, 1932 SUN F2 DEGREES N or S of DUE EAST THE SUN RISES ² 0° 31°N 0° 30°S LATITUDE 37.8° DEGREES N or S of DUE EAST THE SUN RISES ² 0° 31°N 0° 30°S SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON) ^{2.20} 52° 7° 52° 7° 52° 7° 52° 7° 52° 7° 52° 7° 52° 7° 52° 7° 11 42° LEVATION 51 F1 SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO ¹ 11.8.20 AND AZIMUTH ² 42° MIN PREVAILING WIND DIRECTION (FROM WHERE) ⁴ & AVERAGE SPEED ⁷ AND AZIMUTH ² 42° 11.16 16.66 MMH 67.8 20.12.1 31.6 14.1 12.9 12.3	°F LOW	45.7	47.9	48.8	49.7	51.1	52.9	53.7	54.5	55.5	54.4	51.0	46.8	51.0	
RECORD HIGH 103° F 39.4° C July 17, 1988 RECORD LOW 27° F -2.8° C December 11, 1932 SUN [?]2 MAR 21 JUN 21 SEP 21 DEC 21 LATITUDE 37.8° DEGREES N or S of DUE EAST THE SUN RISES' 0° 31°N 0° 30°S SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON) ^{16,23} 52° 76° 52° 29° ELEVATION 51 fT SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO° 1:1.82 AND AZIMUTH' 0° 9AM & 3PM WINTER-SOLSTICE SHADOW RATIO° 1:3.56 AND AZIMUTH' 42° MIND [?]3 MAX SPEED' 71.114 JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC MM*	°C HIGH	13.6	15.4	16.4	17.1	17.7	18.9	18.8	19.2	21.0	20.6	17.6	14.1	17.6	
SUN P2 MAR 21 JUN 21 SEP 21 DEC 21 LATITUDE 37.8° DEGREES N or S of DUE EAST THE SUN RISES' 0° 31°N 0° 30°S SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON) ^{1.2.3} 52° 76° 52° 29° ELEVATION 51 f1 solar-NOON ALTITUDE ANGLE (ABOVE HORIZON) ^{1.2.3} 52° 76° 52° 29° SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON) ^{1.2.3} 51 mAX solar-NOON WINTER-SOLSTICE SHADOW RATIO° 1:1.82 AND AZIMUTH' 42° WIND F3 MAX MAX YUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP CT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP CT NOV DEC	°C LOW	7.6	8.8	9.3	9.8	10.6	11.6	12.1	12.5	13.1	12.4	10.6	8.2	10.6	
DEGREES N or S of DUE EAST THE SUN RISES ² 0° 31°N 0° 30°S LATITUDE 37.8° DEGREES N or S of DUE WEST THE SUN SETS ² 0° 31°N 0° 30°S SOLAR-NOON ALITITUDE ANGLE (ABOVE HORIZON) ^{0,23} 52° 76° 52° 76° 52° 29° ELEVATION 51 T SOLAR-NOON MUINTER-SOLSTICE SHADOW RATIO ¹⁰ 1:1.82 AND AZIMUTH ² 42° WIND P3 WINTER-SOLSTICE SHADOW RATIO ¹⁰ 1:3.56 AND AZIMUTH ² 42° JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV MAX APR JAN FEB MAR MAY MAY W W W W N NN	RECO	RD HI	5H1 <mark>1(</mark>	D3° F	39.4° C	July 17	7, 1988	RECO	RD LOV	V ¹ 27°	F -	2.8° C	Decembe	<mark>r 11, 1932</mark>	
DEGREES N or S of DUE EAST THE SUN RISES ² 0° 31°N 0° 30°S LATITUDE 37.8° DEGREES N or S of DUE WEST THE SUN SETS ² 0° 31°N 0° 30°S SOLAR-NOON ALITITUDE ANGLE (ABOVE HORIZON) ^{0,23} 52° 76° 52° 76° 52° 29° ELEVATION 51 T SOLAR-NOON MUINTER-SOLSTICE SHADOW RATIO ¹⁰ 1:1.82 AND AZIMUTH ² 42° WIND P3 WINTER-SOLSTICE SHADOW RATIO ¹⁰ 1:3.56 AND AZIMUTH ² 42° JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV MAX APR JAN FEB MAR MAY MAY W W W W N NN	SUN P2 MAR 21 JUN 21 SEP 21 DEC 21														
LATITUDE 37.8° DEGREES N or S of DUE WEST THE SUN SETS ² 0° 31°N 0° 30°S SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON) ^{1,2,3} 52° 76° 52° 29° ELEVATION 51 57 FT SOLAR-NOON WINTER-SOLSTICE SHADOW RATION 1:1.82 AND AZIMUTH? 42° WIND F3 SOLAR-NOON WINTER-SOLSTICE SHADOW RATION 1:3.56 AND AZIMUTH? 42° MIN FEE MAR APR MAY JUN JUL AUG SEP OCT NOV VO JAN FEE MAR APR MAY JUN JUL AUG SEP OCT NOV VO MAX ANNUAL MPH 6.7 8.2 10.2 12.1 13.6 14.1 12.9 12.3 10.6 9.0 7.2 7.2 10.3 km/h 10.8 13.2 16.4 19.5 21.9 22.7 20.8 19.8 17.1 14.5 11.6 11.6 16.6 JAN FEB MAR APR MAY JUN JUL <td colspan="10"></td> <td>0°</td> <td>31°N</td> <td>0°</td> <td>30°S</td>											0°	31°N	0°	30°S	
ELEVATION 51 15.5 m FT SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO ⁶ 1:1.82 AND AZIMUTH ⁶ 0° 9AM & 3PM WINTER-SOLSTICE SHADOW RATIO ⁶ 1:3.56 AND AZIMUTH ⁶ 42° WIND P3 MAX SPEED ⁵ MAX SPEED ⁵ MAX SPEED ⁵ MR APR MAY JUN AUG SEP OCT NOV DEC N NW W W W W W W N ANNUAL MPH 6.7 8.2 10.2 12.1 13.6 14.1 12.9 12.3 10.6 9.0 7.2 7.2 10.3 km/h 10.8 13.2 16.4 19.5 21.9 22.7 20.8 19.8 17.1 14.5 11.6 11.6 16.6 WATER P4 AVERAGE RAINFALL (GAIN) 1914 - 2013 ANNUAL ANNUAL ANNUAL ANNUAL 10.5 3.81 2.90 1.42 0.57 0.16 0.02 0.05 0.22 1.05 2.57 4.04 2.16.6 INCHES 1.7 2.4 3.8	LATI	TUDE	37.8°			DEGREE	S N or S o	f DUE WE	EST THE S	UN SETS ²	0°	31°N	0°	30°S	
Instant SOLAR-NOON WINTER-SOLSTICE SHADOW RATION I : 1.32 AND AZIMUTH 0° 9AM & 3PM WINTER-SOLSTICE SHADOW RATION I : 3.56 AND AZIMUTH 42° WIND PREVAILING WIND DIRECTION (FROM WHERE) & AVERAGE SPEED MAX SPEED MAX JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC MMH 10.8 13.2 16.4 19.5 21.9 22.7 20.8 19.8 17.1 14.5 11.6 16.6 WATER F14 AVERAGE RAINFALL (GAIN) ¹ 1914 - 2013 AUG S5.6 2.6.7 4.04 21.16 INCHES 4.35 3.81 2.90 1.42 0.57 0.16 0.02 0.05 0.22 1.05 2.5.7 4.04 <td colspan="14"></td>															
15.5 m SOUR NOTICE SINCE S															
MAX SPEED MAX SPEED MAX SPEED MAR APR MAY JUN JUL AUC SPEED MPH MAN MINU MAN MINU MAX MAN MAY MUL MAY MUL MAY MAY MUL			15.5	l m										120	
PREVAILING WIND DIRECTION (FROM WHERE) ⁴ & AVERAGE SPEED ⁵ MPH im/h JAN FEB MAR APR MAY JUN JUN SEP OCT NOV DEC N NW W W W W W W W W W N ANNUAL MPH 6.7 8.2 10.2 12.1 13.6 14.1 12.9 12.3 10.6 9.0 7.2 7.2 10.3 km/h 10.8 13.2 16.4 19.5 21.9 22.7 20.8 19.8 17.1 14.5 11.6 11.6 16.6 VEXATER FEB NAR APR AVERAGE RAINFALL (GAIN) ¹ 1914 - 2013 INCHES 3.8.1 2.9.0 1.42 0.57 0.16 0.02 0.05 0.22 1.05 2.57 4.04 2.16 <td c<="" td=""><td></td><td></td><td></td><td></td><td>yam & 3</td><td>PM WINI</td><td>EK-SULS</td><td>ICE SHAL</td><td></td><td></td><td>. 00.0</td><td>and Az</td><td></td><td>42</td></td>	<td></td> <td></td> <td></td> <td></td> <td>yam & 3</td> <td>PM WINI</td> <td>EK-SULS</td> <td>ICE SHAL</td> <td></td> <td></td> <td>. 00.0</td> <td>and Az</td> <td></td> <td>42</td>					yam & 3	PM WINI	EK-SULS	ICE SHAL			. 00.0	and Az		42
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC N NW W W W W W W W NOV NOV DEC MPH 6.7 8.2 10.2 12.1 13.6 14.1 12.9 12.3 10.6 9.0 7.2 7.2 10.3 km/h 10.8 13.2 16.4 19.5 21.9 22.7 20.8 19.8 17.1 14.5 11.6 16.6 VATER FP4 AVER MAY JUN JUL AUG SEP OCT NOV DEC ANNUAL INCHES 3.81 2.90 1.42 0.57 0.16 0.02 0.05 0.22 1.05 2.57 4.04 2.16 INCHES 1.7 2.4 3.8 5.3 6.4 7.1 6.7 6.6 5.9 4.4 2.4 1.7 5.4	۱	NIN					CTION (4 0 0 (5)			SPEED ⁴		
N NW W W W W W W W NW NW NN ANNUAL MPH 6.7 8.2 10.2 12.1 13.6 14.1 12.9 12.3 10.6 9.0 7.2 7.2 10.3 km/h 10.8 13.2 16.4 19.5 21.9 22.7 20.8 19.8 17.1 14.5 11.6 11.6 16.6 WATER F8 MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ANNUAL INCHES 4.35 3.81 2.90 1.42 0.57 0.16 0.02 0.05 0.22 1.05 2.57 4.04 2.16 mm 110.5 96.8 73.7 36.1 14.5 4.1 0.5 1.3 5.6 26.7 65.3 102.6 53.75 INCHES 1.7 2.4 3.8 5.3 6.4 7.1		JAN											DEC	/VVPH km/h	
MPH 6.7 8.2 10.2 12.1 13.6 14.1 12.9 12.3 10.6 9.0 7.2 7.2 10.3 km/h 10.8 13.2 16.4 19.5 21.9 22.7 20.8 19.8 17.1 14.5 11.6 11.6 16.6 WATER P4 AVERACE RAINFALL (GAIN) ¹ 1974 - 2073 ANNUAL ANNUAL INCHES 3.81 2.90 1.42 0.57 0.16 0.02 0.05 0.22 1.05 2.57 4.04 21.16 mm 110.5 96.8 73.7 36.1 14.5 4.1 0.5 1.3 5.6 26.7 65.3 102.6 537.5 INCHES 1.7 2.4 3.8 5.3 6.4 7.1 6.7 6.6 5.9 4.4 2.4 1.7 54.4 m 43.2 61.0 96.5 134.6 162.6 180.3 170.2 167.6 149.9 111.8 61.0 43.2 1,381.8 WETTERY PAR'S RAIN ¹ 43.8 INCHES <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>ANNUAL</td></th<>														ANNUAL	
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JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ANNUAL INCHES 4.35 3.81 2.90 1.42 0.57 0.16 0.02 0.05 0.22 1.05 2.57 4.04 21.16 mm 110.5 96.8 73.7 36.1 14.5 4.1 0.5 1.3 5.6 26.7 65.3 102.6 537.5 AVERAGE PAN EVAPORATION (POTENTIAL LOSS) ^{d.6} INCHES 1.7 2.4 3.8 5.3 6.4 7.1 6.7 6.6 5.9 4.4 2.4 1.7 54.4 mm 43.2 61.0 96.5 134.6 162.6 180.3 170.2 167.6 149.9 111.8 61.0 43.2 1,381.8 WETTEST YEAR'S RAIN ¹ 43.8 INCHES 1,111 mm 1983 DRIEST YEAR'S RAIN ⁷ 5.6 INCHES 142 mm 2013 LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION ⁸ RAINFALL INCOME ⁶ 57 GPCD 216 lpcd			2												
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AVERAGE PAN EVAPORATION (POTENTIAL LOSS) ^{d,6} INCHES 1.7 2.4 3.8 5.3 6.4 7.1 6.7 6.6 5.9 4.4 2.4 1.7 54.4 mm 43.2 61.0 96.5 134.6 162.6 180.3 170.2 167.6 149.9 111.8 61.0 43.2 1,381.8 WETTEST YEAR'S RAIN ¹ 43.8 INCHES 1,111 mm 1983 DRIEST YEAR'S RAIN ² 5.6 INCHES 142 mm 2013 LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION ⁸ RAINFALL INCOME ^e 57 GPCD 199 DAYS: MARCH 21 - SEPTEMBER 16, 1982 UTILITY-WATER USE ^{5.10} 49 GPCD AREA ¹⁹ 46.87 SQ MILES POPULATION ¹⁹ 825,863 UTILITY-WATER USE ^{5.10} 49 GPCD HISTORICAL DEPTH TO GROUNDWATER ^{h,11,12} CURRENT CURRENT GROUNDWATER EXTRACTION NATURAL GROUNDWATER RECHARGE ^{113,14} CURRENT VMATERGY P5 # of AVG CA HOMES THAT COULD BE POWERED W/ ENERGY TO MOVE & TREAT SF'S WATER ^{15,10} 1,480 TOTEM SPECI															
INCHES 1.7 2.4 3.8 5.3 6.4 7.1 6.7 6.6 5.9 4.4 2.4 1.7 54.4 mm 43.2 61.0 96.5 134.6 162.6 180.3 170.2 167.6 149.9 111.8 61.0 43.2 1,381.8 WETTEST YEAR'S RAIN ¹ 43.8 INCHES 1,111 mm 1983 DRIEST YEAR'S RAIN ⁷ 5.6 INCHES 142 mm 2013 LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION ⁸ RAINFALL INCOME ⁶ 57 GPCD 199 DAYS: MARCH 21 - SEPTEMBER 16, 1982 UTILITY-WATER USE ^{6,10} 49 GPCD 121.3 km ² POPULATION ^{6,9} 825,863 UTILITY-WATER USE ^{6,10} 49 GPCD 1850 Igcd DEPTH TO GROUNDWATER Igcd 2012 est. UTILITY-WATER USE ^{6,10} 49 GPCD HISTORICAL DEPTH TO GROUNDWATER NATURAL GROUNDWATER FULL Igcd 10,20 I		110.5	20.0					0.0				05.5	102.0	557.5	
mm 43.2 61.0 96.5 134.6 162.6 180.3 170.2 167.6 149.9 111.8 61.0 43.2 1,381.8 WETTEST YEAR'S RAIN 43.8 INCHES 1,111 mm 198.3 DRIEST YEAR'S RAIN ⁷ 5.6 IVENES 142 mm 2013 LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION ⁸ RAINFALL INCOME* 57 GPCD 216 Ipcd 199 DAYS: MARCH 21 - SEPTEMBER 16, 1982 UTILITY-WATER USE ^{8,10} 49 GPCD 121.3 km ² POPULATION ¹⁹ 825,863 UTILITY-WATER USE ^{8,10} 49 GPCD HISTORICAL DEPTH TO GROUNDWATER ^{11,12} CURRENT CURRENT CURRENT VATERGY 5 # of AVG CA HOMES THAT COULD BE POWERED W/ ENERGY TO MOVE & TREAT SF'S WATER ^{15,10} 1,480 MATURAL GROUNDWATER RECHARGE 1,480 F6 MEGAFAUNA: Southern sea otter (Enhydra lutris nereis) MAMMAL: Townsend's big-eared bat (Corynothius townsendit) F1 Delta smelt (Hypomesus transpacificus) AMPHIBIAN: California red-legged frog (Rana draytonii) INSECT: Bay checkerspot butterfly (INCHES	17	24									24	17	54.4	
WETTEST YEAR'S RAIN ¹ 43.8 INCHES 1,111 mm 1983 DRIEST YEAR'S RAIN ⁷ 5.6 INCHES 142 mm 2013 LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION ⁸ RAINFALL INCOME ^e 57 GPCD 199 DAYS: MARCH 21 – SEPTEMBER 16, 1982 AREA ^{f,9} 46.87 SQ MILES POPULATION ^{f,9} 825,863 UTILITY-WATER USE ^{g,10} 49 GPCD 121.3 km ² 2012 est. UTILITY-WATER USE ^{g,10} 49 GPCD 185 Ipcd HISTORICAL DEPTH TO GROUNDWATER ^{h,11,12} CURRENT CURRENT GROUNDWATER EXTRACTION NATURAL GROUNDWATER RECHARGE ^{1,13,14} WATERGY 5 # of AVG CA HOMES THAT COULD BE POWERED W/ ENERGY TO MOVE & TREAT SF'S WATER ^{15,16} 1,480 TOTEM SPECIES F ₆ MEGAFAUNA: Southern sea otter (Enhydra lutris nereis) MAMMAL: Townsend's big-eared bat (Corynorhinus townsendii) FISH: Delta smelt (Hypomesus transpacificus) AMPHIBIAN: California red-legged frog (Rana draytonii) INSECT: Bay checkerspot butterfly (Euphydryas editha bayensis)															
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FOR MORE INFORMATION & HOW TO APPLY IT

- I. 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
- \triangleright **2.** For more SUN information, see chapters 2 & 4 and appendices 5 & 7
- ho**3.** For more WIND information, see chapters 2 & 4 and appendices 5 & 9
- P4. For more WATER information, see the introduction, chapters 1–4, and appendices 1–5
- P5. 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 FRANCISCO 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. According to one definition, if pan-evaporation rates exceed rainfall rates, you are in a dryland environment. Another definition states that drylands are "land areas where the mean annual precipitation is less than two thirds of potential evaporanspiration (potential evaporation from soil plus transpiration by plants), excluding polar regions and some high mountain areas which meet this criterion but have completely different ecological characteristics" (Greenfacts.org). Stated as a ratio of rainfall to pan evaporation, the cut-off for drylands is 1:1.5; when the number on the right is higher than 1.5, the environment is drylands. The higher the ratio of potential evaporation to rainfall, the more important evaporation-reducing strategies such as mulch, windbreaks, shading, and covered water storage become. The data above for San Francisco, estimated totals computed from meteorological measurements using a form of the Penman equation, yield a rainfall:pan-evaporation ratio of 1:2.57. Therefore, per both definitions above, San Francisco's is a drylands environment.
- e. Calculated in situ w/ average rainfall, area, & population

f. City proper

g. San Francisco's given gpcd is the average retail per-capita use of the 10-year period from FY 2000–2001 to FY 2009–2010. **h.**

i.

j. Calculated with 49 gpcd (ref. 10), population = 825,863 (ref. 9), energy-for-water of 72.4 Wh/100 gallons (ref. 15), annual residential energy usage in California = 90.11 billion kWh (ref. 16), number of CA households = 12,466,331 (ref. 9).

CREDITS: Brad Lancaster, Resource concept | Megan Hartman, Resource creation & research

SAN FRANCISCO PLACE-ASSESSMENT REFERENCES

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- 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)
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