ONE-PAGE PLACE ASSESSMENT: POPE VALLEY, CALIFORNIA

LOCATED IN THE UPPER PUTAH SUBWATERSHED WITHIN THE CALIFORNIA WATERSHED

CLIMATE ⚐1

AVERAGE HIGH & LOW TEMPERATURES[1] — 1940 – 2012

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F HIGH	52.4	55.3	58.9	64.9	72.9	80.5	86.7	85.7	81.5	72.0	59.3	52.5	68.6
°F LOW	37.9	39.1	39.7	41.8	46.3	50.8	54.4	53.7	52.9	49.3	42.5	38.4	45.6
°C HIGH	11.3	12.9	14.9	18.3	22.7	26.9	30.4	29.8	27.5	22.2	15.2	11.4	20.3
°C LOW	3.3	3.9	4.3	5.4	7.9	10.4	12.4	12.1	11.6	9.6	5.8	3.6	7.6

RECORD HIGH[1]: 110° F | 43.3° C | *July 15, 1972*

RECORD LOW[1]: 14° F | -10.0° C | *December 9, 1972*

SUN ⚐2

LATITUDE: 38.7°

ELEVATION: 979 FT / 298 m

	MAR 21	JUN 21	SEP 21	DEC 21
DEGREES N or S of DUE EAST THE SUN RISES[2]	0°	31°N	0°	30°S
DEGREES N or S of DUE WEST THE SUN SETS[2]	0°	31°N	0°	30°S
SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON)[a,2,3]	51°	75°	51°	28°

SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO[b]: 1 : 1.89 ...AND AZIMUTH[c]: 0°

9AM & 3PM WINTER-SOLSTICE SHADOW RATIO[b,2]: 1 : 3.72 ...AND AZIMUTH[c,2]: 42°

WIND ⚐3

MAX SPEED[4]: 56 MPH | 90 km/h

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

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
	SE	SE	SW	SW	SW	SW	SW	SW	SW	N	N	SE	
MPH	9	9	10	10	11	13	10	10	10	10	9	9	10.0
km/h	14	14	16	16	18	21	16	16	16	16	14	14	16.1

WATER ⚐4

AVERAGE RAINFALL (GAIN)[1] — 1940 – 2012

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	8.54	7.28	5.21	2.50	1.06	0.31	0.03	0.11	0.42	2.31	5.06	7.84	40.67
mm	216.9	184.9	132.3	63.5	26.9	7.9	0.8	2.8	10.7	58.7	128.5	199.1	1,033.0

AVERAGE PAN EVAPORATION (POTENTIAL LOSS)[d,5] — 1957 – 1970

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	1.53	2.15	3.79	5.82	8.90	11.00	13.22	12.06	8.67	5.72	2.48	1.66	77.00
mm	38.9	54.6	96.3	147.8	226.1	279.4	335.8	306.3	220.2	145.3	63.0	42.2	1,955.8

WETTEST YEAR'S RAIN[1]: 88.89 INCHES | 2,258 mm | *1983*

DRIEST YEAR'S RAIN[1]: 19.00 INCHES | 483 mm | *1990*

LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION[6]: 156 DAYS: *May 21 – October 23, 2002*

RAINFALL INCOME[e]: 316,845 GPCD / 1,199,385 lpcd

AREA[f,7]: 131.4 SQ MILES / 340 km²

POPULATION[f,7]: 803 *2011 est.*

UTILITY-WATER USE[g,8]: GPCD / lpcd

DEPTH TO GROUNDWATER[h,9]: 19.0 FT | 5.8 m | *1979* ... 10.4 FT | 3.2 m | *1983*

CURRENT GROUNDWATER EXTRACTION

NATURAL GROUNDWATER RECHARGE[i,10]

WATERGY ⚐5

% of ANNUAL CA ELECTRICITY CONSUMPTION USED FOR WATER-RELATED PURPOSES[j,11]: 19%

TOTEM SPECIES ⚐6

PLANT: Napa bluegrass *(Poa napensis)* MAMMAL: Salt marsh harvest mouse *(Reithrodontomys raviventris)*

FISH: Delta smelt *(Hypomesus transpacificus)* BIRD: Western snowy plover *(Charadrius nivosus)* REPTILE: Giant garter snake *(Thamnophis gigas)*

AMPHIBIAN: California red-legged frog (Rana draytonii) MEGAFAUNA: Tule elk (Cervus canadensis nannodes)

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.

POPE VALLEY PLACE-ASSESSMENT NOTES

a. The solar-noon altitude angle (a.k.a., solar-noon elevation angle) refers to the number of degrees the sun is located above the equator-facing horizon at solar noon on the given date. In the northern hemisphere, the equator-facing horizon is to the south. In the southern hemisphere, the equator-facing horizon is to the north.

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. The nearest weather station to Pope Valley with available pan-evaporation data is Berryessa Lake SE of Pope Valley. Due to differences between the 2 locations' climatological conditions, Pope Valley's actual pan-evaporation rates will vary from those given. 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 evapotranspiration (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). 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.

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

f. City proper

g. Unincorporated towns in Napa Valley receive their water primarily from groundwater, with some surface water (including Lake Berryessa and Putah Creek). Some limited areas receive water and recycled water from municipalities (ref. 8).

h. These data are from the only USGS-listed well in Pope Valley. For seasonal consistency, both readings provided are from October. Well ID #USGS 383746122254001 007N005W04E001M, Latitude 38°37'46", Longitude 122°25'40".

i.

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

POPE VALLEY PLACE-ASSESSMENT REFERENCES

1. Angwin Pacific Union College station (#040212), wrcc.dri.edu, accessed 4/16/2014

2. Rainwater Harvesting for Drylands & Beyond, Vol 1, or esrl.noaa.gov/gmd/grad/solcalc, accessed 4/16/2014

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. Almananc: Historical Climate, Pope Valley, CA, www.myforecast.com/bin/climate.m?city=518713, accessed 4/18/2014

5. California Monthly Average Pan Evaporation, www.wrcc.dri.edu/htmlfiles/westevap.final.html#CALIFORNIA, accessed 4/16/2014

6. Steve Anderson, Forecaster, National Weather Service, San Francisco Bay Area office, via phone 4/16/2014

7. City-Data.com, 94567 Zip Code Detailed Profile, www.city-data.com/zips/94567.html, accessed 4/18/2014

8. Water Supply, www.napawatersheds.org/app_pages/view/191, accessed 4/18/2014

9. Groundwater levels for California, nwis.waterdata.usgs.gov/ca/nwis/gwlevels, accessed 4/18/2014

10.

11. California Energy Commission Final Staff Report on California's Water-Energy Relationship, 2005, www.energy.ca.gov, accessed 4/17/2014