ONE-PAGE PLACE ASSESSMENT: LAS CRUCES, NEW MEXICO

LOCATED IN THE EL PASO-LAS CRUCES & JORNADA DRAW SUBWATERSHEDS WITHIN THE RIO GRANDE WATERSHED

CLIMATE ⚐1

AVERAGE HIGH & LOW TEMPERATURES[1] — 1959 – 2013

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F HIGH	58.2	63.2	70.2	78.0	86.4	94.8	94.8	92.3	87.1	78.5	67.0	57.8	77.4
°F LOW	28.1	31.5	37.2	44.0	52.3	61.6	67.5	65.7	58.7	46.1	34.7	28.5	46.3
°C HIGH	14.6	17.3	21.2	25.6	30.2	34.9	34.9	33.5	30.6	25.8	19.4	14.3	25.2
°C LOW	-2.2	-0.3	2.9	6.7	11.3	16.4	19.7	18.7	14.8	7.8	1.5	-1.9	7.9

RECORD HIGH[1]: 110° F | 43.3° C | *June 28, 1994*

RECORD LOW[1]: -10° F | -23.3° C | *January 11, 1962*

SUN ⚐2

LATITUDE: 32.3°

ELEVATION: 3,908 FT / 1,191 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]	58°	81°	58°	34°

SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO[b]: 1 : 1.47 ...AND AZIMUTH[c]: 0°

9AM & 3PM WINTER-SOLSTICE SHADOW RATIO[b,2]: 1 : 2.80 ...AND AZIMUTH[c,2]: 44°

WIND ⚐3

MAX SPEED[6]: 69 MPH | 111 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	W	W	W	SE	W	W	W	W	W
MPH	6.4	7.5	8.8	10.1	8.7	8.2	6.8	6.0	6.2	6.1	6.4	6.0	7.3
km/h	10.3	12.1	14.2	16.3	14.0	13.2	10.9	9.7	10.0	9.8	10.3	9.7	11.7

WATER ⚐4

AVERAGE RAINFALL (GAIN)[d,1] — 1959 – 2013

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	0.47	0.37	0.22	0.21	0.33	0.68	1.55	2.08	1.36	0.85	0.46	0.69	9.27
mm	11.9	9.4	5.6	5.3	8.4	17.3	39.4	52.8	34.5	21.6	11.7	17.5	235.5

AVERAGE PAN EVAPORATION (POTENTIAL LOSS)[e,7] — 1959 – 2005

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	3.00	4.33	7.40	9.90	12.03	12.91	12.05	10.34	8.14	6.17	3.85	2.79	92.91
mm	76.2	110.0	188.0	251.5	305.6	327.9	306.1	262.6	206.8	156.7	97.8	70.9	2,359.9

WETTEST YEAR'S RAIN[8]: 19.60 INCHES | 498 mm | *1941*

DRIEST YEAR'S RAIN[1]: 3.44 INCHES | 87 mm | *1970*

LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION[9]: 126 DAYS: *February 15 – June 20, 2008*

RAINFALL INCOME[f]: 334 GPCD / 1,265 lpcd

AREA[g,10]: 76.49 SQ MILES / 198.0 km²

POPULATION[g,10]: 101,047 *2012 est.*

UTILITY-WATER USE[11]: 131 GPCD / 496 lpcd

HISTORICAL: 51 FT | 15.5 m | *1963*

DEPTH TO GROUNDWATER[h,12]: 71.68 FT | 21.9 m | *2013* CURRENT

CURRENT GROUNDWATER EXTRACTION

NATURAL GROUNDWATER RECHARGE[i,13]

WATERGY ⚐5

% of LAS CRUCES' MUNICIPAL ENERGY USED TO PUMP & TREAT WATER & WASTEWATER[14]: 48%

TOTEM SPECIES ⚐6

PLANT: Sneed's pincushion cactus *(Escobaria sneedii)* MAMMAL: Lesser long-nosed bat *(Leptonycteris yerbabuenae)*

FISH: Rio Grande minnow *(Hybognathus amarus)* BIRD: SW willow flycatcher *(Empidonax traillii extimus)* REPTILE: Rio Grande cooter *(Pseudemys gorzugi)*

AMPHIBIAN: Chiricahua leopard frog *(Lithobates chiricahuensis)* MEGAFAUNA: Mexican Wolf *(Canis lupus baileyi)*, Jaguar *(Panthera onca)* [15]

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.

LAS CRUCES 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. A second Las Cruces weather station (#294799) has a longer period of record and good completeness of data, and reports average annual precipitation of only 6.28 inches (1897–2012). NWS meteorologists were unable to explain the 3-inch

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. 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. Las Cruces' ratio of rainfall : pan evaporation = 1 : 10.

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

g. City proper

h. Well ID # USGS 321650106451201 MBOWN-53 - 23S.02E.29.243A (NMSU-2), located at 32°16'49", -106°45'11". Selected for its longest period of record among Las Cruces wells found on USGS site.

i.

CREDITS: Brad Lancaster, Resource concept & oversight | **Dael Goodman,** Primary research **| Megan Hartman,** Resource creation, secondary research

LAS CRUCES PLACE-ASSESSMENT REFERENCES

1. State University station (#298535), wrcc.dri.edu, accessed 4/8/2014

2. Rainwater Harvesting for Drylands & Beyond, Vol 1, or esrl.noaa.gov/gmd/grad/solcalc, accessed 4/9/2014

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. Prevailing Wind Direction, www.wrcc.dri.edu/htmlfiles/westwinddir.html#NEW%20MEXICO, accessed 4/8/2014

5. Average Wind Speed, www.wrcc.dri.edu/climatedata/climtables/westwind/#NEW%20MEXICO, accessed 4/8/2014

6. Almanac: Historical Information, Las Cruces, NM, www.myforecast.com/bin/climate.m?city=23701, accessed 4/8/2014

7. Average Monthly Pan Evaporation, www.wrcc.dri.edu/htmlfiles/westevap.final.html#NEW%20MEXICO, accessed 4/8/2014

8. Climate Guide, Las Cruces 1892–2000, aces.nmsu.edu/pubs/research/weather_climate/RR749.pdf, accessed 4/10/2014

9. Dave Hefner, Meteorologist, National Weather Service, El Paso office, via phone 4/10/2014

10. Census.gov, accessed 4/8/2014

11. Single-family residential = 131 gpcd; overall = 191 gpcd, las-cruces.granicus.com, accessed 4/8/2014

12. Groundwater levels for New Mexico, nwis.waterdata.usgs.gov/nm/nwis/gwlevels, accessed 4/9/2014

13.

14. 2013 data, per Lisa LaRocque, Sustainability Officer, City of Las Cruces, via phone 4/10/2014

15. Totem species selected by Dael Goodman of Las Cruces, New Mexico