ONE-PAGE PLACE ASSESSMENT: GALLUP, NEW MEXICO

LOCATED IN THE UPPER PUERCO SUBWATERSHED WITHIN THE LOWER COLORADO WATERSHED

CLIMATE ⚐1

AVERAGE HIGH & LOW TEMPERATURES[1] — *1973 – 2014*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F HIGH	44.53	48.86	56.34	64.67	74.18	85.18	87.77	85.06	78.90	67.62	54.58	45.10	66.07
°F LOW	13.23	18.26	22.47	27.82	36.33	44.69	53.89	52.68	43.91	30.59	19.94	13.10	31.44
°C HIGH	6.96	9.37	13.52	18.15	23.43	29.54	30.98	29.48	26.06	19.79	12.54	7.28	18.93
°C LOW	-10.43	-7.63	-5.29	-2.32	2.41	7.05	12.16	11.49	6.62	-0.78	-6.70	-10.50	-0.31

RECORD HIGH[1]: 100° F | 37.8° C | *July 28, 1995*

RECORD LOW[1]: -34° F | -36.7° C | *December 23, 1990*

SUN ⚐2

LATITUDE: 35.5°

ELEVATION: 6,519 FT / 1,988 m

	MAR 21	JUN 21	SEP 21	DEC 21
DEGREES N or S of DUE EAST THE SUN RISES[2]	0°	30°N	0°	29°S
DEGREES N or S of DUE WEST THE SUN SETS[2]	0°	30°N	0°	29°S
SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON)[a,2,3]	55°	78°	55°	31°

SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO[b]: 1 : 1.66 ...AND AZIMUTH[c]: 0°

9AM & 3PM WINTER-SOLSTICE SHADOW RATIO[b,2]: 1 : 3.20 ...AND AZIMUTH[c,2]: 43°

WIND ⚐3

MAX SPEED[5]: 74 MPH | 119 km/h

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

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
	SW	SW	SW	SW	WSW	WSW	S	S	WSW	SW	SW	SW	SW
MPH	5.6	7.0	8.0	10.1	8.9	8.4	6.7	5.9	5.9	6.0	5.6	5.9	7.0
km/h	9.0	11.3	12.9	16.3	14.3	13.5	10.8	9.5	9.5	9.7	9.0	9.5	11.3

WATER ⚐4

AVERAGE RAINFALL (GAIN)[1] — *1921 – 2013*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	0.80	0.70	0.75	0.52	0.55	0.42	1.72	1.92	1.13	1.00	0.84	0.72	11.07
mm	20.3	17.8	19.1	13.2	14.0	10.7	43.7	48.8	28.7	25.4	21.3	18.3	281.2

AVERAGE PAN EVAPORATION (POTENTIAL LOSS)[d,6] — *1966 – 1975*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	0.00	0.00	0.00	6.61	9.31	12.12	10.50	8.70	7.95	5.07	2.20	0.00	62.46
mm	0.0	0.0	0.0	167.9	236.5	307.8	266.7	221.0	201.9	128.8	55.9	0.0	1,586.5

WETTEST YEAR'S RAIN[1]: 15.83 INCHES | 402 mm | *1997*

DRIEST YEAR'S RAIN[1]: 5.44 INCHES | 138 mm | *1989*

LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION[7]: 70 DAYS: *September 24 – December 3, 1999*

RAINFALL INCOME[e]: 448 GPCD / 1,695 lpcd

AREA[f,8]: 18.91 SQ MILES / 49.0 km²

POPULATION[f,8]: 22,261 *2013 est.*

UTILITY-WATER USE[g,9]: 160 GPCD / 606 lpcd

HISTORICAL: 4 FT | 1.2 m | *1954*

DEPTH TO GROUNDWATER[h,10]: 70.49 FT | 21.5 m | *2014* CURRENT

CURRENT GROUNDWATER EXTRACTION > NATURAL GROUNDWATER RECHARGE[i,9]

WATERGY ⚐5

% of GALLUP'S MUNICIPAL ENERGY USED TO MOVE & TREAT WATER[j,11]

TOTEM SPECIES ⚐6

PLANT: Zuni fleabane *(Erigeron rhizomatus)* (12)

MAMMAL: Spotted bat *(Euderma maculatum)* (13)

FISH: Zuni bluehead sucker *(Catostomus discobolus jarrovii)* (12)

BIRD: Yellow-Billed Cuckoo *(Coccyzus americanus)* (12)

AMPHIBIAN:

REPTILE:

MEGAFAUNA:

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.

GALLUP 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. 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. Data from Gallup Ranger Station.

e. Given data is for Gallup Municipal Airport weather station. Significantly longer dry spell was recorded east of the Hogback at the Gallup 5E weather station: 126 days from January 1 – May 6, 1976 (ref. 7).

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

f. City proper

g. The city of Gallup uses 160 gpcd for current and future demand projections (ref. 9).

h. USGS-reported depths to groundwater vary widely in the vicinity of Gallup. The well whose levels we report in the chart above, USGS 354017108445201, was chosen for its longest period of record. It is located about 9 miles north of Gallup, and about 3.5 miles NNE of the Yah-Ta-Hey pumping station. The in-town well with the longest period of record (2002–2014), USGS 353134108452101, shows a decrease in depth to groundwater from 146' to 119'. Another well, USGS 353800108494501, about 3 miles W of Yah-Ta-Hey, shows an increase in depth to groundwater from 360' in 1981 to 560.01' in 2014 (ref. 10).

i. Numerous reports, including reference 9, cite an increase of depth to groundwater of 200' over the past 10 years.

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

GALLUP PLACE-ASSESSMENT REFERENCES

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