

ONE-PAGE PLACE ASSESSMENT: LA CROSSE, WISCONSIN

LOCATED IN THE LA CROSSE-PINE SUBWATERSHED WITHIN THE UPPER MISSISSIPPI WATERSHED

CLIMATE		AVERAGE HIGH & LOW TEMPERATURES ¹											1971-2000
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
° F HIGH	25.5	32.4	44.6	59.7	72.5	81.3	85.2	82.5	73.7	61.1	43.6	29.9	57.7
° F LOW	6.3	12.8	24.5	37.1	48.7	57.9	62.8	60.7	51.7	40.1	27.4	13.6	37.0
° C HIGH	-3.6	0.2	7.0	15.4	22.5	27.4	29.6	28.1	23.2	16.2	6.4	-1.2	14.3
° C LOW	-14.3	-10.7	-4.2	2.8	9.3	14.4	17.1	15.9	10.9	4.5	-2.6	-10.2	2.8
RECORD HIGH ¹	108° F	42.2° C	July 13, 1995				RECORD LOW ¹	-37° F	-38.3° C	January 30, 1951			

SUN		MAR 21 JUN 21 SEP 21 DEC 21					
LATITUDE	43.8°	DEGREES N or S of DUE EAST THE SUN RISES ²		0°	34°N	0°	33°S
ELEVATION	669 FT 204 m	DEGREES N or S of DUE WEST THE SUN SETS ²		0°	34°N	0°	32°S
		SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON) ^{a,2,3}		46°	70°	46°	23°
		SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO ^b		1 : 2.38	...AND AZIMUTH ^c		0°
		9AM & 3PM WINTER-SOLSTICE SHADOW RATIO ^{b,2}		1 : 5.04	...AND AZIMUTH ^{c,2}		41°

WIND		PREVAILING WIND DIRECTION (FROM WHERE) & AVERAGE SPEED ⁴											MAX SPEED ^{d,5}		
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	MPH	km/h
	NW	NW	NW	S	S	S	S	S	S	S	S	NW	10.0	16.1	
MPH	9.9	9.8	10.7	12.1	10.7	9.5	8.5	8.3	9.2	10.4	10.9	10.0	10.0	16.1	
km/h	15.9	15.8	17.2	19.5	17.2	15.3	13.7	13.4	14.8	16.7	17.5	16.1	16.1	16.1	

WATER		AVERAGE RAINFALL (GAIN) ¹											1971-2000
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	1.19	0.99	2.00	3.38	3.38	4.00	4.25	4.28	3.40	2.16	2.10	1.23	32.36
mm	30.2	25.1	50.8	85.9	85.9	101.6	108.0	108.7	86.4	54.9	53.3	31.2	821.9
		AVERAGE PAN EVAPORATION (POTENTIAL LOSS) ^{e,6}											1956-1968
INCHES	0.74	1.03	1.99	4.31	6.15	6.95	7.26	6.11	3.85	3.20	1.45	0.80	43.84
mm	18.8	26.2	50.5	109.5	156.2	176.5	184.4	155.2	97.8	81.3	36.8	20.3	1,113.5

WETTEST YEAR'S RAIN ¹	44.11 INCHES	1120 mm	1973	DRIEST YEAR'S RAIN ¹	17.13 INCHES	435 mm	1948	
LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION ⁷	56 DAYS: November 9, 1943 - January 3, 1944						RAINFALL INCOME ^f	612 GPCD
								2,317 lpcd
AREA ^{g,8}	20.52 SQ MILES	POPULATION ^{g,8}	51,647	UTILITY-WATER USE ^{h,8,9,10}	88 GPCD			
	53.1 km ²		2012 est.		333 lpcd			
HISTORICAL	60.0 FT	18.3 m	1966	DEPTH TO GROUNDWATER ^{i,11}	52.5 FT	16.0 m	1999	
RECENT GROUNDWATER EXTRACTION				≈	NATURAL GROUNDWATER RECHARGE ^{i,11}			

WATERGY		# of AVG WI HOMES THAT COULD BE POWERED w/kWh USED BY LA CROSSE WATER UTILITY ^{j,9,12}	245
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TOTEM SPECIES	PLANT: Wild Celery (<i>Vallisneria americana</i>) ¹³	MAMMAL: North American Beaver (<i>Castor canadensis</i>) ¹³
FISH:	Brook Trout (<i>Salvelinus fontinalis</i>) ¹³	BIRD: Whooping Crane (<i>Grus americana</i>) ¹⁴
		REPTILE: Eastern Massasauga Rattlesnake (<i>Sistrurus catenatus catenatus</i>) ¹⁴
MEGAFUNA:	Tundra Swan (<i>Cygnus columbianus</i>) ¹³	MOLLUSK: Higgins eye pearly mussel (<i>Lampsilis higginsii</i>) ¹⁴
		INSECT: Fishfly (Ephemeroptera) 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.

LA CROSSE 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 $x = 1 \div \tan(90 - (\text{latitude} + 23.44))$.
- 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. Maximum 3-second peak wind gust at La Crosse airport during period of record 2000–2012. Gust from the WNW, July 2003.
- e. An evaporation pan holds water whose depth is measured daily as water evaporates, allowing 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. One definition states that if pan-evaporation rates exceed rainfall rates, you are in a dryland environment; another states that drylands occur where mean annual precipitation is less than 2/3 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 are evaporation-reducing strategies (mulch, windbreaks, shading, covered water storage, etc).
- f. Calculated in situ w/ average rainfall, area, & population
- g. City proper
- h. Due to an abundance of water, La Crosse Water Utility does not calculate gallons per capita per day (gpcd), and data provided do not allow us confidently to calculate a residential gpcd. Our given value is the result of dividing gallons delivered in 2012 to 'residential' connections (946,039,000, ref. 9) by the product of the number of said connections (13,450, ref. 9), the average household size (2.18 people, ref. 8), and the number of days in a year (365). However, the water utility's definition of *residential* includes only single-family homes and duplexes, excluding tri- and multi-family units (ref. 10). It is unclear what effect would be seen if the water usage and number of inhabitants of all residential units were known and included in the calculations.
- i. USGS Well # 435138091105401 LC-16/07W/14-0076, located at lat. 43°51'38", lon. -91°10'54" NAD27, is the listed well w/in the city of La Crosse w/ the longest period of record. Initial 1966 reading of 60' was followed by a reading of 51.41' in 1986. The subsequent 138 readings up to the last 1999 reading were all 51' – 56.6', suggesting a very stable water table in this area.
- j. In 2012 the La Crosse Water Utility used 5,415,800 kWh of energy, including pumping, treatment facilities, and other utility operations (ref. 9). This number divided by the average number of kWh used per Wisconsin household in 2012 (22,109, ref. 12) yields the energy equivalent of 245 average Wisconsin households.

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

LA CROSSE PLACE-ASSESSMENT REFERENCES

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Period of record for temperature extremes is 1943–2001. Period of record for precipitation extremes is 1940–2001.
2. Rainwater Harvesting for Drylands & Beyond, Vol 1, or esrl.noaa.gov/gmd/grad/solcalc, accessed xx/xx/20xx
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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14. Endangered species of La Crosse County, Wisconsin, www.fws.gov/midwest/endangered/lists/wisc-cty.html, accessed 9/25/2013
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