ONE-PAGE PLACE ASSESSMENT: SPOKANE, WASHINGTON

LOCATED IN THE UPPER SPOKANE SUBWATERSHED WITHIN THE PACIFIC NORTHWEST WATERSHED

CLIMATE ⚑1

AVERAGE HIGH & LOW TEMPERATURES[1] *1881 – 2016*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F HIGH	33.1	39.1	48.2	58.0	66.9	74.1	84.0	82.7	72.6	59.1	42.8	34.6	57.9
°F LOW	21.7	25.1	30.5	36.4	43.6	50.1	55.9	54.6	46.7	37.6	29.9	24.2	38.0
°C HIGH	0.6	3.9	9.0	14.4	19.4	23.4	28.9	28.2	22.6	15.1	6.0	1.4	14.4
°C LOW	-5.7	-3.8	-0.8	2.4	6.4	10.1	13.3	12.6	8.2	3.1	-1.2	-4.3	3.3

RECORD HIGH[1]: 108° F | 42.2° C | *July 26, 1928* — RECORD LOW[1]: -25° F | -31.7° C | *December 30, 1968*

SUN ⚑2

LATITUDE: 47.7°

ELEVATION: 1,877 FT / 572 m

	MAR 21	JUN 21	SEP 21	DEC 21
DEGREES N or S of DUE EAST THE SUN RISES[2]	0°	37°N	35°	0°S
DEGREES N or S of DUE WEST THE SUN SETS[2]	0°	37°N	35°	0°S
SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON)[a,2,3]	42°	66°	42°	19°

SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO[b]: 1 : 2.92 ...AND AZIMUTH[c]: 0°

10AM & 2PM WINTER-SOLSTICE SHADOW RATIO[b,2]: 1 : 4.00 ...AND AZIMUTH[c,2]: 28°

WIND ⚑3

MAX SPEED[5]: 67 MPH | 107 km/h

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

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
	NE	NE	SSW	SW	SW	SSW	SW	SW	SW	NE	NE	NE	SW
MPH	8.2	8.8	9.7	10.0	9.2	9.3	8.5	8.2	8.0	8.1	8.6	8.2	8.7
km/h	13	14	16	16	15	15	14	13	13	13	14	13	14

WATER ⚑4

AVERAGE RAINFALL (GAIN)[1] *1881 – 2016*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	1.98	1.53	1.44	1.12	1.42	1.23	0.54	0.62	0.78	1.17	2.09	2.22	16.14
mm	50.3	38.9	36.6	28.4	36.1	31.2	13.7	15.7	19.8	29.7	53.1	56.4	410.0

AVERAGE PAN EVAPORATION (POTENTIAL LOSS)[e,6] *1889 – 2005*

INCHES	0.00	0.00	0.00	4.66	7.27	8.57	11.28	10.22	6.41	0.00	0.00	0.00	48.41
mm	0.0	0.0	0.0	118.4	184.7	217.7	286.5	259.6	162.8	0.0	0.0	0.0	1,229.6

WETTEST YEAR'S RAIN[1]: 26.07 INCHES | 662 mm | *1948* — DRIEST YEAR'S RAIN[1]: 7.54 INCHES | 192 mm | *1929*

LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION[7]: 80 DAYS: *June 29 – September 16, 2017*

RAINFALL INCOME[f]: 210 GPCD | 794 lpcd

AREA[g,8]: 59.25 SQ MILES | 153.4 km²

POPULATION[g,8]: 217,108 *2017 est.*

UTILITY-WATER USE[9]: 261–756 GPCD | 988–2,862 lpcd

HISTORICAL: 213.68 FT | 65.1 m | *1959* — DEPTH TO GROUNDWATER[h,10]: 211.83 FT | 64.6 m | *2012* — CURRENT

CURRENT GROUNDWATER EXTRACTION ≈ NATURAL GROUNDWATER RECHARGE

WATERGY ⚑5

% of SPOKANE'S MUNICIPAL kWh USED TO MOVE & TREAT WATER[i,11]

TOTEM SPECIES ⚑6

PLANT: Ponderosa Pine *(Pinus ponderosa)* MEGAFAUNA: Bald Eagle *(Haliaeetus leucocephalus)*

FISH: Columbia River Redband Trout *(Oncorhynchus mykiss gairdneri)* BIRD: Western Osprey *(Pandion haliaetus)* REPTILE:

AMPHIBIAN: Western Toad *(Anaxyrus boreas)* MAMMAL: Rocky Mountain Mule Deer *(Odocoileus hemionus hemionus)*

Available online at HarvestingRainwater.com/one-page-place-assessments

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.

SPOKANE 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 direction of a prevailing wind indicates the direction *from* which the wind blows.

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. Spokane's annual pan evaporation:rainfall ratio is 3:1.

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

g. City proper

h. USGS Well no. USGS 474242117244901 26N/43E-31A01, located at 47°42'42.0" N, 117°24'52.4" W. Earliest reading taken on December 8, 1959; most-recent reading taken on April 26, 2012.

i.

CREDITS: Brad Lancaster, Resource concept | **Megan Hartman,** Resource creation, research | **Beth Mort,** Totem Species research

SPOKANE 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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5. Record Wind Speed; Felts Field, Spokane, WA; Special Reports: Historical Climate, myforecast.com, accessed 9/3/2018

6. Monthly Average Pan Evaporation (Inches), Western Regional Climate Center, Historical Data, Comparative Tables, Average Pan Evaporation Data by State, Washington, Spokane WSO Airport, wrcc.dri.edu, accessed 10/29/2018

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9. Low end of range: City of Spokane Depeartment of Engineering Services, Design Standards, February 2007, static.spokanecity.org/documents/business/designstandards/design-standards.pdf, accessed 10/30/2018
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10. Groundwater Levels for the Nation, U.S. Geological Survey, nwis.waterdata.usgs.gov/nwis/gwlevels, accessed 10/30/2018

11.