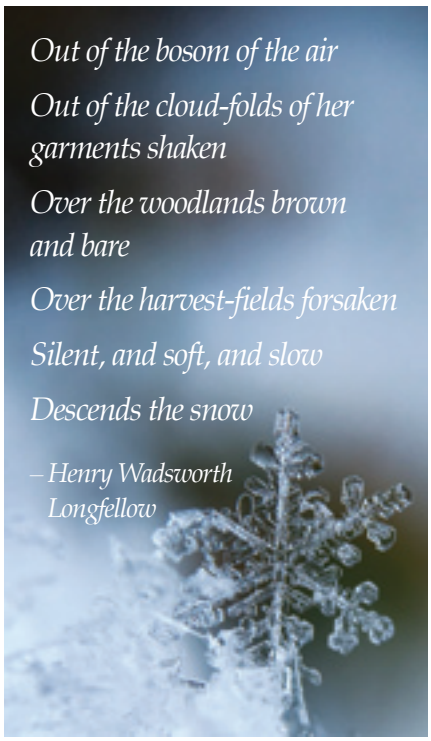
Wisconsin snow is measured by averages and extremes, but can be more predictable than you think.

STEVE APPS

Let it snow

"PANHANDLE HOOKS" BRING WHITE STUFF PERFECT FOR PACKING.

Richard Kalnicky

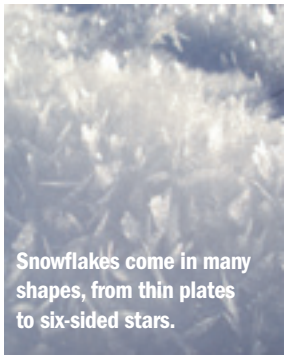


PIXABAY

This is what I saw first in the late 1940s on my parents' dairy farm 6 miles north of Boyceville, in northwestern Dunn County. The browns were replaced by glistening whites. Hills, valleys, forests and fields alike became bright white, the landscape's beauty enhanced by snow-covered tree branches. Not all snowfalls were peaceful, with the occasional blizzards and drifts caused by high winds and the rare heavy thundersnows. As the winter season progressed, snow continued to accumulate, reduced at times by warm spells and too quickly gone after the early spring thaw.

My brother and I took advantage of the snows and hilly farm landscape in the 1950s and early '60s to enjoy sledding and downhill skiing, going as fast and far as possible on our toboggan. What fun and great exercise! In the 1980s and '90s our children graduated from sledding on our gently sloping lot in west Madison, to saucer sliding on the Cherokee Middle School hill, to inner tubing on the steep, long and fast slope of Elver Park. Now fully retired, my wife and I have recently taken up snowshoeing. Throughout these years family members have also enjoyed building snowmen, constructing snow forts and snow angel artistry. We're grateful for such a great variety of fun activities to experience in and on Wisconsin snow!

Having enough snow for recreational pursuits requires the accumulation of incalculable numbers of individual snowflakes. Special photo-microscopes can capture images of freshly fallen snowflakes. The most symmetrical and mostly six-sided crystals usually occur during light snowfalls, without wind and with colder temperatures. However, symmetrical snowflakes are the exception. Most snow falls as asymmetric combinations of small crystal fragments. Snowflakes can grow into many forms: slender needles, thin plates, columns, multi-branched stars and myriad other interesting shapes.



Snowflakes come in many shapes, from thin plates to six-sided stars.

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Wind direction matters

The snow that falls over Wisconsin is associated with cyclonic storms of various paths and intensities. Alberta clipper snowstorms travel from northwest to southeast, frequently bringing lighter fluffier snow with less moisture content. Alberta clippers are often followed by cold Canadian air masses with strong northwest or north winds. If these winds cross ice-free sections of Lake Superior, they create lake-effect snow that greatly increases snow totals in sections of far northern Wisconsin. As the Canadian high pressure moves eastward, the associated east to west air flow over ice-free Lake Michigan can create lake-effect snow episodes on the west shore, episodes that occur less frequently and with significantly less total snow than their Lake Superior counterparts.

Another weather pattern known as a Colorado low heads eastward from Denver through Chicago and generally brings Wisconsin heavier snows than Alberta clippers. The most powerful storms are Panhandle hooks. These storms travel from Texas and Oklahoma northeastward to the Midwest, bringing Gulf of Mexico moisture in the form of heavy snow. Lake-enhanced snow can occur near these storms if the circulation

Six inches is the required snow depth for most snowmobile trails statewide. Check the Wisconsin State Climatology Office website for current snow depth in your area, or go to travelwisconsin.com/snowreport for local snow conditions.

WISCONSIN DEPARTMENT OF TOURISM

crosses ice-free Great Lakes, depositing extra snow on specific locations near lakeshores and for miles inland.

Averages and extremes

More than 120 years of snowfall observations show Wisconsin receives a statewide average of 52 inches of snow each winter. January is the snowiest month, averaging 14 inches. Next is December at 12 inches, followed by February and March, each with about 8.5 inches. November averages 6 inches, April almost 3 inches, with less than one-half inch each in October and May. The winter of 1996-97 had the most at 80.2 inches while 1967-68 had the least at only 21.7 inches. December 2008 was the snowiest month with 33.2 inches.

Annual snowfall varies considerably across the state. As expected, annual snowfall totals increase as one travels northward. Based on 1981-2010 data from 100 stations across Wisconsin, Beloit at 31.9 inches is the least snowy locale while Hurley at 167.5 inches receives the most snow. Most of the larger cities in the state receive close to or slightly below the statewide average: Milwaukee – 46.9 inches, Madison – 50.9 inches, Green Bay – 51.4 inches, La Crosse – 43.3 inches, Eau Claire – 46.8 inches and Wausau – 59.6 inches. Farther north the annual totals increase dramatically: Minocqua – 110.5 inches, and Lac Vieux Desert in northern Vilas County near the border with the Upper Peninsula – 122.5 inches.

For recreation, it is not the total snowfall over the winter season that matters. What counts is the depth of snow on the ground. There needs to be sufficient snow to permit snow-related recreation. Local units of government decide when their snowmobile and cross-country ski trails are open for snowmobile and ski enthusiasts. Snow depth is one of the factors governments use to determine whether trails on their properties are open or closed. According to Darren Parks, Dane County Parks Division, Dane County has a 6-inch required snow depth for the snowmobile trail system to be open on Dane County lands.

Determining snow depth requires several measurements across a designated space, with the average of the measurements recorded as that station's snow depth on that date. However, depths at locations near the station can vary from the "official" measurement. Drifting moves snow from one area to another, greatly altering depths. Also, south-facing slopes subject to greater melting due to direct sunlight have shallower snow depths while north-facing slopes with little sunlight have deeper snow.

How much is enough?

Taking all of this into account, I believe the best number to represent sufficient snow depth for each and every recreation activity is 6 inches. There are activities that can be enjoyed with smaller depths, but the risk of encountering bare spots or insufficient snow increases with each inch of decreased depth.

How often do Wisconsin locations experience snow 6 or more inches deep? As expected, based on data from 1950 through 2015, northern locations such as Lac Vieux Desert and Minocqua have deep snow more often, while southern locations such as Milwaukee and Madison have the least number of days with deep snow. There is also considerable variability from year to year in the number of deep snow days at each of the 12 stations on Table 1.

When can you expect to have depths of 6 inches or greater to enjoy snow recreation? There are few absolutes or guarantees, but there are probabilities based on 1950-2015 data. Again, the northern locations tend to have the highest probabilities for deep snow for longer intervals, while southern locations have the lowest probabilities for deep snow and for shorter intervals. See Table 2 for more details.

The American Birkebeiner, the largest cross-country ski marathon in North America, is held each February on a course that begins in Cable and ends in Hayward. This race has occurred since the early 1970s, except in 2000 when a last-minute thaw turned the course into slush and stones. However, records from the Hayward Ranger Station indicate 2000 to be the rare exception. Based on 1951-2015 data, there is about a 90 percent chance of 6 or more inches of snow on the ground for the Birkie each day in the last half of February.

For more information on recent snowfalls or current snow depths for Wisconsin locations, go to travelwisconsin.com/snowreport; the Wisconsin State Climatology Office website, aos.wisc.edu/weather/index.htm; or weather.gov. For historical data, go to weather.gov, National Climatic Data Center (www.ncdc.noaa.gov) and Utah Maps Utah Climate Center (climate.usurf.usu.edu).

But most importantly, get out and enjoy your favorite snow-related activity. Do it when enough snow is on the ground, either near your home or away, on your property, a friend's property, government land or at a commercial facility. Most important of all, let it snow, let it snow, let it snow!

Richard Kalnicky is retired from the Department of Natural Resources and writes from Madison.

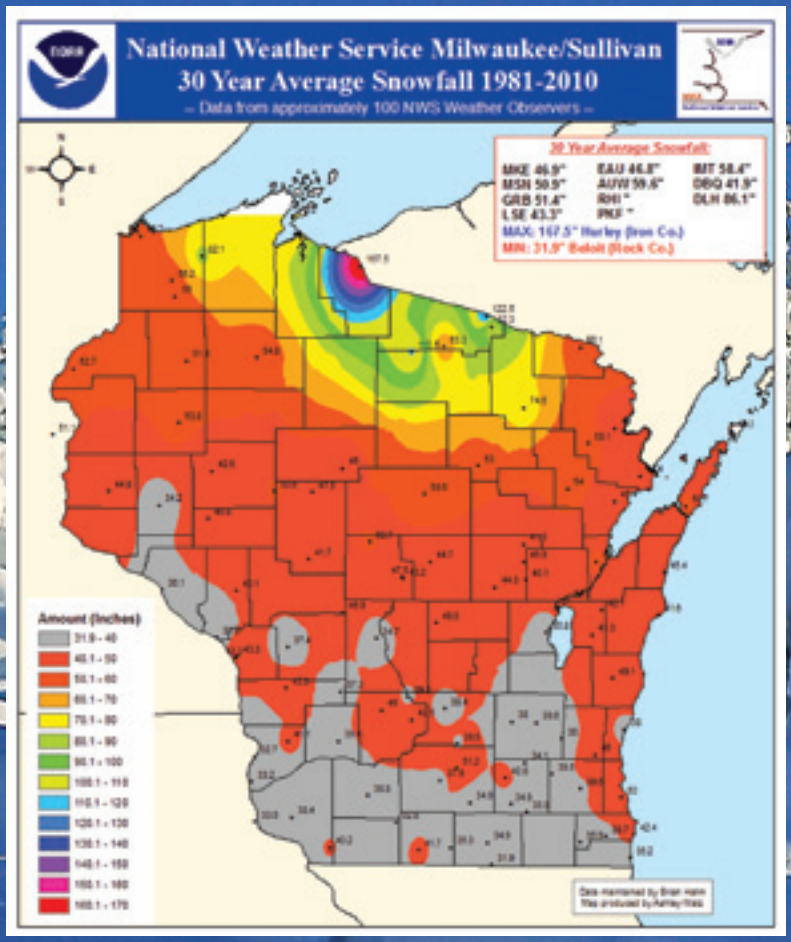

TABLE 1 Days per winter with snow depth 6 inches or more, based on 1950-2015 data.

STATION	LOWEST	AVERAGE	HIGHEST
Appleton	0	36	110
Eau Claire	0	50	123
Hancock	0	50	115
La Crosse	0	34	113
Lac Vieux Desert	43	123	183
Madison	0	27	105
Milwaukee	0	22	74
Minocqua	46	106	150
Spooner	4	69	135
Sturgeon Bay	0	54	114
Superior	0	67	142
Wausau	7	63	119

TABLE 2 Probabilities and dates with snow depth 6 inches or more, based on 1950-2015 data.

STATION	25% OR MORE	50% OR MORE	75% OR MORE	HIGHEST/DATE(S)
Appleton	Dec. 19 – March 11	Jan. 26 – Feb. 11	NA	63% on Feb. 5
Eau Claire	Dec. 17 – March 20	Jan. 13 – March 24	NA	68% on Jan. 30, Feb. 2
Hancock	Dec. 19 – March 21	Jan. 12 – Feb. 21	NA	67% on Feb. 3
La Crosse	Dec. 25 – March 9	Feb. 3 – 6	NA	52% on Feb. 3
Lac Vieux Desert	Nov. 21 – April 16	Dec. 3 – April 8	Dec. 16 – March 29	100% on Feb. 1, 4, 19 and 22
Madison	Jan. 1 – Feb. 25	NA	NA	43% on Jan. 26 and 27
Milwaukee	Jan. 8 – Feb. 18	NA	NA	37% on Jan. 27
Minocqua	Nov. 29 – April 6	Dec. 9 – April 1	Dec. 21 – March 20	100% on Feb. 3 – 6
Spooner	Dec. 9 – March 28	Dec. 31 – March 12	Jan. 24 – 29	77% on Jan. 25 and 28
Sturgeon Bay	Dec. 27 – March 26	Jan. 8 – Feb. 26	NA	74% on Feb. 4
Superior	Dec. 8 – March 26	Dec. 28 – March 14	NA	74% on Jan. 25 – 29
Wausau	Dec. 15 – March 25	Jan. 2 – March 14	Feb. 1 – Feb. 6	77% on Feb. 2, 3 and 6

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Data for tables 1 and 2 (except the Lac Vieux Desert station) comes from the National Weather Service. Data for Lac Vieux Desert is from the National Climatic Data Center website.