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Decay Hazard (Scheffer) Index Values Calculated from 1971–2000 Climate Normal Data

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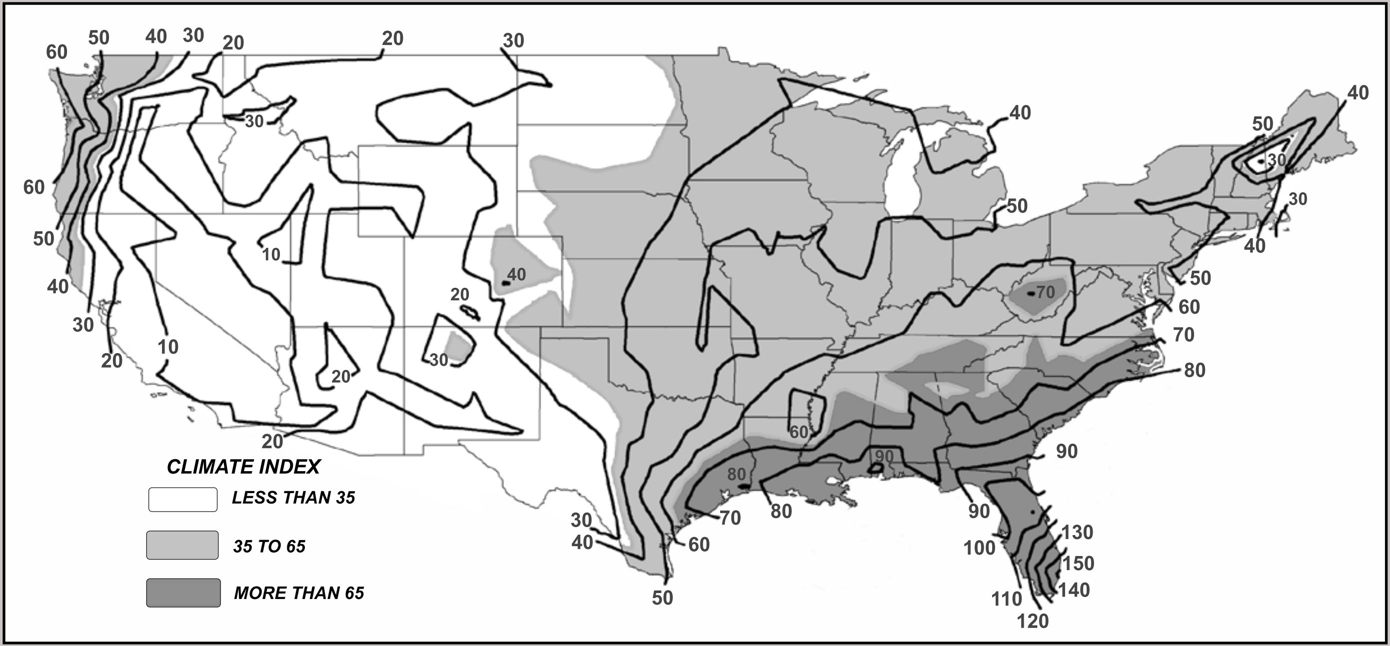

Abstract

Climate index values for estimating decay hazard to wood exposed outdoors above ground (commonly known as Scheffer index values) were calculated for 280 locations in the United States (270 locations in the conterminous United States) using the most current climate normal data available from the National Climatic Data Center. These were data for the period 1971–2000. In general, the values appear to have been moderately higher during this period than the values listed by Scheffer. The values are listed, and a revised climate index map is provided.

Acknowledgments

The author recognizes Lloyd Blackburn and William (Bill) Silva of the U.S. Forest Service Geospatial Service and Technology Center (Salt Lake City, Utah) for preparing the revised climate index map. The map was developed with ArcMap (an ArcINFO Product, ESRI, Redlands, California) exported to a geo-referenced PDF file and edited with Adobe PhotoShop (Adobe Systems, Inc., San Jose, California). The author also acknowledges that the review comments of Steve Cornick, National Research Council of Canada, substantially influenced this report.

Keywords: decay hazard, climate index, Scheffer index, climate normal data, above-ground decay

Contents

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Introduction

A parameter—the "climate index value"—was proposed by Scheffer (1971) to estimate decay hazard, by geographic location within the conterminous United States, for wood exposed above ground to exterior conditions. The parameter, devised to be easily calculated from climatic data available from the U.S. Weather Bureau, is expressed as

$$\text{Index} = \sum_{\text{Jan}}^{\text{Dec}} \left[(T - 35)(D - 3) \right] / 30 \qquad (1)$$

where T is mean monthly average temperature (expressed in °F), D is mean number of days per month with 0.01 in. or more of precipitation, and $(T - 35) \equiv 0$ if $T < 35$.

The index value may alternatively be expressed as

$$\text{Index} = \sum_{\text{Jan}}^{\text{Dec}} \left[(T - 2)(D - 3) \right] / 16.7 \qquad (2)$$

where T is mean monthly average temperature (expressed in °C), D is mean number of days per month with 0.25 mm or more of precipitation, and $(T - 2) \equiv 0$ if $T < 2$.

The climate index value has become widely recognized and is commonly termed the "Scheffer index." The index is cited in the *Wood Handbook* (Forest Products Laboratory 1999), where a hazard map for the contiguous United States (from Scheffer (1971)) is also shown (Fig. 1). Cornick and Dalgliesh (2003) state that decay hazard maps based on the Scheffer index have been developed for Canada and Australia by Setliff (1986) and Carter et al. (1983), respectively. More recently, Wang et al. (2007) developed a decay hazard map for China based on the Scheffer index.

As a metric by which relative hazard can be compared between geographic locations, the Scheffer index is not intended to predict decay propagation rate nor time to failure in specific constructions. Recently, Brischke and Rapp (2008) reported that wood temperature and moisture content better predicted decay than did climate conditions as expressed by the Scheffer index. Their findings would be logically expected inasmuch as decay propagation has been recognized for decades as dependent on moisture and temperature conditions in the wood substrate (Panshin and De Zeeuw 1964). Development of the Scheffer index was based on the intuitively obvious premise that conditions in wood substrates exposed outdoors were related to climatic parameters. The relationship between conditions in a wood substrate and the local climate, however, are not expected to always be precise and predictable. The relationship is expected to vary with specimen configuration and with what is sometimes termed "microclimate" (for example, whether a wood specimen is shaded). The findings of Brischke and Rapp (2008) thus cannot be logically interpreted as indicating inadequacy of the Scheffer index as a climate-based indicator. Brischke and Rapp suggest no alternative climate-based metric for estimating decay hazard.

Use of the Scheffer Index

The Scheffer index was cited by Verrall and Amburgey (1980) in a manual produced for the U.S. Department of Housing and Urban Development regarding decay prevention. The manual provided recommendations for builders and building owners; among these were recommendations for the dimension of overhangs on single-story buildings. The dimensions were conditioned on the Scheffer index value.

The index value may be calculated from local weather data to estimate the local decay hazard that existed over a specified time period. The index value has been used in this way to estimate decay hazard that existed during field studies (Carll et al. 1999, Carll and Wiedenhoeft 2007). Carll and Wiedenhoeft (2007) noted that the Scheffer index value at Madison, Wisconsin, differed appreciably over different roughly decade-long periods and thus could be a contributing factor in apparent differences between two sequential studies in observed decay propagation in test-fence specimens.

An Alternative Measure to the Scheffer Index

A service life prediction model has recently been developed by the Commonwealth Scientific and Industrial Research Organization (CSIRO, the Australian national science agency) for wood installed above-ground in Australia, in which decay is assumed to be the failure mode determining service life. The prediction model is presented in a manual for use by practitioners (Wang et al. 2008) and includes a climate parameter for prediction of decay rate. The parameter was developed from decay rate data collected from L-joint decay-test specimens exposed at 11 locations in Australia (eight locations, two locations, and one location in Queensland, New South Wales, and Victoria provinces, respectively). The climate parameter, termed k_{climate}, was developed for each of the locations by relating decay rate in

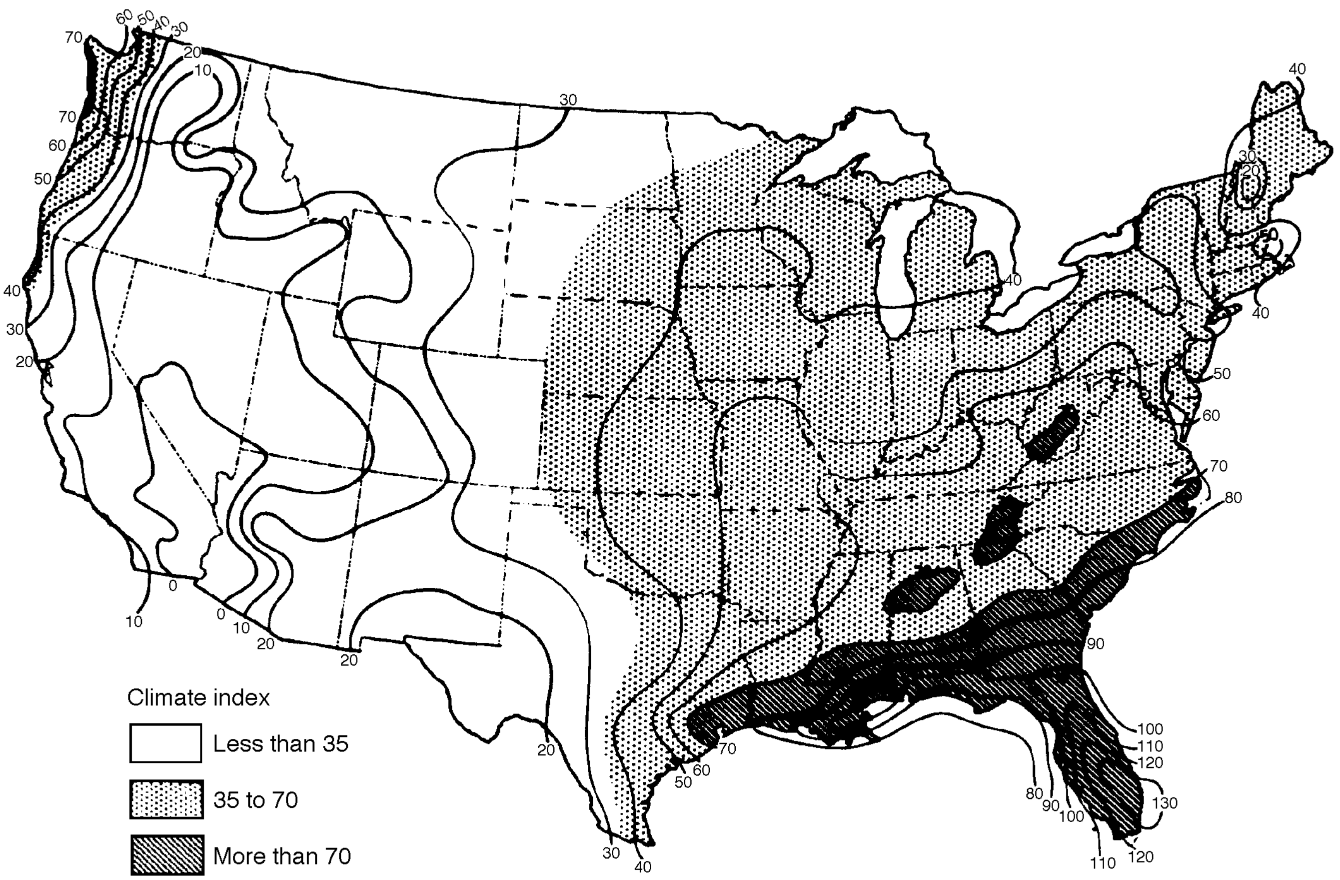

Figure 1. Climate index map for decay hazard based on Scheffer (1971) and reproduced in the *Wood Handbook* (Forest Products Laboratory 1999).

a set of specimens at each location to decay rate in a set of specimens (assumed to be virtually identical) at Beerburrum (near Brisbane). Wang et al. (2008) indicate that values for k_{climate} derived from comparative decay rates were correlated with “annual rain duration” (either number of hours per year or number of days per year during which rain occurred). Of the two measures of annual rain duration, number of days per year with measurable precipitation is directly obtainable from all or virtually all datasets available from the Australian Bureau of Meteorology (BOM), whereas number of hours per year of rainfall must be inferred from rainfall data, which typically is reported in BOM datasets in 3-hour intervals. The primary climate parameter presented by Wang et al. (2008) is thus

$$k_{\text{climate}} = 0.15\sqrt{D_{\text{year}}} \qquad (3)$$

where D_{year} is number of days per year with measurable precipitation.

The 2008 CSIRO manual identifies four decay hazard zones (A through D) based on k_{climate} and indicates that these zones transposed over the Australian map show a very similar pattern to calculated Scheffer index values so transposed (Wang et al. 2008). It may also be noted that the sole meteorological term in Equation (3), days of precipitation per year, is conceptually similar to the term D in the Scheffer index formula (Eqs. (1) and (2)).

Prior to release of the 2008 manual (Wang et al. 2008), CSIRO researchers had implied that the Scheffer index was not as well correlated with decay propagation in outdoor test specimens as were other climate measures, at least not in Australia (Foliente et al. 2002, Leicester et al. 2004). Foliente et al. (2002) did not present a formula for decay climate index values but stated that index values would be a function of mean annual temperature, number of rain days per year, and mean annual vapor pressure deficit (which they did not precisely define).[1] Leicester et al. (2004) imply

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[1] Mean annual vapor pressure deficit would most logically be defined as the difference between vapor pressure of saturated air at mean annual temperature and vapor pressure at mean annual dewpoint temperature. Annual vapor pressure deficit can be considered an indicator of drying potential to the atmosphere. Drying potential is balanced against wetting potential in calculation of climatic moisture indices as indicated by Cornick and Dalgleish (2003). In calculation of moisture indices, wetting potential is typically expressed as total precipitation over time (in millimeters or inches, in liquid equivalent) rather than as hours or days of precipitation. Cornick and Dalgleish noted that the concept of a moisture index had historically proven useful for characterization of natural vegetation cover or for prediction of the potential of a geographic land area for agriculture. They suggested that the concept could be useful with regard to predicting moisture accumulation in building envelopes. They did not, however, explicitly suggest its use for prediction of decay hazard.

that CSIRO researchers had by 2004 abandoned inclusion of either temperature or vapor pressure deficit in calculation of a climatic decay hazard index, indicating that the most consistent predictor of climatic decay hazard across Australia is number of hours per year that rain occurs. The concept of annual rain duration as the most important climate parameter relating to decay was thus recognized by CSIRO researchers by 2004; by the time the 2008 manual was published, they apparently determined that the more useful (or more reliably calculable) primary measure of that parameter was days per year rather than hours per year. For the 11 locations on which the CSIRO researchers based their decay rate observations, annual rain duration does appear to show better correlation with observed decay rate than does the Scheffer index. However, in none of the 11 locations at which decay rate observations were made does coldest monthly average temperature fall below the threshold value of 2°C (35°F), below which decay activity ceases. In summary, the means that CSIRO researchers have found most appropriate for characterizing climatic decay hazard involves an even simpler calculation than the Scheffer index. For the range of (relatively warm/hot) climates of Australia, the simplified calculation appears justified. In contrast, in many locations within the conterminous United States, winter temperatures fall below the level at which decay can propagate. For the conterminous United States, no alternative metric has been shown to be as reliable as the Scheffer index for characterizing climatic decay hazard.

Possible Shift in Scheffer Index Values

Over the past three decades, the perception has grown that decay problems have become more prevalent in new construction (Kadulski 1997, Dell and Laidlaw 1998, Lstiburek 2008). Various reasons have been posited for this:

- Building materials have become less decay resistant (by a combination of more widespread use of less decay-resistant species and shorter rotation ages of commercial timber harvests).
- Construction components and details have become more prone to moisture accumulation (for example, sills of contemporary exterior entry doors have minimal slope and contemporary windows typically no longer have sloped sills that might collect water from jamb casings and drip it to the exterior of wall cladding systems).
- A knowledge base among exterior finish carpenters with regard to water management has largely been lost (with the trend toward more rapid turnover of residential real estate being a disincentive for retention of that knowledge base).
- Energy-efficient construction (with reduced air leakage through walls) has inherently lower capability to dissipate rainwater leakage.
- Effective preservatives (that also posed health risks) have been supplanted with safer, but less effective, preservatives.
- Architectural styles have changed, and the changes have resulted in greater exposure of building walls to rain, in a greater number of joints and interfaces on outer building surfaces, and in more complicated joints and interfaces that are more prone to water intrusion.

A possible contributing factor that has only occasionally been posed is that the decay hazard in a given location may have changed over time. In calculation of Scheffer index values over successive periods that corresponded with a series of relatively recent field studies (Carll and Wiedenhoeft 2007), calculated values varied from slightly to moderately in excess of the index values presented by Scheffer (1971) for the study location (Madison, Wisconsin).

Objective

The objective of the work described here was to calculate Scheffer index values based on the most recent climate normal data available from the National Climatic Data Center. A climate normal is defined by the World Meteorological Organization (WMO) (1983) as the average of a particular climate variable over a uniform and relatively long period of at least three consecutive 10-year periods.

Methodology

The most recent version of climate normal data available from the National Climatic Data Center (NCDC) (National Oceanic and Atmospheric Administration, U.S. Department of Commerce) was used to calculate Scheffer index values for 270 locations in the conterminous United States, 5 locations in Alaska, and 5 locations in Hawaii. The data sets on which the calculations were based are termed "Monthly Station Climate Summaries—CLIM 20" or alternatively "The Climatography of the United States No. 20, Monthly Station Climate Summaries for the 1971–2000 Period of Record."[2] Where possible, data for the same stations on which Scheffer (1971) reported values were used.

Results

Values are reported in Table 1. A map for the conterminous United States is shown in Figure 2.

Discussion

Of the 280 locations for which Scheffer index values were calculated from CLIM 20 data, comparisons could be made with the values calculated by Scheffer at 228 locations. Scheffer calculated index values for 250 locations in the conterminous United States. For some recording stations for which Scheffer listed index values, corresponding values

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[2] http://cdo.ncdc.noaa.gov/cgi-bin/climatenormals/climatenormals.pl?directive=prod_select2&prodtype=CLIM20&subrnum=

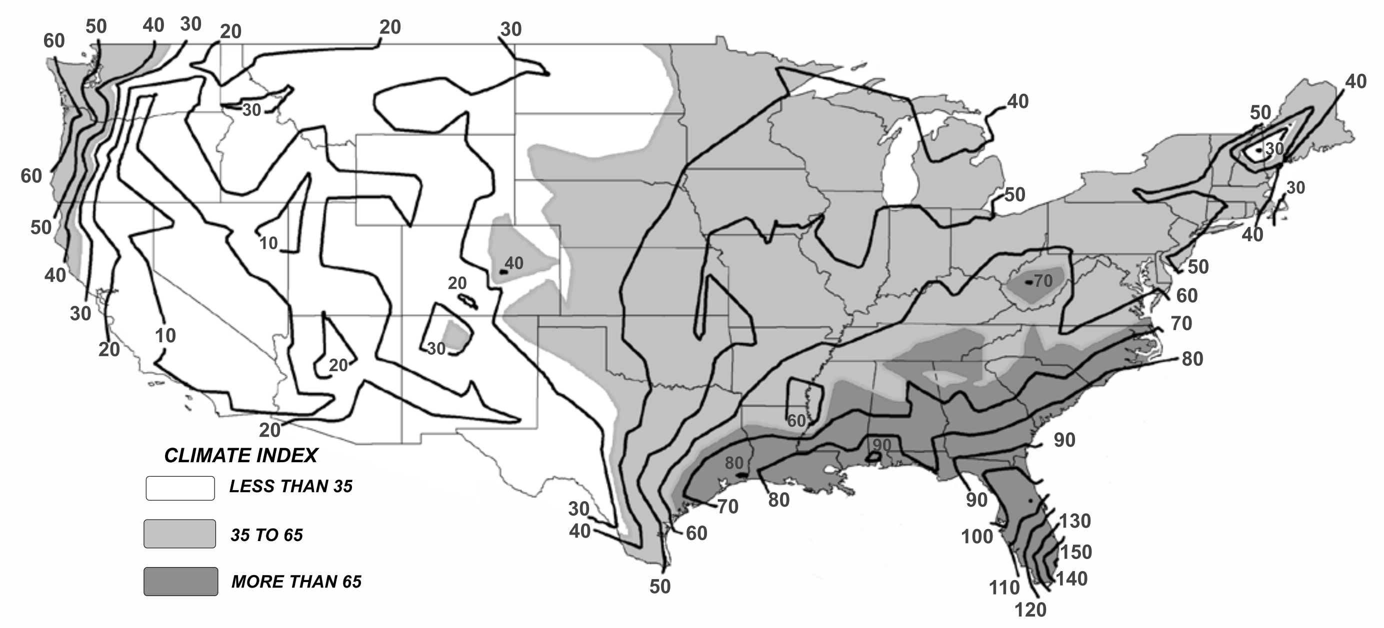

Figure 2. Revised climate index map for decay hazard based on data for the period 1971–2000. Higher index values indicate greater decay hazard.

could not be obtained from the CLIM20 data. For some of these locations, the monthly mean temperature values were obviously faulty in the CLIM20 data (values for all months recorded as zero). In other cases, the locations of recording stations had evidently changed.

Of the 228 locations for which the index values were deemed comparable, values were within 5 points of those listed by Scheffer for 176 of the locations. A difference of 5 points was selected as being appreciable. By this criterion, index values (calculated from CLIM20 data) were not appreciably different than those listed by Scheffer at a substantial majority of recording locations. Of the 52 locations where an appreciable difference in the index value was observed, 16 locations showed a lower index value and 36 locations showed a higher index value.

The overwhelming majority of locations (14 of 16) where an appreciable reduction in index value was observed were east of the Mississippi River and south of 38° N Latitude. The location with by far the most extreme change in index value was Thomasville, Georgia, where the calculated index value decreased from 99 to 46.

Thomasville is located in extreme southern Georgia, at an elevation of 260 feet (79 m). It was listed by Scheffer as having a substantially higher index value than any other recording location in Georgia. This would logically have been expected due to its location and elevation. Thomasville was also listed by Scheffer as having an index value higher than Apalachicola or Pensacola, Florida, and roughly equivalent to that of Tallahassee, Florida.[3] In contrast, when CLIM20 data were used to calculate index values, the value for Thomasville was substantially lower (by at least 10 points) than that for any other recording location in Georgia and also substantially lower (by 30 points or more) than the calculated values for Apalachicola, Tallahassee,[4] or Pensacola, Florida. Selected climate normal data from the CLIM20 database for recording locations in Georgia and in northern Florida are listed in Table 2. The coldest month column of Table 2 clearly shows that none of the locations experienced periods of winter dormancy for decay fungi. Table 2 also shows that Thomasville was unremarkable relative to the surrounding locations with regard to any meteorological characteristic, with the exception of number of days of measurable rain (with rain exceeding 0.01 inches or 0.25 mm). In short, Thomasville was remarkable during the period of 1971–2000 only with regard to rain distribution, not with regard to either temperature or rainfall amount.

Examination of the NCDC data for various recording locations revealed an unusually large amount of missing precipitation data for Thomasville over the period of 1971–2000. The Appendix is derived from NCDC data inventories and lists number of days of missing temperature and precipitation data for the 280 recording stations for which climate normal data were used to calculate index values. Locations in the conterminous United States are ranked in the Appendix in order of decreasing number of missing days of precipitation data over the period of 1971–2000. Precipitation data for Thomasville are substantially less complete than for the other locations listed in Table 2, but of the 270 locations in the conterminous states that were considered in this study,

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[3] Thomasville is approximately 30 miles (48 km) from Tallahassee and is the nearest recording station in Scheffer's list of locations to Tallahassee.

[4] The index value for Thomasville, calculated from CLIM20 data, was more than 40 points lower than the index value for Tallahassee.

16 other locations have more days of missing precipitation data. Although confidence in the precipitation data for Thomasville is reasonably limited, no obvious reason exists to dismiss the climate normal data for Thomasville as being faulty. In final analysis, the index value for Thomasville is based on incomplete data and is a distinct outlier relative to the index values for locations surrounding Thomasville. For this reason, the value for Thomasville was not included in the dataset used to generate Figure 2.

The number of locations at which an increase in index value of five or more points was observed substantially exceeded the number of locations at which a decrease in index value of five or more points was observed (36 and 16, respectively). Of the 36 locations at which such an appreciable increase in index value was observed, 6 bordered the Great Lakes and an additional 3 were located within 45 miles (72 km) of the Great Lakes (either to the east or south). Nine of the other 36 locations were in Texas. The remaining 18 locations were distributed in no clearly obvious pattern. It may be worth noting, however, that at two of the three recording locations in Utah (all at higher than 4,000 ft (1,220 m) elevation), index values increased in excess of 5 points. Another observation that may be worth noting is that at all 16 recording stations located on the Great Lakes (from Duluth and Chicago to Rochester), an increase in index value was observed. A thorough analysis of the changes with regard to their geographic distribution is justified but is not attempted at this time.

Mean index values for the 228 locations where values were listed by Scheffer and could be calculated from CLIM20 data were 45.2 (for Scheffer calculations) and 46.7 (for CLIM20 calculations). The mean difference for the conterminous United States was thus an increase of 1.5 in the index value. The *t*-statistic for this mean difference, calculated as a paired *t*-test (Freese 1974), was 4.23. According to this statistic, the difference was significant at $\alpha < 0.0001$.[5] An assumption underlying paired *t*-tests is independence between pairs. When measurement stations are in close proximity, climate normal values (on which the index value is based) are likely to be correlated.[6] The *t*-statistic thus probably overstates the statistical significance of the differences. The *t*-statistic (4.23) is very high but is probably deceptively high. The test is thus considered a probable indicator of statistical difference rather than a certain or precise indicator of statistical difference. With this caveat in mind, the decay hazard in the conterminous United States appears to have, in general, increased to a moderate degree. As suggested in previous discussion, the apparent general increase does not appear to have been uniform across the country.

The author does not speculate on whether apparent changes in index values were due to changes in monthly climate normal temperatures, rainfall distribution, or some combination of these. The climatological data on which the index values listed by Scheffer were calculated are not adequately identified. For understandable reasons relating to paper length, Scheffer did not list the monthly parameter values on which he based his calculations. Although his paper indicates that the climatological data were obtained from the Department of Commerce, it contains no reference indicating the time period(s) for that climatological data. Determining the monthly parameter values used to calculate the index values listed in Scheffer's paper is thus virtually impossible. The Scheffer manuscript was submitted for publication in December 1970, making it likely that the climatological data used for calculating the Index values listed in the paper did not include observations for calendar year 1970; all observations in the dataset were almost certainly for years earlier than 1970.

Values listed in this report are not necessarily indicative of contemporary decay hazard conditions. They are based on 30-year climate normal data over the period of 1971–2000. Progressive calculation over sequential 10-year periods is recommended to obtain information that might yield a clue regarding contemporary conditions.[7]

Conclusions

The climate hazard for wood decay was apparently not the same across the conterminous United States over the period 1971–2000 as that estimated by Scheffer (1971) based on climatological data from years prior to 1970. The differences for most locations were modest, with a few local exceptions. Stated another way, how index values changed shows geographic variation. This apparent geographical variation has not as yet been rigorously evaluated, but a revised index map is provided.

References

Brischke, C.; Rapp, A.O. 2008. Dose-response relationships between wood moisture content, wood temperature and fungal decay determined for 23 European field test sites. Wood Sci. Technol. 42:507–518.

Carll, C.; TenWolde, A.; Malinauskas, V.; Knaebe, M.; Sotos, P.G. 1999. In-service moisture content of hardboard lap siding in southern Florida. In Vol. 1 of Proceedings, 8th International Conference on Durability of Building Materials and Components. M. A. Lacasse and D. J. Vanier eds. (ISBN 0-660-17737-4). Inst. For Research in Construction, National Research Council of Canada.

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[5] The probability level calculated by the TTEST function (single-tail, paired *t*-test) in Microsoft Excel (Microsoft Corp., Redmond, Washington) was 1.66×10^{-5}.

[6] The obvious non-correlation between index values for Thomasville and Tallahassee calculated from CLIM 20 data is an exception to this expectation.

[7] Such an evaluation, although instructive, would not, strictly speaking, be based on climate normal data as defined by the WMO. However, conditions could possibly have been changing over recent 30-year periods, with the result that the periods no longer meet the WMO requirement for uniformity. In short, the WMO definition of "climate normal" may be losing its meaning.

Carll, C.G.; Wiedenhoeft, A.C. 2007. Mechanical property loss and the occurrence of wood decay during experimental outdoor aging of wood-based panels. In Proceedings, 41st International Wood Composites Symposium. (distributed as CD-ROM)

Carter, J.O.; Cause, M.; Moffat, A. 1983. A preliminary above-ground wood decay index map of Australia, paper presented at 25th Forest Products Research Conference, CSIRO, Clayton, Victoria.

Cornick, S.; Dalgliesh, W.A. 2003. A moisture index to characterize climates for building envelope design. Jour. of Thermal Envelope and Building Science 27(2):151–178. (DOI: 10.1177/1097196303036210)

Dell, M.; Laidlaw, S. 1998. Performance of stucco-clad wood-frame buildings in a temperate rainforest. In: ASTM STP 1314. ASTM, West Conshohocken, PA.

Foliente, G.C.; Leicester, R.H.; Wang, C.; Mackenzie, C.; Cole, I. 2002. Durability design for wood construction. Forest Prod. J. 52(1):10–19.

Forest Products Laboratory. 1999. Wood Handbook: Wood as an Engineering Material. Gen. Tech. Rep. FPL–GTR–113 Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory.

Freese, F. 1974. Elementary Statistical Methods for Foresters. Ag. Handbook 317. Washington, DC: U.S. Department of Agriculture, Forest Service.

Kadulski, R. 1997. Keeping the water out: building envelope performance. Solplan Review, January 1997.

Leicester, R.H.; Foliente, G.C.; Wang, C-H.; Nguyen, M.; Wang, X.; Mackenzie, C.; Thornon, J.B.; Cause, M. 2004. Structural durability of exposed timber. In: Proceedings, Woodframe Housing Durability and Disaster Issues, 2004. Madison, WI: Forest Products Society.

Lstiburek, J.W. 2008. The perfect storm over stucco. ASHRAE J. February 2008:38–43.

Panshin, A.J.; De Zeeuw, C. 1964. Textbook of wood technology, Vol. 1. New York: McGraw-Hill Book Co.

Scheffer, T.C. 1971. A climate index for estimating potential for decay in wood structures above ground. Forest Prod. Jour. 21(10):25–31.

Setliff, E.C. 1986. Wood decay hazard in Canada based on Scheffer's climate index formula. The Forestry Chronicle, October 1986:456–459.

Verrall, A.F.; Amburgey, T.L. 1980. Prevention and control of decay in homes. Prepared as part of interagency agreement IAA-25-75. Washington, DC: U.S. Department of Agriculture, Forest Service, and U.S. Department of Housing and Urban Development.

Wang, J.; Wu, X.; Jiang, M.; Morris, P.I. 2007. Decay hazard classifications for China for exterior above-ground wood. IRG/WP 07-20357. Stockholm, Sweden: International Research Group on Wood Protection.

Wang, C-H.; Leicester, R.H.; Nguyen, M.N. 2008. Manual No. 4: Decay above-ground. Prepared for Forest and Wood Products Australia. Highett, Victoria: CSIRO Sustainable Ecosystems.

World Meterological Organization. 1983. WMO guide to climatological practices, second edition. Geneva, Switzerland: Secretariat of the WMO. (http://www.wmo.ch/pages/prog/wcp/guide/guide.2e/WMOno100.pdf)

Table 1—Decay hazard index values calculated from weather data for the period 1971–2000

Location	Index value	Change
Alabama		
Anniston	62.8	
Birmingham	73.4	1.2
Huntsville	67.0	1.6
Mobile	93.8	– 5.4
Montgomery	71.8	2.6
Arizona		
Flagstaff	25.3	6.1
Phoenix	9.0	2.3
Prescott	24.3	– 1.4
Tucson	25.6	– 1.6
Winslow	17.6	1.7
Yuma	0.0	0
Arkansas		
Bentonville	42.5	
Fort Smith	55.9	3.6
Littlerock	60.6	3.9
Texarkana	59.7	1.1
California		
Bakersfield	8.5	– 0.7
Bishop	0.7	0.6
Blue Canyon	15.3	3.0
Burbank	8.7	– 0.4
Eureka	44.5	3.1
Fresno	11.3	2.2
Long Beach	9.5	5.7
Los Angeles	9.1	1.1
Mount Shasta	14.6	1.4
Oakland	23.9	4.0
Palo Alto	19.5	
Red Bluff	25.3	1.8
Sacremento	16.8	1.0
Salinas	17.4	
Sandberg	3.3	– 0.5
San Diego	13.1	– 0.5
San Francisco	21.8	2.4
Santa Maria	12.8	1.1
Colorado		
Alamosa	18.4	0.5
Colo. Springs	40.9	5.6
Denver	36.3	3.0
Grand Junction	21.8	4.4
Pueblo	30.6	0.1
Connecticut		
Bridgeport	46.3	2.7
Hartford	50.7	1.9
Stamford	53.6	
DC		
DCA airport	58.2	7.0
Delaware		
Wilmington	51.9	0.7
Florida		
Apalachicola	81	– 5.3
Daytona Beach	102.4	0.5
Ft. Lauderdale	154.1	
Ft. Myers	114.1	– 3.8
Gainesville	109.1	
Jacksonville	96.6	– 4.4
Key West	106	– 5.0
Miami	145.9	14.6
Orlando (Sanford)	99.7	
Pensacola	82.7	– 4.5
Tallahassee	93.6	– 5.8
Tampa	95.6	– 8.4
West Palm Beach	141.8	4.3
Winter Haven	109.4	
Georgia		
Athens	65	– 2.9
Atlanta	70.7	4.0
Augusta	69.8	4.8
Columbus	73.6	0.9
Macon	69.9	– 7.6
Rome	62.5	– 6.7
Savannah	83.9	1.4
Thomasville	51.1	– 45.7
Idaho		
Boise	14.7	– 2.0
Bonners Ferry	28.0	
Idaho Falls	9.7	1.1
Lewiston	30.1	5.3
Pocatello	17.2	2.9
Illinois		
Cairo	54.7	– 7.6
Chicago	50.4	4.9
Moline	50.3	3.0
Peoria	48.4	5.7

Table 1—Decay hazard index values calculated from weather data for the period 1971–2000 *(continued)*

Location	Index value	Change
Illinois (cont.)		
Rockford	45.4	2.5
Springfield	48	0.3
Indiana		
Evansville	52.7	– 0.3
Ft. Wayne	49.7	3.7
Indianapolis	53.6	6.9
South Bend	50.9	7.0
Iowa		
Ankeny	42.5	
Burlington	50.6	4.0
Clinton	48.2	
Des Moines	49.5	4.7
Dubuque	44.5	4.6
Sioux City	42.2	– 1.0
Waterloo	43.7	8.7
Kansas		
Concordia	44.8	1.8
Dodge City	38.5	– 1.2
Goodland	34.5	1.7
Topeka	50.4	2.0
Wichita	44.8	0.1
Kentucky		
Lexington	59.6	1.7
Louisville	61.6	8.1
Louisiana		
Alexandria	72.8	1.0
Baton Rouge	85.7	7.7
Lake Charles	80.4	1.4
New Orleans	94.7	– 8.8
Shreveport	63.6	7.0
Maine		
Caribou	45	2.7
Portland	40.9	4.9
Maryland		
Baltimore	52.6	2.0
Salisbury	59.2	
Oakland	58.3	
Massachusetts		
Amherst	44.2	
Boston	48.4	– 2.8
Mass. (cont.)		
Hyannis	27.1	
Lowell	44.1	
Milton	46.5	– 3.0
Worcester	41.9	– 2.4
Michigan		
Alpena	37.9	1.0
Detroit	48.7	2.5
Flint	43.6	4.1
Grand Rapids	44.5	6.0
Ironwood	43.6	
Lansing	43.6	2.7
Marquette	40.9	1.1
Muskegon	40.8	3.8
Sault St. Marie	37.4	3.4
Minnesota		
Duluth	39.4	2.4
Int'l. Falls	38.8	2.4
Minneapolis	45.2	3.5
Rochester	42.2	– 1.0
St. Cloud	39	1.0
Mississippi		
Biloxi	84.9	
Jackson	70.1	– 9.8
Meridian	71.9	6.7
Vicksburg	57.5	– 9.5
Missouri		
Columbia	50.4	– 2.7
Kansas City	57	5.7
Rolla	54	
St. Louis	54	4.2
Springfield	53.3	2.1
Montana		
Billings	33.2	4.2
Glasgow	28.7	1.2
Great Falls	27.8	– 0.7
Havre	26.8	2.2
Helena	26.9	– 1.4
Kalispell	27.4	1.2
Miles City	30.3	– 0.6
Missoula	30.8	3.9

Table 1—Decay hazard index values calculated from weather data for the period 1971–2000 *(continued)*

Location	Index value	Change
Nebraska		
Grand Island	39	– 0.6
Lincoln	43.6	– 5.0
Norfolk	39.3	1.2
North Platte	38.4	3.3
Omaha	46.7	– 0.6
Scottsbluff	33.8	– 0.3
Valentine	36.4	1.8
Nevada		
Elko	10.6	4.0
Ely	13.2	3.9
Las Vegas	0.9	0.9
Reno	4.3	1.8
Winnemucca	8.5	1.9
New Hampshire		
Concord	42.8	4.3
Keene	41.8	
Mt. Washington	17.6	– 0.8
New Jersey		
Atlantic City	45.3	1.0
Newark	55.8	2.7
Toms River	47.5	
New Mexico		
Albuquerque	27.1	2.4
Los Alamos	39.8	
Raton	36.2	1.3
Taos	24.2	
White Sands	17.4	
New York		
Albany	48.8	2.8
Binghamton	48.5	1.2
Buffalo	52.2	7.7
NYC - LaGuardia	52.8	– 0.5
Riverhead	45	
Rochester	51	6.2
Syracuse	55.2	3.1
North Carolina		
Asheville	61.8	– 5.7
Cape Hatteras	77.5	– 2.0
Charlotte	67.5	3.4
Greensboro	59.7	– 6.7
High Point	65	
N.Carolina (cont.)		
Raleigh	63.5	– 2.1
Wilmington	82	2.4
North Dakota		
Bismark	30.9	– 2.1
Fargo	35.1	– 0.1
Williston	29.4	– 0.3
Ohio		
Akron	55.5	7.6
Cincinnati	57	– 3.4
Cleveland	54.5	7.2
Columbus	58.9	4.2
Dayton	52.9	1.4
Mansfield	51	6.1
Toledo	48.9	7.4
Youngstown	52.6	2.0
Oklahoma		
Enid	42.7	
McAlester	46.4	
Muskogee	42.3	
Olka. City	43.7	2.7
Tulsa	50.9	2.5
Oregon		
Astoria	69.2	– 1.9
Bend	7.6	
Eugene	40.8	– 0.6
Medford	24.7	1.0
Pendleton	18.8	– 2.2
Portland	52.4	2.2
Roseburg	48.8	4.8
Salem	43.9	– 2.8
Pennsylvania		
Allentown	50.5	– 2.0
Altoona	55.5	
Erie	56.4	11.0
York	58.7	
Philadelphia	54.1	4.3
Pittsburgh	57.3	
Wilkes Barre	55.6	
Williamsport	56	– 1.8

Table 1—Decay hazard index values calculated from weather data for the period 1971–2000 *(continued)*

Location	Index value	Change	Location	Index value	Change
Rhode Island			**Virginia**		
Newport	42.7		Lynchburg	56.5	– 8.3
Providence	46.5	– 1.5	Norfolk	65.2	– 1.1
			Richmond	59.2	– 2.5
South Carolina			Roanoke	60.7	
Charleston	82.4	– 0.7			
Columbia	71.7	– 0.4	**Washington**		
Florence	70.1	– 4.0	Olympia	43.7	– 5.7
			Pullman	21.2	
South Dakota			Seattle-Tacoma	49.9	0.2
Huron	34.9	– 2.4	Spokane	20.6	0.7
Rapid City	35.7	0	Stampede Pass	26.7	– 1.1
Sioux Falls	39.4	2.2	Yakima	6.9	– 1.3
Tennessee			**West Virginia**		
Bristol	62.3	– 1.8	Bluefield	64.5	
Chattanooga	69.8	2.5	Charleston	70.7	1.7
Knoxville	67.6	– 4.1	Elkins	67.3	5.7
Memphis	62.1	6.8	Huntington	65.1	4.6
Nashville	63.4	– 0.4	Morgantown	62.4	
			Parkersburg	62.5	– 2.2
Texas					
Abilene	34	2.9	**Wisconsin**		
Amarillo	35.5	2.0	Green Bay	40.7	3.4
Austin	55.2	8.6	LaCrosse	47.7	2.9
Brownsville	49.7	6.7	Madison	43.6	4.1
Corpus Christi	50.9	7.0	Milwaukee	44.2	8.6
Dallas	44.3	5.7	Wausau	45.3	
El Paso	25.8	8.2			
Houston	77.2	0.7	**Wyoming**		
Laredo	29.4	1.4	Casper	25.8	3.8
Lubbock	31.4	5.2	Cheyenne	35.7	0.8
Midland	20.6	0.8	Lander	18	3.7
Port Arthur	80.7	4.2	Sheridan	28.7	– 0.7
San Angelo	26.9	4.3			
San Antonio	52.2	8.8	**Alaska**		
Victoria	68.5	27.4	Anchorage	24.3	
Waco	47.2	8.7	Fairbanks	26.5	
Wichita Falls	38.2	4.1	Juneau	27.5	
			Sitka	64.1	
Utah			Valdez	39.8	
Milford	17.1	10.0			
Salt Lake City	25.5	5.7	**Hawaii**		
Wendover	5.1	0.9	Hilo	331	
			Honolulu	79.4	
Vermont			Kahului	83.3	
Burlington	55.3	5.9	Lihue	221	
Montpelier	41.3		Molokai	78.7	

Table 2—Selected climate normal data from CLIM20 (period 1971–2000) for locations in Georgia and northern Florida[a]

Location	Mean annual temperature (°F)	Coldest month mean temperature (°F)	Annual precipitation (mean/median) (in.)	Mean number of days per year with precipitation exceeding 0.01 in.	Mean number of days per year with precipitation exceeding 1.0 in.
Athens, GA	72	51	48 / 50	112	14
Atlanta, GA	72	52	50 / 49	116	15
Augusta, GA	76	56.5	45 / 44	109	13
Columbus, GA	76	57	49 / 49	108	14
Macon, GA	75.5	57	45 / 45	108	13
Rome, GA	70	50	56 / 57	117	17
Savannah, GA	77	60	50 / 49	111	13.5
Thomasville, GA	79	63	54 / 53	80.5	16
Apalachicola, FL	77	62	57 / 56	104	18
Pensacola, FL	77	61	64 / 69	107	20
Tallahassee, FL	79.5	64	63 / 62	113.5	20

[a] $T_{°C} = (T_{°F} - 32)/1.8$; 1 in. = 25.4 mm.

Appendix—Number of Days of Missing Temperature and Precipitation Data, 1971–2000

City (FAA location ID)	State	Missing temperature data (days)			Missing precipitation data (days)			
		1971–1980	1981–1990	1991–2000	1971–1980	1981–1990	1991–2000	Total
Alexandria (ESF)	LA	1,280	2,588	1,034	1,280	2,588	1,037	4,905
Gainesville (GNV)	FL	3,653	1,127	1	3,653	1,127	0	4,780
Kansas City (MKC)	MO	2,252	852	459	2,252	854	436	3,542
Lowell	MA	3,506	2,275	59	2,891	451	61	3,403
Blue Canyon	CA	2	442	2,953	0	441	2,953	3,394
Texarkana (TXK)	AR	111	50	2,650	89	37	2,648	2,774
Sandberg	CA	154	346	1,639	110	136	1,591	1,837
Red Bluff (RBL)	CA	0	94	1,355	0	114	1,356	1,470
Parkersburg (PKB)	WV	1	1	1,311	0	1	1,311	1,312
Salinas (SNS)	CA	4	1	1,231	0	5	1,231	1,236
Milford	UT	2	154	1,073	0	157	1,076	1,233
Montpelier	VT	32	37	1,107	1	37	1,107	1,145
Muskogee	OK	595	121	426	528	77	443	1,048
McAlester (MLC)	OK	0	11	959	0	1	959	960
Biloxi	MS	4	1,279	288	6	933	1	940
Hyannis	MA	575	0	478	525	0	398	923
Thomasville	GA	694	800	1,123	129	471	307	907
Stampede Pass	WA	0	276	516	0	276	515	791
Cairo	IL	0	275	500	0	276	513	789
Rolla	MO	1,116	0	1	764	0	0	764
Altoona	PA	11	30	542	0	37	631	668
Oakland	CA	104	209	549	93	198	273	564
Palo Alto	CA	102	193	394	35	122	389	546
Winter Haven	FL	137	150	173	94	151	212	457
Mt. Shasta	CA	0	371	31	0	402	31	433
Taos	NM	3	0	456	1	1	428	430
Dubuque (DBQ)	IA	0	398	1	0	402	0	402
Savannah (SAV)	GA	365	1	0	365	1	30	396
Ankeny	IA	331	19	21	329	12	39	380
Morgantown (MGW)	WV	30	6	279	30	8	292	330
Anniston (ANB)	AL	31	1	285	31	1	285	317
Keene	NH	33	34	276	30	35	249	314
Stamford	CT	3	122	179	0	130	181	311
Wendover	UT	102	62	0	85	71	147	303
Laredo	TX	276	33	0	263	31	0	294
Oakland	MD	0	122	123	0	125	131	256
Florence (FLO)	SC	243	1	8	243	2	1	246
Bonners Ferry	ID	76	183	34	1	185	52	238
Orlando (Sanford)	FL	8	2	2	0	228	2	230
Worcester (ORH)	MA	0	1	162	0	1	217	218
Enid	OK	10	121	31	0	156	39	195
Omaha (OMA)	NE	0	32	153	3	32	154	189
Yuma, AZ	AZ	124	1	31	154	1	31	186
Ft. Myers	FL	0	34	151	0	32	151	183
Pensacola (PNS)	FL	0	32	123	0	32	150	182
Cincinnati (LUK)	OH	0	0	181	0	0	181	181
Marquette	MI	151	0	2	151	0	8	159
Alamosa (ALS)	CO	30	1	93	0	31	125	156
Havre (HVR)	MT	0	1	154	0	1	154	155
La Crosse (LSE)	WI	0	124	36	0	124	28	152

City (FAA location ID)	State	Missing temperature data (days)			Missing precipitation data (days)			
		1971–1980	1981–1990	1991–2000	1971–1980	1981–1990	1991–2000	Total
Newport	RI	114	31	197	31	33	64	128
Burbank	CA	67	3	63	63	1	63	127
Roseburg	OR	129	0	2	97	5	16	118
Pullman	WA	33	3	62	31	2	83	116
Dodge City (DDC)	KS	0	1	92	0	1	110	111
Apalachicola (AAF)	FL	0	1	92	0	1	107	108
Vicksburg	MS	87	29	63	33	36	36	105
Dallas (Love Field)	TX	0	31	102	0	1	103	104
Sacramento	CA	0	1	109	0	1	99	100
Pueblo (PUB)	CO	0	5	62	0	1	93	94
Grand Island (GRI)	NE	31	1	62	31	1	62	94
Austin	TX	31	1	62	31	1	62	94
Concordia (CNK)	KS	0	1	92	0	1	92	93
Goodland (GLD)	KS	0	1	92	0	1	92	93
Salisbury	MD	5	82	79	1	31	61	93
Olka. City (OKC)	OK	0	1	93	0	1	92	93
Prescott	AZ	0	51	32	0	51	33	84
Bentonville	AR	65	31	0	46	32	0	78
Amherst	MA	48	6	31	35	7	33	75
Chicago (MDW)	IL	79	0	0	73	0	0	73
Bluefield (BLF)	WV	0	2	62	0	2	64	66
Burlington	IA	61	3	0	61	1	1	63
Sault St. Marie	MI	0	1	61	0	1	62	63
Riverhead	NY	2	3	61	0	1	62	63
Tulsa (TUL)	OK	0	1	62	0	1	62	63
Denver (Stapleton)	CO	0	1	61	0	1	61	62
Topeka (TOP)	KS	0	1	59	0	1	59	60
Milton	MA	0	29	30	0	29	30	59
Ironwood	MI	119	39	0	0	45	7	52
Toms River	NJ	16	300	93	1	11	38	50
Raton	NM	12	0	34	8	5	35	48
Flagstaff (FLG)	AZ	0	1	44	0	4	38	42
Bishop (BIH)	CA	31	1	3	31	1	7	39
White Sands	NM	57	5	32	0	1	35	36
Rome	GA	6	0	32	0	1	32	33
Miles City (MLS)	MT	0	32	1	0	32	1	33
North Platte (LBF)	NE	0	32	0	0	32	1	33
Allentown (ABE)	PA	0	1	30	0	1	32	33
York	PA	1	30	0	0	30	3	33
Colo. Springs (COS)	CO	0	1	31	0	1	31	32
Tallahassee (TLH)	FL	0	1	31	0	1	31	32
Waterloo (ALO)	IA	0	32	0	0	32	0	32
Wichita (ICT)	KS	0	1	31	0	1	31	32
Lincoln (LNK)	NE	0	1	31	0	1	31	32
Salem (SLE)	OR	0	32	0	0	32	0	32
Charleston (CHS)	SC	31	1	0	31	1	0	32
Amarillo (AMA)	TX	0	1	31	0	1	31	32
Waco (ACT)	TX	0	1	31	0	1	31	32
Bakersfield (BFL)	CA	0	1	30	0	1	30	31
Springfield (SPI)	IL	0	31	0	0	31	0	31

City (FAA location ID)	State	Missing temperature data (days)			Missing precipitation data (days)			
		1971–1980	1981–1990	1991–2000	1971–1980	1981–1990	1991–2000	Total
Flint (FNT)	MI	0	1	30	0	1	30	31
Nashville (BNA)	TN	0	1	30	0	1	28	29
Los Alamos	NM	0	0	0	0	5	19	24
Idaho Falls	ID	2	1	1	1	1	12	14
Bend	OR	1	1	0	0	3	9	12
Cape Hatteras	NC	0	1	16	0	1	9	10
Louisville (SDF)	KY	0	1	5	0	1	8	9
Lewiston (LWS)	ID	0	1	7	0	1	6	7
High Point	NC	1	2	11	0	3	4	7
El Paso (ELP)	TX	0	1	6	0	1	6	7
Birmingham (BHM)	AL	0	6	0	0	6	0	6
Ft. Smith (FSM)	AR	0	1	0	0	1	5	6
Rochester (RST)	MN	0	1	0	0	1	5	6
Eugene (EUG)	OR	0	1	1	0	1	5	6
Rapid City (RAP)	SD	0	1	3	0	1	5	6
Williamsport (IPT)	PA	0	1	0	0	1	4	5
Santa Maria (SMX)	CA	0	1	2	0	1	3	4
Key West (EYW)	FL	0	1	3	0	1	3	4
Clinton	IA	0	0	0	2	0	2	4
New Orleans (MSY)	LA	0	1	0	0	2	2	4
Muskegon (MKG)	MI	0	1	1	0	1	3	4
Wichita Falls (SPS)	TX	0	1	2	0	1	3	4
Olympia (OLM)	WA	0	1	11	0	1	3	4
Huntington (HTS)	WV	0	1	1	0	1	3	4
Montgomery (MGM)	AL	0	2	0	0	2	1	3
Winslow (INW)	AZ	0	1	20	0	1	2	3
Wilmington (ILG)	DE	0	1	0	0	1	2	3
Caribou (CAR)	ME	2	1	0	2	1	0	3
Lansing (LAN)	MI	0	1	0	0	1	2	3
Helena (HLN)	MT	0	1	2	0	1	2	3
Kalispell (FCA)	MT	0	1	1	0	1	2	3
Atlantic City	NJ	0	1	0	0	1	2	3
Port Arthur (BPT)	TX	0	1	2	0	1	2	3
Seattle-Tacoma (SEA)	WA	0	1	0	0	1	2	3
Ft. Lauderdale	FL	17	35	0	0	0	2	2
Columbus (CSG)	GA	1	1	0	1	1	0	2
Macon (MCN)	GA	0	1	0	0	1	1	2
Des Moines (DSM)	IA	0	1	1	0	1	1	2
Moline (MLI)	IL	0	1	0	0	2	0	2
Portland (PWM)	ME	0	1	0	0	1	1	2
Fargo (FAR)	ND	0	1	0	0	1	1	2
Elko (EKO)	NV	0	2	0	0	2	0	2
Ely (ELY)	NV	1	1	7	1	1	0	2
Reno (RNO)	NV	0	1	0	0	1	1	2
Sioux Falls (FSD)	SD	0	1	0	0	1	1	2
Bristol (TRI)	TN	0	1	1	0	1	1	2
Victoria (VCT)	TX	0	1	0	0	1	1	2
Burlington (BVT)	VT	0	1	0	1	1	0	2
Wausau (AUW)	WI	0	1	0	1	1	0	2
Sheridan (SHR)	WY	0	1	0	0	1	1	2

City (FAA location ID)	State	Missing temperature data (days)			Missing precipitation data (days)			
		1971–1980	1981–1990	1991–2000	1971–1980	1981–1990	1991–2000	Total
Mobile (MOB)	AL	0	1	0	0	1	0	1
Little Rock (LIT)	AR	0	1	0	0	1	0	1
Phoenix (PHX)	AZ	0	1	0	0	1	0	1
Tucson	AZ	0	1	0	0	1	0	1
Eureka	CA	0	1	0	0	1	0	1
Fresno (FAT)	CA	0	1	0	0	1	0	1
Long Beach (LGB)	CA	0	1	0	0	1	0	1
Los Angeles (LAX)	CA	0	1	0	0	1	0	1
San Diego (SAN)	CA	0	1	0	0	1	0	1
San Francisco (SFO)	CA	0	1	0	0	1	0	1
Grand Junction (GJT)	CO	0	1	0	0	1	0	1
Bridgeport (BDR)	CT	0	1	0	0	1	0	1
Hartford (BDL)	CT	0	1	0	0	1	0	1
Washington (DCA)	DC	0	1	0	0	1	0	1
Daytona Beach (DAB)	FL	0	1	0	0	1	0	1
Jacksonville (JAX)	FL	0	1	0	0	1	0	1
Miami (MIA)	FL	0	1	0	0	1	0	1
Tampa (TPA)	FL	0	1	0	0	1	0	1
West Palm Beach (PBI)	FL	0	1	0	0	1	0	1
Athens (AHN)	GA	0	1	0	0	1	0	1
Atlanta (ATL)	GA	0	1	0	0	1	0	1
Augusta (AGS)	GA	0	1	4	0	1	0	1
Sioux City (SUX)	IA	0	1	0	0	1	0	1
Boise (BOI)	ID	0	1	0	0	1	0	1
Pocatello (PIH)	ID	0	1	0	0	1	0	1
Peoria (PIA)	IL	0	1	0	0	1	0	1
Rockford (RFD)	IL	0	1	0	0	1	0	1
Evansville (EVV)	IN	0	1	0	0	1	0	1
Ft. Wayne (FWA)	IN	0	1	0	0	1	0	1
Indianapolis (IND)	IN	0	1	0	0	1	0	1
South Bend (SBN)	IN	0	1	0	0	1	0	1
Lexington (LEX)	KY	0	1	1	0	1	0	1
Baton Rouge (BTR)	LA	0	1	0	0	1	0	1
Lake Charles (LCH)	LA	0	1	0	0	1	0	1
Shreveport (SHV)	LA	0	1	0	0	1	0	1
Boston (BOS)	MA	0	1	0	0	1	0	1
Baltimore (BWI)	MD	0	1	0	0	1	0	1
Alpena (APN)	MI	0	1	0	0	1	0	1
Detroit (Metro airport)	MI	0	1	0	0	1	0	1
Grand Rapids (GRR)	MI	0	1	0	0	1	0	1
Duluth (DLH)	MN	0	1	0	0	1	0	1
Int'l. Falls (INL)	MN	0	1	0	0	1	0	1
Minneapolis (MSP)	MN	0	1	0	0	1	0	1
St. Cloud (STC)	MN	0	1	0	0	1	0	1
Columbia (COU)	MO	0	1	0	0	1	0	1
Springfield (SGF)	MO	0	1	0	0	1	0	1
St. Louis (STL)	MO	0	1	0	0	1	0	1
Jackson (JAN)	MS	0	1	0	0	1	0	1
Meridian (MEI)	MS	0	1	0	0	1	0	1
Billings (BIL)	MT	0	1	0	0	1	0	1

City		Missing temperature data (days)			Missing precipitation data (days)			
(FAA location ID)	State	1971–1980	1981–1990	1991–2000	1971–1980	1981–1990	1991–2000	Total
Glasgow (GGW)	MT	0	1	0	0	1	0	1
Great Falls (GTF)	MT	0	1	0	0	1	0	1
Missoula (MSO)	MT	0	1	15	0	1	0	1
Asheville (AVL)	NC	0	1	0	0	1	0	1
Charlotte (CLT)	NC	0	1	0	0	1	0	1
Greensboro (GSO)	NC	0	1	0	0	1	0	1
Raleigh (RDU)	NC	0	1	0	0	1	0	1
Wilmington (ILM)	NC	0	1	0	0	1	0	1
Bismark (BIS)	ND	0	1	0	0	1	0	1
Williston (ISN)	ND	0	1	0	0	1	0	1
Norfolk (OFK)	NE	0	1	0	0	1	0	1
Scottsbluff (BFF)	NE	0	1	0	0	1	0	1
Valentine (VTN)	NE	0	1	0	0	1	0	1
Concord (CON)	NH	0	1	0	0	1	0	1
Mt. Washington	NH	0	1	0	0	1	0	1
Newark (EWR)	NJ	0	1	0	0	1	0	1
Albuquerque (ABQ)	NM	0	1	0	0	1	0	1
Las Vegas (LAS)	NV	0	1	0	0	1	0	1
Winnemucca (WMC)	NV	0	1	0	0	1	0	1
Albany (ALB)	NY	0	1	0	0	1	0	1
Binghamton (BGM)	NY	0	1	0	0	1	0	1
Buffalo (BUF)	NY	0	1	0	0	1	0	1
New York (LGA)	NY	0	1	0	0	1	0	1
Rochester (ROC)	NY	0	1	0	0	1	0	1
Syracuse (SYR)	NY	0	1	0	0	1	0	1
Akron (CAK)	OH	0	1	1	0	1	0	1
Cleveland (CLE)	OH	0	1	0	0	1	0	1
Columbus (CMH)	OH	0	1	0	0	1	0	1
Dayton (DAY)	OH	0	1	1	0	1	0	1
Mansfield (MFD)	OH	0	1	0	0	1	0	1
Toledo (TOL)	OH	0	1	0	0	1	0	1
Youngstown (YNG)	OH	0	1	0	0	1	0	1
Astoria (AST)	OR	0	1	0	0	1	0	1
Medford (MFR)	OR	0	1	0	0	1	0	1
Pendleton (PDT)	OR	0	1	0	0	1	0	1
Portland (PDX)	OR	0	1	0	0	1	0	1
Erie (ERI)	PA	0	1	0	0	1	0	1
Philadelphia (PHL)	PA	0	1	0	0	1	0	1
Pittsburgh (PIT)	PA	0	1	0	0	1	0	1
Wilkes Barre (AVP)	PA	0	1	0	0	1	0	1
Providence (PVT)	RI	0	1	3	0	1	0	1
Columbia (CAE)	SC	0	1	0	0	1	0	1
Huron (HON)	SD	0	1	0	0	1	0	1
Chattanooga (CHA)	TN	0	1	0	0	1	0	1
Knoxville (TYS)	TN	0	1	0	0	1	0	1
Memphis (MEM)	TN	0	1	0	0	1	0	1
Abilene (ABI)	TX	0	1	0	0	1	0	1
Brownsville (BRO)	TX	0	1	0	0	1	0	1
Corpus Christi (CRP)	TX	0	1	0	0	1	0	1
Houston (IAH)	TX	0	1	0	0	1	0	1

City (FAA location ID)	State	Missing temperature data (days)			Missing precipitation data (days)			
		1971–1980	1981–1990	1991–2000	1971–1980	1981–1990	1991–2000	Total
Lubbock (LBB)	TX	0	1	0	0	1	0	1
Midland (MAF)	TX	0	1	0	0	1	0	1
San Angelo (SJT)	TX	0	1	0	0	1	0	1
San Antonio (SAT)	TX	0	1	0	0	1	0	1
Salt Lake City (SLC)	UT	0	1	0	0	1	0	1
Lynchburg (LYH)	VA	0	1	0	0	1	0	1
Norfolk (ORF)	VA	0	1	0	0	1	0	1
Richmond (RIC)	VA	0	1	0	0	1	0	1
Roanoke (ROA)	VA	0	1	0	0	1	0	1
Spokane (GEG)	WA	0	1	0	0	1	0	1
Yakima (YKM)	WA	0	1	0	0	1	0	1
Green Bay (GRB)	WI	0	1	0	0	1	0	1
Madison (MSN)	WI	0	1	0	0	1	0	1
Milwaukee (MKE)	WI	0	1	0	0	1	0	1
Charleston (CRW)	WV	0	1	0	0	1	0	1
Elkins (EKN)	WV	0	1	0	0	1	0	1
Casper (CPR)	WY	0	1	0	0	1	0	1
Cheyenne (CYS)	WY	0	1	0	0	1	0	1
Lander (LND)	WY	0	1	1	0	1	0	1
Huntsville (HSV)	AL	0	0	0	0	0	0	0
Anchorage (ANC)	AK	0	1	0	0	1	0	1
Fairbanks (FAI)	AK	0	1	3	0	1	0	1
Juneau (JNU)	AK	31	156	32	31	158	31	220
Sitka (SIT)	AK	31	1	425	31	1	426	458
Valdez	AK	893	1	0	782	1	0	783
Hilo (ITO)	HI	0	32	0	0	33	1	34
Honolulu (HNL)	HI	0	1	0	0	1	0	1
Kahului (OGG)	HI	0	1	0	0	1	0	1
Lihue (LIH)	HI	0	1	0	0	1	0	1
Molokai	HI	1,193	7	26	1,046	3	0	1,049

FAA location ID (LID) is the identifier used by the FAA for an airport

FAA LID generally is the same as the NWS call sign, and generally is also the same as the IATA airport code.

Locations in this Appendix without an FAA LID generally are not airport locations.

Airport locations sometimes change (example: Denver Stapleton was an active airport in 1971, but not in 2000)

Locations without an FAA LID may (or may not) have a three-letter NWS call sign.

All locations in this Appendix have a unique 6-digit Cooperative ID code; some also have a WMO ID code.