Verisk™

Understanding evolving hail risk

Hail's widening geographic footprint put more properties at risk in 2021

Overview

Originally, there was "hail alley"—a wedge of states in the Midwest deemed at higher risk for damaging hailstorms. For the past several years, we've watched as this alley has grown wider, bringing more hailstorms to Eastern states and more populous areas.

As a result, nearly 10 percent more properties were affected by one or more damaging hailstorms in 2021 than in 2020, despite a year-over-year decline in the total number of hailstorms.

Examining hail activity in 2021 reveals several notable developments:

- **More properties affected:** More than 6.8 million properties in the United States were affected by one or more damaging hailstorms in 2021, up from 6.2 million in 2020, according to Verisk estimates.
- **Texas tops again:** After a year of historic storms, Texas once again topped the list of states with the most properties affected by hail by a wide margin.
- **Fewer hailstorms:** While the 2021 hail season was distinguished by a wider geographic footprint and a higher number of properties at risk, there were fewer hailstorms than in 2020. Indeed, the number of hailstorms in 2021 fell below the 10-year average.

The shifting geography of hail's reach raises several important questions for insurers to consider, including:

- *How will climate change impact severe thunderstorm risk into mid-century? Will hailstorms become more frequent and/or more severe as the planet warms?*
- *What new population centers are at risk if hail's geographic reach continues to expand?*
- *Are roofs in increasingly at-risk areas to the east of hail alley built to withstand punishing hailstorms?*

Advanced analytics to help insurers understand hail risk

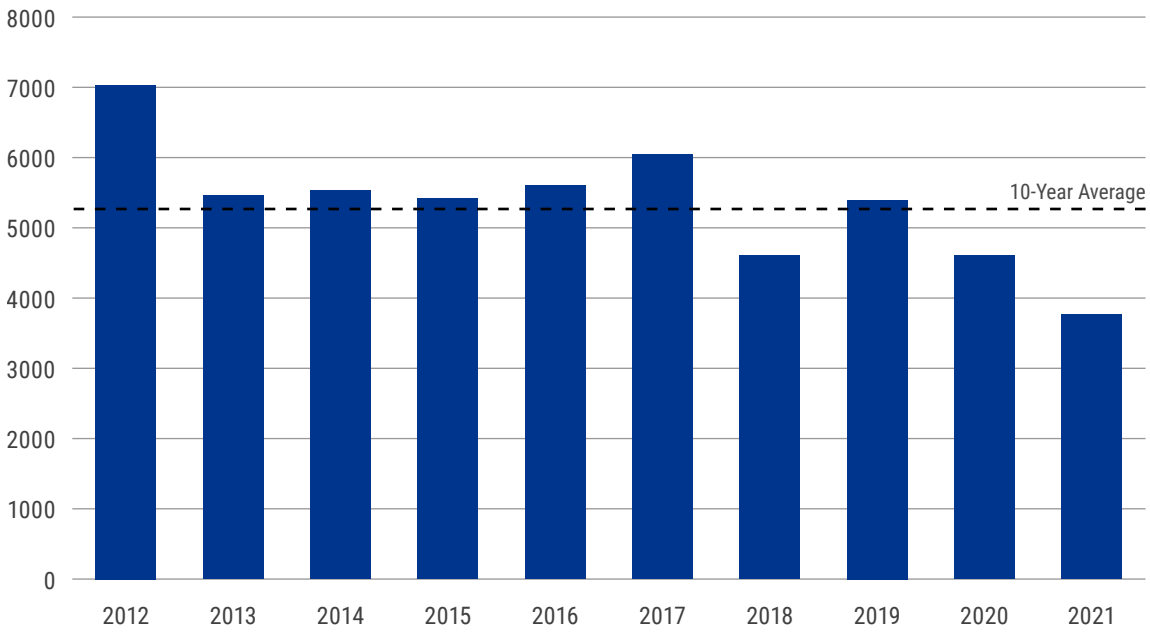
Hail is a highly variable and volatile peril. It requires a robust suite of data to analyze the risk fully. This report is based on Verisk's tracking and analysis of data from damaging hail events at properties in the continental United States in 2021. We generate this data through our proprietary hail algorithm, using multiple advancements in the science of hail identification and dual-polarization radar data processing. Full-resolution weather radar data produces granular information such as gradients along the edge of hailstorms, and new radar variables assist with finer calculations of hail size.

More than 6.8 million properties in the United States were affected by one or more damaging hailstorms in 2021.

The hail trendline: Storm numbers dip, but May sees a surge

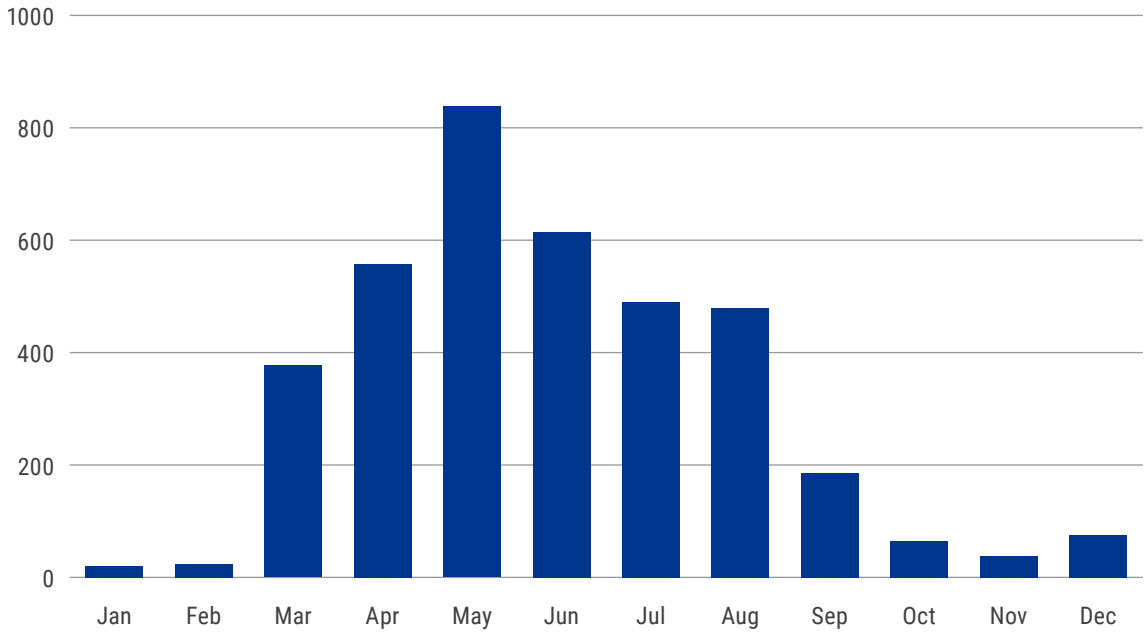
The National Oceanic and Atmospheric Administration (NOAA) recorded 3,763 large hailstorms in 2021, down from 4,600 storms in 2020 and below the ten-year average of roughly 5,300.

Number of hail events over the past decade



While hail has been spreading to a wider swath of states, hail-producing severe storms tend to cluster up in the spring and summer months. Last year, over 830 hailstorms occurred in May, making it the most active month for hail in 2021. It was followed closely by June, April, and July. This peak occurred earlier in the year than in 2020, which saw hail spike in June.

Number of hail events, per month 2021



Zooming in on hail property damage and exposure trends

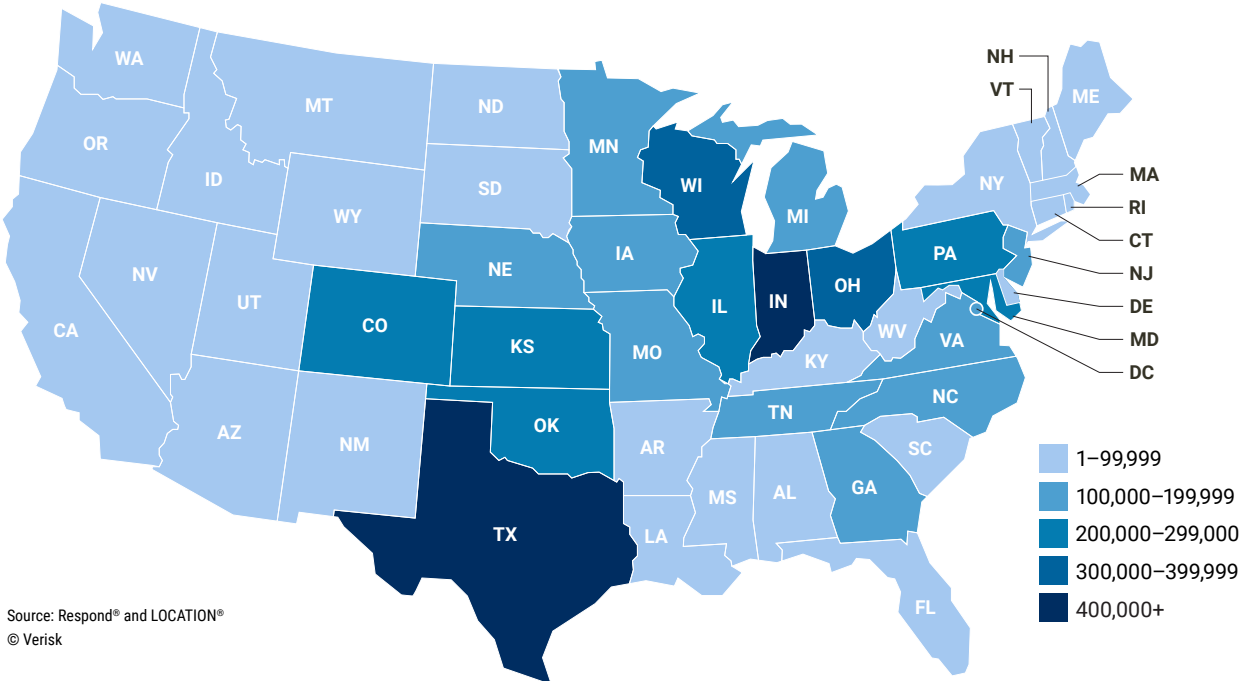
Despite a year-over-year decrease in number of hailstorms, nearly 10 percent more U.S. properties were affected by hail in 2021 than in 2020. This was due, in part, to a growing number of hailstorms in more populous, Eastern states outside of the traditional "hail alley" states of Nebraska, Colorado, and Wyoming.[1]

Two East Coast states, Pennsylvania and Maryland, entered the top ten ranking in 2021 with properties affected by hail. In fact, Colorado was the only hail alley state to crack the top ten in 2021—at number ten. For insurers writing property coverages outside of the traditional hail alley states, the eastward drift of damaging hail events is a trend to watch closely.

While Kansas ranked eighth in terms of states affected by hail, it had the highest percentage of properties affected, at 19 percent.

Rank	State	Estimated number of properties affected	Percentage of properties affected
1	TX	1,591,074	17%
2	IN	475,377	17%
3	OH	389,334	8%
4	WI	306,512	12%
5	MD	274,501	13%
6	PA	271,646	5%
7	IL	261,822	6%
8	KS	216,152	19%
9	OK	204,382	15%
10	CO	197,320	10%

Estimated number of U.S. properties affected by one or more damaging hail events



Source: Respond® and LOCATION®
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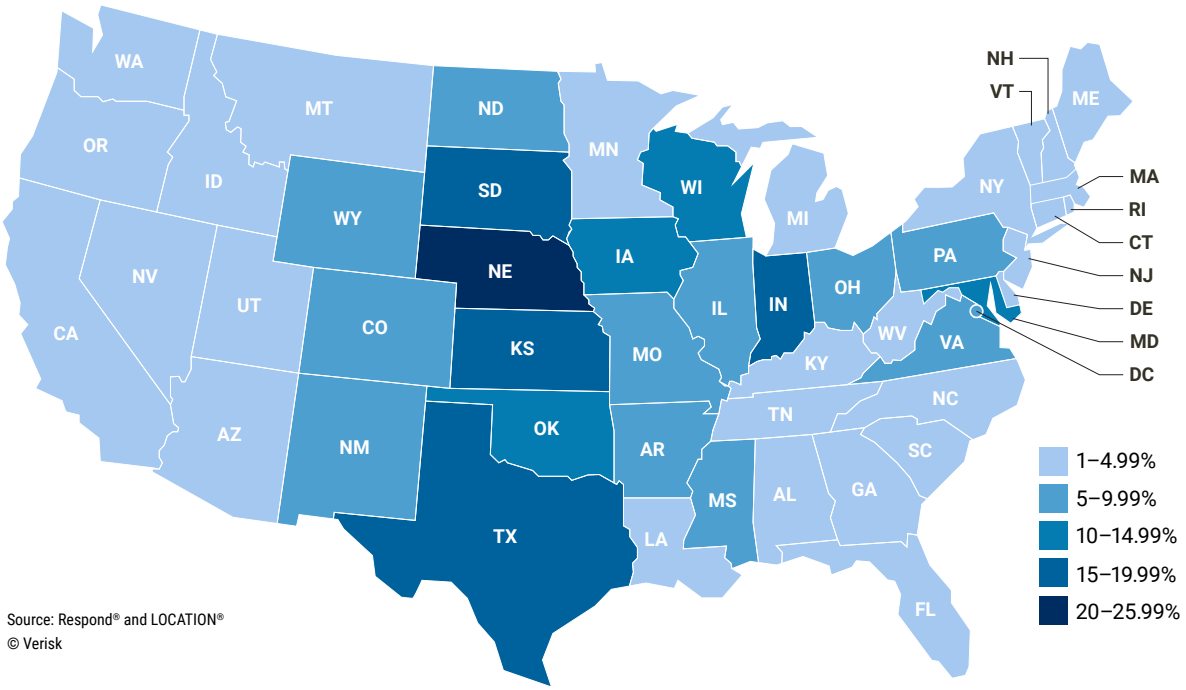
They say everything's bigger in Texas, and that's certainly true for the sheer number of properties affected by hail last year. With an estimated 1,591,074 properties, representing 17 percent of the state's total properties, Texas has nearly *1 million* more properties affected by hail than the next-highest state, Indiana. The total number of Texas properties affected by hail grew by 80,000 from 2020 to 2021. The Lone Star State accounted for nearly a quarter of all properties affected by hailstorms in 2021.

Texas also recorded the single largest hailstone in the state's history in 2021—a 1.26-pound chunk of ice measuring 6.4-inch inches in diameter.[2]

Estimated percentage of U.S. properties affected by one or more damaging hail events



Source: Respond® and LOCATION®
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Coinciding with the increase in properties affected by a damaging hail event in 2021, there was also an increase in claims, which rose to $16.5 billion from $14.2 billion in 2020. Texas also continued the charge here with $5.1 billion in claims due to hail damage—nearly a $2 billion increase from $3.3 billion the previous year. Finally, the second most-affected state, Indiana, had nearly an order of magnitude fewer claims than Texas, with $527,000 in claims from the 17 percent of its housing stock affected by hail.

County breakdown: Where hail hit in 2021

The state of Ohio ranked third in terms of the total number of properties affected by hail, but Montgomery County, OH, had the highest total number of properties affected by hail of any county in 2021 at nearly 200,000. A full 81 percent of properties in the county, which includes Dayton and is the fifth most populous in the state, were affected by hail.

Baltimore, Maryland, had the second-highest number of properties affected by hail—an estimated 183,085, or 36 percent of total properties. On a percentage basis, Saline, Kansas, topped the list with an estimated 97 percent of properties in the county affected by hail last year, followed by La Crosse, Wisconsin, with 89 percent.

1. Texas

County	Estimated number of properties affected	Percentage of properties affected
Harris	169,579	14%
Tarrant	158,030	25%
Collin	111,822	38%
Dallas	108,189	16%
Bexar	93,766	16%

2. Indiana

County	Estimated number of properties affected	Percentage of properties affected
Marion	138,397	36%
Hamilton	79,373	65%
Allen	56,550	34%
Vigo	26,284	49%
Madison	16,886	29%

3. Ohio

County	Estimated number of properties affected	Percentage of properties affected
Montgomery	198,470	81%
Warren	41,699	50%
Greene	35,058	59%
Butler	29,796	22%
Clermont	19,730	25%

4. Wisconson

County	Estimated number of properties affected	Percentage of properties affected
La Crosse	43,909	89%
Outagamie	39,122	55%
Fond du Lac	29,261	68%
Jefferson	19,647	57%
Brown	16,036	18%

5. Maryland

County	Estimated number of properties affected	Percentage of properties affected
Baltimore	183,085	36%
Montgomery	51,468	16%
Prince George's	17,052	6%
Anne Arundel	9,940	5%
Howard	7,710	7%

6. Pennsylvania

County	Estimated number of properties affected	Percentage of properties affected
Allegheny	67,195	13%
Montgomery	52,203	17%
Philadelphia	38,804	6%
Bucks	35,940	16%
Delaware	34,820	19%

7. Illinois

County	Estimated number of properties affected	Percentage of properties affected
Lake	76,580	22%
McHenry	59,042	51%
Cook	17,367	1%
Sangamon	12,399	15%
Knox	9,565	42%

8. Kansas

County	Estimated number of properties affected	Percentage of properties affected
Johnson	26,891	13%
Saline	21,060	97%
Wyandotte	18,334	26%
Sedgwick	17,789	9%
Leavenworth	17,692	60%

9. Oklahoma

County	Estimated number of properties affected	Percentage of properties affected
Oklahoma	57,021	20%
Cleveland	50,315	50%
Tulsa	21,282	7%
Jackson	8,706	8%
McClain	6,426	51%

10. Colorado

County	Estimated number of properties affected	Percentage of properties affected
Douglas	43,373	31%
Arapahoe	42,145	21%
Jefferson	23,843	10%
El Paso	19,937	9%
Denver	16,503	8%

Climate change, severe thunderstorms, and hail

How much is a warming climate contributing to more severe thunderstorms and their dangerous offspring, hail? It's not a question that lends itself to a succinct answer. But neither is it an academic question: Since 1985, an average of 55 percent of the insurance industry's insured losses have stemmed from severe thunderstorm events.

Here's what we can say with a degree of certainty: The number of days where large hail (over 2-inches in diameter) falls has been increasing, particularly in the Midwest and Northeastern United States. The historic hailstone that fell in Texas last year may not be an outlier for long. Severe thunderstorm paths are also getting longer, creating larger swaths of damage.

Understanding the link between severe thunderstorms and climate change is complicated by several factors. Verisk's extreme events research shows that, first, these events can be difficult to quantify, due to the size of hail events and the population bias when reporting severe storms. Regions with more people will naturally report more storms than areas with relatively smaller populations—but that doesn't mean those low-population areas are necessarily experiencing fewer storms. Our hail algorithms are developed to solve these challenges.

A combination of environmental observations can also help compensate for these difficulties. Verisk's analysis suggests the "convective parameters" that correlate to severe storms and their sub-perils (hail, lightning)—such as moisture levels at the Earth's surface, wind speeds, etc.—show a widespread, increasing trend. However, different modeling can interpret the near-term impacts of these parameters differently.

Other research suggests that, as the Earth's surface warms, more hail will melt before it hits the ground.[3] The net effect is that the hail that resists melting in the atmosphere will be larger in size and, potentially, more damaging when it falls to Earth.[4]

Roofs: The first line of defense against a hailstorm

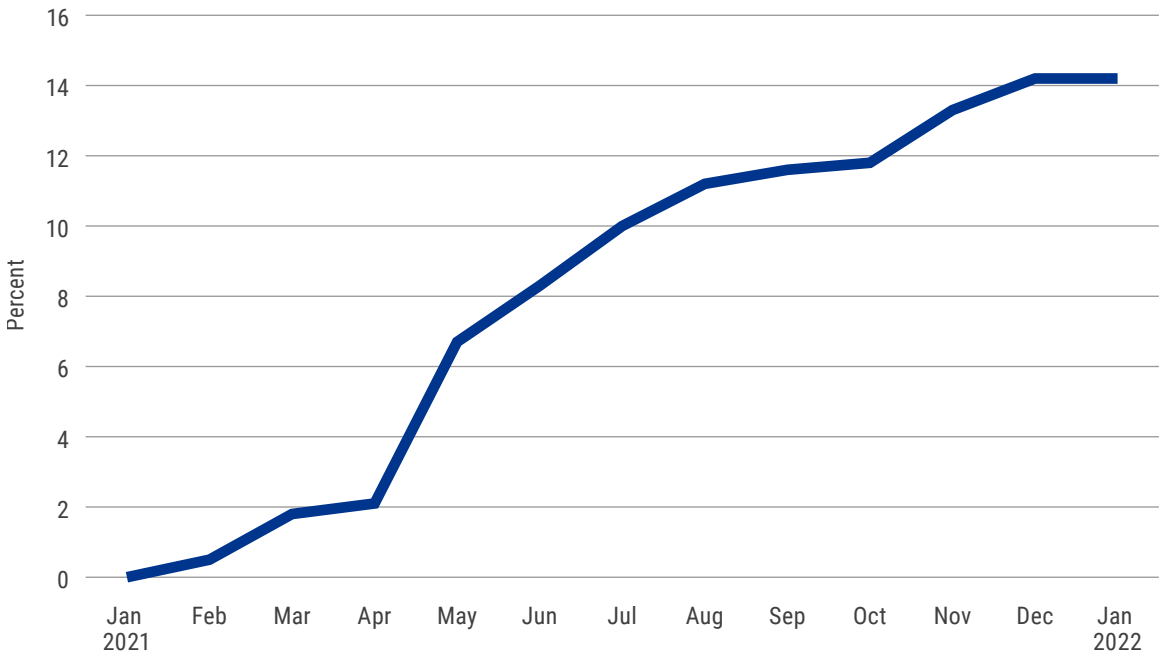
Roofs, in general, are costly and subject to relentless wear and tear from severe weather events. While they may be able to sustain a significant amount of damage during a hailstorm, their condition may deteriorate over time. As severe weather expands out from traditional hail alley states—and as climate change threatens to release larger hailstones from the sky more frequently—understanding roof risk across material, condition, and replacement costs is a key component to managing this peril.

For materials, while many properties in traditional hail-prone states are built using impact-resistant shingles, property owners in Eastern states exposed to the growing threat of hail may not be as familiar with them. Roof shingles are generally sorted into classes of impact resistance and it's important to underscore that even the most fortified roofs in this classification system are only designed to withstand hail that's 2-inch diameters.[5] That's an important consideration as we see storms generate larger hailstones—paired with global warming which may accelerate the trend toward ever-larger hailstones.

Hail can severely damage a roof. And while the damage may go unnoticed for months or years, when it's found, the claim may land with an insurer that wasn't covering the home when the damage occurred. Additionally, the deterioration may make the roof more susceptible to leaks or damage from subsequent events.

As roof condition declines, replacement is often the next step. The costs of replacing a roof can change significantly over time, based on local material and labor costs. Roofing composite has seen a steady increase in costs over from January 2021 to January 2022, rising 14 percent year over year. Staying up to date on these changes is critical to maintaining insurance to value.

Roofing composite: percentage change in costs



Tracking a dynamic peril

Hail risk often poses unique problems for many property insurers, which is why Verisk devotes specialized resources to studying this dynamic peril. Given hail's unpredictability and variability, there's a very real possibility of hail damage already in your portfolio. You just may not have found it yet. A good place to start your search is with the past year's hail activity. County-level analytics on properties affected can help you zero in on potential trouble spots.

And as we see the incidents of damaging hail spread from the Midwest to the East, understanding emerging regions for hail risk, the roofs in these areas, and their replacement costs can help insurers make more informed underwriting decisions and manage risk more effectively.

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