Howden Re

From floods
to flames

A comprehensive look
at 2024 CAT events

HOWDEN

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The year 2024 has been remarkable for its natural disasters, with significant hurricane activity, severe convective storms, destructive wildfires, and widespread flooding. While shifting weather patterns continue to challenge risk assessment and management, our clients remain well-equipped to navigate these complexities through our collaboration and preparedness strategies. 2024 is projected to be the warmest on record, surpassing 2023.

This report highlights the major events of 2024, exploring their impacts on communities, the economy, and the insurance sector, while underscoring the importance of proactive risk management.

161
ACE index active for 2024, indicating an extremely active Atlantic hurricane season

40
Tropical Cyclones recorded globally in 2024, one of the highest on record.

1880
Tornadoes in the U.S. in 2024, among the highest ever

1m
Acres burned by the largest wildfire in Texas history.

Atlantic Hurricanes

The Atlantic Hurricane season began unusually as Hurricane Beryl formed in the Atlantic Basin in late June. Beryl later made landfall as a Category 1 storm in Texas but not before it set the record for the earliest Category 5 hurricane recorded in the Atlantic.

With a total of 18 named storms, 2024 met NOAAs requirements to be classified as "Extremely Active." The number of hurricanes (11) and major hurricanes (5) of category 3 or higher surpassed all long- and short-term averages. Of the total of 18 named storms, three made landfall in Florida alone.
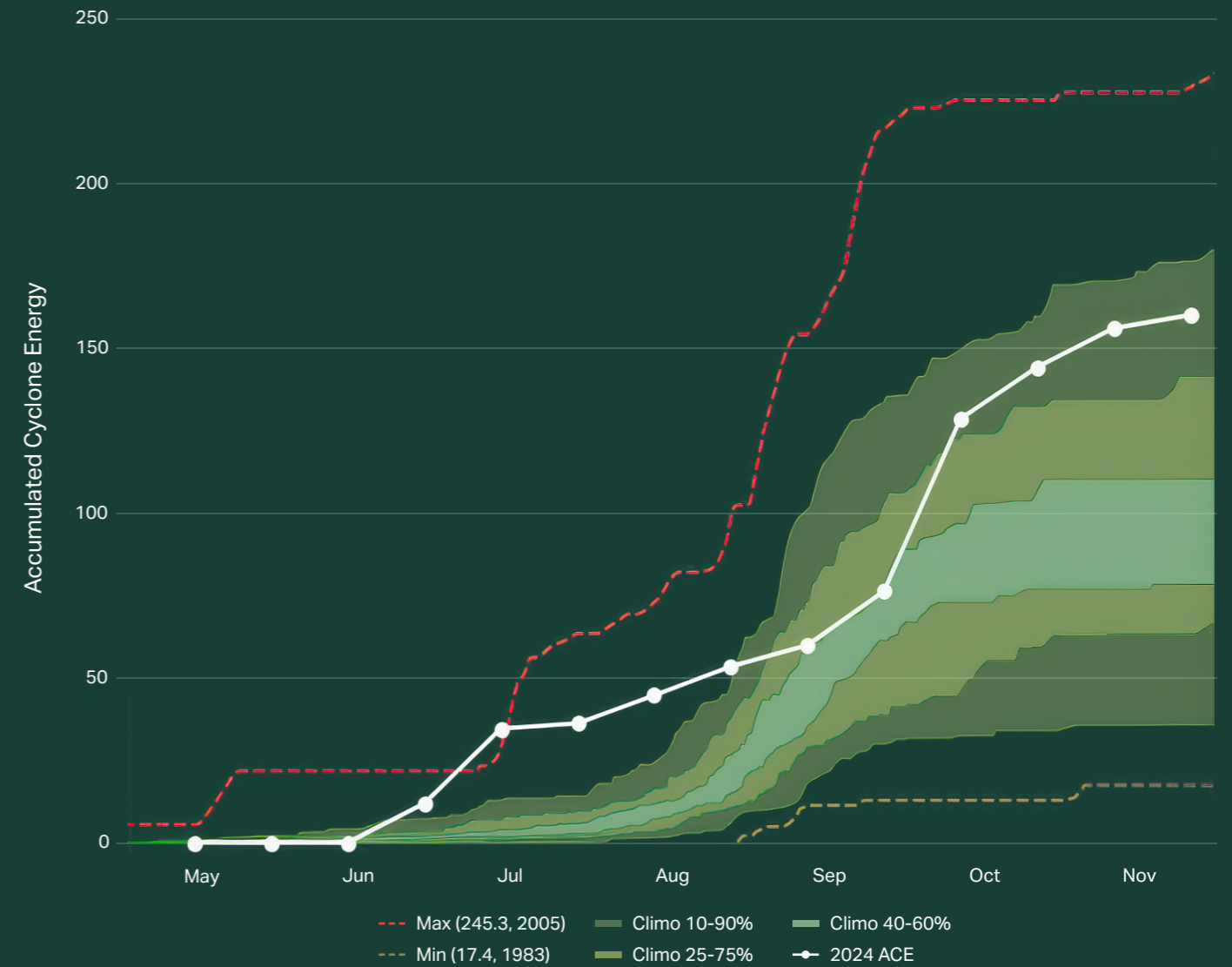
The rapid intensification of Hurricane Beryl and the early occurrence of such a powerful storm led to destruction in the Grenadines. When the storm made later landfall in the US as a category 1 storm, models were unable to account for the preceding wet conditions when quantifying the losses. Those conditions resulted in significant tree fall and extensive power outages. US catastrophe modeled losses were ultimately less than the reported industry losses by up to 30%.

There was a noticeable drought in Tropical Cyclone activity during the summer and into the peak of the season, mid-August to mid-September. Tropical cyclones typically develop from tropical waves that originate off the coast of Africa. However, the weather over Africa was abnormal this year. Usually, African Easterly Waves swirl from the Guinea Highlands in West Africa into the tropical Atlantic, where they strengthen during late August and September. In 2024, the waves moved north of their typical position, instead rolling into the Sahara Desert. This northward shift of tropical disturbances did not create more Saharan Dust over the basin; however, the shift was a major factor contributing to the lack of tropical activity we saw in the Atlantic because storms that would have become tropical disturbances ended up in the Sahara Desert contributing to record rainfall in that region.

North Atlantic Accumulated Cyclone Energy Climatology

Climatology from 1950-2022

ACE Index
Extremely active: > 159.6
Above-normal: 126.1 - 159.6
Near-normal: 73.0 - 126.1
Below-normal: < 73.0

Legend:
- Max (245.3, 2005)
- Min (17.4, 1983)
- Climo 10-90%
- Climo 25-75%
- Climo 40-60%
- 2024 ACE

Hurricanes Helene and Milton

Hurricane Helene, the eighth named storm, intensified rapidly to a Category 4 hurricane, making landfall on the United States Gulf Coast in early October. With sustained winds exceeding 140 mph, Helene caused extensive destruction, particularly in Florida and North Carolina where catastrophic flooding from the storm flooded and destroyed major portions of Asheville. The most remarkable aspect was the extreme rainfall and flooding, especially in North Carolina. Asheville experienced over 20 inches of rain, causing severe flooding that cut off the city from the outside world. Floodwaters damaged roads and interstates, with repairs that will last months, and full recovery could take years.

The flooding was worsened by a Predecessor Rain Event, which dropped 8-12 inches of rain in western North Carolina before Helene even made landfall. This phenomenon highlights the limitations of the Saffir-Simpson scale, which rates hurricanes by wind strength but doesn't account for rainfall. Most of the residential flooding in North Carolina was not insured and the NFIP take-up in the 3 counties hit the hardest in western North Carolina was less than 1%. The death toll surpassed 200, making it one of the deadliest hurricanes in the past 50 years. Damage exceeded $1b in multiple states including Florida, Georgia, North Carolina, and South Carolina. Downed trees accounted for most claims outside of Florida.
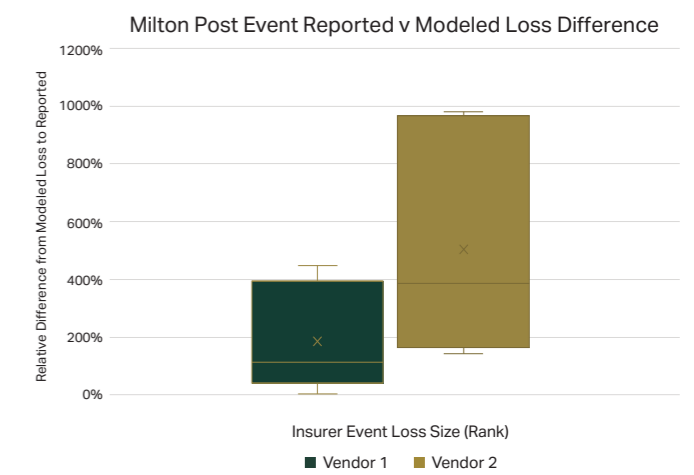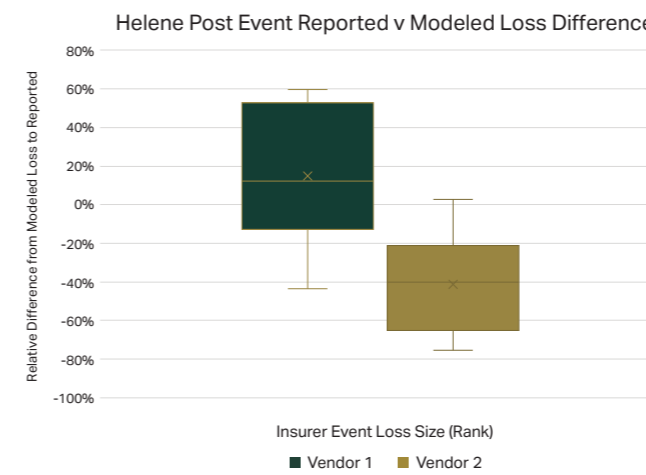
Two weeks after Helene made landfall, Hurricane Milton rapidly intensified into a Category 5 storm before making landfall near Tampa Bay, Florida, as a Category 3 hurricane. Its unprecedented speed of intensification caused widespread destruction along Florida's Gulf Coast. Significant structural damage was reported, including to the Tampa Bay Rays' stadium, which was being used as a shelter for emergency workers. The storm brought torrential rainfall to the Tampa Bay area, with some locations recording over 15 inches of rain, resulting in extensive flooding that compounded the wind damage.
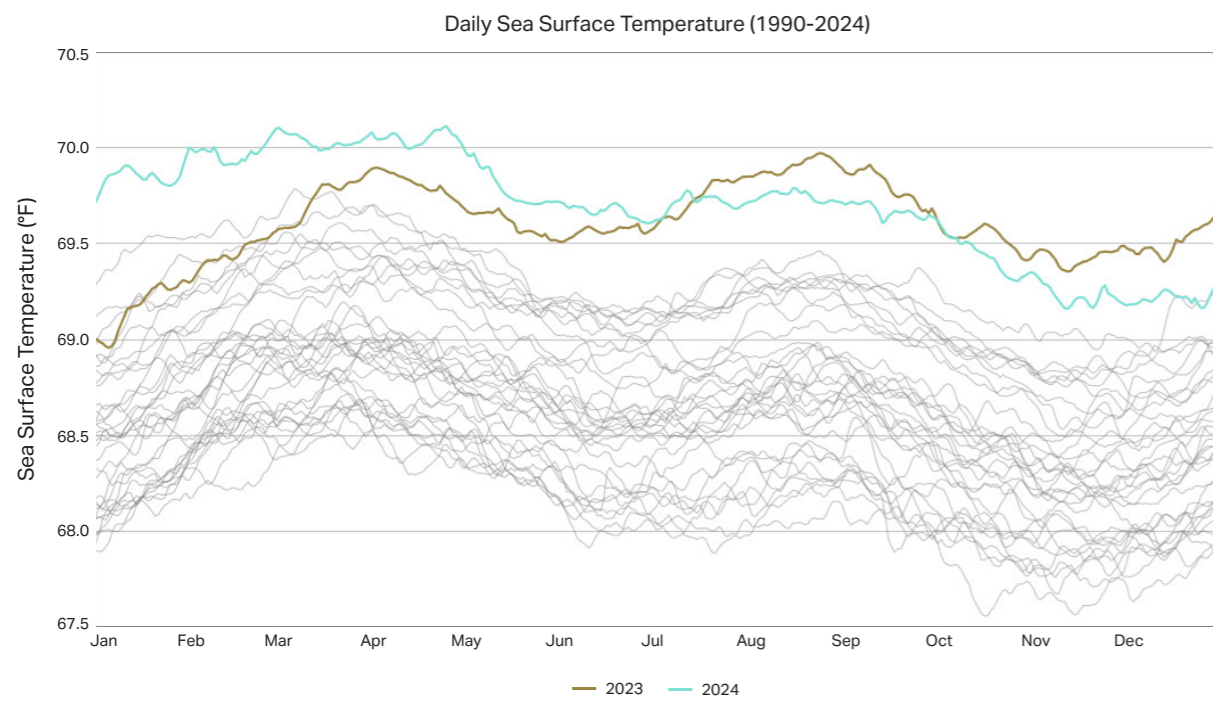
Milton is only the sixth known Atlantic hurricane to reach a minimum central pressure below 900 millibars (mb). The others are Wilma (2005), Gilbert (1988), Rita (2005), the Labor Day Hurricane (1935), and Allen (1980). The insurance industry faced additional challenges from roughly 45 confirmed tornadoes spawned by the storm, prompting the National Weather Service (NWS) to issue over 125 tornado warnings. Milton's total industry loss estimates varies but we expect Milton's insured loss to be less than $20 billion.

The storm's explosive development, with maximum wind speeds of 180 mph, made it one of the strongest hurricanes by wind speed ever recorded in the Gulf of Mexico and exposed shortcomings in existing weather prediction models. Milton's rapid intensification surpassed forecast expectations, exposing the need for models to better account for factors such as unusually warm ocean temperatures and other climate-related variables.

Hurricanes Helene and Milton complicated loss estimates due to the overlapping events across similar paths. Additionally, many of the regions affected were also impacted by Hurricane Debby earlier in the 2024 season, and by Hurricane Idalia in 2023. In some cases, prior damage could limit the exposure to Hurricane Milton's damage. A structure totaled by flood would not sustain any claimable damage from Milton; however, gaps in insurance coverage exist, this may increase the likelihood of water damage leaking into wind damage from either storm. In other cases, the in-progress clean up from Helene may have exacerbated Milton's damage. Piles of debris on the street served as a source of projectiles to be launched by Milton's winds.

Daily Sea Surface Temperature (1990-2024)

Daily Sea Surface Temperature (1990-2024) — Sea Surface Temperature (°F), months Jan–Dec. Legend: 2023, 2024

Helene Post Event Reported v Modeled Loss Difference

Helene Post Event Reported v Modeled Loss Difference — Relative Difference from Modeled Loss to Reported. Insurer Event Loss Size (Rank). Legend: Vendor 1, Vendor 2

Milton Post Event Reported v Modeled Loss Difference

Milton Post Event Reported v Modeled Loss Difference — Relative Difference from Modeled Loss to Reported. Insurer Event Loss Size (Rank). Legend: Vendor 1, Vendor 2

Overall, the 2024 hurricane season has been marked by unprecedented storm activity, rapid intensification, and significant impacts on affected regions. 2024 will enter a unique spot on the record charts tying 1886, 1933, 2004, and 2005 as years with 5 landfalling hurricanes on the United States mainland. The season will likely be one of the costliest Atlantic Hurricane seasons on record once final figures are realized.

Northwest Pacific Typhoons

The 2024 NW Pacific typhoon season saw below average activity with an ACE index 30% below the 1991-2020 climate average; however, the season was very deadly and destructive, with 23 named storms, 15 typhoons and 9 intense typhoons.

This season experienced a late start, but activity increased over the summer with frequent, high-impact typhoons, which brought significant rainfall, strong winds, and storm surges. Among the most notable storms were Typhoon Yagi and Typhoon Gaemi, each of which caused substantial damage in the region.

23
named storms

15
typhoons

9
intense typhooons

Typhoon Yagi & Gaemi

Typhoon Yagi, which formed in mid-July, briefly reached Category 5-equivalent intensity as it approached Hainan and affecting the Philippines and parts of East Asia. Yagi became one of only four Category-5 typhoons recorded in the South China Sea and the strongest storm to impact Vietnam on record. The combination of Typhoon Yagi and the southwest monsoon led to heavy rains over Luzon in the Philippines, while the remnants of the storm caused catastrophic flooding and landslides in Myanmar, and extensive flooding and deaths in Laos and Thailand. Economic losses across all affected countries are estimated at roughly $17 billion, with insured losses for China and Vietnam alone surpassing $1.6 billion.

Typhoon Gaemi, which formed in late July, was classified as a Category 4-equivalent typhoon and impacted Taiwan, East China, and The Philippines, bringing heavy rainfall and strong winds that caused severe flooding and power outages. The storm left a trail of devastation, particularly in coastal areas, with financial losses approaching $2.5 billion.

A surge in activity occurred from late October through the first half of November, when the Maden / Julian Oscillation (MJO) entered an enhanced phase and produced five typhoons during this period of which four were classified as very strong or violent by the Japan Meteorological Agency (JMA). Four typhoons existed simultaneously in November for the first time on record. While large scale atmospheric and moisture conditions were conducive to typhoon formation, and sea surface temperatures across the basin were warmer than average (as one would expect for cold-neutral or La Niña conditions), the concentrated surge in activity that occurred over this three-week period cannot be easily explained, as October and November 2023 Sea surface temperatures were higher than this year.
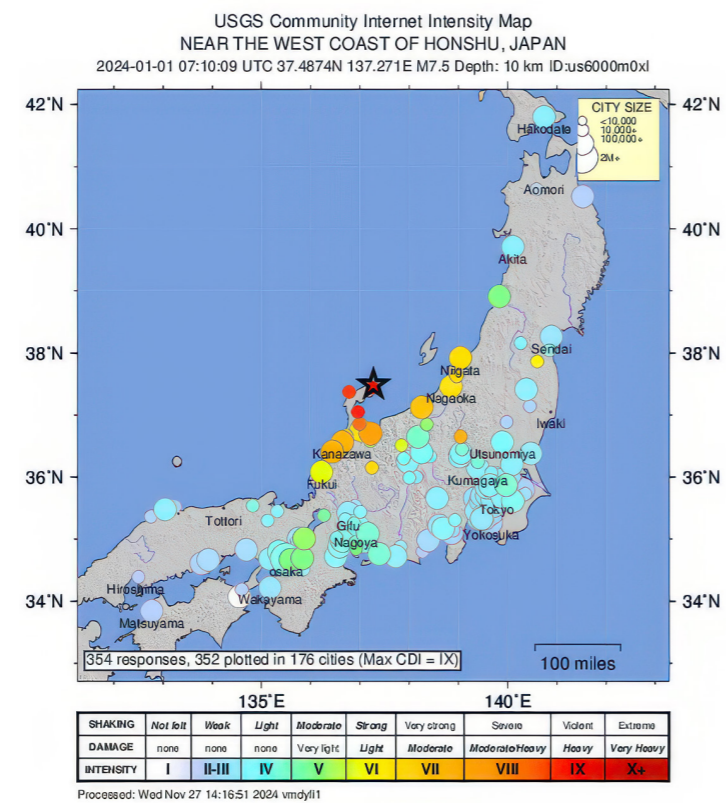
Earthquake

The United States did not face any significant earthquakes during 2024. Earthquake activity was primarily concentrated on the Pacific Ring of Fire, a region well-known for its seismic activity. This geologically active zone saw several significant events, including magnitude 7.0 or higher earthquakes impacting Taiwan, Peru, China, the Philippines, and Japan.

A major seismic event occurred on January 1st, 2024, when a magnitude 7.6 earthquake struck Japan's Noto Peninsula. This earthquake resulted in estimated economic losses of approximately $12 billion, driven by extensive damage to infrastructure, public utilities, and uninsured properties, as well as disruptions to economic activity. However, insured losses were relatively low, with estimates suggesting they could top $2.5 billion. This disparity highlights Japan's high earthquake insurance penetration and stringent building codes, which effectively mitigate damage to insured structures but do not fully cover all economic impacts, such as losses to public infrastructure and high deductibles borne by policyholders. Japan's frequency of large earthquakes, 21 of magnitude 7.0 or higher since 2000, averaging about one per year, has nurtured a culture of resilience and awareness. This preparedness, combined with advanced engineering standards, significantly reduces

the ratio of insured losses to total economic losses while emphasizing the country's proactive approach to seismic risk mitigation.

USGS Community Internet Intensity Map
NEAR THE WEST COAST OF HONSHU, JAPAN
2024-01-01 07:10:09 UTC 37.4874N 137.271E M7.5 Depth: 10 km ID:us6000m0xl

> " Japanese Islands have seen 21 earthquakes 7.0 in magnitude or higher since 2000 with an average of about 1 every year.

Severe convective & winter weather

The year has experienced above-average SCS activity thanks to a persistent heat dome over the Gulf of Mexico and cooler upper-level temperatures over the central United States Together these features created a strong temperature gradient, fueling storm development. Storm reports for all major SCS sub-perils (hail, tornado, wind) stood above the 2005-2015 annual average. In addition, like 2023, SCS insured losses once again surpassed $50 billion.

In 2024, the United States experienced a series of significant severe convective storms (SCS), leading to substantial insured losses and highlighting the increasing impact of such events. During the first half of the year, SCS accounted for approximately $42 billion in insured losses globally, with the United States bearing most of these costs.

The United States recorded 1,880 tornadoes in 2024, making it one of the most active years on record, second only to 2011. According to the Storm Prediction Center (SPC), 2024 also saw the highest number of EF2+ and EF3+ tornadoes since 2011.

Notably, 57 separate storms resulted in total losses exceeding $50 billion, many of which involved loss in Texas, highlighting the growing financial risks associated with severe weather. In May, an outbreak producing more than 165 tornadoes developed across many central, southern and southeastern states.

This multi-day tornado outbreak produced at least 61 EF-0, 79 EF-1, 13 EF-2, three EF-3, and one EF-4 tornado, causing widespread damage to many homes, businesses, vehicles, agriculture and other infrastructure.

The increased frequency and severity of storm loss have been attributed to factors such as urban expansion, increased property values, and the vulnerability of structures to hail damage. Additionally, inflation and rising construction costs have intensified the financial toll of these events. Insurers continue to look for methods to mitigate the losses, one of these mitigations continues to be a deeper dive into Actual Cash Value (ACV) or Replacement Cost Value (RCV) regarding roof replacement; however, these actions have not yet shown meaningful impact on the market at large, despite some insurers seeing financial benefit from such terms.

Howden Re view of US Industry SCSWT losses
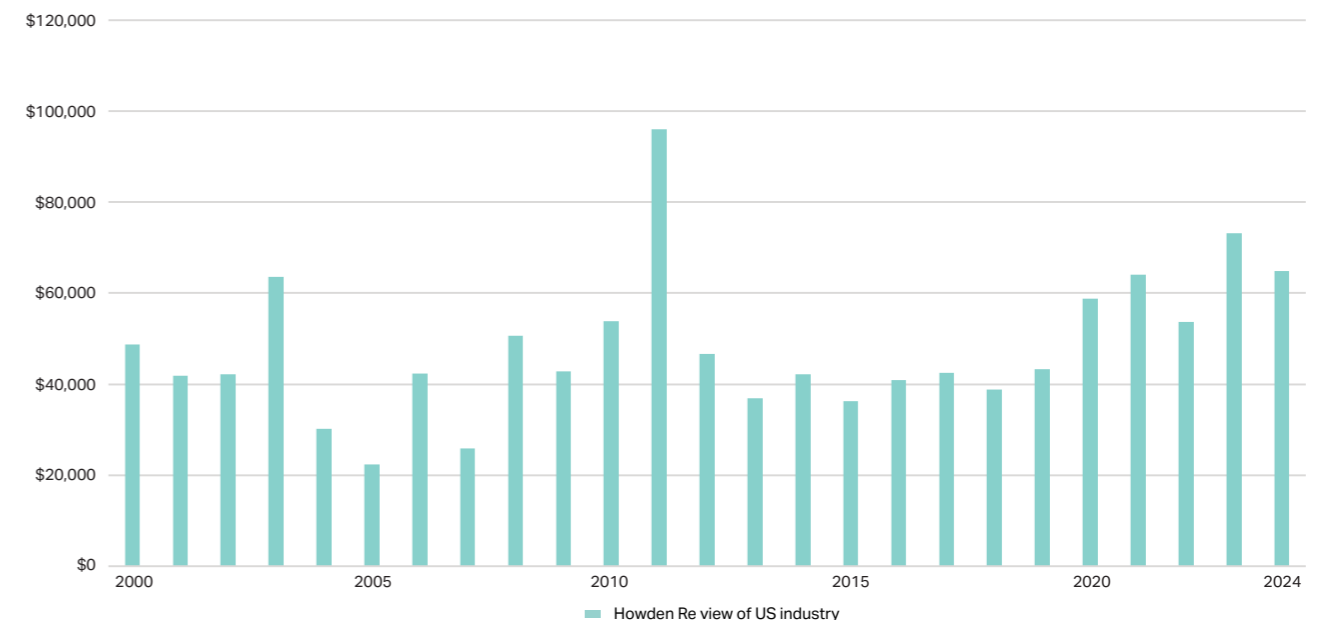
The United States experienced several significant winter storms that resulted in substantial insured losses. In early January, a strong winter system brought heavy snowfall, severe flooding, and tornado outbreaks across the Midwest, Southeast, and East Coast. The storm caused an estimated $2.0 billion in insured losses. Shortly afterward, another system swept through the Pacific Northwest and southern states, bringing rare snow and ice to Texas and Louisiana before impacting the Mid-Atlantic and Northeast. In recent years, winter storm losses have surged to unprecedented levels, driven by increasingly severe and widespread events. In 2024, winter storms once again highlighted this trend, with insured losses skyrocketing due to the frequency and intensity of occurrences. These events, characterized by a mix of heavy snowfall, flooding, ice damage, and tornado outbreaks, underscore the growing challenge of managing winter storm risks. From an occurrence standpoint, the industry continues to face heightened exposure, with losses from these events now rivaling those of more traditionally catastrophic perils.

In Canada hailstorms in Calgary in early August were the major driver behind Canada's largest insured losses for 2024, expected to top $6 billion in total insured loss. The majority of the insured losses were associated with the Calgary hail event.
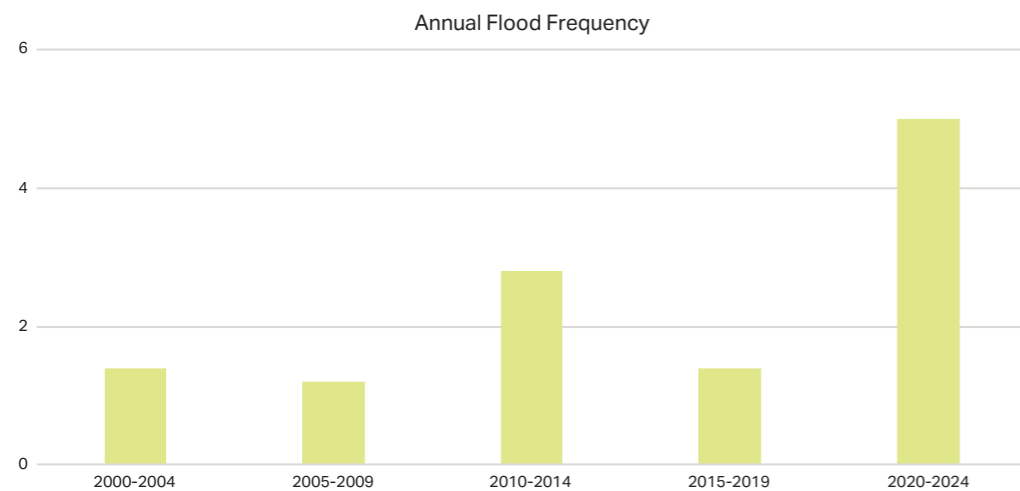
Flood

In August, the Northeast faced unprecedented rainfall, particularly in southwestern Connecticut and Long Island, New York. Over 10 inches of rain fell within 24 hours, overwhelming drainage systems and leading to severe flash flooding. The deluge caused mudslides, submerged streets, and left numerous communities stranded.

Emergency responders conducted swift-water rescues as the rapid flooding endangered lives and properties. This event was classified as a 1-in-500-year rainfall.

The National Oceanic and Atmospheric Administration (NOAA) estimates sea level around the contiguous United States coastline will rise by about a foot on average over the next 30 years and according to the State of New York, flood insurance premiums are expected to nearly double over the next 5-10 years due to rising sea levels.

Internationally, floods were once more the main peril driving losses across numerous countries from Brazil to Spain, Central and Eastern Europe and the Arabian Peninsula. According to The CRESTA organization,

which tracks catastrophe events outside of the United States, 2024 annual total of $18.2 billion in losses, of which 78% came from flood events. One of the deadliest flood events occurred in Valencia, Spain. In October, flash flooding swept through the region, claiming at least 200 lives and leaving approximately 2,000 people missing. The Valencia Meteorological Service reported that Turís received 640.8 mm of rain in one day, which is 1.5 times the annual rainfall. Industry losses are expected to exceed $4 billion, making this the largest loss causing event for the insurance industry in Spain, and have been largely borne by the Consorcio de Compensacion de Seguros (CCS) that since its establishment in 1954 has been closely linked to the coverage of the Extraordinary Risks Scheme.

Annual Flood Frequency

(NASA Provided Satellite Imagery of Valencia
On the Left October 24th, 2022 – On the Right October 30th, 2024

Historic flooding events

Earlier in the year, between April 13th and 17th, a low-pressure system affecting the southeastern Arabian Peninsula, supported by the warm waters in the Arabian Gulf, resulted in extensive flooding and flash flooding particularly in Oman, United Arab Emirates (UAE), Qatar and Bahrain. Reports from the National Centre of Meteorology in UAE indicated the region experienced the heaviest precipitation in more than 75 years, with extensive damage to households, commercial properties and vehicles and insured losses estimated close to $3 billion.

In Brazil, while the country has been enduring some of the most persistent drought conditions on record, April and May brought over 420mm of precipitation in the Rio Grande do Sol state, leading to more than 90% of the state being affected by flooding. It was the worst flooding event in more than 80 years, with the Guaiba river water levels surpassing those seen in the deadly 1941 floods, according to the climatological average of 1990-2020, the region received three months' worth of rainfall in just three days. Insured losses from the event are estimated close to $2 billion.

In late May-early June intense precipitation in Germany led to extensive flooding and damage, particularly in the federal states of Bavaria and Baden-Württemberg. May/June precipitation, with recordings of more than 400mm in several stations, came after a very wet winter making soil very saturated in the area and further exacerbating flooding impacts. Insured losses were estimated between $1.7 and $2.2 billion according to PERILS, likely making the event the 6th largest flood event from an insured loss perspective in Europe over the past 30 years.
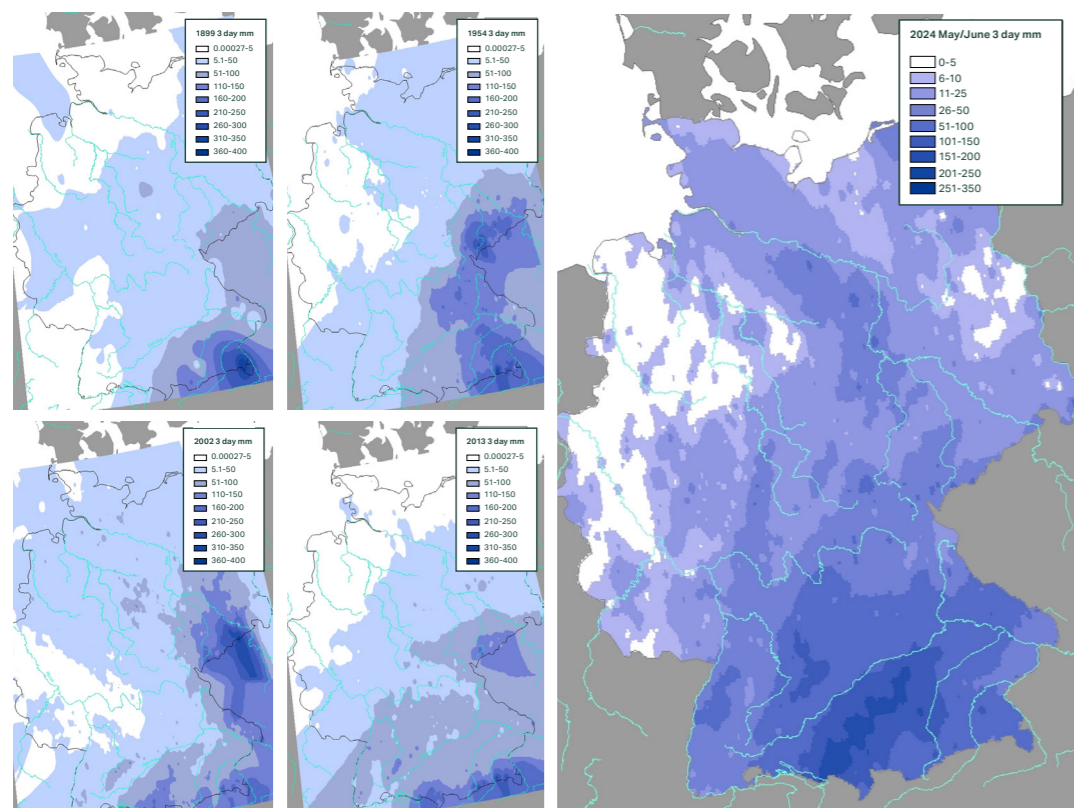
A comparison of peak 3-day rainfall indicates that a vast area of southern German states were exposed to rainfall extremes compared to more localized events in the past

Finally, in September a strong cut-off low front developed and brought extreme precipitation across large parts of Central Europe, particularly across Austria, Czech Republic, Poland and Slovakia. The precipitation, starting September 11th, was also enhanced by the unseasonably warm, for the time of the year, water surface temperatures in the Mediterranean and Adriatic seas. In Lower Austria, the 7-day precipitation totals surpassed the 400 mm-mark with the Danube River running close to the 100-year flood mark. Insured losses across all affected countries have surpassed $2.3 billion according to PERILS. Building level resilience in the form of enhanced preparedness and alerting, allied to continued water-course management and building of flood defenses appear to have made a significant difference for this event. While floods have always occurred in the region, changes in weather-patterns continue to present challenges and emphasize the importance of continued investment into enhancing societal resilience.

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6th largest flood event from an insured loss perspective in Europe over the past 30 years.

Wildfire

Non-traditional states like Texas and New Mexico experienced large acreage wildfires this year. The Smokehouse Creek Fire in Texas formed at the end of February, the fire started by a downed power line from a broken utility pole and spread across the Texas Panhandle into western Oklahoma. It stands as the largest wildfire in Texas history, burning over one million acres, and second largest in United States history since 1988. Although this wildfire set records, in Texas losses were minimal due to the rural area it affected.

In June and July 2024, New Mexico experienced significant wildfire activity, notably the South Fork and Salt Fires near Ruidoso. The South Fork Fire, which began on June 17, 2024, rapidly spread due to strong winds, destroying over 1,000 structures and leading to the evacuation of more than 8,000 residents. The National Centers for Environmental Information reported that these wildfires caused insured losses exceeding $1.7 billion.

In September of 2020 Commissioner Lara of the California Department of Insurance announced California's Sustainable Insurance Strategy and committed to implementing various reforms to overhaul the state's insurance market by end of year 2024. In September of 2024 an announcement for a joint effort to create the nation's first public wildfire catastrophe model with next steps announced in April 2025. The last outstanding prong of the Sustainable Insurance Strategy is allowing the cost of California only reinsurance to be used of ratemaking, the CDI published the final regulation for cost of reinsurance in rate making at the end of 2024.

In 2024, California experienced significant wildfires in both its southern and northern regions, notably the Franklin Fire in Malibu and the Park Fire near Chico. The Franklin Fire, which began on December 9, 2024, in Malibu, Southern California, rapidly spread due to strong Santa Ana winds, consuming over 4,000 acres and destroying at least 20 structures.

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In June and July 2024, New Mexico experienced significant wildfire activity

In contrast, the Park Fire in Northern California ignited on July 24, 2024, near Chico. It became one of the largest wildfires in the state's history, burning over 350,000 acres and destroying 709 structures. There are several factors that explain why the number of structures impacted is so stark.

01

Vegetation and Terrain: Northern California is a dense forest providing plenty of fuel for fire to spread rapidly. Southern California is coastal scrub, while flammable, it does not support the same rapid-fire expansion.

02

Weather Patterns: Southern California's Santa Ana winds can intensify fires. In Northern California, a combination of high temperatures, low humidity, and strong winds can create conditions that produce more uncontrollable wildfires.

03

Population: Northern California has several communities spread within wildland areas, often with limited access routes, compared to Southern California where more accessible infrastructure can lead to quicker response times.

Franklin Fire Damage Survey
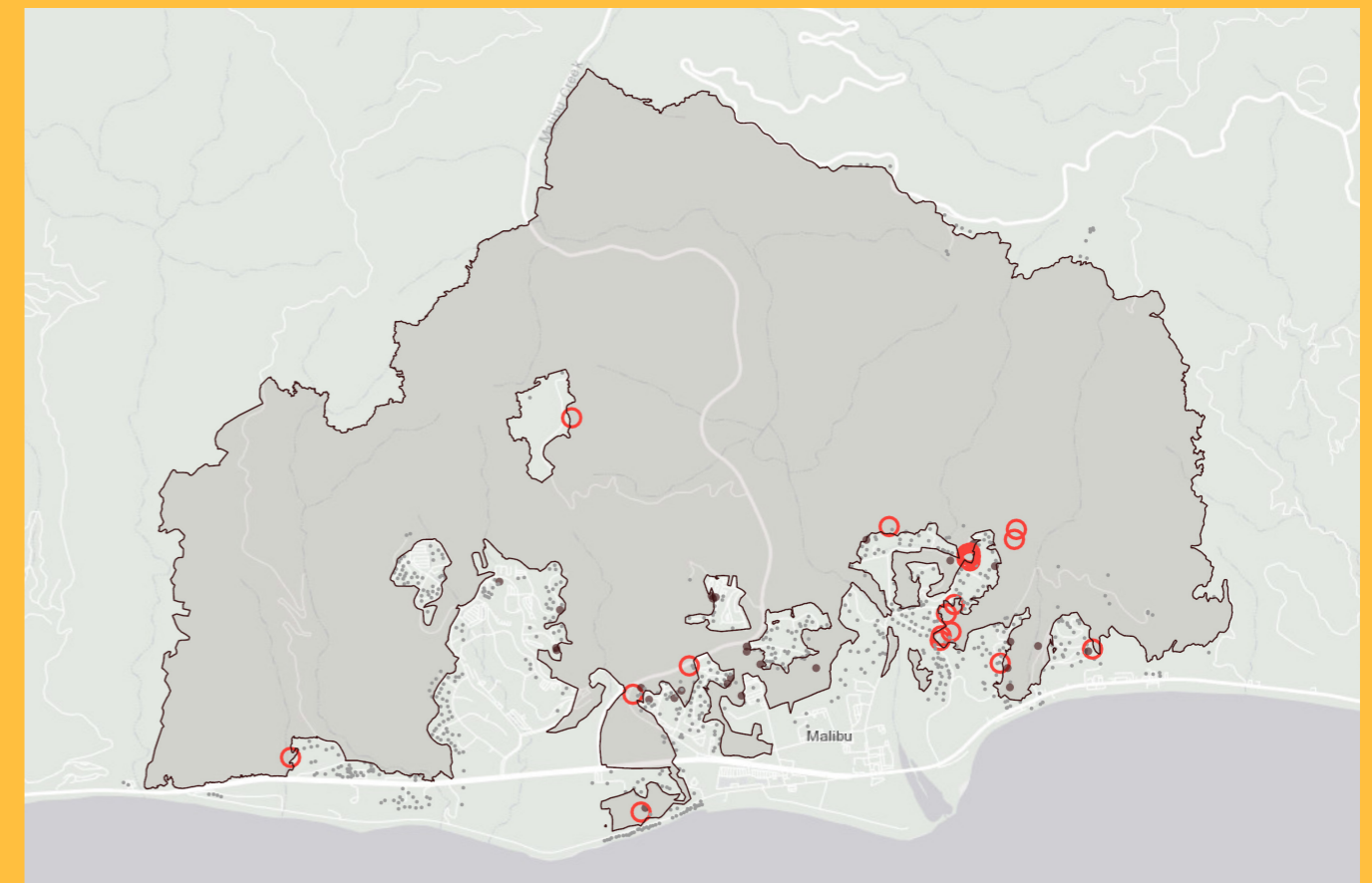
○ Destroyed   ☐ Wildfire
● Damaged   ● No Damage

Conclusion

The year 2024 stands out as a pivotal moment in the evolving landscape of natural disasters. From the destructive force of Atlantic hurricanes to the unprecedented wildfire activity in unexpected regions, and from severe convective storms to catastrophic flooding, the scope and scale of these events underscore the increasing complexity of managing catastrophic risk in a changing climate. This report demonstrates how the convergence of shifting weather patterns, urban expansion, and economic pressures intensifies the challenges for individuals, communities, and the (re)insurance industry alike.

The record-breaking Atlantic Hurricane season exemplifies the growing need for adaptive and forward-thinking catastrophe models that account for unusual storm paths and the compounding effects of overlapping events. Similarly, the surge in severe convective storm activity and winter storm losses emphasizes the pressing need for innovative mitigation strategies and updated valuation methods, such as reassessing the use of Actual Cash Value and Replacement Cost Value in claims processing. The unparalleled rainfall events and their devastating consequences in both the United States and abroad further highlight the urgency of addressing infrastructure vulnerabilities.

The wildfire events of 2024, including the record-breaking Smokehouse Creek Fire in Texas demonstrate that wildfire risk is no longer confined to traditional hotspots. The development of new tools, such as California's public wildfire catastrophe model, represents a promising step forward, but sustained collaboration among stakeholders is essential to addressing the growing exposure in this peril.

All these events serve as a stark reminder of the escalating risks posed by natural catastrophes. However, it also presents an opportunity to enhance resilience through proactive risk management, technological innovation, and global cooperation. By integrating lessons learned from this year's events, the (re)insurance industry, policymakers, and communities can better prepare for the uncertainties ahead.

Meet the experts

Anna Neely
Managing Director
Head of R&D
anna.neely@howdenre.com

Justin Roth
Associate Director
Catastrophe Analytics R&D
justin.roth@howdenre.com

Myrto Papaspiliou
Head of Model Research & Evaluation
myrto.papaspiliou@howdenre.com

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Howdenre.com

To discuss this report in more detail, contact our team of experts today at catwatch@howdenre.com

One Creechurch Place, London, EC3A 5AF

T +44 (0)20 7623 3806
F +44 (0)20 7623 3807
E catwatch@howdenre.com

howdenre.com