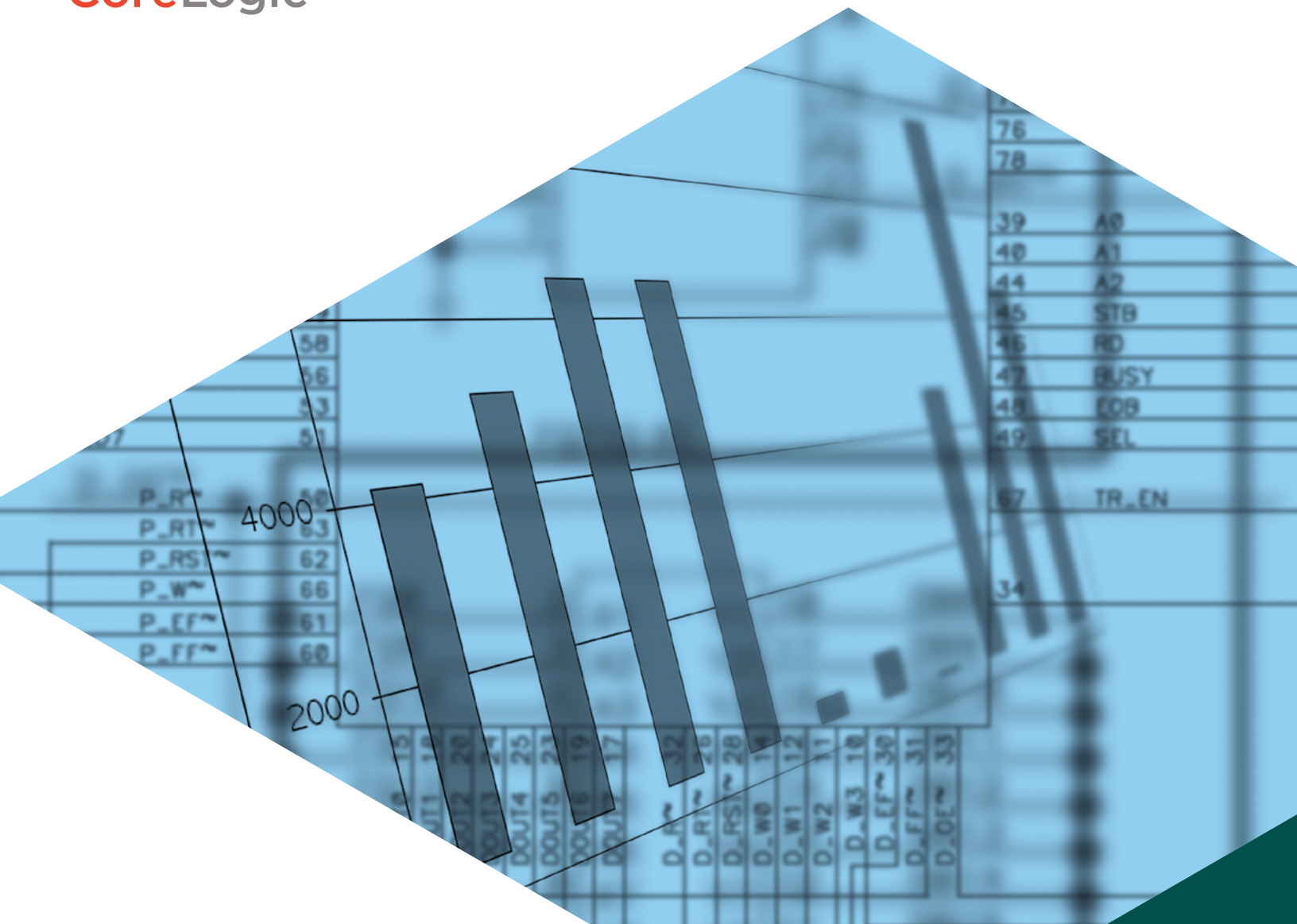




CoreLogic®



CoreLogic® 2011 Natural Hazard Risk Summary and Analysis

Howard Botts, PhD
Wei Du, PhD
Brady Foust, PhD
Thomas Jeffery, PhD

Executive Summary

2011 Natural Hazard Risk Summary and Analysis

As it has been noted by numerous scientists, risk analysts and other forecasters, 2011 proved to be a record-breaking year for natural catastrophes in the United States and around the world. Hurricanes, wildfires, tornadoes, earthquakes and various flooding events caused billions of dollars in property damage, put disaster readiness plans and emergency responders to the test in major U.S. urban areas, and resulted in a significant number of lost lives across the country. Now, in addition to reviewing the immediate structural, geographic and financial impact of the past year's catastrophic events, it's crucial to consider notable changes in natural hazard incidents as part of a longer-term perspective and evaluate the implications of these trends.

One of the most noteworthy statistics to emerge from this annual natural hazard review is that 2011 was the most expensive and the deadliest hurricane season for the U.S. since 2008. Though only three named Atlantic storms made landfall, they caused at least a combined \$8 billion in damage, primarily from flooding. In addition, the 2011 tornado season was the third most active since 1980. The 1,559 storms to date this year resulted in the deaths of 552 people, which amount to the combined total number of casualties over the previous ten years.

While the 2011 wildfire season continued the trend of having fewer but larger wildfires, there was a significant geographic shift in home losses over the past year from California, which had a cooler and wetter-than-average fire season, to the drought-affected states of Texas, New Mexico and Oklahoma. In fact, total burned wildfire acreage in California was down 90 percent in 2010-2011 compared to 2007-2008. At the same time, the Wallow fire in Arizona burned 469,000 acres and was the largest fire in the state's history.

Also important to note is that two non-western U.S. earthquakes occurred this year in Virginia and Oklahoma – events that startled many residents who believed earthquakes to be strictly a far west U.S. phenomenon. Though in reality earthquake activity in 2011 mirrored the long-running trend of quake concentration in the western U.S., where underlying geology and plate tectonics generate a more active seismic zone, the two unexpected events in the Midwest and Northeast caused a considerable stir among homeowners, insurers and many others affected by the quakes.

The CoreLogic Natural Hazard Risk Summary and Analysis provides an overview of the most significant catastrophic natural hazard events that took place in 2011, as well as a brief analysis of potential risk in the coming year and the implications of unexpected changes in natural hazard frequency, intensity and geographic patterns.



HURRICANES

Year in Review

SNAPSHOT

While the direct impact on New York City from Hurricane Irene (a Category 1 hurricane) was ultimately minimal, there are some important lessons to be learned from this event. The evacuation order, affecting 370,000 residents, suggests the city lacks confidence in the flood control infrastructure. In fact, New York City does not have sufficient capacity to defend itself from the storm surge associated with catastrophic hurricane events, which would be a storm classified as Category 2 or greater. With major tunnel and subway entrances only four feet above sea level, even a modest hurricane-driven storm surge would result in significant inundation and could easily lead to billions in economic loss.

This year was the most expensive and deadliest hurricane season since 2008. While only three of the 18 named Atlantic Ocean storms struck the U.S. (Hurricane Irene, Tropical Storm Lee and Tropical Storm Don), those storms resulted in at least \$8 billion in damage and 45 people killed. Much of the property damage associated with the storms was a result of flooding from intense rainfall as opposed to wind or storm surge flooding. Overall, 2011 was the seventh most active hurricane season to date in terms of property and life losses since tracking began in 1851.

HURRICANE IRENE: The largest and most destructive storm of 2011, Hurricane Irene, made landfall over coastal North Carolina on August 27. The storm tracked northward along the Mid-Atlantic coast (moving over Virginia, Washington, D.C., Maryland, New Jersey, New York, Connecticut, Rhode Island, Massachusetts and Vermont) causing torrential rainfall and flooding across much of the northeastern U.S. Especially hard hit were New York, New Jersey and Vermont, which experienced extensive flood damage. According to the National Climatic Data Center, the total cost of the hurricane was more than \$7.3 billion, of which the associated flood damage was about \$2 billion. Comparing flood damage over the past several years with the flood damage from Hurricane Irene (see Figure 1), the flood loss from this single hurricane ranks as the second most expensive in this region.

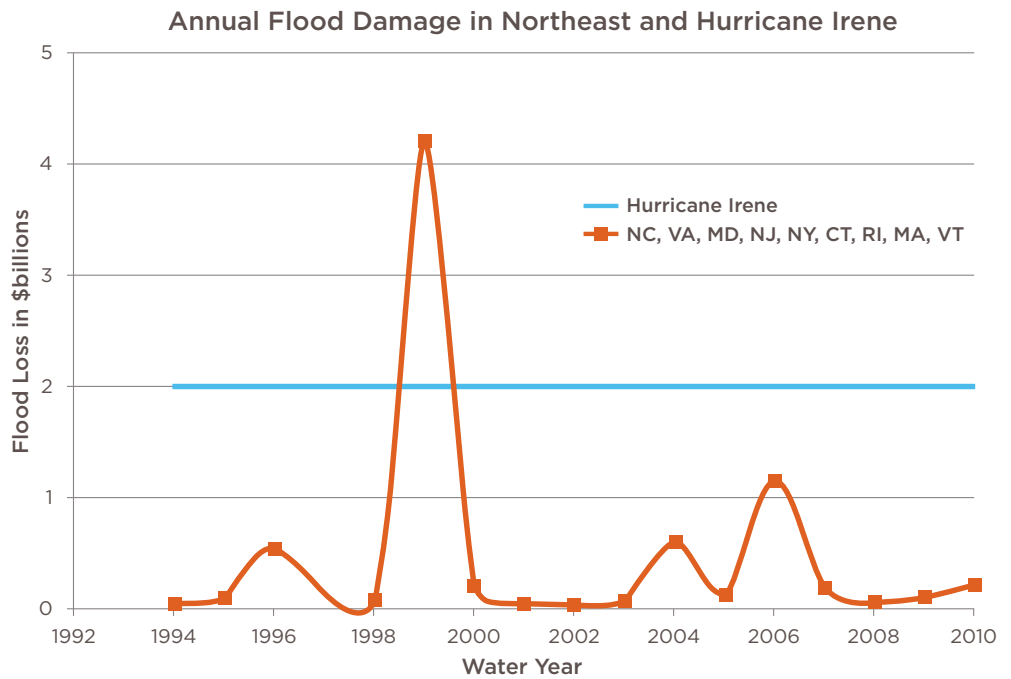


Figure 1 - Comparison of Historical Flood Losses and Irene (1999 hurricane flood losses were the result of Hurricane Floyd, with an estimated \$4.5 billion in damages and 56 people killed.)

TROPICAL STORM LEE: On the heels of Hurricane Irene, Tropical Storm Lee developed from a broad tropical disturbance over the Gulf of Mexico on September 1, 2011. The storm was both large and slow moving, and because of these characteristics, drove heavy rainfall over southern Louisiana, Mississippi and Alabama. The storm then moved north toward the Mid-Atlantic U.S. and unleashed a second outpouring of intense precipitation over Pennsylvania and New York. Figure 2 shows the rainfall map for Tropical Storm Lee, produced by NASA. The satellite imagery clearly shows the five states listed above

receiving the greatest amounts of precipitation, with some locations in Pennsylvania and New York accumulating 12 inches of rainfall. Flooding associated with the heavy Tropical Storm Lee precipitation caused significant property damage in the affected areas, estimated to be more than \$1 billion.

Implications and Projections

Given the extent of property damage left in the wake of Hurricane Irene and Tropical Storm Lee, particularly in what might be considered unlikely and underprepared regions of the U.S., many risk experts

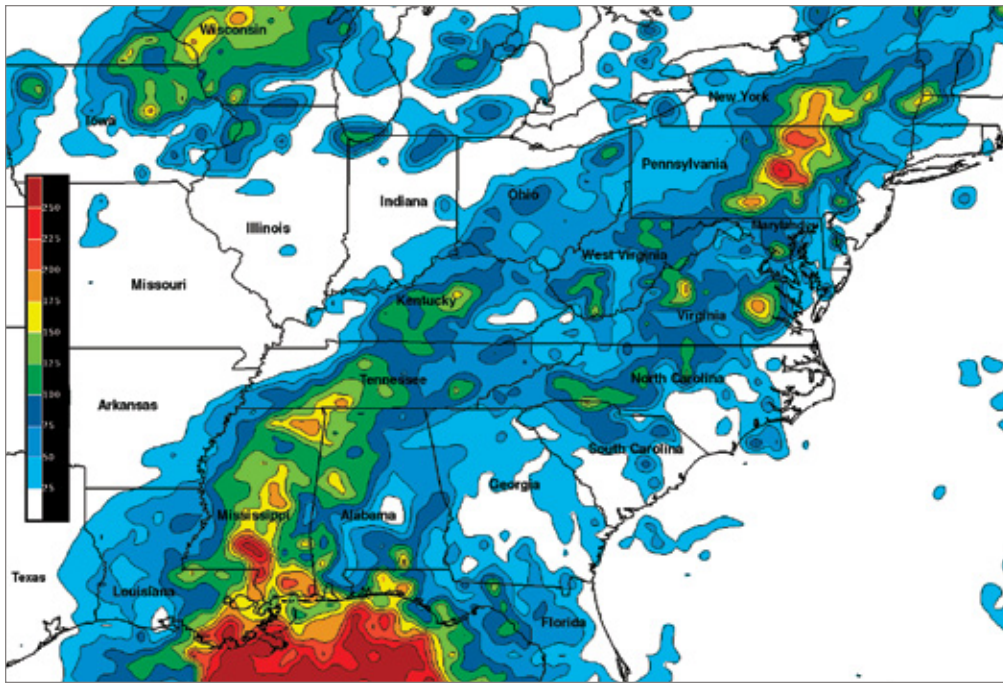


Figure 2 - Precipitation Map from Tropical Storm Lee

feel it's time to rethink national flood policies around the country and especially in major metropolitan hubs like New York City. There are several key lessons to be taken away from the impact of Tropical Storm Lee, including:

- ▶ Large-sized and slow-moving tropical storms originating from the Gulf of Mexico can carry significant precipitation and lead to severe flooding and property damage in the Northeast.
- ▶ Short-time intervals between two severe weather systems can exacerbate flooding. Just one week prior to Tropical Storm Lee, Hurricane Irene had soaked the northeastern region of the country. Tropical Storm Lee then poured huge amounts of water on top of the already saturated Northeast, resulting in elevated levels of flooding.
- ▶ Property loss associated with flooding from Tropical Storm Lee for the five principal states affected was ranked as the fifth highest based on records over the past 16 years. Even though Lee was not an extreme event, conditions were present that combined to result in extensive damage and destruction.



SNAPSHOT

The U.S. Army Corps of Engineers opened the Morganza spillway in Louisiana on May 14, 2011 to divert record-high Mississippi River water levels away from densely populated metro areas like Baton Rouge and New Orleans. The spillway was intended to relieve pressure on downstream levees, sparing hundreds of thousands of homes as well as numerous oil refineries and chemical plants along the Mississippi River.

CoreLogic analysis at the time showed that many homes in otherwise low-risk zones were suddenly in the path of floodwaters and that a total of 21,272 homes were at risk of being fully or partially inundated by the floodwaters flowing down from the Atchafalaya Basin. Of the more than 20,000 homes located in the overall potential Atchafalaya flood area, 4,528 homes are located outside of Federal Emergency Management Agency (FEMA) defined flood zones and are, therefore, not required to maintain flood insurance policies.

FLOODING

Year in Review

In 2011, there were a number of climate disaster events across the U.S. that each resulted in flood losses exceeding \$1 billion, according to data from the National Climate Data Center (NCDC):

- ▶ Tropical Storm Lee, September 2011, caused an estimated \$1 billion in flood damage, with particularly severe impact on the states of Pennsylvania and New York.
- ▶ Hurricane Irene, August 2011, caused an estimated \$2 billion in flood damage (out of \$7.3 billion in total damage).
- ▶ In the summer of 2011, the melting of an above-average snowpack across the northern Rocky Mountains combined with abnormally high precipitation caused the Missouri and Souris rivers to swell beyond their banks across the upper Midwest. The resulting flooding caused an estimated \$2 billion in losses.
- ▶ In the spring and summer of 2011, record-breaking rainfall in the Ohio Valley (nearly 300 percent over normal precipitation amounts) combined with melting snowpack caused historical flooding along the Mississippi River and its tributaries. Flood loss estimates from the Mississippi River inundation are estimated to be \$4 billion.

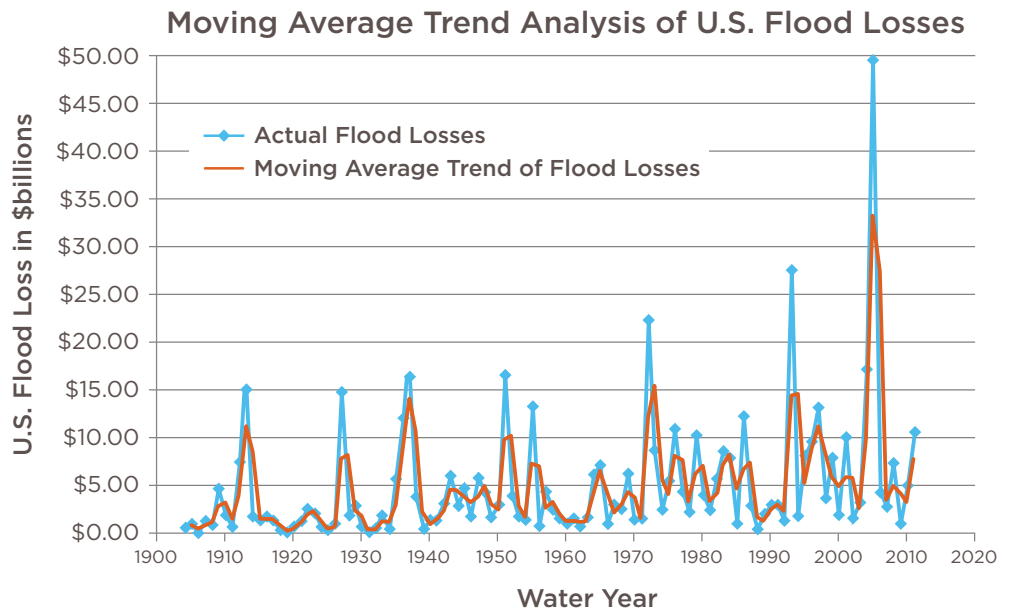


Figure 3 - U.S. Flood Loss Trend Analysis

Implications and Projections

Based on flood losses from the various catastrophic events that occurred in 2011, flooding and storm events recorded in the NCDC climate event database and the consideration of other related factors, CoreLogic estimates the 2011 U.S. flood-related losses at approximately \$10.67 billion.

Combining this 2011 estimation with more than 100 years' historical data reveals a fluctuating trend in flood losses with a cyclical climate pattern over time. Figure 3 illustrates both the characteristics of recorded U.S. flood losses since 1900 and a projected trend curve, which aligns directly with the historical data. Fluctuation of flood loss trend data lends itself to a number of forecasts for the possible magnitude of national flood loss in 2012:

- ▶ Based on the trend pattern, 2012 should not be an extreme flood year. In fact, 2012 is the seventh year after the 2005 catastrophic event Hurricane Katrina, and according to the flood loss trend, there should be several more years before the next extreme flood loss year.
- ▶ As demonstrated in Figure 3, the flood loss trend curve at 2011 is the upward side of a small peak (the second peak after an extreme year), therefore the curve in 2012 should potentially continue downhill. In other words, the U.S. flood loss level in 2012 should be lower than the loss level in 2011.
- ▶ By using a loss reduction ratio from two previous second peaks after extreme years (1972 and 1993), and considering the forecast for the next 20-year average flood loss, the projected U.S. flood loss in 2012 is approximately \$3.53 billion.
- ▶ Though historical trend pattern analysis suggests that U.S. flood loss for 2012 should not be extreme, CoreLogic data suggests hurricanes, tropical storms, and tsunamis may affect flood totals significantly.

Important to note is that the floods of 2011 have heightened awareness of flood risk outside of the FEMA 100-year flood zones and will put pressure on businesses and insurance companies to develop a better understanding of flood-risk vulnerability. Hurricane storm surge potential and inland flooding this year have also emphasized the need to raise the current flood protection standard for the critical and strategic infrastructures in the U.S.



SNAPSHOT

The “2011 Super Outbreak” occurred between April 25 and April 28, and has been identified as the largest tornado outbreak ever recorded with 336 confirmed tornadoes spread across the South, Midwest and the Northeast. In addition, April 27 was the single deadliest day since 1925, with 324 tornado-related deaths. The most destructive storm of the outbreak, an EF5 tornado, struck Tuscaloosa, Ala., destroyed a significant part of the town and resulted in 51 deaths. Insured loss estimates for the four-day outbreak range from \$3.5 to \$5 billion, with the Tuscaloosa damage alone estimated in excess of \$2 billion.

Not quite a month later, on May 22, another EF5 tornado struck Joplin, Mo., plowing a mile-wide path directly through the southern part of the city, killing 161 people and causing tremendous damage to the city. The most recent insurance payout estimates for the Joplin tornado are in excess of \$2.2 billion.

TORNADOES

Year in Review

As of December 1, a total of 1,559 confirmed tornadoes have been reported in the U. S., making 2011 the third most active tornado season since 1980 (see Figure 4 below). The number of tornadoes in 2011 was also significantly above the yearly average of 1,125 (1980 - 2010). In particular, April represented a huge anomaly with 762 confirmed touchdowns, 200 over the previous record.

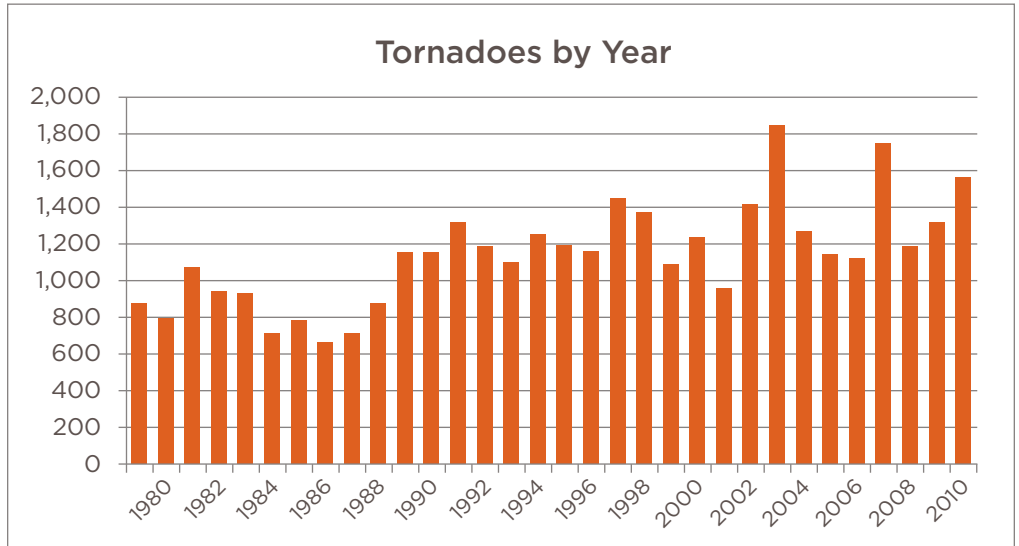


Figure 4 - Confirmed U.S. Tornadoes by Year

What really set the 2011 tornado season apart from previous years was the number of casualties, with a total of 552 as of December 1. The total number of deaths in 2011 alone is equal to the previous ten years of tornado-related deaths combined. Given that we live in the era of Doppler radar, which has lead to earlier and more accurate tornado warnings, this number is exceptionally extraordinary. The direct urban hits by tornadoes in Tuscaloosa, Ala. and Joplin, Mo. greatly contributed to the exceedingly high number of casualties.

Implications and Projections

In most years, with the exception of large catastrophe losses from earthquakes or hurricanes, wind and hail damage from cyclonic storms are major contributors to insurance claim losses. In the past, companies were confident they had an accurate underwriting knowledge of the areas, such as “tornado alley,” that resulted in the greatest claims. During the past few years, however, property, casualty and commercial insurers have begun to realize they need to carefully reevaluate this perception. For many companies, the result of actuarial analysis of claims loss against granular damaging winds and hail geospatial databases has led to a considerable expansion of areas now considered higher risk for wind and hail claims loss.



SNAPSHOT

Though 2011 is close to the ten-year maximum in wildfire acreage burned for the country, there is one unusual factor that is not apparent in the combined statistics. California is often one of the leading states in both wildfire activity and insurance claims due to wildfire-related property loss, topping one million acres and billions of dollars of damage in both 2007 and 2008. However, the statistics for 2010 and 2011 indicate a greater than 90 percent reduction in acreage consumed by wildfires when compared with the 2007-2008 period. From January through mid-November 2011, California wildfires totaled just 51,379 acres – less than half the historically low amount of 108,742 acres in 2010 (see Figure 7). An abnormally wet winter and cool summer in parts of the western U.S., including California, are primarily responsible for this significant reduction in wildfire acreage.

WILDFIRE

Year in Review

The 2011 wildfire season in the U.S. is indicative of the dynamic variability of wildfire activity. Wildfire statistics through October 2011 parallel the overall trend of fewer fires that are larger in size (see Figures 5 and 6 below). As of October, the U.S. has experienced the fifth most acreage burned and the eighth highest number of fires, when compared with the preceding ten-year period. If compared with just the preceding five years, 2011 would be ranked lowest in number of fires and fourth in terms of acres burned.

Much of the wildfire activity in 2011 shifted to southwestern states undergoing a prolonged and significant drought. In late May, the largest fire in Arizona history, the Wallow Fire, forced the evacuation of thousands of residents and burned more than 469,000 acres. Texas and Oklahoma also experienced a record number of wildfires, with the Bastrop fire in Texas alone resulting in more than 1,600 homes and structures destroyed and 34,000 acres burned.

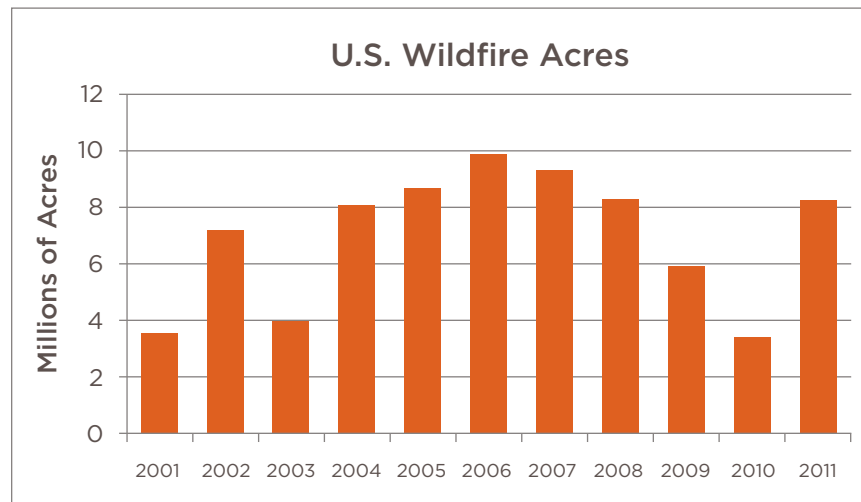


Figure 5 – Total U.S. Wildfire Acres Burned 2001 - 2011

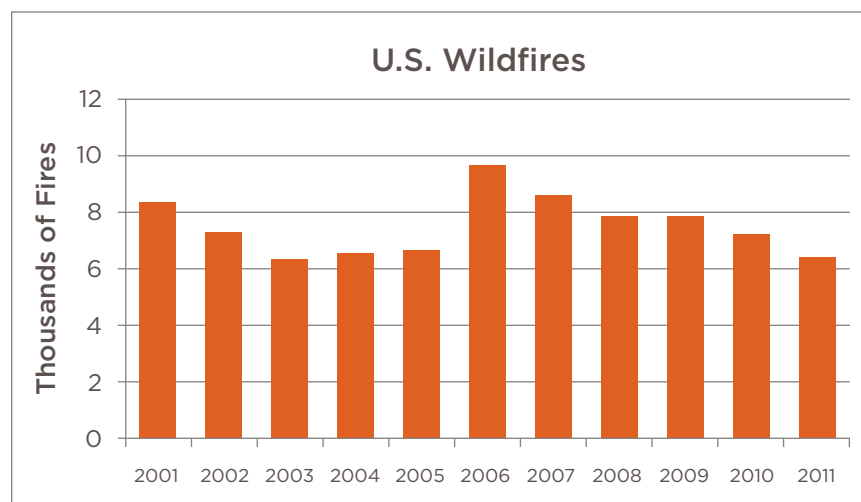


Figure 6 – Total Number of U.S. Wildfires 2001 - 2011

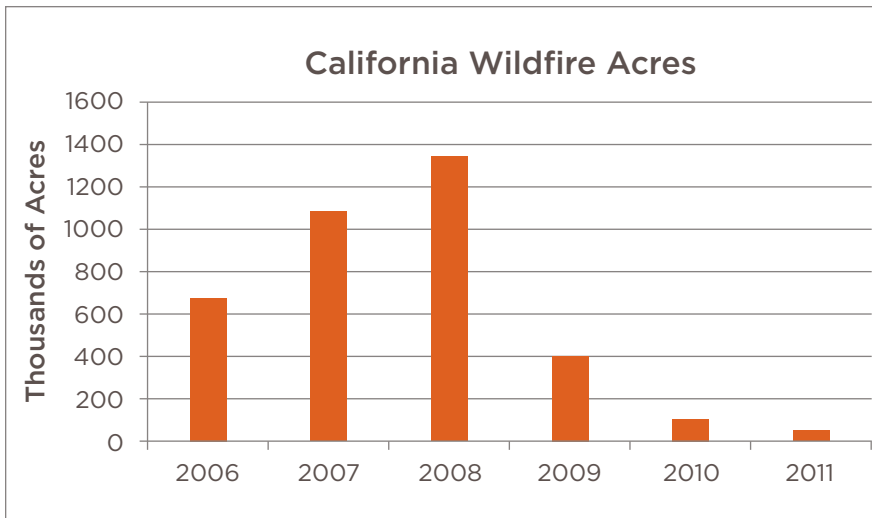


Figure 7 - California Wildfire Acres Burned 2006 - 2011

Implications and Projections

A review of past fire seasons indicates that wildfire activity often follows a cyclical pattern of increase and decrease due to changing seasonal weather patterns. Colder and wetter weather in areas prone to wildfires is often the precursor to a dramatic increase in the number and size of wildfires in subsequent years, as a result of greater than normal vegetation growth during times of increased precipitation. It would not be unreasonable to expect parts of California to see a similar trend in the next few years, with wildfire acreage increasing dramatically from the current historic lows to higher, more typical levels.

In addition, persistent and intensifying drought conditions are forecast for an even larger section of the U.S. for the coming year, extending in a continuous band from Arizona to South Carolina and as far north as Kansas and Missouri. Much of the increase in wildfire activity for 2011 in Texas, Arizona and New Mexico was the result of the persistent drought conditions in those areas (see Figure 8 below), which is expected to intensify and spread in the early part of 2012.

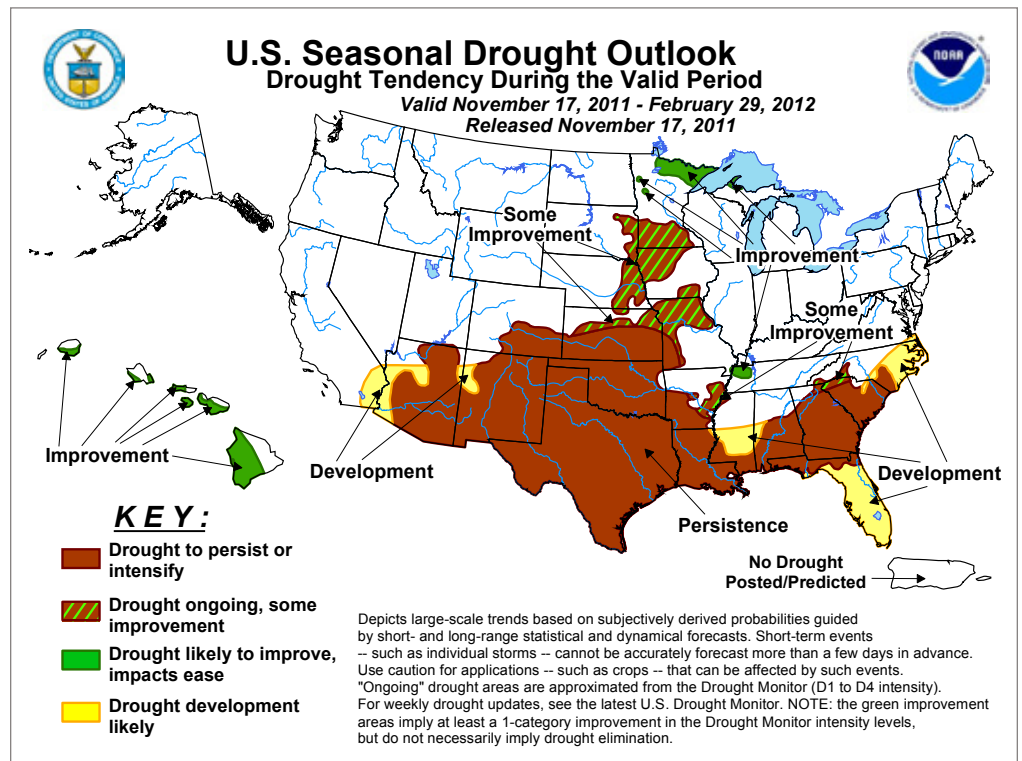


Figure 8 - U.S. Seasonal Drought Outlook



EARTHQUAKES

Year in Review

SNAPSHOT

The 5.8 magnitude earthquake that hit central Virginia and was felt throughout the eastern seaboard on August 23, 2011 was unusual, but not unprecedented. The quake was felt from as far north as Quebec to as far south as Georgia and caused damage to a number of buildings in the region. Though thankfully no lives were lost as a result of the Virginia quake, the tremors wreaked havoc on several iconic local structures, namely the National Cathedral and the Washington Monument. In early November, Oklahoma also experienced a series of low magnitude earthquakes, with one quake on November 5 registering a 5.6 magnitude, the strongest ever recorded in the state.

This year has been an unusual year in terms of the frequency of larger earthquakes, or quakes registering as greater than 2.8 on the Richter Scale (see Figure 9 below), as was 2010. As the graph below indicates, 2010 and 2011 have seen more than double the number of earthquakes compared to the previous 14 years. The contiguous U. S. generally averages around ten major quakes per year.

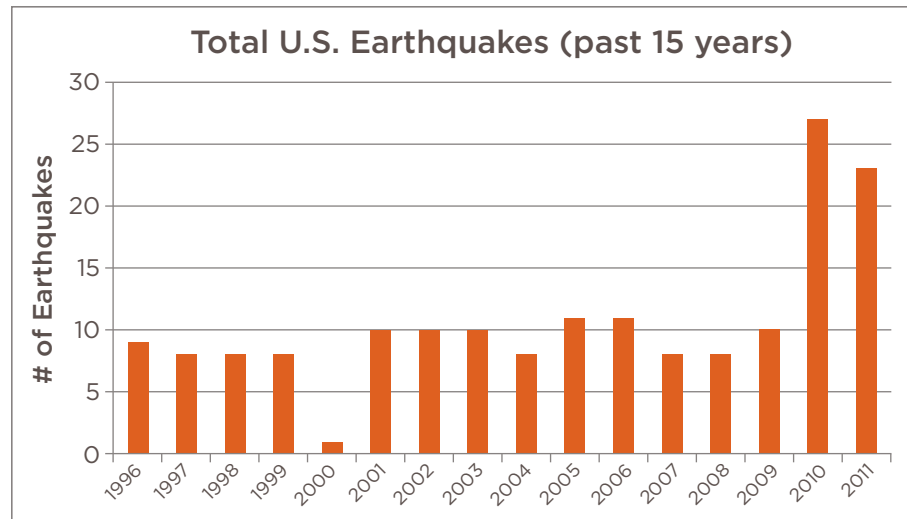


Figure 9 – Total U.S. Earthquakes Over the Past 15 Years

Though it is discussed less frequently than the fault lines in the west, the eastern part of the country does have some geographic areas that face a higher risk of earthquake activity, as shown in Figure 10 below. The New Madrid area centered around southeast Missouri, as well as the area around Charleston, S.C. are especially vulnerable.

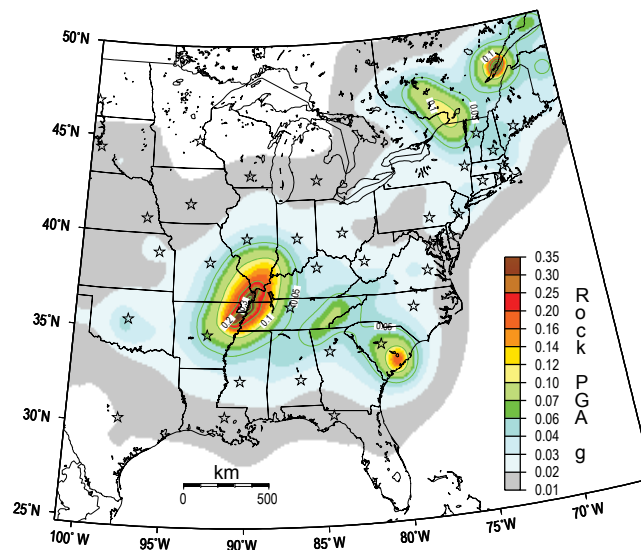


Figure 10 – Eastern U.S. Earthquake Risk

Despite the seemingly unexpected 2011 earthquake events in Virginia and Oklahoma, seismic activity has typically been concentrated in the west over the past 15 years, as shown in Figure 11. This is a long-running trend reflecting the underlying geology and plate tectonics of the western U.S.

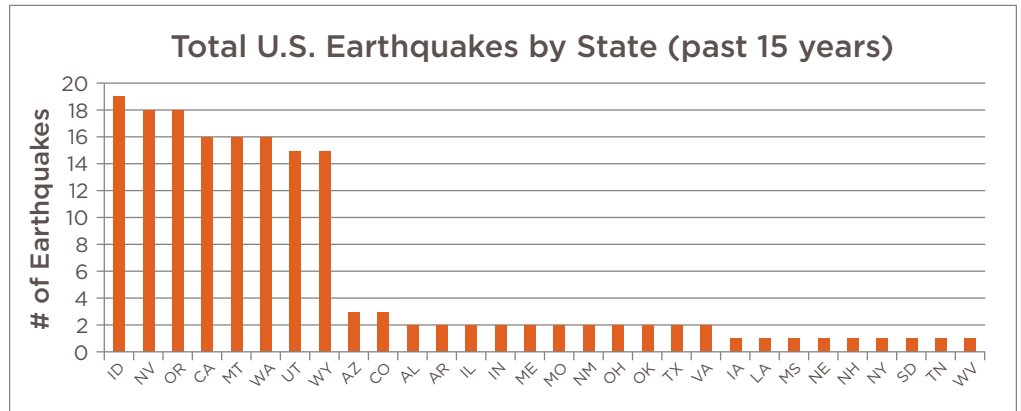


Figure 11 - Total U.S. Earthquakes by State Over the Past 15 Years

One noteworthy finding in an analysis of historical U.S. earthquake data is that even though Virginia has only experienced two quakes and New York has faced just one in the past 15 years, both states recorded incidents that produced fairly high readings on the Richter scale. In terms of total quakes and magnitudes, however, the West still far exceeds the eastern U.S. in earthquake hazard events (see Figure 12 below).

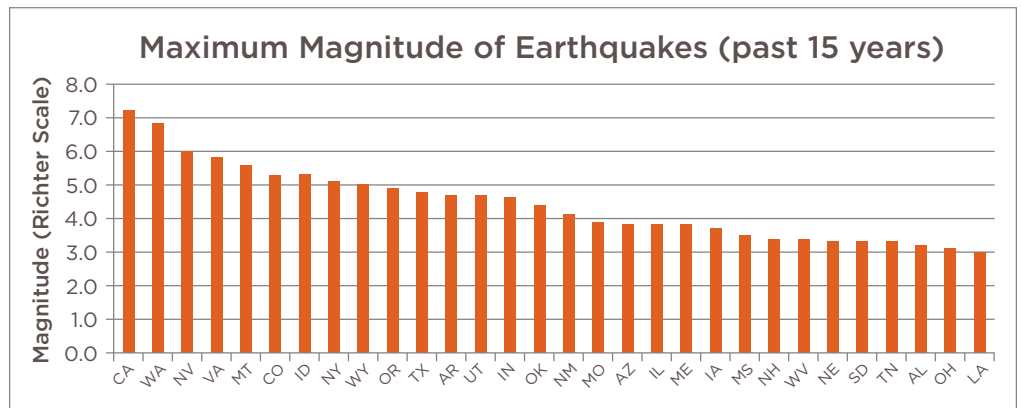


Figure 12 - Maximum Magnitude of Earthquakes over the Past 15 Years

Implications and Projections

The two instances of non-western U.S. earthquakes this year in Virginia and Oklahoma surprised many residents who previously thought earthquakes to be primarily a western U.S. phenomenon. As a result, insurance companies throughout the Northeast and parts of the Midwest that offer earthquake policies have experienced a significant increase in inquiries relating to earthquake insurance.

ABOUT CORELOGIC

CoreLogic (NYSE: CLGX) is a leading provider of consumer, financial and property information, analytics and services to business and government. The company combines public, contributory and proprietary data to develop predictive decision analytics and provide business services that bring dynamic insight and transparency to the markets it serves. CoreLogic has built one of the largest and most comprehensive U.S. real estate, mortgage application, fraud, and loan performance databases and is a recognized leading provider of mortgage and automotive credit reporting, property tax, valuation, flood determination, and geospatial analytics and services. More than one million users rely on CoreLogic to assess risk, support underwriting, investment and marketing decisions, prevent fraud, and improve business performance in their daily operations. The Company, headquartered in Santa Ana, Calif., has more than 5,000 employees globally. For more information visit www.corelogic.com.

Conclusion

The largely unexpected and often record-breaking outbreak of natural hazard incidents in 2011 has in many ways brought disaster preparedness and risk analysis to the center stage. In both rural and urban areas, among homeowners, insurers, government officials and even the news media, the undeniable impact of these catastrophic storms and events has become a key point of discussion.

Extreme flooding in New England, the Midwest and along the Mississippi River heightened awareness of flood risk for properties located outside of the designated FEMA 100-year flood zones, putting pressure on businesses and insurance companies to better understand flood vulnerability in areas previously identified as lower risk. Similarly, estimates of potential hurricane-driven storm surge damage and inland flooding have underscored the need for city and government representatives to reevaluate the standards in place to protect critical and strategic infrastructures across the United States.

Within the insurance industry, many insurance companies are now closely examining their policies and parameters for coverage. In response to wind-related events in particular, insurers have begun reevaluating risk for tornado and hail damage well beyond the traditional geographic focus on “tornado alley” and adjacent areas. Homeowners are also showing increased interest in earthquake insurance quotes in regions not typically considered earthquake-prone and exploring the need for flood insurance for homes outside of FEMA flood zones.

Overall, the natural disasters felt throughout the U.S. in 2011 will have a lasting impact on the policies, procedures and safety measures in place for many homes and businesses. The effects will undoubtedly shape the nation’s response to catastrophic events in 2012, inform the general understanding of risk and, hopefully, improve preparedness in years to come.

FOR MORE INFORMATION, PLEASE VISIT
corelogic.com/spatialsolutions

©2011 CoreLogic, Inc.

CORELOGIC and the CoreLogic logo are registered trademarks of CoreLogic, Inc. and/or its subsidiaries. Proprietary and confidential. This material may not be reproduced in any form without expressed written permission.

BRO_Natural Hazard Risk_1112_01



CoreLogic®

corelogic.com