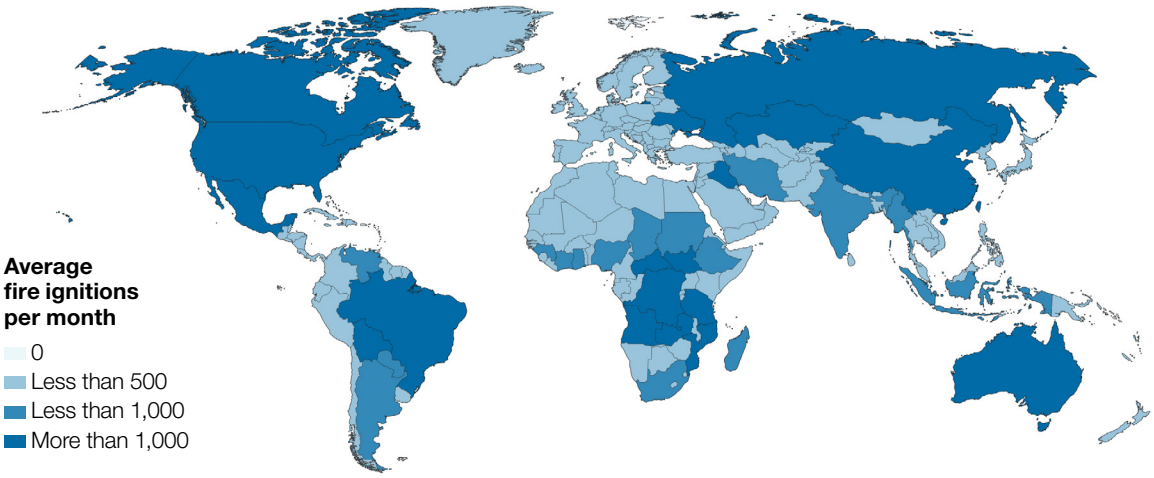
Wildfire Risk Insight

Analysis of property exposure and wildfire damage in 2019

Verisk

A threat across continents

The high visibility of wildfire events in the United States can make them appear to be primarily a U.S. hazard. But recent years offer a reminder that the peril of wildfire extends to any location with the right mix of risk factors. Climate change and human encroachment on wildlands have fostered conditions that increase fire risk from California, to Australia, to the Amazon rainforest, to Siberia. And demonstrating how wildfire can intersect with other hazards, fires burning near the site of the Chernobyl nuclear plant raised concerns that radioactivity might be released as contaminated structures burned within the exclusion zone around the site.



The above map is segmented by average fire ignitions per month spanning the past five years as detected by satellite-based MODIS (Moderate Resolution Imaging Spectroradiometer) instruments. MODIS can detect ignition points for multiple types of fires with various causes—including lightning, arson, and even prescribed burns—but the majority of detections are wildfires. Of those, human-caused wildfires have been among the most devastating. The five most active countries are Russia, Brazil, Australia, the Democratic Republic of the Congo, and the United States.

Location aside, wildfire risk includes a few shared elements:

Wildland vegetation
Vegetative fuels such as grass, trees, and dense brush feed a wildfire.

Terrain
Topography influences the speed of wildfire spread.

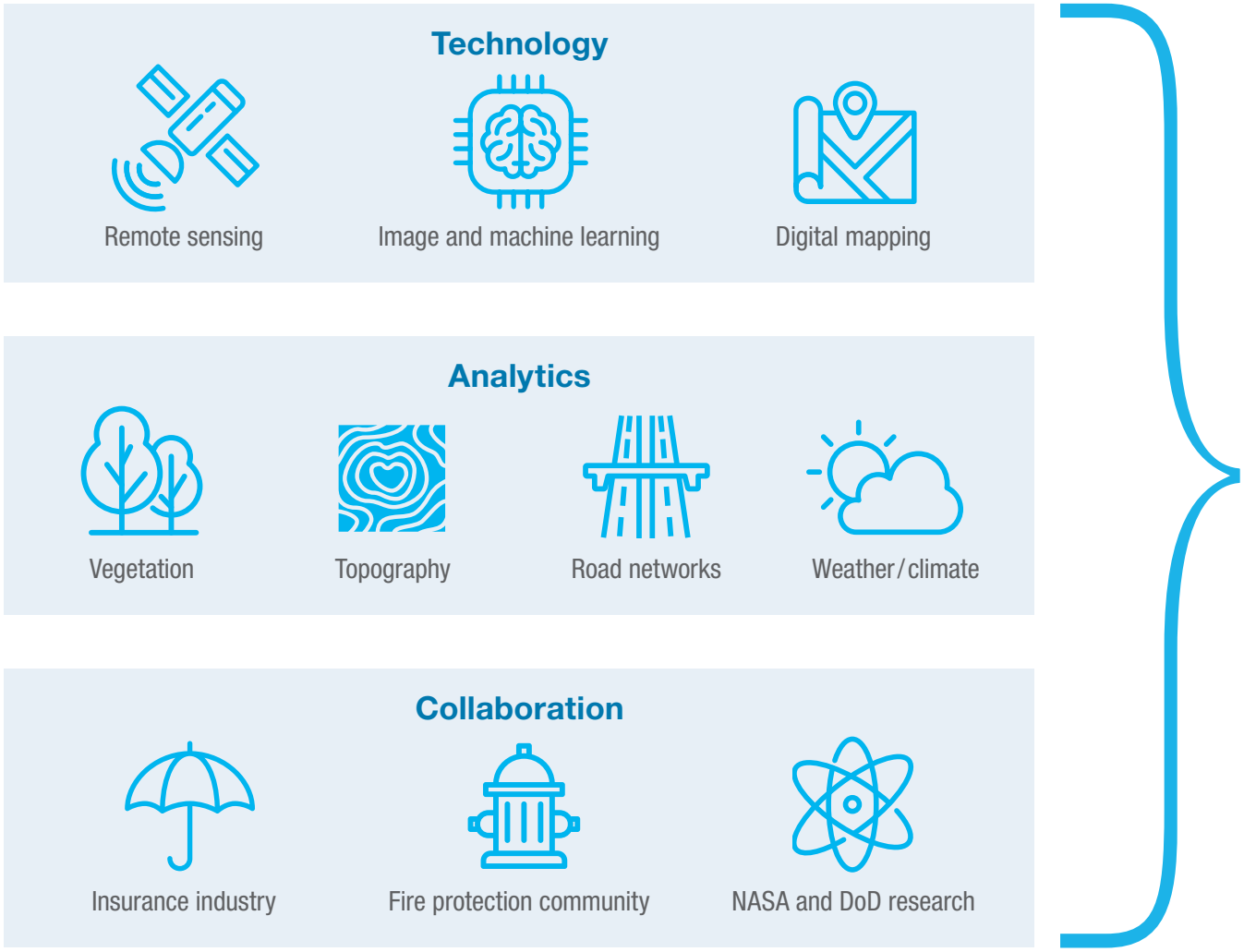
Road access
Limited road access and dead-end streets impede firefighting equipment.

Wind-borne embers
Strong, dry, downslope winds carry embers, expanding the fire's perimeter.

Assessing wildfire risk

Wildfire risk assessment for property insurance is complex and draws on multiple fields of expertise. These include large-scale data and analytics as well as scientific methods to comprehensively assess wildland fuels and wildfire risk. Taken in isolation, individual data sources aren't deep enough to fully characterize the risk. Likewise, data analysis methods such as machine learning and artificial intelligence (AI), applied solely to aerial imagery, may produce unreliable or unbalanced risk assessments if they lean heavily on data that's too narrow, biased by specific events, or both.

It's also important to have partnerships with organizations that track and promote mitigation of wildfire risk down to the community level, which can yield a greater understanding of local hazards and help highly exposed areas to be safer and better prepared.



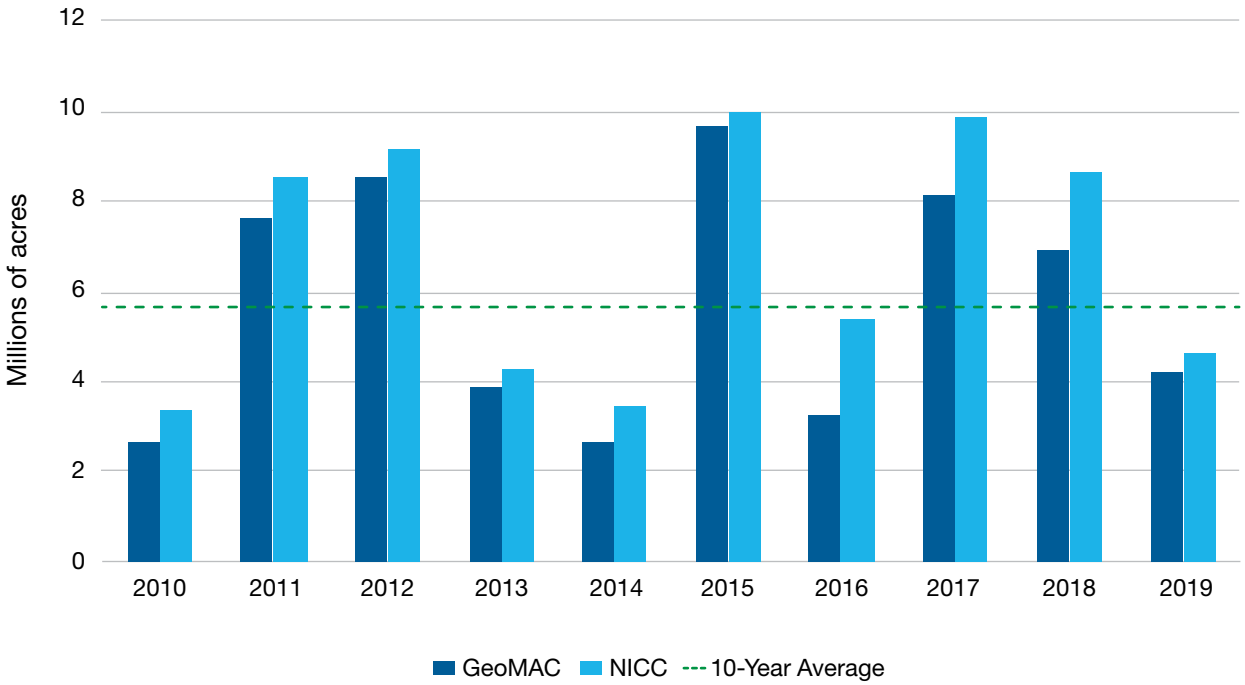
Climate change can magnify the risk

Climate change can affect the growing number and intensity of wildfires. Rising temperatures, severe droughts, and evolving precipitation patterns are contributing to year-round wildfire "seasons." Data has also linked large wildfires to early spring snowmelt in mountainous regions, which extends the dry season and enhances conditions that lead to wildfires. Snow cover keeps the risk of wildfire relatively low, but early snowmelt makes dry fuel more available to ignite and burn. These factors, added to accelerating development in and near wildlands, elevate the risk of loss.

It's important to examine the big picture—not just the areas with direct exposure to wildfire but also the periphery, where the effects can spill over in ways that are less catastrophic but still potentially costly. Wildfires produce other types of losses, such as smoke and ash damage, additional living expenses due to evacuations, business interruption, and more.

The exhibit below shows fire perimeter acreage statistics from the top two publicly available data sets, GeoMAC and the National Interagency Coordination Center (NICC). These vary based on differences in agency reporting and methodology. According to the National Interagency Fire Center (NIFC), the average annual acreage burned is around 5.7 million over the past 30 years. Compared with the 1990s, average acres burned have increased. The United States has experienced several record-breaking seasons over the past few years.

Reported acres burned

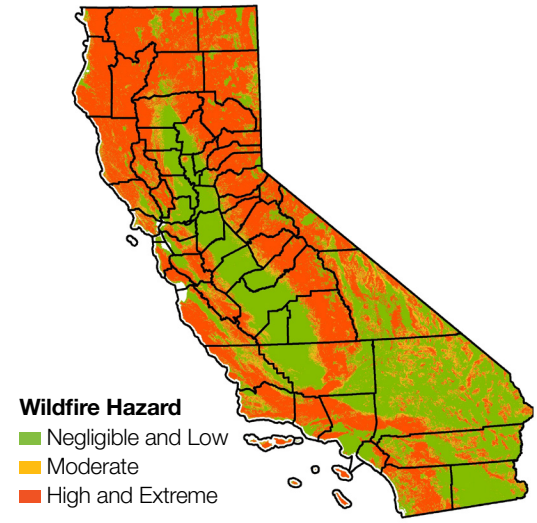


FireLine® State Risk Report—California

Wildfire Risk at a Glance

Number of Housing Units[1]	13,680,100
Number and Percentage of Housing Units at High and Extreme Risk	2,019,800 15%
Largest Insured Wildfire Loss[2]	$14 billion (2017)
Number of Acres Burned in 2018[3]	1,823,200
Largest Historical Wildfire[3]	Mendocino Complex (2018) 459,100 acres burned

Sources: 1. U.S. 2010 Census, 2. PCS®, 3. National Interagency Fire Center (NIFC)



According to U.S. Census data, California has 13,680,100 housing units. The following is a breakdown of the percentage and number of housing units broken out into the low, moderate, and high wildfire risk categories.

Negligible and Low		Moderate		High and Extreme	
Percentage	Number	Percentage	Number	Percentage	Number
73%	9,995,800	12%	1,664,600	15%	2,019,800

Top five counties by number of housing units in high and extreme wildfire risk categories	
Los Angeles	431,200
San Diego	247,300
San Bernardino	112,300
Riverside	78,000
Alameda	77,800

Top five counties by highest concentration of housing units in high and extreme wildfire risk categories	
Alpine	88%
Trinity	81%
Tuolumne	81%
Mariposa	78%
Nevada	75%

The data compiled in this report is only an indication of risk. All figures are rounded. Actual risk for an insurer depends on the location of the individual property and its wildfire risk attributes. For underwriting purposes, FireLine® provides a wildfire hazard score ranging from 0 (negligible) to 30 (extreme) for each property analyzed.

The numbers of housing units indicated above are derived from the latest information on address locations and existing U.S. Census information.

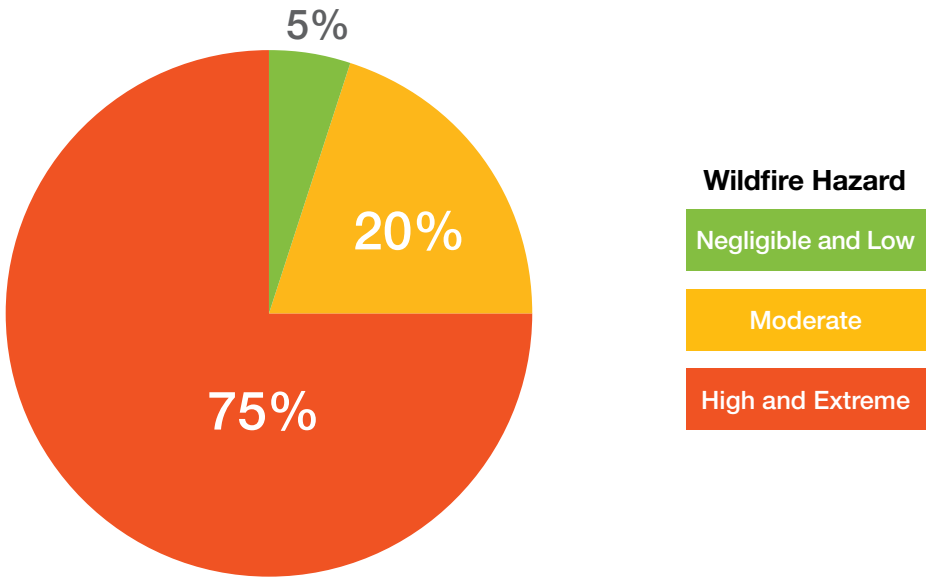
FireLine evaluates wildfire risk at the address level. The service uses advanced remote sensing and digital mapping technology to assess the primary factors that contribute to wildfire risk—fuel, slope, and road access—to determine the wildfire hazard score.

Assessing the impact of 2019 wildfires

In analyzing fire perimeters, GeoMAC's fire perimeter data is among the most comprehensive public data sets available for analysis. The below acreage analysis was conducted using the GeoMAC data set. FireLine® is guiding our analysis of risk factors seen within the perimeters.

Around 99 percent of the acres burned in 2019 were classified at risk. Specifically in California, around 95 percent of acres burned were classified at moderate to extreme risk.

FireLine risk categories tracked to California acres burned in 2019



Our analysis shows that wildfire perimeters are subjective and approximate. Agricultural areas and large bodies of waters may be included within wildfire perimeters (negligible and low risk areas); however, they tend not to burn.

Identifying this problem, Verisk maintains a growing unique database containing verified addresses with wildfire-related structural damage, spanning multiple decades. Long-term analysis of Verisk data shows that more than 95 percent of property locations damaged by wildfire are usually associated with moderate to extreme exposure levels.

2019 wildfires at glance

Museum Fire

The Museum Fire consumed nearly 2,000 acres in the area of Arizona's Coconino National Forest. The Federal Emergency Management Agency (FEMA) reported that the fire threatened 3,600 homes, 180 businesses, the Flagstaff water plant, and multiple fire stations and municipal buildings. FireLine determined that the total fire area was at moderate to extreme risk. Coconino County ranks fifth in Arizona by number and concentration of housing units in the high or extreme wildfire risk categories, according to the FireLine State Risk Report for Arizona.

Pedro Mountain Fire

The Pedro Mountain Fire surpassed 20,000 acres near Wyoming's Pathfinder Reservoir after destroying seven structures and prompting evacuations, according to local news reports and government sources. The fire started around 1 p.m. on August 24. The *Casper Star-Tribune* reported seven structures destroyed. Authorities believed lightning to be the cause of the fire. FireLine determined that the total fire area was at risk, with more than 95 percent at moderate to extreme risk. The fire was located partially within Natrona County, which ranks second in the state by number of housing units in the high or extreme wildfire risk categories, according to the FireLine State Risk Report for Wyoming.

Red Bank Fire

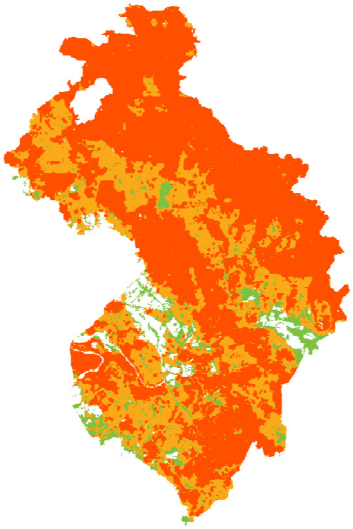
The Red Bank Fire, ignited by lightning, started on the afternoon of September 5, according to the California Department of Forestry and Fire Protection (CAL FIRE). The fire consumed more than 8,800 acres west of Red Bluff, with two structures destroyed. FireLine determined that the total fire area was at risk, with more than 98 percent at moderate to extreme risk.

Walker Fire

The Walker Fire started September 4 in California and consumed more than 50,000 acres in Plumas County. The cause of the fire was under investigation. FireLine determined that the total fire area was at moderate to extreme risk.

Kincade Fire

The Kincade Fire ignited on October 24 near Geyserville, California, in Sonoma County. As of October 30, CAL FIRE reported the fire burned nearly 78,000 acres. Strong winds caused the fire to spread rapidly, destroying 374 structures and damaging 60. The cause was under investigation. FireLine categorized the total fire area at risk, with around 94 percent at moderate to extreme risk.

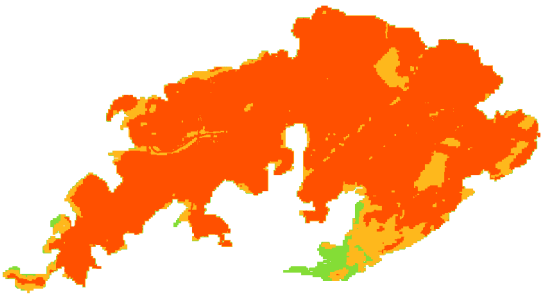


Wildfire Hazard

- Negligible and Low
- Moderate
- High and Extreme

Tick Fire

The Tick Fire ignited on October 24 in the Santa Clarita Valley in Los Angeles County. According to CAL FIRE, the fire burned more than 4,600 acres. Strong Santa Ana winds drove the fire's rapid growth. More than 70 structures were destroyed or damaged. Los Angeles County is ranked first in the state by number of housing units in the high and extreme wildfire risk categories, according to Verisk's FireLine State Risk Report for California. FireLine categorized the total fire area at risk, with around 98 percent at moderate to extreme risk.

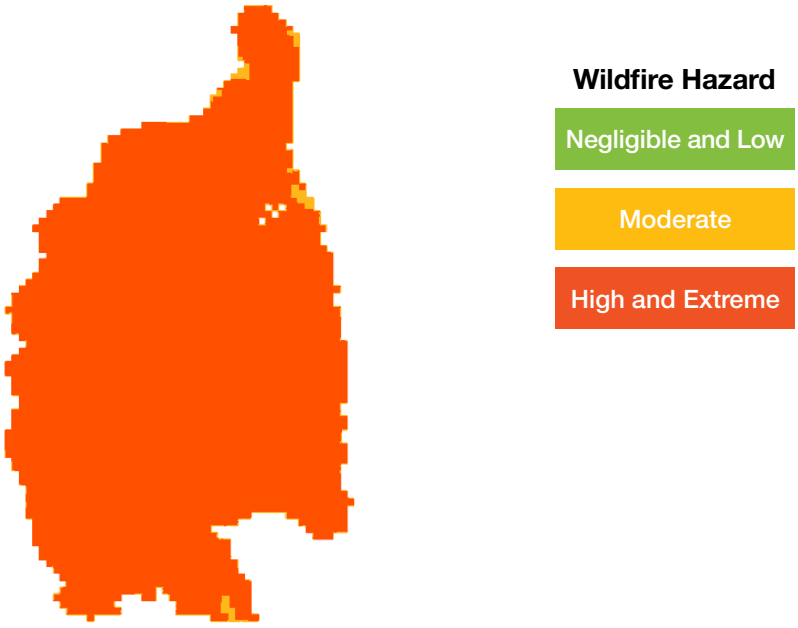


Wildfire Hazard

- Negligible and Low
- Moderate
- High and Extreme

Getty Fire

The Getty Fire broke out October 28 and quickly exceeded 700 acres near and west of the 405 Freeway. The Los Angeles Fire Department reported approximately 25 structures destroyed or damaged. The Getty Fire burned in the top-ranked county by number of housing units in the high and extreme wildfire risk categories, according to Verisk's FireLine State Risk Report for California. FireLine categorized the total fire area at moderate to extreme risk.



Wildfire risk management

Fully understanding the peril of wildfire and the primary risk factors is imperative for insurers to accurately underwrite properties and manage exposure across their portfolios. While the peril is unpredictable, there are risk management strategies to help—covering underwriting, pricing, and concentration management across both personal and commercial lines.

At the **address level,** questions insurers should consider include:

- Where are properties at risk located, and how can this inform underwriting decisions?
- How does concentration of risk within geographic areas influence loss outcomes?
- Are premiums commensurate with the level of exposure to wildfires at individual property locations?
- How are you addressing peripheral wildfire exposures?

FireLine Special Hazard Zones identify areas adjacent to wildlands, where less destructive but still significant effects of wildfires can inflict costly losses. Examples can include smoke and ash damage, expenses related to evacuation orders, and business interruption.

Complementing this address-level risk management, probabilistic wildfire models can aid in **portfolio-level** strategic risk management. AIR Worldwide, a Verisk business, provides a comprehensive stochastic view of potential financial losses from wildfires and associated probabilities as well as average annual loss (AAL)—the expected loss per year averaged over 10,000 simulated years. These models can help with risk assessment, stress testing, and more.

Mitigation preview

Verisk supports coordinated research and education to potentially reduce the scope and severity of wildfire losses. As part of that commitment toward resilience, Verisk is working with various organizations to help insurers better understand the protective measures communities are taking toward wildfire mitigation.

Verisk has partnered with the International Association of Fire Chiefs (IAFC) to help insurers identify properties located in communities taking action to mitigate wildfire risk. Verisk can now indicate whether a property is part of a community participating in the Ready, Set, Go! (RSG) Program administered by the IAFC. RSG works with local fire departments and community organizations in wildland and wildland urban interface (WUI) areas to fight wildfire hazard with risk mitigation measures. The partnership helps insurers better understand protective measures communities are taking toward wildfire mitigation at the property level.

Verisk has also partnered with Intterra, a leading provider of software for fire departments across the United States, and the Western Fire Chiefs Association (WFCA) to explore new ways of analyzing and understanding wildfire risk. The partnership brings together experts in insurance, technology, and fire protection. Intterra has worked with the WFCA for several years to develop the Fire Data Lab, a nonprofit organization dedicated to accelerating the use of data-driven decision making in the fire service. The addition of Verisk brings robust insurance data and risk analytics to the alliance to help generate new insights.

The COVID-19 pandemic has affected public safety functions from the federal to local levels, as resources remain limited and ordinary modes of operation are set aside. With respect to wildfire, incident response and mitigation efforts may be affected by staff shortages and travel restrictions. In addition, firefighter training, prescribed burns, and community awareness meetings have been postponed to help prevent the spread of the virus. In light of these challenges, communities are encouraged to help with mitigation efforts such as preparing defensible space, keeping up with training via distance learning, and continuing to inform the public through virtual channels.

Verisk has collaborated with the Rebuild Paradise Foundation, formed after the Camp Fire destroyed much of the town of Paradise, California. This organization brings together residents, businesses, and community leaders and officials to help rebuilding efforts in Butte County and to prepare for any future disasters. In the community's quest to rebuild, Verisk has provided expertise and assistance with respect to insurance and building structure.

A report by the Wharton School notes the interdependent nature of wildfire risk. The safety of individual properties depends on the cumulative protection efforts of neighbors to help contain the spread of fire. At the community level, measures such as rigorously enforced building codes can also reduce wildfire risk. And at the state and local levels, sound land use management and strategies to reduce vegetation and fuel can further contain the risk.

Verisk will continue to innovate and expand its network in an effort to lead and assist the mitigation community.

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