



WILDFIRES REPORT

November 2017



Kennedys

INTRODUCTION

Wildfire risks are evolving. They are difficult to quantify and could have a major impact on society and industry. Due to this, wildfires are identified as an emerging risk for the insurance market. This insights report seeks to identify and illustrate the potential new threats for the insurance industry. Wildfires cannot be prevented. Effective risk management strategies exist that have the potential to lead to a significant reduction in human and economic losses from wildfires. Much of these require action at business, community and homeowner level and regulation of building in high-risk areas could be a factor in risk mitigation.

Wildfires are destined to become a yet more important consideration for underwriters in the future. Frequency and severity prediction models will become more influential in the assessment of risk. Global warming and extreme climate conditions, together with a growing world population, are expected to result in more wildfires of greater severity. Evidence of this has already been seen this year with the devastating wildfires in Portugal, France, the US, and Canada.

As urban development expands into rural areas, there are an increasing number of buildings in the wildland/urban interface where structures are located alongside or in the natural vegetation. Population growth increases ignition risks and, therefore, the financial amounts at risk.

With this pattern of expansion, wildfire losses will continue to rise unless there are significant changes in human factors and loss prevention measures.

Predictions of hotter temperatures and increased drought conditions in years to come mean that fire conditions are generally expected to worsen, which will make it more difficult and more expensive for home and business owners to purchase coverage in areas prone to wildfires.

To provide effective insurance options, the insurance industry needs to work with legislators, communities and individuals to mitigate exposure to wildfire losses.

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PART 1

BACKGROUND

Wildfires are uncontrolled vegetation fires that usually occur in the countryside or in wilderness areas such as forests, woodlands, bushland, scrubland, grassland or peatland.

They are distinguishable from other types of fire by their:

- Size
- Speed at which they can spread
- Potential to change direction
- Ability to circumvent firebreaks.

Wildfires are important in the maintenance of ecosystems and form part of the natural course for many forests, shrub and grasslands over hundreds of millions of years. As communities develop at the wildland/urban interface, such fires increasingly represent a hazard to people, property, businesses, economies and habitats and bring with them far-reaching and costly after-effects.

Wildfires are more prevalent in the summer months in both the northern and southern hemispheres (we have already seen instances of major and devastating wildfires in California, Canada, Portugal and France so far this year), but nations closer to the equator remain susceptible throughout the year.

As a result of large losses experienced in California during the 1990s, when four such fires resulted in insurance payments of between US\$265 million and US\$1.7 billion, the insurance industry began to look more closely at wildfires.

Today, wildfires represent a significant risk exposure for insurers and reinsurers, as well as other operations trying to manage loss and damage - not just to property and income, but also reputation - across a wide range of industry sectors.



PART 2

DESCRIPTION OF THE RISK

In the insurance industry, catastrophic events are natural or man-made disasters causing a significant number of claims in any region. An event is described as a 'catastrophe' by the insurance industry in the US when the claims are expected to reach a certain financial threshold (being US\$25 million as at July 2016) and more than a set number of insurers and policyholders are affected.

The 2016 Fort McMurray Wildfire in Canada was the costliest ever Canadian natural disaster for insurers. According to the CEO of Munich Re Underwriting (Phillip Wassenberg), these wildfires cost his firm around €400 million.

In 2015, it was estimated that approximately 10 million acres burns every year in the US causing millions of dollars in damage. Widespread burning in the summer and even spring is becoming the "new normal" in the American West.

The most common wildfire regions are Western US, South-Coast Canada, parts of the Mediterranean Basin, Eastern Siberia, South-Central Australia, Western South America and drier regions of Asia. Nearly all have experienced costly wildfires.



Case studies

'Black Saturday': Victoria, Australia, February 2009

'Black Saturday' was the deadliest bushfire in Australia ever recorded and cost insurers approximately A\$4.4 billion. Six major fires broke out on 7 February 2009 and burned through 4,000km, destroying over 2,000 homes and 3,500 structures.

Waldo Canyon Fire, Colorado, USA, June 2012

This wildfire burned for over 18 days. It is reported to have destroyed 346 homes and led to the evacuation of 32,000 people, ranking it as one of the 20 most costly insurance losses in 2012. It was estimated as the most costly fire in Colorado with insurance costs totalling US\$453.7 million from 6,648 claims.

Indonesia, June to October 2015

This wildfire raged for months burning 52,000 hectares in Sumatra and 138,000 hectares in Kalimantan. The fire had far-reaching effects on Southeast Asia. Its haze covered Malaysia, Thailand, Singapore and Myanmar - the fumes were deemed so toxic that public events in Singapore were cancelled.

Fort McMurray, Alberta, Canada, May 2016

This wildfire started in May 2016 and raged for almost a month, resulting in approximately 4,300 property, motor, commercial and farm claims. As well as the usual losses, there were wider implications which were particular to the area as a result of the forced shutdown of mining facilities, with around 4,000 workers having to be evacuated. Energy companies Suncor Energy and Syncrude slowed or halted production. The latest loss estimate from Property Claim Services Canada suggests the wildfire will cost the insurance industry C\$4.67 billion (US\$3.62 billion), around 30% higher than the C\$3.6 billion estimate of total insured losses the Insurance Bureau of Canada issued in July 2016.

Pedrogao Grande, Portugal, June 2017

Portugal's annual wildfire season started earlier than usual this year with a devastating wildfire that raged for five days, damaging 40,000 hectares of woodland, injuring more than 250 and tragically claiming the lives of 64 people.

California, US, June 2017

The 2017 wildfire season in California started ferociously, with 2,135 fires scorching 20,200 acres by 25 June. This is compared to 1,750 fires over 18,354 acres for the same period in 2016. This resulted in tens of thousands of residents being evacuated and hundreds of structures destroyed. There have also been reports of potential damage to vineyards in the Napa Valley region.

British Columbia, Canada, July 2017

British Columbia declared a state of emergency for the first time in 14 years as more than 200 wildfires ripped through the region, destroying dozens of buildings, forcing the shutdown of three major lumber companies and the evacuation of more than 14,000 residents.

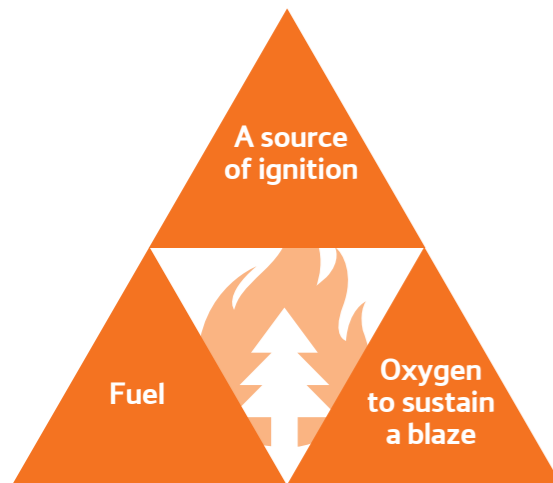
Carros, France, July 2017

The wildfire that was allegedly started by two teenagers in the south of France in July 2017 destroyed 150 hectares of vegetation, scorched a further 7,000 hectares of land, destroyed homes and resulted in thousands of residents and holiday makers being evacuated.

PART 3 SOURCE OF THE RISK

Wildfires are a natural hazard, which can be influenced by a variety of environmental, natural and human factors.

Wildfires occur when all of the necessary elements of a 'fire triangle' come together in a susceptible area:



Dry surfaces are generally a requirement for extreme fire behaviour. Droughts lead to favourable conditions for fires. Environmental conditions in the summer months can desiccate wildland vegetation. Whilst weather conditions may persist for some weeks without significantly increasing the likelihood of wildfires, there is a very real danger that a trigger event in an area of high fuel load (where there is a large amount of flammable material per unit of area) will result in a wildfire.

In more densely populated regions such as the UK and the US, the source of ignition is most commonly human, either by accident (including prescribed fires getting out of control) or by arson. In Canada, the two most significant activities associated with wildfires are electrical utility transmission/distribution and debris burning. However, in July 2017, officials in British Columbia said that out of the 572 wildfires started in the region since April 2017, 258 of these were caused by humans.

PART 4 CLIMATE CHANGE – A CONTRIBUTING FACTOR?

Climate change and the rise in average global temperatures is likely to lead to substantial increases in the frequency and size of wildfires worldwide.

More heatwaves are predicted and a drier environment is expected to lead to an increased possibility of lightning. Whilst vegetation (fuel) is drier, the drier weather may reduce vegetation growth overall, which will decrease fuel loads in the long run (although areas of wildland/urban interfaces are likely to increase as populations expand).

Higher temperatures in spring and summer cause soil to be drier for longer periods of time, which increases the likelihood of drought and a longer wildfire season (particularly in Western US). As these conditions become more prevalent, so the likelihood of intense and long-burning fires increases.

Unhelpfully, as the impact of climate change results in larger scale wildfires, these fires are themselves becoming a significant contributor to greenhouse gas emissions. This has created a situation where large fires create more emissions, which contribute to global warming and, in turn, more fires.



PART 5

A GLOBAL RISK

Global risk of wildfires is increasing. Every year, vegetation fires affect approximately 4% of the global landscape. The level of carbon dioxide released annually from these fires exceeds half of the emissions from humans burning fossil fuels.

As global temperatures rise, the number of days wildfires are likely to burn each year is increasing, as is the length of the wildfire season.

The UK Government Cabinet Office publishes a National Risk Register for Civil Emergencies - a classification of the risk of civil emergencies in the UK or to UK interests. The register divides emergencies into malicious risks and other risks, which are then considered on a matrix of relative likelihood of occurrence in the next five years, against an overall relative impact score. In the UK in 2015, the highest priority non-malicious risks were identified as pandemic influenza, coastal flooding and widespread electricity failure.

In 2015, the risk of "severe wildfire" (which was only added to the UK National Risk Register in 2013) was considered to be between one in 2000 and one in 200, with a relative impact score of two (out of a possible five). Despite being viewed as low impact compared with other emergencies in the UK, the location of potentially severe wildfires could cause damage or disrupt transport, energy, infrastructure (road, airports, pipelines, power lines, communications), commercial property, homes and crops, and have health consequences in the form of respiratory ailments.

Similarly, in Canada, the Northwest Territories Hazard Identification Risk Assessment identifies hazards and examines the risks that pose a threat to people, property, environment and economy. In 2014, the risk of fire was assessed as very high with the potential to cause extensive damage. This is expected to increase in frequency due to climate change causing more extensive damage to communities in the future.



PART 6

IMPACTS AND OUTCOMES

Time frame

Wildfires are a live issue which are likely to continue to be significant for the foreseeable future and requires action in both the immediate and longer term.

We divide emerging risk themes into those likely to occur in less than three years and those likely to occur later. This assessment should not be used as an indicator of when action is needed, as some themes likely to occur in the more distant future may, nonetheless, require immediate action to prepare.

We consider it more likely that UK wildfire risks will increase in the long term, but that preventative action is required in the more immediate future.

Society

As well as an inherent danger of loss of life, wildfires bring with them more indirect health impacts such as:

- Threats from smoke inhalation and reduced air quality.
- Increased levels of pollutants (hydro-carbons, carcinogens, particulate matter of varying size, carbon dioxide, carbon monoxide, sulphur dioxide) which are:
 - Highest near the flame front and burnt areas
 - Spread further afield and may exceed national standards, posing a risk to human health.

In the short term, these impacts can lead to respiratory infections, asthma and conjunctivitis, and in the longer term the risks are associated with cancer-causing compounds in smoke.

Along with the risk to health comes the inevitable risk of loss of property, which may include damage to critical national infrastructures. Most structural damage in wildfire events comes from flying embers which, depending upon wind conditions, can travel a mile or more from the flame source presenting a further risk of second and third tier fire locations.

Wildfires can also lead to transport and road closures because of poor visibility and the risk of exposure to pollutants. Smoke plumes can travel significant distances and affect visibility sufficiently to temporarily close airports and railway lines.

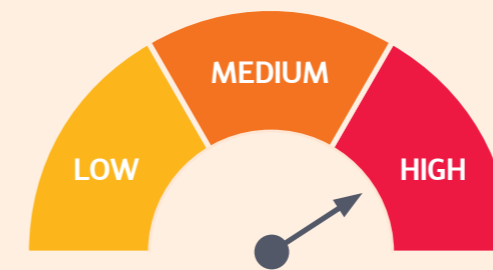
Environmental impact

As outlined in Part 4, the increasing amounts of carbon dioxide and greenhouse gases from wildfires contribute to global warming, which increases the risk of future wildfires.

Wildfires near rivers can also have a significant impact upon water quality as ash and other pollutants leach through the soil and contaminate watercourses, leading to discolouration of water or excessive pollution levels. Accordingly, water companies are usually keen to be involved in the management of wildfire outbreaks.

Overall impact

The overall impact is an indicator of the potential financial, reputational and/or regulatory impact associated with an emerging risk topic. This is assessed on a scale from high to low:



- Potentially low financial, reputational and/or regulatory impact, or low stakeholder concern.
- Potentially medium financial, reputational and/or regulatory impact, or moderate stakeholder concern.
- Potentially high financial, reputational and/or regulatory impact, or significant stakeholder concern.

We judge wildfires to be in the HIGH category for a number of reasons, including the amount of potential losses, the significant risk to life and the damage to habitats and rare ecological settings around the world.

The business areas which are most likely to be impacted are:

Property



Casualty



Life and health



Financial markets



Operations



[Scale measured from 0 (= no impact) to 4 (= significant impact)]

PART 7

INSURANCE INDUSTRY

Economic

The spectrum of direct economic losses is extensive and varied. These include losses to:

- Business
- Crops and forestry
- Infrastructure
- Production during clean up
- Reputation

Damage to property is not a prerequisite in order to suffer a loss as a result of a wildfire. These fires may prevent the movement of people or materials to and from premises, which impacts upon an organisation's ability to operate. Equally, government officials may order evacuation and close access to operations or a wildfire may interrupt utilities so production is not possible.

In 2016, the impact of the Fort McMurray wildfire in Canada resulted in significant reductions in oil production at the Alberta oil sands plants. Workers fled their homes and operations were shut down as a precaution against the advancing wildfire. Production was estimated to have dropped by between 1.1 million and 1.25 million barrels of oil per day. It is possible that the closure of the lumber mills as a result of the July 2017 wildfires will have similar impact.

Most wildfire insured losses have resulted from property damage in the wildland/urban interface and exposure is expected to increase in this area. Risk management will be important to secure the future of such areas as the potential for wildfire increases. This will include the need for reliable fire risk maps and forecasting models.

As a result of the 2015 wildfires in California and Colorado, some insurance companies stopped writing policies for homeowners in high-risk wildfire areas, forcing them to take out higher-priced policies with companies that insure 'unusual' risks, such as Lloyd's of London.

The challenge facing the insurance industry is that wildfires are not an easy peril to model. How can you predict which houses/buildings will survive a wildfire? It can depend upon wildfire speed, time that a fire moves through an area, terrain relative to the direction of fire spread, and fuel conditions - all of which impact upon fire behaviour.

Many of these challenges are location specific and vary on a daily basis. However, relatively simple efforts such as fuel remediation and preventing fuel build up before an event occurs make a significant difference.

Models need to consider and take into account:

- Natural and manmade sources.
- Weather conditions at the time of an event and how that can impact upon spread.
- That embers are often the cause of property fires miles away from the main conflagration.
- The ease with which the fire can be fought.

Depending upon the model used, insurers may wish to add in additional relevant underwriting factors which may be location specific, such as topographical features.

Some insurance companies offer personal wildfire protection programmes for policyholders in high-risk wildfire areas in Western US. The goal is to pre-empt wildfire damage before it occurs. Insurers will send their own wildfire protection specialists to assess a property's vulnerability to wildfire.

This may typically include an evaluation of the building's:

- Construction
- Roof type
- Clearance
- Access
- Surrounding vegetation
- Elevation

in order to provide location specific information about how to reduce or eliminate the risk.

Where the risk cannot be eliminated, insurers may choose to transfer or share the exposure with reinsurers.



PART 8 MITIGATION

As part of the natural cycle, there is an element of inevitability associated with wildfires. Intervention may delay their onset but is unlikely to prevent them altogether.

Reduced incidences of wildfires can lead to increased fuel loads which, in extreme circumstances, exacerbates the effect of a wildfire when it occurs. Megafires are the result, which, although relatively infrequent, cause significant losses in terms of property, damage to natural resources and fatalities. For this reason, the benefit of programmes of prevention and suppression are questionable and mitigation aimed at reducing the impact of wildfires offers a more balanced approach.

The National Fire Protection Association in America's Firewise Community Programme encourages local solutions for safety involving homeowners taking individual responsibility for protecting their homes from the risk of wildfires. Cross-community efforts are best, but even basic mitigation techniques can make a difference. Many structures are lost in wildfires from burning embers. Increasing set back distance, cleaning gutters and screening in porches and vents reduces the number of fuels available for embers to land on and increases the structures' likelihood of survival. Simple steps such as these can prevent a fire from moving into a community to begin with.

“ What I would like to see is greater mitigation of risk, especially around issues like the use of flammable materials in buildings and removing dead trees and other undergrowth from around towns and villages, so fires have less chance of spreading through populated areas. ”

Marc-André Parisien,
Forestry research specialist of the University of Alberta

The firewise projects have been so successful that some insurers are starting to give discounts for members living in firewise communities in certain wildfire prone states, in order to encourage participation.

Introduction of laws to prevent building in areas with high wildfire risk would be a major step forward in wildfire mitigation.

In the meantime, mitigation is aimed at minimising the impact of wildfires upon lives and property whilst avoiding the conditions that lead to more damaging fires. This may include a move away from wholly suppression-based models and the reintroduction of complementing managed fires to minimise the impact upon lives and property, but avoiding the conditions that lead to particularly severe risks.

Land management

Effective measures to reduce the spread and therefore the impact of a wildfire include:

- Land management programmes incorporating natural or manmade fire breaks.
- The management of fuel loads and cultivation of a mixture of vegetation which is not naturally flammable at the same time of year.

Prescribed fires are recognised to reduce fuel and permitted in some (but not all) regions. Certain regions limit it to balance against implications for air quality. Within the EU there is no common fire management policy. Prescribed fires and suppression of fires are only considered in the legal framework in France, Portugal and Spain. Elsewhere in non-Mediterranean Europe, the wildfire policy is limited to suppression.

The use of early warning systems to identify critical time periods for fires allow for protection, detection and suppression measures to be put in place. The US National Interagency Coordination Centre provides seven-day fire weather, fire damage and fire potential reports based upon fuel conditions, weather and resource availability.

Effective mitigation requires a joint effort between governments and the general public/private owners, working to overcome the difficulties associated with engaging the public on the subject. Difficulties include a preference for the wildland as their habitat and a view that suppression assistance and insurance are substitutes for mitigation.

Stimulating private action may be a chance to promote a safety first approach. Public incentives could be conditional upon a threshold of private mitigation efforts.

Mitigation information could be used in setting insurance premiums and thereby encourage property owners to:

- Reduce fuel loads
- Break fuel sources
- Maintain defensible space
- Remove debris and space between adjacent buildings to reduce spread
- Use fire resistant materials.

Perhaps in the future, mitigation could be actively promoted by some form of subsidies and legislation that links insurance availability and premiums to risk mitigation behaviour and education about mitigation and wildfires.

UK response

England does not yet have a specific national wildfire agency or strategy. It is vulnerable to wildfires, but due to their intermittent frequency, remote locations and poorly documented extent and impact records, this hazard has been largely overlooked by policy makers until recently, even though the average annual cost to the Fire and Rescue Services of vehicle response to all vegetation fires in Great Britain was estimated at up to £55 million.

The Swinley Forest fire in 2011 brought wildfires to the public and the government's attention as it threatened critical infrastructure and communities within 50 miles of London. This and the risk assessments in advance of the 2012 London Olympics contributed to the addition of 'severe wildfire' to the National Risk Register for the first time in 2013.

The Forestry Commission has pioneered good practice in adaptive land management to build fire resilience into UK forests but a coordinated policy is needed to identify best practice and to promote understanding of the role of fire in the ecosystem.

The Forestry Commission's practice guidance influenced the design of a major housing development adjacent to the Swinley Forest fire site. However, one view is that in general, development control planners' awareness of wildfire risk in the UK rural/urban interface remains low, leading to a risk that major residential developments will be situated next to high risk wildfire sites.

As detailed above, North America has benefitted from national firewise projects, resulting in the modification of existing, local institutions to better respond to local community needs. This is the opposite to the UK process where, instead of governance spreading from central control towards local solutions, local solutions have prompted ad hoc coordination at national level which, in turn, has influenced government policy.

“ The Swinley Forest fire in 2011 brought wildfires to the public and the government's attention as it threatened critical infrastructure and communities within 50 miles of London. ”

PART 9

BUSINESS RESPONSE

By adopting a practical approach to the threat of wildfires, businesses can enhance the protection of employees and buildings, thereby maintaining business continuity whilst reducing the risk of a loss.

To reduce the impact of wildfires, it is necessary to have an understanding of the probability of wildfires in a particular location, taking into account the terrain and landscaping. It is vital to understand how these factors could impact upon the growth and spread of a fire and to use fire resistant materials in the construction of commercial buildings. Careful management of flammable material in the locality is also recommended.

Non-combustible construction materials provide the greatest protection against flames, embers and radiant heat. Dual panelled windows of tempered glass are more likely to remain intact and protect against embers. Non-combustible mesh screens prevent embers entering vents.

Management of combustible material in the vicinity of buildings can reduce the chance of flames making direct contact with the building.

In some countries and communities, approval of development applications can be dependent upon the measures taken to mitigate the risk associated with wildfires.

“ Management of combustible material in the vicinity of buildings can reduce the chance of flames making direct contact with the building. ”



PART 10 FUTURE TRENDS

Expectations are that the severity of wildfires will increase, burning ever larger expanses of land and resulting in higher overall losses. This is due to global warming and extreme climate conditions, together with growing world population and changes to land use - particularly the urbanisation of the fire prone landscape.

Looking to the future, containment of losses will depend upon the steps taken by communities to:

- Reduce impacts
- Mitigate
- Develop post-fire rehabilitation schemes.



PART 11 RECOMMENDATIONS

As set out at the beginning of this report, the insurance industry needs to work with legislators, communities and individuals to mitigate exposure to wildfire losses. Recommended steps include:



Being proactive in developing a coordinated, structured approach to the mitigation of losses caused by wildfires with stakeholder industries such as construction, utility companies and insurer bodies



Cooperation with the legislators to produce a coordinated and funded policy to identify best practice and promote understanding and awareness



Coordination with the construction industry to utilise fire resistant materials in the construction of commercial buildings



Supporting the requirement of planning regulations to specifically consider the threat of wildfires



Ensure forecasting models used are sufficient



Be alert to exposure to wildfires and the implications of such exposure



Consider incentives to property owners who implement mitigation measures



DEFINITIONS

Emerging risks

We define emerging risks as newly developing or changing risks that are difficult to quantify and could have a major impact on society and industry.

Emerging risk insights

Emerging risk insights illustrate potential new threats for the insurance industry and have been assessed and edited by Kennedys' emerging risk experts.

Trend spotlights

Information throughout the text provides selective spotlights on emerging trends which could become relevant for the (re)insurance industry and its customers. The selection of topics is non-exhaustive, and descriptions are intended as food for thought and discussion starters rather than comprehensive reviews.

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