

Wildfire Tool Kit

Helping your organization understand
and prepare for wildfires



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Introduction

Wildfires are among the most destructive natural disasters on earth. The term wildfire encompasses uncontrolled fires that spread rapidly through vegetation, often in rural and forested areas. These fires can occur anywhere in the world, but they are especially common in regions with hot, dry climates such as the western United States, Australia, and the Mediterranean. Wildfires can be caused by natural factors like lightning or human activities such as campfires, discarded cigarettes, or arson. The generic term for this phenomenon is wildfire, but depending on the specific conditions and regions, they can also be referred to as bushfires or forest fires.





Wildfires: Understanding a growing risk

Wildfire season in the U.S. and Canada traditionally occurs during the warm summer months. However, climate change has led to a gradual warming of the planet, resulting in wildfire risks that persist throughout the year and extend into regions that historically have not faced such threats. Even fire-adapted ecosystems are now experiencing more frequent and intense burns, putting them under significant stress¹³.

Recent events highlight the escalating severity of this issue. In Canada, a combination of extreme drought and high temperatures has led to an increase in wildfire activity, producing dense smoke that affects air quality across multiple communities. Similarly, in the U.S., wildfires have become more intense, creating large clouds of smoke that rise high into the atmosphere, complicating firefighting efforts and threatening numerous structures²¹⁹.

The past few years have seen particularly devastating wildfire seasons, with fires burning millions of hectares and creating numerous “megafires” that char vast stretches of forest. Advanced satellite systems have provided detailed monitoring of these fires, revealed patterns of explosive growth and helped to refine risk models for future fires³.

While some unpredictable factors, like lightning strikes and acts of arson, contribute to wildfire occurrences, the scientific consensus is that climate change will continue to result in larger, more intense fires in regions prone to them. This volatile reality necessitates early and intelligent planning for mitigation, response, and recovery efforts. A comprehensive understanding of the nature of wildfires and evolving conditions is essential for businesses, communities, and individuals as they navigate these growing risks²¹⁹.

What causes wildfires?

There are three components required for a wildfire, often referred to as the ‘Fire Triangle’⁴:

- A heat source: This can be anything from the sun to a bolt of lightning to a lit match.
- Fuel: This can be any flammable material, including dry, dead grass, leaves and trees; and some forms of living vegetation.
- Oxygen: Fire feeds off oxygen, which increases in high winds, helping spread the fire.

Wildfires are a natural — and often essential — part of our ecosystem, but like destructive storms, their power can quickly overwhelm regions and their inhabitants. Moreover, while there are natural triggers for fires, human activity is estimated to be responsible for nearly 85% of wildland fires in the U.S.⁵

Human-caused wildfire triggers include:

- Campfires left unattended
- Intentional acts of arson
- Burning of debris
- Equipment use (including power lines) and malfunctions
- Discarded cigarettes
- Fireworks

Prescribed fires (or controlled burns), set intentionally for a number of beneficial reasons, including reduction of more extreme wildfires, have also sometimes gone out of control. While still considered an important strategy by many experts, with increasing heat and drier conditions, there is serious debate about when and where to employ controlled burns.

Whether natural or man-made, in terms of wildfires growing to uncontrollable levels the trigger is less important than the conditions for spread and intensity.

Conditions that increase wildfire risks

Our ecosystem is always in a state of delicate balance and there are several factors that can adversely impact that harmony. In terms of wildfire risks, these include:

- Extreme heat
- Droughts
- Insects and disease that cause trees to die prematurely
- Deforestation
- Bad land management
- High winds

Excessive heat, droughts, insects and disease have plagued human and animal life long before climate change was on anyone's radar, but most of the conditions above have been impacted by or significantly contributed to the effects of climate change.

The historically warmer, drier conditions we are experiencing result in longer heat waves, increased drought, lower soil moisture content, the spread of damaging insects, and an increase in combustible fuels created by dead trees and plants.⁶ Deforestation (mainly caused by logging) and poor land management have resulted in an increase in wildfires in regions where historically they were very rare, notably the rainforests in the Amazon and Indonesia.

It's also important to note that wildfires can lead to increased risks for flooding, mudslides and debris flow. The destruction of trees and grasslands that could absorb rainfall can leave areas downhill and downstream more vulnerable to these events.⁷

Types of wildfires

There are three main categories of wildfire^{8,9}:



Ground fires ignite within the soil, feeding off organic material like plant roots and smoldering until they grow into a surface or crown fire.



Surface fires burn in dead or dry vegetation, such as parched grass or fallen leaves or branches at ground surface level.



Crown fires burn through the top layer of foliage on a tree. They are the most intense type of these three and often difficult to control.

Wildfires can also be defined by regions and their associated climates. "Wildfire" has widely replaced "forest fire" as common terminology for wildland fires, but "forest fire" can be useful in distinguishing fires in woodlands from those in grasslands or shrublands. The latter fires are often called "brush fires," not to be confused with "bushfire," the common general term for woodland and grassland wildfires in Australia.

Where in North America are wildfire risks growing?

Evaluating wildfire risks is tricky and sometimes can be misleading. Frequency is a major concern in some areas, but growing severity and duration can be equally troubling indicators in regions where the overall number of fires may actually be decreasing.

While fatalities are the most tragic immediate outcome of a fire, they are more an indicator of the success or lack thereof in responding to the fire than the level of risk. Small fires that are poorly managed or that ignite unexpectedly can be more lethal than fires of historic size or duration where evacuations of populated areas were effective.

Similarly, immediate man-made conditions — such as the massive, industry-driven deforestation of the Amazon — can be hard to compare from a data standpoint to longstanding and evolving climate-driven conditions, whether driven by human activity or not.

However, it's useful to look at areas that suffered from major, recent impacts of wildfires; the conditions that led to those fires; and what indicators may be for the future:

The United States: Over the last 20 years, both the area burned by wildfires and the number of large fires (10,000 acres or more) have increased markedly across California, driven by changes in fuel conditions and climate change. Historically, California's forests adapted to periodic burning, but this pattern has been disrupted by changes in land use and fire management practices. Recent fires have resulted in tragic losses of lives, homes, and iconic tree species like coast redwoods, giant sequoias, and Joshua trees. Experts warn that the region has entered an era of "mega-fires," with 2020 seeing a record 4.2 million acres burned, more than double any previous year. The increase in wildfires is linked to hotter, drier conditions, human-caused warming, and accumulated fuels due to a century of fire suppression. The August Complex Fire of 2020, California's first "gigafire," burned over one million acres and devastated wildlife habitats in multiple national forests.¹¹

Canada: In 2023, Canada experienced its most destructive wildfire season ever recorded, with over 6,000 fires burning a staggering 15 million hectares of land—an area larger than England and more than double the previous record set in 1989. These fires were fueled by record high temperatures and widespread drought conditions across the country. Unlike previous years, the fires were widespread, affecting regions from the West Coast to the Atlantic provinces and the North. By mid-July, there were 29 mega-fires, each exceeding 100,000 hectares. Scientists found that climate change more than doubled the likelihood of extreme fire weather conditions, particularly in Quebec, where over 120 fires were ignited in a single day on June 1. Canada's warmest May to July period in over 80 years, breaking previous temperature records, made the extreme intensity of this fire season at least twice as likely as under preindustrial conditions. This unprecedented fire activity has significant long-term consequences, impacting forest carbon balance, biodiversity, local businesses, forest sector economies, and Indigenous communities.¹²

Economic impacts of wildfire

When climate factors impacting wildfire risks are addressed, too often the discussion breaks down to an ecology versus economy argument. This is shortsighted considering the deep economic costs of wildfire disasters.

Wildfires have become a significant threat to both the economy and the well-being of communities across the U.S. Climate-exacerbated wildfires now cost the U.S. between \$394 to \$893 billion annually, which is equivalent to 2-4% of the U.S. GDP. This range includes costs from property damage, health impacts from wildfire smoke, income loss, watershed pollution, insurance payouts, timber loss, and other factors.

The interconnected nature of businesses means that costs are not contained by state or national borders. Supply chain interruptions, rising insurance losses, and workforce migration away from wildfire-prone regions are just a few of the issues to contend with. For instance, the 2018 California wildfires alone cost the U.S. economy over \$148 billion, with nearly \$46 billion of that lost outside the state.

Recent years have seen a devastating string of wildfires in places like Maui, the western U.S., and Louisiana, making the threat increasingly clear. Federal actions, such as investments from the Inflation Reduction Act, improvements to the U.S. energy grid, and the establishment of the American Climate Corps, aim to combat these fires and reduce their economic toll.

Additionally, ensuring adequate pay for wildland firefighters and providing FEMA with more resources will help communities better recover from these disasters. These measures, alongside other preventive actions like prescribed burns, aim to mitigate the severe economic and human costs of wildfires.²⁰

As with hurricanes and more extreme storms, wildfires are events that require both long-term and immediate planning. Zurich will continue making resources available to help with that planning, including the articles below offering guidance on mitigation, response and recovery actions.



Wildfire loss mitigation starts with a plan

Working with local fire officials and removing combustibles on and around properties can help to protect businesses and their employees from wildfires.

Wildfires are destructive, deadly and unpredictable. Because of [climate change](#), they are occurring more frequently and burning for much longer than they used to. Wildfire “season” has become a nebulous term, as these destructive firestorms now happen throughout the year and throughout the country, from California to the Northwest, and in Texas, Colorado, Florida and throughout the forested areas of the Midwest.

Despite the growing risk, business owners in areas prone to wildfires can take some steps to help mitigate their risk and protect their employees.

Any mitigation efforts should start with a clear and well-practiced plan. Business owners should work closely with local fire officials and implement physical improvements to prevent wildfires from reaching or igniting your properties.

Start by developing a wildfire emergency plan

Protecting your property and your people begins with developing an emergency plan that addresses actions to take before, during and after a wildfire. The plan should include the following:

- Organize an internal work team to collaborate with local and wildland firefighters.
- Conduct a business impact analysis to assess business resiliency.
- Review shutdown and evacuation processes, including data backup, as well as shipping important tools, dies and records offsite.
- Create a business continuity plan.
- Monitor for wildfires year-round.

Business owners will need to rely on firefighters to help protect their properties, so it is important that they make it as easy as possible for them to do their job. Here's how business owners can help:

- Create a pre-incident checklist that includes information about your facility, such as building layout, description of occupancies, and alarm and fire-protection systems.
- Maintain site entrances and ensure they're clearly marked.
- Provide and clearly identify water sources, including fire hydrants, swimming pools, water storage tanks, wells and ponds.
- Make sure entrances to your facility are large enough to accommodate emergency vehicles.

Effective pre-wildfire planning includes interaction with local authorities as well as employees to develop and fine-tune pre-wildfire strategies. Business owners should schedule regular inspections by the fire department to ensure they are up to date on their pre-incident checklist and any changes in their facility. They should also develop an evacuation plan and regularly schedule fire drills to assess time, staff and resource needs.

Stop the wildfire spread

Wildfires spread by following a continuous path of combustibles. Windborne embers also present a threat, so the key to preventing a wildfire from reaching or igniting your property is removing combustibles on and around the property. Here are some things to consider:

- Have sufficient open space free of vegetation and other combustibles between your business and any nearby forest.
- Provide open space of at least 25 feet between property and long grass or desert scrub, and at least 200 feet between property and forested areas.
- Invest in exterior building surfaces that are either noncombustible or considered resistant to ignition by embers.
- Consider outside sprinklers to protect the building.
- Limit yard storage and remove flammable items, vehicles and, especially, propane tanks from the property or move them at least 100 feet away from the building.
- Close and seal building openings with tight-fitting, non-combustible materials.
- Shut building air intakes.
- Install tight-fitting, noncombustible doors, shutters and/or dampers that can be closed when implementing your wildfire plan.
- Fully close and seal windows and doors, including garage doors.
- Cut the grass (keep below six inches) and irrigate the landscaping.
- Limit landscaping materials to noncombustible materials like stone, rock, brick and concrete pavers. Avoid combustible materials like mulch, wood ties and plastic ornamentalations.

Where there's smoke, there's soot

Wildfires can produce plumes of smoke that spread far in advance of the fire itself, causing damage to a building even if flames never reach it. Smoke and soot damage from wildfires has resulted in multi-million dollar losses, often by being sucked into a building when HVAC systems are operating or reactivated after a fire. Here are some ways to minimize the impact:

- Find ways to keep soot and smoke from entering the building. For example, install louvers that automatically close when they're not being used.
- Have a plan in place to shut down HVAC systems when necessary.
- Provide non-combustible covers for HVAC openings that can withstand high winds and contact with small items.
- Provide a way to automatically stop air intake fans upon smoke detection.
- Provide duct-type smoke detectors in all outside air intakes.
- Interlock duct-type smoke detectors to automatically remove power from air intake fans and automatically close air intake dampers upon smoke detection.
- Examine all HVAC systems, clean surface areas and replace filters before resuming operation after a fire.

Following these steps can help businesses mitigate property losses well before they are facing an imminent threat from a wildfire. Business owners will also need to consider what actions to take as a wildfire approaches and how they can recover from losses caused by a wildfire.

These actions should be part of a fully developed wildfire Emergency Response Plan (ERP). The articles in the [Wildfire Resource Hub](#) detail the risks of wildfires and the other major components of a wildfire ERP. Taken together, they can provide your business with a path to reduced risks and faster recovery.



Activate your wildfire emergency response plan

When facing an imminent threat of wildfire, activate your emergency response plan to limit property damage and ensure employee safety.

A wildfire has been reported in your area and may be headed your way. You may only have hours until you learn firsthand whether your preparations will be adequate to the task of preventing or limiting damage to your business and ensuring against danger to your employees. It is time to activate all aspects of your wildfire response plan.

Monitor wildfire emergency alerts

It is likely that outside sources such as local news outlets and government alerts will be your first notification of a wildfire emergency. If you receive a report from an onsite employee or an offsite contact and are uncertain whether local authorities are aware of the threat, report it immediately.

If it appears likely that a wildfire may affect your location, begin taking the following actions:

- Monitor information sources such as local news reports and government websites for updates and alerts.
- Be aware of local weather conditions, such as wind speed, wind direction, humidity, and temperature.
- Review your plan's wildfire triggers and be ready to activate them.
- Discuss wildfire duties with assigned staff (typically fire team members) and verify the needed staff will be available and ready for action.
- Visually review the open space around your facility and clear away any unnecessary combustibles.
- Maintain communication with all staff members to keep them informed and ready for evacuation, if required.

Assemble your wildfire response team

- Immediately make sure that all trained wildfire team members are available and ready to complete their assigned duties.
- Review all emergency shutdown and evacuation procedures with your team.

Prepare your property

- Shut down building air intakes to prevent smoke, soot and possibly embers from entering your facility. Some facilities will have air intakes with smoke detectors designed to automatically shut down air intakes. If your facility is not so equipped, make sure it is done manually if the location is to be evacuated.

- Close and seal building openings to prevent smoke or soot from entering the facility, including docks, garages, personnel doors, air intake louvers, kitchen vents in cafeterias, and other potential openings.
- Clear a defensible space by relocating combustible yard storage at least 100 feet away from buildings and important outdoor structures to reduce risk if combustible materials are ignited.
- If appropriate, relocate combustible yard storage offsite or indoors where equipped with automatic sprinklers of appropriate design.

Initiate safe business shutdown procedures

If your business is in an area at risk of wildfires, you should already have a shutdown sequence and procedure prepared for the emergency. You should know how long the process will take and what potential glitches may occur. The shutdown procedure should include:

- Back up data to capture any data created since your last scheduled backup. Make sure your data is saved in the cloud or at a remote data facility.
- Remove critical tools, dies and records to locations offsite. If your facility is damaged by the wildfire, your recovery time will be faster if such items and materials are not lost. This may enable you to continue limited operations in a temporary location where suitable production machinery is available.
- Shut down all utilities, including fuel gas supplies and electric power. However, ensure that all fire-suppression systems, such as sprinklers, remain in operation.

When the time comes, evacuate!

Finally, a critical component of any wildfire response plan is knowing when it's time to evacuate your people. Usually, the order will come from civil authorities. When it does, you must act immediately no matter the status of your shutdown procedures and preparations. Property can be restored. Lives cannot.

Employees should evacuate following pre-planned escape routes worked out well in advance of a wildfire event. And remember that wildfires are often fast-moving, unpredictable, and likely to spawn satellite fires due to airborne embers that can become life-threatening in minutes. So, when the order is given, GO!

These actions should be part of a fully developed wildfire Emergency Response Plan (ERP). The articles in the [Wildfire Resource Hub](#) detail the risks of wildfires and the other major components of a wildfire ERP. Taken together, they can provide your business with a path to reduced risks and faster recovery.



After a wildfire: A 10-step recovery plan for your business

When fire damages a commercial property, a strategic recovery plan is crucial to help ensure your company's future. Consider these 10 steps as you rebuild.

A wildfire can damage everything in its path, destroying property and compromising the buildings that remain standing. And their toll is rising. According to the JEC Democratic Majority's 2023 analysis, wildfires in the United States cause between \$394 billion and \$893 billion in damages annually.¹ And that's just one region of the country. Wildfires can and do occur everywhere in North America.

Recovering from the physical and emotional toll may take time, but it's vital for businesses to follow the necessary precautions to help them rebuild with even greater resilience.

To get your business back in operation, consider these 10 steps in your post-fire recovery plan from the Risk Engineers of [Zurich Resilience Solutions](#):

1. Maintain communications

Wildfires and severe weather events can impact your business operations. It's important to establish internal and external communications with these key groups:

- **Corporate management:** As the recovery process continues, provide periodic updates on conditions and progress.
- **Your insurance distributor and carrier:** Contact insurance representatives to begin the claims process. As you start gathering information about physical damage and business interruption, seek and follow their guidance to help ensure you're providing the necessary documentation regarding losses and expenses to support your claim.
- **Displaced personnel:** Deliver updates on your company website, or with text messages, social media and/or phone messages.
- **Your customers and vendors:** Update your website's homepage to communicate with them. Social media and text messaging can help keep your business connected. You may also want to record daily updates on your general phone line, if that is feasible.
- **Local and federal governmental agencies:** Contact the relevant groups for guidance and information regarding regional protocols, updates and resources.

2. Return only when it's safe to do so

Don't return to the site until the proper local authorities grant permission. While you're waiting, develop a checklist of items you'll need to address before you can allow employees to return. When you do visit your business, dress for recovery operations with protective gear that includes heavy, thick-soled footwear; leather gloves; hard hat; safety glasses; safety vest; and a mask to keep out dust and ash particles. Potable water and flashlights should be part of your supply kit, as well as smartphones and cameras to help document damages.

3. Check for signs of fire and other hazards

The absence of flames does not mean an absence of risk. Smoldering debris and live embers are capable of reigniting fires. In addition, the ground may contain heat pockets or ash pits from burned tree roots that can burn you or ignite another fire. Inspect the site and building, including roofs, gutters, etc., for hot ash, charred trees, smoldering debris and live embers. But these aren't the only risks. Check for hazards such as broken glass, sharp metal, weakened utility poles and trees/branches, live electrical wires, leaking fuel gases or flammable liquids.

4. Survey structural damage

Fire and smoke can compromise a building's integrity. Check for signs of fire and/or structural damage, especially to the ceiling, roof, windows and doors, as well as weakened hardscape/paved areas that could shift or collapse, including power poles or burned trees. If damage is apparent, have qualified professionals undertake a structural engineering evaluation and use an infrared scanner to check for hot spots in the walls and ceilings. Document damage for insurance claims, using photos and videos.

5. Make sure protection systems are working

Check water supplies, fire-protection systems (e.g., sprinklers, fire pumps and alarms), damaged utilities and security systems. If either your fire or security systems are compromised, post a fire watch in areas with impaired fire protection and security personnel as needed. All of these issues must be safely addressed as soon as possible.

6. Evaluate mechanical, electrical and HVAC systems

Have qualified personnel inspect all utility systems and hazardous processes before they're put into service. Check electrical/mechanical rooms with vents in the walls for smoke damage, and electrical equipment by inspecting circuit breaker panels, switchgear and motors. Heating, ventilation and air conditioning (HVAC) units must also be inspected for ashes, soot and/or airborne particles that may have settled inside. In addition, it's important to make sure areas around HVAC intake vents (typically on buildings' lower roof areas) are also free of ashes and soot. Turning on compromised HVAC equipment could allow the debris to be ingested into a building or generator engine, not only damaging the systems but also contaminating the air with pollutants.

7. Assess the risk of flash floods and mudslides

When a wildfire destroys trees and vegetation, even modest rainfall on slopes can precipitate flash floods and mudslides, including areas that weren't damaged by the fire itself. Assess the risk in the terrain around and uphill from your site. These flash floods can carry surface debris such as downed trees, boulders and gravel.² This is not a short-term risk: After a wildfire, it may take two to

five years for vegetation to regain the ability to intercept and retain water.³ Businesses should address and/or implement pre-flood planning, even if they are located in areas typically considered safe from flooding, to help protect life, property and exterior storage.

8. Maintain health and sanitation

As employees return, be sure to provide appropriate health and sanitation advice from public health departments. Don't use water until authorities deem it safe, and discard any food that has been exposed to heat, smoke or soot. Local health guidelines may include administering tetanus shots to protect people from the bacteria in contaminated soil. Also be aware that air quality may be compromised after a wildfire. You may need to keep workers inside, provide respiratory protection and move some staff members to alternate locations or implement remote work.

9. Initiate repairs and start the salvage process

Establish repair priorities and notify contractors. Consult local experts to restore and re-plant your property with fire-safe landscaping. Begin salvage to prevent further damage to the buildings and their contents, and remember to document everything you're salvaging or discarding. Consult your insurance representative for guidance on disposing damaged goods. Also, remember to dispose contaminated waste in an environmentally responsible manner.

10. Review your wildfire emergency plan to evaluate its effectiveness

When business has resumed, be sure to review your wildfire response and recovery processes to determine if your contractors and vendors came through, if there were critical tasks you overlooked and identify any steps that could have been handled more smoothly.

These recovery actions should be part of a fully developed wildfire Emergency Response Plan (ERP). When undertaken responsibly and thoughtfully, the recovery process can help property owners rebuild with even greater resilience after a wildfire and move forward with confidence.

The articles in the [Wildfire Resource Hub](#) provide timely information on the risk of wildfires, as well as tips on preparedness and immediate response. Taken together, they can provide your business with a path to reduced risks and faster recovery:

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3. ["Post-Fire Debris Flow Facts."](#) California Department of Conservation. 2019.

Conclusion

“Programs and controls need to be well thought out and address exposures that are specific to the project and project location. Once written, they don’t do any good sitting on a shelf or computer hard drive. Be sure they are reviewed and updated at least annually or with the changing conditions of the project. Claims not only cost money, but they cost time and reputation. Wouldn’t it be better to tell your client that because of your pre-planning and controls, there was minimal damage and no time delays as a result of the last wildfire? No one wants to tell their client their project has been delayed by months and caused millions in damage because proper planning wasn’t executed. Even worse would be letting the client know that had the written plan been followed, exposures to damage might have been limited. Take the time and make the effort to carefully plan and establish a project-specific wildfire action plan. You and your client (oh, and your insurer!) will be glad you did.”



Visit the Zurich Natural Hazards Resource Hub at <https://www.zurichna.com/knowledge/natural-hazards-resource-hub> for more insights to help your business prepare for, respond to, and recover from natural hazards, including Hurricanes, Floods and Convective Storms.



- ¹ [Northwest Territories Ablaze](#)
- ² [Weather-Making Fire Burns in Southern California](#)
- ³ [Tracking Canada's Extreme 2023 Fire Season](#)
- ⁴ ["Wildfires 101." National Geographic video. 23 October 2017.](#)
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- ¹³ [Perry, Nick. "Australia endures droughts, fires, floods and marauding mice." Associated Press. 26 March 2021.](#)
- ¹⁴ [Ungku, Fathin. "Nearly a third of Indonesia forest fires are in pulp, palm areas: Greenpeace." Reuters. 21 October 2020.](#)
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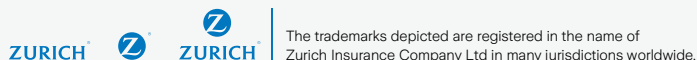
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