

Risk Topics

# Wildfire and Property Protection

June 2020



Considering the destruction wrought by wildfires, a well-organized government response is seen as the most realistic way to protect threatened property. However, property owners can also take steps to help reduce the threat of damage due to fire, smoke, and soot.

## Introduction

Wildfires threaten property in two ways: directly through fire damage and indirectly through smoke and soot damage. Both may be mitigated by taking specific steps before, during, and after a wildfire.

## Discussion

While many areas could experience a wildfire, some areas have a history of these recurring events.



*(Photo source: NOAA)*

## Wildfire and fuel

Wildfires require a natural fuel supply which may increase in three ways.

- Forestry services extinguishing naturally occurring wildfires, enabling unburned fuel to accumulate.

### US experience

In past decades, the US would aggressively extinguish wildfires to preserve forested areas. Today, the benefit of natural wildfire activity is better understood, and naturally occurring wildfires may be allowed to burn unless they threaten property.

For more information on the US wildfire experience, visit the following website:

<https://www.fs.fed.us/managing-land/fire>

- Insects and disease overwhelming a forest, leaving behind large areas of dead trees.

### Canadian experience

Insects (such as mountain pine beetle, spruce budworm, and gypsy moth) and disease (such as Dutch elm disease) have reportedly destroyed tens of thousands of square kilometers (miles) of forested areas in Canada.

For more information on the Canadian wildfire experience, visit the following website:

<http://www.nrcan.gc.ca/forests/fire-insects-disturbances/17598>

- Forested areas experiencing wet periods (supporting the growth of lush vegetation) followed by dry ones, increasing areas of dead dehydrated vegetation.

### Australian experience

Bushfire is the Australian term for wildfire. Geoscience Australia (part of the Commonwealth of Australia) notes on their web site the Australian climate is hot, dry, and subject to drought. All contributing factors to their ongoing bushfire experience.

For more information on the Australian bushfire experience, visit the following web site:

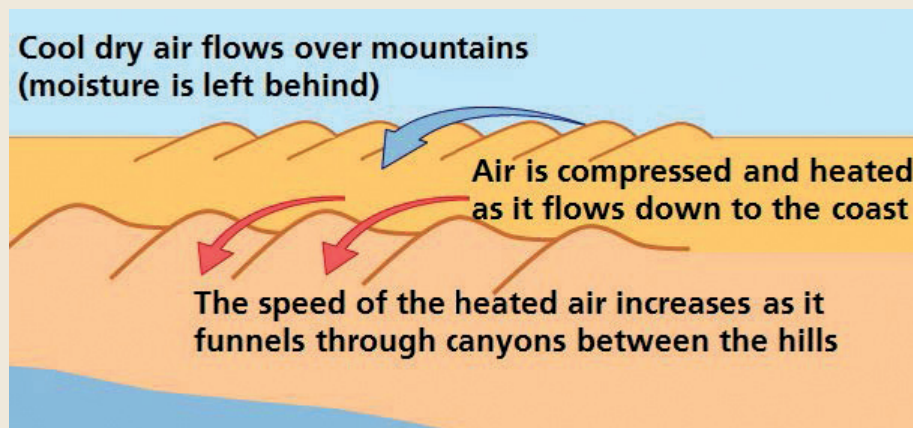
<http://www.ga.gov.au/scientific-topics/hazards/bushfire>

## Wildfire and weather

Weather may exacerbate wildfire activity through decreasing humidity, increasing temperature, and wind.

### US experience

Santa Ana winds in southern California and Diablo Winds in the San Francisco region combine hot, dry air and hurricane force winds to support the historic wildfire events in California. These winds occur in the fall and winter when high pressure forms inland over the Great Basin. The high pressure creates a westward flow of air across the mountains and down towards the coast. Humidity decreases as air crosses the mountains, wind speed accelerates as air funnels through passes and canyons, and temperature increases as the downhill flow of air is compressed.



*Santa Ana and Diablo winds (Image source: Rich Gallagher, The Zurich Services Corporation)*

These winds are especially troublesome when they occur after a wet spring and dry summer. As noted earlier, this wet and dry sequence produces wildfire fuel.

Keep in mind, climate change could introduce wildfire supporting weather conditions in areas without any previous history.

## Wildfire and ignition

Wildfires begin with a source of ignition, such as:

- Unintended human activity (carelessly discarded smoking materials and inappropriately handled campfires)
- Intended human activity (arson)
- Lightning
- Power lines (e.g., arcing faults, overgrown trees contacting or falling into power lines).

## Wildfire-prone areas

A characteristic of a wildfire-prone area is cycles of wet and dry periods. The wet periods support vegetation growth and the following dry periods dehydrate the vegetation creating wildfire fuel.

Areas subject to periodic rain throughout the year may not experience widespread vegetation dry-out for any extended periods. This may mitigate the wildfire experience in those areas.

Arid areas with infrequent precipitation typically do not develop large inventories of vegetation. The vegetation that does grow is likely to be drought resistant and retain moisture (e.g., succulents like cacti). This may mitigate wildfires.

Therefore, when identifying wildfire-prone areas, consider past wildfires, but also be alert for areas where patterns of wet-dry cycles are emerging.

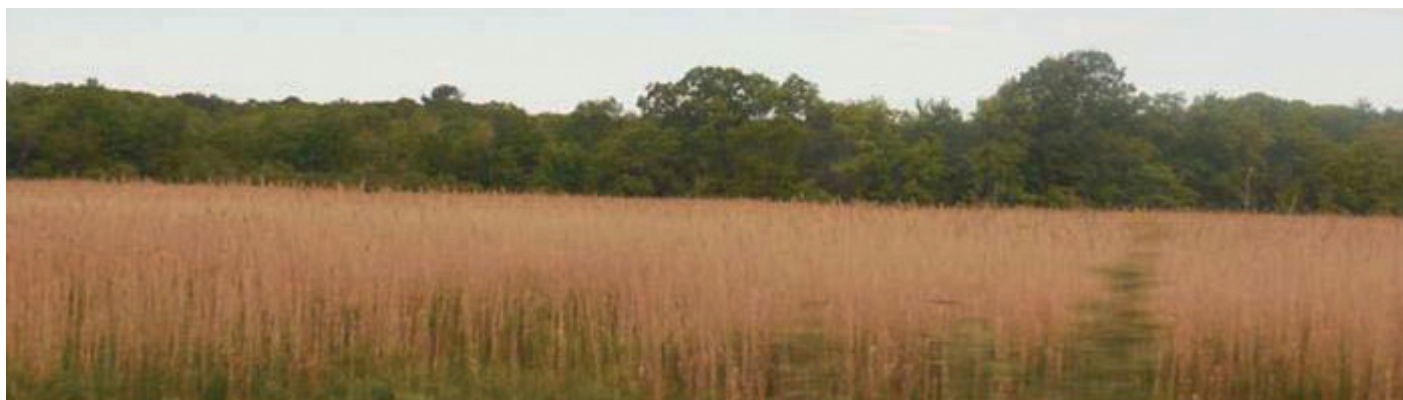
## Wildfire threats

Wildfire threats to property include fire, smoke, and soot, and civil authority evacuation notices.

### Fire

Wildfires may spread in two ways.

First, they may spread along a continuous path of combustibles, often dry vegetation from tall grass to trees. Other combustibles may include yard storage and buildings. A spreading wildfire may be inhibited by open areas without readily ignitable combustibles.



*Tall grass (Photo source: Rich Gallagher, The Zurich Services Corporation)*



*Trees (Photo source: Rich Gallagher, The Zurich Services Corporation)*

Second, wildfires may spread as air borne embers as far as 3 to 5 km (2 to 3 mi.). These embers may present sufficient energy to ignite distant combustibles such as dried vegetation, combustible yard storage, and combustible building features.



Combustible yard storage, wood bins (Photo source: Rich Gallagher, The Zurich Services Corporation)



Wildfire spread to yard storage (Photo source: FEMA News Photo)

#### Smoke and soot

The non-thermal effects of a wildfire (smoke and soot) may affect a location even if the thermal effect (fire) never gets close enough to cause on-site fire damage.



Wildfire and smoke (Photo source: NOAA)

Smoke and soot may affect outdoor features such as:

- Building envelopes, including roofs, walls, doors, and windows
- Important outdoor structures, including transformers, generators, cooling towers, and aboveground pipes and wires.



Transformer, generator, cooling tower, and overhead wires (Photo source: Rich Gallagher, The Zurich Services Corporation)

- Yard storage, including stock, idle machinery, tanks, and vehicles.



Log yard and propane tanks (Photo source: Rich Gallagher, The Zurich Services Corporation)

However, smoke and soot may also penetrate into buildings by:

- Passive movement, including migration through building roof or wall openings



Left: Building wall openings (Photo source: Sam Goddard, The Zurich Services Corporation)

Right: Rooftop gooseneck air intake (Photo source: Rich Gallagher, The Zurich Services Corporation)

- Active movement, including flow induced by operating buildings ventilation systems.

Smoke particulates may remain suspended in air more readily than soot. Soot accumulations have been noted 150 to 200 mm (6 to 8 in.) deep.

#### Civil authority

As a wildfire spreads, civil authorities may issue evacuation notices to those located in threatened areas. For some occupancies, evacuation may not interrupt normal operations – for example, automated facilities managed from distant control centers. However, in most cases, evacuation means normal business operations will likely be interrupted.

# Guidance

Wildfires occur worldwide. Based on geographic location, wildfire seasons vary. Accordingly, this document does not define the wildfire season.

## The wildfire plan

For locations exposed to wildfires, consider preparing an emergency plan addressing actions to take before, during, and after a wildfire event.

Keep in mind the wildfire plan is likely part of a larger emergency response program for the location. When developing a wildfire plan, call on the:

- Fire team organized to support firefighters
- Business impact analysis to assess business resiliency
- Business continuity plan to mitigate the impact of an emergency on a location
- Business continuity management (a corporate- or group-level plan to mitigate the impact of an interruption affecting one or more locations)

As with any emergency plan, a wildfire plan should be quick, simple, and practiced.

### Characteristics of an effective emergency plan

Quick – Fits a reasonable timeframe recognizing how quickly a wildfire may reach the evacuation stage

Simple – Checklists to guide actions and provide reminders

Practiced – Fully tested to verify time, staff and resource needs

## Before wildfire season

Verify each wildfire-exposed location is aware of its local wildfire season and is prepared for any unexpected wildfires outside the locally defined season.

Before the local wildfire season begins:

- Maintain open space  
Inhibit the spread of a wildfire by providing and maintaining open space between property and surrounding vegetation. Property includes buildings, important outdoor structures, and yard storage.

Provide open space:

- At least 8 m (25 ft.) of open space between property and long grass or desert scrub.
- At least 60 m (200 ft.) of open space between property and forested areas.

Limit vegetation within the open space to cut grass less than 150 mm (6 in.) tall. Irrigate the grass as needed to keep it from becoming dry. Isolated shrubs or trees may be located within the open space; however, keep them irrigated as needed to avoid drying.

Implementing open space may take significant time. Keeping open space will likely involve periodic maintenance.

Consult with your Zurich account team where the recommended open space is not available. Options may involve:

- Eliminating yard storage
- Eliminating outside structures
- Providing outside sprinklers for exposure protection
- Improving building envelopes to incorporate fire resistance

- Manage debris

Do not allow combustible debris (e.g., trash, trade waste, vegetation waste) to accumulate. This applies to all outdoor areas including the open space.

- Manage landscape materials.

Limit landscaping materials to noncombustible materials like stone, rock, brick, and concrete pavers. Avoid combustible materials like mulch, wood ties, and plastic ornamentations. This applies to all outdoor areas, including the open space.

- Control yard storage
  - Manage the amount  
Limit, or if possible eliminate, yard storage. Yard storage is likely subject to damage by both the thermal and non-thermal effects of a wildfire.
  - Manage the location  
Locate combustible yard storage at least 30 m (100 ft.) away from buildings and important outdoor structures. Consult with your Zurich account team if the separation distance will be less.
- Protect exterior building surfaces  
Provide exterior building surfaces that are either noncombustible or considered resistant to ignition by embers.  
**Note:** Where building features (e.g., soffits, roof elevation changes, rooftop equipment) can trap and accumulate embers, the accumulation may develop into a credible ignition source to any exposed combustible feature.
  - Roof coverings  
Wind-borne embers from wildfires may collect on building roofs. As such, buildings in wildfire-prone areas should have roof coverings capable of resisting ignition by embers. Provide roof coverings that are Zurich Recognized Solutions. Specifically, select a roof covering evaluated by a Zurich Recognized Testing Laboratory using an acceptable reaction to fire test protocol.

## An example of a roof reaction-to-fire test protocol supporting Zurich Recognized Solutions

- ANSI/UL 790, "Tests for Fire Resistance of Roof Covering Materials"

For more information, see the Zurich Risktopic **Zurich Recognized Solutions for Property risks**.

- Wall cladding and glazing  
Wind-borne embers from wildfires may lodge, attach, or collect on or near exterior building walls. As such, all exterior building elements should be noncombustible or considered resistant to ignition by embers.  
Where combustible elements are present, replace them with noncombustible ones.  
If replacing combustible elements is not possible, protect the combustible elements. Options may include a metal covering or a suitable fire-resisting coating such as intumescent paint.
- Protect building openings  
Provide means to keep wind-borne embers, soot, and smoke from entering a building.
  - Permanently close building openings where possible.  
Use tight fitting, noncombustible materials.
  - Provide temporary means to close building openings that cannot be permanently closed.  
Provide tight-fitting, noncombustible doors, shutters, or dampers that can be closed when implementing a wildfire plan.
  - Provide means to automatically stop air intake fans upon smoke detection.  
Provide duct-type smoke detectors in all outside air intakes. Interlock the duct-type smoke detectors to automatically remove power from air intake fans and automatically close air intake dampers upon smoke detection.
- Support the public fire service
  - Maintain site entrances  
Clearly mark each site entrance. Make the entrance large enough to accommodate emergency vehicles.

Extend the defensible space to include each entrance so burning vegetation is less likely to hamper access.

- Provide water sources access

Clearly identify water sources – fire hydrants, swimming pools, water storage tanks, wells, and natural sources such as ponds.

Maintain access to each water sources for public fire service vehicles.

- Develop an evacuation plan

Evacuation involves the orderly relocation of people (employees, contractors, and other visitors) from an area affected by an emergency to an area designated as a gathering location during an emergency. In the case of a wildfire, the designated gathering location will likely be a remote off-site location.

Evacuation is typically a fire team function. All locations should consider forming a fire team. Fire teams do not fight fires. Instead, they participate in functions that support firefighters. For further information, see the Zurich Risktopic **Manual firefighting: Fire team**.

### Why discuss evacuation in a document focused upon property protection?

It is anticipated the primary objective of the public fire service will always be life safety. Only when life safety efforts are completed, will their efforts be direct towards property preservation.

Considering this, an effective evacuation process may allow life safety efforts to be complete as quickly as possible. Then, the secondary objective of defending property may proceed.

- Maintain a current wildfire plan

Verify the fire team has incorporated and assigned wildfire functions such as:

- Backing up data
- Shutting down building air intakes
- Closing and sealing building openings
- Moving yard storage
- Shutting down processes
- Shipping important tools, dies, and records off site

- Turning off unnecessary utilities (except fixed fire protection)
- Evacuating the site

Assign the duty to trigger a wildfire plan to persons qualified and empowered to initiate the plan. There should be more than one person qualified and empowered to perform this function, but only one should be on duty at any time.

Provide triggers to start and stop each of the wildfire functions listed above.

### Before a wildfire

A wildfire may occur at any time. Monitor for unexpected wildfires all year, and increase monitoring throughout the local wildfire season.

A wildfire may occur at some distance or nearby. The wildfire distance from the location may affect how quickly wildfire plan triggers develop.

Some possible sources for monitoring wildfire alerts are provided in Appendix A.

In case of normal power or communication outages, have alternative means to monitor wildfire alerts. For example, portable radios, mobile phones, and satellite phones. Maintain spare batteries or back-up power for these devices.

### During a wildfire

Often, initial wildfire notification comes from outside sources like local news outlets or government alert systems. If the initial wildfire notification comes from a person onsite and there is any doubt civil authorities are aware of the wildfire, report it. Follow local fire reporting practices.

If a wildfire may potentially affect your location, consider taking the following actions:

- Monitor
  - Follow local news and government websites for updates and alerts
  - Monitor local weather conditions such as wind speed, wind direction, humidity, and temperature



- Prepare
  - Review the wildfire plan triggers and be ready to trigger the plan
  - Discuss wildfire duties with assigned staff (typically the fire team members), and verify the needed staff is available and ready for action
  - Visually review the established open space, and clear unnecessary combustibles
  - Maintain communication with all staff to keep them informed and ready for evacuation if needed

- Event Mobilization

- Back up data
 

Initiate a data backup to capture data created since the last backup.
- Shut down building air intakes
 

Shutdown air intakes if smoke or soot from a wildfire is detected onsite or if the location is to be evacuated.

While air intakes may be equipped with a duct-type smoke detector interlocked to automatically shut down the associated air intake fan, manually implement the actions if they have not occurred automatically.
- Close and seal building openings
 

Protect building openings if smoke or soot from a wildfire is detected onsite or if the location is evacuated. Means of protection may include:

Self-operating – Some openings may be fitted with permanently installed, self-closing features that close on their own once the holding medium is removed. For example, personnel doors will close once a person is no longer holding the door open. An air intake louver may close once the associated fan is turned off.

Manual operating – Some openings may be fitted with permanently installed, manually-closing features. These features will require human intervention (such as a fire team member) to close. An example is an overhead door at a truck loading dock.

Manually installed – Finally, some openings may have no permanently installed closing feature. These openings will require human intervention (such as a fire team member) to manually install a cover or seal. An example may be a commercial cooking air intake or gooseneck-type vent.

- Move yard storage
 

If there is concern a wildfire may approach within 3 to 5 km (2 to 3 mi.) of the location, manage combustible yard storage through actions such as:

  - Relocating combustible yard storage off site
  - Moving combustible yard storage to a suitable indoor location (specifically, an indoor area equipped with automatic sprinklers of appropriate design)
  - Locating combustible yard storage at least 30 m (100 ft.) away from buildings and important outdoor structures (to reduce the impact if combustible yard storage is ignited)
- Shutdown processes
 

Shutdown operations in an orderly manner. Consider the time and sequence needed to shutdown processes without:

  - Creating a hazard
  - Harming machinery or product
  - Losing data
- Ship important tools, dies, and records off site
 

Should the wildfire adversely affect the location, recovery time may be faster if important tools, dies, or records are not lost.

It may be possible to put important tools, dies, or records to use at another location where suitable production machinery is available.
- Turn off unnecessary utilities
 

Necessary utilities include fixed fire protection systems. Fire protection systems may be needed if a wildfire threatens the facility.

Another example of a necessary utility may be a refrigeration system protecting perishable contents that cannot be removed from the location.

Unnecessary utilities may include fuel gas supplies and electric power serving systems not considered necessary.

- Evacuate
 

The decision to evacuate a location is a life safety action beyond the scope of this property protection document. Follow the guidance of other experts including civil authorities.

### After a wildfire event

- Recovery
 

When returning to the location after a wildfire evacuation, consider the general guidance offered in the Zurich Risktopic ***Tips for property protection during cleanup and recovery operations.***

In addition, consider the following wildfire specific guidance.

  - Clear soot away from air intakes before starting equipment such as air intake fans and generators. Starting equipment before clearing soot could allow soot to be ingested into a building or generator engine.

# Conclusion

For any location in a wildfire-prone area, consider developing a wildfire plan intended to reduce the adverse effect of wildfire on both the location and the business.

Make the wildfire plan part of the overall emergency plan for the location.

Remember, it is possible to prepare for a wildfire.

# References

1. Zurich Risktopic. *Manual firefighting: Fire team*.
2. Zurich Risktopic. *Tips for property protection during cleanup and recovery operations*.
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4. Buckley, Bruce, et al. *Weather: a Visual Guide*. Firefly Books, 2008. Print.
5. Bell, Trudy E. *Science 101: Weather*. Collins, 2007. Print.
6. Kovach, Robert L., and Bill McGuire. *Firefly Guide to Global Hazards*. Firefly Books, 2004. Print
7. NFPA 1144. *Standard for Reducing Structure Ignition Hazards from Wildland Fire*. Quincy, MA, USA; NFPA, 2018. Online.
8. NFPA 1600. *Standard on Disaster/Emergency Management and Business Continuity/Continuity of Operations Programs*. Quincy, MA, USA; NFPA, 2016. Online.
9. *Best Practices Guide for Wildfire — Commercial Properties*. Tampa, FL, USA; Insurance Institute for Business and Home Safety, 2015. PDF.
10. *Fortified for Safer Business Standards, Volume 1: Standards*. Tampa, FL, USA; Insurance Institute for Business and Home Safety, 2014. PDF

## Appendix A – Wildfire resources

The following is a list of wildfire resources. The links were active as of February 17, 2018.

### Canada

Canada map of active wildfires	<a href="http://cwfis.cfs.nrcan.gc.ca/maps/fw">http://cwfis.cfs.nrcan.gc.ca/maps/fw</a>
Canada wildfire information	<a href="http://www.nrcan.gc.ca/forests/fire-insects-disturbances/fire/13143">http://www.nrcan.gc.ca/forests/fire-insects-disturbances/fire/13143</a>
Alberta map of active wildfires	<a href="http://www.wildfire.alberta.ca">www.wildfire.alberta.ca</a>
Alberta wildfire information	<a href="http://wildfire.alberta.ca/">http://wildfire.alberta.ca/</a>
British Columbia map of active wildfires	<a href="http://governmentofbc.maps.arcgis.com/apps/webappviewer/index.html?id=a1e7b1ecb1514974a9ca00bdbfffa3b1">http://governmentofbc.maps.arcgis.com/apps/webappviewer/index.html?id=a1e7b1ecb1514974a9ca00bdbfffa3b1</a>
British Columbia wildfire information	<a href="http://www2.gov.bc.ca/gov/content/safety/wildfire-status">http://www2.gov.bc.ca/gov/content/safety/wildfire-status</a>
Northwest Territories map of active wildfires	<a href="http://www.nwtfire.com/cms">www.nwtfire.com/cms</a>
Northwest Territories wildfire information	<a href="http://www.nwtfire.com">www.nwtfire.com</a>
Saskatchewan map of active wildfires	<a href="https://gisappl.saskatchewan.ca/Html5Ext/?viewer=wfmpublic">https://gisappl.saskatchewan.ca/Html5Ext/?viewer=wfmpublic</a>
Saskatchewan wildfire information	<a href="http://www.saskatchewan.ca/fire#utm_campaign=q2_2015&amp;utm_medium=short&amp;utm_source=%2Ffire">www.saskatchewan.ca/fire#utm_campaign=q2_2015&amp;utm_medium=short&amp;utm_source=%2Ffire</a>

### United States

US national wildfire information	<a href="https://www.fs.fed.us/managing-land/fire">https://www.fs.fed.us/managing-land/fire</a>
US wildfire information on individual wildfires	<a href="https://www.fs.fed.us/science-technology/fire/public-fireinformation-websites">https://www.fs.fed.us/science-technology/fire/public-fireinformation-websites</a>
U.S. Forestry Service Wildfire Hazard Potential	<a href="https://usfs.maps.arcgis.com/home/webmap/viewer.html?useExisting=1&amp;layers=86bdf78a665e40d09810d1f1b6a341f2">https://usfs.maps.arcgis.com/home/webmap/viewer.html?useExisting=1&amp;layers=86bdf78a665e40d09810d1f1b6a341f2</a>

### NFPA

<http://www.firewise.org/wildfire-preparedness.aspx>

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