



# WILDFIRE

**This briefing summarises how wildfire has been assessed in the latest UK Climate Change Risk Assessment (CCRA) Technical Report, and what types of action to adapt to changing wildfire risks would be beneficial in the next five years.**

**The full assessment looks at risks and opportunities for the UK under two climate change scenarios, corresponding to approximately a 2°C or a 4°C rise in global temperature by 2100. It answers three questions, for 61 different risks or opportunities using available published evidence and analysis:**

- 1.** What is the current and future level of risk or opportunity?
- 2.** Is the risk or opportunity being managed, taking account of government action and other adaptation?
- 3.** Are there benefits of further adaptation action in the next five years, over and above what is already planned?

The main findings from the full assessment related to wildfire are summarised below, together with the adaptation actions that would be beneficial over the next five years.

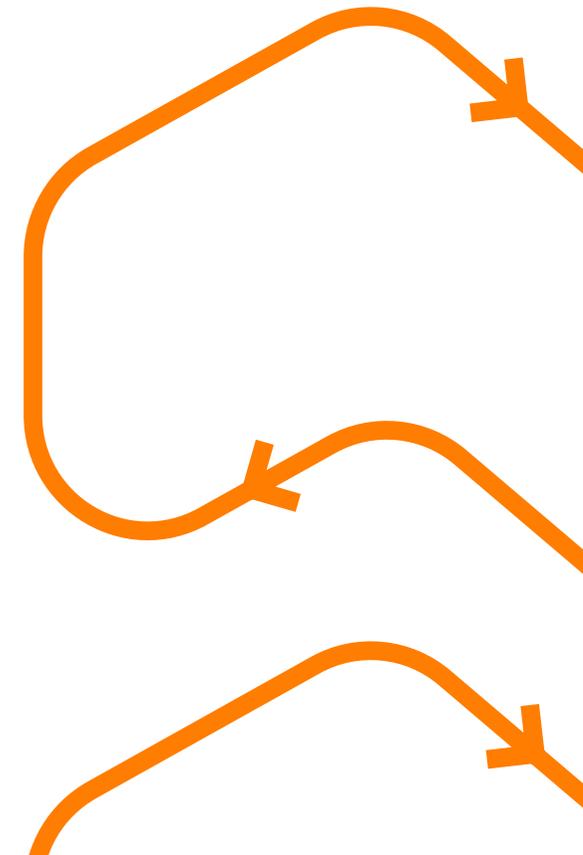
Each risk or opportunity has an identifier code linked to the full analysis, which is available in the CCRA3 Technical Report.

Readers are encouraged to use these briefings to locate the parts of the Technical Report of most relevance to them. An accompanying analytical report on wildfire is also available.

Alternatively, if you would like a summary of the analysis by UK nation, please go to the national summary documents:

- **England** • **Northern Ireland**
- **Scotland** • **Wales**

This briefing is aimed primarily at the UK Government, the governments of Scotland and Wales, the Northern Ireland Assembly and their respective departments and agencies responsible for combatting wildfire risk. However, it should also be of interest to a wider audience. The other briefings in this series may also be of interest as they cover a range of other climate hazards (such as flooding or high temperatures) to the same sectors that are covered here.



## Key messages



- Wildfires are defined in the UK as ‘any uncontrolled vegetation fire which requires a decision, or action, regarding suppression’.
- There are multiple drivers that affect wildfire frequency and intensity including human triggers, vegetation type and wind patterns. Projected hotter conditions and more frequent periods of water scarcity are likely to increase wildfire risk as a direct result of climate change. The risk could double in a 2°C global temperature increase scenario and quadruple in a 4°C scenario.
- Some of the serious recently recorded incidents of wildfires in the UK have occurred on heath or moorland, including peatlands. Wildfires on peat soils can lead to large amounts of carbon being released into the atmosphere, contributing further to climate change.
- There is currently more literature on the risk of wildfire in forests compared to agricultural land, but incidence data show both are at risk. In both cases, the risk magnitude is of high local importance rather than being a threat to overall national production levels for food or timber.
- Iconic landscapes and cultural heritage assets could also be more vulnerable to wildfire exposure in future.
- Wildfire can result in serious localised damage to, or loss of, habitats and species, which may show varying degrees of recovery in the years afterwards.
- Wildfires can also cause serious localised air pollution, leading to implications for human health.
- There will be benefits from further cooperation between national and local bodies working to reduce wildfire risks and manage fires when they occur, as well as building further capability to predict and respond to wildfire risk including through national assessments like the National Security Risk Assessment (NSRA).
- A dedicated report on wildfire is available as one of the CCRA3 outputs (Belcher et al., 2021).

## Terrestrial biodiversity



Fires have been a part of landscape management and maintenance for centuries, and small fires can have some benefits for renewing vegetation or controlling pests.

However, with the growing risk from wildfires due to climate change, there is a risk of serious damage and loss of wildlife and vegetation, and recovery can take decades.

Several types of habitat and ecosystem are at risk, especially upland and lowland heath, peatland, grassland, woodland and arable land.

A greater number of wildfires could lead to changes in specific species, such as Calluna-dominated raised bog and heathland composition.

### Beneficial actions in the next five years include:

- **More flexible and integrated approaches to managing natural capital, and initiatives to increase habitat extent, improve habitat condition and connectivity will help to combat climate risks, including increasing wildfire risk.**
- **Account for climate change more explicitly in conservation planning at site level which would help with the identification of more resilient species that could thrive in particularly challenging environments.**
- **Include the impacts on natural capital from wildfire in national risk assessments including the NSRA.**
- **Further research on the implications of climate change on wildfire risk in the UK.**

*Further details on this risk: Natural Environment and Assets Technical Chapter, risk N1*



# Agriculture

There are few recent policy developments in relation to managing wildfire for agriculture, possibly due to fewer serious incidents compared to other land types like forests in recent years, but productivity losses from fire could have high localised impacts.

Wildfires in summer 2018 cost UK farms approximately £32 million in total, for example.

## Beneficial actions in the next five years include:

- **Decisions about the future sustainability of different agricultural systems and techniques can consider wildfire risk alongside other climate hazards such as drought and heat (e.g. ploughing on stony soils in very hot weather, as sparks can be created and cause fires).**

*Further details on this risk: Natural Environment and Assets Technical Chapter, risk N6*



# Forestry

Forest fires are a relatively well studied aspect of wildfire in the UK and there have been severe wildfires in recent years that have led to adaptation planning to reduce the risk (e.g. Swinley Forest in 2011, referenced in CCRA2, and Wareham Forest in 2020).

An additional threat highlighted in this latest assessment is the impact that new pests and diseases could have on woodland, also caused by climate change, which can lead to increasing fuel loading associated with both standing trees and surface litter, making fires spread more easily.

## Beneficial actions in the next five years include:

- **The level of awareness and engagement with wildfire risk is variable, reflected by a limited inclusion of wildfire in some local strategic plans. This gap should be addressed, which will be especially important for forests given their higher risk of fire due to climate change.**
- **Landowners should consider how changing agricultural and forestry practices, such as planting new species, could change vulnerability to wildfire.**

*Further details on this risk: Natural Environment and Assets Technical Chapter, risk N6*



## Damage to soils and release of carbon from natural stores

Wildfires over dry soils can lead to initiation of smouldering fires below the land surface.

Long-term damage to soils, especially peat, can take place if fires are not suppressed quickly.

Along with contributing to damage to biodiversity, fire-damaged soils can release significant amounts of locked carbon into the atmosphere and contribute to the greenhouse gases (GHG) that cause climate change.

### Beneficial actions in the next five years include:

- **Integrated land use policies that focus on soil health alongside agriculture and forestry can include wildfire risk mitigation as part of an integrated plan.**
- **Identify which soils could recover best from, or be more susceptible to, wildfire damage.**
- **Re-wetting areas of degraded peatlands would help to reduce wildfire risk to these soil types, and further research could determine whether peatlands can be restored after a fire.**

*Further details on this risk: Natural Environment and Assets Technical Chapter, risk N5*



## Damage to landscape character

Landscape character has been modified by the increased incidence of large-scale wildfires especially in recent years (2018 – 2020).

Damage can sometimes be temporary, but landscapes can also be altered permanently depending on recovery rates.

### Beneficial actions in the next five years include:

- **Improved collaboration between local and national government in developing a cross-scale planning framework for Landscape Character Assessment (LCA) that integrates climate change responses, including wildfire risks.**
- **Other techniques, such as grassland restoration and hydro-seeding, can facilitate restoration of valued landscapes. Pilot schemes are taking place in Wales and could be replicated elsewhere.**

*Further details on this risk: Natural Environment and Assets Technical Chapter, risk N18*



## Damage to cultural heritage assets



Many of the UK's built heritage assets (e.g. historic buildings) are in areas adjacent to or within landscapes that are more at risk of wildfire incidence, such as peatland or forests, or themselves contain features that could encourage a wildfire to spread.

This is coupled with the increased risk of ignition from people visiting these sites though e.g. dropping cigarette ends or having barbeques.

Wildfire would lead to damage to these assets but in some instances can also lead to the discovery of new archaeological sites if wildfire changes the make-up of the landscape.

### Beneficial actions in the next five years include:

- **Further mapping of climate-related hazards to understand the vulnerability of different heritage assets to a range of hazards, including wildfire.**
- **Identify those types of assets and locations that are most at risk so that plans can be put in place before a fire occurs.**

*Further details on this risk: Health, Communities and Built Environment Technical Chapter, risk H11*



## Increase in air pollution

Wildfires can emit particulate matter and toxic products, and can create extensive and long-lasting air pollution events, particularly during hot weather.

A wildfire across Saddleworth Moor near Manchester in 2018 was found to have caused poor air pollution and haze over the city and pollution levels were double the permitted levels.

These events can have implications for the health of those living in surrounding areas.

### **Beneficial actions in the next five years include:**

- **Investigation into the level of risk of poor air quality due to wildfire, as this is not quantified at present and could be significant for human health in affected areas.**
- **Improvements to planning for air pollution events caused by wildfire.**

*Further details on this risk: Health, Communities and Built Environment Technical Chapter, risk H7*



## Impacts on infrastructure



Wildfire is noted as a threat across multiple infrastructure sectors including energy distribution, digital data centres and transport.

It is highlighted as a key hazard that can cause multiple knock-on effects across entire infrastructure networks.

### Beneficial actions in the next five years include:

- **There is little quantified evidence available at the national level of the specific risks to infrastructure assets from wildfire, so further work is required to assess the changing risk due to climate change.**
- **Applying consistent standards of resilience across infrastructure networks that consider wildfire risk.**

*Further details on this risk: Infrastructure Technical Chapter, including Risk I1*

# Housing



Widespread destruction of people's homes has been sadly observed in wildfires in Australia and the US in recent years, demonstrating the scale of damage and risk to life that wildfire can cause.

Several residential and commercial properties have been destroyed by wildfire in the past decade in the UK, including in Great Wakering in Essex (2010) and Marlow in Buckinghamshire (2018). Evacuations were also carried out during the Chobham Common fire in summer 2020, Wanstead Flats in 2018 and Swinley Forest in 2011.

A major wildfire, spreading into residential areas is considered as a high impact, low probability event in this CCRA Technical Report.

## Beneficial actions in the next five years include:

- **Further local assessments of the risks of wildfire to housing and therefore people's lives. These could be linked to the Fire and Rescue Service's Integrated Risk Management Plans.**
- **Large-scale evacuation simulations have been undertaken for Swinley Forest and Wanstead Flats and can be replicated in other at-risk locations.**
- **Wildfire forecasting and warning systems can also complement many of the actions included above, especially in susceptible areas.**

*Further details on this risk: Health, Communities and Built Environment Technical Chapter*

## Case studies from around the UK



Understanding which parts of the UK are likely to be most exposed to wildfire in the future is difficult to predict, due to the numerous factors that drive wildfire incidence.

This includes changing human behaviour such as increased outdoor activity, as most wildfires in the UK are started by people, either deliberately or accidentally.

The likelihood of a wildfire taking hold and spreading is strongly linked to hot, dry conditions and studies that have modelled this link suggest that the south and east of England are particularly at risk, but further studies are needed that consider a wider range of wildfire triggers.

### Some case studies of recent wildfire events include the following:

- **Northern Ireland:** The sustained dry weather from 1 to 15 July 2018 led to the Northern Ireland Fire and Rescue Service attending an unprecedented number of gorse fires. There were 1,061 incidents in total, representing a 1,053% increase on the same period in the previous year.
- **Flow Country, northern Scotland:** The peatbog, which stretches across the Flow Country in Caithness and Sutherland, is the largest in Europe and is an import store of GHG. It has been estimated that GHG emissions of approximately 0.6-1.4 MtCO<sub>2</sub>e were released from a six-day wildfire here in 2019.
- **Saddleworth Moor, near Manchester, England:** This fire burned for three weeks in 2018 and was measured to have emission rates similar to that expected from a medium sized power

station. Nearby monitoring sites recorded peaks in particulate matter levels of twice that of the UK air quality objective annual mean target.

- **Wareham Forest, England:** In March 2020, a large area of heathland and forest set fire, leading to a major incident being declared. Around 200 hectares burned including the land around Woolsbarrow Fort. At its peak, the incident required 150 firefighters per shift and additional resources from multiple Fire and Rescue Services from across the south of England.
- **Chobham Common, Surrey, England:** In August 2020, a large wildfire declared a major incident that destroyed 30 hectares of rare lowland heathland and wildlife habitat. Concerns arose on the potential loss of biodiversity as the site is home to more than 100 species of birds, all six reptile species native to the UK and numerous wildflowers and insects. Several dozen houses were also evacuated around the periphery of the Common. It is estimated that the habitat will take ten years to recover.

## Background

The UK Government is required by the UK Climate Change Act 2008 to assess the risks and opportunities from climate change to the UK every five years and respond to the risks via a National Adaptation Programme, covering England. The devolved administrations also publish their own adaptation programmes in response to the risk assessment.

For this third UK Climate Change Risk Assessment, the Government's independent advisers on climate change, the Climate Change Committee (CCC), have been asked to prepare an independent risk assessment setting out the latest evidence on the risks and opportunities to the UK.

Over 450 people from more than 130 organisations have contributed to preparing the assessment. The risks have been assessed using the latest climate projections for the UK which were updated in 2018 by the Met Office. These briefings summarise some of the key topics that are assessed through the Technical Report, to enable readers to understand the key messages and where to find more detail.

## Where to find more detail

Each risk or opportunity in this briefing has an identifier code linked to the full analysis, which is available in the CCRA3 Technical Report. Readers are encouraged to use these briefings to locate the parts of the Technical Report of most relevance to them.

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