UplandsManagementGroup

Wildfire Risk Assessment

A wildfire risk assessment is an evaluation of the likelihood of a wildfire occurring and the severity of damage it might cause if it does occur.

The Risk Assessment should record both on and off-site factors and features that are relevant in the consideration of wildfire risk. The relevant factors and features should be identified at the individual site level through site inspection and drawing on local knowledge and experience. The assessment should take account of short-term factors such as weather and should be reviewed annually to take account of changing circumstances.

The identification of what is at risk and hazards

Consider what is valuable on the land and at risk from wildfire. Both could be represented in map form to help indicate where action could be taken to reduce risk, especially if it is also possible to predict fire behaviour and map that as well.

The Wildfire Risk Assessment should include:

- The identification of hazards, both direct and indirect
- The identification of assets vulnerable to wildfire, including environment, people and property
- An evaluation of the risk, including likelihood of fire occurring and severity of incidents
- An analysis of the risk to agree appropriate actions

Potential Hazards include:

Factors that influence the risk of a fire starting

- People (visitor use and numbers)
- Access points (public rights of way, car parks, open access land)
- Presence of 'honeypot' areas (eg picnic sites, campsites)
- Land management/land use type
- Adjacent land management/land use
- History of wildfires in the area (including identification of ignition points)

Factors that influence fire behaviour (intensity and rate of spread)

These factors help in understanding of the potential scale of a fire and where actions may be necessary to reduce scale and rate of spread so that fires can be brought under control.

- Vegetation type (susceptibility to drought and fire)
- Vegetation growth (biomass/fuel loading)
- Extent of habitat features / presence of natural firebreaks (continuity of fuel)
- Distribution of habitats (continuity and arrangement of fuels)
- Topography
- Soil type / soil moisture content
- Presence of ground fuels (peat soils)

Factors that influence the effect of fire

- Access for firefighting
- Availability of firefighting equipment
- Areas that are difficult to access
- Presence of buildings and other property

Assets Potentially at Risk from Wildfire include:

- People
- Critical infrastructure (radio / TV masts, roads, railways, sub stations, overhead powerlines, gas mains)
- Property and business units (on the land or in close proximity)
- Sporting (habitat and infrastructure)
- Tourism assets
- Drinking water catchment
- Public access and highways
- Cultural heritage
- Food production (crops, grazing resources)
- Livestock
- Timber
- Priority habitats
- Priority species
- Protected sites
- Historic environment features
- Recreation and aesthetic assets
- Air quality
- Carbon-rich peat soils

The Risk Assessment Process

Two stages of assessment of risk are proposed:

Stage 1: Wildfire Risk Scoresheet
A starting point is evaluation of the factors that may affect the likelihood of fire starting and fire severity to determine where more detailed risk assessment is required. The Wildfire Risk Scoresheet allows evaluation of the factors that a land manager should consider and provides a threshold score, above which further risk assessment is recommended. This is in effect a screening process. It encourages all land managers to consider wildfire.

The Scoresheet records both on and off-site factors and features that are relevant in the consideration of wildfire risk. They should be identified at the individual site level drawing on local knowledge and experience. Local Wildfire Groups or Fire and Rescue Services (FRS) may be able to help identify particular local issues to consider in the assessment process.

After completion, a total score of 40, or more, indicates that the wildfire risk is significant and a more detailed Wildfire Risk Assessment should be carried out. This may lead to the development of a Wildfire Response Plan and a Wildfire Management Plan.

Land managers who are already aware of and plan for wildfire would be likely to move to the Stage 2 risk assessment process instead of this first step.

The Wildfire Risk Scoresheet is suitable for simple open country cases but is unlikely to be suitable for use on forested land or where there is complex infrastructure. In these cases the Stage 2 risk assessment process is likely to be required from the outset.

Stage 2: **Wildfire Risk Assessment**
Where indicated by a scoresheet total of 40 or above, or where the risk is initially assessed as being significant, the development of a full Wildfire Risk Assessment (WRA) is recommended.

Use of a risk assessment framework to identify fire risk will bring focus to those risk factors and hazards that may be mitigated by management (Table 1). This will aid decision making and provide the evidence base for the development of a Wildfire Response Plan and Wildfire Management Plan.

Fire risk is a combination of the probability of a wildfire occurring and its potential impact at a particular location. It can be quantified using the formula: 'Fire Risk = Likelihood x Severity'.

Likelihood means the probability that a wildfire will start and or become established. This will be influenced by possible sources of ignition, weather conditions and the presence of suitable fuel to allow a fire to become self-sustaining.

Severity is measure of how much damage will be done by a wildfire once established. This will be influenced by the type and quantity of fuel load available, weather conditions, topography and the presence or absence of assets at risk.

Both likelihood of fire starting and likely severity vary from place to place and from time to time including on short timescales. This makes risk assessment complex and a precautionary approach should be adopted, considering expected conditions that are most likely to be supportive of wildfire.

When assessing severity an important factor is how hot a fire will burn. This is a product of weather, topography and fuel load. It is important to assess the fuel load correctly. Fuel load is a combination of the volume of material available and its composition. Once established a wildfire can recruit further fuel load by heating and drying out material that would otherwise not have burned.

In wildfire terms, hazards are factors that could result in fire starting or that affect its severity. The risk is the chance that someone or something could be harmed.

The level of detail required for a WRA should be proportionate to the wildfire risk. It can be presented in map or matrix form, depending on the scale and nature of the land being assessed.

Table 1 – Steps in a Wildfire Risk Assessment

Step	Details
1	Identify the hazards
2	Decide who/what might be harmed and how
3	Define what is already being done to manage risk and what could be done.
4	Evaluate the risks and decide on precautions
5	Record findings and implement them
6	Review the assessment and update if necessary

Evaluating the Wildfire Risk

A wildfire risk assessment is an evaluation of the likelihood of a wildfire occurring and the severity of damage it might cause if it does occur. The assessment may be carried out on a broad scale for large areas where map-based approaches may be useful. Wildfire Risk will vary considerably within most large sites and over time and a flexible responsive sub division of large will sites will likely be appropriate in most instances.

A matrix-based approach, described below, may be suitable for small areas, premises or specific locations, especially where employees or the public may be at risk.

Wildfire risk is difficult to quantify because it varies from place to place even over small areas and from day to day. The Tables below suggest a means of scaling risk that may be used as a means of quantifying risk. Where the assessment of severity may differ between Property/business, environment and people use the highest value in the analysis.

Table 2: Likelihood of a wildfire starting and becoming established

Scale	Likelihood	Description
1	Very unlikely	Event may occur only in exceptional circumstances - there are either no ignition sources or fuel to allow a fire to establish.
2	Unlikely	Event could occur at some time
3	Moderate	Event will occur at some time – the combination of ignition source, fuel supply and weather conditions conducive to fire are likely to coincide infrequently
4	Likely	Event could occur in most circumstances – presence of ignition sources and fuel mean that fires are likely whenever supportive weather conditions occur
5	Very likely	Event will occur in most circumstances – there are frequent periods of supportive weather conditions in combination with ignition sources and fuel load

Table 3 – Determining the severity of a wildfire

Scale	Severity	Description
1	Negligible	**Property/business:** No financial loss or damage. **Environment:** Minor damage; habitats and species will recover in less than a year. **People:** Minor local first aid treatment (e.g. minor cuts/abrasions).
2	Minor	**Property/business:** Minor financial losses (up to 1% of profit), disruption or damage. **Environment:** Minor damage; habitats and species will recover in 1–5 years. **People:** Injury requiring first aid treatment.
3	Serious	**Property/business:** Serious financial losses (up to 5% of profit), disruption or damage. **Environment:** Serious damage; habitats and species will recover in 5–10 years. **People:** Medical treatment required.
4	Major	**Property/business:** Major financial losses (up to 10% of profit), disruption or damage. **Environment:** Major damage; habitats and species will recover in 10–20 years. **People:** Permanent or life-changing injuries.
5	Severe	**Property/business:** Destruction of the property (total loss) or business. **Environment:** Irreversible impact on habitats or species. **People:** Single or multiple deaths.

Table 4 - Severity scale for assessment of likely impact on habitats

Scale	Severity	Habitat			
		Heathland	Blanket bog	Grassland	Scrub
1	Negligible	Perennial plants singed but not killed. Moss layer, seed bank and soil intact	Above-ground vegetation damaged but surface moss layer unaffected	Spring fire of infrequent occurrence removing litter	Damage to plants but structure survives
2	Minor	Most plants singed but not killed, some old heather may not reshoot from root. Moss layer singed and bleached but not killed. Seed bank and soil intact	Above-ground vegetation damaged and surface moss layer affected but heat but not burned	Spring fire removes litter and short term impacts on fire-sensitive species	Loss of structure but scrub species regrow
3	Serious	On moorland most or all plants killed, moss layer damaged or destroyed. Seed bank and soil affected. Organic soils become hardened and impervious but no loss. Bare areas colonised by cushion mosses	Above-ground vegetation killed and surface moss damaged by fire	Fire in growing season impacting species composition and abundance in more than one year	Loss of scrub species and replacement by open habitat
4	Major	Total loss of all plants and seed bank. Loss of some organic soils depth resulting in resulting in erosion on steep slopes and delayed recolonisation by key species such as heather	Above-ground vegetation killed and surface moss killed and bare peat exposed so that there are impacts on hydrological properties of the peat	Fire removes vegetation	Loss of habitat. Soil surface affected by heat. Populations of key / rare species affected
5	Severe	Loss of vegetation, seedbank and organic soils so that recolonization by moorland species is severely delayed. Restoration action (eg re-seeding) required	Loss of vegetation and consumption of peat by fire. Major changes to habitat structure and hydrological properties. Recovery of blanket bog vegetation unlikely	Fire removes vegetation. Soil surface affected by heat resulting in erosion on steep slopes. Loss of seedbank and changes to species composition at re-growth. Populations of key / rare species loss	Loss of habitat, damage to soils resulting in erosion on steep slopes. Loss of key / rare species

Wildfire Risk Assessment Matrix

Likelihood								
Severity	1	2	3	4	5	Cate-gory	Score	Risk Rating
1	**1**	**2**	**3**	**4**	**5**	**1**	1 - 5	Low
2	**2**	**4**	**6**	**8**	**10**	**2**	6 - 10	Moderate
3	**3**	**6**	**9**	**12**	**15**	**3**	12 - 16	High
4	**4**	**8**	**12**	**16**	**20**	**4**	20 - 25	Unacceptable
5	**5**	**10**	**15**	**20**	**25**			

The Risk Assessment matrix is a tool that may be of use in specific circumstances such as in small intensively used areas or around buildings, where likelihood and severity of fire are relatively constant.

The matrix offers a means of making the assessment process more objective. Where the risk assessment exceeds the threshold for acceptability mitigation measures should be built into the WMP (Forestry Commission, 2014)[1].

A High or Unacceptable risk rating will require the use of prevention or other control measures to reduce the rating to an acceptable level. These may be measures that reduce the risk of fire starting, reduce severity or, in respect of risk to people, prevent access to the hazard.

Note that the calculation of wildfire risk should include any existing mitigation measures that are in place in order to assess their effectiveness.

Details of the risk assessment can be recorded by using the Wildfire Risk Assessment Template as included below.

[1] Forestry Commission: Practice Guide Building wildfire resilience into forest management planning (2014)

Wildfire Risk Assessment Template

Name of Land Holding	Location	Date of assessment and date of review

What are the fire hazards?	Who/what might be harmed and how?	What is already being done to manage risk?	Initial Risk Rating				What else needs to be done?	Revised Risk Rating			
			Likelihood	Severity	Risk Rating	Assessment		Likelihood	Severity	Risk Rating	Assessment