Responding to wildfires together: awareness for land managers

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Remote Learning Series Introduction

The topics below will guide land managers in how to interact with Fire and Rescue Services and give FRS management the confidence to embed suitably trained personnel into their activities. These principles can be applied to any vegetation fire; wild or prescribed. This training is provided by EWWF and the Moorland Association.

The five topics covered are:

1. An Introduction to principles, terminology etc.
2. FRS Liaison at Wildfires
3. Wildfire Prediction System - WiPS
4. Wildfire Safe System of Work - LACES
5. Working Safely with Air and Ground Assets

Purpose

This presentation is aimed at Land Management Sector that find themselves working alongside Fire and Rescue Service personnel at wildfires. This could include game keepers, forestry workers, rangers etc.

The aim is to enhance understanding between the land management sector and Fire and Rescue Services and to promote safe systems of work to the benefit of all.

This presentation sets out the expectations of both parties to ensure safe working, to avoid confusion and to assist with effective management of the emergency incident.

Land Managers ‘Add Value’

The FRS retain legal control of the incident but recognise that:

- Land Managers hold invaluable local knowledge
- Land Managers have access to specialist equipment and machines
- Land Managers are used to working in the open countryside
- Land Managers can be a positive asset at wildfires if they become embedded into the Incident Command System

By completing this training you, as a land manager, should be able to add value as described above. The FRS should recognise that you are now able to work safely alongside them.

Topic -1- Wildfire Introduction

This topic will cover:

1. Wildfire definitions
2. Prescribed Fire
3. General Considerations
4. Terminology

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So what is a Wildfire?

A Wildfire is “any unwanted vegetation fire”. The UK Fire and Rescue Service National Operational Guidance (NOG) further defines a Wildfire as any one of the following:

- > one hectare in size
- flame length of more than 1.5 metres
- >four fire and rescue service resources
- at least six hours in duration
- serious threat to life, environment, property and infrastructure

[https://www.ukfrs.com/guidance/wildfires]

All vegetation fires are recorded in the FRS Incident Recording System (IRS). Most wildfires in the UK are much smaller than those described above, but are still captured in IRS, often as a ‘small fire in the open’.

Prescribed Fire

A prescribed fire is a vegetation fire that is deliberately set by a land manager to a set of pre-determined criteria to meet a management objective.

Examples of prescribed, or controlled, burning in the UK include bonfires, heather burning, muirburn and swaling etc.

Prescribed fire forms the basis of many traditional landscapes such as Lowland heath, which is the result of historic grazing, harvesting and burning. The burning was used to help clear the land initially and then to remove moribund vegetation to improve the grazing.

Considerations

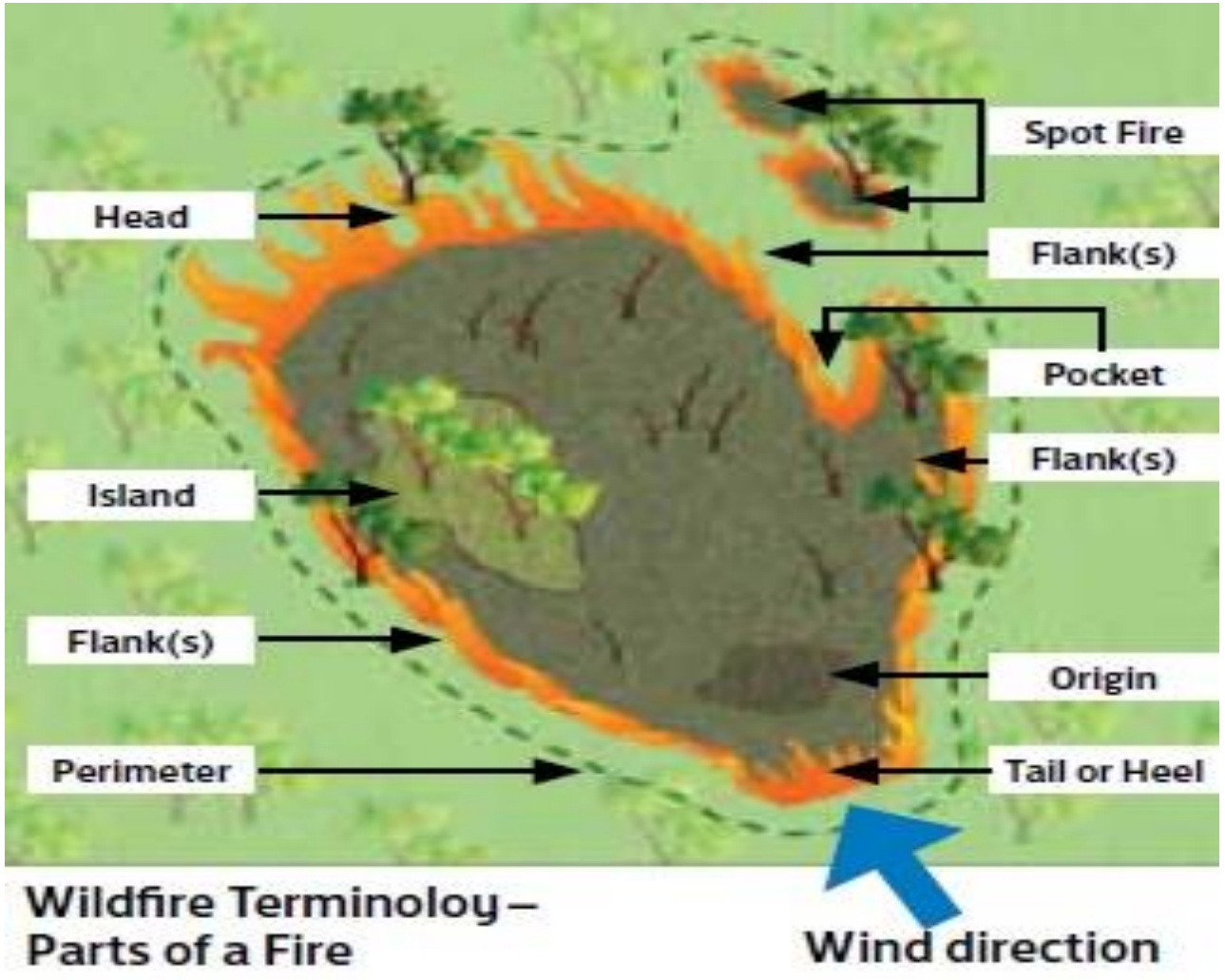
Wildfire is the generic term used to describe uncontrolled vegetation fires occurring in the open.

Key to the success of wildfire or prescribed fire control is an understanding of the fires behaviour in relation to the land, vegetation and weather; applying the right fire fighting tactics at the right time and in the right location.

Planning for wildfire (and prescribed fire) is an essential element to creating a safe system of work. The provision of up to date topographical and risk information, as well as sound understanding of factors influencing a fire, will allow managers to undertake an appropriate dynamic risk assessment and develop a suitable tactical plan.

The Local Knowledge of the Land Manager can be critical information for the FRS Incident Commander.

Terminology



Anchor Point – safe entry, normally at the tail
Flanks – Left and Right
Head – leading edge of fire
Origin – point of ignition
Spot Fire – small fire caused by embers
Pocket – unburnt fuel wrapped by flank
Island – an area of unburnt fuel within perimeter
Perimeter – outside edge of fire
Black – burnt fuels (grey on illustration)
Green – unburnt fuels (green on illustration)

To help describe the containment of a fire these two phrases are also used:
Black line – contained edge of fire perimeter
Red line – uncontained edge of fire perimeter

Topic -2- FRS Liaison at Wildfires

A Wildfire incident falls under the legal control of the FRS. Effectively, a cordon is created around the incident and it is essential that all those present within this cordon are known to the FRS and work jointly with them towards a successful outcome.

This topic will cover:

1. Liaison protocols at Wildfires
2. Typical Wildfire Incident Command Support
3. Incident Command System tabards
4. The Joint Emergency Services Interoperability Principles (JESIP) Doctrine


COMMAND
SUPPORT
CAUTION !
UNEVEN STEP
HEIGHTS
WILDFIRE
TACTICAL ADVISOR

ICS – Incident Command System

- The UK FRS use ICS to manage all incidents
- Initially it may all seem chaotic, but there will be a risk assessed plan!
- The Incident Commander will relay the plan to oncoming appliances. The IC will normally be wearing a white helmet, whereas a firefighter wears a yellow helmet
- As soon as practical a Command Support pump or specialist Command Vehicle will be established. It will normally be the only vehicle still using blue lights, except where safety is a higher priority
- All people at the incident MUST book on at Command Support before taking any action. Here you will receive a safety brief and be directed to the correct person or “Gateway”

Liaison Protocol at Wildfires

If you attend a wildfire as the Land Manager representative you must follow a safe system of work and liaise correctly with the FRS.

1. Make contact with Command Support if up and running. This will normally be the fire engine with blue lights still flashing. If unclear, ask
2. If Command Support is not up and running, report to the Incident Commander
3. Do not self-deploy onto the incident without doing 1 or 2 above
4. You should be wearing appropriate PPE and have identification with you
    a) Fire resistant clothing, stout footwear, eye protection, filter mask and gloves
    b) Ideally high visibility tabard or similar to identify your organisation/position

Incident Command System – FRS Roles and tabard markings

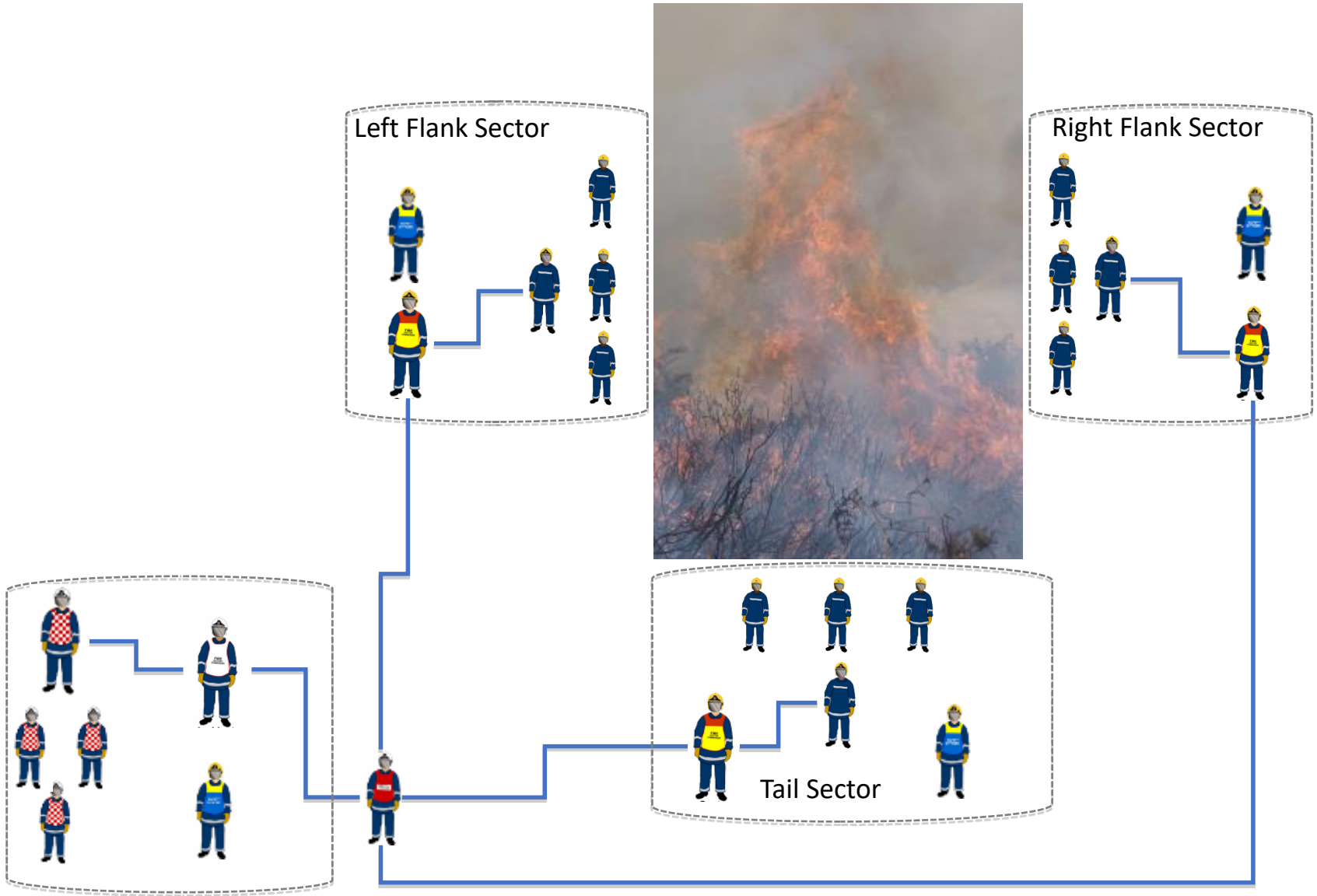
Incident Commander

Operations Commander

Sector Commander

Safety Officer

Command Support



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Wildfire Tactical Advisors

Wildfire Tactical Advisors are a National Fire and Rescue Service resource. They are hosted by their own FRS but are available to be deployed anywhere in the country to significant incidents, at the request of the host FRS.

They are all trained to a standard agreed by the National Fire Chiefs Council Wildfire Group and complete Continuous Professional Development at least annually.

They provide specialist wildfire advice to the command team and will help to coordinate other specialist resources such as tactical burns teams if required.

National Tactical Advisors should be identified by an orange tabard with orange and white cheques on the top half.

JESIP Doctrine – For information only

The JESIP (Joint Emergency Services Interoperability Principles) Doctrine is used by all Emergency Services in the UK to establish joint management of emergency situations.

In the event of a fire, the Fire and Rescue Service will normally be the lead agency.

They have legal control of the incident until they hand it back to the Land Owner/Manager.

[https://www.jesip.org.uk/five-principles]

Topic -3- Wildfire Prediction System (WiPS)

For the safety of all those present at a wildfire, it is important to have a basic understanding of wildfire behaviour.

This helps predict the future direction and intensity of the fire and creates a common understanding and language.

This topic will cover:

1. Factors of Alignment
2. Factorisation
3. Extreme Fire Behaviour

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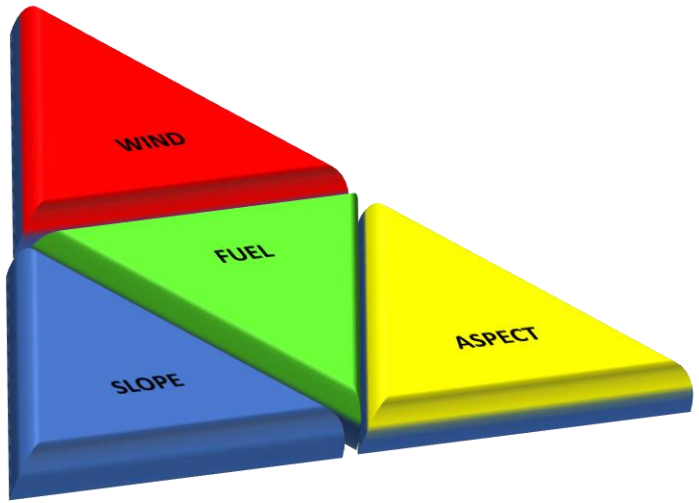
Factors of Alignment

The three outer triangles are known as the factors of alignment:

1. Wind
2. Slope
3. Aspect



These, combined with fuel, determine fire intensity and severity

Wind will…

- Drive a fire and give it direction
- Ensure a constant supply of oxygen
- Dry out or ‘cure’ the fuel
- Create spot fires

Slope will…

- Increase (or decrease) the speed of the fire
- Increase (or decrease) the intensity of the fire
- Alter the direction of travel of the fire

Increase burning upslope, decrease burning downslope

Aspect will…

- Preheat the fuel
- Lower humidity (reduce fuel moisture content)
- Dry out or ‘cure’ the fuel

Aspect means ‘in direct sunlight’

Factors of Alignment

Understanding the factors of alignment will enable you to:

- Predict fire direction
- Predict changes in fire speed
- Predict changes in fire intensity
- Identify windows of opportunity

Factorisation

Each factor of alignment in wildfire has a score of 1

- Wind driven = 1
- Burning up slope = 1
- In aspect = 1

This gives a maximum score of 3.

Fuel is not factored in on the fireground but is very important. There are no negative scores.

Factorisation

Each factor increases the score and the range of factors is from 0 to 3.

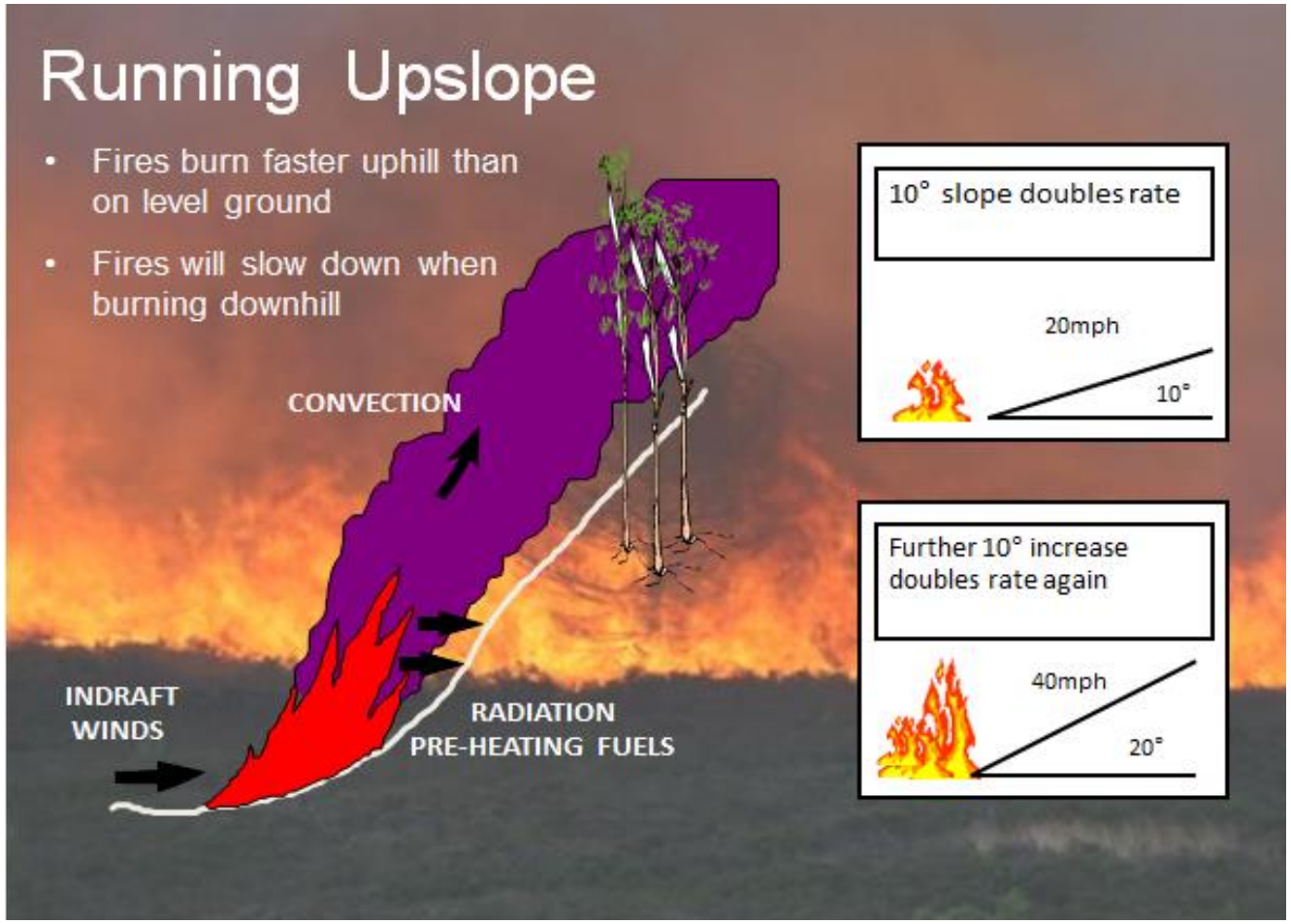
- No factors in the favour of the fire F0
- 1 factor in favour = F1
- 2 factors in favour = F2
- 3 factors in favour = F3

An F3 wildfire is potentially very dangerous.

Extreme Fire Behaviour – F3

If a fire is in **aspect** (full sunlight) running up**slope** with the **wind** behind it, then it may exhibit extreme fire behaviour – F3

Conversely, if burning downslope, at night against the wind, then the fire may self extinguish – F0



Topic -4- Safe System of Work LACES

It is essential that everybody attending a wildfire incident adheres to a Safe System of Work. This ensures that everyone is well informed and knows what to do in the event of an emergency. Land Managers may be part of a team or operate as a team in their own right.

This topic will cover:

1. LACES
2. Suppression Principles
3. Vegetation Fire Suppression

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We need to have a safe system of work and in wildfire this is known as the LACES protocol.

L OOK OUTS

A WARENESS

C OMMUNICATIONS

E SCAPE ROUTES

S AFETY ZONE

Lookouts

Lookouts are allocated by each team and they should lookout for changes in topography, weather and fuel, in fact anything that can impact on safety or change the fire behaviour.

They should be looking for both positive and negative impacts on fire behaviour and must communicate these to the team.

Awareness

Prior to being tasked, all team members must be made aware of the plan via a LACES briefing.

The Lookout will notify the team of any changes in fire behaviour during the task.

The team leader will notify the team of any changes in task or priorities.

Every team member must remain aware of their surroundings – Look up, look down, look all around!

Communications

All team members must be aware of the communications channels available to them.

They should remain in voice contact with team members.

Radio or mobile should be used to communicate with Command Support.

There should be an agreed emergency evacuation signal, normally repeated blasts on a whistle.

Escape Routes

Escape routes should be identified as soon as possible, ideally prior to deployment into the risk area.

There should be more than one escape route if possible.

Changes in escape routes must be communicated to the team.

Escape routes must lead to a place of complete safety.

Safety Zones

The safety zone must be identified and communicated to all team members prior to entering the risk area.

It must be large enough to safely accommodate all personnel that may require it. It should be a minimum of 4x max flame length around the personnel.

It must be known to Command Support should an evacuation be required.

LACES protocol will ensure that:

1. Personnel are supervised and remain informed of the status and development of the wildfire
2. The situation is monitored and the risks that personnel are exposed to are continually assessed
3. It proactively identifies a response to any unexpected events, ensuring that an escape route exists to take personnel from a place of danger to one of complete safety

LACES – Land manager expectations

- Partnership work – All agencies are expected to cooperate under the leadership of the FRS to bring the incident to a safe and successful conclusion
- Report to Command Support on arrival so that a register of personnel can be maintained. Don't forget to book out when you leave
- Share information on hazards such as powerlines, mine shafts, soft ground etc.
- There is no expectation that land managers will directly fight wildfires. If you do, then consider:
- Wear suitable PPE if you are likely to enter the risk area [https://ukfisa.com/Safety/Safety-Guides/fisa-803]
- If you offer up equipment or machinery – ensure that operators are experienced and adequately trained and that the equipment is maintained and fit for purpose
- Land managers can often assist in enhancing escape routes and safety zones by mowing

Suppression Strategies

There are basically two strategies that can be adopted:

- DIRECT - where the fire can be safely attacked at close quarters – normally FRS personnel, but can be fogging units, leaf blowers etc from land managers
- INDIRECT - where the fire intensity or remoteness makes it too dangerous to attack directly – this can be where land managers have better tools than FRS such as mulchers, mowers, excavators and ploughs etc.

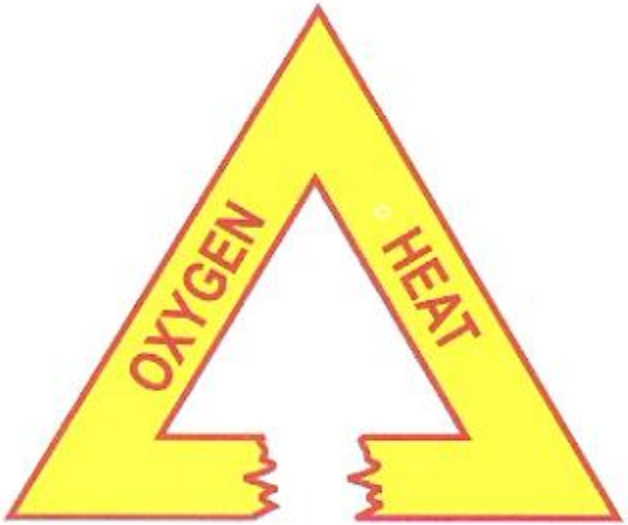
Flame Length helps determine your strategy

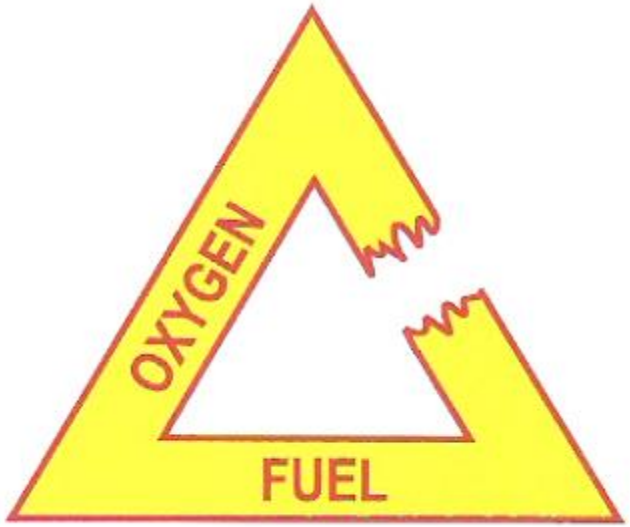
Flame Length (m)	Strategy
0-0.5	LOW intensity-Fires normally self extinguish
0.5-1.5 - Moderate Intensity (waist high)	MODERATE intensity-Direct Attack Hand tools and back-packs
1.5-3.5	HIGH intensity-Direct Attack Pumped Water, Fogging, Aerial operations
	HIGH intensity-Indirect Attack Control lines, fuel breaks, foam, machinery, tactical use of fire, aerial operations
3.5-8 (will require outside agency assistance) 8+ (beyond FRS capability)	EXTREME intensity-Direct Attack Aerial attack
	EXTREME intensity – Indirect Attack Consider flanking, control lines, defensive use of fire, aerial operations

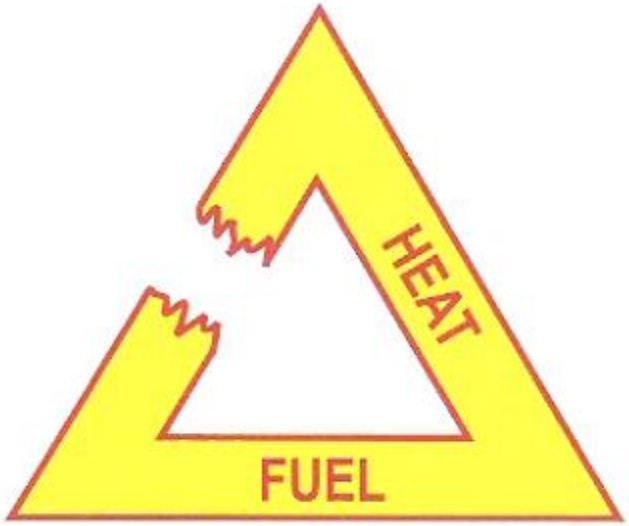
At the initial stages of the incident, **FRS can be expected to manage up to the point where flame length exceeds 2.5m.** From here on, the use of land manager machinery and equipment can be very valuable. Ultimately, contract helicopters may be required for extreme fire intensity.

Principles of Attack

The aim is to reduce the intensity of the fire by starvation, cooling or smothering. Break the triangle.







Remove the HEAT

FRS personnel have access to water in a variety of ways.

Many land managers have access to bowsers, often with the ability to deliver some form of spray. They also often have access to fogging units that are normally used to assist with prescribed fires. These are very effective at cooling the fire.

Removing the fuel with a mower reduces intensity.

Leaf blowers remove heat and disrupt combustion.

Fuel Management

Land Managers often have the most effective means of fuel management:

Reduce OXYGEN

FRS may use foam to starve the fire of oxygen.

Land managers can use soil via bulldozers, excavators, ploughs etc. to smother fires.

The Knock Down

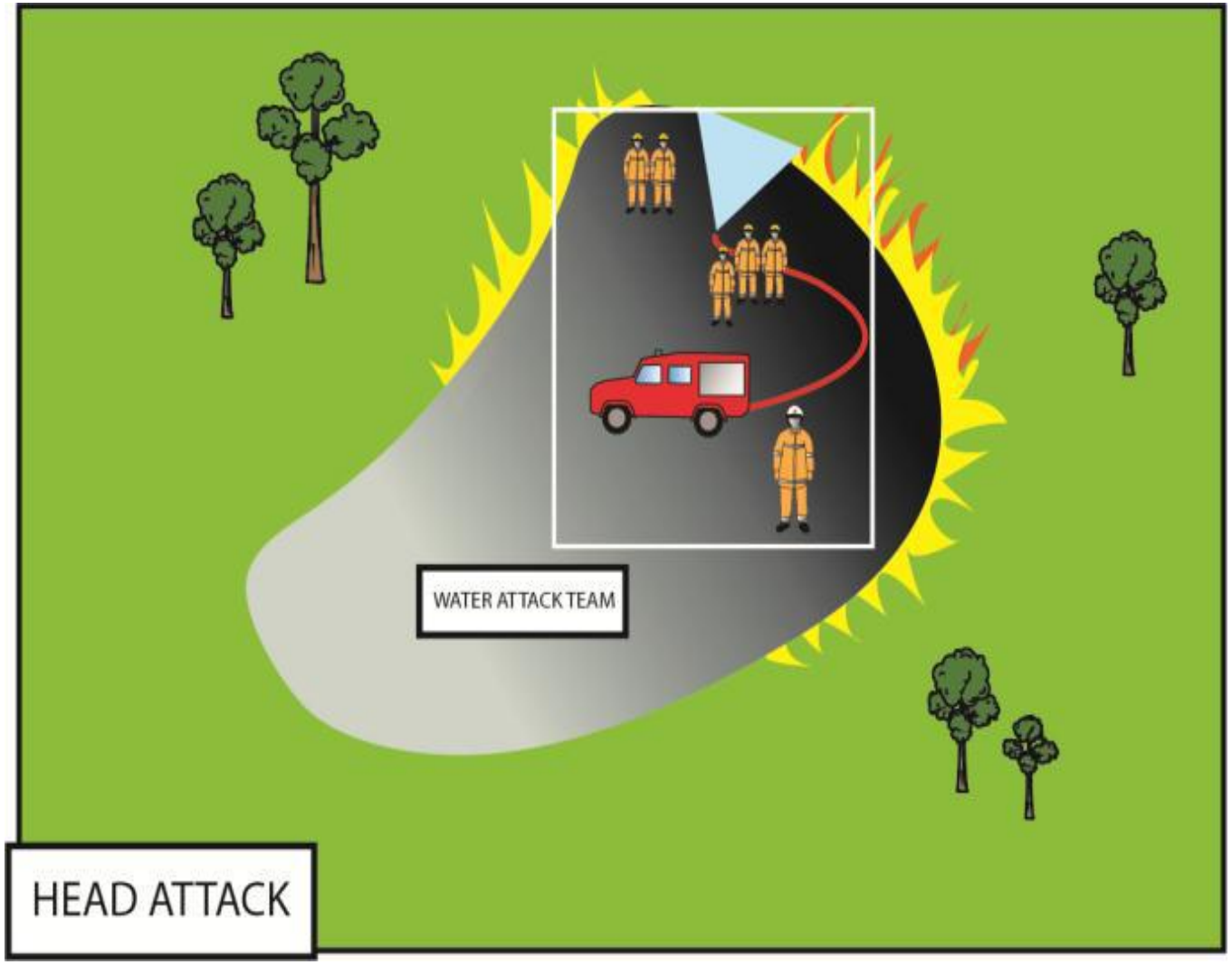
There are two basic ways to knock down and control a vegetation fire:

- Head attack
- Flank attack

Both can be dangerous if inexperienced or underestimated.

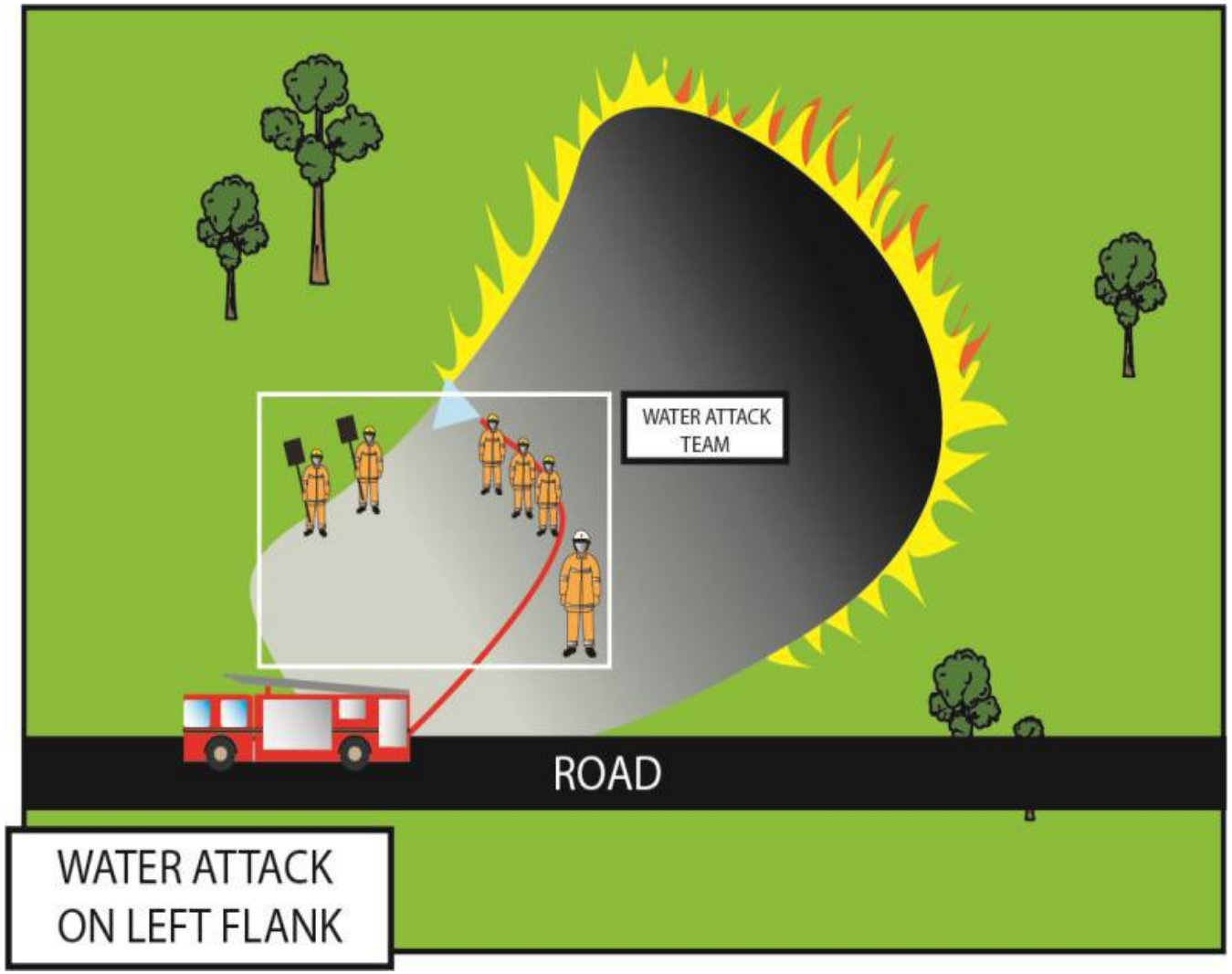
Head Attack

Work from the burnt area (the black) if possible. Aim to split the head fire as quickly as possible to reduce its intensity. Avoid working from the green and stay out of the smoke.



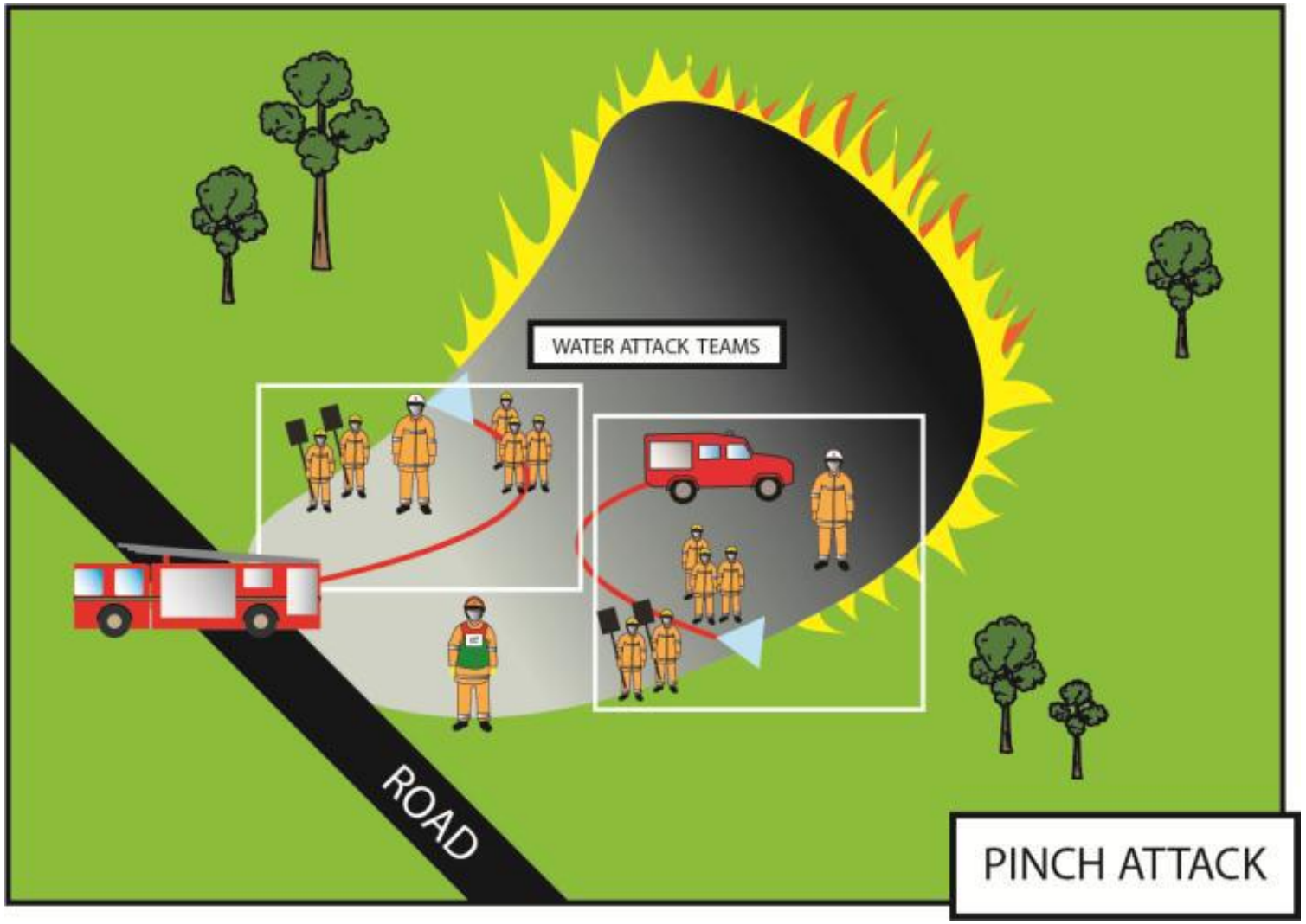
Flank Attack

Work from the tail. Create a safe anchor point and work along a flank from the black if possible. Do not allow the fire to re-ignite behind you.



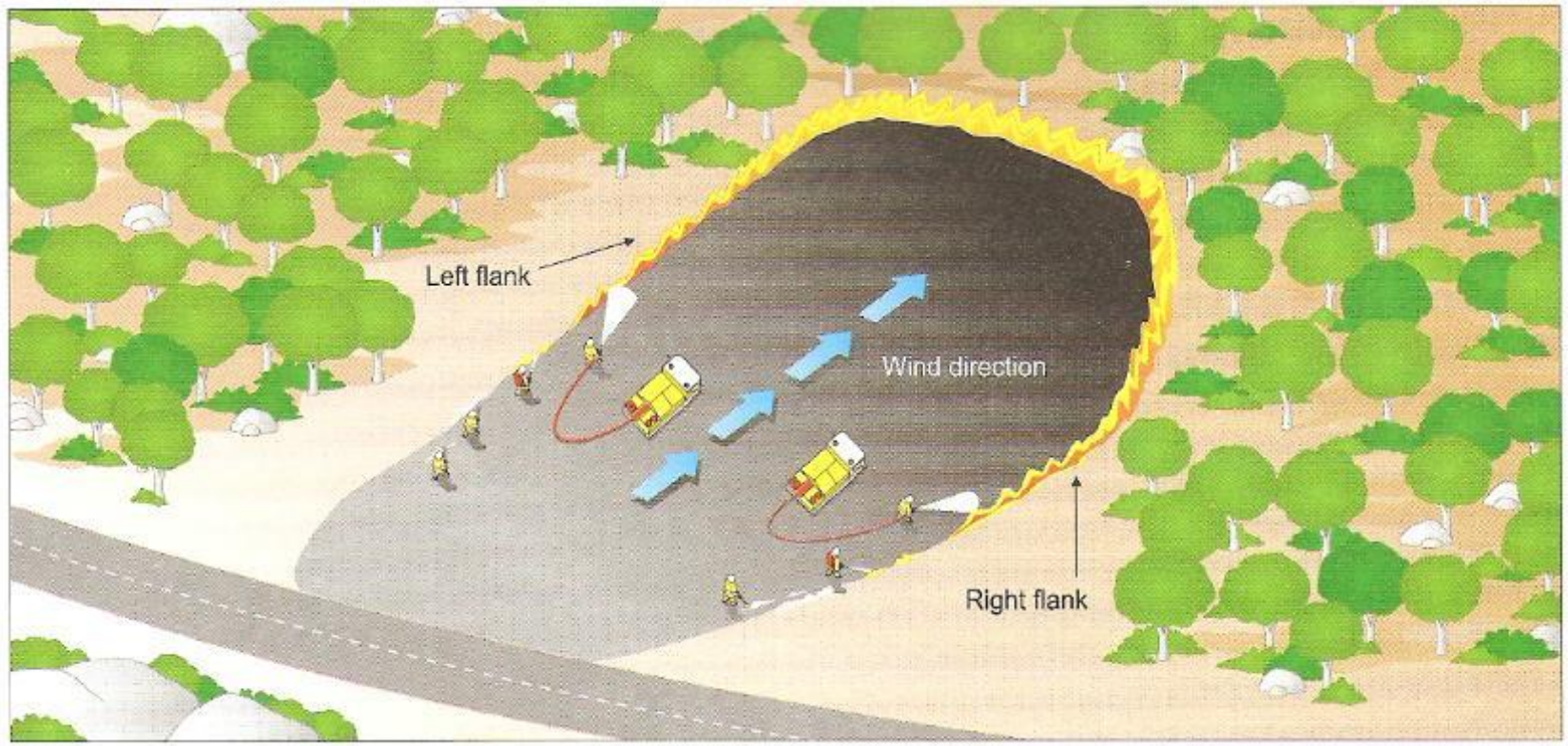
Pinch Attack

Work from the tail to create a safe anchor point. Then move up both flanks from the black if possible. Do not allow the fire to re-ignite behind you. Use follow on crews to support you.



Working in the black

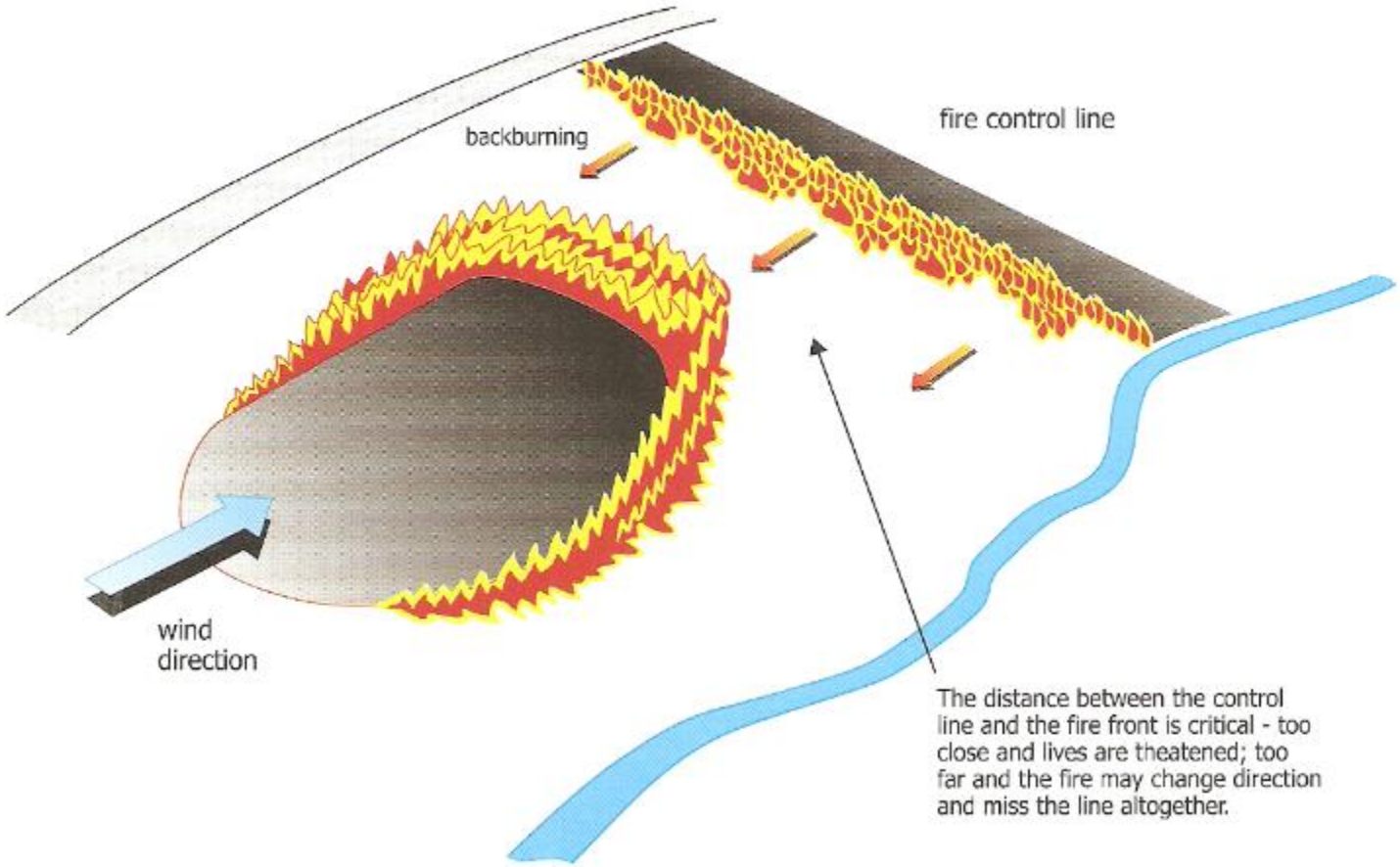
If possible work from within the black because all of the fuel has already been burnt.



Indirect Attack

When the fire intensity is very high, consider an indirect attack. This allows a control line to be created at a safe distance ahead of the fire by foam, mowing, ploughing or burning etc.

Figure 2.9 Indirect attack – control line tied into existing break (secure perimeter)



Topic -5- Working Safely

This topic will cover:

1. Working Safely with other agencies
2. Working Safely with Aerial Assets
3. Working Safely with Heavy Plant
4. Working Safely with Power Tools

Definitions

- Aerial assets in this respect is helicopters only
- Heavy plant refers to large machines including bulldozers, excavators and Fire Engines
- Power tools refers to battery or petrol operated hand tools such as brushcutters, chainsaws and leaf blowers

Working safely with other agencies

Fire and rescue services will develop partnerships and good working relationships with other organisations to pre-plan for wildfire incidents. These partnerships can be established to:

- Share knowledge and understanding
- Enable familiarisation of policies and procedures
- Prepare for wildfire incidents, for example through the collaborative development of wildfire fire plans
- Pre-plan the response to wildfire incidents
- Exercise for a multi-agency response to wildfire incidents
- [https://www.ukfrs.com/guidance/wildfires]

Working Safely with Aerial Assets 1

- Try to pre-plan landing sites in advance, normally a minimum of 25mx25m and clear of any debris and furniture etc that is not fixed to the ground. The downwash can be very damaging
- If a road is used for the landing area, then both carriageways must be closed to traffic
- Do not use bright lights or lasers to attract crew attention
- Do NOT approach the helicopter without a clear visual indication from the Pilot. Follow their signals closely. If in doubt, do not approach until rotors have fully stopped
- Only approach from the front two quarters, NEVER approach from the rear two quarters
- The landing area may be required for emergency use if departure is aborted. Keep clear until operations are complete
- Stay clear from underslung loads including water bombing
- If firefighting, withdraw as the aircraft approaches, allow it to drop safely, then return to firefighting. If unsafe to drop due to personnel, then the pilot will orbit. This is your clue to move away

[https://www.ukfrs.com/guidance/search/working-around-helicopters?bundle=control_measure&id=29161]

Working Safely with Aerial Assets 2

Approach and Departure

- Stay clear of landing area during approach/departure
- Always approach/depart from the downslope (lower) side as directed by pilot
- Approach/depart helicopter in a crouch position, wear eye protection
- Do not run
- Keep in pilot's view at all times
- Do not reach up or chase after loose objects
- Never approach the tail section of the helicopter
- NO SMOKING within 15m of the aircraft

[https://www.nwcg.gov/sites/default/files/publications/pms461.pdf]

Working Safely with Heavy Plant 1

- The vehicle operator should be suitably trained/experienced in the use of the vehicle. They determine what can be safely achieved
- The vehicle must be in a good state of repair/maintenance and suitable for the task
- Where possible provide clear separation between heavy plant routes and pedestrian routes
- Where possible provide adequate turning space for heavy plant, including firefighting vehicles
- Use banksperson/signallers to guide heavy plant where appropriate. Use agreed signals
- Where heavy plant is required to work alongside personnel, post a lookout/safety officer to maintain a watching brief of all operations
- Use appropriate PPE including high visibility clothing and hard hats as required
- Avoid steep slopes and be aware of overhead and underground hazards such as high voltage cables

Working Safely with Heavy Plant 2

- When working around heavy equipment stay at least 30m in front and 15m behind the equipment. In timber, distances should be increased to 2½ times the canopy height
- No one but the operator should ride on the equipment
- Never approach equipment until you have eye contact with the operator, all implements have been lowered to the ground, and equipment is idled down
- Avoid working downhill from equipment where rolling material could jeopardise your safety
- Night work is more dangerous due to reduced visibility. Use headlamp and/or glow sticks so the operator can see you
- Establish visual and radio communication methods prior to engaging
- Communicate all hazards to the operator (spot fires, burn operations, and obstacles)
- Equipment operators have difficulty seeing ground personnel; take responsibility for your safety and all those around you

Working Safely with Power Tools

- Keep all tools in good condition with regular maintenance
- Use the right tool for the job
- Examine each tool for damage before use and do not use damaged tools
- Operate tools according to the manufacturers' instructions
- Provide and properly use the right personal protective equipment
- Maintain safe working distances – 15m for brush cutters, 5m for chainsaws (groundwork), for leaf blowers and other power tools follow the manufacturers guidance
- Provide safe refueling areas and use safe refueling practices

Follow this link to complete an on-line assessment:
https://forms.gle/GXAKqLeNrsAkd7hU8

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