Initial Attack

It is a fundamental responsibility of fire services to train firefighters to accept calculated risks during initial attack, because they must make every effort to prevent the fire escaping and later burning under extreme fire weather and threaten people who have no understanding or experience of bushfires whatsoever.

"Fires always look worse at night; Fires always look worse from a Distance" (Alan McArthur Circa 1961)

This was Alan MacArthur's introduction to fire suppression course at the Australian Forestry School. His point was that you cannot possibly make a decision about how to go about fire suppression unless you make a close-up assessment of the fire and recognise its position in the landscape and how the fuels around it will affect its behaviour.

The most successful firefighting will be achieved if the initial attack starts as soon as possible after ignition. Most often the first night after ignition is the safest and easiest period that will occur until rain extinguishes the fire or it has burnt out of the forest[1].

Forest fires starting from a point can be strongly affected by local changes in fuel load such as a patch of bare ground rock out crops, or a large log that blocks the head fire's access to fine fuels - when they are small. These may slow the spread of the fire either directly, or by confining the width of the head fire so it does not reach the size required to produce the potential ROS for the prevailing conditions.

[1] See Fire Control Officers Group paper on night fire fighting

The variation in rate of spread and fire size for 16 simultaneous fires burning in relatively uniform fuel is illustrated in Figure 1[2]. The fires were lit simultaneously at a point by electrical ignition.

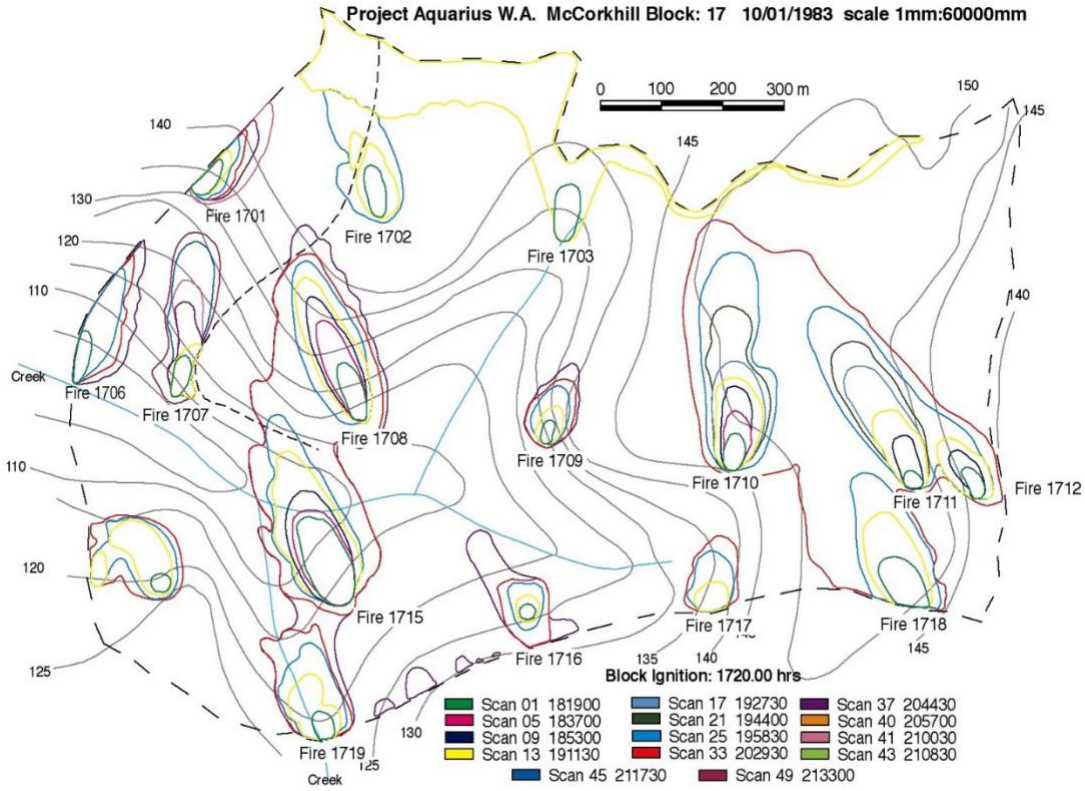

Figure 1. Variation in fire spread and fire size for 16 fires lit simultaneously at 1720 in dry eucalypt forest, WA. The fires were measured by IR line scan every 4.5 minutes; not all scans are illustrated – see legend

The fuels were in a dry sclerophyll forest of Jarrah/Marri eucalypts in Western Australia with a fine fuel load <15 t/ha and a significant layer of elevated shrub fuels. Weather conditions were mild (Temperature 18°C, Relative Humidity 55%, Wind speed @ 10m open 11.5-20 km/hr). The fires burnt into the evening with decreasing wind speeds. The perimeter of the fires were measured Infra-red line-scan imagery. The fires had burnt slowly for an hour before the first scan was taken at 1819 hrs.

The diagram is complex so I want you to focus on the shape and spread of some individual fires and the implications for initial attack.

- Fires 1701 and 1706 had the left flank confined by a fire trail. Headfire intensity was reduced and suppression could be concentrated on the right flank
- The right flank of fire 1707 was partially contained by an abandoned internal trail.
- Fire 1708 started on a windward slope and burnt directly up-slope with the wind and had lower rates of spread than fires that burnt onto level ground. The entrained wind blowing up-slope reduces the variation in local wind direction which keeps the headfire narrow and confines lateral spread of the fire which makes suppression on the flanks safer.

[2] The fires were part of Project Narrik conducted by CALM in conjunction with Project Aquarius to investigate the feasibility of developing prescriptions for high-intensity fires in summer

- Fire 1709 started on a slope but did not spread rapidly, perhaps confined by a discontinuity of fuel.
- Fires 1710 and 1711 burnt onto level ground where they we subjected to a variable wind direction. These fires exhibited the fastest rates of spread.
- Some fires lit on a downslope in relation to the wind direction e.g.1716, 1717 and 1719 and spread only slowly.

The potential rate of spread for the prevailing conditions was 426 m/hr. The only fire that approached the potential rate of spread was fire 1710 between 1928 and 1958.30 hrs which burnt at 340 m/hr. This was after the fire had burnt up onto level ground and was exposed to greater fluctuations of wind direction to widen the head fire. The average spread of all other fires was very much lower. (See Figure 2).

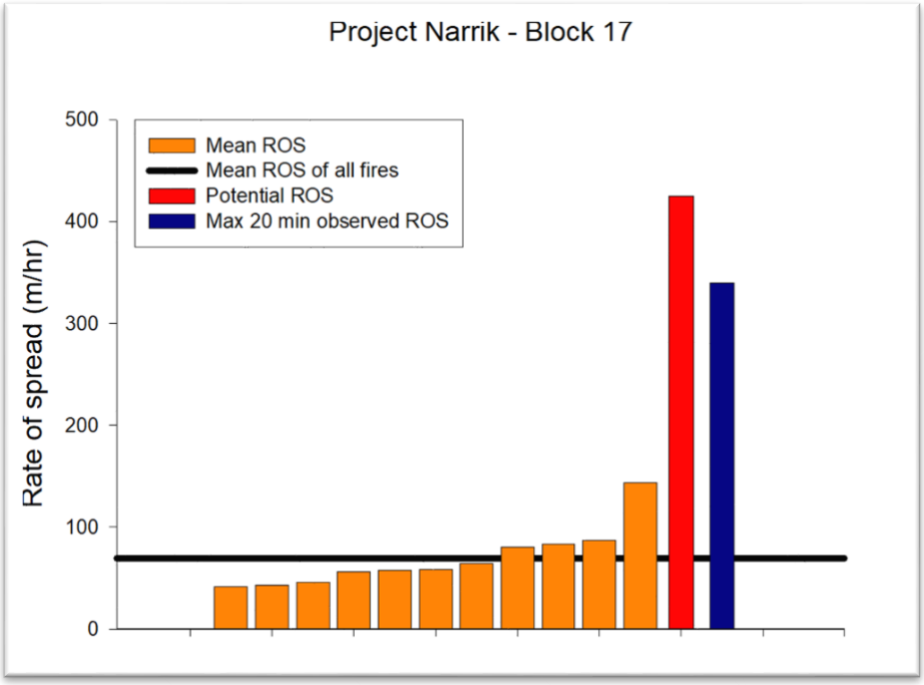

Figure 2: Mean Rates of forward spread Project Narrik

The example shows the variation of fire behaviour when fires start at a single point and some of the factors that will affect fire spread and fire suppression. It is important that the field incident controller inspects the fire on the ground as soon as possible after ignition to plan initial attack. This is impossible from an office or some other location remote from the fire ground. Even Inspection from the air, while vital for precise location of the fire and a guide to the fire intensity, can only give a good evaluation when conducted by someone with experience with direct suppression.

An example where slow Initial Attack resulted in a fire disaster

There are many examples where initial attack has been delayed, or not even attempted, including the extensive fires in NSW and East Gippsland in the 2019-2020 fire season. Probably the most detailed assessment and analysis of firefighting efforts on a major fire event was the Coronial Inquest into the Canberra Fires between 8 – 18 January 2003.

The Canberra fires started in remote country to the west of Canberra on 8 January 2003 and burnt unchecked under mid weather for 8 days then burnt into the Western suburbs of Canberra killing 4 people and destroying 500 houses.

The report "The Canberra Firestorm" by Maria Doogan, Coroner (National Capital Canberra), ran to 640 pages and 102 pages of appendices and made 73 recommendations.

The findings relevant to initial attack were:

- The fires started from 4 lightning strikes around 1500 hr on 8 January 2003 under conditions of Very High Fire danger. A cool change passed over the area at 2000hs and brought rapidly increasing relative humidity and light southerly winds. Mild weather with Low to Moderate Fire Danger persisted as the wind direction moved anti clockwise from South to the North-west for 8 days until Extreme Fire weather preceded another frontal change on 18 January
- One fire started on a westerly aspect (McIntyre's) and burnt intensely upslope to the top of the ridge and had cast several spotfires downwind on to easterly aspects where they burnt mildly after the wind change. (Figure 3.)This fire was managed by the RFS of NSW. The fire was not assessed in the field by an experienced incident controller and crews were not dispatched for initial attack.
- The RFS committed to a burning-out program of about 4000 ha but this was delayed for 3 days while adequate men and equipment were assembled. It could not be completed by the 17 of January when the fire broke containment lines.

Figure 3. Head fire of the McIntyre Fire at 2003 hrs backing into a light southerly breeze.

- The other fires (Bendora, Stockyard, Gingera) started on easterly aspects and were not subjected to strong winds on 8 January. These fires were managed by the ACT Emergency Services Bureau (ESB). Despite mild weather, low ROS and low flame heights these fires were not attacked aggressively. Parts of these fires were observed to be self-extinguishing in grassy fuels on the first night.

- Fire crews attended the Bendora Fire and were preparing to suppress the fire with hose-lay and hand tools. The fire was approximately 3 ha.
- The field incident controller was concerned about firefighting at night and the ESB withdrew the initial attack crews at around 2130 on the first night.
- The ESB failed to follow The Australian Inter-service Incident Management System. Although experienced incident controllers were available they did not replace the field incident controller.
- Roads tracks and fire trails within Namadgi National Park had not been maintained and were over grown preventing access by firefighting vehicles.
- Heavy fuel loads hampered suppression on parts of all fires
- Bulldozers were banned from cutting trails in National Park until day 3. By which time the fires were too large to suppress and fire lines were mostly attempted on significant roads or not at all.

By the morning of 18 January there were three large uncontrolled fires in the Brindabella ranges which coalesced and ran into Canberra when the wind rose and created Extreme Fire Danger after 1000 hours. These also burnt the ACT commercial pine plantations west of the Murrumbidgee and more than 90% of the National Park.

Effective Fire Suppression

The principles of effective fire suppression have not changed since man started deliberately putting out fires:

- The flames have to be suppressed.
- The perimeter has to be surrounded by a bare-earth trail to ensure the smouldering combustion is physically separated from unburned fuels. This includes cutting through large log material crossing the trail.
- Smouldering material in the burnt area, within a certain distance of the fire edge, and including large logs, trees alight in hollows and roots that can burn underground must be extinguished. This often requires tree-felling, digging and breaking open large material.
- The fireline must be patrolled until it is certain that undetected combustion doesn't relight on the surface.

The time elapsed between detection and the first fire crew arriving at the fire must be minimised. Modern detection systems, including the use of aircraft, can facilitate this. While Aircraft are particularly useful in attacking fires when they are small, particularly in remote areas where access is slow and difficult, rapid dispatch of ground crews and quick access to the fire is an essential part of the process.

Recent emphasis on fire-fighter safety has led to decisions, often made without an experienced assessment of on-site conditions. These decisions have contributed to a slow initial response to fires and/or the withdrawal of on-the-ground resources at night, when direct fire-fighting is most efficient.

Fire-fighting, like most emergency response activities, is accompanied by an elevated risk of injury to participants. This is an integral part of the job. Safe working conditions cannot be secured by "backing off" from critical situations, when the greatest gains stand to be made. Systems that recognise this and manage the risk, must be put in place.

Fire fighters must be protected by extensive training, tools and support that is fit for purpose, competent experienced supervision, and intelligent and responsive incident management.

When wildfires are extinguished at a small size, there is little kudos and publicity for fire fighters. Notwithstanding that had a large fire developed, significant impacts may have been incurred, including large asset and financial loss, human trauma, and possibly loss of life.

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