

HighFire Risk: Fire crew watch-outs arising from our research

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Introduction

Analysis of the drivers of fire behaviour in the high-country has revealed a number of interesting phenomena. Some of these have not been considered in the context of Australian bushfire, while others have been recognised but not studied in detail.

Our studies have highlighted a series of conditions that have the potential to either

- (1) Lower the likelihood of achieving incident objectives;
- (2) Jeopardise the safety of fire crews; or
- (3) Increase the general threat to life and property.

We suggest that this list be considered for fire operations in rugged terrain, especially when conditions permit fires to readily escalate in scale.

Thermal Belt	When planning overnight operations in mountainous valleys always consider the presence of a thermal belt. Unexpectedly high fire danger on mid-slopes can jeopardise strategies and crew safety.
Night-time Dew Point Depression Events	Field observations are essential before lighting up backburns at night, to ensure that the dew point is as expected. Remember that most events do not intensify until after midnight. An early start to a burn that may take hours to complete must be carefully planned – including a discussion with the BoM fire weather forecasters.
Daytime Dew Point Depression Events	There is a need for IMTs to discuss with forecasters the potential for regions of dry upper air to impact on fire activity. There is an expectation that fire weather forecasters will be monitoring water vapour imagery (available hourly on the web) for regions of dry air of various forms. The approach of a region of dry upper air can be seen with perhaps a few hours notice, giving time for incident strategies to be reviewed.
Low Level Jets	LLJs can be difficult to detect. Good field observations are the best way to anticipate potential problems. Always discuss the potential for LLJs with fire weather forecasters when planning the next shift at a campaign fire on high ground. Apart from the direct effect of wind speeds on FDIs, the effects of turbulence should be considered.
Dynamic Channelling	The speed and intensity of a channelling-driven fire event is such that it would be difficult to react in time to achieve crew safety or protect life and property. This requires prior identification of channelling-prone landforms and clear safety instructions to crews operating in remote rugged areas. Of greatest concern, the largest channelling-driven fire events have all arisen off contained if not cool fire edges.
Violent Pyro-Convection	IMTs need to arrange monitoring of fire behaviour either in terrain conducive to channelling or when wind changes are forecast. The formation of deep flaming must be treated as a dangerous event that may be the harbinger of the transition to a plume-driven fire. Monitoring fuel moisture content is also needed Additionally, observers placed some kilometers away from the fire at right angles to the wind direction should watch for pyro-cu or pyro-cb formation. These need to be reported as soon as possible, in the same way that approaching thunderstorms are reported.
Foehn Winds	Regions immediately to the lee of major ranges can experience these warm, dry winds. Weather can vary greatly over short distances and short periods of time. As these events can occur at night-time, satellite images may be of little value. Discussions with fire weather forecasters in BoM should address foehn events. There is no substitute for good field observations.
Mountain Wind Waves	Field observers must look out for parallel lines of cumulus that are stationary over the ground. At higher levels the appearance of “lennies” (<i>altocumulus standing lenticularis</i>) indicates strong waves reaching high levels. Pressure charts should always be checked to see if the bulk winds are aligned with local escarpments.
Fire in Rugged Landscapes	Planning Officers should note when fires are in rugged lands. If containment proves unexpectedly difficult then a review of incident objectives or of current objectives’ achievability is strongly recommended.

