HighFire Risk: Fire Crew Watch-Outs arising from our research

R. McRae
ACT Emergency Services Agency
J.J. Sharples, R.O.Weber
University of New South Wales at the Australian Defence Force Academy

Introduction

In analysing the drivers of fire behviour in the high country, we have studies a number of phenomena. Some of these are new science, some have not been on the wildfire agenda, while others have been recognised but not studied in detail.

Our studies have highlighted a series of new conditions that might arise that would 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 a thermal zone. Unexpectedly high fire danger on mid-slopes can jeopardise strategies and crew safety.
Nighttime 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 dry slots 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 dry slots of various forms. The approach of a dry slot 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 channeling-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 (a) prior identification of channelling-prone landforms, and (b) clear instructions to crews operating in remote rugged areas on safety actions. 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 channeling 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 Additonally 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 in as soon as possible, in the same way that approaching thunderstorms are reported on.
Foehn Winds	Weather can vary greatly over short distances and short periods of time. As these events can occur at nighttime 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" (*altocumulus standing lenticularis*) clouds 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.