Fire Interval Guidelines – What's Missing?

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Abstract
Fire interval guidelines were developed for NSW vegetation formations and were incorporated into the Bush Fire Environmental Assessment Code (BFEA Code) in 2003. By focusing on the numbers in the table, has the message in the fine print been lost?

The initial intent with these broad guidelines was that they were not to be seen as prescriptions, but as a starting point for an adaptive management approach. Limitations of the approach (the focus on flora, data gaps, data currency and reliability) were discussed in the report. As was the need to consider spatial extent, variability, other fire regime elements, local expert knowledge, regional variation, accurate fire history mapping, monitoring, and defining fire management goals.

The purpose of this paper is to remind users of the fine print, and encourage improvements to fire intervals for local management.

CONCEPT

This paper refers specifically to the NSW *Guidelines for Ecologically Sustainable Fire Management* (Kenny, Sutherland, Tasker and Bradstock, 2003)[i], and includes direct quotes from that report in italics.

The fire interval guidelines are based on the vital attributes system of Noble and Slatyer, where plant attributes are used to define functional types with predicted responses to different fire regimes. By examining the maturity time of species sensitive to frequent fire, and the senescence time of those sensitive to infrequent fire, a domain of 'acceptable' (predicted to be consistent with maintenance of existing species) fire intervals can be defined.

This approach has been applied to fire management in NSW (Bradstock and Kenny, 2003), (Kenny et al., 2003), Victoria (Cheal, 2010), South Australia (DEWNR, 2013) and Western Australia (Burrows, 2008). The reason that the focus has been on fire frequency based primarily on plant responses is that the vital attributes system for plants provides the necessary framework to do so, and an extensive plant fire response database has been compiled with suitable information. It is recognised that this approach has many limitations, and that a broader range of issues should be considered. However, the state of knowledge of these other issues is variable (Driscoll et al., 2010).

INTERPRETATION – THE 'FINE PRINT'

'These guidelines are not meant to be used as prescriptions'.

No one fire interval will be suitable for all species within any vegetation community. The repetition of fire intervals below the recommended minimum or above maximum will result in the loss of species that are sensitive to frequent or infrequent fire. Likewise, repetition of any

particular fire interval within the acceptable domain will also advantage and disadvantage different species, and lead to the dominance of particular species. To accommodate the requirements of all co-occurring species, variation in inter-fire intervals is required.

MINIMUM INTERVAL

'It should be noted that these are extreme minimum values'.

The minimum intervals given in the Guidelines report, and used for Strategic Fire Advantage Zones within the BFEA Code are based on primary juvenile periods not on seedbank replenishment. An additional 3 years is recommended to allow for building seedbank reserves (Keith, Williams and Woinarski, 2002), and short inter-fire intervals should be followed by an interval that at least allows for this buffer. The Land Management Zone minimum intervals added to the BFEA Code in the 2006 review take this into account.

MAXIMUM INTERVAL

'Considerable uncertainty surrounds these estimates'.

Maximum intervals are based on the predicted senescence time of species requiring fire to re-establish. Most of this data is based on generalisations and assumptions about life-span and seedbank longevity, rather than on quantitative data.

The maximum intervals should thus not be seen as a point at which intervention must be applied; rather areas approaching or beyond maximum interval should be assessed for species diversity and abundance. A decision to apply ecological burning in long unburnt areas should then be based on a landscape assessment of the extent of area involved, and on explicit management goals and priorities. Pre and post-fire monitoring will provide important data to improve the maximum interval guidelines.

Long unburnt vegetation provides important habitat elements (e.g. tree hollows, logs, thick cover) that many threatened fauna species rely on. Long unburnt areas are rare in many vegetation types, and the needs of fauna must be considered in their management.

SPATIAL VARIATION

'Use of fire interval guidelines is dependant on an explicit consideration of the proportion of the landscape potentially affected by either adverse or favourable fire intervals'.

The fire interval guidelines are intended to be applied and assessed at a landscape scale. At least 50% of each vegetation community should fall within the given fire interval domain. This allows potential for recolonisation of species from areas where fire regimes are favourable to areas where they may have declined.

It is important to recognise that a wildfire may occur at any time in the landscape, and under extreme conditions burn through recently burnt areas. If too much of the landscape is managed to maintain a short time since fire, then a large wildfire has the potential to convert this to a short inter-fire interval at a detrimental scale.

Accurate fire history mapping is required in order to analyse the proportion of a landscape or vegetation type within or outside of the appropriate fire interval domain.

OTHER FIRE REGIME ELEMENTS

'Elements of the fire regimes other than frequency were not explicitly considered'.

Fire frequency is the focus of the guidelines as there is a framework and sufficient data to provide management advice at a range of scales. Other elements of fire regimes however should be considered at a local scale and with specific management priorities in mind.

Fire severity is known to affect both mortality and post-fire recovery of species in different ways. Repetition of low intensity fires may lead to decline of species with a heat cue for germination, while repetition of high severity fires may impact structural habitat elements.

The season in which a fire occurs will impact different species depending on how it coincides with breeding and growth cycles. Regeneration will vary with seasonal post-fire conditions, such as temperature, rainfall and drought.

Fire size and extent will influence access to refugia and resources, as well as post-fire herbivory and predation.

DATA ISSUES

'The guidelines and accompanying fire response databases are based on current, available data. There are significant gaps in this data'.

Only species for which enough data on fire response and life history is known are considered in calculation of the fire intervals. Hence the guidelines are biased towards areas where more quantitative data has been collected (e.g. Sydney Basin) and will be less reliable in regions with data gaps (e.g. western NSW).

The Fire Response Databases need to be constantly updated with new information from research and monitoring projects, and the guidelines periodically recalculated.

LOCAL MANAGEMENT

'Interpretation of the guidelines for management should be done in association with local expert knowledge and monitoring programs'.

The guidelines are based on broad, generalised vegetation formations. As such they don't take the needs of highly restricted species or regional variations into account. Maturity rates, and hence appropriate minimum interval, are likely to vary depending on system productivity (i.e. rainfall, temperature, soil type, etc). The process used to produce these guidelines should be applied to a local species list with interpretation from local experts to determine if refinement of the guidelines is necessary.

Assessing the appropriateness of the intervals for threatened ecological communities, and refining them where necessary, is a priority for sustainable fire management. This has been done for EECs of the Blue Mountains (Keith 2010), which provides a valuable example of performing a more detailed analysis as well as also considering and providing operational guidelines for other fire regime elements. Keith (2010) extended the fire frequency intervals to include recommendations for solitary, consecutive and episodic intervals. Fire severity, season, type and size were also considered.

Other ways to make the guidelines more locally applicable include:

- reviewing locally relevant information (e.g. literature reviews prepared through the Hotspots program);
- targeted monitoring or research to fill gaps in fire response data (e.g. Clarke and Knox, 2002);
- validation of guidelines with field research (e.g. Penman, Beukers, Kavanagh and Doherty, 2011); and
- empirical research of species or community response to fire regimes (e.g. Duff, Bell and York, 2013).

The acceptable fire interval domain approach of Kenny et al. (2003) aims to maintain diversity of existing species. Management objectives, more broadly, should be well defined before determining if these guidelines are suitable. Management objectives may range from asset protection, maintenance of biodiversity, enhancement of specific biodiversity values, conservation of threatened species, to restoration of degraded sites. 'Appropriate' fire intervals to achieve these different goals may vary considerably.

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BIOGRAPHY

Dr Belinda Kenny has a background in fire ecology research, environmental fire policy, bushfire risk management, reserve management planning, and fire fighting. Her current position with NPWS Fire and Incident Management Section brings these interests together as the link between research and NPWS fire management policy.

[i] NB This document is cited variously by users as 2003 or 2004. The copyright date is 2003. The date of 2004 on the cover of the document is erroneous.