

## **PRESCRIBED BURNING IN THE SOUTHERN MT. LOFTY RANGES: HOW AND WHY IS THE DECISION TO BURN MADE?**

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### **Abstract**

Preliminary results are presented from a case study being conducted in the Southern Mt. Lofty Ranges region near Adelaide. This region is characterised by high bushfire risk, increasing land use fragmentation and areas of remnant vegetation of conservation significance.

Prescribed burning decisions in the region are made within a context where values associated with the reduction of bushfire risk to human life and assets, may conflict with values associated with biodiversity conservation. Decisions are also made in the legislative context of state Acts which may either compel bushfire hazard reduction activities, such as prescribed burning, or conversely may prohibit the burning of native vegetation.

To understand the ‘how and why’ of prescribed burning decisions a qualitative methodology is used with reference to decision theories, in particular ‘bounded rationality’ and ‘disjointed incrementalism’. To date the research has found that prescribed burning decisions were, until recently, made on an ad hoc basis on most land tenures. This is changing, particularly on public lands, with the formation of inter-government bodies to coordinate and codify the process. Nonetheless, it is evident that political imperatives play an important part in the decision and are arguably a greater influence than empirical knowledge.

Keywords: bushfire, values, decision theory, conservation, hazard reduction.

### **Introduction**

Gill *et al.* (2002) identified that the values and ideas associated with fire management have largely gone undocumented in the scientific literature. This paper presents the preliminary results of research being undertaken to determine what values and ideas influence the ‘how and why’ of prescribed burning decisions and thereby contribute to filling the gap identified by Gill *et al.* Prescribed burning has attracted controversy in Australia since the 1960s with the debate characterised by concerns over the ecological effects of burning and the effectiveness of the process in achieving bushfire hazard reduction aims (Gill and Bradstock 1994; Lindenmayer and Burgman 2005). Those charged with the responsibility of making prescribed burning decisions face the difficult task of reconciling potentially competing objectives of bushfire hazard reduction and biodiversity conservation. This is especially the case where human life and asset protection is juxtaposed with objectives to conserve indigenous biodiversity, such as in peri-urban environments (Whelan and Baker 1998; Whelan 2002; Whittaker and Mercer 2004).

The results presented are from a case study being conducted in the Southern Mt. Lofty Ranges region near Adelaide in South Australia. The data discussed was collected from June to December 2005. This is the first of two case studies being undertaken with the second to be conducted in the Mt. Macedon region of Victoria in 2006. The Southern Mt. Lofty Ranges region is characterised by a temperate climate, areas of remnant vegetation (native vegetation accounts for an estimated 13 per cent of land cover), hilly topography, a recent history of urban and rural development and land use fragmentation (MLRIINRM 2003). The region has experienced numerous significant bushfire events and the entire region is zoned as either an extreme or a high bushfire risk for development purposes under the South Australian Development Act 1993. The region is also listed by the Commonwealth Department of Environment and Heritage as one of the 15 ‘Biodiversity Hotspots’ in Australia, as it supports the largest remnants of woodland vegetation communities in South Australia (Dept. of the Environment and Heritage 2005).

The ultimate aims of this research are to present a descriptive theory of how and why prescribed burning decisions are made and suggest a normative theory on how these decisions may be improved.

## Methods

A case study methodology has been chosen for this work because of its capacity to deal with a full variety of evidence including documents, artefacts, interviews and observations (Yin, 2003). The value of this type of research strategy is that it can discover connections that are not obvious and allow the posing of difficult questions (Flyvbjerg 2001). The case study approach, employing qualitative methods, is particularly useful to address explanatory ‘how and why’ questions in the ‘real-life’ context in which they exist (Stake 1995; Yin, 2003). The methods employed for this research are semi-structured interviews, participant observation and documentary reviews. At the time of writing 25 interviews have been conducted with a range of stakeholders (Table 1), these and participant observation, form the primary data collection process for the research. A further 20 interviews are expected to be conducted to complete data collection for this case study.

<b>Table 1 Interview matrix Southern Mt. Lofty Ranges case study 2005-2006</b>								
Affiliation	Entity represented							
	Government		NGOs			Individual actors		Data code
	Commonwealth	State	Local	NRM	Environment	Indigenous		
Department for Environment & Heritage		3						DEH 1-3
Commonwealth DEH	1							CDEH
Nature Foundation SA					1			NFSA
Current Native Vegetation Council		1						CNVC
Retired Native Vegetation Council							1	RNVC
Aboriginal Community						1		AC
SACFS		3						CFS1-3
Local Govt.			7					LGA1-7
Retired SA Forestry Corporation							1	RFSA
Planning SA		1						PSA
SA Indigenous Flora							1	SAIF
SA Museum							1	SAM
Urban Forest Biodiversity Program					1			UFBP
Fire Prevention Officer				1				FPO
Friends of Park Group					1			FOP
Totals	25	1	8	7	1	3	4	

(Data codes in Table 1 are referred to in the text.)

Secondary data collection has occurred through unstructured key informant interviews and the review of organisational documents such as operational guidelines, guides to regulations and fire management plans. Tertiary data collection has included the review of publicly available documents, relevant legislation and reports. This wide range of data collection enables a triangulation process along converging lines of inquiry and has provided construct validity (Morrison 2004).

## Theoretical position

This research will consider the prescribed burning decision as it relates to three theoretical areas; ecophilosophy, fire ecology and fire behaviour, and decision theory. Prescribed burning decisions, and the values they contain, are posited within overarching ecophilosophical positions. Values may be identified which are located within a spectrum of philosophies ranging from ‘deep ecology’, which would privilege non-human nature ahead of human needs to ‘anthropocentrism’ where human needs would be privileged above non-human nature. The demarcation between different ecophilosophies however may not always be clear (see for example Hay 2002).

Prescribed burning decisions are more explicitly informed by the growing, but far from complete, body of empirical knowledge about fire behaviour and fire ecology. There is considerable empirical and anecdotal support for the view that prescribed burning for hazard reduction purposes is necessary and effective at achieving its objective, although there are caveats concerning site specificity, frequency and spatial arrangements in the prescription design. The recent inquiry commissioned by the Council Of Australian Governments into bushfire mitigation and management gave clear support for hazard reduction burning, whilst recognising the complexities of the process and its execution (Ellis *et al.* 2004). There is also a significant literature that identifies potentially undesirable consequences of frequent hazard reduction burning for vulnerable species (for example Keith 1996; Morrison *et al.* 1996; Cremer 2004). Some regard hazard reduction burning and biodiversity conservation as incompatible; others however, (for example Bradstock and Gill 2001; Wouters 2005) articulate approaches based

on landscape zoning, assessment of ecosystem functional groups and plant vital attributes as guides for prescriptions to accommodate both objectives.

This research will also consider the prescribed burning decision in the context of the body of literature dealing with decision theory. The works of Simon (1957; 1982) and his concept of ‘bounded rationality’ and Lindblom and Braybrooke (1963) and their work on ‘disjointed incrementalism’ are seen as useful frameworks against which to evaluate the decision process. The essence of Simon’s bounded rationality is that humans cannot possibly know and evaluate all information and all options that exist when making a decision, in other words we cannot make a comprehensively rational choice. This does not mean that our decisions are necessarily irrational, but rather, that our rationality is limited or bounded by, amongst other factors, our intellectual capacities, values and organisational environments. Lindblom and Braybrooke accept bounded rationality but are hostile to rationalist views that decision making ought to be a neat step by step process, progressing from a definition of goals through to selection of alternative actions and evaluation of options. They contend that this is simply not workable for complex questions, a category within which prescribed burning decisions comfortably fit. They identify a need for a process that involves a continuum of building out from current knowledge, proceeding by incremental change using trial and error, the foundations of adaptive management perhaps, but labelled by them as ‘disjointed incrementalism’. They also contend that decisions need to be based on a degree of stakeholder agreement. This is applicable in the context of prescribed burning, particularly where objectives for land management may clash, such as in the peri-urban realm where collaboration between disparate parties is needed to sustain land management (for example, Boura 1994). Agreement between parties, politics in other words, is an essential component of fire management, as Pyne (2006) asserts, *‘In the realm of bushfires, politics is not an intervention or a distortion. It is the fundamental arena for deciding what should be done and how to do it.’*

## Results

### *Legislative framework*

The key legislative framework that guides prescribed burning in the region, over various land tenures, is outlined in Table 2, together with the principle agencies that have a role in prescribed burning.

**Table 2: Relationship between responsible agency, land tenure and legislation, Mt. Lofty Ranges 2006**

Legislation	Agency	Land tenure jurisdiction (within case region)
Fire & Emergency Services Act 2005	South Australian Country Fire Service	All private (but has certain powers in respect of all non metropolitan land)
Native Vegetation Act 1991	Native Vegetation Council	All, public & private in respect of planned burning (clearance) of native vegetation
National Parks & Wildlife Act 1972	Department for Environment & Heritage	National parks and conservation reserves
Forestry Act 1950	South Australian Forestry Corporation	Forest plantations and native vegetation reserves
South Australian Water Corporation Act 1994	SA Water	Reservoir and water infrastructure lands

The South Australian Country Fire Service (SACFS) is the key agency, outside the metropolitan area, that may conduct prescribed burning on private lands. Prescribed burning may arise as a result of a landholder request, or the identification of what may be regarded as high bushfire risk fuel loads through the operations of district or regional Bushfire Prevention Committees which are constituted under the *Fire and Emergency Services Act 2005* (previously the *Country Fires Act 1989*). These committees are comprised of a range of personnel from local and state government agencies and the community. On public lands the Department for Environment and Heritage (DEH), South Australian Forestry Corporation (SAF) and SA Water are the most relevant organisations. Under the *Native Vegetation Act 1991* burning of native vegetation stratum is regarded as clearance requiring the approval of Native Vegetation Council (NVC). There are some exceptions relating to asset buffers, access roads and emergency situations. This approval applies to all public and private land tenure although authority has been delegated to DEH to conduct its own assessments, subject to annual review by the NVC, except for wilderness protection areas.

### *Prescribed burning case study background*

Interview participants widely acknowledged that South Australia is in the early stages of using prescribed burning as an environmental management tool whilst its use in the case study region for bushfire hazard reduction has only re-emerged in the last 2 years. This follows a decade or so of reluctance to employ it due to environmental concerns (Interview DEH 3). The SAF was cited as the agency with the longest active experience in prescribed burning, both as part of silvicultural practice and as part of management of its own native vegetation reserves, predominately as a means of reducing bushfire hazard.

The re-emergence of prescribed burning was attributed, in part, to the 'Bushfire Summit' (the Summit) of 2003 convened by the South Australian Government to examine a number of bushfire related issues including *'the desirability of a burn off program of excess fuel loads...'* (Government of South Australia 2003). The Summit was held following the Canberra bushfires of January 2003 and was used to announce a budget increase of \$21m to enhance bushfire prevention and suppression capacities in the state. Within DEH, the agency responsible for the management of the states national parks and conservation reserves, additional funds were provided to create a dedicated fire management section to increase fire management capacity within national parks. The development of prescribed burning guidelines and policy being an important component of the section's work. The Summit, and the investment in fire management that accompanied it, created what was widely recognised as a 'political imperative' for evidence of action in the field, as a Friends of Parks member recalled, with reference to fuel reduction burning, *'it came down from the Minister that there had to be some burns'*.

### *Values and ideas emerging from the data*

The Summit also called for the streamlining of clearance approvals required under the *Native Vegetation Act 1991*. This issue was also on the minds of SACFS officers who, during interviews, were critical of the NVC, who administers the *Native Vegetation Act 1991*, for being too slow in approving applications to conduct prescribed burning on private land (Interviews SACFS 1,2 & 3). They were also concerned that the NVC was being unreasonable in expecting landholders to justify that proposed burns would not cause undue damage. The concerns held by SACFS officers are perhaps an inevitable consequence of the different values that inform the operational objectives of the SACFS and the NVC. Values institutionalised in the legislation under which each organisation is constituted. The SACFS is required under the *Fire and Emergency Services Act 2005* to *'provide services with a view to preventing the outbreak of fires, or reducing the impact of fires'* (Division 2, 59 (1) a). In pursuit of this duty the SACFS regard prescribed burning for bushfire hazard reduction as an effective means, amongst others, of preventing bushfire occurrence and severity (Interview SACFS 1,2 & 3). A key object of the *Native Vegetation Act 1991* is *'conservation, protection and enhancement of the native vegetation of the state and in particular, remnant native vegetation'* (Part 2, 6 (a)), and burning is regarded by the Act as *'clearance'* of native vegetation. The *Fire and Emergency Services ACT 2005* does not disregard the environment, indeed protection of environmental assets is an expected function of the SACFS under the Act nor does the *Native Vegetation Act 1991* or the NVC disregard the need for reasonable measures to protect human life and assets. That it is divergent values that are at the heart of this issue is made clearer by the limitations imposed by time and finite resources. A thorough assessment of prescribed burning impacts on native biota at a given site takes considerable time and expertise to assemble and analyze. However the bushfire threat that high fuel loads may represent is, within the bushfire season, more or less immediate. If high fuel load risks are being identified only as they peak, rather than being predicted, then the pressure to address that risk becomes immediate and the values of conservation and the protection of human life and assets are more likely to clash.

Interviews with those for whom conservation of indigenous biodiversity is a key objective revealed that the concept of applying pre-European fire regimes was broadly accepted as an important process for conserving indigenous biodiversity (Interview UFBP; FOP). This was associated with an awareness that indigenous biodiversity was a product of millennia of Aboriginal fire use and that analogous regimes would be required to achieve conservation goals. The return to, or maintenance of pre-European vegetation communities, was cited as an ideal of conservation efforts (Interview FOP; UFBP). The pre-European ideal appeared to be regarded as synonymous with *'natural'* even though Aboriginal fire use has created what is, in effect, a cultural landscape. Wouters (2005) on the other hand argues that *'too much emphasis has been placed on obtaining an assessment of 'natural' fire regimes'* which he regards as probably impossible to determine.

The prescribed burning debate in Australia has long involved a contention that burning for hazard reduction reasons is incompatible with ecological fire regimes (Gill and Bradstock 1994). This remains contentious in the case study region. In interviews with SACFS and DEH staff, hazard reduction objectives and biodiversity conservation were regarded as mutually achievable outcomes, provided appropriate planning and assessment is undertaken (Interviews SACFS 1, 2 & 3; DEH 2 & 3). However the view expressed by Vickery (2005) that '*It is illogical to suggest that in the Australian context, we can remove fuel without reducing biodiversity*' reflects concerns that continue to be held in conservation circles in the region. Various interview participants also raised the concern that not enough research had been done in the region to make informed decisions and that research findings from other states were not necessarily applicable in the Mt. Lofty Ranges (Interview CNVC; NF; SAIF). Certainly the region is not an homogenous environment and as the Nature Foundation representative cautioned '*simplistic answers were to be avoided and it is not possible to apply the results of research from elsewhere in Australia*'.

The established view that fuel reduction burning could be effective at achieving its purpose was challenged by a research participant who asserted that there is evidence that elevated fuel loads in the region's stringy bark forests (*Eucalyptus obliqua* and *E. baxteri*) actually reduce in the long term absence of fire. This was attributed to the senescence of mid-layer vegetation such as *Acacia pycnantha*. The informant held that mid-layer fuel loads, in these forests, were actually increased by fire frequencies of between 5 and 10 years, as may be applied with hazard reduction burning, due to fire induced generation of many mid layer species (Interview SAIF).

The debate over prescribed burning embodies broader philosophical questions of humanity's engagement with the non-human environment, how nature is perceived and what this means for natural resource management. The desire to conserve native vegetation, and the ecosystems it sustains, and the desire to protect human life and assets are both widely held by the Australian community and are manifest in the legislation that has been discussed here. These desires are more likely to become mutually exclusive when pressure to act compromises a planned and considered approach.

Parsons (1995) in discussing decision analysis and Simon's 'bounded rationality', suggests that decision analysis is not about ensuring that correct decisions are made, but rather, that a good decision making process is followed. This research does not aim to develop a case for or against prescribed burning *per se*, rather it is about critically investigating the decision process so that possibilities for its improvement may be suggested. A process better able to reconcile the divergent values that exist.

## Conclusions

It is evident that prescribed burning within the case study region has until recently, with the exception of SAF lands, been a relatively infrequent activity. However following the stimulus of the Bushfire Summit, conducted in response to the Canberra 2003 fires, prescribed burning activity for hazard reduction reasons has been increasing on public lands, particularly national parks and reserves managed by DEH. The implementation of burning on these land tenures has occurred following investment in human resources to assess and develop a planned and codified approach which at the time of writing is continuing to be developed. On private lands however an overarching landscape scale approach is not yet evident, although its attainment remains a goal. The complexities of landscape scale planning across fragmented private land tenure will require an effective prescribed burning decision making process, one that deals with divergent values and ideas.

## Acknowledgements

This work is conducted with the financial assistance of an Australian Postgraduate Award and the Faculty of Social Sciences at the Flinders University of South Australia. The support of my supervisors, Dr. Tiffany Morrison, Dr. David Bass and Professor Iain Hay and of all those who have participated in this research is gratefully acknowledged.

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