
Reconciling property bushfire preparedness and native vegetation management

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Abstract

Research consistently shows that survival of people and houses during bushfire relies upon a suite of factors that include resident preparedness and behaviour, building design and construction and, property preparedness. Vegetation management is a significant component of bushfire property preparedness. Concurrently, native vegetation clearance is a major cause of both biodiversity loss and land degradation. As a result, vegetation management for property bushfire preparedness may conflict with native vegetation management objectives and vice versa. Such conflict can aggrieve and frustrate those involved in fire safety and native vegetation management. Moreover, inappropriate resolution may reduce community safety and/or lead to unnecessary environmental impacts. Reconciling these two complex and legitimate issues presents a challenge that requires a joint approach between environmental managers, fire agencies and communities. For fire agencies it means providing bushfire risk treatments that are robust enough to effectively mitigate the risk and sophisticated enough to minimise impact on native vegetation values. Aiming to reconcile these two issues, Victoria's Country Fire Authority has initiated a project to work in partnership with the state's Department of Sustainability and Environment and a number of municipalities. This paper describes the project and presents a case study where the issues are being reconciled on the ground.

Introduction

Our vegetation, geography and climate mean that fire is an inherent and integral part of living in Australia. These factors combined with land-use patterns that see development expand into bushland areas result in annual bushfire risks. One of the most hazardous areas, in terms of both human and economic loss, is the urban-forest interface (Boura 1994). That said, people can and do live with the risk and survive the passage of bushfire. Research consistently shows that survival of people and houses during bushfire relies upon a suite of factors that include resident preparedness and behaviour, building design and construction, and property preparedness (Eg. Ramsay *et. al* 1983, Wilson 1984, etc).

The Country Fire Authority Victoria (CFA) works to improve community bushfire preparedness through municipal fire management planning, community education, and through involvement in regulation and land use planning controls such as the Wildfire Management Overlay (WMO). CFA provides advice about vegetation management to improve property bushfire preparedness through its community education approaches. The WMO, being a regulatory control, prescribes vegetation management along with access and water supply requirements to achieve certain bushfire safety objectives.

Concurrently, areas prone to bushfire are often characterised by areas of native vegetation that contain significant flora and fauna. These areas may also be protected by legislation or planning controls such as Environmental Significance Overlays (ESO). Native vegetation clearance is a major cause of biodiversity loss and of overall land degradation (WWF 2001). Victoria is losing 2,500 hectares of native vegetation a year, and the quality of the remaining vegetation continues to decline (NRE 2002). In addition, people settle in these areas for a number of reasons, many of these reasons may mean they wish to minimise any vegetation

modification. As a consequence, managing vegetation for property bushfire safety may conflict with native vegetation management objectives. Conversely, it is equally important that fire safety be incorporated into the management of private land in bushfire prone areas.

Reconciling these contrasting but legitimate land management issues presents a challenge that requires a joint approach between environmental managers, fire services and communities (Llewellyn 1987, Boura 1994). Based on discussions with Victorian policy owners and practitioners, it appears that there is some shared understanding of and attempts to reconcile the various objectives. However, this tends to occur on an ad hoc basis, reliant upon good relations between individuals (Joiner *et. al* 2004). Without a mutual understanding of the respective objectives and reasonable actions to achieve those objectives people involved in either field, including residents and landholders, can become aggrieved, frustrated and confused. Worse yet, inappropriate resolution may reduce community bushfire safety and/or create unnecessary adverse ecological impacts. A shared understanding of the respective objectives, along with sound, practical and consistent advice, is needed to support practitioners of State and local policies in their decision-making. Residents require similar advice in making well-informed decisions about reducing their bushfire risks while responsibly managing the ecological systems of which they are a part.

To provide consistent and reliable ways of addressing the challenges presented, including the provision of appropriate advice, CFA has initiated a project that aims to develop solutions to reconciling property bushfire preparedness and native vegetation management. The project is conducted in partnership with the state's Department of Sustainability and Environment (DSE), and a number of municipalities within a pilot area. This paper describes the project and presents a case study where the issues are being reconciled 'on the ground'.

Project Aim:

The project's primary aim is to develop and give effect to solutions that will enable the achievement of property bushfire preparedness in the context of native vegetation management.

Project Approach:

The project has five main stages, with a strong emphasis on communication throughout. Stage 3 was recently initiated. The five stages are:

1. Identify underlying causes of conflict;
2. Identify potential solutions;
3. Develop draft solutions;
4. Test and refine solutions; and
5. Implement the solutions State-wide

1. Identification of the underlying causes of conflict

Solutions to reconciling the two issues will only be effective if they address the underlying causes of conflict. The first stage of the project therefore aimed to clearly and comprehensively identify these causes of conflict. To enable this identification, contributions were sought from policy owners and practitioners of bushfire safety, native vegetation management and land use planning via extensive discussions, interviews and a two-day workshop. Much of the available literature was also read.

Unsurprisingly, a lack of a shared understanding of the different objectives and a lack of communication were identified as the most frequent causes of conflict. The lack of a shared

understanding was evident in the project’s first stage where people defined bushfire safety, or native vegetation management, or reconciling them, in many different ways. Reconciling issues is difficult when people do not share an understanding of the objectives and as a result, work toward different outcomes. This can lead to confusion, frustration and even active avoidance of communication. Preventing open dialogue and the integration of new information that challenges established views, resists change or learning (Allen 2001). The two-day workshop was conducted to explicitly encourage open dialogue between a range of practitioners. It successfully enabled participants to discuss, debate and negotiate different perspectives. Via facilitation that engendered respect between participants, the workshop also enabled participants to explore and test ideas, and perhaps most valuably, to find common ground.

This common ground is expressed in the workshop’s collective definition of bushfire safety, native vegetation management and what it means to reconcile the two: “*Achieving residents who are informed and prepared to survive the passage of fire and have a realistic assessment of their own risk and responsibility within the context of managing native vegetation and landscapes to conserve and protect ecosystem services and ecological processes*”. This definition was shortened to: “achieving property bushfire preparedness within the context of native vegetation management”. In collectively developing this definition participants shifted their focus from the results of any conflict, toward an agreement to work together to reduce or manage the conflict.

In contrast to the variability of initial definitions, interviewees and workshop participants identified remarkably similar causes of conflict, including the lack of a shared understanding of objectives and a lack of communication. As a result of this similarity, the identified causes of conflict were readily consolidated into four categories or central challenges (Table 1).

Table 1. Causes of conflict consolidated into central challenges

Central challenge	Cause of conflict
Policies & regulations	<ul style="list-style-type: none"> • Competing legislative objectives • Lack of a landscape perspective. Issues considered on a site-by-site basis, which prevents consideration of both objectives and use of the precautionary principle. E.g. identification of areas with high bushfire risk <i>and</i> high native vegetation significance. • Inconsistent application of legislation/policy
Procedures	<ul style="list-style-type: none"> • No standard for planning applications with both issues resulting in inconsistent requirements/outcomes for permits
Personnel skills	<ul style="list-style-type: none"> • Limited number of appropriately skilled personnel • Limited opportunities for people to develop relevant skills
Information/ tools	<ul style="list-style-type: none"> • Lack of sound and practical information regarding bushfire risk treatments that effectively mitigate the risk and minimise adverse impacts on native vegetation • Misperceptions about bushfires resulting in more vegetation modification than is necessary or effective to reduce bushfire risk • Limited understanding of effective community education approaches.

2. Identification of potential solutions

It was clear from the central challenges identified, that reconciling the issues requires the following:

- Policy owners and practitioners with a shared understanding of and commitment to the respective objectives;
- Communication (open dialogue) between relevant stakeholders, that facilitates a shared understanding and acceptance of the respective objectives;
- A policy framework that effectively considers both property bushfire preparedness and native vegetation management simultaneously, supporting a landscape perspective;
- Consistent and reliable procedures used in the application of policy/regulation;
- Practitioners with the skills and knowledge to maintain the integrity of both objectives in the implementation of policy/regulation; and
- Sound and practical information regarding bushfire risk treatments that are robust enough to effectively mitigate the risk and sophisticated enough to minimise impacts on native vegetation values. These treatments should be applicable in both the regulatory and voluntary (community development) arenas.

3. Development of the solutions

The project is currently at this stage. A collaborative approach continues to be used in the development of the identified solutions to ensure that policy owners and practitioners:

- Have a sound understanding of how and why the solutions work;
- Build relevant skills and knowledge;
- Increase their confidence and capacity in using and advocating the solutions; and
- Provide honest and constructive criticism of the practical application of the solutions.

Experience in other projects (eg South East Queensland Fire and Biodiversity Consortium (SEQ FABC)) suggests that whilst a collaborative approach may take longer, by building skills, interest and capacities that continue even after the project ends, the sustainability of the project's aim should be supported (Llewellyn 1987, Connick and Innes 2003, Allen 2001). The CFA project is using a number of collaborative approaches to develop and eventually implement the identified solutions.

To facilitate a policy framework that appropriately considers both native vegetation management and property bushfire preparedness objectives, CFA initiated establishment of a relatively informal group that represents relevant policy owners. The group will work to ensure that further policy development and implementation effectively consider both objectives. It is intended that this group will advocate and support initiatives developed in the pilot area by providing a forum to address identified issues and by providing State level guidance regarding priorities and capacities for implementation.

Refinement of procedures and development of practical advice/tools will occur using working groups that will:

- Outline the desired guidelines or procedures;
- Identify information and tools that already exist which may meet these needs;
- Identify any gaps in information required, seek out and include this information; and
- Develop drafts for testing.

A number of organisations have done extensive work in attempting to reconcile the two objectives. Consequently, in developing the practical advice/tools all effort will be made to

not “reinvent the wheel”, but rather to build upon (and recognise) that which already exists. Work that may provide worthwhile input include:

- CFA’s WMO Applicant’s Kit (CFA 2002);
- Land for Wildlife’s draft *Planning for fire safety and biodiversity* (NRE 2001);
- SEQ FABC (2002) *Individual Property Fire Management Planning Kit*;
- The integrated approach described by Ramsay and Rudolph (2003); and
- A number of local council approaches Eg Shire of Yarra Ranges.

The project also aims to eventually work with existing land management and bushfire safety programs such as Greening Australia, Land for Wildlife and Community Fireguard. To develop and support appropriately skilled personnel, the intent is to also work toward the availability of appropriate training for practitioners.

4. Test and refine the solutions

The draft solutions will be developed by the end of 2004 and will be field-tested in a number of locations across the State during 2005. Field-testing will occur subsequent to preliminary work to strengthen communication between relevant practitioners. This testing aims to assess the efficacy of the solutions and to ascertain whether there are other issues that have not been identified. For example, there is a potential for additional issues to exist in councils with relatively different socio-economic circumstances

A Case Study –

Reconciling property bushfire safety and native vegetation management on the ground

The preceding information describes an overall project process. However, a large part of the challenge rests in the practical interpretation and application of policy. That is, how do people actually achieve property bushfire preparedness in the context of native vegetation management ‘on the ground’? The following presents a case study where, with assistance from a number of bushfire safety, native vegetation management and land use planning practitioners, a property owner has been able to improve their property’s bushfire preparedness and biodiversity.

Background:

A landholder, who is also a Community Fireguard member, approached both their Fireguard facilitator and local council for guidance in managing their property’s bushfire risk in an ecologically sustainable manner. To support the landholder’s initiative, practitioners from Parks Victoria, CFA and Nillumbik Shire were invited to meet on site to discuss the issue, with supportive information from DSE’s Regional Native Vegetation Officer. The meeting provided the landholder an opportunity to ask questions and develop their own plan for achieving their aim. Community development experience suggests that policies and strategies are more effective when they are well understood by the affected community, which feels ownership and control and, supports their implementation (CFA 2003). When landholders feel ownership and control they are more likely to implement and maintain their land management actions.

Context

The property sits on the banks of the Yarra River and is subject to a number of planning controls. It is within a designated environmental rural zone, the purpose of which includes the conservation and permanent maintenance of flora and fauna species, and areas of scientific interest and natural scenic beauty or importance. It is subject to an Environmental Significance Overlay (ESO), the purpose of which is to protect and enhance sites of faunal

and habitat significance and strategic habitat links. The property is also within a proposed WMO. The purpose of the WMO is to ensure that land use and development includes adequate fire protection measures, does not significantly increase the threat to life, property and the environment and, does not significantly increase the likelihood, occurrence or spread of wildfire. In addition, in terms of bushfire preparedness, consideration had to be given to the fact that vehicle access and egress to the property is limited because it is situated at the end of a single-lane dirt road.

A local myrtaceous-shrub that reaches 2-10 metres in height has established dense cover over large areas of this and neighbouring properties. The shrub has invaded and dominated after human-induced disturbances such as land clearing and fragmentation of original floristic communities. Grazing has little impact because the species is unpalatable to both indigenous and introduced fauna. In dense stands the species is considered an environmental weed because it out competes and suppresses understorey vegetation, reducing plant diversity. Like many other myrtaceous-shrubs, this shrub has a reputation for being difficult to ignite under controlled burn conditions. However, given critical wind strength, where it does ignite, in dense stands it can burn with relatively high intensities and considerable flame lengths. At this site, dense stands of these shrubs surrounded the house from about 5-10 metres to a depth of more than 200 metres. As a result, it represented an extreme elevated fuel hazard (NRE 1999) which, should it ignite, would have posed a threat to the house.

As a consequence of these issues, the landholder's primary aim was to reduce the fuel hazard and improve plant diversity via the removal and modification of the myrtaceous-shrub. However, with a few exemptions, under the ESO, a permit was required for the removal, destruction or lopping of any vegetation. Additionally, any intended vegetation management had to avoid erosion and, protect the riparian vegetation and rare flora species.

The overall approach

The landholder decided that a Property Management Plan (PMP) would best assist their bushfire preparedness and native vegetation management plans. With a request that the practitioners provide some joint guidance, the landholder has developed a plan based on the municipality's PMP proforma. The plan includes the following components:

- Objectives;
- Identified fire risks and assets requiring protection;
- Identified ecological assets – particularly those requiring protection from vegetation modification;
- Potential approaches to reduce fuel hazards and improve plant diversity, an analysis of the potential impacts of those approaches and therefore alternatives;
- Selection and implementation of approaches; and
- Monitoring and review of plan.

The vegetation management

Appropriate vegetation management is one of a suite of factors required for the survival of people and houses during wildfire. It must be considered in conjunction with other factors known to be vital in bushfire survival - building construction and design, and occupant preparedness and response. Although this landholder has a 'personal' plan, there were limited opportunities to retrofit the construction of the house. Consequently, a greater emphasis had to be put on vegetation management to mitigate the bushfire risk.

Fortunately, removal of the dominating environmental weed could create an effective defensible space whilst simultaneously providing an opportunity to improve local plant diversity. Appropriate vegetation management ideas for improving plant diversity were gleaned from Parks Victoria representatives who have started trialling different techniques to manage this particular plant species, which is presenting similar problems in a number of Victoria's State parks. Decisions regarding the area and vegetative structure of the defensible space were informed by fire science. Using the assumptions underlying CFA's WMO Applicant's Kit, potential flame lengths and the distance at which the heat flux¹ would be less than 29kW/m², were calculated using standard fire behaviour models. Other assumptions were 1:50 year (Ash Wednesday) fire weather conditions² and a steady state fuel load of 25 t/ha. The site assessment uses these calculations to derive the area of defensible space required.

A defensible space, as defined by the CFA WMO Applicant's Kit, has an inner and an outer zone. The outer zone aims to prevent crown fires and reduce the chance of direct flame contact and radiant heat from the unmanaged vegetation igniting the building (Maughan *et. al.* 1999). It aims to achieve this by keeping the overall fuel hazard at or below moderate, equivalent to that of DSE's Fuel Management Zone 1. The inner zone aims to mitigate the effects of fire in the outer zone by again preventing ignition of the building by the same two mechanisms (Maughan *et. al.* 1999). Creation of a defensible space also aims to provide residents an area in which they can effectively defend their home from ember attack. Based on CFA's advice, the landholder is now working to achieve the following vegetation structure to create a defensible space around their home:

- Within the first 10 metres immediately around the house:
 - Low surface fuel hazard
 - Grasses no more than 100mm tall and leaf litter less than 10mm deep
 - Low elevated fuel hazard on at least 50% and no more than moderate on the remainder
 - No elevated fuel on at least 50%. On remaining elevated fuel, sparse with little dead material.
 - Any dry shrubs are more than 10 metres from the house.
 - No trees are overhanging the roofline.
- Within the remaining 70 metres of the identified defensible space (during the fire danger period):
 - Low to moderate surface fuel hazard on at least 80%
 - Grasses kept at no more than 100mm tall and leaf litter less than 20mm deep
 - Low – moderate elevated fuel hazard on at least 50% of the area
 - Re-establishing, locally indigenous shrubs are encouraged to form clumps with approximately 10 metres between each clump
 - With management of surface, near surface and elevated fuels, the contribution of bark fuels to direct flame or radiant heat will be significantly reduced.

Implementation

Without ongoing land management, complete removal of the environmental weed, particularly over such a large area, would have created adverse ecological impacts. Without

¹ 29kW/m² is the radiant heat flux at which wood ignites spontaneously after prolonged exposure. Drysdale (1985)

² Ash Wednesday, Melbourne Airport 1500- Drought index 120, Drought factor 10, temperature 41.2, relative humidity 5% and wind speed 45kph

maintenance, the defensible space would also have been lost. As a result, following removal of the environmental weed, locally indigenous grasses will be established, scattered or clumped locally indigenous trees and shrubs will be guarded as they re-establish, and any emergent seedlings of the environmental weed will be removed. It is the landholder's intention that within the defensible space, thinning out the environmental weed and tree-guarding locally indigenous species will allow for some eventual 'natural' competition. It is hoped this will eventually reduce the need for more intensive land management.

Because the PMP aims to improve the property's plant diversity, local council permission was granted for the removal of the myrtaceous shrubs. In fact, the Shire's biodiversity incentive scheme will provide funding for the exclusion plots, tree guards and seedlings of locally indigenous grasses. The landholder is hoping to garner assistance from a Green-corps group to complete removal of the bulk of the environmental weed. Parks Victoria are keen to be kept abreast of the control of this particular species' and DSE are satisfied that this approach should achieve a "Net Gain"³ for the property's native vegetation (NRE 2002). CFA is satisfied that the landholder and property's bushfire preparedness has been improved within the context of native vegetation management.

Relationship to project

This case study has identified a key step that should be incorporated into the refined planning permit application process. It has also provided some indicative land management principles that may be incorporated into the practical advice and tools.

To expect that each property would receive a joint site visit from a number of practitioners is unrealistic. However, it is evident that having input from relevant practitioners in the initial stages of a proposal's development, can lead to more holistic, practical and acceptable outcomes. Indeed, workshop participants suggested a couple of simple yet more efficient means of achieving this input that would improve the overall permit application process. Both approaches would also enable the provision of consistent advice to applicants. The two suggestions are:

- Provision of pre-application advice to include practical guidance on meeting both bushfire preparedness and native vegetation management objectives; and
- A regular meeting of all relevant practitioners to discuss applications where achieving both objectives is an issue. This group would then provide advice to planners who undertake assessment of such applications in the first instance.

Although not a new concept by any means, this case study also highlighted how readily bushfire preparedness activities based on risk management principles, and native vegetation management objectives, might be simultaneously incorporated into a Property Management Plan or Whole Farm Plan. The key components of such a plan were outlined in the 'overall approach' section.

Conclusion

Reconciling property bushfire preparedness and native vegetation management objectives presents a challenge that requires a joint approach between environmental managers, fire services and communities. Enabling this relies upon:

³ A reversal, across the entire landscape, of the long-term decline in extent and quality of native vegetation, leading to a Net Gain (NRE 2002).

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- Policy owners and practitioners with a shared understanding of and commitment to the respective objectives;
 - Communication (open dialogue) between relevant stakeholders, that facilitates a shared understanding and acceptance of the respective objectives;
 - A policy framework that effectively considers both bushfire safety and native vegetation management simultaneously – that supports a landscape perspective;
 - Consistent and reliable procedures used in the application of policy/regulation;
 - Practitioners with the skills and knowledge to maintain the integrity of both objectives in the implementation of policy/regulation; and
 - Sound and practical information regarding bushfire risk treatments that are robust enough to effectively mitigate the risk and sophisticated enough to minimise impacts on native vegetation values. These treatments should be applicable in both the regulatory and voluntary (community development) arenas.

Whilst the above seeks to enable theoretical reconciliation of the issues, a large proportion of the challenge still rests in the interpretation and implementation of the objectives in a practical sense. That is, reconciliation of the issues ‘on the ground’. Whilst the case study presented here depicted a situation where the objectives could be relatively easily reconciled, it is recognised that there are and will be more complex and difficult cases. It is envisaged that the above solutions will provide a consistent means to identify, and discuss the issues to ensure that at the very least, both objectives are considered simultaneously and subsequently used to inform decision-making. The project seeks to use other case studies to inform development of the solutions and, to eventually illustrate their practical application.

Draft solutions will be produced by December 2004, with a minimum 12 months field-testing and refinement, before statewide implementation. A monitoring and evaluation program will also be established to assess the solutions efficacy in the long-term. That is, the program will assess whether property bushfire safety is actually achieved within the context of native vegetation management. The most crucial and beneficial aspect in reconciling the issues is facilitating communication between policy owners and practitioners of bushfire preparedness, vegetation management and land use planning.

References:

Allen, W.J. (2001) *Working together for environmental management: The role of information sharing and collaborative learning*. Chapter Two - *the role of adaptive management within sustainable development*. PhD (Development Studies) Massey University, New Zealand.

Boura, J. (1994) *Reconciling fire protection and conservation issues in Melbourne’s urban-forest interface* Fire Management Quarterly No. 7.

Connick, S. and Innes, J.E. (2003) *Outcomes of collaborative water policymaking: applying complexity thinking to evaluation* In Journal of Environmental Management **46** 2 2003.

Country Fire Authority (2002) *Building in a Wildfire Management Overlay – Applicant’s Kit*.

Country Fire Authority (2003) *Strategic direction for CFA Community Development*.

Drysdale, D. (1985) *An introduction to fire dynamics*. John Wiley and Sons, cited in Maughan *et. al.* (1999) *House safety zones: a theoretical model* (Unpublished).

Joiner, R., Adair, J. and Bosomworth, K. (2004) *Bushfire mitigation in environmentally significant areas on the urban-interface*.

Llewellyn, P.V. (1987) *A perspective on people and conflict in land management planning* In Fire Management on Nature Conservation Lands, Department of Conservation and Land Management Western Australia, May 1989.

Maughan, D., Krusel, N, Boura, J and Caling, T. (1999) *House safety zones: a theoretical model* (Unpublished CFA internal paper).

NRE (1999) *Overall Fuel Hazard Guide*. McCarthy G.J., Tolhurst K. and Chatto K. Natural Resources and Environment.

NRE (2001) Draft *How to plan for fire safety and biodiversity for conservation – a guide for Land for Wildlife landholders*. Department of Natural Resources and Environment.

NRE (2002) *Victoria's Native Vegetation Management – A Framework for Action The State of Victoria*
The State of Victoria, Department of Natural Resources and Environment.

Ramsay, G.C., McArthur, N.A. and Dowling, V.P. (1983) *A survey of houses involved in the Otway Ranges Fire, February 16, 1983*. CSIRO Division of Building Research - Highett.

Ramsay, C. and Rudolph, L. (2003) *Landscape and building design for bushfire areas*. CSIRO Publishing.

SEQ FABC (2002) *Individual Property Fire Management Planning Kit* South East Queensland Fire and Biodiversity Consortium.
<http://www.gu.edu.au/school/asc/fire2/home.html>

Wilson, A.A. G. (1984) *Assessing the Bushfire Hazard of Houses: A Quantitative Approach* RFRC Technical Paper No. 6. Rural Fire Research Centre Victoria, Australia

World Wildlife Fund & the Humane Society (2001) International. Environment Protection and Biodiversity Conservation Act 1999 - Fact Sheet.