TITLE PAGE

Perceptions of Preparedness for Bushfire: A Case Study of Tamborine Mountain

Thesis submitted by Luke John BALCOMBE (BA Leisure Mgt.)
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for the degree of Master of Science
in the School of Tropical Environment Studies and Geography
James Cook University

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I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Disclaimer

The contents of this report include research results and analysis from a case study which was intended to inform relevant stakeholders of issues related to bushfire awareness. Participants were informed of the purposes of the research according to ethics procedures established by James Cook University and the Queensland Fire and Rescue. Therefore, the persons and institutions involved waive responsibility for any misuse of information.

Glossary of Terms

Bushfire: A bushfire is any fire in native bushland. Fires which have been purposely lit for fuel reduction or to meet ecological imperatives are known as "controlled burns".

Fire: Fire is the combustion of any material, including bushland.

Fire Risk: Risk is a given asset's degree of exposure to damage by fire. Risk can vary over time and can be managed through human intervention. As such the risk to any particular asset at any particular time depends not only on those elements used to determine potential bushfire hazard but also factors such as: proximity of the asset to fire fighting services; access to and around the asset; appropriate landscaping; house site location and design; and fuel reduction measures.

Fire Breaks: Fire breaks refer to any natural or man-made elements in the landscape that can impede the progress of a fire and/or provide access so as to create an impediment to a fire. Fire breaks provide access to otherwise impenetrable bushland areas; a means of evacuation for fire fighters and residents; and suitable locations from which to backburn so as to stop an advancing bushfire. Fire breaks include elements such as the following: fire retardant species and vegetation communities; man-made or natural water features (creeks, dams, rivers, streams); walking/riding trails; roads and driveways of any construction and type; man-made landscaping features (lawns, rock/ brick garden walls); and substantially reduced fuel zones (created by selected thinning).

Fuel Reduction: The reduction of fuel build up performed generally before the onset of the fire season. This includes but is not limited to: reduction or removal of accumulated fuel by lopping, chipping, crushing, slashing; prescribed or controlled burning; planting of 'green firebreaks' to replace existing highly combustible vegetation.

Potential Bushfire Hazard: Potential bushfire hazard is an indication of the potential of an area to carry bushfires, based upon its physical characteristics. For purposes of this report, these characteristics comprise vegetation, slope, aspect and fire history.

Glossary of terms were sourced from the Gold Coast Bushfire Management Strategy (Gold Coast City Council 1998, iv-v).

Abstract

The research explored perceptions of preparedness for bushfire-related matters at the rural-urban community of Tamborine Mountain. A literature review expressed the need for changes in bushfire mitigation/management as a result of the need for increased self-reliance. The social construction of risk methodology was applied to a multi-method case study to derive and deliver an analysis of agreements and differences in the perceptions/expectations of fire services and the community (see results below).

How the fire services' and the community's perceptions/expectations agreed

1.	There are varied degrees of perception regarding bushfire risk.
2.	Experience with fire appears to be related to awareness of associated risks.
3.	Risk awareness does not appear to be related to recent Australian bushfire events.
4.	The overall view was that fire breaks are a necessary fire management initiative.
5.	The local bushfire season was perceived to be from early spring to summer.
6.	There is a need for Bushfire Management Plans to be effectively implemented.

How the fire services' and the community's perceptions/expectations differed

Fire services' perspective	Community's perspective
1. Most people in the community would rely on fire services to respond in the event of a fire.	1. At least half of survey respondents reported they would not rely on help from fire services in the event of a fire.
2. Most people are unaware of the bushfire risk.	2. Most people reported being aware of the bushfire risk but have other priorities in their life that take precedence.
3. The public expects things to be done for them.	3. The survey results indicated that individual householders see themselves as the most responsible for personal and home safety.
4. Controlled burns are not wanted by the public.	4. Respondents supported controlled burns as long as they are carefully done.
5. Provision of advice is possible but can not tell residents they need to take action.	5. Respondents reported feeling frustrated that specific advice is not provided.

Bushfire-related matters that need further resolution

Also important for the basis of discussion are some bushfire-related matters that need further resolution. These matters are separate from how the perceptions/expectations agreed and differed because they were solely from either the fire services' or the community's perspective (as represented below).

Bushfire-related matters identified through interviews with the fire services
1. Fire services perceive there is confusion within the community about the roles of urban and rural fire brigades.
2. Fire services want to improve their capacity to convert data and information relevant to bushfire mitigation and management into knowledge to guide decisions.
3. Fire services were interested in how they can inform the public of the need for preparation against the risk of bushfire without sensationalising the topic.
4. Fire services see that it is necessary to find ways of improving the community's participation in bushfire mitigation and management.

Bushfire-related matters that arose from the community survey and community group interviews
1. Community groups seek operation of optimum controlled burn return intervals.
2. Research data indicated a high proportion of retired people in the community. Strategies need to be developed to effectively engage such resources of time and knowledge.
3. Survey respondents indicated that they are not confident in the costs of protecting property against fire and bushfire safety aspects to do or use if the need arose.
4. A wide range of media was identified as being the preferred way of receiving information, direct engagement with fire services was the least preferred.

Survey and interview results were interpreted into the key research findings (as presented on this and the previous page) and were used as the basis of discussion. The research findings were distilled into patterns of language and further summarised into a common language so that they could be compared and combined with similar research

such as the findings and recommendations of State and Federal Governments of Australia. A common language related to preparedness for bushfire has the potential for fire services, Governments and communities to move forward with bushfire community education efforts. The research findings indicated that the community's preparedness for bushfire was especially associated with the topics of risk perception, experience of fire, confidence in bushfire safety aspects and responsibility for life/property protection and less associated with controlled burning acceptance, impact of educational efforts and cost/effort required.

The research explored contemporary bushfire issues in an at-risk-from-bushfire Australian rural-urban locality adjacent to and mixed amongst protected areas. The term "marginalised" can be used to describe the landscape of some places partly as a result of the effects of bushfire. Some people are "marginalised" because of how their perceptions/situation regarding bushfire-related matters shape their behaviours and attitudes towards preparedness for bushfire. This finding is of particular concern to fire services throughout Australia as are expanding rural-urban interface areas, difficulties in impacting upon targeted areas for community education and the possible increase in the incidence of adverse weather conditions. The current situation is that citizens need to be aware of their exposure to hazardous conditions, and share responsibility for the mitigation of bushfires.

The research provides the relevant information to understand preparedness for bushfire issues from the local fire services' and an at-risk-from-bushfire rural-urban community's perspectives. Where there is agreement between fire services and the community, investment in communication is about reinforcing shared perceptions/ expectations. The differences in perceptions/expectations highlight those areas that need particular attention by fire services and communities alike. It was an important priority for the research to effectively capture certain locals' perspectives, especially those with fire experience so that such invaluable knowledge is recorded. The case study illustrated a snapshot of a rural-urban community with bushfire-related matters as a medium to communicate that. This thesis provided an unbiased account of stakeholder perspectives with an emphasis upon recognition of the different constructions of bushfire risk within a community as a part of the transition towards increased self-sufficiency for bushfire preparations and shared responsibility for the protection of life and property.

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Chapter 1
Introduction

Fire authorities and citizens increasingly recognise that land management agencies and local fire services face difficulties conserving life, resources and property in high risk to extreme bushfire conditions. As a result, Australian bushfire mitigation and management is moving towards increased community self-sufficiency, whereby individuals and communities accept more responsibility for the protection of life and property in the event of a bushfire. Also associated with the view towards increased self-reliance is a growing recognition that private property owners bear a margin of responsibility for protecting their own safety and property. Understanding a community's perceptions of fire hazard, their view of the role of fire services and their own role in hazard mitigation and response is necessary if individuals are to take responsibility for their own safety, develop their own bushfire mitigation strategies and undertake preparations against the risk of bushfire.

There is particular concern for rural-urban interface communities where they are exposed to higher levels of bushfire risk. Rural-urban interface communities are an increasing trend for varied reasons such as for aesthetics of the landscape, cheaper house prices and reduced crime, less pollution and crowding (Hugo 2002, Monroe et al 2003). Fire services are concerned that many homeowners who move to rural-urban interface areas are not fully aware that they are living with increased risks from fire (Koperberg 2003, Queensland Fire and Rescue Service 2004, Smalley 2003). People who choose to live in the rural-urban interface need to have a good understanding of fire and take responsibility if they place themselves at risk, and fire services have a responsibility to inform people about how to make their properties safe and how to look after themselves (Cheney 2004a).

Fire services have not traditionally sought to understand the community's perception of risk as an important component of bushfire mitigation. This research was undertaken with the view that it is possible that fire services may have perceived bushfire risk differently to the communities they serve and vice versa. In particular, there was a need to explore perceptions of preparedness for bushfire and the role of fire services and the

community in the implementation of bushfire mitigation efforts. An understanding of these different views about bushfire hazard and preparedness could help bridge communication gaps between fire services and the communities they serve. For fire services in particular, it is useful to understand the community's perceptions of bushfire risk in order to develop methods to assist the community in becoming better prepared against the risk of bushfire.

A case study of the fire services' and community's perspectives on bushfire preparedness at Tamborine Mountain (in south-east Queensland) explored the needs, beliefs, attitudes, perceptions and expectations of the local stakeholders.

The aim of the research was to:

- Identify the way bushfire risk is perceived in a rural-urban community to compare agreements and differences with fire services' perceptions.

The objectives of the research were to:

- Identify the perceptions of bushfire risk held by members of the Tamborine Mountain community and fire service personnel for the area;
- Identify the expectations held by the community and fire services regarding fire service delivery;
- Compare community perceptions and expectations with those held by fire services and other stakeholders;
- Identify areas where communication might be improved or built upon.

The background context and theoretical approach to the research are presented in Chapter 2. The qualitative and quantitative research methods which were used for the case study are presented in Chapter 3. A profile of the Tamborine Mountain community and perspectives of fire services and the community are presented in Chapter 4. The results of the community survey and interpretation of the case study results are presented in Chapter 5. A discussion of agreements/differences between case study stakeholders and matters for further resolution are presented in Chapter 6. The key research findings are discussed in more detail in Chapter 7. Chapter 8 provides the conclusion to the thesis and some implications of the research.

Chapter 2

Bushfire and People – The Australian Context

Introduction

Bushfires are an inherent part of the Australian environment (Ellis et al 2004: xi). Bushfires started by lightning strikes were part of the Australian environment before human settlement of the continent. Aboriginal arrival to Australia (considered to be between 40,000-70,000 years ago) resulted in an increased frequency in the incidence of bushfires, a pattern which was continued upon European settlement (Hallam 1985, Florence 1996). "Fire has shaped the life of everything that exists in Australia, from the composition and geography of native vegetation, to the character and lifestyle of both the Aborigines and the European settlers" (Pyne 1991: 3). The geographic location of Australia and its topography make almost all vegetation types in the country prone to fire, and many have evolved to utilise fire in their regeneration (Cheney 1995, Florence 1996).

Fire ecology

In Australia there are regional differences in the frequency and intensity of bushfire. The south-eastern corner of Australia, south of a line between Adelaide and Sydney, is particularly vulnerable to severe fire weather due to weather systems that can bring hot, dry air from the centre of the continent and very strong, dry winds from the Southern Ocean (Cheney 1995). The House of Representatives Select Committee on the Recent Australian Bushfires (2003, 409) observed that "severe fire behaviour typically occurs when there is a coincidence of factors conducive to the ignition and spread of fire, including: stressed vegetation; maximum fuel availability - lengthy period since areas were burned, high availability of grass/shrub/bark fuels; very high to extreme periods of fire behaviour; and prolonged summer dry spells that follow a dry winter and/or spring". The south-eastern parts of mainland Australia and Tasmania are also especially vulnerable to bushfire because they have tall forests which produce heavy fuel loads and are juxtaposed with relatively densely populated urban areas (Cheney 1995). Therefore, the densely populated rural-urban interface areas close to fire-prone bushland of south-eastern Australia (including Tasmania) have been pinpointed by fire authorities as being the most intense bushfire-prone areas of Australia.

Australia has experienced a number of other dangerous bushfires; for a list of major bushfire events, see Appendix A. There are some places and times which bushfires are more likely to naturally ignite due to weather, climate and landscape considerations. Bushfires in Australia can grow very rapidly and quickly become uncontrollable. As an example, the Bendora fire in the Namadgi National Park, which contributed to the firestorm that destroyed 500 homes in Canberra on the 18th of January 2003, grew from around 100 square metres at 5pm to 200,000 square metres by 11am the following day (Doherty 2004). It is the impact that bushfires have upon the lives and property of people that makes them of concern.

Costs and impacts of bushfires in Australia

Due to the diversity of Australia's climate and landscape, and the way in which some very large individual bushfires can influence total costs, it is useful to consider annual average cost of bushfire from a state/territory perspective. There were some difficulties collecting information. Firstly, the most contemporary accessible information from the Australian Government on the annual average costs of bushfire was limited to data up to 1999. Therefore, recent data was not included. This information was considered to be satisfactory overall since the aim was to identify long-term patterns of major bushfire events. Also, the information was obtained from the Commonwealth's Bureau of Transport and Regional Economics (BTRE) which reported that most states and territories pool resources of more than one agency to fight bushfires (BTRE 2001). The BTRE indicated that the data was reported from one agency per state/territory to reduce duplication and for the case of Victoria, a range was used because two agencies were involved.

The economic impact of bushfire appears to have been most detrimental in the south-eastern states of Australia. Bushfires in New South Wales, Victoria, South Australia and Tasmania represented 94% of Australia's average annual costs of bushfire disasters. The average annual cost of bushfires in Western Australia was higher than Queensland's comparatively low economic costs, yet lower than south-eastern Australian States (BTRE 2001, 35). The average annual cost of bushfire disasters is just 7% of the cost of other disasters including floods, cyclones, earthquakes and storms (BTRE 2001).

Between 1967 and 1996, 42% of the average annual economic costs of bushfire were accrued in Victoria, 22% in NSW, 15% in South Australia, 14% in Tasmania and 6% in Western Australia. Queensland was reported as having accrued only 0.5% of average annual costs for bushfires in Australia. The BTRE figures in 2001 were skewed by a relatively small number of particularly devastating fires, and also because they were published before the January 2003 fires in the Australian Capital Territory (Willis 2004, 1). There was a zero average annual cost for Northern Territory which belies the very large number of fires and acreage that burns in the Northern Territory every year; it appears that these fires burn without incurring economic costs to lives or property. Victoria, however, occupies a small percentage of the total Australian land mass and experiences only a small proportion of the total number of bushfires that burn each year, however, the state's climate and landscape make it disproportionately vulnerable to the effects of bushfire.

In the past five years, Australia has incurred increased economic costs, environmental and social impacts due to bushfire. Each year ‘disaster-level’ bushfires cost Australia an average of $77 million, though this can vary significantly from one year to another (BTRE 2001: 44-46). Between 1967 and 1999, Australia was affected by 23 bushfires where the insurance cost was greater than $10 million. The total cost of these bushfires is estimated to have been more than $2.5 billion, though the BTRE report noted that it is not clear whether this amount includes damage to forestry. The value of forest resources can be a significant component of bushfire damage. Following the January 2003 bushfires in the ACT, which caused some $300 million damage, the ACT government received an insurance payout of $52 million for the loss of much of the ACT's forest industry (Sydney Morning Herald 2004: 1). The figures for the economic costs of bushfire have not included the social and environmental costs to Australia.

Since 1926 more than 250 people have been killed by bushfires in Victoria (Kapardis et al 1983: 244). Major events have included the 1939 Black Friday bushfires which burned almost two million hectares, claimed 71 lives, burned 1,000 homes and cost $350 million (in 1998 dollars; Department of Sustainability and Environment 2004, BTRE 2001: 46). In 1967, the extreme Black Tuesday bushfires in south-eastern Tasmania caused the loss of 62 lives and 1400 homes (COAG Inquiry 2004). In 1983, a combination of weather, fuel and ignition factors that developed on one day led to the

Ash Wednesday fires in Victoria and South Australia: Seventy five people lost their lives in those fires, 2,545 buildings were destroyed and over 390,000 hectares of country were affected (Trevitt and Ryan 1995a).

In January 1994 almost all of coastal New South Wales experienced an extended period of extreme fire weather. Between 27 December 1993 and 16 January 1994, 800 fires started, burning approximately 800,000 hectares: over 200 houses were destroyed, mostly in urban areas of Sydney, while many others were severely damaged and four people, including two firefighters, were killed (Trevitt and Ryan 1995b). During the Christmas period in 2001 more than 450 bushfires burned throughout New South Wales (Drabsch 2003: 3). Responding to these fires required 1,695 fire fighting equipment units, 109 aircraft and more than 29,000 personnel from 50 organisations: "Despite these efforts 754,000 hectares of bushland were burned, 7,000 head of livestock were killed and 109 homes were destroyed. No human lives were lost, although an uncountable number of non-livestock animals doubtless perished and the financial cost of these fires was estimated to be around $100 million" (Drabsch 2003: 3).

Fires in other parts of Australia have also been costly. The firestorm that hit suburbs of Canberra on the 18th of January 2003 destroyed more than 500 homes, took four lives and caused more than $300 million in damage (McLeod 2003: 1). The Coalition of Australian Governments' (COAG) report, *National Inquiry on Bushfire Mitigation and Management* (edited by Ellis et al 2004) was prompted in part by the severity of the 2002–2003 fire season and its impacts. Ellis et al (2004) mentioned that severe drought conditions and above-average temperatures prevailed across much of Australia, creating high-risk conditions. Ten people lost their lives; city suburbs, rural towns, farms, plantation forests and infrastructure were damaged; property losses exceeded $400 million; and there were significant environmental impacts. In southern Australia, the fire season was characterised by both campaign fires and extreme events on particular days during the campaign fires.

Aspects of the 2002–03 fire season in south-eastern Australia were reminiscent of other seasons that have generated inquiries, among them 1939 in Victoria, 1961 in south-west Western Australia, 1967 in south-eastern Tasmania, 1983 in Victoria and South Australia, and 1994 and 2001 in New South Wales. "This pattern is a reminder that, while the 2002–03 season was severe, it was not unprecedented or even unusual in the

longer sweep of history in such a fire-prone continent" (Ellis et al 2004: xii). Bushfires tend to occur in cycles and "we can expect other severe fire seasons in the future; they may even become more frequent and more severe under changed climatic conditions" (BTRE 2001: 38, Ellis et al 2004).

The Australian Bureau of Statistics Year Book (2004) reported that in the 2002-2003 fire season, the greatest area burnt was in Australia's rangelands and northern savannas, where extensive bushfires affected particularly Indigenous communities, pastoralists and environmental assets: "The area burnt in the northern Australian savannas in 2002–2003 was less than that burnt in the two preceding seasons, but Central Australia experienced the greatest area burnt in 25 years as a consequence of high fuel loads following good rains in previous years" (ABS Year Book 2004: 2). Therefore, the largest areas burnt by bushfire occur in central-northern Australia and significant costs from bushfire occur in south-eastern Australia.

More people were injured by bushfires than all other disasters combined and bushfires created 48% of the total death and injury cost from natural disasters in Australia (BTRE 2001: 38). Much of the damage caused by bushfires is difficult to place a financial cost on, as it is not confined to buildings, vehicles and livestock, all of which have a fixed dollar value. Willis (2004, 1) suggested that "it is often considered impossible to place a financial value on loss of life, and there is certainly no way to place a value on the emotions surrounding a death or serious injury". The psychological impact upon firefighters is another potential cost arising from bushfires (McFarlane 1988).

Fires can disrupt social and economic activities and this may be particularly true for bushfires that spread over a large area, sometimes destroying infrastructure and properties as well as creating potential health hazards through the effects of smoke entering urban areas. The social and environmental costs are often overshadowed by the economic costs of bushfire disasters because fire suppression bills and economic costs from life and property damage are easier to quantify. However, the social and environmental costs are gaining more attention as new research such as the Stern Review Report (Stern 2006) highlights the possibility that the global economy will meet significant challenges as a result of climate change.

As intense bushfires burn, a large amount of carbon enters the atmosphere - adding to the levels of carbon dioxide which are contributing to global warming. Given the significance of greenhouse gas emissions to the global environment and Australia's high level of emissions compared with other developed countries, it is pertinent to note that more than half of these emissions are produced by bushfires (Abru 2001: 32). The 2002-03 bushfire season was responsible for the emissions of around 130 million tonnes of carbon dioxide which is equivalent to around a quarter of Australia's annual greenhouse emissions (National Association of Forest Industries 2007). It is apparent that there is differing quantifications of greenhouse gas emissions from bushfire, however between a quarter to half of the nation's emissions is significant and warrants more awareness and attention from governments, industry and citizens in preventing and offsetting these carbon emissions. Abetz (2007) outlined that "emissions from bushfires are not counted in Australia's carbon accounts because it is assumed forest regrowth will suck the emission right back in. Therefore I ask, why should emissions from regeneration burns then be counted?" It appears that there are grey areas in regards to carbon accounting and different kinds of burning.

The overall costs and impacts of bushfire are diverse. It was reported that despite the fact that much larger areas of land are affected by bushfire in the Northern Territory (BTRE 2001), south-eastern Australia has experienced much more dangerous bushfires as a result of weather, climate, landscape and human factors (Trevitt and Ryan 1995 a&b, Willis 2004). It has been established that bushfire-prone areas of most concern to the Australian public, Governments and fire authorities are those where the economic costs and social/environmental impacts are greatest. Such impacts of bushfire appear to have been experienced more intensely in the south-eastern states/territory of Australia and to a lesser extent in Western Australia and Queensland. The most significant bushfire risks in Australia generally occur where populated areas meet with areas of bushfire risk – the areas referred to as the rural-urban interface.

The rural-urban interface and bushfire risks

Rural-urban interface areas exist wherever homes and other developments are intermixed among trees and other combustible vegetation. The rural-urban interface or peri-urban developments in Australia are also known as the wildland-urban interface when referring to the equivalent in North America. The common themes for such areas

include population and property considerations, and associated preparedness and response issues.

The conception we have of the physical layout of peri-urban locations needs some clarification according to Cottrell (2005a, 2):

> Peri-urban zones can be totally new suburbs with small lot housing, shopping centres, service facilities, but essentially a suburb next to bushland. Peri-urban zones can also be large lot suburban developments. In many areas, they may be a mix of suburban and industrial zones as housing has spread into peripheral industrial estates. In other areas they may be conurbations gradually infilling unsettled areas on the periphery, and in yet other areas they may be encroaching on rural production.

A difficulty in my research was determining the difference between urban and rural areas (discussed and clarified in the 'Limitations' section in Chapter 3). Hugo (2002) informed how it is necessary to understand that there has been a substantial blurring of the distinctions between urban and rural areas which represent a fundamental change in the nature of urbanism in Australia. He suggests that there is a need to classify non-metropolitan areas as being rural (remote or accessible) and urban (accessible or remote). Categorisation through Recreation Opportunity Classes follows a similar distinction between natural areas with its focus on access and remoteness. The Recreation Opportunity Classes according to the Bureau of Land Management (2005) include Primitive, Semi-Primitive Non-Motorised, Semi-Primitive Motorised, Roaded Natural, Rural, and Urban. Therefore, this suggests that there are four levels of wilderness areas beyond the rural-urban interface.

Communities in the rural-urban interface (areas on the fringes of cities) tend to feature relatively large populations living in close proximity to highly-flammable bushland areas. High fuel loads are often complicated with rugged topography with poor access and exit points. A high proportion of the inhabitants in these areas are commuters with little experience of living in the bush or fending for themselves in a major fire (Miller, Carter and Stephens 1984). Nicholson (1995, 3) stated that "fringe communities are the most vulnerable part of the Australian and world wide environment". Rural-urban interface areas are particularly vulnerable to disaster if fire services and residents are not

adequately prepared for the possibility that lightning, accidents and acts of arson may ignite highly-flammable bushland areas.

There is an increasing trend of rural-urban interface residences amongst bushland and/or near protected areas in some areas of Australia. Whether near large urban areas or remote rural locations, rural-urban interface zones involve a significant population shift from urban living to increased living among peripheral areas (Cottrell 2005a, Sadiki and Famutsindela 2002). Urban fringe areas are the fastest growing in Australia (Cottrell 2005a, O'Connor and Stimson in Newton and Bell 1996). Fire authorities are especially concerned for the safety of people and property in areas where there is previous evidence of high-intensity and high-severity bushfire.

The impact of fire is increasing in some rural-urban areas. Frentz et al (2004) described how the impacts of fire upon the rural-urban interface are increasing for three primary reasons: (1) fire suppression and less hazard reduction has led to increased fuel loads; (2) fire risk has worsened due to drought conditions; and (3) the population and density in areas of high fire risk is growing and rural-urban interface areas are growing rapidly, as more people seek to live in non-metropolitan areas and near amenity-rich areas.

The recent increase in rural-urban interfaces areas is only part of the equation of increased bushfire risks. Not all rural-urban interface areas are the same in terms of geographic and bushfire risk situations. Proximity of structures to bushland fuels and whether structures are scattered amongst, adjacent to or separated from bushland fuels are factors which contribute towards the various conditions of rural-urban interface areas.

Fire authorities are faced with many considerations for managing and mitigating bushfire risks of rural-urban interface areas. Some rural-urban interface areas may become prone to bushfires that can quickly grow to sizes that are difficult to extinguish because of proximity of burning vegetation to nearby homes. Some homeowners who move to rural-urban interface areas not fully aware that they are living with increased risks from fire (Smalley 2003, Cottrell 2005a). Fire services are currently faced with little choice but to adapt their operations to include education for empowering people to take responsibility for their own safety and developing their own fire mitigation strategies. Shared responsibility between fire services and communities for the

mitigation and management of bushfires is a necessity borne out of the inability of fire services to maintain sufficient fire suppression capabilities under high to extreme bushfire conditions.

Some bushfires occurring on the urban fringe are coined as 'disasters'. "The United Nations Disaster Relief Coordinator defined disaster as a measure of the vulnerability of a community to a specific hazard" (Salter 1992: 2). This definition was put into the bushfire context by Nicholson (1995, 14): "The magnitude of a bushfire disaster is a function of the extent to which the actions and behaviour of people make them particularly vulnerable". It can be inferred that those residents who are unprepared and living on the fringe of fire prone areas have a high vulnerability to fire and may be prone to disaster. They must, therefore, be provided with the knowledge and skills to prepare themselves so that they are able to mitigate and cope with a disaster (Salter 1992, 2). Preparedness for bushfire has the potential to influence whether or not a bushfire turns out to be a disaster.

There is room for improvement in partnerships between communities and fire services which encourage taking preparative action against the risk of bushfire. Pro-active measures for preparedness for bushfire are not guarantees that fuel loads will be reduced in all the critical areas where homes and wildfire meet at the rural-urban interface. However, if success in preparedness for bushfire is measured as a step in the right direction, then fire services and communities have a realistic first outcome to achieve.

An initiative for a collaborative approach to fire management was established in the United States of America with assistance from the National Fire Plan in 2000. Hamilton (2003, 5) stated that "wildland-urban interface neighbourhoods are social systems … Failure to work with the social system will probably doom efforts to promote fire hazard mitigation". The challenge for fire management leaders is to "address issues, exchange ideas and techniques, involve and listen to communities, and work toward solutions in individual neighbourhoods" (Hamilton 2003, 5). The issue of sharing responsibility for preparedness for bushfire appears to be in need of being understood by fire services and communities.

Preparedness for bushfire stems from an awareness that a bushfire hazard exists and acknowledgement that there is shared responsibility for mitigating risks. Strategies for

preparedness for bushfire can come later. Krusel and Petris (1992, 3) indicated that preparedness for bushfire can be divided into three levels – individual, community and government. “The most effective bushfire safety strategies will be developed by people taking responsibility for their own bushfire safety and, by working together as a community, developing strategies most appropriate to their specific situation” (Krusel and Petris 1992: 3). The role of governments/agencies is to facilitate preparedness through provision of expertise, support, and policy (Krusel and Petris 1992: 3).

There are a number of ways to interpret what preparedness for bushfire constitutes. Krusel and Petris (1992, 3) described preparedness for bushfire as “a mix of social, biophysical and behavioural considerations”. Whelan (1987, 6) defined bushfire preparedness as a “function of awareness, individual beliefs, fuel reduction, home design, garden layout, community norms, hazard assessment, reliance on fire brigades, weather conditions and previous experiences”. The current situation of rural-urban interface area bushfire management in Australia dictates a number of complex factors to be considered.

Current situation of rural-urban bushfire management in Australia

Fire authorities and rural-urban communities are being confronted by challenges in protecting life, resources and property in high risk to extreme bushfire conditions. Dynamic bushfire mitigation measures such as hazard reduction, creation of asset protection zones and controlled fire near vulnerable assets can offer effective protection during less significant bushfires but these management strategies can not offer guaranteed levels of protection during high to extreme events. Bushfire management strategies now include directing resources and comprehensive mitigation efforts to increase community self-sufficiency, whereby individuals and communities accept more responsibility for protection of life and property in the event of a bushfire. Self-reliance strategies against the threat of bushfire promotes acceptance by private property owners that they also bear a margin of responsibility for protecting their own safety and property.

Bushfires hazard has increased in some areas because of where the community has evolved. There is a growing pattern of population movement into fire-prone rural-urban areas (Hugo 2002, McCaffrey 2004, Cottrell 2005a). Assets in the rural-urban interface

are particularly at risk, especially where settlement patterns result in an expanding interface area (Cheney 2004a). A difficulty with the growth of populations in at-risk-from bushfire areas is that community self-reliance for preparedness for bushfire has not eventuated. Preparations for bushfire have not materialised as much as the reliance on fire authorities when in need. As a result, available fire services are stretched to the limit when there is extensive fire occurrence and adverse weather threatens large areas. Shared responsibility for bushfire preparations is a strategic measure considered by fire authorities as necessary for resolving various issues to do with hazard reduction, communications, organisation, equipment, and local knowledge.

There are a number of background issues for why there are difficulties in reaching a high level of shared responsibility between communities and fire services for preparedness against bushfire risks.

There is a much stronger recognition that the interactions between fire services and the communities they serve are crucial if there is to be successful avoidance of substantial losses to infrastructure and property, especially to rural-urban housing. Australia's fire-proneness (Pyne 1991, Rohrmann 1999) and the potential impacts of climate change (Whittaker and Mercer 2004) means that Australians are faced with accepting the exposure of rural-urban interface areas to impact by high intensity fire (Koperberg 2003, 2). The situation now exists in certain parts of Australia where communities are exposed to the potential impact of high intensity fire at some stage in their existence.

It is important to consider cultural background in order to understand where the risks of bushfire are placed in the context of modern people's everyday lives. It appears that the expectations which fire services and communities place upon themselves and each other are now markedly different from the early days of European settlement up until the last forty or so years.

Koperberg (2003, 2) recalled how fire fighting was less complicated thirty to forty years ago: "The few fire fighting authorities got on with the task of suppressing fires as best they could, often with limited equipment, simple organisational structures and a lot of people who possessed little or no training for what was a very dangerous and arduous task. The public warmly appreciated the efforts of volunteer brigades, farmers, forestry workers, national park rangers, police and anybody else who lent a helping hand". More

recently, fire services perceive that community self-reliance for bushfire preparedness has been replaced by a reliance on fire authorities. Some fire authorities perceive that advancements in fire suppression operations is a big factor in why much of the lay public perceive people and modern technology as being capable of defeating even extraordinary bushfire events by their preparations and responses to them. Another reason why rural-urban interface areas are difficult to manage is that appropriate planning protocols were not authorised until the mid 1980's, and then in an improvised manner, so few of the necessary development controls kept apace with new developments (Koperberg 2003). It appears that the lay public has acquired a false sense of security regarding the capabilities of fire services.

The focus of hazard reduction activities on public lands appears to have been rarely matched by a focus on hazard reduction activities on privately held lands. An innovative approach for shared responsibility as suggested by some fire authorities is the formal identification and registration of bushfire-prone holdings. Some rural-urban interface areas throughout Australia are experiencing rapid increases in population growth because the right of people who choose to live in a bush environment is often not challenged. The focus on maintaining more environmentally sensitive surroundings within developments is being recognised. However, the frequency and types of intervention strategies is complicated by different perspectives on what is best for the environment and communities (Moore 2005).

The situation for fire management seemed to be less complicated some decades ago, when the rural-urban interface more or less moved with the advancing development of towns and cities causing bushfire-prone areas to be neutralised by the comprehensive removal of bushland as areas were developed and given over to housing. Nowadays, with increasing affluence has come a move from the creek bottom to the ridge tops, as well as developments within far more significant areas of bushland, more obscure building styles and an increasing area of house/bush interface. The factors which contribute to the fire safety of people and buildings such as prescribed burning, buffer zones, development regulations and building standards "are all, by degrees, contentious and poorly appreciated" (Moore 2005: 2).

The incidence of bushfire in the rural-urban interface is dependent more so on a set of

environmental and human conditions than on a geographical location. Although the geographic location is an important factor that dictates a set of general climatic conditions, the conditions in which rural-urban interface fires occur (or have occurred) exist in nearly every community in the world. It is the conditional elements of weather, humidity, vegetation, building construction, road construction, lot size, housing density, topography, and other such factors that simply make some communities more vulnerable to losses from bushfire than others (Whelan 1987, Smalley 2003, Moore 2005). It appears to be difficult to change the communities that already exist in hazardous conditions; however, there is a good opportunity to make wise fire-safety decisions at the outset of planning for new housing developments (Smalley 2003: 3).

Bushfire impact on the rural-urban interface over the past seven decades has taught us many lessons (since coronial inquests began after the 1939 Black Friday bushfire). These lessons have invoked change in behaviour, community understanding and policy. The principles of how bushfires impact on the rural-urban interface are now well established; however, science cannot accurately predict the overall effects and specific risks in order to effectively mitigate the risk posed by bushfires reaching the rural-urban interface. The Australian Capital Territory bushfires during January 2003 highlighted how predictions of bushfire impact based on the past two decades are not adequate for predicting potential loss. Therefore, it is necessary for bushfire research to broaden the range of considered factors influencing risk. Beyond this, there is an ever-increasing need to consider bushfire management strategies in the broader ecological and socio-economic value systems (Leonard in Cary et al 2003).

Understanding the perceptions of fire services and communities for preparedness for bushfire is a useful step for doing something about the risks. Ellis (2003, 1) noted that "fire prevention and preparation for response is insurance, and needs to be viewed as a valuable risk management approach".

The bushfire mitigation and preparedness process is now as much about sophisticated technologies as it is about ways of cooperation. There is a need for a much closer degree of cooperation between individuals, communities, fire services and land managers, on a permanent and ongoing basis. There are examples where rural-urban interface communities have engaged productively with fire services to secure a safer environment

in their surroundings. It is necessary to further promote understanding of the need for shared responsibility for the mitigation of loss of life and property from bushfire.

As more people move out of cities and into rural-urban interface areas, tragic and disastrous bushfires will inevitably occur. Whilst people, directly and indirectly, are by far the greatest cause of bushfires in Australia, controlling people and their use/misuse of fire is not a realistic or practical solution. Empowering the communities at risk from bushfire to play an active part in their own safety and in the protection of their assets in partnership with their fire services is a viable long-term strategy to enable safe co-existence with fire as a natural element of our environment. The combined efforts of fire protection services, legislators, planners, developers and home owners will be required to prevent tragic loss of lives and homes in the rural-urban interface area. The needs and aspirations of community members need to be addressed for fire services to assist at-risk communities with efforts for effective protection from bushfire. In many cases, the local community that is potentially at risk needs to be educated on those risks and the consequences of action, as well as inaction, if they choose to ignore or underestimate the risks.

It is pertinent to understand how fire services determine areas for community education. Queensland Fire and Rescue (2004, 4) indicated that community education needs are determined from geographic information, fire history and the community's general level of preparedness: "The community's level of preparedness is the hardest to determine of these three because of community perceptions and needs … Efforts to prepare communities for bushfire can be met with unwelcome resistance … Complacency by some communities may be overcome when relevant information is given".

A higher level of cooperation between individuals, communities, fire services and land managers is needed for mitigation of bushfire risks. There are examples where communities have engaged productively with fire services to secure a safer environment in their surroundings such as in the Community Fireguard program in south-eastern Australia. However, despite the occurrence of some community group preparedness activities, there is a need for individuals who are not part of bushfire preparedness programs to also be informed and motivated to make plans and actions against the threat of bushfire. There is a need to further understand the perceptions and expectations of people living within at-risk-from-bushfire communities in order to assist fire services to

best provide preparedness information and advice to mitigate the risks of bushfire. There are different perceptions and expectations of bushfire, property and natural resource management which need resolution. In particular, the situation of some homes in fire-prone areas are of concern to fire services, as are expectations of the community that firefighters will provide protection in the event of a fire. Firefighters' safety and sensible planning restrictions on rural-urban interface development are also important issues for fire services. A lot of the population is urban-based and most people don't understand the role of fire in the natural environment (Koperberg 2003, Cheney 2004b). It is pertinent to address the attitudes of citizens towards bushfire and their concerns about forest and bushland management and hazardous fuel treatments.

Social construction of bushfire risk

Research that explores the agreements and differences in perceptions and expectations held by communities and fire services is an important part of developing a greater understanding of the issues of preparedness for bushfire. The number of ways bushfires impact upon communities raises questions of how individuals, communities and fire services perceive risks from bushfire and what contexts influence these perceptions. This requires a broader understanding of risk. Whyte and Burton (1980, 2) in Chu and Simpson (1994, 67) define risk as the probability times the consequence of adverse event. The World Health Organisation (1987) definition of risk, seen in Chu and Simpson (1994, 67) is the exposure times the adverse effects.

Risk is appearing in the texts of news headlines and stories increasingly more. In 1992, 'risk' appeared 2,356 times in the main texts of news stories and 89 times in headlines (Lupton 1999). The number of mentions steadily increased each year. By 1997, 'risk' appeared 3,488 times in articles (almost half as many again as in 1992) and in 118 headlines. Such findings suggest that risk has become more of a key word in the media, used in place of such words as 'danger', 'threat' and 'hazard'.

Various reasons exist for the proliferation of the concept of risk in expert discourses over the past few decades. Lupton (1999) suggest that these include developments in probability statistics and computer technologies, allowing the statistical manipulation of large sets of data sets in ways which were not previously possible, and the establishment

of institutions and regulatory agencies to deal with concepts that are risky, e.g. bushfires.

The proliferation of risk in our daily lives has not occurred simply because the technological or natural conditions exist for such circumstances to eventuate. For the individual, it is argued that changes in risk research are associated with an intensifying sense of uncertainty, complexity, ambivalence and disorder, a growing distrust of social institutions and traditional authorities and an increasing awareness of the threats inherent in everyday life (Lupton 1999: 35). Similarly, Luhrmann (1993) in Lupton 1999) asserted that risk awareness is characterised by a fascination about extremely improbable circumstances with grave outcomes. Luhrmann (1993) in Lupton (1999) claimed that the explanation for this fascination is that today the decisions of individuals or organisations can be identified as the root cause of disasters, and therefore it can be demanded that their decisions be opposed so as to obviate danger. Therefore, easy agreement on decisions of individuals or organisations has been likened to complacency about a certain risk (e.g. bushfire threat in rural-urban interface areas). A lack of different perceptions can actually hinder preparedness for the risk because a number of different ways of thought and action have not been argued and considered in the scrutiny that opposition presents.

Decision-making and risk are inter-related to strategies which propose solutions. Lupton (1999) suggested that the concept of risk has gained importance in recent times because of the dependence of society's future on decision-making has increased and is now dominating ideas about the future. Lupton (1999, 34) explained that "juxtaposed against this world of change are the meanings and strategies constructed around risk, which both spring from the uncertainties, anxieties and the lack of predictability characteristic of late modernity and also attempt to pose solutions to them". Risk meanings and strategies are attempts to tame uncertainty, but often have the paradoxical effect of increasing anxiety about risk through the intensity of their focus and concern.

Risk is related to where we are at in terms of time and locality. Lupton (1999) indicated that "identification of risks takes place in the specific socio-cultural and historical contexts in which we are located. To call something a risk is to recognise its importance to our subjectivity and well-being". Therefore, surroundings and environment, both human and otherwise are factors considered to contribute towards awareness of risk.

‘The environment’ is used in different contexts to describe an array of things such as the home; the family; the city; the workplace or school; non-urban areas; urbanised areas; the globe; the natural world; the non-natural world; the physical or material world; the social world; personal lifestyle; human relationships (Petersen and Lupton 1996, 176). When individuals are constructed as being ‘at risk’ from environmental hazards such as air or water pollution, they are not considered responsible for any health problems which might arise, for the risk is regarded as being beyond their control. Petersen and Lupton (1996, 177) described that more and more ‘environmental risks’ are now conceptualised as agreeable to personal control. The concept of sustainability has recently contributed to individuals being expected by society and governments to take up their duties and responsibilities as ‘environmental citizens’ in relation to consumer activities like recycling and conserving water.

An empiricist approach to research is relevant to the relationship between social factors and the perception of bushfire risk because its approach is to focus upon what happens normally and as a rule, rather than address what happens consistently and always. The inevitable contingencies, indetermancies and uncertainties of the socially constructed nature of scientific knowledge make it impossible to present irrefutable evidence regarding social factors. However, it is possible to investigate social factors to a limited extent and relate this to economic, environmental and cultural contexts. Therefore, the social construction of risk theoretical approach informed the selection of research methods and the interpretation of results in the thesis because I was interested in the different positions that people take in relation to the bushfire preparedness, not only as members of social groups but also through acknowledgements of personal risk and the various beliefs, values and attitudes that exist.

A major focus of social constructionism is to uncover the ways in which individuals and groups participate in the creation of their perceived social reality. The literature on social construction of risk outlines that it seeks to understand how various people formulate their beliefs, attitudes and values (Berger and Luckman 1967, Wynne in Brown 1989, Hilgartner in Short and Clarke 1992, Douglas 1985, Lupton 1999, Kemshall et al 2006). Berger and Luckmann (1967) argue that all knowledge, including the most basic, taken-for-granted common sense knowledge of everyday reality, is derived from and maintained by social interactions. The objective of social construction

of risk according to Brown et al (1989, 99) is "to facilitate understanding between public and institutions to protect a route out of the ever-growing bitterness of clashes between affected publics and the managing institutions". Collaboration, consultation and partnership between government and other sectors and organisations are seen as a contemporary way to work with vested interests rather than directly challenging them.

The objective of the social construction of risk approach with the Tamborine Mountain case study was to explore the economic, social, cultural and environmental contexts of bushfire preparedness describing the inter-relationships between individuals, the community and fire services in order to better integrate awareness, knowledge and understanding in these relationships. Therefore, the social construction of risk approach was intended to bridge divides in perspectives between fire services and the community because it sought to understand how a sample of these people formulate their beliefs, attitudes and values and present agreements and differences on the same matters.

Sociological analysis has traditionally focused on risk in the public forum. Lupton (1999) deals with the important question of how lay people construct risk knowledge in the context of their everyday lives. An individual's awareness and knowledge of various forms of risks affects how they subjectively live their everyday life; the choices one makes for themself contributes to their self-conception and identity within social groups and society. Lupton (1999, 43) explained that "the way risk is dealt within the public forum may be different from the subjective experience of risk in personal life where many categories of risk can be discerned". Each person has lifestyle factors which contribute to how various forms of risk are perceived, experienced and dealt with.

Lupton (1999, 36) identified that at least six major categories of risk currently appear to predominate in the concerns of individuals and institutions in western societies:

- 'Environmental risks', or those posed by pollution, radiation, chemicals, floods, fires, dangerous road conditions and so on;
- 'Lifestyle risks', those believed to be related to the consumption of such commodities as food and drugs, engagement in sexual activities, driving practices, stress, leisure and so on;
- 'Medical risks', those related to experiencing medical care or treatment (e.g. drug therapy, surgery, childbirth, reproductive technologies, diagnostic tests);

- ‘Interpersonal risks’ related to intimate relationships, social interactions, love, sexuality, gender roles, friendship, marriage and parenting;
- ‘Economic risks’ implicated by unemployment or under-employment, borrowing money, investment, bankruptcy, destruction of property, failure in business etc.;
- And ‘criminal risks’, those emerging from being a participant in or potential victim of illegal activities.

Risk is related to the way we understand our self and the world we live in. Lupton (1999, 38) explained that “those phenomena that we single out and identify as ‘risks’ have an important part in our understandings of selfhood and the social and material worlds”. Lupton (1999, 39) goes further to explain that societies are also influenced by risk: “Societies – and within them, social institutions, social groups and individuals – need their selection process associated with risks as part of their continued operation”. Therefore, risk selection and the activities associated with the management of risk, are central to ordering, function and individual and cultural identity.

Categorisation of risks helps the individual to place various risks into the context of their everyday lives. Lupton (1999) explained that the “other” always represents a sense of danger or risk to the individual and anything that cannot be readily ordered or categorised leads to feelings of uncertainty and angst. Lupton (1999, 45) indicated that since risk by definition always involves uncertainty, it may be considered as one form of the “other”. The marginalised member of society is considered “risky” or threatening because of the “other” status culturally linked to such an individual by the dominant group.

There is also a relationship between risk and pleasure. After reviewing that individuals in modern society have become self-regulating and self-controlling (as opposed to social control by coercive external forces of the state), Lupton (1999) argued that some individuals today rebel against such self-control and self-regulation through the active and voluntary courting of risks involved in, for example, extreme sports such as white water rafting, sky diving and rock climbing. Further, Lupton (1999, 56) explained that lesser forms of risk-taking are considered by some as a necessary part of “self-actualisation”. Thus, individuals often learn to take risks through personal development

activities that push the limits of self-control. Risk pursuit or risk avoidance attitudes may be linked to the socially constructed ideals of identity. Therefore, understanding one's self and one's identity as part of a larger community/society is related to partaking in risk-related activities for the sake of taking the risk. Risk is not necessarily always an imposition, so it can be inferred that volunteering for or against risk has origins in self-development risk-related activities that are a release from mundane everyday life.

Culture is an important consideration when considering the understanding of a community's bushfire awareness. Culture in this context specifically refers to the shared beliefs and values of a group; the customs, practices, and social behaviour of a particular nation or people. Douglas (1985) describes culture as a 'mnemonic system' which helps people to calculate risks and their consequences. Lupton (1999, 45) stated that "not only does culture help people understand risk, it also contributes to the communal rather than an individualistic notion of risk, taking into account mutual obligations and expectations". Douglas (1985, 120) explained "a community uses its shared, accumulated experience to determine which foreseeable losses are most probable, which probable losses will be most harmful, and which harms may be preventable". This means that as a cultural behaviour, communities collectively pool their experiences and perceptions together to determine which risks are worthy of mitigation. Together, communities make judgements about risks; there may be differences between groups within the same culture in terms of what is considered a risk and how acceptable it is thought to be.

The values of a community are especially relevant to their social construction of risk. According to Lupton (1999, 47), traditional risk research ignores the conceptual ethical and moral difficulties around the definition of equality and justice – "each type of society has its custom built ethical-system" and thus fails to acknowledge or address the related problem of how risk is to be judged acceptable or not. Lupton (1999, 48) determined that "it is pointless, therefore, to concentrate on providing 'better' communication or more education about risk to the lay public as a means of settling risk disputes, for the issue is not one of misguided perception but rather is the result of the clashes in political, moral and aesthetic judgements on risk". Therefore, the notion of gaining a better understanding of a community's bushfire awareness from a case study in order to combat "misperceptions" of the lay public has been reported as unlikely to

be productive if the intention is to provide more effective communication or education (see Chapter 7 for further discussion). The different factors that account for a community's and fire services' social construction of risk are likely to include various judgements on risk, which may be difficult to influence or change through bushfire community education programs.

Risk is intimately related to notions of politics, particularly in relation to accountability, responsibility and blame. Lupton (1999, 49) stated that "sometimes the reality of dangers are not an issue but rather about how they are politicised". Douglas (1985, 122) sees risk as a "socially constructed interpretation and response to a 'real' danger that objectively exists, even if knowledge about it can only ever be mediated through socio-cultural processes". Therefore, the perceptions of whether or not bushfire risks are "real" or likely to eventuate as an event are important to consider when determining preparedness for bushfire. The information from the case study has the potential to be useful to fire services' and Government's information, advertising, and strategy related to bushfire-related matters. There is potential for policy to influence how individuals and communities formulate their perceptions and interpret risks associated with bushfire.

There are a number of ways in which the phenomenon of risk is addressed in the social scientific literature on risk perception. Lupton (1999, 53) described how there are realist, weak and strong constructionist perspectives existent in society:

- Realist: Risk is an objective hazard, threat or danger that exists and can be measured independently of social and cultural processes, but may be distorted or biased through social and cultural frameworks of interpretation.
- Weak constructionist: Risk is an objective hazard, threat or danger that is inevitably mediated through social and cultural processes and can never be known in isolation from these processes.
- Strong constructionist: Nothing is a risk in itself – what we understand to be a 'risk' (or a hazard, threat or danger) is a product of historically, socially and politically contingent 'ways of seeing'.

Within constructionism, a continuum of positions exists from weak constructionist in which risks may be viewed as cultural mediations of 'real' dangers or hazards, to strong

constructionist in which the 'dangers' or 'hazards' are themselves perceived as socially constructed (Kemshall et al 2006). Weak social constructionists tend to see some underlying objective factual elements to reality, and strong social constructionists see everything as, in some way, a social construction. Berger and Luckman (1967) have been influential in the sociology of knowledge, including the sociology of science, where Latour and Woolgar (1979), Knorr-Cetina (1983) and Barnes (1996) among others use the ideas of social constructionism to relate what science has typically characterised as objective facts to the processes of social construction, with the goal of showing that human subjectivity imposes itself on those facts we take to be objective, not solely the other way around. Lupton (1999) explained that the most common way risk is addressed is from the realist perspective, which has developed and expressed principally in technical and scientific approaches. However, contemporary critical realists and social realists hold views that are much closer to that described as weak constructionist than that described as realist constructionist (e.g. Kemshall et al 2006).

Social constructionism is relevant to the Tamborine Mountain case study because of its interest in community, societal and governmental connotations and an interest in what risks exist, how they should be managed and how risks are cognitively responded to. Therefore, I took a weak constructionist approach because I explored the community's understanding of what the fire services had classified as 'real' bushfire hazards; the socially constructed nature of scientific knowledge was of interest rather than a reliance on 'objective facts'. Those who have adopted social constructionism, regardless of the strength of their position, tend to argue that a risk is never fully objective or knowable outside of belief systems and moral positions: what we measure, identify and manage as risks are always constituted via pre-existing knowledge and discourses (Brown et al 1989, Douglas 1985, Lupton 1999). Therefore, experience shapes a large part of social construction of risk. Social constructionists argue that humans and their social world exist in a dialectical relationship, in which each creates the other (Lupton 1999). Patterns of language – the words that people are often subject to in their everyday lives – become integral for their expression of their experiences. Lupton (1999, 55) explained that "although the material and social worlds are experienced by most individuals as objective, pre-existing realities, these realities involve the reproduction of meaning of knowledge through social interaction and socialisation and rely upon shared definitions". Therefore, there is a potential for people to influence the meaning of

knowledge associated with risks; because of the continually constructed nature of reality, its meanings are precarious and subject to change.

For social constructionists, it is not a matter of doing more research to obtain a clearer view of exactly the risks to which people are exposed. Instead, the primary focus is on examining how concepts of risk are part of world views. Lupton (1999, 55) explained that there are cultural patterns in which certain phenomena are identified and dealt with as 'risks'. This pattern is subject to change over time and space: "It is important to highlight the importance of understanding the embeddedness of understandings and perceptions of risks, and that these understandings and perceptions often differ between actors who are located in different contexts and thus bring competing logics to bear upon risk". There are layers within perceptions of risks which are often unique.

Judgements about risk are not simply cultural interpretations of objective dangers or hazards. What is deemed a 'danger' or 'hazard' in one historical or cultural context may not be so identified in another, and this has implications for how knowledge and understandings about risks are developed. Hilgartner in Short and Clarke (1992) argued that even constructionist accounts have tended to neglect the social construction of what he calls 'risk objects' (things, activities or situations to which harmful consequences are conceptually attached) or to examine systematically the construction of networks of causal attribution that links chains of risk objects to harm or danger. To become risk objects, objects must first become constructed as 'objects', and then as 'risky', or identified as the cause of harm or danger. Hilgartner in Short and Clarke (1992) explained that the process of defining harm or danger is a third construction in this linkage. Therefore, understanding risk involves a process of objective and subjective characteristics.

Risk can be associated with many different objects or occurrences. Lupton (1999) explained that the extent to which objects may be linked with each other and with harm in a causal attribution model is potentially infinite: anything may be defined as a 'risk'. What is of importance for a socio-cultural analysis of risk is the ways in which certain linkages are defined. Lupton (1999, 64) indicated that "the task of constructing a risk object is essentially a rhetorical process, performed in specialised texts or in public arenas and usually involves building networks of heterogeneous risk objects". Lupton (1999) also mentioned that the task of constructing risk often involves intense struggles

over meanings, particularly in relation to those actors who are deemed to be responsible for the risk object. These struggles are complemented by struggles with a variety of human and non-human actors to identify and control risk objects (Hilgartner in Short and Clarke 1992).

It is rare that lay people play a major role in the construction of risk objects at the level of public debates. Rather, Lupton (1999, 67) explained that "expert knowledge – particularly those emerging from science are often mediated through the mass media and are central to the construction and publicising risk". It is now possible that the emergence of media on the internet and blog websites has the potential to influence diversified sources of media and a chance for lay people to have a role in the construction of risk.

The acquisition and presentation of data is often subject to scientists and experts' own personal and professional experience and knowledge. Different systems of values and perspectives shape experts' judgement of these data (Lupton 1999, 68). Experts, in seeking validity for their knowledge claims, do not tend to acknowledge the situated and localised nature of their risk calculations and prognoses; neither do they acknowledge that their knowledge is culturally shaped (Wynne in Brown 1996, 41). If a 'risk' is understood as a product of perception and cultural understanding, then to draw a distinction between 'real' risks (as measured and identified by 'experts') and 'false' risks (as perceived by members of the public) is irrelevant. It is the ways in which understandings are constructed and acted upon that is considered important, not the extent to which one perspective may be considered to be more 'accurate' or less 'biased' than the other, for this distinction is also considered to be irrelevant (Lupton 1999). Especially in this research's case study, there is no right or wrong perception of risk. The key research findings provided an unbiased account of relevant perspectives.

Exposure to a hazard affects a person's perception of the risk. Lupton (1999, 74) reported that "the best established results of risk research show that individuals have a strong but unjustified sense of subjective immunity. In very familiar activities there is a tendency to minimise the probability of bad outcomes". Apparently, people underestimate risks which are supposed to be under their control. They also underestimate risks of events which are rarely expected to happen. Hence the question about perception of risk: Why do so many in their layman's role judge everyday hazards

to be safe and think of themselves able to cope when the event shows that they cannot? Relevant literature and theory will further explore this question in Chapter 7.

Most people tend to "play down" risks because they are surrounded by some sort of danger on an everyday basis. Lupton (1999, 78) explained that the presence of danger becomes a part of everyday life and does not overwhelmingly affect our consciousness:

> Most common everyday dangers tend to be ignored. On the other end of probabilities, the most infrequent, low-probability dangers also tend to be played down. Putting these tendencies together, the individual seems to cut off their perceptions of highly probable risks so that his immediate world seems safer than it is and, as he also cuts off his interest in low-probability events, distant dangers also fade.

The concepts of risk and acceptable risk have been applied to improve social impact assessment (SIA) and environmental impact assessment (EIA) procedures. Risk assessment utilises SIA and EIA in assessing threshold impacts to compare with existing standards defining the desired thresholds. Chu and Simpson (1994, 67) outline that "the final decision regarding the level of 'acceptable risk' will depend on the perceived risk' in the community." Chu and Simpson (1994) reported that community perceptions and actual levels of risk often have little correlation. Chu and Simpson (1994, 67) indicated that "all too often risk assessment carried out in an EIA is not acceptable risk assessment, but rather technical or quantitative risk assessment." The background to this thesis' case study research involved understanding the QFRS' I-Zone risk classification, which is a technical risk assessment, for Tamborine Mountain (see Map 1 in Chapter 4). The perceptions of bushfire risk in the Tamborine Mountain community will therefore provide information for fire services to make a final decision regarding the level of 'acceptable risk'.

Technical information and public perceptions of risk are often separate components of risk assessment. Chu and Simpson (1994, 67) outline "that risk assessment is often used in the environmental health area for evaluation, particularly in attempting to integrate technical information with public perceptions of the problem". It uses the best available scientific data to identify options for risk management. In finding what the risks or benefits will be, and who will be affected, it is the foundation for the whole exercise. Decisions are made for the assessment to go ahead. Assessment in the form of

risk/preparedness relationships etc. are the scientific facts required in order to improve environmental assessment procedures. Then the information can be used to alleviate public concern over the risk by taking measures to lower risks etc. Risk assessment provides a framework for discussion between scientists, decision-makers and the public, and the facts are able to used for policy making, for reaching cost-benefit solutions or the facts could be ignored or nothing gets done about the risks because of lack of efficient management and implementation.

A difficulty involved with risk assessment is determining how important the risks are. Chu and Simpson (1994, 67) outline that "all too often risk assessment does not leave the technical arena". By estimating the probabilities of exposure of the population to certain levels of exposure, health risks can be ascertained. A difficulty in implementing a risk assessment framework is that given the estimate of risk, how does this compare with other risks? Whyte and Burton (1980) in Chu and Simpson (1994, 67), suggest four ways of assessing the importance of the predicted risks: "Comparison with background levels, comparison with alternative development projects, comparison with other risks accepted by the population and comparison of the benefits: benefit-risk analysis." However, these comparison of standards have only been established for a small number of cases, they may be location specific, and may not include synergistic effects due to environmental/health, lifestyle and population factors. Chu and Simpson (1994, 67) quoted the World Health Organisation (1987, 57): "Analysis of the population, therefore, includes not only information on the total numbers subject to the health factors, but also details of lifestyle and other characteristics of that population and sensitive groups within it". Therefore, assessment of risk in a locality requires information on those within the boundaries of the locality including an understanding of overall and particular values, beliefs, and attitudes".

Factors that increase the probability of developing a disease or health problems are called risk factors. Lawson (1991, 3) described risk factors as including nutrition; road traffic crashes; overexposure to the sun; use of tobacco, alcohol and drugs; social isolation; unsafe sexual behaviour; lack of exercise. The abstract concept of risk factor is based on the premise that it is not possible to spell out risks or threats and subsequently control the health of an individual. This is because epidemiological studies are of rational behaviour, studying disease and illness and their risk factors as they

occur in groups rather than individuals (Petersen and Lupton 1996: 27). Risk factors are socio-culturally oriented and are components of our lifestyles which impact on each other as well as other factors such as behaviour and social interaction, life course, values and beliefs.

Choices made about risk factors by individuals come about from their perceptions of "culturally defined moral problems in which power relations always have a central position" (Frankenberg 1993: 236 in Petersen and Lupton 1997: 47). Individual-oriented behaviour stems from perception of the risk, attributes of the risk and decisions made in regards to these. This web of causation of behaviour is often constructed to show why individuals may, for example, choose to smoke cigarettes. Petersen and Lupton (1996, 47) draw attention to attributes of risk factors such as stress which lead to decisions to smoke: "low self esteem and self-efficacy in association with lack of knowledge about the side effects of smoking and nicotine addiction draw attention to stress". Therefore, risk perception is an automatic path to follow shaped by intuitions created from lifestyle pattern. For some individuals, they may smoke because they feel stressed and smoke to alleviate it, and lack the self-discipline and efficacy to give it up. Petersen and Lupton (1996, 47) outline the inadequacy of reducing health risks for individuals: "It is often overlooked in sociological studies of how the cause of stress is generated and why that individual lacks self-esteem and self-efficacy." Rather, the focus is centred on improving self-esteem and self-efficacy for alleviating stress, so that the individual may give up smoking.

In a socio-cultural context, risk factors related to death and diseases appear to be more controllable because we can identify their specific causes, which we believe may be avoided. Petersen and Lupton (1996, 48) prescribe a further corollary of the under-standing of death, illness and disease: "Individuals are ascribed personal responsibility for their death or illnesses by continuing to smoke or other risk factors, and therefore causing their own fates". This understanding draws upon the individual who chooses to associate themselves with risk factors as being "an unfinished project; something to be worked on and improved throughout the lifespan, whereby irrational risky behaviour resulting in death is the ultimate failure" (Petersen and Lupton 1996: 48). Responsibility for mitigation of a risk is a factor in the way we ordinarily differentiate between

everyday and temporal risks. Everyday risks may accumulate over time to become more risky to one's self than temporal risks which are collectively experienced.

The limits of risk-factor contribute to a distorted picture of health and disease in society whilst becoming a prevalent factor of public health. This discourse about the conceptualisation of risk factors is best summed up by the following quotation by Rose (1992, 75): "Risk factors predict disease but they do not necessarily cause disease or predict benefit from intervention; low income is associated with more illness, but health may not be improved by winning a large amount of money." It is evident that the environment and health and their association with risk factors are related to individual behaviour. However, this individual behaviour has importance for studies on society, cultures and social groups because it seems they are more controllable when epidemiological studies identify specific causes, which we believe may be avoided.

There are underlying assumptions that compound risk perception issues into complex societal functions. My research was not able to obtain a clear understanding of the exact risks people are exposed to, but it was interested to know about how people prepare against the risk of bushfires and what messages can assist people to sufficiently-prepare for bushfire. Timely and topical deliverance of messages which effectively motivate residents in at-risk communities to prepare for bushfire presents as a challenge to fire authorities. Perhaps there will continue to be individuals who resist being told that they are at risk from bushfire, and that they need to share responsibility for doing something about it. Nonetheless, understanding the underlying assumptions and various perceptions of risk helps to understand preparedness for bushfire issues.

The social issues related to bushfire are as diverse as the needs and uses of fire. Careful consideration of social norms and culture, economic needs and history of communities must be given to issues of suppression, fuel reduction, prevention, education, and other activities. Social values are difficult to formulate on a national context because there will be regional differences, and also differences amongst and within communities. Addressing the many issues which are confronting rural-urban interface communities requires facilitation to help stakeholders join forces and strengthen partnerships in reducing risks to lives and property from bushfire (Balcombe 2003). Local efforts can make it easier where it is difficult to apply ecosystem-based management strategies

(Balcombe 2003). It is difficult for the Federal and State Governments of Australia to effectively address the various social issues of preparedness for bushfire because of the complexity of different social constructions of risk and the time and resources required to garner better understanding of bushfire risks.

Understanding what stakeholders think about bushfire, and linking these cognitive patterns (e.g. value orientations, social norms) to management actions, is an important first step in developing a scientific means to inform bushfire educational and communications programs (Cottrell 2005a: 1). Understanding communities' perceptions of fire hazard, their view of the role of fire services and their own role in hazard mitigation and response is necessary if individuals are to take responsibility for their own safety, develop their own bushfire mitigation strategies and undertake preparations against the risk of bushfire.

Fire services have not traditionally sought to understand communities' perception of risk as an important component of bushfire mitigation. It appeared that fire services may have perceived bushfire risk differently to the communities they serve and vice versa. In particular, there was a need to explore perceptions of preparedness for bushfire and the role of fire services and the community in the implementation of bushfire mitigation efforts. Cottrell (2005b) explained that locality remains significant in terms of fire service delivery and the complexities in understanding rural-urban communities presents challenges for delivering appropriate services. A better understanding of perceptions of bushfire risk and preparedness for bushfire is a step towards implementation of more effective bushfire community education strategies.

Conclusion

This chapter has been about providing a context for understanding the relationship between people and bushfire for this case study on Tamborine Mountain. The social construction of risk was identified as the theoretical approach used for the case study to inform the research methods and interpretation of results in order to derive relationships between the perceptions, beliefs and attitudes of stakeholders and the economic, social, cultural and environmental context. A weak constructionist approach was taken because the socially constructed nature of scientific knowledge was of interest rather than a reliance on 'objective facts'. The intention of this approach is to deliver an analysis of

agreements/differences in perceptions and expectations between fire services and the community as well as matters for further resolution. The next chapter is about the methods of how I went about the research.

Chapter 3

Research Methods - A Case Study Approach

Introduction

A case study approach was used for this research. A case study is an in-depth examination of one example or instance of a wider phenomenon which makes use of a variety of different methods of enquiry (Hawtin et al 1994). Greene and Caracelli (1997) outlined seven design characteristics of mixed method research methods: phenomena, paradigm, status, independence, timing and number of studies. Case studies allow the researcher to go beyond initial identification of issues and provide an elaboration of what those issues mean for individuals within the community. Hawtin et al (1994, 47) explained that "information gathering techniques of a case study may include statistical and interpretive analysis from surveys, as well as observation techniques such as verbatim comments drawn from unstructured interviews or group discussions". This case study involved multi-methods, utilising both qualitative and quantitative methods.

Tamborine Mountain case study

A reason that Tamborine Mountain was chosen as a case study was because it had been identified as a rural-urban community which is at-risk-from-bushfire (Parfitt 2004). The Gold Coast Bushfire Management Strategy (Gold Coast City Council 1998: 3) suggested: "generally minor to moderate bushfires occur within the naturally vegetated areas. However, periodically (about every ten years or so) more intense devastating fires occur in extensive hinterland areas". Recorded history of bushfires in the area indicated that a local bushfire occurred on the 10th of September, 1991. There was one life and three homes lost during the bushfire. Interviews with local Rural Fire Brigade personnel with extensive family history in the area indicated that bushfires have gone over the mountain, as recently as in the 1960's. Observations of fire scars on eucalypts as well as rainforest species around Tamborine Mountain indicate that major bushfires have occurred. Bushfire hazard remains an issue because of the recent increase of peri-urbanism in areas adjacent to Tamborine Mountain, such as Wongawallan, which have experienced bushfire as recently as spring of 2004.

Tamborine Mountain is a locality on a plateau with an escarpment in a discrete physical location making it a more 'bounded' community which is helpful in the context of a case study. In addition, fire services for the area are almost as equally bounded. There is a mix of public and private lands comprised of mostly eucalypt bushland and some sections of rainforest. I had experience as a Park Ranger with Queensland Parks and Wildlife Service (QPWS) in 1999 at Tamborine Mountain; this provided some knowledge of the location and some key people to contact within the community. In addition, there had been a Tamborine Mountain community research report (Parfitt 2004) conducted for Queensland Fire and Rescue Service (QFRS) a year earlier upon which it was possible to build.

A case study seeks to explore how various stakeholders construct their views on issues. It is not uncommon for qualitative case researchers to call for letting the case "tell its own story" (Carter 1993, Coles 1989 in Denzin and Lincoln 2000). However, one can not know at the outset what the issues will be (Stake 1994 in Denzin and Lincoln 2000, 240). Case researchers enter the scene expecting, even knowing, that certain events, problems, relationships will be important, yet discover that some actually are of little consequence (Parlett and Hamilton 1976, Smith 1987). Case content would seemingly require evolvement from the act of writing itself. What is necessary for an understanding of the case will be decided by the researcher even though the competent researcher will be guided by what the case may indicate is most important (Stake1994 in Denzin and Lincoln 2000). The case will have its own story but the researcher is ultimately responsible for how the story is to be conveyed to the reader. Criteria for what is included in the case are covered by what most comprehensively covers the research topic.

The circumstances surrounding a case study, including the researcher and their environment and influences upon them, are paramount to the methods that the case is presented with. Because most researchers have an intrinsic motivation in their case, Stake (1994) in Denzin and Lincoln (2000, 242) indicated that intrinsic case study designs "draw the researcher toward understanding of what is important about that case within its own world, not so much the world of the researchers and theorists, but developing its issues, contexts and interpretations". Stake (1994) in Denzin and Lincoln (2000, 243) continues that the instrumental case study is different because it "illustrates

how the concerns of researchers and theorists are manifest in the case". This research falls into the category of an instrumental case study which focuses on bushfire mitigation issues. The instrumental case study has the advantage of being able to have knowledge of the critical issues in advance and follow the expectations of the discipline it is being explored within.

The case study involved a process of planning, acting, observing and reflecting. A case study is participatory and therefore is best conducted as a group; members of the group can include the researcher, other people working on the activity being studied and other people affected by the activities being studied (Kemmis and McTaggart 1988: 46). The case study involved a consultative process of engaging with stakeholders such as fire services and the community which involved working with other researchers/supervisors.

The responsibilities of my research were negotiated and worked out before and throughout the research process. Stake (1994) in Denzin and Lincoln (2000, 244) outlined that the major conceptual responsibilities of the qualitative researcher are:

- bounding the case, conceptualising the object of the study;
- selecting phenomena, themes/issues – the research questions – to emphasise;
- seeking patterns of data to develop the issues;
- triangulating key observations and bases for interpretation;
- selecting alternative interpretations to pursue;
- developing assertions or generalisations about the case.

Quantitative methods were employed with the bushfire awareness community survey to compliment the qualitative methods used. The quantitative community survey was complemented by in-depth interviews and group interviews with fire service providers and community members that required qualitative content analysis. Despite the advantages of employing quantitative methods, the tendency to equate content analysis only with numerical procedures has come under criticism on a number of grounds (Holsti 1969, 10). The most general of these is the charge that such a restriction leads to bias in the selection of problems to be investigated, undue emphasis being placed on precision at the cost of problem significance (Smythe 1952). One can draw more meaningful inferences by non-quantitative methods (Kracauer 1952). Qualitative methods allow for more articulate open-ended responses. Qualitative content analysis,

which has sometimes been defined as the drawing of inferences on the basis of appearance or non-appearance of attributes in messages, has been defended most often, though not solely for its superior performance in problems of applied social sciences (Holsti 1969, 10).

Measurement theorists are generally in agreement that quantitative and qualitative are not dichotomous attributes, but fall along a continuum (Lazarsfield and Barton in Lerner and Lasswell1951). Thus, the content analyst should use qualitative and quantitative methods to supplement each other according to Holsti (1969, 11). Qualitative methods are generally perceived by experts to be insightful and quantitative ones are generally perceived to be mechanical methods for checking hypotheses, "however, the relationship is a circular one; each provides new insights which the other can feed" (Holsti 1969: 11). Insight into preparedness for bushfire issues was an intention of the case study; this involved the use of both qualitative and quantitative methods to derive various sources of data.

I see the role of the researcher as one of collecting other people's views and expressing them in places and spaces where they would otherwise not be heard. I see it as important for the researcher to validate their research through the use of rigorous methods. A combination of qualitative and quantitative methods was used for this case study. Methods of data collection included a journal, in-depth interviews with the assistance of members of the research team, independent observer's records, anecdotal records, literature review, survey results and field notes. Triangulation and comparison of comments by the researcher, the research team and the independent observer were particularly useful as the data represented different backgrounds and experiences in the conduct of the study. Inconsistencies in data were investigated to determine the reasons for the inconsistency and gather further information regarding the matter if deemed necessary. Individual interviews and group interviews were conducted to provide the qualitative component in a local context and identify issues to be included in the community survey which was the quantitative component.

Qualitative interviews

Interviews are an important part of any case study research project as they provide the opportunity for the researcher to investigate further, to solve problems and to gather

data which could not have been obtained in other ways (Cunningham 1993: 93). The group interview is essentially a qualitative data gathering technique that finds the interviewer/moderator directing the interaction and inquiry in a very structured or unstructured manner, depending on the interview's purpose (Denzin and Lincoln 2000: 365). Merton et al (1990, 135) suggested that the focused interview with a group of people "will yield a more diversified array of responses and afford a more extended basis both for designing systematic research on the situation at hand". The task of interview analysis is to sieve and sort the data in order to reduce its bulk, to sort trivia from significant information, to begin to order it so that patterns and themes may be more visible, and to begin structuring the findings for effective communication (Patton 2002).

The advantages of in-depth interviews are that it increases the relevance of questions, the interview is able to be tailored to the respondent, there is increased flexibility, more detail and a better search for understanding. The disadvantages include that there is different information from different people, it is unsystematic, the analysis is difficult, and there are strong interviewer effects upon the interview.

Semi-structured interviews include a broad sequence of prompts. The advantages of semi-structured interviews include that there is an increased comprehensiveness of information, logical gaps in data can be closed, it provides for a somewhat more systematic data, responses are more comparable and the flexibility of in-depth interviews is retained. A disadvantage of semi-structured interviews is that they may not cover important broad topics of which the researcher is unaware.

The interviews of the case study worked well because different interview strategies were used. In-depth interviews with representatives of fire services and the community were conducted first and provided the context for relevant issues and themes for the survey. There were individual and group meetings with the fire services and the community. Ten members of fire services were interviewed individually; three of whom were auxiliary (part-time urban QFRS) fire fighters. A further twelve Rural Fire Brigade fire fighters participated in a group meeting. Sixteen members of the community were interviewed, five were individually interviewed, eight attended the community group meeting and two were interviewed individually and also participated in the community group meeting. Semi-structured interviews were employed via a set of pre-determined

questions (see Appendix B) but the intention was that informants provided answers that opened up other directions not foreseen by the researchers.

The research team and locals at Tamborine Mountain built the interviewee list, central questions were formulated by the research team, the interviews were conducted and answers and statements were recorded. The interviews were transcribed, including variations in procedures, interruptions and additional ideas that were raised. The reason for flexibility at interviews was to follow the relevant issues. Sometimes I used written questions and I referred to my notes and other research team members did the same. A transcription of statements was seen as the most appropriate method for recording data; a tape recording was decided against because this may have interfered with the flow of the interview. The process worked well because interviewees were comfortable talking about issues, statements were clarified if required and interviewees had the opportunity to contribute as they wished. The relevant issues identified from a review of interviews were refined into survey questions. The values of the case study were better understood from both the interview and survey processes.

The in-depth interviews were not observations of fire service/other agency staff – I was interested to know their perceptions. The interviews were not intended to be intrusive. The data gathered from interviews provided adequate information for analysis. The formulating of central questions, conducting of interviews, and analysing of interview data are part of a reciprocating process. For interviews, data analysis begins after the first few interviews and shapes subsequent data gathering. Early interviews influenced the questions and content of subsequent interviews. I followed the practical steps offered by Bogdan and Biklin (1998) to guide the process while gathering data:

- Refine your focus and narrow the scope of data collection;
- Reassess central questions and determine if they are still relevant;
- Plan future interviews based on your early interviews;
- Record insights and summarise your reflections after each interview.

Interviewees were given the opportunity to tell their story. Respondents to the survey were also given the opportunity to include comments and perspectives on bushfire-related matters. The intensity and time spent with interviewees was not burdensome, amounting to an hour at the most. The intention of the research was to gain a holistic

perspective of the social dimensions – the perspectives of staff and community members; it was important to ensure all the voices of stakeholders were heard.

It is important for critical thinking to "challenge the truth in ways that subvert taken-for granted ways of thinking" (Thomas 1993:18). It was the purpose of the study to better understand the community of Tamborine Mountain in regards to bushfire-related matters. We did so through non-structured interviews – questions were not in the same order for all interviewees. Informants gave information that they wanted to share. The research team was of the impression that the interviewees were not really telling us what we wanted to hear and there was nothing we wanted to hear in particular anyways.

Scheurich (1997) argued that of course power asymmetries do exist in the research process but emphasised that the 'subject' is negotiating their own meaning, has their own agency which influences the situation of interviewing.

Scheurich (1997, 71) further described the interviewee's influence:

> Interviewees do not simply go with the researcher's program, even if it is structured rather than open. I find that interviewees can often control some or part of the interview … Many times I have asked a question which the respondent has turned into a different question that he or she wants to answer. Sometimes, this is a result of a misunderstanding, but at other times it is a result of the interviewee asserting their control over the interview, giving the information that they want to give.

Qualitative research designs are those that are associated with interpretative approaches, from the informants' point of view, rather than measuring discrete, observable behaviour. Qualitative research seeks relevance rather than scientific vigour and concentrates on words and observations to express reality and attempts to describe people in natural situations. Kreuger (1988, 26) outlined that the "purpose is to obtain information of a qualitative nature from a predetermined and limited number of people". A qualitative approach seeks patterns in information rather than measuring variables; it is inductive rather than deductive and seeks to understand meaning rather than the mathematical facts.

Qualitative methodologies are strong in those areas that have been identified as potential weaknesses within the quantitative approach, e.g. the use of interviews and observations to provide a deep, rather than broad, set of knowledge about a particular phenomenon. The advantages of qualitative methods is that it is a personal approach, takes context into account, flexible, accommodates a wide range of data, discovers relationships and emerging themes, and gets data simply and easily. Some disadvantages of qualitative methods are that it can miss data and not be representative, there may be sensitivities in interactions, ethical problems, misinterpretation, results are open to interpretation and/or bias, and the method is expensive and time consuming.

The interview transcripts provided a large volume of data that was both directly relevant, and not relevant to the research. Qualitative content analysis was used to identify which themes were more visible for effective communication of findings relevant to the research questions (Paisley in Gerbner et al 1969, Patton 2002). The themes derived from interviews were useful for specific exploration of issues in the community survey for a more comprehensive quantitative/qualitative content analysis.

Community survey

The community survey's primary purpose was to obtain quantitative data. Quantitative research relies primarily on the collection of quantitative data and is characterised by the assumption that human behaviour can be explained by what may be termed "social facts", which can be investigated by methodologies that utilise "the deductive logic of the natural sciences" (Horna 1994: 121). Quantitative investigations look for "distinguishing characteristics, elemental properties and empirical boundaries" (Horna 1994:121) and tend to measure "how much", or "how often" (Nau 1995). A quantitative research design allows flexibility in the treatment of data, in terms of comparative and statistical analyses, and repeatability of data collection in order to verify reliability.

The purpose of a survey is to use a consistent format in order to derive a representative sample of views, attitudes and beliefs (Hawtin et al 1994, 45). Although surveys are not the only way of collecting new information from a community, "they are one of the important methods of collecting accurate information from a representative sample of the community that will enable the researcher to make general statements about that community with any degree of confidence" (Hawtin et al 1994, 46). Collection of

information in a structured way is necessary if you want to be able to analyse that information relatively easily and also if you want to be able to compare the responses of different groups of people as well as if you want to be able to assess the proportion of people in a community holding certain views.

The survey questions were designed for respondents to share their views on preparedness for bushfire-related issues. A pilot survey was conducted to identify survey questions that respondents had difficulty understanding or interpreted differently than the research intended. Conventional pre-testing procedures are relatively simplistic (Krosnick 1999, 541). Interviewers conducted a small number of interviews (usually 15-25), then discussed their experiences in a debriefing session (Bischoping in Cannell et al 1989, Nelson 1985). In the case study, comments and results from the pilot surveys were discussed with my research supervisor and a representative from QFRS to further shape the final copy of the community survey.

Having decided on the order in which the survey questions should be asked, it was important to think about the wording of the questions and answers wanted. Hawtin et al (1994, 67) specified that there are basically two kinds of questions to ask – open and closed. It was further explained by Hawtin et al (1994, 67) that "closed questions predetermine the possible reasons that someone might have for an answer". A closed question asks the reader to select their answer/s from a number of options. An open question allows the respondent to answer in whatever way they like.

There are advantages and disadvantages associated with both open and closed questions. Open questions are much more difficult to code and analyse because the answers are not provided to choose from and are therefore more likely to be cumbersome. People are generally more likely not to answer open questions in self-completion surveys because, as Hawtin et al (1994, 69) explained, "open questions require more effort to answer (and the ability to write), whereas closed questions usually require the respondent simply to mark the appropriate box". Similarly, open questions are more likely to elicit the response "I don't know", which Hawtin (1994, 69) purported as often meaning "I can't be bothered to answer your question or think about the issue" (see also Smith 1987: 81). Geer (1988, 368) indicated that some researchers fear that open-ended questions would not work well for respondents who are not especially articulate and yet others suggest that the reliability and validity of open-ended questions is better than that of close-ended

questions (e.g. Krosnick 1999: 544, Hurd 1932, Remmers et al 1923). Therefore, closed questions are more likely to appeal to a wider audience than open-ended questions.

Overall, open-ended and close-ended questions were effectively combined into the survey for viable research outcomes. It was carefully considered that closed questions may have had the effect of imposing the views of the person or group who drafted the survey on those who are responding by effectively dictating the range of possible responses. The solution to potential imposition of closed questions was the provision of an "other" category for responses outside of the listed responses. The "other" category enabled respondents to include another response if it was not provided. The researchers provided a range of options to the close-ended survey questions in order to be as comprehensive as possible and present respondents with sufficient options to answer.

A mix of open and closed questions was provided in the survey so that questions were asked in varied ways and people were not constantly doing the same thing. When using closed questions, it was indicated to the respondent what they were required to do (e.g. circle a number). Sufficient room was left after open-ended questions for the respondent to write in their answer. In general, the words used and the style in which questions were asked were designed to be familiar to members of the community (who were to be responding to the questions). Hawtin et al (1994, 61) stated that "the order of the issues raised in a survey should allow for a natural flow of ideas". The order in which questions appeared began with impersonal, easy-to-answer questions which did not challenge or threaten the respondent. The questions were arranged to arouse the respondents' interest in the survey and secure their cooperation.

A decision upon choice of technique for drawing a sample most appropriate was the next step of the community survey. There are three main approaches to developing the sampling frame (Hawtin et al1994, 56); random, quota and cluster sampling. Representative sampling is important because "it affects the validity and reliability of the information that is collected" (Hawtin et al 1994, 43). Krosnick (1999, 538) explained that "representative sampling methods are standard practices essential to permit confident generalisation of results". The survey required a competent sampling procedure to ensure that statistic results are meaningful. Hawtin et al (1994, 50) raised concerns that "the response sample (those completing and returning the survey) may not be representative, as certain groups of people are notoriously reluctant to fill in surveys

of this kind". The survey was intended to be representative of the community's views on bushfire-related issues. It was not possible to engage every person in the community; therefore, it was necessary to find an appropriate sample.

It was my intention at the outset of research to conduct a random sample. The purpose for selecting participants must reflect the purpose or goals of the study and allowing the investigator to find representative individuals who have the characteristics being considered in the investigation (Arcury and Quandt 1998, 45). Typical of random sampling, it was not possible to specify the defining characteristics of the sample that would provide maximum variation (Lincoln and Guba 1985). I sought a wide-ranging sample of the area's householders to fill out the bushfire awareness survey.

It was decided by the research team that 500 delivered surveys was adequate for deriving a representative sample of the community. The 2001 census records reported that there were 5646 persons and 2218 households on Tamborine Mountain. The surveys were delivered based upon a representative sampling method whereby we delivered 500 surveys aiming to receive back about 300 surveys. The grounds for the survey sample size of 500 were determined by the Raosoft online sample size calculator. The following questions were asked. What margin of error can you accept? I chose 5% which is a common choice. What confidence level do you need? Typical choices are 90%, 95%, or 99%; I chose 90%. What is the population size? I entered 5646 (2001 census data). What is the response distribution? The most conservative choice is 50%, so I chose this. The Raosoft program computed that the minimum recommended size of the survey should be 259. A sample of this many people with responses from everyone would have made it more likely to get a correct answer than from a large sample where only a small percentage of the sample responds.

The self-completion surveys were delivered with a letter to the residents of Tamborine Mountain explaining that the survey is being conducted by James Cook University on behalf of the Queensland Fire and Rescue Service (see survey and letter in Appendixes C and D). Tamborine Mountain was divided into four segments by the research team who started in the middle of each segment (centre of a grid drawn on street directory map) and drove and walked up and down each street delivering a survey to every fifth house despite whether it was rural or urban or intermixed. We delivered surveys at fixed intervals of every fifth residence along from the last survey delivered on the block (2218

households divided by 500 surveys rounds up to five). We received 163 surveys back via the mail which was 137 less than we had anticipated.

Self-completion surveys were delivered to allow householders adequate time and space to fill out the survey. The length of the survey and the number of surveys delivered meant it was not possible for the research team to ask the survey questions and record the responses. Hawtin et al (1994, 49) suggested that the types of situation for which self-completion surveys might be useful are "where you want to get a fairly superficial, broad-brush indication of issues from a relatively large group of people". There are positives and negatives with the methods of self-completion surveys: "They are relatively easy to administer and reach quite a lot of people, but the disadvantage is that they tend to result in low response rates" (Hawtin et al 1994, 49). Cumbersome and difficult to complete surveys are more likely to be problematic (Hawtin et al 1994, 53). These difficulties were overcome by having the survey graphic designed in a user-friendly format. Every fifth dwelling had a survey delivered to the householder or left with a note at the front door if they were not home. Pre-paid, self-addressed envelopes were provided by QFRS and assistance was offered for people to complete and return them. Incentives such as key rings and fridge magnets were given to encourage completion and return of the surveys.

Data analyses methods

The analysis of interview transcripts involved development of coding categories through understanding conceptual relationships, and counting key words. I coded transcripts into meaningful categories to organise large amounts of text and discover patterns. I ordered interview transcripts and other information chronologically and carefully read all of the data more than twice during long, undisturbed periods. Next, I conducted initial coding by generating numerous category codes. I read responses, labeling data that are related without worrying about the variety of categories. I wrote notes, listing ideas or diagramming relationships I noticed, and noted special vocabulary that respondents used. Codes are not always mutually exclusive, so on occasion of such, a piece of text was assigned several codes. Last, I applied what is called focused coding to eliminate, combine, or subdivide coding categories and look for repeating ideas and larger themes that connect codes. Repeating ideas are the same idea expressed by different respondents, while a theme is a larger topic that organises or connects a group

of repeating ideas. After I developed coding categories, I made a list that assigned each code an abbreviation and description.

I drew from Berkowitz (1997) questions when coding qualitative data: What common themes emerge in responses about specific topics? How do these patterns (or lack of) help to illuminate the broader study question(s)? Are there deviations from these patterns? If so, are there any factors that might explain these deviations? How are participants' environments or past experiences related to their behavior and attitudes? What interesting stories emerge from the responses? How do they help illuminate the central study question(s)? Do any of these patterns suggest that additional data may be needed? Do any of the central study questions need to be revised? Are the patterns that emerge similar to the findings of other studies on the same topic? If not, what might explain these discrepancies?

The interviews' central questions shaped the coding scheme. I utilised a coding category described by Bogdan and Biklin (1998) as 'Respondents' Ways of Thinking about People and Objects' to capture how they categorise and view each other, outsiders, and objects. I used a diagram (Figure 1, p.54 at the end of this chapter) to illustrate relationships and themes. I shared interview transcripts with research partners and stakeholders before I completed my analysis to verify what was said. I made conclusions after I fully analysed the data. In hindsight, I could have made sure I avoided bias if I had sought out an outside evaluator, rather than project staff, to identify project strengths and weaknesses or evaluate outcomes. This may have helped to better view analysed data from a distance until I saw a larger picture and understood how this picture relates to the evaluation's central questions. Comparison with similar research helped me to make better sense of repeating ideas and larger themes. I identified underlying factors that explained the themes I observed and then constructed a logical chain of evidence. It was important to be flexible with the qualitative research because there were respondents who did not follow the usual pattern, so it was important to understand why.

Open-ended survey question responses were also coded by themes. Frequency counts and percentage were derived to tabulate how many times certain themes appeared in survey results. The development of codes was a dynamic process because it took numerous "draft" sets of codes before a final set was used; codes provide a performed

set of ideas or interpretation of the data. For example, the task of coding some parts of interviews as 'caretaker' was a process equivalent to putting the interviewee's thoughts into a neat box. The danger in this process is that my choice of words might limit my interpretation. For example, I might see one thing as related to another and in doing this it is possible to miss the difference and individuality of two things.

Coding techniques were employed to theme the qualitative answers to survey questions. Stake (1994) in Denzin and Lincoln (2000, 242) believed that many researchers develop an anticipatory coding method whereby "we see data sometimes pre-coded but continuously interpreted, on first sighting and again and again". It was necessary to peruse records and databases more than once and have someone else involved in the process to help recognise patterns and to develop reflective thoughts on the information. A hands-on approach to qualitative case studies is most effective according to Stake (1994) in Denzin and Lincoln (2000, 242) because it "is characterised by the main researcher spending substantial time, on site, personally in contact with activities and operations of the case, reflecting, revising meanings of what is going on". Therefore, the values of the case are best understood and expressed from experience in the interview and survey processes. A Statistical Analysis Plan (see Appendix E) specified variables used for data analyses.

The capacity to fuse descriptive or scaled data with qualitative responses or interview material has been made easier with advances in software development. With the tools now available, it has become possible to take information derived from unstructured textual (or other qualitative) data and incorporate it into a quantitative analysis, giving access to new variables and making possible new analyses (Bazely 1999: 284). Numerically coded and text responses were entered into Excel spreadsheets and SPSS databases. Numeric codes were entered into the SPSS databases for statistical analysis.

Key Cross Tabs were used to test for statistically significant relationships between variables of interest. All tests were conducted using the SPSS program, Version 12.

A number of questions in the survey required the respondent to select a response from more than two categories (for example, Q.2, 3, 5a and b, and 8e), but due to small sample size some categories were pooled together to avoid the bias in results associated with a small sample size. Question 2 and 5a categories were pooled into "agree", which

included agree strongly and agree slightly, “neither”, and “disagree”, which included disagree strongly and disagree slightly. Question 3 categories were pooled into “action taken”, which included action taken in past few months and action taken before past few months and “action not taken”, which included aware of but not taken action, would consider action and would like advice. Question 5b categories were pooled into “more responsible”, which included rankings 1 to 3 and “less responsible”, which included rankings 4 and 5. Because respondents could rank only five categories out of a possible six, the sixth (i.e. the category with a non-response when other categories were ranked) was treated as no responsibility assigned (i.e. “less responsible”). Question 8e categories were pooled into “more important”, which included rankings 1 to 3 and “less important”, which included rankings 4 and 5. Similar to Question 5b, the category receiving a non-response was treated as not important (i.e. “less important”). Furthermore, categories receiving a very low response rate (i.e. “unsure” in Q2 and 5a) were excluded from analyses to avoid biased answers.

Validity of research

Validation is necessary in all types of research as there is no neutral research (Lather 1986, 67). This is because the job of validation is not to support an interpretation, but to find out what might be wrong with it. A proposition deserves some degree of trust only when it has survived serious attempts to falsify it (Cronbach 1982 in Lather 1986, 67). In critical research, validation is used to ensure that the researcher does not “misconstrue evidence due to personal bias” (Hillcoat 1996, 153 in Williams 1997).

Quantitative research uses the criteria of validity, reliability and replicability in the findings and interpretations. Conversely, the notion of trustworthiness is now commonly referred to as a criterion of research worth for qualitative studies (see Patton 2002, Scheurich 1997). For Lincoln and Guba (1985) in Denzin and Lincoln (2000), validity is derived from community consensus regarding what is real, what is useful and what has meaning.

Patton (2002, 32) presents three steps in the process of “enhancing the quality and credibility” of qualitative research. These are to establish that you have rigorous methods; the credibility of the researcher; and a philosophical belief in qualitative inquiry. The strategy that I have utilised is looking for negative cases to the identified

theme. Looking for negative cases involved the conscious re-examination of the data for cases that do not fit within the identified pattern. Evidence that contrasts with the interpretation does not necessarily lead to a rejection of the interpretation (although it might), but it does enhance the complexity and usefulness of the interpretation.

There have been no personal or professional associations that have affected data collection, analysis and interpretation of the case study. Patton (2002) outlined that the researcher should avoid overestimating or underestimating the effect of their presence and involvement but that they have the responsibility to describe and study what those effects are. Constructive analysts should deal with these issues through a conscious and committed reflexivity (Patton 2002: 569). I made sure that personal and professional information that may have affected data collection, analysis and interpretation was reported. I have been open about my involvement, concerns and influence in the research process. "The focus is not on the meaning-making of the individual mind but on the collective generation of meaning as shaped by conventions of language and other social processes" (Schwandt in Denzin and Lincoln 2000, 120). Therefore, careful attention to coding lists was imperative for making sense of the data and adequately identifying the case study's patterns of language, so that the social construction of risk involved a fair indication of overall community viewpoints.

There is no 'truth' about what the case study's interview and survey results are or not, rather there are multiple meanings, meanings which are constructed in, and out of, interaction with others. The meanings themselves are dynamic because the meanings are subject to change. Being interviewed about one's relationship with bushfire can alter the meaning of the experience. The simple act of asking questions may lead to one questioning their own thoughts and viewpoint, when they previously seemed clear. There was no intention to uncover 'reality' as such, but the multiple realities or 'parts of the whole' and therefore the whole in terms of its parts (Schwandt in Denzin and Lincoln 2000, 121).

The issue of low-response rates affecting the validity of the random survey results has been explored (Babbie 1990; Lavrakas 1993; Weisberg et al 1996, Krosnick 1999). The wide-held view is that systematic, representative sampling methods must be used, and high response rates must be obtained to maximise representativeness. Krosnick (1999, 538) pointed out that "although face-to-face interviewing was thought to be the optimal

method, the practicalities of telephone interviewing made it the dominant code since the 1980's". Self administered mail surveys were "clearly undesirable, because they typically obtained low response rates" according to Krosnick (1999, 538).

Traditionally, survey researchers have believed that for a sample to be representative, the survey's response rate must be high (Steeh 1981, Brehm 1993, Krosnick 1999). Response rates for most surveys have fallen in the last four decades (Steeh 1981, Brehm 1993), so "surveys often stop short of the goal of a perfect response rate" (Krosnick 1999, 539). Therefore, it can be inferred that response rates for random surveys have become lower in the last five decades as have expectations from survey researchers about response rates being high.

A drop-off and mail-back method was used to deliver and collect the Tamborine Mountain community bushfire awareness surveys. Thirty-three percent of the 500 surveys dropped off were returned. This is considered a satisfactory response rate under current circumstances. Most surveys have difficulty achieving response rates higher than 70% (Brehm 1993 in Krosnick 1999, 539). Brown and Wilkins (1978, 227-231) outlined that if a survey is exceptionally well-presented and easily returned, and it is a topic that the study audience is well-acquainted with, the resultant return rate could be at least 65 percent of delivered surveys, according to their research results; "70 percent is considered to be good". Heberlein and Baumgartner (1978, 451) report the average response rate to a first mailing to be 50 percent, and with only one follow-up, an additional 20 percent is attained. The survey that we delivered was not followed up; we provided a self-addressed envelope for the respondents to return their surveys. Therefore, a response rate of 33% can be seen as below average of what could have achieved had we more time and resources to further improve the survey's design and if we had followed-up on non-returned surveys.

The prevailing wisdom that high response rates are necessary for sample representativeness is being challenged (Fowler and Cannell 1996 in Schwarz et al 1998, Visser et al 1996, Krosnick 1999). Recent research has shown that surveys with very low response rates can be as accurate as surveys with much higher response rates according to Krosnick (1999, 540). Becker and Iliff (1983, 264) specified that when sampling homogenous populations (groups with common interests) it is not necessary to achieve high response rates to avoid non-response bias: "non-respondents have not been

found to be significantly different in these populations". Therefore, having a low response rate does not necessarily mean that a survey suffers from a large amount of non-response error or that it is not useful for developing a picture of the overall population studied. After determining the geographical boundary, it was then important to decide what kinds of people within a community we were interested in including in the survey. The objective was to efficiently achieve a representative sample whereby the characteristics of the survey sample were as closely as possible representative of the community at large. The community survey was a research method that built upon and further investigated the findings of the interviews.

Triangulation of research

Triangulation is the use of two or more methods and/or sources of data collection to confirm the observations and findings of the researcher. It is used with a view to double or triple check results. Lather (1986, 67) explained that triangulation "expanded beyond the psychometric definition of multiple measures to include multiple data sources, methods and theoretical schemes, is critical in establishing data trustworthiness". It is essential for triangulation that the research design seeks to counter patterns as well as convergence if data are to be credible (Lather 1986). Triangulation is also called cross-examination; there is more confidence if different methods lead to the same result.

Both interviews and surveys were used in the Tamborine Mountain case study as methods of investigation. The reason the research methods were followed in a particular order was to set the groundwork for the next stage (i.e. the interviews helped set the groundwork for the community survey). You never really understand an issue or know how to resolve it until you involve yourself in the issue, then begin to understand it, to identify the principal parties and actors involved, and begin to realise how to change it (Friere 1970, cited in Stapp and Wals 1992: 3). There is much progress to be made from observation and reflection. Stake 1994 (in Denzin and Lincoln 2000, 242) prefers "interpretive work" as the descriptor in order to emphasise the production of meanings, but ethnographers "have tried to make that term mean to learn the special views of actors, the local meanings" (Ericksen 1986, cited in Stake 1994 in Denzin and Lincoln 2000, Schwandt in Denzin and Lincoln 2000). In being reflective, the researcher is committed to pondering the impressions, deliberating recollections and records – but not necessarily following the conceptualisations of theorists, actors, or audiences (Carr

and Kemmis 1986). Local meanings are important as foreshadowed and consequential meanings (Stake 1994 in Denzin and Lincoln 2000). Reflective methods were employed in order to relate the case study findings with theory and knowledge

Triangulation was put into practice by comparing themes in community group statements in interviews with results from the community survey and synthesising this into a community perspective. Similarly, themes from interviews with rural and urban fire brigades were compared and synthesised into the fire services' perspective. It was apparent that there were issues which community groups and the surveyed community agreed upon and differed. There were more consensuses between the two fire brigades. Triangulation was put into practice when the results across the chosen methods was synthesised when I reviewed the interview data repeatedly to check that conclusions were grounded in what was said and looked at independent evidence from other sources and used other methods, such as focus groups and a survey to verify conclusions.

Limitations of research

Discussion regarding the limitations of the case study is related to a number of topics:

Definition of a rural and urban town: Q.1b of the community survey asked where respondents lived before moving to the area (town and state). The limitations encountered were that the question did not ask if the residents considered their previous town as being rural or urban nor did it ask all the places where the respondent had previously resided. Therefore, I had to make a decision for whether respondents lived in a rural or urban town based on available definitions of what constituted a rural and urban town. The Australian Bureau of Statistics' (ABS 2005) definition of rural and urban towns in 2001 differed to the 2000 U.S. Census data designations which described that all towns in a designated Micropolitan Statistical Area with a population of less than 15,000 and those towns in Metropolitan Statistical Areas with a population of less than 7,000 are designated rural. Towns with 1,000 residents or less were generally considered by the ABS to be rural and towns over 1,000 residents were generally considered to be urban.

The ABS (2005) defined rural as areas which are not part of any urban area. As the following definitions indicate, rural and urban can be split at the 1,000 resident mark, however, there are subsets of these definitions such as "bounded locality" and "rural

balance" for Australian rural areas and "major urban" and "other urban" for Australian urban areas and there is also a "migratory" category for those who were not residing at the locality. "Bounded locality" is a category that provides for two categories of rural areas; localities with a population of 500 to 999 and 200 to 499 and "rural balance" is a category that provides for those areas not included in the other four categories (i.e. "major urban", "other urban", "bounded locality" and "migratory". An "urban centre" is generally defined as a population cluster of 1,000 or more people and can be split into "major urban" and "other urban". People living in "urban centres" are classified as urban for statistical purposes while those in "localities" are classified as rural (i.e. non-urban). The ABS (2006, 3) reported that "locality is a term used by different people to mean different things and assumptions should not be made about what the term means in any given usage".

The ABS reported that the 1000 person mark is generally where rural towns become urban for statistical purposes associated with the census, however, it was also mentioned that "urban centre" and "localities" respectively classify urban and rural areas and assumptions should not be made about what constitutes a "locality". The boundary between urban and rural was not clear and therefore open to interpretation. A limitation of the survey was that there is no specific definition of the population range for a rural-urban area. In this case study, Australian towns with populations over 10,000 residents were considered to be urban and towns with 10,000 residents or less were considered rural. The same level for what constituted a rural and urban town for the purposes of the case study was applied for residents who previously resided overseas.

Themes of open-ended responses: Themes of open-ended responses to surveys were sometimes difficult to derive. For example, in question 2, respondents were asked to think about the risk of fire in their area and circle the number which showed the extent that they agreed or disagreed with 6 statements and then after it was asked "please explain why you feel the way that you do". Most respondents did not refer to which particular statement/s they were referring, making it difficult to theme the answers in reference to a particular statement. It may have helped to ask respondents to mention which statement/s they were referring to in their open-ended answers so that I could accordingly theme answers.

Coding of open-ended responses: Coding of open-ended responses was sometimes limited to whether or not the respondent had answered to the question or not. Some open-ended responses were difficult to theme because of the high number of different answers, so these responses were basically coded "yes" or "no" for whether or not the respondent provided an answer. This meant that there were limitations for data analyses performed by the SPSS program in questions with highly-varied open-ended responses.

Interpretation of close-ended questions: The limitation of survey questions which asked respondents to choose only one of the close-ended answers is that respondents may not have had just one of the options available that best represented their view or situation.

Low response rate to community survey: There were limitations with receiving back only a third of surveys delivered (163 returned surveys from the 500 delivered). Low response rates was discussed previously as being fairly typical and having a low response rate does not necessarily mean that a survey suffers from a large amount of non-response error or that it is not useful for developing a picture of the overall population studied.

Data Analyses: Relationships between activities taken or not against the threat of fire, perceptions of bushfire risk, confidence in bushfire safety aspects, responsibility for the protection of life and property in the event of bushfire and demographics information were the main areas of data analyses. As mentioned in themes and coding of open-ended responses, there was a limit to what data could be analysed in relationships because of the number and presentation of questions in the survey and interviews.

Errors: Each stage of the case study was subject to stringent quality assurance measures. For example, interview notes and community survey data were recorded separately by two researchers and results of theme coding and data analysis were checked and compared. However, in a case study, there is the possibility that errors can not be picked up. The Australian Bureau of Statistics (2006, 2) reported that "there are recognised sources of error which may survive in the data produced. These include undercounting, processing and respondent error". Some of these are overcome or repaired during processing, especially when another research member checks the data and results. "The effect of errors that remain is generally slight" according to the ABS (2006) "although they may be more important for small groups in the population such as the Indigenous

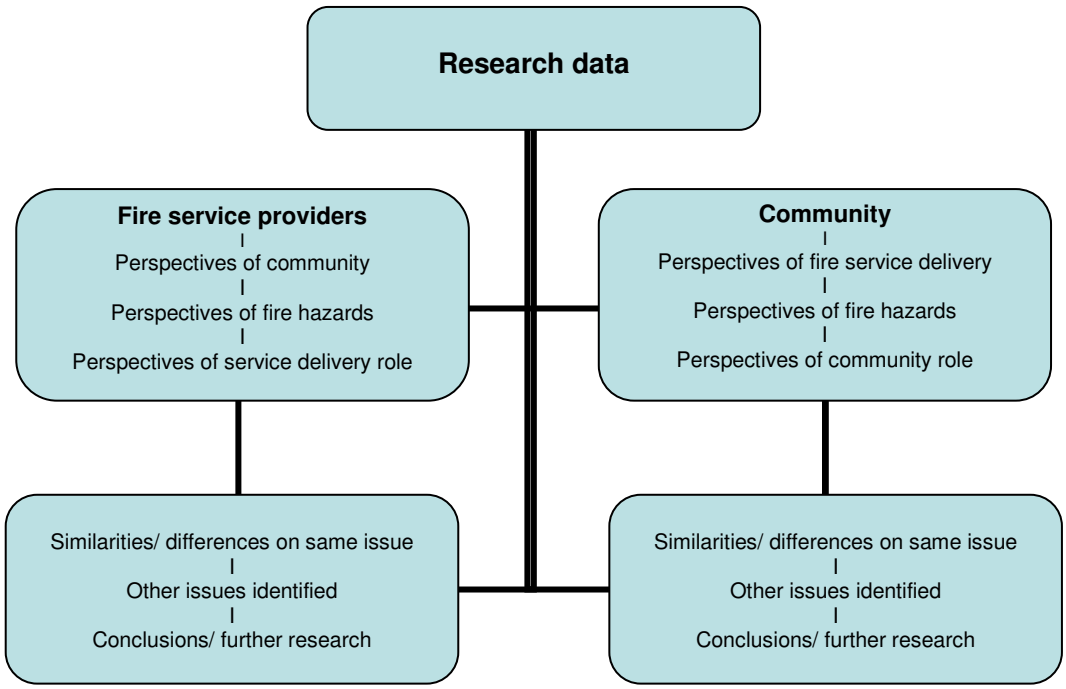
population". The reason some totals do not add up to 100% is because of rounding errors. It was considered to be acceptable if the rounding errors are under 1%.

Conclusion

The multi-methods research for the case study was introduced in this chapter. The research followed a case study approach which utilised both qualitative and quantitative methods (interviews and a community survey) for gathering data before data analyses were conducted. The validity, triangulation and limitations of the research were addressed so that it was clear that the research followed structured rules and procedures.

The Research Output Model in Figure 1 represents the process followed for extrapolating research data by engaging the stakeholders and looking into how the two parties of fire service providers and the community perceived themselves, the other party and fire hazards. The data analyses required finding similarities and differences on the same issues, as well as identifying other issues for resolution before making conclusions and implications for further research.

Figure 1: Case Study Research Output Model



A profile of Tamborine Mountain and the results of interviews and surveys are presented in Chapter 4.

Chapter 4

Profile of Tamborine Mountain and Perspectives of Local Fire Services and Local Community Organisations on Bushfire-Related Issues

Tamborine Mountain: Background

Tamborine Mountain is 64 kilometres south of Brisbane on the Gold Coast hinterland of South-East Queensland and is situated mostly within Beaudesert Shire Council to the west, north and south and partly within Gold Coast City Council to the east. Surfers Paradise is 32 kilometres to the east and is visible from the Mountain's eastern vantage points. Tamborine Mountain has a generally mild sub-tropical climate. The plateau is an irregular shape, about 8 kilometres long and about 5 kilometres across at its widest part. The highest point on Tamborine Mountain is about 600 metres above sea level. Tamborine Mountain had a population of 5646 at the 2001 census (Beaudesert Shire Council 2005). Beaudesert Shire had a total population of 58,000. The population of the Gold Coast passed 500,000 inhabitants during 2005 and is expected to continue to grow rapidly over the coming years.

Valuable timbers such as the Australian Red Cedar lured the first settlers to Tamborine Mountain over 100 years ago (Graham 2005). Since then much of this dense forest has been cleared to make way for farming although many remnant stands of the original forest still exist. Farming is still a local way of life (Graham 2005); where once this fertile area produced commercial citrus fruits, vegetables and milk, it now produces mainly avocados, kiwi fruit and rhubarb and also some export-quality cut flowers. Eleven National Parks almost encircle the Mountain escarpments. The small plateau is rich in animal and bird life.

Tamborine Mountain is a community with a mix of rural and suburban properties. The peace and beauty of the area has attracted talented artisans, craft persons and gardeners. Young families choose to live there because they consider it an ideal place to rear children away from suburban life (Graham 2005). Many professional and academic people also call Tamborine Mountain their home, many commute to work, more people are also telecommuting (Graham 2005). There are approximately 1 million tourist visits per annum to the Mountain (Tamborine Mountain Chamber of Commerce 2006).

Census profile

In order to develop a picture of the Tamborine Mountain community and whether or not the community survey sample was representative of the overall Tamborine Mountain community, it was pertinent to first outline the most recent census data (Beaudesert Shire Council 2005). This section outlines information about survey respondents' age, gender, household situation, occupation, employment situation, commuting time and information related to their residence such as construction materials, insurance level, length of residence, prior place of residence, and property type and surroundings. Most of the demographics and residence information was able to be compared with census data to develop a more comprehensive community profile.

There were 5646 residents (47.5% male and 52.5% females) in the year of 2001 (Beaudesert Shire Council 2005). There was a total of 2711 dwellings, of which 2201 were separate houses and 306 were unoccupied dwellings (perhaps used as holiday houses).

Australian born residents amounted to 69%; of which 24% indicated having been born overseas and there was a small group of Indigenous Australians. The countries of origin which were the highest represented for those whom had immigrated to Australia included the United Kingdom and New Zealand. There was a diverse mix of countries of origin for the remainder of immigrants to Tamborine Mountain.

Most of the residents of Tamborine Mountain lived in a family dwelling (79%). Most of those families were couples with children (48%) and couples without children (38%). One parent families with children were 14%, and the median household size for Tamborine Mountain was 2.4 persons.

The age groups are presented in ten-year brackets up to the age of 79 and an 80+ bracket (Table 1). The most represented age group at Tamborine Mountain was the 50-59 age bracket (18%), followed by the 41-50 age bracket (16.5%), and then the 60-69 age bracket (12.5%). Therefore, residents in the middle to older age brackets are the most represented within the community (Table 1). There was almost the same amount of children under the age of 10 (13%) as older children and young adults (aged 10-29) which is two age groups combined (13.5%).

Age	N	%
0-9	673	13
10-19	347	6.5
20-29	367	7
30-39	655	12.5
40-49	871	16.5
50-59	921	18
60-69	722	14
70-79	449	8.5
80+	201	4
Total	5206	100

Table 1: Ages of residents at Tamborine Mountain (N=5206)
Source: Beaudesert Shire Council (2005)

The total number of residents in the workforce was 43% which reflects the high number of retired people living at Tamborine Mountain and the median income levels (see Table 4). Out of those in the workforce 52% were working full-time, 36.5% were part-time workers and 8.5% were unemployed. The proportion of part-time workers compared with full-time workers was quite high. This reflects the median income bracket being between $300-399. The median income bracket for a family ($700-799) and a household ($600-699) is possibly boosted by dual-income households (see Table 4 on the next page).

The largest occupation group was professionals and associate professionals (see Table 2). Overall, the distribution of employed persons across industries was fairly diverse which reflects the accessibility to local hospitality, trade and service industries as well as professional and associated positions at Brisbane and the Gold Coast, where a lot of residents commute each day. Seventy percent of Tamborine Mountain's employed residents (2198 persons) drive to work.

Occupation	N	%
Professional	510	23
Associate Professional	320	14.5
Intermediate Clerical, Sales and Service Workers	305	14
Tradesperson	255	12
Managers/ Administration	239	11
Elementary Clerical, Sales and Service Workers	171	8
Labourers/ Related Workers	155	7
Advanced Clerical and Service Workers	85	4

Table 2: Occupation of Tamborine Mountain residents in workforce (N=2198)
Source: Beaudesert Shire Council (2005)

There was a high proportion (42%) of the resident population who indicated that they have qualifications, considering that 19.5% of the population were not yet 20 years old.

Qualifications	N	%
Postgraduate degree	92	2
Graduate diploma	75	2
Bachelor degree	510	12
Advanced diploma	416	9
Certificate	773	17
Not applicable/ not stated	2619	58

Table 3: Qualifications of Tamborine Mountain residents (N=4485)
Source: Beaudesert Shire Council (2005)

Home ownership is high in the Tamborine Mountain area: 50% of dwellings were fully-owned, a further 30% being purchased, 1% being rented and the remainder (19%) were indicated as belonging to "other" which may have included businesses such as for the area's tourism industry. The population at Tamborine Mountain is rather mobile with 50% of residents having a different address 5 years ago.

The overall picture we have of the population at Tamborine Mountain from the census data coincides with data from the in-depth interviews: an older population, with high levels of retired people, high levels of education, more professional and allied occupations, and a relatively comfortable income (Table 4).

Attribute	Median
Age	44
Monthly housing loan repayments	$800-$999
Weekly rent	$150-$199
Weekly individual income	$300-$399
Weekly family income	$700-$799
Weekly household income	$600-$699
Household size	2.4

Table 4: Median of various census attributes for the population of Tamborine Mountain
Source: Beaudesert Shire Council (2005)

Census data helped to develop a picture of characteristics of the community at a given time. In order to develop a more specific understanding of the bushfire-related issues of the Tamborine Mountain area, it is necessary to outline background information that provided a foundation for research into the perceptions and expectations of fire services and the community. Therefore, local fire management background information for Tamborine Mountain is presented next.

Fire Management Background Information

Background information about fire management on Tamborine Mountain is grouped under the organisations of the Queensland Fire and Rescue Service/Rural Fire Brigade, Beaudesert Shire Council and Gold Coast City Council, Queensland Parks and Wildlife Service and the community-initiated Tamborine Mountain Escarpment Management Plan.

Queensland Fire and Rescue Service/Rural Fire Brigade

Tamborine Mountain's fire brigades are included in the Ipswich District Office area. Ipswich covers the southern area of South-East Queensland to the New South Wales border and west to Gatton. It is one of 15 districts in Queensland. The Queensland Fire and Rescue Service (QFRS) Head Office in Brisbane provides brigades with materials e.g. brochures, posters and maintenance of websites. QFRS developed the "Bushfire Prepared Communities" program, television advertisements and brochures. Maps and I-Zone fire hazard maps are developed at the QFRS Head Office (see Map 1 on page 68). QFRS' methodology for assessing bushfire hazard risks is manually assessing areas and satellite imaging of slope and vegetation on the ground. There were no higher quality maps available than the I-Zone maps, where only the main roads are determinable. It is possible that I-Zone maps can be used in conjunction with road maps to work out the approximate area of the hazard classifications. There has been no local input into the process but State Planning Policy Guidelines were followed for determining bushfire risks to particular areas.

Tamborine Mountain has an auxiliary urban fire brigade and a rural fire brigade. Auxiliary means part-time brigade; there are paid volunteers who cover built up areas with 2 fire trucks. The Rural Fire Brigade (RFB) covers area around the built up area and properties as unpaid volunteers. The Beaudesert area has 14 active brigades. The brigades assist each other; once one brigade is fully committed then the next are on standby; when 2 brigades are fully committed, the overall brigade officer is notified and a command structure is put in place for the incident. The RFB can go off road and are also responsible for National Parks but they receive no funding for this. Fundraising is required by the RFB because the number of properties they are responsible for is less than the urban brigade; they receive less of the overall community fire levy payment

because rural areas have less properties. The RFB relies on volunteers and off-road vehicles are especially needed in some areas.

Beaudesert Shire Council and Gold Coast City Council

The Gold Coast City Council has a Bushfire Management Strategy for the large areas of bushland that can carry significant fires. The identification of these areas was deemed necessary to ensure that development addresses the associated hazards. Beaudesert Shire Council has recently completed a Natural Disaster Risk Management Study, where strategies were recommended, however there is no Bushfire Management Plan to date. The overall risks posed to the population of the region are relatively small and infrequent compared with other parts of Australia. Bushfires and floods are the most significant natural hazards in both rural and urban areas. Beaudesert Shire and the Gold Coast are vulnerable to bushfire mostly in the rural/bushland areas. Tamborine Mountain is especially a high fire risk area because of eucalypt forests (Gold Coast City Council 1998). Councillors often receive phone calls regarding overgrown properties and people clearing foliage over their fence. Buffers (such as clearance of vegetation in fire-prone areas) are encouraged but cannot be enforced.

Queensland Parks and Wildlife Service

The Queensland Parks and Wildlife Service (QPWS) are responsible for eleven sections of National Parks throughout Tamborine Mountain, including fire management for which they have firefighting equipment. The area's Fire Warden for QPWS is now based 40 kilometres away at Daisy Hill; he was previously based on Tamborine Mountain with 3 other staff and is currently the Fire Warden for 3 districts including Tamborine Mountain, as well as a volunteer with the Tamborine Mountain RFB. QPWS were involved in the development of fire trails for the *Tamborine Mountain Escarpment Management Plan* through the efforts of the Fire Warden who continues to check the fire trails with the RFB. Controlled burns are normally prepared around August by the Fire Warden and RFB. Photos 14 and 15 on page 65 illustrate the circumstances where plans for a controlled burn were held off until the next year. Photos 13, 15 and 16 on pages 65-66 illustrate fire prevention activities from previous years. The other photos (pages 62-66) illustrate various aspects of Tamborine Mountain, bushland and rural-urban interface homes.

Tamborine Mountain Escarpment Management Plan

The *Tamborine Mountain Escarpment Management Plan* was developed in 2001 for the western/northern aspects of the Mountain (see Map 2 on p.69). The escarpment is where the Mountain's ridges meet a plateau. It is of special value because management for the escarpment affects the whole mountain. Community members initiated the project, Beaudesert Shire Council provided seed funding and the rest was funded by the Natural Heritage Trust – the report was produced by Brisbane-based environmental management consultant, Graham Watson. Escarpment landowners participated in the project through one or more of the following activities: access, fire trails – creation and maintenance, fences, biodiversity – assessment and protection through Land for Wildlife, in-kind support, equipment use, weed management, revegetation and feral animal control.

The *Tamborine Mountain Escarpment Management Plan's* Bushfire Management Plan was developed to be a guide to fire safety issues and was intended to enable the relevant landholders and firefighters who live and work in areas of potential bushfire hazard to be provided with the best information to protect their lives and property in the event of a wildfire. The Bushfire Management Plan was developed to act as a guide for optimum controlled burning regimes to effectively maintain the biodiversity of forest ecosystems occurring across the escarpment. The responsibility for determining the timing and location of these deliberately lit fires was indicated as belonging to the Fire Warden. It was reported in the Bushfire Management Plan that controlled burning "will occur only when there has been a substantial build up of forest litter, when the general threat of fire is low and the location has not been burnt within the previous six years. For the purposeful protection of built infrastructure, hazard reduction burning may be conducted in restricted areas as often as every four years" (Watson 2001: 12). The Bushfire Management Plan for the escarpment emphasised that the diversity of forest ecosystems and fauna will be protected by careful burn plans: "The general strategy for hazard reduction burning is that fires will be of low intensity, of varying extent, with varied ignition points and will be lit at varying times of the year. In this way, the hazard reduction burning regime will try to simulate the random distribution of fires which are started naturally, and thereby maximise ecologically acceptable outcomes" (Watson 2001: 13).

Rural-urban interface photos of Tamborine Mountain and fire management maps

Photos 1-8: The photos on the left side show various aspects of the local bushland around Tamborine Mountain. The photos on the right side show examples of the various aspects of the rural-urban interface.

Photo 9: East of Tamborine Mountain at Eagle Heights: a fire meter is located on one of the four entry/exit points to Tamborine Mountain. It displayed very high risk of fire during the bushfire season (September 2004). The Wongawallan area experienced bushfire during the next month of October 2004.

Photo 10: Tamborine Village at the site of a previous radiata pine forest (September 2004). There have been reports of arson causing bushfire in the area due to stolen cars being set on fire and spreading to surrounding eucalypt and pine tree fuels. The site was purchased by Delfin for a satellite town of 50,000 residents but the development group has been unable to build homes as planned due to difficulties in accessing town water. The previously forested was last harvested in 1999 and is adjacent to Queensland Parks and Wildlife Service's Tamborine Management Unit. Natural regrowth has been mostly by eucalypts, there is a small amount of radiata pine regrowth (exotic species from California).

Photo 11: A rural-urban interface house at the foothills of Tamborine Mountain before bushfire season (August 2004). Tamborine Mountain was identified as a high-at-risk-from-bushfire area by the Queensland Fire and Rescue Service's GIS department during planning for I-Zone maps in 2003.

Photo 12: Tamborine Mountain's western aspect; view from road towards Brisbane (August, 2004).

Photo 13: A controlled burn on Beaudesert Shire Council land at Tamborine Village (October 2004).

Photos 14 and 15: A grass fire at Tamborine Village during August, 2004. Controlled burn plans had to be held off until the next year as the window of opportunity (before the bushfire season) had been lost due to the arrival of high westerly winds and the very high extent of dry foliage and grasses. The controlled burn had been cooperatively planned by the local Fire Warden and district/regional staff of Queensland Parks and Wildlife Service and the Tamborine Mountain Rural Fire Brigade, as well as with assistance from Beaudesert Shire Council and Queensland Fire and Rescue Service (Tamborine Mountain urban brigade). Private landowners cooperated with controlled burn plans by allowing access to their property to check for infrastructure/water, as well as track grading and backburning preparations.

Photo 1-15 taken by Luke Balcombe.

Photo 16: An excavator fells a burning tree next to a fire trail after a controlled burn in 2000. Photo is from the *Tamborine Mountain Escarpment Management Plan* (Watson 2001).

Photo 17: A controlled burn was conducted by the QPWS on Tamborine Mountain State Forest land (2000). Photo is from the *Tamborine Mountain Escarpment Management Plan* (Watson 2001).

I-Zone Type 1: Under 0.25ha = Urban **I-Zone Type 2**: 0.25 to 10ha = Rural Residential

Queensland's State Planning Guidelines were followed in QFRS' I-Zone research in order to determine community assets at risk and areas to target for community education:

1. Fire scar mapping (history) 2. Potential bushfire hazard maps

3. Community assets at risk 4. Community education targets

The I-Zone Type 1 and 2 images and background information images represent Queensland Fire and Rescue Service's (QFRS) way of framing bushfire risk. QFRS has utilised Geographic Information System (GIS) mapping applications to determine the location of at-risk-from-bushfire communities. The methodology for assessing bushfire hazard risks is manually assessing areas according to a classification system as well as satellite imaging of slope and vegetation on the ground to locate and identify the type of hazard experienced within a bounded area (e.g. I-Zone map is on next page).

Map 1: I-Zone Identification Map from QFRS (2003)

Map 2: Tamborine Mountain Potential Bushfire Hazard from the *Tamborine Mountain Escarpment Management Plan* produced by Watson (2001) from Gold Coast City Council and Beaudesert Shire maps. The Gold Coast Bushfire Management Strategy (Gold Coast City Council 1998:19) reported that "to minimise the risk to human life and property, it is essential that potential bushfire hazard be considered an integral component of land-use planning and development".

Interviews - Fire Services' and Community Representatives' Perspectives

In-depth interviews with fire brigades, emergency services, land managers, builders, local councillors, community groups and individuals were conducted in February 2005 in order to understand the issues experienced by the Tamborine Mountain locality. The in-depth interviews enabled insight into the bushfire-related issues of the fire services and Tamborine Mountain community e.g. controlled burning issues, local council building regulation enforcement, provision of information and advice by service providers, increased householder responsibility for protection of life and property, volunteerism concerns and time and resource constraints of Rural Fire Brigade. There were various perceptions of bushfire risk among the stakeholders and community; the results of the interviews have been presented according to the fire services' and community representatives' perspectives. Issues solely from the fires services' perspective are presented first.

Issues derived from interviews with fire services

Fire brigade roles

- The lay public are confused about the roles of urban and rural fire brigades.

Community education undertaken by fire services

- A range of community education initiatives inform the public such as "Bushfire Prepared Communities" presentations and videos, annual event of firefighting demonstrations at the local showgrounds. Rural Fire Brigade have articles in both local newspapers and give talks at community meetings e.g. Neighbourhood Watch. Auxiliary firefighters give fire education talks to children and parents at schools.
- Property assessments are conducted by RFB Fire Wardens. They feel frustrated because they are not allowed to tell people what to do because of liability issues.

Fire brigades' perceptions of the community's bushfire awareness

- There are many strong views existing about bushland management.
- Most people probably do not think about fire brigades until they need it.
- Most people are unaware of the bushfire risk and some think of hazards when they build and some do not, even when they build in at-risk-from-bushfire areas.

- Most people who have experienced fires are aware of the associated risks but most only think about it when a fire arrives.
- Awareness of fire is in inverse proportion to proximity to major fires.

Fire brigades' perceptions of the expectations of the public

- People in the community expect that fire prevention and suppression is done for them and they do not have to fend for themselves in the event of a fire.

Fire brigades' perspective of the community's perception of risk

- RFB perceive that the public do not expect lives to be put at risk to save property.

Hazard reduction from fire brigades' perspective

- The majority of people do not want hazard reduction because of negative effects such as smoke, potential to get out of control, damage to the local flora and fauna.
- Rural enterprises such as farmers have become more constrained with legitimate burn-offs because of the need for permits and nearby housing developments.

Land development from fire brigades' perspective

- Local councils are approving development in medium to high fire risk areas.
- Developers are not being presented with a Bushfire Management Plan.
- Councils are responsible for enforcing building codes but are not always doing so.
- Local fire brigades have not been consulted about development issues.
- The consensus was that some areas such as ridges should not be developed even though desirable for a view because a bushfire could be uncontrollable there.
- There is not much room left for development on Tamborine Mountain.

Perception of publicity

- Lay public are more aware of fire hazard when fire bans are placed due to better publicity on fire meters and local RFB newspaper column.
- Fire danger meter levels depend upon altitude of sign and local drought index.
- The difficulty of informing the public of fire danger is that it can incite arsonists.

- There is concern about sending the right messages to the public when the media want to sensationalise issues.

Funding

- The RFB is dependent on fundraising as most local levies go to urban brigade because most properties on the Mountain are classified within the urban boundary.

Rural Fire Brigade volunteers

- There are difficulties in keeping and attracting volunteers for firefighting. However, there is still a sense of community on Tamborine Mountain which helps at times.

Operational issues

- Access for firefighting vehicles in the event of a fire and over-grown vegetation on some properties are concerns for the firefighting operations of the RFB.
- Fire brigades don't have enough firefighting resources (e.g. fire fighting equipment and personnel) and there is a limited amount of water available on the Mountain.
- There is a need for RFB to continually check properties and know tracks and resources extremely well. However, continual familiarisation is expensive of time. Daytime checking of areas is important but volunteers train at night and staff turnover is high. A strategy to cope with time and resource constraints is necessary.
- There are issues with training and responding to fire during the day time because some volunteers and residents work off the mountain and are sometimes unable to get to the fire event/home in a short amount of time.
- Maps are useful, however, a core group of volunteers need to see area in daylight.

Bushfire risk identification maps

- I-Zone maps from QFRS are available to brigades but not to the public. They are of little use if not discussed with fire brigade personnel. The overall view was that ground truthing on the validity of data should be done first as maps are not accurate enough for work at the fire brigade level.

Insurance

- It is hard to tell if insurance is sufficient enough until an event occurs. Under/non insured e.g. what happened with Canberra bushfires is probably a reflection of the community at large. There was a suggestion that some insurance companies are not insuring property until the owner has a Bushfire Management Plan in place. No proof of this was ascertained.

Vulnerable people

- Elderly people who are "just hanging on and can't manage their property" were identified as the most vulnerable group in a bad situation.

The major issues identified by fire services include apparent confusion by the lay public over the role of rural and urban fire brigades, expectations that firefighters will fight fires, development in high fire risk areas, and not enough firefighting equipment and personnel.

Issues derived from interviews with community representatives

The following issues are from the community representatives' perspective. The issues were gleaned from in-depth interviews which were semi-structured: a series of questions were asked and we also allowed for individuals and community groups to discuss bushfire-related issues which were of concern to them. Most of the community representatives' issues appeared to be of a similar theme to the fire services' issues; perception on some issues was similar but on others it was different.

General perception of risk

- Bushfire is generally not mentioned in the community. People who live on the escarpment are more aware of the issue, though often their main priority is a view.
- People often feel immune from the threat of bushfire because area looks green.
- There is more risk when fire is further down the mountain and the slope is steep.
- People are more concerned about environmental concerns (snakes, development).

Environment

- Although environment is an emotive issue, farmers and green groups are in less conflict now than in the past.

National Parks and fire trails

- Level of risk increased in last 3 years due to changes in National Parks' structure.
- Role of Fire Warden important – National Parks are a concern as Fire Warden can do less work on the Mountain in his current role. Fire trails have made a difference.
- The *Tamborine Mountain Escarpment Management Strategy* developed 120 kilometres of fire trails, which are mostly slashed which creates problems with feral animals because it allows them easy access around the Mountain.
- The lack of National Parks staff based on the Mountain in the last few years has made it difficult for maintenance of the feral animal problems linked to fire trails.

Hazard reduction

- No burns recently at escarpment; prolonged drought leading up to last bushfire season; there is history of fire jumping over the main road from escarpment.
- Hazard reduction is now difficult due to accessibility in some areas and because agreement is needed with all of the neighbours adjacent to a controlled burn.
- There are different views on appropriate return intervals for controlled burns.
- It is okay if RFB plans a burn but National Parks are not always well maintained because they no longer have staff on Tamborine Mountain. The situation with the local Parks Headquarters being disbanded in 2002 was a sore point for some people.

Fire Brigades

- The community group recognised RFB is in a cost squeeze as funding from levies depends on number of properties within boundary, some of the community pitches in now and then when they are directly called upon for RFB fundraising.
- Fire Warden/Rural Fire Brigade have the keys to gates for access to bushland areas on Tamborine Mountain. Auxiliaries will assist RFB where they can.

Water supply

- There is no reticulated water on Tamborine Mountain. There is not much known about deep bores and some users may be draining aquifers, especially one or two property owners who are having water tanked off of the Mountain for commercial purposes. There is no control over the pumping out of water for private sale.
- Some residents do not store enough water for dry times. It costs between $80-200 for a load of water to be delivered (depending on where it is sourced from).
- Forest dehydration occurs in dry times. This contributes towards bushland conditions that make the area more susceptible to bushfire.

Land development

- Development issues regarding bushfire risk management and wildlife preservation have been raised by a community group. The local Fire Warden checked the site and was concerned about access for RFB but a report was not forthcoming.
- Concern about South-East Queensland Regional Plan (e.g. urban footprint).

Tourism business

- Business owners were concerned about risks but had no bushfire evacuation plan.

The community representatives' perspective indicated that there appears to be more concern about the environment than about bushfire risks. The current state of local National Parks was a concern, especially now that there is no longer any staff based on the Mountain. The lack of maintenance for National Parks has an impact on perceptions of controlled burns. The concept of controlled burns is generally appreciated but there are concerns about its actual application in terms of dry conditions, return intervals, the local biodiversity and the vulnerable situation of some homes. There is concern about further development upon the Mountain, especially in high-fire risk areas and wildlife habitats. The community groups appreciated the time and resource constraints of the RFB, however some of the community may not be aware. There was concern about future water sources upon the Mountain and tourism business owners expressed concern about not being prepared against bushfire risks.

Differences and similarities in comments from the in-depth interviews

Fire services' perception of issues similar to that of the community representatives:

- The fire brigades' roles could be better understood by the community.
- Most people in the community do not regularly think about the local bushfire risk.
- There is not much room left for housing development on Tamborine Mountain. There are concerns for existing residences which are on ridges because fire has the potential to be uncontrollable there.
- The dry weather experienced in the recent years has disrupted the routine of control burns and the overall consensus is that National Parks are not always well maintained because National Parks no longer have staff on the mountain.
- The fire brigades are not providing as much input into local development as they would like and there are also concerns about development in high at-risk-from-bushfire sites. Fire brigades expressed concern that it appears that Bushfire Management Plans are not being presented to developers and the local councils are not always enforcing building codes. "Developers and residents should be provided with information and advice to improve their awareness of the potential bushfire hazard and fire risk mitigation measures" according to Gold Coast City Council (1998, 33). There were examples of people who had called on the Rural Fire Brigade to look into development issues, some had expressed disappointment that more was not done to prevent building in what they perceived to be at-risk-from-bushfire areas. No strong views for further development were expressed.
- There is consensus that there are concerns about access to water for firefighting.
- Fire brigades emphasised that there are firefighting resource and volunteer issues being experienced which compound the expectation that they perceive to be upon them (that they are willing and able to fight a fire). The community representatives knew that the RFB rely on donations, recognise how the community contributes towards the levies and that some locals contribute towards fundraising activities.

Fire services' perception of issues different to those of community representatives:

- The fire brigades perceived that the community expected things to be done for them and they do not have a consistent interest in preparations for bushfire and this should increase in order to share the responsibility against the threat of bushfire. The community representatives showed interest in bushfire-related issues and described personal and collective actions taken against the threat of bushfire.
- The fire services perceived that most of the community would rely on them to respond in the event of a fire. There was no similar indication by the community representatives that there is wide-held reliance upon brigade response to fire.
- Controlled burns are not wanted by the public according to fire brigades. Community groups expressed views that controlled burns are okay if they are carefully done. There were different views on appropriate return intervals for controlled burning both within the fire services and the community.
- Fire brigades pointed out that they provide information and advice but emphasised they can not tell people that they need to take action. The local Fire Wardens and the community groups were frustrated specific advice can sometimes not be given and action to help (e.g. remove a tree) is sometimes not provided because of liability issues.

Conclusion

It appeared from the interviews with fire services that there are resource and volunteer issues being experienced by fire services which compound the expectation that they perceive to be upon them (that they are willing and able to fight a fire). The fire services perceived that the community do not have a consistent interest in preparations for bushfire and this should increase in order to share the responsibility against the threat of bushfire. The fire brigades expressed their view that controlled burns are not wanted by the lay public.

Community groups expressed that controlled burns are okay if they are carefully done. There were different views on appropriate return intervals for controlled burning. It appeared that the dry weather experienced in recent years has disrupted the routine of controlled burns and the overall consensus was that National Parks are not always well maintained because National Parks no longer have staff on the mountain. There were

also concerns expressed about access to water for firefighting. There was an issue raised about there being frustration that advice is not given or the advice received from fire services is not specific enough for their needs.

The overall perception was that the community could be better informed about the role of the fire services. It also appears that Bushfire Management Plans are not being presented to developers and the local councils are responsible for enforcing building codes but are not always doing so. There are concerns for vulnerable residences near the escarpment. The fire services would like to have more input into local development planning and there are also concerns within the community about development in high at-risk-from-bushfire sites.

The interviews with fire services, community groups and individuals helped to frame issues for the design of the community survey, the results and interpretation of which are presented in the next chapter (5). Discussion of research findings will proceed after Chapter 5.

Chapter 5

Tamborine Mountain Bushfire Awareness Community Survey

Introduction

Five hundred surveys were delivered to dwellings on Tamborine Mountain in May 2005, and 163 (33%) were returned in the mail by June, 2005. The questions and response rates are in Appendix D and results are presented below.

Profile of survey respondents

Background information about respondents was collected to provide a profile of respondents which could be compared with census data to ascertain the representativeness of the respondents to the community (see Q.10a, b and c in Appendix D).

There were slightly more male (52.7%) than female (47.3%) respondents, a representation of gender that was in reverse proportion to the 2001 census data (47.5% males and 52.5% females).

The age representation of survey respondents is clearly biased towards older residents. The census data also had a large proportion of older persons. Persons aged over 55 were clearly the most represented age group of the survey with 57% of overall responses. In the age ranges below this option, less than half of the responses are represented on a sliding scale in reverse from the 55 and over option. The 41-55 age group include nearly a third of responses with 31% of the overall responses. Eleven percent of respondents indicated that they are between the ages of 26-40 years old and just 1% of responses were received from persons 25 years and under. The 2001 census data reported different ages categories, however, a similar trend with older persons was evident with the 50+ age brackets the most represented with 44.5% of the local population overall, the 40-49 age bracket had 16.5%, the 20-39 age brackets had 19.5% overall and 19.5% for those under the age of 20. The survey was addressed to residents of Tamborine Mountain, so it was not specified who we preferred to respond. The older population in the local area, time availability and interest in the topic appear to have biased the survey towards older persons.

The household type for those who responded to the survey was similar to that of the 2001 census. The census outlined that most residents of the Mountain resided in a family dwelling (79%), which is lower than that of the survey responses (86%).

A major group of survey respondents described themselves as couples with children (52%) which is similar to the census data (48%). Another major group of respondents (34%) described their household as "a couple without children" which is similar to census data which outlined there was 38% of such household situations. The third highest survey response was "a single person living alone" (14%) which was the same amount as the census data (14%). Therefore, just over two-thirds (68.5%) of the overall responses indicated that there were no children are living at home. If there were offspring living at home, the most likely household situation for survey respondents was where the youngest was under 7 years of age or they were adults (see Table 24 in Appendix E).

Occupation of respondents

A series of questions related to the occupations of respondents were asked to identify the specific occupations of the household's main wage earners, the employment status of the respondent, the type of occupation of the respondent and commuting time to their work location. The questions 10d-g (see Appendix D) were asked to understand work and lifestyle considerations including the priorities of a rural-urban interface resident and the time they may have to give attention to matters that are not related to work. For example, it was mentioned in an in-depth interview with fire service providers that a lot of family-oriented residents of Tamborine Mountain work off of the mountain during the week and by the end of the week, they prefer to spend some time with their families rather than concerning themselves with preparations around the home for bushfire. Information related to the occupation of respondents gives a clearer picture if such an example of people being too busy to give much attention to bushfire-related matters is actually a representative statement of the community as a whole.

Similar to the census data, the survey responses indicated the distribution across various industries was diverse. There were 44 different responses to occupations of respondents (see Table 23 in Appendix E). There was a great variety of responses considering that

the majority of responses indicated that respondents were “retired” (37.5%). The other main occupations were “teacher/education” (10%) or “manager” (7%).

Occupations of respondents were categorized as “professional/ management” (32.5%), “self employed” (18.5%), unspecified” (13%), “tradesperson/ skilled worker” (11.5%), “office worker” (5.5%), and “business owner” (4.5%).

Thirty percent of respondents worked full time, 12% part-time and 8.5% were casual/temporary employees (the census data were very similar). A little under half (47.5%) of the respondents were in the workforce compared with 38% of the overall community according to the census data. Respondents who were “not currently working” (8.5%) was consistent with Tamborine Mountain residents who were unemployed (8.5%) according to the census data.

The responses indicate a fairly high incidence of middle to high level occupations. This reflects the 2001 census data which indicated the median income bracket for Tamborine Mountain residents as being between $300-399, for a family it was $700-799 and for a household it was $600-699. The median income bracket was likely lessened by the high proportion of retired people. The survey results suggested that there is a diverse mix of professional and skilled worker occupations for respondents who are not retired. The 2001 census data also indicated that there are high amount of qualified workers compared to unskilled workers residing at Tamborine Mountain. The census data and the survey data indicated that the distribution of employed persons across industries was fairly diverse.

Responses for commuting time to location of work for those respondents in the workforce gave us an indication of how far people travel to work. A little over half of the responses received to the question (52%) indicated that the respondent commutes on the mountain for an overall average of 12 minutes. The size of residential areas, geography of the mountain and the situation and condition of the roads on the mountain are such that it is possible to reach various places on the mountain fairly quickly by motorised vehicle. The remaining responses (48%) indicated a commute off the mountain on average for 90 minutes a day. Most of these commuters who work off the mountain are likely to travel to the Gold Coast or Brisbane areas for work each day during the week because it is 30 minutes to the Gold Coast and 60 minutes to Brisbane

(each way). The percentage of surveyed residents working off the mountain (23%) appears significant because this means that a substantial proportion of residents are not present on the mountain during working hours. This has implications for time available for making bushfire preparations as well as in response situations because residents and volunteer firefighters may not be locally available in the case of an emergency.

Residences

A series of questions (see Q.10h-m in Appendix D) were asked about the respondents' residence and surroundings because this gave us insight into how their living environment affected their perceptions about bushfire-related matters. It was also important to know where respondents lived before moving to their current address because this offered insight into whether respondents came from rural and perhaps other fire prone areas. Part of the fire service providers' view is that city people are more dependent on their services. Therefore, we were interested to see where respondents lived before moving to Tamborine Mountain. A question about the coverage of insurance for bushfire was asked because this is an indicator of respondents' preparedness against the risk of bushfire.

Most respondents were homeowners (95%), with the majority having no mortgage (58%) and only a small minority of respondents indicated that they are renting their home (5%). The very high rate of home ownership suggests that Tamborine Mountain is affluent. The 2001 census supports the high amount of homeowners (80%); those with no mortgage were in the majority with 50% of the ownership status. The census data outlined that only 1% of local residents indicated that they are renting their home which was slightly lower than for survey respondents. The census data outlined that 19% of the local population indicated "other" as a response which may include boarders, tourist accommodation and those living with family or friends. The average age of the respondents' property at the time of survey was 17 years which suggests a mix of old and new homes within the survey sample.

Homes were made out of wood (37%), brick (33%) plasterboard (14%), fibro-cement (10%). The remainder of responses (6%) specified materials such as steel, *Hardieplank*, corrugated iron and *Colourbond*. The high amount of wooden homes on Tamborine

Mountain is linked with the character of "Queenslander" style homes which are well suited to the natural and built environment of the locality.

Eighty percent of respondents reported having full-cover household insurance for bushfire, 17% were not sure of the level of their household insurance for bushfire and 3% they are partially covered. The high level of respondents that indicated they are fully insured for bushfire (80%) reflects the high level of home ownership and affluence in the area. There was only one respondent who indicated they had no insurance.

In terms of where they resided on Tamborine Mountain, 44% of the respondents resided at North Tamborine, 37% at Eagle Heights and 17.5% at Mount Tamborine which is the most rural and least populated section of Tamborine Mountain. North Tamborine and Eagle Heights are mostly residential areas and therefore comprised most of the homes to which surveys were delivered.

In order to understand exposure to bushfire risk see (question Q.1c in Appendix D), the survey asked whether the respondents' homes were surrounded by buildings, open space or something else. The majority of respondents' described their property as being situated on a residential street (61%), with the remainder (39%) situated amongst or adjacent to natural bushland or other green space. The latter indicated that they live on the escarpment which is near the edge of the plateau (the top of Tamborine Mountain) or near bushland/ forest.

Respondents were asked how long they had lived at their current address. This question was asked because there is a view that recent arrivals may not be as informed as long term residents about bushfires (Question 1a in Appendix D). The average response for length of time the respondent has been at their current address was 7 years. Most responses (59 %) indicated that they have lived at their current address for less than 5 years (the range was 0.5 to 54.8 years). This indicates a transient and recently developed locality. The 2001 census supported similar statistics with 50% of residents having the same address for the past five years and the 50% having more than one address in the past five years.

The overall responses for where the respondents lived before moving to the Tamborine Mountain area indicates that the majority (61%) have moved from within the South-

East Queensland region with the remainder having moved to Tamborine Mountain from all parts of Australia (33.3%) and overseas (5.7%). Those who had moved from South-East Queensland had come from the nearby cities of the Gold Coast (23.5%), Brisbane (20%) and from within the Tamborine Mountain locality (15%). The migration from within South-East Queensland does not indicate the migration pattern of respondents beyond that of their immediate previous residence (see Table 22 in Appendix E for previous residence).

Using the Australian Bureau of Statistics' (ABS 2006) definition of rural areas, which described them as less than 10,000 people and urban areas as greater than 10,000 people, most respondents (56.5%) previously resided in an urban area; 37.8% in a rural area; and 5.7% indicated that they previously lived overseas. Out of the 37.8% of respondents who previously lived in a rural area, 15.8% were from Tamborine Mountain and 22% were from rural areas elsewhere on the east coast of Australia.

Summary of demographics and residence information for Tamborine Mountain

The representation of responses between males and females was similar. People aged over 55 were the most represented age group with more than half of the overall responses. The next largest age group was 40-55 year olds. This is consistent with census data that there is an older population. Households surveyed were mainly couples on their own.

There were a lot of respondents who are retired (37.5%). There is a balanced mix of professional and trade/service occupations for the remainder. A little under half of the overall respondents (47.5%) were in the workforce with the majority being of full-time status, with some part-time workers and people employed in casual/ temporary work.

A quarter of respondents commute off the mountain for an average of 90 minutes each day, and another quarter commute on the mountain for an average of 12 minutes each day.

There was a high level of home ownership; a high level of full-cover household insurance for bushfire was reported. The average length of time respondents had been at their current address was 7 years indicating a transient and recently developed locality. Almost 60% of respondents had moved to their current address in the last 5 years. Over

half had previously resided in urban areas. Forty percent resided adjacent to or within bushland settings.

A slight majority of respondents resided in residential areas rather than rural/bushland/ escarpment/farm/other green areas (e.g. rainforest). The majority (61%) of respondents moved from within South-East Queensland; most had previously lived in an urban area.

Perceptions of fire risk

A number of questions were asked about the respondent's perception of the fire risk in their area (Table 5 and Q.2, Appendix D). The questions did not ask about bushfire specifically, but asked for perceptions of general fire risk. The questions were designed to understand where fire is placed in the consciousness of respondents. These questions also addressed the view of whether people move to the rural-urban areas to enjoy the amenity of bushland.

Table 5: Tamborine Mountain Residents' Bushfire Preparedness Survey - Perceptions of fire risk

Perceptions of Fire Risk	Strongly Agree %	Slightly Agree %	Neither %	Slightly Disagree %	Strongly Average Disagree %	Total* %
I am less concerned about the risk of fire than about other risks to personal safety (N=150)	14.5	36.2	18.8	14.5	15.1	**99.1**
I moved here to be close to nature (N=156)	46.2	38.5	10.3	1.9	3.2	**100.1**
I think about the risk of fire here everyday (N=156)	1.9	19.7	16.6	22.3	38.9	**99.4**
The impact of fire is far greater than of any other risk (N=155)	30.1	25.6	12.8	21.8	9.0	**99.3**
The bush should be left as untouched as possible (N=157)	36.5	24.4	5.1	24.4	9.0	**99.4**
I haven't really thought about fire risks (N=150)	1.4	11.5	8.1	23.0	55.4	**99.4**

*** Totals may not add up to 100% because of rounding errors**

Half of the respondents expressed a lack of concern with fire as opposed to other risks to personal safety. Only approximately 30% were more concerned about fire safety than other safety issues. As well, only approximately 20% think about the risk of fire everyday but this does not mean that some others do not think about it more at certain

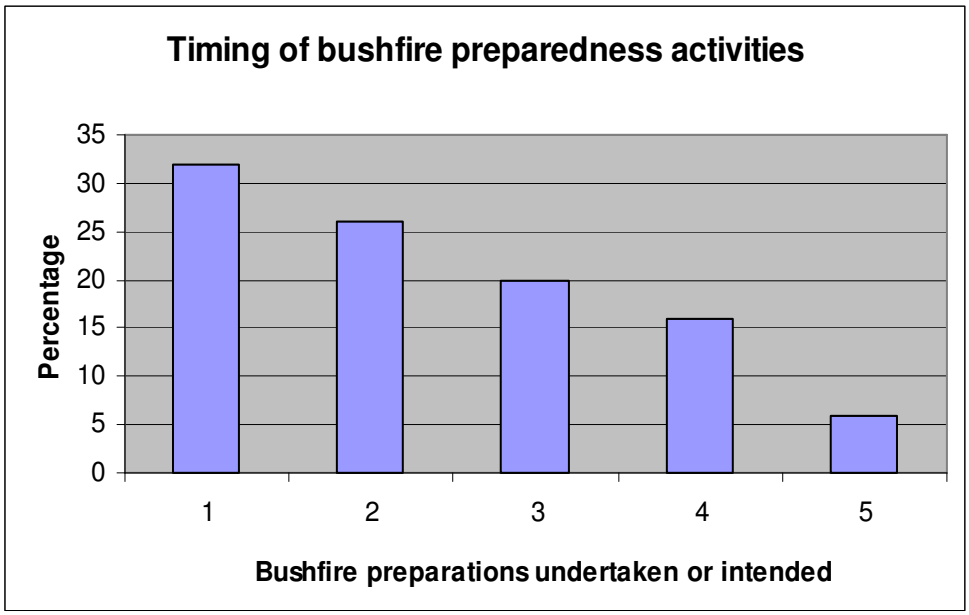
times. Over half of the respondents were of the view that "fire has an impact far greater than any other risk". However, slightly over three quarters of respondents had thought about the fire risk.

Most of the respondents (85%) moved to Tamborine Mountain to be closer to nature, but only 61% felt the bush should be left as untouched as possible.

Preparedness for bushfire

A series of questions were asked in order to understand preparedness for bushfire. Questions were asked about bushfire preparedness actions that respondents had taken, not taken, would consider or would like advice about (see Q.3a-e and Q.4 in Appendix D, Diagram 1 below, Table 6 on the next page and Table 25 in Appendix E). We were also interested to know what prompted the actions that respondents had undertaken.

Diagram 1: Tamborine Mountain Residents' Bushfire Preparedness Survey – Timing of bushfire preparedness activities (N=158)



1. Preparative actions taken in the last three months (32%).
2. Preparative actions taken before the past few months (26%).
3. Aware of actions but have not taken it (20%).
4. Would consider action before the fire season (16%).
5. Would look for further information or advice (6%).

On average, 58% of respondents (32% + 26% from 1 and 2, Diagram 1) had undertaken the listed bushfire preparedness activities (see Table 6). On average, a disturbing 42% of respondents had not taken action (20% + 16% + 6% from 3, 4 and 5). Out of the 42% of respondents who had not taken bushfire preparations, a little over half (22%) would

consider action before the fire season or look for further information or advice.

Table 6: Tamborine Mountain Residents' Bushfire Preparedness Survey – Bushfire preparedness activities undertaken (N=146)

Bushfire preparedness activities	Action Taken (%)
1. Cleared junk out of the yard	96
2. Cleaned out the gutters	95
3. Cut the grass	98
4. Removed overhanging branches	91
5. Ensured flammable items and fuel are safe	93
6. Checked sources of water and hoses	93
7. Talked to the neighbours about fire safety	46
8. Established a local warning system	21
9. Contacted the Fire Service for Safe Home visit	8
10. Installed smoke alarms	87
11. Installed sprinkler system (internal/external)	12
12. Checked smoke alarms	85
13. Purchased fire extinguisher or blanket	66
14. Formulated an evacuation plan	48
15. Contacted Council about clearing vegetation	38
16. Decided on situations to stay or go	43
17. Checked equipment	70
18. Established fire breaks or buffers	60
19. Brushed up on First Aid knowledge	52

When asked the question of what actions they have undertaken, actions that might be considered general housekeeping (cleared junk out of the yard, cleaned out the gutters, cut the grass, removed overhanging branches, ensured flammable items and fuel are safe and checked sources of water and hoses), but which also serve the needs of bushfire preparedness were undertaken by a very high amount of respondents (over 90%).

There was also a very high amount of respondents who have installed and checked smoke alarms (87% and 85% respectively) which may have something to do with home safety advertising on television (as supported by open-ended responses to Q.9). The response levels were higher than the 2002 Queensland Household Survey's average of 71.4% for operational smoke alarms (Parfitt 2004). Actions such as purchase of a fire extinguisher or blanket, checked equipment and established fire breaks were reported by between 60-70% of respondents as having made such action. This indicates that personal action towards technical preparations for fire is active more so than not within the surveyed community.

Actions listed such as whether the respondent had talked to the neighbours about fire safety, formulated an evacuation plan, contacted Council about clearing vegetation, decided on situations to stay or go, brushed up on First Aid knowledge are actions that between 38-52% of respondents reported having done. Such actions indicate that there

is already a participation from nearly half of the community who involve themselves in a preparation processes which takes time and effort to effectively mitigate or be prepared for fire risks.

There were a small proportion of respondents (as 8-21%) who had established a local warning system, contacted the Fire Service for a Safe Home visit or installed a sprinkler system (internal/external). Table 25 (see Appendix E) outlined that the willingness to consider such action before the start of the bushfire season was relatively high compared with other actions that would be considered (24-37%). Table 25 also outlined that a further 11-25% of respondents would like advice on these actions. This indicates that people are generally more interested in establishing agency or community services such as a local warning system or Safe Home visits before they would be willing to incur costs preparation for their homes (e.g. installation of sprinkler system).

Table 7: Tamborine Mountain Residents' Bushfire Preparedness Survey – Prompts for taking bushfire preparedness actions (N=158)

Prompts for preparedness	**%**
General housekeeping	27
Awareness of fire risk	16
Common sense	13
Drought/ dry weather	12
Experience	4.5
Bushfire coverage on TV	4.5
Local bushfires	4
House close to bush	4
Water considerations	3
Wooden house	2
Smoke alarm maintenance	2
Education programs	2
New surroundings	2
Risk of loss of life/ house	2
Smoke alarm advertisements on television	1
Pressure from neighbours	1
Total	**100**

Question 4 (see Appendix D) asked what prompted respondents bushfire preparations. The most common response (25%) indicated that "general housekeeping" prompted them. This is likely to be because the majority of respondents were not particularly motivated to cut the lawn or do other such housekeeping activities specifically to mitigate the threat of bushfire and such actions taken were considered to be part of the normal upkeep of their property. From the remaining responses it can be seen that prompts for 61% could be construed to mean sensitivity to bushfire hazard, but among

those, the particular reasons are varied. This suggests a general lack of understanding of what is necessary, and that a universal message may not reach all concerned.

The second highest ranked response was “awareness of fire risk” with 16% of overall responses to the question. This response indicates that the there was a high-ranked proportion of respondents who perceive fire risks as worthwhile enough to take action to mitigate the threat of fire beyond “general housekeeping” considerations.

“Common sense” ranked at third place (13%) as a reason that prompted respondents into recent action against the threat of fire. This is a similar response to “awareness of fire risk” but it can not be assumed that “common sense” transfers to adequately understanding the threat of fire and taking precautions accordingly.

It is evident that “drought/ dry weather” prompted respondents into action against the threat of fire in the three months before the survey (12% of overall responses).

Therefore, it can be inferred that preparedness against the threat of fire is mostly considered by respondents to be part of living in their environment and society rather than fire itself being the issue.

Perceptions of the protection of life and property

A number of statements (Table 8) were presented to respondents so that they could indicate to what extent they agree, disagree or neither agree nor disagree with the utility of possible actions against the threat of fire. Q.5a (see Appendix D) was asked because I was interested to know the varying degrees of respondents’ perceptions of responsibility for taking action against the threat of fire.

Table 8: Tamborine Mountain Residents' Bushfire Preparedness Survey – Perceptions of preparations against the threat of fire

Perceptions of preparations against the threat of fire	Strongly Agree %	Slightly Agree %	Neither %	Slightly Disagree %	Strongly Disagree %	Unsure %	Total %
There is very little you can do to protect yourself and your home against bushfire (N=155)	1.2	6.2	2.5	16.1	66.5	7.5	**100**
Protecting my home properly is too expensive (N=152)	1.3	7.2	11.8	24.3	52.0	3.4	**100**
There is no point in me protecting my property if my neighbours don't (N=152)	3.3	7.2	4.6	19.1	65.1	0.7	**100**
If fire were to arrive, we would leave rather than try to protect our property (N=150)	16.7	16.7	2.6	22.0	32.0	10.0	**100**
Survival is more about instinct than planning (N=149)	9.4	12.1	4.7	27.5	43.6	2.7	**100**
There is no point protecting my property if Council/ other agencies don't clear foliage/ back burn (N=152)	13.8	13.8	2.6	22.4	46.7	0.7	**100**

Most respondents (82.6%) disagreed with the statements that there is very little that the individual householder can do to protect life and home:

- The cost of protecting the home properly is too expensive (76.3%);
- There is no point in protecting their property if their neighbours do not (84.2%);
- That it is pointless in protecting their property if Council or other agency does not backburn or clear foliage (69.1%).

The stay or go issue was raised with the statement "if fire were to arrive, we would leave rather than try to protect our property". It appears that 33.4% of respondents agreed with the statement, however, 54% would take measures to protect their property rather than leave when a fire arrived.

Somewhat encouragingly, Table 8 outlined that most respondents saw that survival is more about planning rather than instinct (71.1%).

Table 9: Tamborine Mountain Residents' Bushfire Preparedness Survey – Action plans for hazards (N=100)

Hazard	Action plan	%
Bushfire	Prepare property – stay and defend	32
Bushfire	Prepare property – leave if necessary	24
Bushfire	Prepare property – undecided on whether to stay or leave	10
Bushfire	Prepare to leave early	10
Bushfire/House fire	Prepare to leave early	5
Bushfire/House fire	Prepare property – leave if necessary	2
House fire	Stay and defend property	1
House fire	Call fire brigade - leave property	12
Storm	Prepare property - stay with home	4
Total		**100**

There was a survey question (6c, see Appendix D) which asked respondents to detail any action plans that they might have. Most respondents (53%) planned to leave their property in the event of a bushfire or house fire ("Bushfire: prepare property – leave if necessary" with 24% + "Bushfire: prepare to leave early" with 10% + "Bushfire/House fire: prepare to leave early" with 5% + "Bushfire/House fire: prepare property – leave if necessary" with 2% + "House fire: Call fire brigade – leave property" with 12%. More of those out of this group of 'leavers' indicated that they would leave only if necessary if a bushfire approached, however, most indicated that they would leave early in the event of house fire. Another common response (32%) for an action plan for bushfire was to "stay and defend property"; only 1% of respondents had a plan to do the same for a house fire. "Prepare property but undecided whether to stay or go" was the third highest response with 10% of the total which was very similar to the amount of responses in Table 8 for "unsure" to the statement "If fire was to arrive, we would leave rather than try to protect our property". There were 4% of respondents who detailed a contingency plan for storms (the question did not ask for a specifically for an action plan for fire). There was a confounding proportion of 'leavers' from house fire (1% who would "stay and defend property" rather than 12% who would "call fire brigade – leave property") compared with the 'leavers' from bushfire (24% who would "prepare property – leave if necessary" rather than 10% who would "prepare to leave early").

A question (6b, see Appendix D) was asked to see whether the number of respondents with an action plan for bushfire was much higher than house fire or storms. Table 26 (see Appendix E) outlined that 55.5% of respondents had an action plan for house fire compared to 49.4% for storms and 44.4% for bushfire. However, 82% of those with an action plan for bushfire plan to protect their property, 15% would do the same for house

fire and 100% would take precautions to save their property from storms. This indicates that preparedness against hazards is related to the type of hazard and the perception of whether or not there is likely something that can be done to mitigate its effects.

Who is seen as responsible for the protection of life and property?

Questions were asked regarding perceptions of who respondents would rely on in the event of a fire, and which aspects of bushfire safety they were confident with their own capacity to take action (questions 5b, 6a, 6b, 6c - see Appendix D).

Table 10: Tamborine Mountain Residents' Bushfire Preparedness Survey – Responses for "If fire were to arrive, we would just call the fire brigade" (N=149)

Response	%
Agree strongly	26.2
Agree slightly	20.1
Neither	4.0
Disagree slightly	21.5
Disagree strongly	26.2
Unsure	2.0
Total	**100**

Respondents were equally divided about whether or not they are willing to take action against fire as much as those who would rather rely on authorities to promptly respond.

Table 11: Tamborine Mountain Residents' Bushfire Preparedness Survey – Respondents' perceptions of responsibility for keeping homes safe from fire (N=150)

Persons/organisations responsible for keeping homes safe from fire	Most %	More %	Some %	Less %	Least %	Other %	Total %
Individual householder	80.7	6.7	4.6	6.7	1.3	0	**100**
Groups of neighbours	4.7	47.3	18.7	10.7	16.0	2.6	**100**
Queensland Fire & Rescue Service	7.3	21.3	35.3	20.7	9.3	6.1	**100**
Local council	9.3	19.3	21.3	22.3	26.7	1.1	**100**
Queensland Parks & Wildlife Service	3.3	8.0	16.0	32.0	35.3	5.4	**100**

Respondents clearly perceived the individual householder as being the most responsible for keeping homes safe from bushfire. Groups of neighbours who live close to each other were perceived to have more responsibility for keeping homes safe than local council/ other agencies. Queensland Fire and Rescue Service were mostly perceived as having some responsibility. Local council were perceived to have slightly less responsibility, however, it was the Queensland Parks and Wildlife Service who was perceived to be least responsible for keeping homes safe. The "other" category was

provided as an option for respondents whose perceptions did not identify with the provided options.

Table 12: Tamborine Mountain Residents' Bushfire Preparedness Survey – Respondents' confidence in bushfire safety aspects (N=161)

Confidence about capacity to take action	Confident %
1. How to prepare property to minimise impact of bushfire	78.6
2. Where to get information and advice	55.2
3. The equipment needed to deal with fire	50.0
4. The situations in which to stay or leave your home	46.1
5. First Aid	43.1
6. What to do if you are trapped in your home in a bushfire	40.5
7. Where to buy the equipment you need	39.2
8. What to do if you are trapped in your car in a bushfire	35.5
9. The costs of protecting the home	22.2

As shown in Table 12, most respondents felt confident that they knew enough about how to prepare their property to minimise the impact of bush fire. However, only a little over half were confident about where to get information and advice, and only half about the equipment needed to deal with fire. Less than half were confident about the critical issue of staying or going in the event of a fire, what to do if trapped at home or in a car, or even simply first aid.

Remembering that earlier (Table 8) 76% claimed that it is not too expensive to protect a home, in Table 12 it can be seen that only 22% claim they feel confident about the costs of protecting their homes. There was not a high level of confidence overall for the bushfire safety aspects listed.

Respondents at Tamborine Mountain were more concerned with an action plan for house fire (55.8%) and storms (49.4%) than bushfire (44.4%). More respondents indicated that they would make last minute or prior preparations before leaving (more indicated that they would evacuate only if necessary than those who indicated they would evacuate early). The proportionately high amount of respondents who had made action plans for the event of a bushfire mostly focused on last minute preparations. Table 9 outlined that in the event of a bushfire, 68% would mostly make personal item preparations, housekeeping preparations, remove debris around the house, make the car ready and use water to fill gutters and to attempt to extinguish fire before evacuating if

need be. This suggests that these respondents with action plans are not really prepared, and in fact could be placing themselves and their families at risk.

Experience of fire/perceptions of bushfires at Tamborine Mountain

A series of questions regarding experience of fire were asked because we were interested to see the connection between perceptions/experience of bushfire and preparing for bushfires. The following table is derived from Q.8a (see Appendix D) to outlined respondents' experience with fire in general.

Table 13: Tamborine Mountain Residents' Bushfire Preparedness Survey – Rank of respondents' experience with fire (N=189*)

Type of experience with fire	% **
I have experience of bushfire somewhere that I have lived before	36
I have experience of bushfire in this area	20
I have experience of fire at home somewhere that I have lived before	8
I have experience of fire at home in this area	4
I have never had experience of fire anywhere that I have lived	32
Total	**100**

*** Some respondents identified with more than one type of experience with fire.**
**** Percentages are from the base of total responses to the options.**

Slightly more than half of the respondents reported experience with bushfires (56%) and a further 10% with house fires, and nearly a third (32%) of responses indicated no experience of fire at all.

We were interested to know perceptions of the bushfire season at Tamborine Mountain because of the view held by fire services that many people have moved to the area from outside of the region and were unaware that the local bushfire season is different to other areas of Australia (Q.8c, see Appendix D).

Seventy percent of respondents to the survey indicated that they thought the fire season at Tamborine Mountain is the eight months from late winter until the middle of autumn. The other responses ranked from the highest to lowest in the following sequence: "hot, dry and windy conditions", "all year", "don't know", "anytime it is dry and undergrowth is thick", "dry season/ drought", "none, the Rural Fire Brigade is doing a great job".

All of the environmental conditions listed for what the respondents thought as being the bushfire season included “dry” in the description which suggests that some respondents think that bushfires are possible when dry weather is combined with other conditions and elements. There were a mentionable amount of responses which indicated they thought the bushfire season is “all year” or they “don’t know” and one of the responses thought there is no bushfire season at all.

Most of the responses indicate residents were reasonably well-informed as to the bushfire season in their local area according to local and regional sources (Bureau of Meteorology, Queensland Fire and Rescue Service, Tamborine Mountain Rural Fire Brigade and Beaudesert Shire Council). A total of 491 fire weather day records were analysed by the Bureau of Meteorology. These show that the period of greatest likelihood for serious fires to occur in Beaudesert Shire is from September to December – 88.7% of all events occurred during those months. Interviews with regional and local fire authorities have indicated that the fire season for Tamborine Mountain is usually throughout spring (September until the end of November). Therefore, a dry winter and sub-tropical rain arriving by December is the usual weather pattern for the Tamborine Mountain area, though this can not be assumed because weather patterns have been erratic and exacerbated by unreliable climate patterns such as dry or drought conditions for several years. Therefore, the bushfire season for Tamborine Mountain had been extended beyond the beginning of summer in the recent years before the survey and the average overall response by respondents can be seen as reflective of that.

An open-ended question (see Q.8d in Appendix D) was asked so respondents could outline what other things they thought was more important than worrying about bushfires in order for an understanding of particular matters, concerns and issues which contribute to the social construction of risk.

There was a diverse range of responses for what other things respondents thought was more important than worrying about bushfires (see Table 27 in Appendix E). Two main themes arose for what respondents thought was more important than worrying about bushfires: “personal, family and health matters” and “home and environmental matters”, or a combination of the two responses.

Experience/perceptions of other natural hazards

Table 14: Tamborine Mountain Residents' Bushfire Preparedness Survey – Respondents' experience of hazards and overall average of how many years ago it was experienced (N=161)

Hazard	YES %	Average of overall responses to numbers of years ago if YES
Flood	51	23.6 years ago
Cyclone	44	23.9 years ago
Earthquake	21	28.5 years ago
Other (please specify)	7	20 years ago

Questions (8e-f, see Appendix D) were asked to determine respondents' perceptions of bushfire in comparison to other hazards. It is helpful to understand where bushfire is placed in the respondents' perceptions of other natural hazards because it allows insight into the importance that respondents place upon bushfire in comparison with other relevant natural hazards. Although, the occurrence and experience of other natural hazards other than bushfire was an issue explored earlier, we were interested to know whether this translates to respondents placing more importance on frequently occurring hazards. Perceptions of local hazards were enquired upon to have a more complete understanding of respondents' perceptions of hazards.

Floods and cyclones were the other hazards most commonly experienced by respondents (Table 14), and generally, not recently.

Table 15: Tamborine Mountain Residents' Bushfire Preparedness Survey – Rank of hazards respondents deemed to be most (1) to least important (6) * (N=154)

Hazard	Rank 1 %	Rank 2 %	Rank 3 %	Rank 4 %	Rank 5 %	Rank 6 %	Total %
Bushfire	72.1	19.5	5.2	1.9	1.3	0	**100**
Cyclone	16.6	48.3	24.5	6.6	4.0	0	**100**
Landslide	0.6	23.0	44.1	22.4	9.9	0	**100**
Flood	2.0	8.7	10.0	34.0	42.0	3.3	**100**
Earthquake	3.9	2.6	14.5	30.3	48.0	0.7	**100**

*** Rank 6 represents hazard not provided – most common response for other hazard was storms**

Overall, respondents perceived bushfire as the most important hazard. This corresponds with Q.8a where respondents have experience with bushfire (56%), although only 20% of the respondents experienced bushfire at Tamborine Mountain. Cyclone rated as

second highest most important hazard overall for Tamborine Mountain which corresponds that a high amount of respondents in Q.8b indicated that they have had experience with cyclone (44%). Landslide rated as third highest important hazard overall and is understandable due to the mountainous terrain and high rainfall at times on Tamborine. "Storms" was the most common response specified by respondents in the "other" category. Storms are more common than cyclones at Tamborine Mountain, so it appears that the respondents did not identify with storms as within the same category as earthquake, flood, cyclone and landslide hazards. Table 15 confirms that storms are the most common other local hazard.

Logically, most respondents did not include their experience of flood in considerations for placing a high level of importance on the hazard in the local area despite past experience (51%) because Tamborine Mountain is an elevated location. Similarly, there is no history of local earthquakes, yet 21% of respondents had experienced an earthquake and it was ranked last out of the listed natural hazards. Bushfire is a unique natural hazard in regards to the importance that local residents place upon it because more residents had experienced a bushfire at a location elsewhere (36%, Table 13) rather than locally (20%, Table 13), yet it was deemed to be the most important local natural hazard. Importance placed upon bushfire hazards in the local area appear to be related to past bushfire experience elsewhere as well as the local bushfire hazard.

Nearly half of the survey respondents did not indicate whether they thought there was another type of hazard in the area (Table 16). "Storms in summer" had the most responses (32%), and "cyclones" was outlined by 22% of respondents.

Table 16: Tamborine Mountain Residents' Bushfire Preparedness Survey – Other local hazards identified by respondents (N=85)

Rank	Hazard	Season	%
1	Storms	Summer	32
2	Cyclones	February/ March	22
3	Don't know	Not applicable	13
4	Cattle ticks	August to February	6
5	Flooding	Summer	6
6	Other	Not applicable	6
7	Landslides	Summer	5
8	High winds	Summer	4
9	Tourists	Weekends/ holidays	2
10	Snakes	Spring and summer	2
11	Drought	Dry conditions	2
Total			**100**

Receiving information

For fire services to deliver more effective education programs there is a need to understand which method of communications people see as most effective (Table 17). The responses below are to Q.9 in Appendix D. There was also a need to understand which bushfire safety methods that people would like to learn more about (Q.7a, b in Appendix D; see Table 18).

Table 17: Tamborine Mountain Residents' Bushfire Preparedness Survey – Home safety advertising or media coverage that has had impact on the way respondents thought about the safety of their property and family (N=221*)

Advertising or media method	% **
Television advertisements for electricity and personal safety	23
Local Newspaper	8.5
Television	8
Storm warning/ damage and advertisements on television	6
News coverage of bushfire disasters on television	6
Fire safety advertisements on television	5.5
Smoke alarm advertisements on television	5
Road accident/ safety advertisements on television	4
Pool safety advertisements on television	4
Burglary/ crime advertisements on television	4
None	3
Radio	2
Brochures	2
Neighbourhood Watch	2
Local Rural Fire Brigade/ fire fighter demonstrations	2
Home hazards advertisements on television	2
Letter to householder	1.5
School fire safety visits and information	1.5
Media	1
Child safety awareness in media	1
Literature on preparation for bushfire in magazines	1
Water conservation signs	1
Home improvement magazines	1
Insurance information	1
Police crime newsletter	1
Healthy lifestyle advertisements in media	0.5
Pest control advertisements in media	0.5
Snake bite treatment	0.5
Personal/ family safety as a topic in media	0.5
Wildlife signalling approaching weather	0.5
General safety warnings	0.5
Total	**100**

*** Some respondents identified with more than one home safety advertising/media coverage.**
**** Percentages are from the base of total responses to the options.**

Most respondents identified with more than one media or advertising method as having had an impact on the way they thought about the safety of their property and family. There were 30 different types of responses which have been grouped together to give a more concise understanding of the mediums that respondents indicated as having a lasting impact on the way they thought about personal and home safety.

Television advertisements for "electricity and personal safety" had particularly made the most impact on the way respondents thought about the safety of their property and family with 23% of responses indicating the option, with some specifying "the Energex fallen electrical wire on ground television advertisement", or "electric shock television advertisement". These graphic TV advertisements left a lasting impression on respondents.

There were a few responses that were associated with fire that had an impact on the way respondents thought about the safety of their property and family. The responses of "news coverage on bushfire disasters", "fire safety advertisements on television" and "smoke alarm advertisements on television" amounted to 16.5% of the overall responses. This indicates that fire advertisements and media coverage on television has had the second most impact overall. The responses of "fire safety advertisements on television" and "smoke alarm advertisements on television" can be combined to be associated with house fire. "News coverage on bushfire disasters" is separate from the other two in that it is not an advertisement and is specifically focussed on bushfire.

"News coverage of bushfire disasters on television" such as the recent Sydney, Canberra and Eyre Peninsula bushfires left a lasting imprint on the consciousness of a small percentage of respondents (6%). This indicates there is a mix of disaster and other life and property safety issues which shaped the consciousness of respondents.

There were a broad range of general media, community programs and miscellaneous responses that overall indicated a relatively minor impact on the way respondents thought about the safety of themselves, family and property. It is of note that radio was reported as having little effect on respondents.

Despite what respondents viewed as most effective (Table 17), in terms of preferred methods for receiving bushfire information/advice, there was a wide range of preferred methods for bushfire information and advice (Table 18).

Table 18: Tamborine Mountain Residents' Bushfire Preparedness Survey – Rank of preferred methods for bushfire information and advice (N=211*)

Method of bushfire information and advice	Rank	%**
The distribution of safety literature through local letterboxes with information on where to get further assistance	1	36.2
Programs which bring together small groups of residents in their homes or local halls to work together with the Fire Service two or three time throughout the bushfire season.	2	20.1
More general advertising and media coverage (television, newspapers)	3	18.1
Information in local media (newspapers, noticeboards, schools etc.)	4	14.7
Large community meetings are organized to which all local residents are invited in a local park near their home and given a talk and safety literature distributed.	5	10.9
Total		**100**

*** The survey question allowed for more than one response.**
**** Percentages are from the base of total responses to the options.**

Passive methods of receiving bushfire information and advice were stated as being preferred for receiving bushfire information and advice:

- "The distribution of safety literature through local letterboxes with information on where to get further assistance (36.2%);
- "More general advertising and media coverage (television, newspapers)" (18.1%);
- "Information in local media (newspapers, noticeboards, schools etc." (14.7%).

The results suggest that there is an overall preference for receiving passive methods of bushfire awareness information and advice (Rank 1, 3 and 4 combine to nearly 69%). These methods are passive because they do not require interaction with the Fire Service. The remainder of respondents (31%) preferred "programs which bring together small groups of residents in their homes or local halls to work together with the Fire Service two or three time throughout the bushfire season" rather than "large community meetings are organized to which all local residents are invited in a local park near their home and given a talk and safety literature distributed". Therefore, respondents preferred small group meetings if there is to be interaction with the Fire Service. Interviews with various community members indicated there are over sixty community groups within Tamborine Mountain in a community of 5646 (ABS 2001). This may be a reason why small community group meetings were preferred over large ones.

None of the methods of presenting bushfire safety information and advice were preferred over 48.4% and the last four methods were fairly even spread. The number of responses indicated that more than one method would work best for some of the respondents. The distribution of safety literature through local letterboxes with information on where to get further assistance was clearly the most popular option.

There was a clear indication that most of the respondents would obtain advice in relation to bushfire safety measures with the local Rural Fire Brigade. Nearly half (48%) of the people who wrote a response to question which asked who respondents would seek advice from in relation to bushfire safety measures (see Q.7a in Appendix D) solely selected the Rural Fire Brigade (see Table 28 in Appendix E). The Rural Fire Brigade was combined with other fire services for 26.5% of other responses, the Fire Warden had 1.5%, so this amounts to 76% of respondents who indicated they would seek advice from the local Rural Brigade and/or other fire services. Although QFRS ranked second with 14% of the overall responses to (see Table 28 in Appendix E for responses), it is apparent that respondents perceive bushfire matters as primarily a Rural Fire Brigade concern despite where their property is situated. There were miscellaneous responses amounting to 10%.

It was reported in the "Residences" section of this chapter that there was a clear majority of respondents (62%) who were living in residential areas rather than rural/ bushland/ escarpment/ farm or other green area (38%). The Tamborine Mountain Rural Fire Brigade (RFB) is mostly concerned with off-road non-residential areas and the Queensland Fire and Rescue Service (QFRS) urban brigade is mostly concerned with the residential areas with paved or bitumen road access.

The various mix of results for combinations between organizations or persons whom respondents would seek advice from in relation to bushfire safety measures suggests that over a quarter (26.5%) of respondents to the question would seek advice from more than one source. The most highly ranked responses which included a mix (each with 7% of overall responses to question) included local RFB alternatively with the QFRS or Local Council (which was also the third highest ranking organization but only received 2% of overall responses to the question). The rest of the mixes included local RFB/ QFRS/ Local Council/ State Emergency Services/ Fire warden/ Queensland Parks and Wildlife Service/ Police/ Library/ Information Centre or friend/ themselves. The various

mixes suggested there are combinations of people/organization from whom respondents would seek advice.

Perceptions of environmental management practices

Questions 7c-e (in Appendix D) were asked to gain insight into respondents' perceptions of environmental management practices such as their views on controlled burning and fire breaks and what they are used for. It was especially important to ask about perceptions of environmental management practices because in-depth interviews expressed concerns about the maintenance of National Parks and the return intervals of controlled burns.

Table 19: Tamborine Mountain Residents' Bushfire Preparedness Survey – Statements which best represent respondent's views on fire breaks (N=175*)

Views on fire breaks	% **
Fire breaks are an essential part of bushfire prevention.	68
I feel safer knowing fire breaks are there.	25
I do not know anything about fire breaks.	7
Total	**100**

*** The survey question allowed for more than one response.**
**** Percentages are from the base of total responses to the options.**

Table 19 indicates that the majority (68%) of respondents view fire breaks as an essential part of bushfire, and a quarter felt safer knowing they are there.

Table 20: Tamborine Mountain Residents' Bushfire Preparedness Survey – What respondents thought of the use of fire breaks (N=139)

Perceived purpose of fire breaks	%
To contain fire from spreading	36
To prevent the spread of fire	26
To prevent the spread of fire and access	17
To contain fires from spreading and backburning	5.5
To prevent the spread of fire and backburning	5
To prevent the spread of fire, to contain fire from spreading, access	3
Backburning	2
To contain fires from spreading, backburning and access	1.5
To prevent the spread of fire, backburning and access	1
Access for transport of fire fighting equipment	1
To control fuel reduction burns and control backburns during a fire	1
Reduce fuel, create a line of protection if maintained	1
Total	**100**

Responses for Table 20 were gleaned from open-ended responses. The most common response (36%) for what respondents thought of fire breaks was that they are used "to

contain fire from spreading". There was a high amount of respondents whom thought fire breaks are used "to prevent the spread of fire" (26% of overall responses). The main differences between "containing" and "preventing" the spread of fire is that "containing" is about "stopping, isolating, and controlling" the fire from spreading and "preventing" is more about "slowing, reducing and avoiding" the spread of fire.

The higher amount of responses that expressed a perception that fire breaks are used "to contain fire from spreading" rather than "preventing the spread of fire" means that more respondents think that fire breaks are used by fire fighters to control a fire with backburning techniques to stop or isolate the fire from property on the other side of the fire break rather than slow or reduce the effects of a fire (as a buffer zone in the case of major bushfire). Both of the responses allow for the possibility that the fire is a controlled fire or bushfire and assume that fire breaks are accessed by fire fighters to "contain" or "prevent" fires, which brings attention to the third highest response which respondents indicated that fire breaks are used as access points for fire service operations.

The Gold Coast City Council (1998, Glossary of Terms) indicated that "fire breaks refer to any natural or man-made elements in the landscape that can impede the progress of a fire and/ or provide access so as to create an impediment to a fire; they are a means of evacuation for fire fighters and residents and suitable locations from which to backburn so as to stop an advancing bushfire". It can be interpreted that the Gold Coast City Council's reference to fire breaks as being designed to impede the progress of a fire is similar to containing or preventing the spread of fire as found to be the most popular responses to the survey question. The associated responses of "access" and "backburning" were the next ranked survey responses; these two words were also referred to as functions of fire breaks in the quote above. Therefore, most of the respondents included the similar key words used by the Gold Coast City Council as to what fire breaks are used for.

Controlled burning can be a contentious issue in some communities, and Tamborine Mountain is no exception. Therefore, it was important to understand the different perceptions for controlled burning by asking the extent of support or discontent within the survey community for its application (see Q.7e in Appendix D and Table 21).

Table 21: Tamborine Mountain Residents' Bushfire Preparedness Survey – What best represented respondents' views on controlled burning (N=209*)

Rank	View on controlled burning	% **
1	An essential part of bushfire prevention	69.3
2	A bit of a nuisance but on balance is necessary	22.0
3	It damages the plants and animals	6.1
4	A health hazard	2.1
5	The smoke is a nuisance	0.5
Total		**100**

***Some respondents expressed more than one view.**
**** Percentages are from the base of total responses to the options.**

As indicated in Table 21, 91.3% of responses indicated that controlled burning is necessary. The remaining 8.7% were a minority of responses that did not indicate support for controlled burning. There were just over a quarter of respondents who considered controlled burning a bit of a nuisance but on balance think that they are necessary. Respondents mostly accepted that there are certain trade-offs such as smoke that come with controlled fire; only 0.6% of respondents agreed that "the smoke is a nuisance" as their view of controlled burning. The in-depth interviews expressed the fire services' view that controlled burns are not wanted by the lay public. The survey results indicated that this was not the case because the majority of respondents considered controlled burning as essential or on balance necessary.

Respondents' views on what fire breaks are used for (as presented in Table 20) indicated that the respondents were well-informed. There is a similar relationship between people who represented their view as not knowing anything about fire breaks (7%) and the combined overall responses (8%) where respondents had views on controlled burning as not necessary (i.e. that it is a health hazard, it damages plants and animals, and the smoke is a nuisance). The case study's in-depth interviews indicated that there are differing opinions within the community regarding the appropriate controlled burning return intervals.

Overall, the majority of respondents accept that there are certain trade-offs that come with controlled fire because they view it as a necessary part of bushfire prevention. The influence of a few community members who expressed strong opposition to controlled burning appeared to have shaped the fire services' view that controlled burns are not wanted. However, it can be concluded that controlled burning remains a contentious issue.

Key Variables

Assessment of the significance of relationships between particular variables (see Statistical Analysis Plan in Appendix F) was undertaken using cross tabulations and Chi-square tests in the SPSS program (Version 12). Chi-square tests were performed to check the statistical significance of the cross tabulation and to identify significant differences in distribution between groups. A statistically significant cross tabulation indicates that there is a relationship between the variables. The importance of the Chi-square distribution stems from the distribution of the variance of a sample taken from a normal distributed population (Institute of Phonetic Sciences 2005).

Significant differences in distribution between groups were represented by 'p' being equal or less than 0.05. An error or such outside of the analysis may have been the cause of an otherwise (expected) significant result, for example; a grey area. The key variables of interest (those that are significant) will be included in this chapter, the Chi-square test results are presented in Appendix G, as well as some of the overall percentages of how many respondents had taken a certain action or were confident in their bushfire preparations or who they viewed as responsible for protection of life/property.

The key variables are presented within four sub-headings: Preparations against the risk of bushfire; Perceptions of bushfire risk; Confidence with bushfire safety aspects; and Responsibility for protection of life and property in the event of a bushfire.

Preparations against the risk of bushfire

Households without children, those over the age of 55 years and those who have experienced bushfire in the local area before were more likely to have participated in bushfire preparation activities (e.g. checked sources of water and hoses, installed smoke alarms, decided on situations to stay or go, and established fire breaks or buffers).

The installation of smoke alarms was more likely to be undertaken by those over the age of 40 (significant relationship, see Section 1 in Appendix G).

Those who had not decided on situations to stay or go were more likely to be less concerned about the risk of fire than about other risks to personal safety and to have

disagreed that they think about the risk of fire everyday (significant relationships, see Section 1 in Appendix G).

Property type did not emerge as a significant influence on preparations overall, but was significant for whether or not the respondent had decided on situations to stay or go. Those living in bushland/open space areas rather than residential streets were less likely to have made the decision about whether to stay or go in the event of a fire (see Section 1 in Appendix G), despite these being the people who really needed to have made the decision.

There was a significant relationship between respondents with an urban rather than rural background being more likely to have talked to their neighbours about fire safety (see Section 1 in Appendix G).

Risk perception emerged as a significant influence overall on bushfire preparations. Those respondents who placed a high priority on the risk of bushfire were more likely to participate in preparation activities. For example, those that disagreed with the statement "I am less concerned about the risk of fire than about other risks to personal safety" were more likely to talk to neighbours about fire safety, have decided on situations to stay or go and have a bushfire plan. This was similar for those who had thought about fire everyday (see Section 1 in Appendix G).

Time and resources available were factors which influenced whether respondents had taken preparations against the risk of bushfire (see Section 1 in Appendix G). Analyses found that activities requiring an investment (especially checking equipment) were less likely to be undertaken by renters, those with children and those not retired. Analysis results weakly suggest that those believing home protection is too expensive were less likely to have checked equipment.

Children in the household did not emerge as a significant factor overall. However, having children in the household was a significant influence for the respondent having checked that fuels were safe (see Section 1 in Appendix G).

People from interstate were more likely to have agreed that there is little they can do to protect life and property from bushfire; the relationship was significant (see Section 1 in Appendix G).

Females were more likely to have agreed that home protection is too expensive, and that there is no point protecting their home if neighbours don't (relationships were both significant). The most significant relationship with females was that most (56%) would leave if a fire came (see Section 1 in Appendix G).

There was a significant relationship for those living in bushland/forest, on a hobby farm or a rural road being more likely to having agreed that preparation is pointless if Council do not undertake bushfire prevention (see Section 1 in Appendix G).

There were 6.5% of respondents who rented homes. Despite the small number of renters overall, homeowners appeared to know more about firebreaks and were more likely fully covered for insurance; renters were more likely to be not sure about the level of coverage (all relationships were significant, see Section 1 in Appendix G).

Perceptions of bushfire risk

Analyses suggest that retirees may have a lower risk perception. For example, they were more likely to agree that they are less concerned about the risk of fire compared to other risks to personal safety. Those who were retired were less likely than those who were not retired to agree that "I haven't really thought about the fire risk" (see Section 2 in Appendix G).

Analysis results suggested that there was a significant relationship whereby homeowners were more likely to disagree that the impact of fire is greater than other risks (see Section 2 in Appendix G).

There were significant relationships which suggested that respondents living within or adjacent to bushland or forest and those who have experienced fire before were more likely to have a high risk perception of it. Those living in bushland or forest were more likely to think of fire everyday, and more likely to disagree that "I haven't really thought about the fire risk" and they expressed the view that it is worthwhile in preparing their homes even if their neighbours do not. Those who had experienced fire in another area were likely to leave their property in the event of a fire and were more likely to agree that "survival is more about instinct and common sense than planning" (see Section 2 in Appendix G).

Confidence with bushfire safety aspects

There was a significant relationship between undertaking bushfire preparation activities and increasing confidence (see Section 3 in Appendix G). The respondents that had undertaken bushfire preparation were generally more confident in their safety than those that had taken no action to minimise the risk of bushfire. It was the same for those who were confident in the equipment they need to deal with fire and where to buy it. Those who were confident where to get information and advice were more likely to have ensured flammable items and fuels are safe and checked equipment. There was a relationship between those who were confident in situations in which you should stay or leave home in the event of a fire and first aid (see Section 3 in Appendix G).

In regards to type of property, those living within or adjacent to bushland or forest (including near the escarpment) appear to be one of the most confident groups (e.g. how to prepare house to minimise the impact of bushfire, have relevant equipment and a plan to stay or go in the event of a bushfire, see Section 3 in Appendix G).

Respondents without children appeared more likely to be confident with the costs associated with preparing against the risk of bushfire (see Section 3 in Appendix G).

Those with full insurance for a fire event also appear to be more likely to be confident with equipment-related preparations (see Section 3 in Appendix G).

There were significant relationships whereby respondents appeared to be more confident if they had a bushfire action plan and believed there is something you can do to protect yourself, even when neighbours do not prepare their property as well as having taken preparations against the threat of bushfire (see Section 3 in Appendix G).

Workforce participants were more confident with first aid (see Section 3, Appendix G).

Past bushfire experience does not appear to increase or decrease confidence, except for in having decided to stay or go in the event of fire (see Section 3 in Appendix G).

Responsibility for protection of life and property in the event of a bushfire

There was a significant relationship which suggested that homeowners were more likely than renters to agree that the householder is more responsible than fire services for

protection of life and property in the event of a bushfire (94% of homeowners viewed householders as more responsible compared to 67% of renters).

Those less likely to only call the brigade in the event of a fire are also more likely to have expressed the view that the householder and groups of neighbours are more responsible for protecting property from bushfire. These relationships were significant (see Section 4 in Appendix G).

There was a significant relationship for those who are more likely to believe that neighbours are more responsible for protecting property from bushfire being over the age of 55 (80% compared to 65% of those between the ages of 41-55, and 38% of those between the ages of 26-40, see Section 4 in Appendix G).

Respondents with homes surrounded by or adjacent to bushland were less likely to have expressed the view that the householder is responsible for protecting property from bushfire (see Section 4 in Appendix G). The most significant relationship is that they appear to be more likely to believe that Queensland Parks and Wildlife are more responsible for the protecting property from bushfire (see Section 4 in Appendix G).

There was a significant trend in relationships which suggested that those more likely to believe that the Council is more responsible protecting property from bushfire include respondents between the ages of 41-55, in the workforce and with children (see Section 4 in Appendix G).

Conclusion

Data analyses found a number of relationships between key variables which were significant in regards to preparations against the risk of bushfire. Respondents with an urban rather than rural background were more likely to have talked to their neighbours about fire safety. Home ownership status was also relevant to preparedness for bushfire: owners appeared to know more about firebreaks and were more likely fully covered for insurance; renters were more likely to be not sure about the level of coverage.

Location of dwelling and occupation emerged as significant factors for bushfire preparedness. Those living in residential streets rather than bushland/ open space areas were more likely to have made the decision to stay or go in the event of a bushfire. Occupation

was especially significant for only a couple of particular actions against the threat of bushfire. Those in the workforce were less likely to have taken action to have made sure fuels were safe around their house.

Gender and occupation emerged as significant personal factors which influenced perceptions of bushfire risk. Retirees were more likely to agree that they are less concerned about the risk of fire compared to other risks. Females were more inclined than males to leave their home if a fire came. Therefore, it appears that males were much more prepared to stay and defend their home in a bushfire event. However, most respondents described last-minute preparations around the home rather than actions which require an investment of cost/effort. Therefore, interpretation of the survey results found that respondents with action plans are not really prepared, and in fact could be placing themselves and their families at risk.

Those respondents that placed a high priority on the risk of bushfire were more likely to participate in preparation activities. People from interstate were more likely to have agreed that there is little they can do to protect life and property from bushfire.

The respondents' type of property and home ownership status emerged as significant residence-related factors which influenced respondents' perception of bushfire risk. Those living in bushland/forest, on a hobby farm or a rural road were more likely to have agreed that preparation is pointless if Council/other agency do not clear foliage or backburn. The respondents who had experienced fire before and were living within or adjacent to bushland or forest were more likely to think of fire everyday, and not dependent on whether or not their neighbours are also preparing against the risk. Homeowners appear to be less concerned than renters about the risk of fire compared to other risks.

Increased confidence with bushfire safety aspects was especially related to a few certain preparations, associated costs, capacity to acquire and use equipment, as well as level of insurance. The respondents who had cleared junk out of the yard, checked water and hoses, and installed smoke alarms were generally more confident in their safety than those that had taken no action. Males appeared more confident in the costs of protecting their house and also appeared more likely to be more confident with equipment-related preparations. Those with full insurance for a fire event also appear to be more likely to be confident with equipment-related preparations. Therefore, fully-insured males who

had made a few preparations using equipment/tools around the home were the most likely persons in the surveyed community to be confident with bushfire safety aspects.

Responsibility for the protection of life and property was especially related to age, occupation, home ownership status, type of property, and family situation. Homeowners were more likely than renters to view the householder as more responsible than fire services for protection of life and property. Those more likely to believe that groups of neighbours are more responsible for protecting property from bushfire were over the age of 55. Respondents with homes surrounded by or adjacent to bushland were less likely to have expressed the view that the householder and neighbours are more responsible for protecting property from bushfire; it appears that they are more likely to believe that Queensland Parks and Wildlife are more responsible. Those more likely to believe that the Council is more responsible protecting property from bushfire include respondents under the age of 55, in the workforce and with children.

Research findings indicate that the task of increasing shared responsibility for preparations against the risk of bushfire is complex. Bushfire preparations had been undertaken by 58% of respondents which indicated a disturbing 42% of respondents had not taken action at all. The percentage for those with a hazard action plan was similar (62%). Half of the respondents expressed a lack of concern with fire as opposed to other risks to personal safety. There was not a high level of confidence overall for the bushfire safety aspects listed. Renters, those under the age of 55 and with children and working, as well as those with their home surrounded by or adjacent to bushland are those mostly likely to not have a high level of shared responsibility for protection of life/property. Those most likely to believe in shared responsibility include residents over the age of 55 and those working on the mountain. It was outlined that respondents prefer passive methods of receiving information/advice such as letters to the householder, television advertisements and newspaper columns. Small group meetings were preferred by those who want engagement between fire services and the community.

The Tamborine Mountain community's preparedness for bushfire was understood from topics gathered from relevant sources such as a community profile, interviews with fire services/ members of the community and also from a community survey. The results of the community survey were presented in this chapter (5), as were the key variables (significant relationships). Key research findings are discussed in Chapter 6 and 7.

Chapter 6

Key Issues Identified by the Fire Services and How They Are Perceived in the Community

Introduction

A number of themes were identified from the qualitative data generated by interviews with fire service personnel, community groups, key community representatives and comments in the community surveys. In the following discussion, comments attributable to fire services will be annotated as 'FS', the community groups and representatives as 'CG', and the community surveys as 'CS'.

How Perceptions/Expectations of Fire Services and the Community Agreed

1. There are varied perceptions of bushfire risk.

"There are so many strong views now. Views regarding bushfire risk are challenged by environmental groups who are passionate about the issue" (FS).

The survey responses indicated that 78.4% of respondents (Table 5) had thought about fire risks, and 50.7% were less concerned about the risk of fire than about other risks to personal safety (Table 5). The variety of perceptions of fire risk were evident from survey comments for which six themes were identified: specific concerns about vulnerable location or vegetative conditions; concerns about preparedness; vague concerns; no concerns because of preparedness, no concerns; and more concerns for the environment than fire issues.

Examples of concerns about vulnerable locations and vegetative conditions:

- "Beaudesert Shire is vulnerable to fire; Tamborine Mountain is a high risk area and south of the Shire is probably at highest risk" (CG).
- "Escarpment blocks are the problem so it is not such a hazard on plateau as there are mostly quarter acre blocks there" (CG).
- "There is evidence of fire on property but not for ten years. Vegetation is very dry, it must be due" (CS).
- "Like trees but fire risks are a concern" (CS).
- "Live near escarpment. Worried when certain conditions prevail" (CS).

- "Houses in near vicinity are in fire risk area" (CS).
- "Concerned about large trees in neighbours yard" (CS).
- "Forest is big and close. House is of wood. Dry spells are a worry" (CS).
- "Bushfire is the biggest hazard in our area and it is good to be prepared" (CS).
- "Bushfires frighten me. Bushland and high winds are worrying" (CS).
- "Live in a bushland escarpment with national park on one side and surrounded by trees so I think about fire risks" (CS).
- "Not personally at risk, but there is great risk for those living on the escarpment" (CS).
- "Living on top of mountain presents less risk than on its slopes" (CS).

Examples of concerns about preparedness:

- "Wooden home/ the pump will fail if the power does" (CS).

Examples of vague concerns:

- "We are worried about bushfires" (CS).
- "Have often thought about fire risks" (CS).
- "Very little fuel, however, open to winds" (CS).

Examples where people felt prepared to meet the risk:

- "Have clearing around house and always clear hazards against risk of bushfire" (CS).
- "New house with lots of open space and no trees" (CS).
- "Although not at risk from fire - we still take precautions" (CS).
- "Property is cleared land, a creek runs through it" (CS).
- "Fire is worrying, especially losing personal mementos. I love the countryside, so I take what precautions possible to minimise risk, as with any other risk" (CS).

Some examples of comments from surveys in response to "please explain why you feel the way you do about the risk of fire in the area" indicated respondents' perceptions were concerned about the local risk of fire but had other priorities that took precedence:

- "I do not worry about fire risks, except when it is very hot, windy and dry" (CS).

- “Little risk of bushfire in street” (CS).
- “Area seems safe from bushfire” (CS).
- “Bush across road and escarpment has never had fire” (CS).
- “Our property unlikely to be in danger of fire” (CS).
- “The risk does not seem great” (CS).
- “There doesn’t seem to be a threat of bushfires. Evidence of small spot fires but feel pretty safe” (CS).
- “Many other things occupy our attention. We don’t dwell on what might happen” (CS).
- “Bushland 150-200 metres away, no trees close” (CS).
- “Rainforest is fire resistant, weeds are an issue, house fire is always a potential” (CS).
- “We are in a very low risk site, grass is kept and rainforest, no fire history” (CS).
- “Cleared flower farming area” (CS).
- “Believe fire risk is low at residence location” (CS).
- “Property is not surrounded by bush” (CS).
- “Unless the drought really dries the rainforest, I think this area is fairly safe” (CS).
- “I think about house fire caused by other reasons than bushfire” (CS).
- “Fairly built up area and good supply of water, back up system in case of blackouts” (CS).
- “Not something I think about much” (CS).
- “Live in residential area with little risk of fire” (CS).
- “Check fire danger but live in a very safe zone despite bush at the back of us” (CS).

There was a feeling from both community groups and the fire services that views regarding bushfire risk are challenged by environmental groups who are passionate about the issue.

- “While fire can be a problem here, especially on the escarpment, there are a number of issues that need to be taken into account when burning off or removing vegetation to improve fire safety” (CG).
- “Tamborine Mountain is a green place; fire would be devastating” (CS).

- "Surrounded by remnant rainforest - beautiful and peaceful environment" (CS).
- "I love trees … want to be surrounded by them. Fire is a concern but that is my choice" (CS).
- "Love the green spaces, quiet and less pollution" (CS).
- "Tamborine Mountain is a very special place with a healthy environment" (CS).

2. Experience with fire appears to be related to awareness of associated risks.

"Most people who have experienced fires are aware of the risks associated with it but most only think about it when fire arrives" (FS). The community groups and surveys indicated that there was some support for the first part of this view held by the fire services, but the latter point is less clear.

Community survey data suggests that respondents living within or adjacent to bushland or forest and those who have experienced fire before were more likely to have a high risk perception of it (as reported in 'Perceptions of bushfire risk' in 'Key Variables' section of Chapter 5 and Section 2 of Appendix G). For example, they were more likely to think of fire everyday, and they expressed the view that it is worthwhile in preparing their homes even if their neighbours do not.

A community group member indicated that awareness of the bushfire season is associated with experience of its associated risks: "Comments have been made based on very local observations and experience … for the next few months, I will worry about fire from time to time" (CG).

The survey respondents' previous experience of fires was varied and included experience of house fires as part of their responses to the community surveys (CS):

- "I have experienced severe bushfires in the Coomera area" (CS).
- "We are aware. Been in a house fire 40 years ago. Water limits a concern" (CS).
- "I have lived in serious fire risk area before. Aware of risks and precautions to take. Children a different concern than self" (CS).
- "Aware of risks because I grew up in the bush and have often been surrounded by fire" (CS).
- "At Victoria, I was a previous member of the Rural Fire Service and Army - plenty of fire experience" (CS).

- "Have seen vast devastation of bushfire near Sydney" (CS).
- "Lived in Sydney in 1990's when bushfire destroyed a certain place" (CS).
- "Fire swept through this area 29 years ago" (CS).
- "Awareness of risks of fire based on experience" (CS).

3. Risk awareness does not appear to be related to recent Australian bushfire events.

"Awareness of fire is in inverse proportion to proximity to major fires" (FS).
"Residents react to media e.g. Sydney fires; plus there are different trees here" (CG).

The first comment by the fire services indicates a perception that the further away that residents are situated from major bushfires; the less aware they are of the associated risks.

The latter comment by a community group member perceived the media's portrayal of bushfires to have impacted on the way residents react to the risk of bushfire. It was also perceived that another factor which influences risk awareness is that there are different trees in the local area compared to southern states. Therefore, it was suggested that residents construct a different perception of the matter; location remains significant.

The community survey results indicated that bushfire disasters left a lasting impression on the consciousness of only 6% of respondents who reside at Tamborine Mountain (i.e. "news coverage of bushfire disasters on television" as a response in Table 17).

4. The overall view was that fire breaks are a necessary fire management initiative.

"The RFB monitor fire trails and use them for backburning and access during fires" (FS). "Most of the escarpments are controlled burned by the RFB because this is considered the most crucial area for preventing the spread of fire into residential areas on the plateau" (FS).

Community groups seemed to be informed about fire trails and supportive of their purpose and uses:

- "An environmental organisation assesses the situation twice a year, coordinates with the Fire Warden and follows up with the Council for clearance and maintenance" (CG).

- "Landowners cleared much of fire trails and there has never been a problem" (CG).
- "Fire Warden was involved in the development of the western shelf trails (50 metres down) in order to reduce the fire risk and the fire trails were well maintained when he was Ranger-in-Charge here" (CG).
- "Level of risk increased in last 3 years due to change in QPWS structure as staff of four have moved from Tamborine Mountain. Fire trails and National Parks management are overlapping issues" (CG).
- "Local fire management strategy developed 120 kilometres of fire trails, which are often slashed and not burnt and then become highway for feral dogs to wilderness areas which create havoc for fauna" (CG).
- "Fire trails have made a difference" (CG).

A majority (68%) of survey respondents view fire breaks as an essential part of bushfire prevention (Table 19 in Chapter 5). A high proportion of respondents (86%) indicated some knowledge of the use of fire breaks (Table 20). It was illustrated in Table 20 that the most common responses for the use of fire breaks was "to contain fire from spreading", "to prevent the spread of fire", and for "access" and "backburning".

5. The local bushfire season was perceived to be from early spring to summer.

"The fire season for Tamborine Mountain is usually throughout spring" (FS).
Spring at Tamborine Mountain is from the beginning of September until the end of November.

It was reported in the "Experience of fire/perceptions of bushfires at Tamborine Mountain" section in Chapter 5 that the Bureau of Meteorology (2004) identified that local bushfires are most likely to occur between September to December – 88.7% of all events occurred during those months. It was also reported that drought conditions had disrupted the usual pattern of a dry winter followed by summer rain. It can be inferred that the drier than usual weather experienced at Tamborine Mountain in the years before the survey meant that the bushfire season had been extended beyond spring to include summer until the cooler weather arrives in April.

A couple of community group members were more informed about the bushfire season being affected by weather patterns: “There was a prolonged drought leading up to spring (last bushfire season)” (CG).

Another community group member suggested the bushfire season was “late August to end of November, depending on rainfall” (CG).

A majority (70%) of respondents to the survey indicated that they thought the fire season at Tamborine Mountain is the seven months from late August until April (beginning of spring to early autumn). Some examples of comments on the surveys indicated that the respondent perceived the local bushfire season as:

- “August-November” (CS);
- “Late August to summer” (CS);
- “August to March” (CS);
- “October to April” (CS);
- “Dry windy conditions in August/September, hot dry conditions in summer” (CS).

6. There is a need for Bushfire Management Plans to be effectively implemented:

Fire services perceived that Bushfire Management Plans do not appear as being presented to developers and building codes do not appear to be enforced by Councils:

- “Gold Coast City Council and Beaudesert Shire Council are approving development in medium to high risk areas. Developers are not provided with a Bushfire Management Plan e.g. Timberview Estate on Elevation Drive. It was agreed by the group that the area should not be developed due to fire risk, and landscape and fauna diversity. Auxiliaries and RFB were not consulted on the development and agreed that further houses should not be built on ridges” (FS).
- “Building codes were not used at Timberview Estate. The local councils are responsible for enforcement of fire building codes. Building codes used in southern states may have been used more recently within Gold Coast City” (FS).
- “Some insurance companies are not insuring property until owner had a bushfire management plan in place” (FS).

Despite this last comment, there was a high amount (80%) of overall respondents who felt they had full-cover household insurance for bushfire.

Community groups expressed a need for effective Bushfire Management Plans:

- "Houses should be away enough from bush" (CG).
- "There should be a perimeter between buildings and the bush - say 20 metres" (CG).
- "People should probably not build houses on slopes in fire-prone areas in the first place, and if they do, they understand that the possibility of fire is the risk they take in order to live in area full of trees and wildlife. Living like that is a privilege, not a licence to make things 'safe' by causing damage to the natural environment" (CG).
- "Wongawallan Rd. is to be developed which is steep in places and some sites are close to a small National Park, Panorama Point. There was an original plan for 66 dwellings, then 33 and now 12 dwellings. There were many objections to Beaudesert Shire Council regarding the development. Beaudesert Shire Council has replied to a community group letter in September 2004 advising that issues were addressed and development is going ahead". A discussion around bushfire and wildlife preservation issues took place (CG).

There was an interview with an accommodation business on the edge of eastern escarpment with eucalypt trees close below; the accommodation is on border with a Gold Coast City Council reserve. The business had no bushfire evacuation plan and the owner was concerned about the bushfire risk but did not know whom to contact.

The *Tamborine Mountain Escarpment Management Plan* (Watson 2001) documented preparation for an at-risk-from-bushfire section of Tamborine Mountain. The *Tamborine Mountain Escarpment Management Plan* (Watson 2001: 22) included a Bushfire Management Plan which stated that "the effectiveness of the Plan depends on ongoing maintenance". It appears that the western escarpment on the Beaudesert Shire side was the focus of the Plan and interviews with an eastern escarpment business owner on the Gold Coast side indicated that the Plan had not encompassed the mountain as a whole.

Support for bushfire hazard planning can be found in the *Tamborine Mountain Escarpment Management Plan* (Watson 2001: 23) which recommended that: "Council Planners be obliged to defer to the distribution of Potential Bushfire Hazard classes

shown in Bushfire Hazard Planning in Queensland. Medium and high risk areas should be considered for recognition as designated bushfire prone areas as defined by the Building Code of Australia (Australian Government 1996) and a Bushfire Management Plan should be required for development in these areas. It is further recommended that property searches requested by potential property buyers automatically return the Potential Bushfire Hazard class". See Map 2 (p.69 in Chapter 4) for a Potential Bushfire Hazard map of Tamborine Mountain.

How Perceptions/Expectations of Fire Services and the Community Differed

1. Reliance of community upon fire services to respond in the event of a bushfire.

"Most people in the community would rely on fire services to respond in the event of a fire" (FS).

Nearly half of the survey respondents reported they would not rely on help in the event of a fire, and an almost equal number reported they would call the fire brigade (Table 10). While this is not as high as the fire services suggest, there is still the issue of whether the fire services have the capacity to support half the population in a large event. It is also relevant to consider if respondents were prepared and confident to respond in the event of a bushfire because insight into whether or not people rely on fire services in the event of a fire involves a complex construction of risk.

The surveyed locality had on average taken the listed bushfire preparation actions more often than not. Diagram 1 illustrated that those who had taken action against the threat of fire (whether in the last three months before the survey or not) was 58%. Table 6 indicated that most of the actions taken are considered to be general housekeeping (i.e. cleared junk out of the yard, cleaned out the gutters, cut the grass, removed overhanging branches, ensured flammable items and fuel are safe and checked sources of water and hoses). Data analyses suggested that those who had taken general housekeeping preparations for safety against risk of fire were more likely to be more confident in the protection of life and property than those that had taken no action (see 'Confidence in Bushfire Safety Aspects' within the 'Key Variables' section of Chapter 5).

2. The community's awareness of bushfire risk.

Most people are unaware of the bushfire risk (FS):

- "Sometimes people think of hazards when they build and some do not, even when they build in at-risk-from-bushfire areas" (FS).
- "People are unaware of bushfire risk and don't think about things they should do even when they build in risky areas" (FS).
- "Some people think of hazards when they build and some don't. Some build houses around trees and others build on a landslide area" (FS).
- "When people build they don't think about fire hazard, more often the view" (FS).
- "People think of the rainforest more than fires" (FS).
- "There are homes with gutters full of leaves. Some people buy trucked water all the time so they are not concerned about collecting rain water" (FS).
- "The longer the time between fires, the less conscious people are. Some property owners don't want RFB on property. Once fires are not on TV, they're gone! Too busy with own routine which is more important than clearing gutters" (FS).

Although respondents perceived bushfire to be the most important natural hazard, most (61%) did not think about the hazard on a daily basis (Table 5). Most respondents to the community survey reported being aware of the bushfire risk but have other priorities in their life that take precedence. Respondents placed more importance on the following matters as more worrying than bushfires: "personal, family and health matters", "home and environmental matters" and both of these combined (Table 27 in Appendix E).

The following quotes were from community group interviews:

- "People often feel immune because area looks green" (CG).
- "Bushfire is not mentioned in community. People who live on escarpment edge more aware of issue. Main priority of those on top of escarpment is view" (CG).
- "People more concerned about snakes, development of rainforest, over utilising what's here and degrading environment" (CG).

The following comments from the surveys were in response to "please explain why you feel the way you do about risk of fire in the area"; the responses indicated that survey

respondents perceived themselves to be aware of the risk of fire in the area but had other priorities in their lives that took precedence in their concerns:

- "I am an environmentalist but aware of risks from bushfire" (CS).
- "Aware of other dangers as well as bushfire" (CS).
- "I enjoy rural life, aware of risk of bushfire - only one of life's dangers" (CS).
- "Aware of danger but not preoccupied" (CS).
- "Fire is a risk concern, though other concerns outweigh fire" (CS).
- "Aware of the risk of fire, take preventative actions as deem needed" (CS).
- "Live near nature and bush - must be aware of the environment living amongst" (CS).
- "Lot of green, not much dead wood. No point in worrying about something that you can't control" (CS).
- "Live in heavily wooded area. Aware of fire danger but more concerned about storms" (CS).
- "If the climate change causes hotter and dryer conditions in the future, I will have to change my mind and stop trying to restore the rainforest! I will think about fire during the bushfire season from time to time". This respondent agreed strongly that "I moved here to be close to nature" and "I believe that the bush should be left as untouched as possible" and disagreed strongly that "I haven't really thought about fire risks" (CS).

Some respondents perceived themselves to be aware of the risk of fire in the area and also expressed concerns specifically about bushfire risks:

- "Fire awareness is paramount" (CS).
- "Aware of property maintenance bush/ rainforest and council and fire brigades do burn offs regularly" (CS).
- "Like bushland but aware it is a natural hazard" (CS).
- "Realise that we live in a fire risk area. Property abuts bushland which causes concern in the dry season" (CS).

Some comments in response to "please explain why you feel the way you do about risk of fire in the area" where the respondents perceived themselves to be aware of the risk of fire and also expressed that they were not particularly concerned about bushfire risks:

- "Aware of fire risk but consider home location safe" (CS).

- "Aware of proximity to bushfire risk but live in residential cleared area" (CS).
- "Accept risks of living on mountain but does not worry us" (CS).

3. Responsibility for protection of life and property in the event of a bushfire.

The public expects things to be done for them: (FS)

- "Expectation exists in the community that things are done for them and people do not have to fend for themselves" (FS).
- "The Rural Fire Brigade is not expected to put lives at risk to save bush or even a house. The public often does not realise that our service is voluntary" (FS).

The community survey results indicated that individual householders see themselves as the most responsible for personal and home safety:

Table 11 shows that 80.7% of respondents indicated individual householders as the most responsible. Table 11 illustrated that 47.3% of respondents chose groups of neighbours who live close to each as being secondly responsible and it was overall perceived that such groups have greater responsibility for protection of homes from bushfires than QFRS, local council or QPWS (Table 11 indicated that respondents perceived these organisations as third, fourth and fifth responsible overall).

There is obviously a feeling amidst the local community that there is something that the individual householder can do to protect life and home because Table 8 indicated that 82.6% of overall respondents disagreed that "there is very little you can do to protect yourself and your home against bushfire", indicating that individual householders are willing to take some responsibility for the protection of life and property against bushfire.

Table 8 illustrated that most respondents (71.1%) indicated that planning is more imperative than instinct or common sense for safety from bushfire, especially for household action plans and evacuation plans for in case of a major bushfire event.

Homeowners were more likely to hold the view that "the householder is more responsible than fire services for protection of life and property in the event of a bushfire". Those less likely to call the brigade during a fire event were also more likely to believe that the householder and groups of neighbours are more responsible for

protection of life and property. Respondents who were surrounded by or adjacent to bushland are less likely to believe that the householder and neighbours are responsible; it appears that they may be more likely to believe that the Council and QPWS are more responsible. Those more likely to believe that neighbours are more responsible include those over the age of 55 and residents working on Tamborine Mountain. This suggests that those over the age of 55 and residents working on the mountain were more likely or willing to take collective responsibility for action against the risk of fire.

As discussed already, those respondents with time and resource considerations and "personal and family matters" as priorities in their lives before "home and environmental matters" were more likely to perceive the Council/other agency as more responsible for protection of life and property from bushfire, but this does not necessarily mean that they also perceive "there is no point in protecting my property if the Council/other agency don't clear foliage or back burn". Data analyses found that time and resources available were factors which influenced whether respondents had taken preparations against the risk of bushfire. Data analyses also suggested that activities requiring a significant investment (cost/effort) were perhaps less likely to be undertaken by renters, those with children and those not retired (females were less likely to build a fire break). Analysis results weakly suggested that those believing that home protection is too expensive were less likely to have checked equipment. Data analyses found that households without children, those who are retired (and over 55 years) and those who have experienced bushfire before were more likely to have participated in bushfire preparation activities (e.g. checked sources of water and hoses, installed smoke alarms, decided on situations to stay or go, and established fire breaks or buffers).

Community group interviews supported that time availability was especially an important factor to consider:

- "There are quite a number of families living on the mountain where the husband works with long commutes off the mountain and when there is time on the weekend, they spend time with their family rather than preparing against bushfire hazard" (CG).

4. The community's views regarding bushfire hazard reduction.

Controlled burns are not wanted by the public (FS):

- "The public's response to hazard reduction is that they don't want it" (FS).
- "A majority of people do not want hazard reduction because of negative effects" (FS).
- "Negative public reaction sometimes even though residents advised by leaflets" (FS).
- "People have complained about smoke from a fire that RFB were fighting" (FS).
- "There is still a perception among the community that the mountain won't burn and fire prevention is inconsistent with lifestyle" (FS).
- "Urban people often complain about the negative effects" (FS).
- "Some people have been lobbying for no-burn" (FS).
- "There have been complaints about back yard burn-offs" (FS).
- "Rural producers used to burn off. The situation now is that rural enterprises have become more constrained with legitimate burn offs" (FS).

Comments from community group interviews indicate the complexity of the issue:

- "It is okay if the Rural Fire Brigade plans a controlled burn but National Parks are not always well maintained because QPWS no longer have staff on Tamborine Mountain, which is a sore point" (CG).
- "Controlled burns are normally prepared in August by Fire Warden and RFB" (CG).
- "Western escarpment last burned by bushfire about 1993. Prevention is difficult now due to access and agreement needed by every adjoining property owner. Last controlled burn was low temperature and worked well. Cool burn in winter more controlled and reduces hazard without reducing wilderness and habitat" (CG).
- "Regular controlled burning can favour certain species so there is a need for irregular burning as there are 14 different ecological systems" (CG).
- "The process of controlling fire depends on tonnes of fuel per hectare" (CG).
- "There are different values between ecology and controlled burns. Escarpment has burning/biodiversity issues but main plateau is not at great risk" (CG).

However, community group interviews revealed more complexity than the community surveys. The following comments were made by a community group member who represented an environmental group we visited for an interview and these comments were attached with a completed survey: “While fire can be a problem here, especially on the escarpment, there a number of issues that need to be taken into account when burning off or the removal of vegetation to improve fire safety is considered” (CG):

- “Aspect and vegetation: there is a big difference between a west and north facing slope with eucalypt forest and an east and south facing slope with wet eucalypt forest and a rainforest understorey, or pure rainforest. There is a number of different vegetation communities on the escarpment and each one needs to be considered separately” (CG).
- “Slope stability: the removal of trees on steep slopes is a recipe for future disaster: the same trees that are considered to be dangerous also keep the slope together” (CG).
- “Erosion: as above but in addition, a fire which gets too hot or gets out of hand can be the cause of future erosion, especially if the soil ends up totally bare and cracked and old roots (from trees logged years ago) are burnt out” (CG).
- “There is a possible increase in flammable material as a result of burning off. This occurs especially where there is an under-storey of young eucalypts and rainforest trees: the fire kills them, and they all stay there, providing additional fuel for the next time” (CG).
- “Ecology: an under-storey is very necessary for tree health, especially in wet sclerophyll bushland: it provides habitat for the many small birds which control lerp and other pests that attack and damage trees (more fuel to add to the fire if the trees die)” (CG).
- “In areas that are already short of suitable habitat trees for wildlife because of previous clearing, burning further reduces available hollows etc.” (CG).
- “Wildlife in general: fire could have an effect on locally resident lyrebirds, wallabies, lace monitors, echidnas, koalas, planigales etc. Would they be able to get away in time? What about their food supply? What happens when they lose their territory? (They can’t just move in on territory already occupied)” (CG).

The survey results included mostly supportive views on controlled burning and acceptance of trade-offs such as smoke and most (84.9%) saw it as “an essential part of

bushfire prevention" (Table 21). Statements made by respondents indicate this high support for controlled burns.

The following comments were provided as open-ended survey responses:

- "Controlled burning is a must. Love the bush but common sense must prevail. Life and property come first" (CS).
- "House is close to eucalypt forest and beyond that is western escarpment where fuel reduction is uncertain" (CS).
- "Greenies are blind dumb bastards that would rather put people at greater risk of fire rather than burn off" (CS).
- "Live next to national park - needs clearing of hazards" (CS).
- "Nature strip behind homes so backburning should be a priority" (CS).
- "Burn offs should be regular at escarpment to reduce fuel build up. None ever taken place to my knowledge" (CS).
- "Preventative measure should be taken to achieve effective fire management" (CS).
- "Regular controlled burning is required to limit fuel sources and promote regeneration" (CS).
- "Suitable steps to reduce fire risks should be taken yet retain natural forest/bush as much as possible" (CS).
- "Understand clearing and burn offs are necessary but want as much bush left untouched as possible" (CS).

Contrary to views held by fire services that controlled burns are not wanted by the public, there were strong views held by the community that controlled burning is a necessary part of bushfire prevention (especially if carefully done). The community's views regarding controlled burning compared with findings of the *Tamborine Mountain Escarpment Management Plan* indicated that community group representative's comments regarding controlled burning were mostly very well-informed of what had recently happened in the area. There were examples of comments from community members such as "there a number of issues which need to be taken into account" (when considering the effects of controlled burning upon the environment and wildlife). The community expressed mostly supportive comments via surveys such as controlled burning is "a must", "necessary", "needed", "required", "a priority" and "uncertain".

Therefore, it can be interpreted that a well-informed understanding of the risk of bushfire and possible treatment methods was associated with higher acceptance of "limiting fuel sources" including controlled burning. It appears the fire services' view of the community's acceptance of controlled burning was influenced by a small number of people who were vocal about their opposition to it.

5. Fire services' provision of advice to the public.

Provision of advice is possible but can not tell residents they need to take action (FS):

- "Property assessments are done by Rural Fire Brigade Fire Wardens who can advise people on what they could do but not tell them they ***need*** to take action e.g. plant certain trees, have a good water supply, clear areas around house, metal taps, portable pump, keep gutters clean, have fly screens, clean underneath house, keep water tanks full" (FS).
- "RFB could expose themselves to liability if they advise people that they ***need*** to do this or that" (FS).
- "Never tell a householder that a tree will not fall as you never know" (FS).

However, there were several examples of frustrated comments in community surveys about potentially hazardous issues. For example, where a tree was hanging over a fence and an organisation was approached about it but specific advice was not provided or action to help was not taken. Overall, the community's frustration that specific advice or action is not provided appears to stem from not understanding the role and limitations of the RFB (see next point for further discussion about brigade roles).

Respondents reported feeling frustrated that specific advice is not provided or action to help is not taken (CS):

- "Worried about neighbours overhanging trees but they do not want them trimmed. Who is liable when our house burns down?" (CS).
- "Advice is not knowledgeable enough" (CS).
- "Natural habitat too much developed, concerns not heard; fire has never been up ridge, aware of possibility" (CS).
- "Bushland adjacent to house needs to be managed" (CS).

Community group members reported concerns about fire risk and needed advice:

- "Access for RFB at proposed development is difficult and Fire Warden was concerned. A report was requested from the Fire Warden but not forthcoming (CG).
- "I am concerned of the bushfire risk and did not know whom to contact" (CG).

Bushfire-Related Matters That Need Further Resolution

Some of the important messages from the case study are that fire services and community resources appear to be constrained because of time and economic considerations and exposure to bushfire hazards appears to be increasing due to social, climatic and environmental factors as well as concerns about development not being sustainable. Presentation of bushfire-related matters that need further resolution is necessary because it represents the different perspectives of fire services and the community.

Bushfire-related matters identified through interviews with the fire services

1. Fire services perceive there is confusion within the community about the roles of urban and rural fire brigades:

- "People do not understand about 2 brigades on the mountain, often think all RFB. Often people do not know the difference between the red and yellow trucks - they just expect a fire truck to come immediately. Different response as Auxiliary red trucks are not supposed to go off road and RFB go off road. Auxiliary may need RFB back up to go off road and RFB hoses can extend further" (FS).
- "RFB levy is $25 a property and there are approximately 284 properties. Rates levy raises approximately $4500 per annum. RFB ask for a donation for burn-offs. RFB have to do fundraising to keep brigade running" (FS).
- "We raise two thirds of funds (about $22,000) to run RFB. People on Tamborine Mountain donate readily although it depends on the fire season if RFB is in the public's mind" (FS).

- "2500 households on Tamborine Mountain do not contribute to RFB. Areas are currently being renegotiated. Auxiliary fire brigade has a percentage of the dollars that goes to state government from levies that are refunded to them" (FS).
- "RFB and Auxiliary brigade at Tamborine Mountain know each others limitations and capabilities and can handle situations together" (FS).
- "There is a good relationship between the urban and rural fire brigades and QPWS and the State Emergency Services (SES) have come on board recently" (FS).

Community groups were well-informed of the roles of the fire brigades:

- "Urban paid volunteers and RFB unpaid volunteers. They assist each other. RFB can go off road. RFB also responsible for national parks but receive no funding for this. People are dependent on RFB as the only brigade with off road vehicles. The RFB's lack of funding and manpower are serious issues" (CG).

There was no clear indication in the community surveys about respondents' perceptions of the role of the fire brigades. Table 28 (see Appendix E) illustrated a disproportionate number of respondents (48%) would seek advice solely from the local RFB.

It was recommended in the *Tamborine Mountain Escarpment Management Plan* that:

- "Beaudesert Shire Council liaise with the Fire Warden and the Queensland Fire and Rescue Service to compile a brochure detailing the fire fighting resource inventory based on Tamborine Mountain that could also indicate the local chain of command structure" (Watson 2001: 18).

<u>2. Fire services want to improve their capacity to convert data and information relevant to bushfire mitigation and management into knowledge to guide decisions:</u>

- "QFRS have I-Zone maps but they are of little use if not discussed with those on the ground. Maps are not applicable to the public. Ground truthing on the validity of the data should be done first as maps are inaccurate" (FS).
- "When fire in a particular area the RFB maps indicate resources required to fight fire in that location. There is a need to continually check properties as they change hands etc. Local knowledge is important in some areas but continual

familiarization a time issue. Train at night so need to check areas in daytime especially as a result of recent turnover of staff. It also keeps community informed if RFB are out there doing checks" (FS).

- "Request for water points for RFB includes dams, tanks, pools marked on gate of property and list in trucks of water location and what it is" (FS).
- "Knowledge valuable and gives greater degree of confidence especially at night and on bush tracks" (FS).
- "We try and give RFB members a basic A4 size map of area going into as can be dangerous at night. Even with GPS, constant relearning necessary" (FS).
- "Map is of assistance but have to visually see area in daylight. Need a core of people who know the trails and need to do some training at night" (FS).
- "Planning to focus RFB on certain locations and terrain on Tamborine Mountain so that they have that particular knowledge" (FS).
- "Fire danger meters on roads which approach mountain" (FS).

The *Tamborine Mountain Escarpment Management Plan* reported:

- "It is recommended that the Beaudesert Shire Council, through the Rural Fire Brigade (RFB), install fire risk warning meters on each of the main roads that access Tamborine Mountain. Another reason for the introduction of fire management measures such as rural property addressing, fire risk warning meters, accurate maps of the location of auxiliary water storages, naming of fire trails and management areas is that there is a fairly high turnover of volunteers in the RFB generally. This high turnover of staff means that some members may be unfamiliar with the location of various landmarks as well as the likely distribution and type of fire threats that occur on the escarpment such that the more tools and aids that are available to these volunteers, the better" (Watson 2001: 21).

<u>3. Fire services were interested in how they can inform the public of the need for preparation against the risk of bushfire without sensationalizing the topic:</u>

- "Fire bans publicized better than previously. Public are more aware when ban put in place than when lifted. Fire danger on meters depends on altitude and where drought index assessed" (FS).

- "Difficulty of informing public of extreme fire danger is that this can incite arsonists. When there has been fire footage in the media, the arsonists increase and CSIRO are now asking media not to publicise fires" (FS).
- "How can we send the right message to the public when the media want to sensationalise?" (FS).

In the *Tamborine Mountain Escarpment Management Plan* (Watson 2001: 22-23), the Beaudesert Shire Council recommended:

- "Ensure that the Tamborine Mountain Library is supplied with at least two copies of the informative CSIRO video entitled 'Buildings and Bushfire' and that it is publicised and encouraged for viewing" (Watson 2001: 22).
- "Ensure that the Visitor Information Centre is supplied with a quantity of the booklet entitled 'Individual Property Fire Management Planning Kit' from the South-East Queensland Fire and Biodiversity Consortium" (Watson 2001: 22).
- "Distribute a leaflet warning residents of the danger of bushfires and of resources available to assist them to properly prepare for a bushfire and outlining the nature of the fire protection measures in place on the Mountain" (Watson 2001: 23.

Fire services were of the view that "volunteer groups in the community are useful for transfer of information". The distribution of bushfire safety information and advice may be convenient for fire services if done through volunteer groups in the community because these channels of communication are readily available and open. From the community survey it was apparent that passive methods of receiving bushfire information and advice were preferred over the methods which require personal communication with fire services or other community members such community education programs (Table 18). However, this matter requires further exploration, because it is not clear whether community members actually use the information provided in their preferred form.

<u>4. Fire services see that it is necessary to find ways of improving the community's participation in bushfire mitigation and management:</u>

- "Beaudesert Shire Council constantly puts out press releases in bushfire season to clear gutters and rubbish, keep tanks full etc." (FS).

- "Information is at libraries. Disaster Management Committee at Beaudesert Shire Council now includes Officer-in-Charge of SES" (FS).
- "Weekly update in local newspaper before fire season with a list of things to do" (FS).
- "Videos about preparations against the risk of bushfire are at the library" (FS).
- "South-East Queensland Regional Plan was discussed and 9 groups included in the meetings about urban footprint plan and the high number of submissions" (FS).
- "RFB has not been approached by many enterprises although I-Zone issues will bring this forward. Property owners can contact RFB or bring in an independent specialist but they have to know how fire operates to assess the situation" (FS).

Educational efforts by fire services appear to not have played an important role in survey respondents' participation in bushfire mitigation and management. Table 7 indicated that educational efforts had prompted only 2% of respondents to take preparative actions against the risk of bushfire during the few months before the survey. Table 6 illustrated that 8% of respondents had contacted the Fire Service for Safe Home visit. Therefore, educational efforts involving communication between fire services and the community appear to have had little impact.

Seventy percent of respondents had a preference for methods of bushfire safety information/advice that are passive (e.g. via safety literature, television and newspapers) and do not involve personal efforts such as community meetings (and Table 18).

Bushfire-related matters that arose from the community group interviews and community survey

1. Community groups seek operation of optimum return intervals for controlled burns:

- "Western escarpment has not been burnt recently. There was a prolonged drought leading up to spring" (CG).
- Regular controlled burning can favour certain species so there is a need for irregular burning as there are 14 different ecological systems" (CG).
- "Some individuals favour burning every 10-14 years, others more frequent" (CG).
- "The process of controlling fire depends on tonnes of fuel per hectare" (CG).

- "There are different values between ecology and controlled burns for fuel reduction. Escarpment has burn/biodiversity issues but main plateau is not at great risk" (CG).
- "In some areas it is necessary, but it should be kept in mind that on each occasion the rainforest (where it adjoins eucalypt forest) is pushed back and suppressed a bit further; this increases rather than reduces the fire hazard in the long run" (CG).

The *Tamborine Mountain Escarpment Management Plan* (Watson 2001: 24) reported that:

- "The Plan will further act as a guide to the use of fire to maintain the range of forest ecosystems occurring across the escarpment" (Watson 2001: 24).
- "The Fire Warden will determine the timing and location of these deliberately lit fires. They will occur only when there has been a substantial build up of forest litter, when the general threat of fire is low and the location has not been burnt within the previous six years" (Watson 2001: 24) .
- "For the purposeful protection of built infrastructure, hazard reduction burning may be conducted in restricted areas as often as every four years" (Watson 2001: 24).
- "The diversity of the escarpment forest ecosystems and fauna will be protected by careful burn plans" (Watson 2001: 24).
- "The general strategy for hazard reduction burning is that fires will be of low intensity, of varying extent, with varied ignition points and will be lit at varying times of the year. In this way, the hazard reduction burning regime will try to simulate the random distribution of fires which are started naturally, and thereby maximise ecologically acceptable outcomes" (Watson 2001: 24).

As already mentioned respondent acceptance for controlled burning as a necessary bushfire prevention tool was high (92%). It was also mentioned that fire services perceived that "controlled burns are not wanted by the public". This indicates that fire services may not have been aware of the potential for extremely high levels of acceptance of controlled burning and instead seem to have had their perceptions shaped by those who have been vocal in their views in opposition to it. Most of the views expressed by community members included concerns about the environment and

wildlife but also included comments such as “this is not to say that there should be no burning off anywhere on the escarpment”. Therefore community acceptance for controlled burning may not be a matter of priority for fire services. It may be that fire services see the matter differently to community members because the Escarpment Management Plan was seen as a resolve on the matter. However, there may be a need to determine optimum return intervals of controlled burns for the mountain as a whole.

2. Research data indicated a high proportion of retired people in the community. Strategies need to be developed to effectively engage people with resources and time.

The topic was raised by a community group member who expressed:

- “A recent Sport and Recreation study on Tamborine Mountain showed that the mature age population is higher than the Queensland average”.

Fire services expressed their view that:

- “Elderly people in very large houses who are just hanging on and can’t manage property are at risk in a bad bushfire situation. Community assistance available through Homecare and St. Vincent de Paul whom will provide free labour if the resident buys materials. Bluecare, Meals on Wheels etc. on mountain see people regularly” (FS).
- “Community Care will assist elderly people and Councillor contacts Rotary and Lions where applicable” (FS).

It was evident at the interviews that most of the members of the community groups that volunteered their time for in-depth interviews were over the age of 55. These community groups were well-informed on natural history, environment, development and water issues and expressed concerns especially about controlled burning return intervals and National Parks under-staffing and changes in management. Fire services already are aware that volunteer groups are “effective for transferring information” but there is potential to further engage such community-minded people with resources and time. People who volunteer for assisting elderly people already help to decrease vulnerability with their efforts and charity, and may be of assistance in formulating evacuation plans.

3. Survey respondents indicated that they are not confident in the costs of protecting property against fire and bushfire safety aspects to do or use if the need arose.

Table 12 clearly indicated that community members were not confident about the cost of protecting property against bushfire; if trapped in their car in a bushfire; where to buy the equipment they need; what to do if trapped in their home in a bushfire; first aid; the situations in which to stay or leave their home; and the equipment needed to deal with fire. Action plans also appeared to be inadequate (Table 9). Accessible and understandable information and clear instructions on how to stay or go would be helpful to individual householders' plans against the threat of fire.

4. A wide range of media was identified as being the preferred way of receiving information; direct contact with fire services was not preferred.

Table 17 indicated that most respondents identified with a broad range of home safety advertising or media coverage for the way they thought about the safety of their family and property. "Television advertisements for electricity and personal safety" (23%) was the number one response. Other responses related to television comprised of 42.5% of the overall responses. The local newspaper was a notable response (8.5%) and the remainder of responses (26%) were mostly related to community programs.

Table 18 indicated that most respondents (69%) prefer methods of receiving bushfire information and advice that do not require engagement with the fire services. The most preferred method was "the distribution of safety literature through local letterboxes with information on where to get further assistance" followed by "more general advertising and media coverage (television, newspapers)", and "information in local media (newspapers, noticeboards, schools etc.)". In regards to community engagement programs, small group meetings were preferred twice as much as those which bring together large groups.

Key Research Findings

How the fire services' and the community's perceptions/expectations agreed

1. There are varied perceptions of bushfire risk.
2. Experience with fire appears to be related to awareness of associated risks.
3. Risk awareness does not appear to be related to recent Australian bushfire events.
4. The overall view was that fire breaks are a necessary fire management initiative.
5. The local bushfire season was perceived to be from early spring to summer.
6. There is a need for Bushfire Management Plans to be effectively implemented.

How the fire services' and the community's perceptions/expectations differed

Fire services' perspective	**Community's perspective**
1. Most people in the community would rely on fire services to respond in the event of a fire.	1. At least half of survey respondents reported they would not rely on help from fire services in the event of a fire.
2. Most people are unaware of the bushfire risk.	2. Most people reported being aware of the bushfire risk but have other priorities in their life that take precedence.
3. The public expects things to be done for them.	3. The survey results indicated that individual householders see themselves as the most responsible for personal and home safety.
4. Controlled burns are not wanted by the public.	4. Respondents supported controlled burns as long as they are carefully done.
5. Provision of advice is possible but can not tell residents they <u>need</u> to take action.	5. Respondents reported feeling frustrated that specific advice is not provided or action to help is not taken.

* Each of the perspectives consists of five representations of perceptions/expectations regarding specific bushfire-related matters expressed by the case study participants.

Bushfire-related matters that need further resolution

Also important are bushfire-related matters that need further resolution. These matters are separate from how the perceptions/expectations agreed and differed because they were solely from either the fire services' or the community's perspective.

Bushfire-related matters identified through interviews with the fire services
1. Fire services perceive there is confusion within the community about the roles of urban and rural fire brigades.
2. Fire services want to improve their capacity to convert data and information relevant to bushfire mitigation and management into knowledge to guide decisions.
3. Fire services were interested in how they can inform the public of the need for preparation against the risk of bushfire without sensationalising the topic.
4. Fire services see that it is necessary to find ways of improving the community's participation in bushfire mitigation and management.

Bushfire-related matters that arose from the community survey and community group interviews
1. Community groups seek operation of optimum controlled burn return intervals.
2. Research data indicated a high proportion of retired people in the community. Strategies need to be developed to effectively engage such resources of time and knowledge.
3. Survey respondents indicated that they are not confident in the costs of protecting property against fire and bushfire safety aspects to do or use if the need arose.
4. A wide range of media was identified as being the preferred way of receiving information; direct contact with fire services was not preferred.

Conclusion

This chapter discussed key research findings of the case study. I detailed how the fire services' and the community's perspectives contributed to key research findings regarding bushfire hazard awareness matters in a rural-urban interface area. The next chapter will further discuss the key research findings, especially the relevance to government policy and other findings/recommendations and literature/theory.

Chapter 7
Discussion of Key Research Findings

Introduction

In the previous chapter, key research findings were presented as agreements and differences in perceptions of fire services and the community. There were also some bushfire-related matters which arose that were separate from how the perceptions/ expectations agreed and differed. Some of these matters are now discussed in more detail.

Perceptions/expectations of the Fire Services and community that were in agreement

There are varied perceptions of the fire risk at Tamborine Mountain

The fire services and community groups identified the issue of people moving to the area for the environment:

- "People think of the rainforest more than fires" (FS).
- "People often feel immune because area looks green" (CG).

The fire services outlined that fire is not the greatest local hazard in their perspective:

- "Motor vehicle accidents are the greatest hazard. Since February last year, there have been more motor vehicle accidents than fires" (FS).
- "The community probably don't think much about it until they need it" (FS).

Data analyses of the community survey outlined that an individual with a high perception of risk was more likely to undertake preparations. However, there are other factors to consider such as experience, confidence in bushfire safety aspects and responsibility for protection of life/property. Generally, survey respondents did not perceive bushfire risk as a priority in their lives: personal, family, home and environmental matters (in that order) were perceived to be more important overall.

Although many survey respondents had thought about local fire risks (78.4%, Table 5), only a small proportion thought about it everyday (21.6%, Table 5). As mentioned in the preceding paragraph, priorities such as personal and family concerns, as well as

home and environmental-related matters were considered more important than worrying about bushfire risk. Some specific environmental-related concerns include increased housing development, water availability and climate change. Bushfire was considered by survey respondents as the most important natural hazard at Tamborine Mountain. Therefore, location is an important factor for risk perception.

As identified by fire services and community groups, most respondents had moved to the area to be closer to nature (84.7%, Table 5) and acknowledged that fire hazards exist (55.7% agreed that the impact of fire is greater than other risks, Table 5). Retired males with a fully-insured home were more likely to be less concerned about the risk of fire.

There are many factors which influence an individual's and community's perceptions of risk. Inclusiveness and cohesiveness in communities is generally considered to encourage sharing of knowledge and experience which leads to realistic perceptions of risk.

Ellis et al (2004, 41) quoted Machlis (2002): "Individual attitudes and perceptions can have a strong influence on how people respond to bushfire risks" and it was also outlined that variations in attitudes and perceptions can be particularly strong in areas experiencing considerable demographic change such as the rural–urban interface. Ellis et al (2004, 41) outlined that "individuals' attitudes to fires can be shaped by many factors e.g. education, age, income, personal experience/knowledge of bushfires, peer group influences, emotions, beliefs and residential location".

Literature outlined that perception of risk is related to the level of exposure to risk. The best established results of risk research show that individuals have a strong but unjustified sense of subjective immunity (Lupton 1999, Douglas 1985, Green and Brown 1980, Fischhoff and Lichtenstein and Slovic 1980). This means that in very familiar activities there is a tendency to minimise the probability of bad outcomes. Apparently, people underestimate risks which are supposed to be under their control. They also underestimate risks of events which are rarely expected to happen. Hence the question about perception of risk: why do so many in their lay public role, judge everyday hazards to be safe and think of themselves able to cope when the event shows that they cannot?

It can be interpreted that previous risk research which outlined that there is a tendency of the lay public to "underestimate risks" and "minimise the probability of bad outcomes" is similar to the research finding that only a small proportion thought about it everyday (21.6%, Table 5).

Literature has identified reasons for why perception of risk is often not at the forefront of people's consciousness. It can be interpreted from literature (Douglas 1985, Lupton 1999) that ignorance and detachment are coping mechanisms for dealing with risks. There are reasons as to why individuals are often detached from their own perception of risk. Douglas (1985, 87) outlined that "each cultural pattern of risk is sustained by its own appropriate economic structure. There is good reason to suppose that most societies select and train certain members to take physical risks and reward them for doing so by heaping prestige on the successful adventurers". The context of bushfire management is often volunteer-based; this is a unique economic structure because members of the public volunteer to expose themselves to risks. The volunteer against risk culture has been a factor in why lay people "tend to ignore most common everyday dangers … and the most infrequent, low-probability dangers also tend to be played down" (Douglas 1985: 125). The lay public's perceptions of bushfire risk is normally filtered through a lens which "plays down risks" ordinarily outlined by fire services because other risks compete for priority in their lives.

<u>Experience with fire appears to be related to awareness of associated risks</u>

From the interviews with fire services, there was a view that people with experience of bushfires are more aware of the risk:

- "People who've been through fires are aware what to do but most only think about it when fire arrives" (FS).
- "People who live on escarpment edge are more aware of the issue" (CG).

The data analyses outlined a significant trend which suggested that respondents who have experienced fire before were more likely to have a high risk perception of it, live near bushland, and have increased feelings of responsibility for protection of life and property. However, experience was not of impact to confidence in bushfire safety except for a decision on whether to stay or go in the event of a bushfire.

There was a weak link between bushfire experience and preparedness; residents with past bushfire experience may be more likely to prepare. This does not appear to depend on the length of time since the experience or the type of experience (i.e. whether the resident or their property was threatened).

Experience is considered important for being well prepared, physically and mentally, for the impact of the passage of the fire front. Ellis et al (2004) referred to Gill (2004) that even well prepared residents and those responsible for conveying the safety advice have not experienced the windiness, noise, darkness, ember storms and heat of a major fire at first hand, let alone experienced a suburban disaster; preparedness is important.

Risk awareness does not appear to be related to recent Australian bushfire events

Comments from fire services and community groups outlined risk awareness in terms of major bushfire events that were not in the local region:

- "Awareness is in inverse proportion to proximity of major fires. Once fires not on TV they're gone! Too busy with own routine which is more important than clearing gutters" (FS).
- "Residents react to media (e.g. Sydney fires) but think of themselves as safe because there are different trees here" (CG).

Table 17 outlined home safety advertising or media coverage that has had an impact on the way respondents thought about the safety of their property and family. "News coverage of bushfire disasters on television" had only a slight impact; only 6% of respondents indicated that their risk awareness was related to broadcasting of recent Australian bushfire events.

It appears that people bushfire events in the media have had little effect on sustained awareness of the hazard. There appears to not have been effective transfer of information in regards to being effectively equipped and prepared against the risks of bushfire. Improved bushfire awareness and understanding of the issues surrounding building loss in bushfires is needed. "It is understood that a wide range of risk mitigation strategies exist and are well defined in their own right"; Leonard in Cary et al (2003, 112) reported that "we now need to develop a common language and value system so that they can form a unified approach".

Fire breaks are a necessary fire management initiative

There was support for fire trails from community groups and fire services:

- "Local fire management strategy developed 120 kilometres of fire trails" (CG).
- "Fire trails have made a difference" (CG).
- "Before fire season the RFB try and get around the fire trails and check growth areas especially hazard reduction areas" (FS).

Table 19 indicated that the majority (68%) of respondents view fire breaks as an essential part of bushfire, and a quarter felt safer knowing they are there. Therefore, there was a very high amount of responses who agreed that fire breaks are necessary.

The Gold Coast City Council (1998, iv) outlined that "fire breaks refer to any natural or man-made elements in the landscape that can impede the progress of a fire and/or provide access so as to create an impediment to a fire". Fire breaks are used for controlled burning when conditions are safe to have a low-intensity fire and backburning in the event of bushfire in order to mitigate the effects of bushfire.

A number of points were made in the Cunningham Submission (2003, 4) to the Coalition of Australian Governments (COAG) Inquiry (Ellis et al 2004) in regards to the importance of fire breaks and hazard reduction burning being near rural-urban interface housing:

- Hazard reduction burning located one kilometre of urban areas, and especially within 300 metres of, and indeed within, the urban areas themselves are the most crucial areas.
- We can keep land 'groomed' to ensure that further fuel does not accumulate.
- Fuel reduction close to houses is problematic, especially where the small size of reserves is already compromising conservation objectives.
- A fire break can be considered a 'sacrificial zone' within a reserve because it reduces the size of the reserve and alienates part of it from its primary conservation purpose. Future subdivisions must surely contain adequate fuel load reduction zones within the subdivision, not in the adjacent bushland.

Consensus on bushfire season

There was consensus on that the bushfire season at Tamborine Mountain is from spring to early summer:

- "The fire season for Tamborine Mountain is usually throughout spring" (FS).
- "Late August to end of November, depending on rainfall" (CG).
- Seventy percent of respondents to the survey indicated that they thought the fire season at Tamborine Mountain is the seven months from late August until April.

The Bureau of Meteorology (2004) confirmed that local bushfires are most likely to occur between September to December – 88.7% of all events occurred during those months.

Due to the diversity of Australia's climate and landscape, there are different bushfire seasons throughout the country. The densely populated rural-urban interface areas close to fire-prone bushland of south-eastern Australia (including Tasmania) have been pinpointed as being the most intense bushfire-prone areas of Australia in the summer months (December-February) because severe weather can bring hot, dry air from the centre of the continent and very strong, dry winds from the Southern Ocean (Cheney 1995).

Need for Bushfire Management Plans to be effectively implemented

Both the community meetings, and the fires service interviews indicated concerns with planning, but at two different levels. For the community groups, bushfire management plans were the issue and for the fire services, land use planning was the issue.

Ellis et al (2004, 334) outlined that the COAG Inquiry Committee recommends that "state and territory governments be required to regularly perform risk assessments to the land within their jurisdictions to ensure that bushfire prone areas are accurately identified and can be appropriately managed". It was outlined that certain types of development should be limited or prohibited in bushfire prone areas. The clarity of *AS3959–1999: Construction of Buildings in Bushfire Prone Areas* was seen as necessary to ensure that all relevant stakeholders can interpret and apply the Standard in the way it is intended.

Furthermore, Ellis et al (2004, 92) outlined that there is connectivity between the planning profession, planning policy, local government, town planning, the construction industry, land management, hazard abatement, fire response, and community education. Ellis et al (2004) supported jurisdictions for planning requirements that have varying degrees of integration between state and local governments and industry.

The COAG Inquiry (Ellis et al 2004) was concerned by delays in the review of the building code, in particular the *Construction of Buildings in Bushfire Prone Areas Standard AS3959* by Standards Australia. Ellis et al (2004) also outlined that the Building Code of Australia Board will be asked to resolve this risk modification matter as soon as possible as well any other outstanding issues relating to the building code and natural hazards, including bushfires.

The *National Inquiry on Bushfire Mitigation and Management - NSW fires 2001-2002* (Joint Select Committee on Bushfire 2002) outlined that it is clear from the many submissions and evidence gathered that there is a need to better manage bushfire, at all levels, individual, local, state and federal. The Joint Select Committee on Bushfire (2002) findings outlined the need for Bushfire Management Plans:

- Bushfire management plans are essential. The federal government could assist in providing research and information to develop bushfire plans across the country.
- Bushfire risk management plans should be based on the assessment of all risk factors such as ignition potential, asset vulnerability (including homes, property and environmental assets), hazard or fuel management, land use planning provisions and the provision of suitable equipment and resources to manage residual risk.
- Bushfire risk management plans should have regard to ecologically sustainable development in the consideration of their potential impact as well as the need to protect human life, community assets and environmental assets such as national parks estate, wilderness areas, remnant urban bush land, threatened species and communities which are not fire tolerant need to be protected.

The Tamborine Mountain community's concern for bushfire management plans and the fire services concern about land use planning were mirrored by the recent Inquiry findings.

Differences in Perceptions/Expectations of fire Services and the Community

Reliance on fire services

The fire services outlined in an interview that "many people do not realize that they are responsible for their property and 000 will not necessarily bring a brigade to their property". In contrast, 80.7% of the surveyed community perceived themselves as most responsible for keeping homes safe from fire (Table 11). However, it was alarming that that 46.3% of respondents would just call the fire brigade in the event of a fire (Table 10).

Ellis et al (2004) outlined that in rural–urban interface areas in New South Wales, and more recently in the Australian Capital Territory, groups of residents under the sponsorship of fire agencies have formed community fire units. These groups, based on streets or small suburbs, are trained by the fire services and provided with protective clothing and a trailer or fixed cabinet containing basic firefighting equipment. The role of such groups is essentially to defend homes against ember attack, in support of and under the control of organised fire services, and to be involved in local bushfire-related community education and mitigation activities.

The report of the *Victorian Inquiry into the 2002–2003 Victorian Bushfires* (Esplin et al 2003) recommended that the Country Fire Authority provide technical advice to Community Fireguard groups so that they can purchase equipment and protective clothing to respond to fires on their own land. Ellis et al (2004) supports the advice of the Tasmania Fire Service that the operation of these community fire units in fire suppression needs to be carefully managed to ensure that members of these groups are not encouraged to participate in bushfire situations that exceed their training, equipment and overall capabilities. New South Wales (NSW) Fire Brigades have developed strict procedures, supervisory processes, and training for its community fire units, and in the last decade have had no experience of volunteers acting beyond their capabilities or brief. Ellis et al (2004) outlined numerous bushfire community education programs that mostly required direct engagement between fire services and communities. A difficulty with this is the case study finding that outlined survey respondents preferred passive community education methods (Table 18).

Awareness of the bushfire risk

Fire services think more areas of Tamborine Mountain are in more danger than the public think because the local brigades do not have enough resources especially with limited water availability. Some awareness issues were identified:

- "Bushfire is not mentioned in community. People who live on escarpment edge are more aware of issue. The main priority of those on top of escarpment is view" (FS).
- "Most people don't realise how fast a fire can travel up a slope".

Half of the respondents (50.7%) agreed that they were not really concerned about the risks of fire, but 78.4% had thought about the risks (Table 5). Data analyses outlined that a high risk perception emerged as a significant influence on bushfire preparations, as did experience, confidence in bushfire safety aspects and responsibility for protection of life/property. Although bushfire preparations were not particularly high (58% of respondents had taken preparative actions, Diagram 1), the level of awareness was important to some respondents having a high risk perception which in turn appears to have lead to an overall medium level of preparedness in the community.

The varied levels of concern for bushfire risk confirms that the social construction of the risk is complex. It appears that the lay public's perceptions of bushfire risk is filtered through a lens which "plays down risks" ordinarily outlined by fire services (such as on fire meters) both when fire danger is considered to be low or moderate (which causes less concern) and when the probable risk is high to extreme (and is considered a temporary everyday danger) because other risks compete for priority in their lives. Lupton (1999) suggested that most of the lay public judge everyday hazards to be safe and think of themselves as able to cope. However, there are other factors to consider which may increase or decrease awareness and perceptions of risk such as level of/reliance on insurance, enforcement of building codes and experience of fire.

Public expects things to be done for them

The views of fire services and individual householders differed for matters of responsibility for bushfires. The fire services' perspective was that the public expects things to be done for them whereas the individual householders viewed themselves as

most responsible overall, followed by groups of neighbours, the fire services, the local Council, and then the National Parks service (Table 11).

It was outlined in the introduction of the thesis that fire authorities want communities to share responsibility and be more self-reliant in their preparedness for bushfire. Most studies (e.g. Beringer 2000, Holden et al 2000) support the survey research findings which found that most people perceive themselves to be responsible for some level of bushfire protection. However, it is difficult to define exactly what constitutes responsibility for protection of life and property against bushfire because a community is made up of individuals who have different capabilities for preparedness, mitigation and response. Awareness and perception of the risk are important first steps followed by a belief in the purpose of preparation activities. Also, a number of factors such as age, family and household situation (e.g. renting or owner occupied), specific location, lifestyle/ neighbourhood preferences, cost/effort required time and resources available emerged from data analyses as important influences upon responsibility for protection of life/property.

Data analyses suggested that those over the age of 55 and/or those who worked within the local area at Tamborine Mountain were more likely to express responsibility for protection of property and life. Those over the age of 55 were especially more likely to view groups of neighbours as being more responsible than fire services. Those who were confident in preparations allocated more responsibility upon themselves than upon fire services. Homeowners were more likely than renters to view the householder as more responsible than fire services for protection of life and property and were less likely to call the fire brigade in the event of a bushfire. Females were more likely to look to what neighbours do in the event of a bushfire before making a decision what to do. Those more likely to believe that the local council is more responsible include respondents under the age of 55, in the workforce and with children. Respondents with homes that are amongst or adjacent to bushland were less likely to have expressed the view that the householder/ neighbours are the most responsible for protecting property from bushfire; it appears that they are more likely to believe that the National Parks service is more responsible. Overall, there was sense of shared responsibility for protection of life and property (Table 11) but a medium level of individual householder/community preparedness (Diagram 1).

Data analyses outlined that the public perceives the primary responsibility of fire services to be fire suppression and protecting people and property. Most research findings indicate that the public highly values and are confident in local brigades. There is also wide-held appreciation of communication efforts such as local newspaper columns which provide useful tips and information. There does not appear to be an expectation that brigades should be highly visible and have regular contact with the community, rather some people believe that brigades should assign a higher priority to hazard reduction activities. There is some recognition that brigade activity can be constrained by limited resources and authority.

Time and resource constraints appeared to be inhibitors for some respondents' bushfire preparedness. Most respondents were not confident in the cost of protecting their property. Females were much more likely to think costs are too expensive. Households with no children appeared to be more confident with costs. Renters, those with children and not retired were less likely to make a significant investment in preparations for bushfire. Economic costs were preferred over time costs for bushfire risk mitigation.

Acceptance of controlled burning

Controlled burning intends to reduce flammable vegetation for hazard reduction. The fire services' view was that controlled burning is not wanted by the public. However, the surveyed community supported controlled burning if it is carefully done. Controlled burning appears to be generally accepted as necessary maintenance for public lands – very high acceptance levels made it the fire authorities' counterpart to the lay public's participation in general housekeeping actions which are also preparedness activities.

Strong support for controlled burning as a long-term solution was indicated by the Cunningham Submission (2003: 4) to the COAG Inquiry (Ellis et al 2004). Koperberg (2003) outlined that pro-burners and the anti-burners contribute their perspectives especially after a major bushfire and the public are generally impartial to the issue. The community's level of support for controlled burning was not clear and appears to be linked to time and place.

The community's acceptance of controlled burning is influenced by numerous factors. It appeared to have extended from a well-informed understanding of bushfire, its

ecological importance and alternative intervention methods. Similar to fire breaks, controlled burning was considered as a necessary fire management initiative and it was widely-accepted that there are trade-offs such as smoke. The varied ecological and operational concerns make optimum return intervals a complex matter. Those who expressed views that they appreciate the scenic aspects of bushland and forested areas were more likely to have also expressed concerns about the environmental effects of controlled burning. The case study research found that the influence of a few community members who expressed strong opposition to controlled burning appeared to have shaped the fire services' view.

Provision of advice

The matter of provision of advice was raised by the fire services:

- "Rural Fire Brigade (RFB) are not approached by many enterprises" (FS).
- "Property owners can contact RFB or bring in an independent specialist but they have to know how fire operates to assess the situation. We could expose ourselves to liability if we advise people so RFB can't say you ***need*** to do this or that" (FS).

Some individuals in the community were unsure of the role of fire services in providing advice. The fire services can provide advice but they emphasised that they can not tell residents that they need to take action. "Advice to the public must also be credible in relation to the actual risk factors" (QFRS 2004: 5). The surveyed communities would like to be better informed about the establishment of local warnings systems, 'Safe Home' visits from the fire service, situations to stay or go in a fire event, installation of a sprinkler system, clearing of vegetation and establishment of fire breaks/buffers.

The surveyed communities preferred passive information/advice from fire services with different methods that do not take up much of their time nor require much effort. Safety literature linked to information/advice resources was the most preferred method. A letter to the householder was preferred for information/advice on technical preparations. Information in the media was a moderately preferred method. The surveyed communities least preferred information/advice methods which require engagement with fire services. Whether or not these would be effective is another matter.

Bushfire-Related Matters Arising from Interviews with Fire Service Personnel

Confusion of roles of urban and rural brigades

Fire services outlined that "people do not understand about 2 brigades on the mountain; they often think it is all Rural Fire Brigade. Often people do not know the difference between the red and yellow trucks - they just expect a fire truck to come immediately".

Fire services perceive there is confusion within the community about the roles of urban and rural fire brigades. This concern is reflected in discussions presented by Organ (2003) in Ellis et al (2004, 140), regarding the roles of the National Parks and Wildlife Service which manages fire for conservation purposes, whilst the Rural Fire Service (RFS) manages fire to protect life and property. Organ (2003) in Ellis et al (2004, 140) concluded that the RFS is the "most appropriate agency to manage bushfire emergencies".

Similarly, the Wilberforce Rural Fire Brigade, Submission 204 (2003:1) in Ellis et al (2004) outlined that "it is of course wrong to blandly state that the National Parks and Wildlife Service does not manage fire to protect life and property, as well as for conservation purposes. Just as it is obviously important that the RFS manage bushfire emergencies in close cooperation with the National Parks and Wildlife Service".

The need for better education about the roles of fire services includes appreciation of the limitations involved with firefighting as well as hazard reduction. "Many people have of course already built in bushfire prone areas and so we must implement strategies to protect these properties from destruction from fire … Fire fighting services need support, supplementation and additional resources" (Cunningham Submission 2003: 5 in Ellis et al 2004).There are a number of issues such as declining volunteer numbers and lack of funding in the Rural Fire Brigade which makes it difficult to effectively mitigate bushfire risks. Local governments often also require additional resources and finances to enable the proper implementation of its responsibilities with regard to the assessment and implementation of hazard reduction strategies (Cunningham Submission 2003: 5 in Ellis et al 2004). Therefore, resource and funding issues have been outlined as impediments to the effective mitigation of bushfire risk at the local level.

Conversion of data and information to guide decisions on bushfire mitigation/ management

In the quest for better information and knowledge and utilisation of available technology, QFRS has utilised Geographic Information System (GIS) mapping applications for the I-Zone program to determine the location of at-risk-from-bushfire communities and hazards within a bounded locality. In Chapter 4, it was suggested by Tamborine Mountain fire services in an interview that the I-Zone maps "are of little use if not discussed with fire brigade personnel. Ground truthing on the validity of the data should be done first as maps are inaccurate" (FS). This may be a case of local brigades and head office needing maps for different purposes.

It was acknowledged by the fire services in interviews that there are limitations for staff becoming familiar with maps: "Local knowledge is important in some areas but continual familiarisation is a time issue" (FS).

Ellis et al (2004, 91) agreed that local knowledge is important, as well as traditional knowledge and individual and organisational experiences. Local knowledge data and information supports both strategic and operational decisions, as well as the overall risk management process and each of its elements. Finding 8.3 of the COAG Inquiry (Ellis et al 2004: 149) outlined that "failure to acknowledge and use local knowledge erodes the credibility of fire agencies … ultimately reducing the effectiveness of the national bushfire-response effort". 'Local knowledge' means both knowledge of the local environment and knowledge of previous fire events, often not recorded on spatial information sources (Ellis et al 2004). How this local knowledge is acquired can vary. It can be provided by a member of local government, a long-term resident, or anyone with detailed knowledge of the area.

The users of local knowledge data and information include firefighters, land managers, members of the community, policy makers and researchers. Ellis et al (2004, 91) outlined that "data and information needs vary, reflecting differences in roles and responsibilities, interests and purposes, and time frames and scope. These needs can be classified generally as spatial, meteorological, relating to fire behaviour and impacts, and relating to fire occurrences and agency performance". The capacity of users - skills, technologies and tools - to convert the information into knowledge to guide decisions

was recognised by Ellis et al (2004, 91) as a critical factor for good decision making at the strategic and operational levels. A whole of government approach is considered as important for information to be useful on the ground.

For many important datasets, such as those covering fuel condition, human settlement, property locations and weather conditions, it is critical that up-to-date data and information be available to support bushfire-related decision making (Ellis et al 2004: 94). For example, in the *Inquiry into the Operational Response to the January 2003 Bushfires in the ACT,* it was outlined that "lack of up-to-date maps was identified as a limitation to effective response by firefighters in the 2003 fires, hampering local and interstate units' capacity to work efficiently in unfamiliar territory" (McLeod 2003: 96). Therefore, it is evident that GIS technologies have emerged as a critical tool for providing up-to-date information relevant to bushfire mitigation and management in order to guide fire services' knowledge and decisions. However, there appears to be some associated limitations.

Ellis et al (2004, 71) outlined that the limitations of data and information technology must be recognised: "Rapid advances in data and information technology capabilities challenge their capacity, as they do the capacity of other organisations. This means that enhancing the capacity of the users of data and information is both a necessary and an ongoing activity, to ensure that the best possible use is made of available data and information". Therefore, there appears to be recognition that it will take substantial efforts between communities as well as public and private stakeholders to ensure that GIS maps are able to be effectively used by fire brigades in their bushfire mitigation and management.

Research focused on the protection of people and property has provided for new information to guide bushfire mitigation and management. Leonard in Cary et al (2003, 103-104) outlined that a major finding believed to be contrary to wide-held perception in the community was that the majority of houses destroyed in bushfires actually survived the passage of the fire front, only to be burnt down in the next few hours due to the fire spreading from ignitions caused by wind-borne burning debris. Whilst the behavior of bushfire and its impact on buildings is relatively well-established, the issues of human decision making and behaviour are not yet well known.

It appears from the case study research findings that technological, analytical and communication advances have complicated the usability of some GIS applications on the ground. Recognition of such helps stakeholders to redress gaps and abnormalities.

Fire services were interested in how they can inform the public of the need for preparation against the risk of bushfire without sensationalising the topic

Fire services outlined in an interview that the difficulty of informing public of extreme fire danger is that this can incite arsonists. It was outlined by a fire service member that there have been cases where arsonists have been incited into action when there has been images of fire in the media.

Recommendation 51 of *A Nation Charred: Inquiry into the Recent Australian Bushfires* (HRSCRAB 2003) outlined that the Committee recommended that (under Programs C and E) the Bushfire Cooperative Research Centre considers the following items as part of a national education program:

- Introducing bushfire skills training to schools and libraries.
- Training various categories of emergency services personnel on their specific role in the event of a bushfire.
- Ensuring that those in the fields of building, engineering, urban planning, forestry and science have a clear understanding of bushfire risk management including current related regulatory codes and legislation.
- Counselling prospective land developers in bushfire prone areas on the risks and necessary protective planning.
- Running adult education courses on protective planning for bushfire (including insurance, building design, maintenance and defence techniques).
- Broadcasting protective planning issues through the media, television, Internet, radio and publications.
- Structuring the community into groups and providing them with guidelines for launching an initial attack on a bushfire.
- Enclosing brochures about bushfire protection with rates notices.
- Having a Bushfire Awareness and Preparedness Day (similar to Clean Up Australia Day) where the community is encouraged to undertake risk reduction with local governments coordinating the disposal of hazardous material.

There has been success in community education and engagement programs more so in southern states of Australia according to Leonard in Cary et al (2003, 108). The Victorian Country Fire Authority (CFA) and others have addressed education in a number of successful ways:

- Community Fireguard Program;
- Educational videos and texts;
- A broad range of information leaflets;
- Television advertisement campaigns;
- Brigades in Schools Program
- Bushfire Blitz meeting Program

In reference to these community educations methods, Leonard in Cary et al (2003, 112) indicated that community education needs constant updating with new and accurate information to remain effective. Web-based community education program links are likely to offer increased accessibility. Other initiatives include branching out to police, emergency services, specialised builders and landscapers to work towards fire-safe outcomes.

Bushfire community education methods spread throughout various times and formats may effectively influence individual householder and community preparedness for bushfire and not overwhelm the community with information/advice during the bushfire season. As mentioned by the fire services at Tamborine Mountain, over-emphasising reports about bushfires through the media lead to unwanted outcomes (i.e. arson activity).

How to better inform the public

The impact of community education for bushfire preparedness appeared to be low overall in the surveyed communities. The impact of direct engagement between fire services and the community appeared to be very low overall (2% of respondents indicated that community education programs had prompted them to take preparative action – Table 7).

There is a broad consensus that the impact of community education has not been an effective influence for bushfire preparedness. The COAG Inquiry (Ellis et al 2004)

stated that community participation in bushfire community education programs has been marginal throughout Australia and improvements are needed. It was acknowledged that the overall structure for community education is difficult to formalise, especially in marginal areas. Fire services' traditional mitigation efforts have "concentrated on modifying the environmental variables, by measures such as fuel reduction burning or roadside slashing, to reduce the chance of a fire starting and the intensity with which it could burn" (Boura 1994: 1). The Community Fireguard program broadened the approach by targeting residents' behaviour and knowledge base (Country Fire Authority 1993). Especially in the southern states of Australia, Community Fireguard helps residents to plan for the threat of a bushfire and to manage their own fire risk in order to reduce the loss of lives and homes.

It was acknowledged that there were gains made in the 1980's and 1990's by fire services to develop community engagement and education such as the Country Fire Authority with the Community Fireguard program in Victoria and to a lesser extent with State fire services in South Australia, New South Wales and Tasmania (Boura 1994). Traditionally, bushfire community education attempted to correct what fire services perceive to be misperceptions of the lay public as in order to promote understanding of bushfire risk and the need for adequate mitigation and preparedness. As introduced in Chapter 2, fire authorities throughout Australia are cooperating to reassess their community education methods and develop more effective ways to empower some communities to take more responsibility for themselves.

In order to understand how bushfire community education programs can be improved, it is necessary to first outline what community education aims to do, what it is defined to be, and what the barriers/requirements for effective community education are. The aim of education is shaping behaviour (Hungerford and Volk 1990: 8). Community education has been defined as community development by Dixon et al (1981, 27). Huckle (1983, 106) does not provide a definition of community education but notes that there is a growing convergence of development, environmental and community education in publications addressing education for the environment. Minzey and Le Tarte (1979, 41) described this interaction process (community education) as involving "the joint collaboration of community members and professionals – both educators and

representatives of other service agencies – in the identification of local problems and subsequently in the selection of appropriate strategies for tackling them".

Many people shy away from the concept of learning after completing formal schooling and avoid getting involved in anything that looks like formal education later in life according to Crombie (1995, 63). If this has not occurred, the general perception is that learning is tedious hard work (Crombie 1995, 63). Programs aimed at adult learning must overcome barriers to learning so that adults are able to participate and learn through past experiences, critical thinking and reflection so that they are able to draw out important learning for themselves according to Hoyt and Lee (2002). There is thus a need to go beyond formal teaching towards facilitating understanding and actions in adults (Altizer 1993).

Knowles (1988, 67), an adult learning theorist, identified six requirements for adults to learn; relevance, self-direction, building on existing experiences, readiness to learn, 'hands on' experiences, and motivation or enthusiasm:

- Relevance – adults are not interested in learning for the sake of learning. They are interested in solving problems and discovering ways to resolve their own issues.
- Self direction – adults are generally in charge of their own lives and their learning and they choose what and how they learn. Involving participants so they can contribute to the learning process reinforces this self-direction.
- Building on existing experiences – adults accumulate knowledge and skills through life experience. Adult education programs should relate previous experience to the concept being introduced.
- Readiness to learn – adults are more likely to take action when they have made the decision to do so and there is a sense of ownership over action.
- 'Hands on' experiences – adults learn to apply their knowledge to an immediate or real-life problem rather than future use or generalized issues.
- Motivation/enthusiasm – adults gain motivation through a need to gain knowledge and skills but the learning experience must be enjoyable to increase their self-esteem. Adults must also know 'what's in it for me' before they will accept new material or participate in new programs.

It is of interest to explore the case study findings in regards to the community's preferred methods of receiving information from the fire services. Table 18 indicated that programs which bring together groups of residents (both small and large meetings) make up 30% of respondents' preferred methods for bushfire information and advice. Respondents preferred small meetings (20%) over large meetings (10%). The other preferred methods were the distribution of safety literature (37%), information in local media (20%) and general advertising and media coverage (15%). Therefore, a mix of bushfire information and advice methods were preferred by respondents. Those respondents who did prefer direct contact with fire services were to likely be already involved in the community through small volunteer groups.

There have been a number of approaches suggested to overcome adult learning impediments. Crombie (1995, 59) understands the difficulties of formal education for adults and believes that the most appropriate method of generating changes in beliefs and attitudes is through informal learning in small participatory groups. Community groups assist in changing people's attitudes because they provide a reference group, compensation for individual weaknesses, provide a sense of belonging, and enable richer and more accurate information flow (Nicholson, 1995, 24). Stapp and Wals (1992) also advocate small groups for community problem solving as the group process empowers participants to collect and analyse information, identify alternatives and carry out a plan of action to combat local problems. Minzey and Le Tarte (1979, 36) describe this as 'a powerful process though which members of the community can convene around important problems and collectively devise sound strategies for dealing with them'. Therefore, research up to 1995 strongly advocated small group community education but the issue now is whether or not it is still preferred over more recent methods of obtaining advice such as the internet.

Recent literature (Leonard in Cary et al 2003, Rohrmann in Cary et al 2003, Ellis et al 2004) described how web-based programs are now important for accessibility to community education. However, bushfire preparedness is not merely an awareness that a bushfire hazard exists. Rather, it is a function of awareness, fuel reduction, individual beliefs, home design, garden layout, community norms, hazard assessment, reliance on fire brigades, weather conditions and previous experiences (Whelan 1987, 6) and Hungerford and Volk (1990) warned us that information (or knowledge) is only one

variable in the process leading to action; intention to act, ownership and empowerment all play major roles.

In the Bushfire Prepared Communities Background Information, QFRS (2004, 5) it was stated that "community safety campaigns that people understand, trust, implement and develop themselves are the most effective". Fire authorities such as QFRS understand that caution and care needs to be taken when planning, developing and delivering community education. QFRS (2004, 5) further stated that "the utmost care is taken not to generate fear and panic in the target community. Factual information should be conveyed calmly and all questions answered thoughtfully. All interactions with community members in relation to Bushfire Prepared Communities should be factual, diplomatic, and positive, and under no circumstances alarmist". QFRS (2004) acknowledged that advice can be perceived in different ways than intended. For example, if publicising of the need for preparedness against bushfire risk does not bring welcome information to individuals and communities, this can be combated by authorities providing constructive strategies on how householders can reduce or prevent the risk. It is evident that QFRS has recently sought to combat what they perceive to be misperceptions of the lay public through provision of constructive preparations against the risk of bushfire.

After the case study's community consultation in May 2005, the Federal Government collaborated with State and Territory Governments to air television advertisements before and during various bushfire seasons around the country. The motto of "Be Safe, Be Prepared" represented the messages from the Inquiry into the Operational Response to the January 2003 Bushfires in the ACT which emphasised the nature of the threat of bushfire; that authorities are unable to guarantee that firefighters will always be available to assist; householders generally need to take sensible precautions and be prepared, if that is their choice, to protect their own lives and properties; and authorities are committed to doing all they can to help, including advising the community on how best to go about achieving a higher degree of personal and household self-reliance so people can better protect themselves and their properties.

It appears that community education programs such as "Bushfire Prepared Communities" did not seem to have made a noticeable impact upon the case study community's preparedness against bushfire risks. In an article titled "Ill-prepared for

fire" in the Townsville Bulletin on October 18, 2005, Malcolm Weatherup reported that the "Bushfire-Prepared Communities" program was not very effective. This was not a result of complacency from QFRS according to I Zone officer Errol Fancourt, who said there is a "slack attitude of people to fire risks". Fancourt expressed to Weatherup (2005, 4) his disappointment that people across much of Queensland have shown virtually no interest in the Bushfire-Prepared Communities Program: "Nobody seems to be picking up on it, communities and householders are generally being pretty slack about the situation". This report indicated difficulty in getting worthwhile community support and active participation for preparedness against the risks of bushfire.

Bushfire is generally perceived to be regionally disparate throughout Australia (e.g. northern and southern Australia can experience bushfire-related matters in different ways). The perceived disinterest in the "Bushfire Prepared Communities" program in Queensland may or may not represent a broader Australian view that fire services have difficulties in directly engaging communities. As mentioned earlier, there was also not enough data available for this research to know the impact of the "Be Safe, Be Prepared" television advertisements which aired in Queensland during spring/summer of 2005. However, it is known from the case study that the individual householder activities against the threat of bushfire that require a significant investment (cost/effort) were less likely to be undertaken and the preparation activities that the community would most like be better informed about mostly relate to practical considerations of being equipped and prepared for what to do in the event of a bushfire.

Given that the Tamborine Mountain community indicated that television had the most impact on the way they thought about the safety of their family and home safety (Table 17), it is worrying that the main media used by fire services (e.g. Bushfire Prepared Communities program) is perceived to be ineffective.

<u>Need to find ways to improve community participation in bushfire mitigation and management (preparedness)</u>

Most actions for bushfire preparedness undertaken by survey respondents were general housekeeping, such as cutting grass and clearing rubbish out of the yard, cleaning leaves from gutters, removing branches and undergrowth from around the house, and checking the water supply (Table 6). Some people reported making technical preparations such as

the purchase of a fire extinguisher or blanket, checking over of equipment and the establishment of fire breaks or buffers. Few people indicated that they had evacuation plans. In particular, those living in residential streets rather than bushland/open space areas were less likely to have made the decision to stay or go in the event of a bushfire. The residents more likely to have taken preparation activities were retired, have experience with a house fire and/or bushfire, and have no children at home.

It was recognised from data analyses of survey results that economic and social circumstances can influence residents' attitudes and behaviour towards bushfires and their mitigation and management. A significant finding of my research was that the survey respondents who live surrounded by or adjacent to bushland, in a house they are paying a mortgage on or renting, as well as being under the age of 55, with children, and a participant in the workforce which requires a commute off the mountain are more likely to have "personal and family matters" and time and economic considerations that lessen their perception of personal responsibility to lower than the responsibility they assign to Council/National Parks for the protection of life and property from bushfire. Ellis et al (2004, 41) also supported that economic and social factors affect attitudes and behaviours to bushfires, giving the example that "a stressed community is likely to have less capacity to respond to challenges than a more vibrant community". The dynamics of a community are an important consideration for improving participation in community education.

Ellis et al (2004, 97) outlined that community capacity for bushfire mitigation can to be developed in a variety of ways. Current examples of initiatives to develop community capacity are as follows; those developed and delivered to northern Australian communities by a broad partnership of land management and fire agencies and research organizations such as the Natural Heritage Trust funded project 'Developing Knowledge-based Fire Management for Northern Australia Savanna Communities', the Nature Conservation Council of New South Wales Bushfire Community Education Program and the South East Queensland Fire and Biodiversity Consortium.

The preface the Coalition of Australian Governments (COAG) Inquiry (Ellis et al 2004) noted that community participation in fire management has been marginal in the past and improvements are vital to achieving better bushfire preparedness.

Many submissions to Ellis et al (2004, preface) included suggestions for improving community participation:

- Involve the community/public in the planning process to appreciate bushfire risk management strategies, and to appreciate their role in that.
- Intensive and co-operative development and implementation of property, reserve, village and town level management plans, each of which has its own subset.
- Need to develop mechanisms for collecting and utilising local knowledge.

The COAG Inquiry mentioned that there was plenty of discussion about the need for a better educated and prepared community: "Improvements in bushfire mitigation and management will be significant only if the community is better educated and engaged. More effective education about bushfires is central to the realisation of the Inquiry's vision for bushfire mitigation and management in Australia" (Ellis et al 2004, 42). One researcher felt that there was already substantial information to support effective delivery of community education: "Many community engagement programs are already informed by appropriate research" (Rohrmann 2003 in Ellis et al 2004, 41). Finding 7.1 of the COAG Inquiry Ellis et al (2004, 134) acknowledged that "the community information and engagement programs conducted by the states and territories are generally comprehensive. Their effectiveness depends on community uptake and commitment. Community surveying needs to be done regularly to ensure that programs retain their relevance and are being delivered in ways that maximise community participation and understanding". This thesis is an example of a research project responding to the need for understanding community bushfire preparedness so that community education and information programs may be further improved.

The *Inquiry into the Operational Response to the January 2003 Bushfires in the ACT* (McLeod 2003, 96) made suggestions to improve community education:

- Community bushfire awareness is the direction to aim towards, whereby the community has an understanding of the nature of the threat, and knowledge of how to better protect themselves and their properties.
- Initiatives such as Community Fireguard and other forms of direct community support are endorsed to encourage community self-help arrangements.

- The need for self-sufficiency to protect life and property in major bushfire emergencies with knowledge that fire authorities are committed to doing all they can to help, including advising the community on how to best achieve self-reliance.

Among the community engagement programs introduced and maintained by fire agencies are FireWise in New South Wales and the Australian Capital Territory, Community Fireguard and Bushfire Blitz in Victoria and South Australia, and the work of the Bushfire Ready Action Groups in Western Australia. As mentioned in Chapter 4, the Bushfire Prepared Communities program was introduced to Queensland in 2005. Programs of this kind typically involve street or community meetings during which local bushfire hazards are identified and information on bushfire behaviour and personal and property protection is provided. If possible, local community organisations are involved. These groups receive information and guidance, but they have no organised fire suppression role beyond their own property. They are not provided with protective clothing or basic fire equipment.

In regards to community information programs, Ellis et al (2004, 132) reported that States and Territories have printed material and documents available on the internet, setting out preparation and response measures that need to be taken to safeguard people and property from bushfire. Ellis et al (2004, 132) outlined that the *Bushfire Information Booklet* distributed to all residents of the ACT is an example of such a comprehensive document: "That public information program is an example of what can be done in response to a major fire disaster. The challenge is to maintain a similar priority of effort in subsequent years, when there is likely to be less community interest and, often, less funding available". Therefore, materials on the internet were well received during recovery of a major bushfire; however, sustained interest in preparedness remains a challenge for community education.

There appears to be widespread belief among fire agencies and researchers that there is a need to build on community education programs to engender a wider sense of shared responsibility in the community and consequent behavioural change to increase individual and community readiness. Ellis et al (2004, 132) noted that "successful programs are based on the specific community's needs and style, and they work in with other important community objectives. This means engaging with each community and

understanding what is unique about it. What needs to be avoided is lecturing the community. Programs for increasing interaction, improving preparedness and raising awareness must be flexible, adapting to suit the characteristics of the community and to empower them to act on their own behalf and share responsibility". Therefore, programs such as QFRS' Bushfire Preparedness were endorsed by Ellis et al (2004). The issue now is to address the concerns that pro-active engagement efforts have not been effective (in Queensland at least). It appears that encouragement of taking pro-active measures for preparedness against the risks of bushfire is necessary in some areas, and enforcement may be necessary in others.

The Blue Mountains Conservation Society Submission (2003, 3) to Ellis et al (2004) noted:
"With regard to damage mitigation of individual properties, retro-fitting of protective items to buildings should be encouraged, e.g. shutters, metal screens, water tanks, sprinkler systems, etc. … There is an urgent need for legislation regarding restrictions on building approvals in bushfire areas to be implemented and enforced". Rural-urban interface areas which are at-risk-from-bushfire are an increasing trend in some areas such as the Blue Mountains. Similar to the findings of community groups and fire services at Tamborine Mountain, there were views expressed regarding the need for local governments to strictly enforce design codes for subdivision or individual home developments. There was acknowledgement in both mountain communities that legislation which requires fire breaks or buffer zones can have an adverse effect on the environment and biodiversity, but this needs to be balanced against the need for property protection and needs further research.

Professor Whelan's Submission (2003, 4) to the COAG Inquiry suggested that "the real lesson when we choose to live close to the bush, is to be prepared for fire and the possibility that we can lose everything and be fully insured". A difficulty with educating perceptions of bushfire awareness is that it can be met with resistance.

Perceptions of bushfire awareness in the context of community education were explored in a literature review. How little can be achieved by public education for better risk perception was indicated by Fischhoff and Lichtenstein (1974, 23) who wrote with special reference to the problem of nuclear risk: "Our own view is that educational attempts designed to reduce the 'perception gap' are probably doomed to failure."

Later, Fischhoff, Lichtenstein and Slovic (1980, 35) described how many people's mental images of a nuclear accident include hundreds of thousands or millions of immediate deaths accompanied by incalculable and irreversible damage to the environment: "These images bear little resemblance to the views of industry officials (and most technical experts) … Industry proponents have tended to attribute this perception gap to public ignorance and irrationality. We question this attitude and we doubt that its proposed remedy, education, will succeed". Therefore, research on the problem of nuclear risk suggests that community education programs are not likely to be effective if the desired outcome is to change people's perceptions of risk.

There was an overall lack of preparedness as indicated by the overall proportion of actions not taken against the risk of fire (44%, Diagram 1), and the high percentage (78%, Table 12) of bushfire safety aspects in which overall respondents are not confident. This indicates that information and advice about the bushfire safety aspects that the community are not confident has a potential to increase confidence levels for both preparations and response to bushfire risk. Table 25 in Appendix E outlines percentages of respondents who would consider action/ like advice on certain bushfire preparations. Such information is useful to fire services in their planning and implementation of community education programs.

Although preparedness for bushfire did not appear to be a priority in respondents' lives, risk perception emerged as a significant influence upon their bushfire preparations, as did experience of fire, confidence in bushfire safety aspects and responsibility for protection of life and property. Preparative activities that require a significant investment (cost/effort) were less likely to be undertaken. The actions against the threat of bushfire which respondents would most like be better prepared for are mostly related to advice from fire services about being equipped and prepared for what to do in the event of a bushfire.

Matters that Arose from Community Surveys and Community Group Meetings

Operation of controlled burning return intervals

The Tamborine Mountain community accepted controlled burning on public lands by local council/Parks service and fire services as "necessary" (Table 21).

However, Ellis et al (2004, 98) acknowledged the complexity of controlled burning. Many submissions to the COAG Inquiry called for the need for sensible planning, rather than the need for more hazard reduction burning, as a way of countering the severity of impact upon urban areas during a fire event. Calls for the need for more burning were countered by a number of submissions:

> "In some sectors, there has been a tendency to blame the fires on national parks and other natural areas. Statistics show that more wildfires start outside national parks and burn into them rather than vice versa. Natural places should not become the victims of fire counter-measures, but rather a more enlightened approach to development surrounding them is needed. The importance of such places and the need for their proper preservation must be recognised" (National Parks Association of Queensland, Submission 2003:1 in Ellis et al 2004).

Cunningham, in a submission to the COAG Inquiry (Ellis et al 2004) agreed that controlled burning is supported by various people associated with bushfire management and the lay public. Associate Professor Cunningham questioned whether controlled burning is a general solution to bushfire management and discussed how it is only one tool of a comprehensive bushfire management plan (Cunningham, Submission 2003: 4):

- Controlled burning for the protection of private property it is a very limited.
- The window of opportunity to conduct controlled burning is generally less than forty days and human resources are often constrained because it is labour intensive.
- The appropriate return interval is difficult to achieve in practice.
- Activities at the boundaries of urban areas and adjacent bushland show promise.

There are complex matters that need to be carefully considered in regards to hazard reduction methods and planning for bushfire-prone areas. Recommendation 13 of A *Nation Charred: Inquiry into the Recent Australian Bushfires* (HRSCRAB 2003) in Ellis et al (2004, 328) outlined that the Committee recommends that: "The Commonwealth seek to ensure that the Council of Australian Governments seek agreement from the states and territories on the optimisation and implementation of prescribed burning targets and programs to a degree that is recognised as adequate for the protection of life, property and the environment. The prescribed burning programs should include strategic evaluation of fuel management at the regional level and the

results of annual fuel management in each state should be publicly reported and audited". Therefore, a whole of government approach was recommended to continually improve knowledge about optimal fire return intervals.

Ellis et al (2004, 99) outlined in Section 6.4.1 of the COAG Inquiry that "effectively applied and strategically planned fuel-reduction burning is widely accepted by land management and fire agencies as a very important strategy for reducing the risk of bushfire-induced damage to assets. Considerable work has already been done by fire and land management agencies with a view to assessing the effectiveness of fuel-reduction burning and developing prescribed-burning manuals for achieving safe and effective fuel reduction in different vegetation types and climatic regions". For examples and references of prescribed burning manuals around Australia, see Section 6.4.1 of Ellis et al (2004, 99).

Ellis et al (2004, 99) outlined that "in order to be effective in mitigating the effects of bushfire on assets, fuel-reduction activities need to be strategically located and repeated often enough to keep the fuel load from exceeding a particular threshold level. The Australasian Fire Authorities Council's (AFAC) training manual for prescribed burning supervisors links the magnitude of fuel reduction that is desired to the objective for a prescribed burn. See, for example, Australasian Fire Authorities Council (2002).

It appears from the number and applicability of manuals for controlled burning around Australia that fire authorities have provided fire services with detailed information regarding appropriate procedures to apply in different landscapes and climatic regions. The Tamborine Mountain community initiated an Escarpment Management Plan (Watson 2001) to provide a more localised approach to controlled burning among other matters. Different opinions regarding the controlled burn return intervals were still existent five years later.

<u>Strategies are needed to effectively engage highly active retired people</u>

Educational efforts involving communication between fire services and the community appeared to have impacted on 2% of survey respondents' preparations against bushfire (Table 17). Fire services may decide to develop methods to increase confidence levels

for both preparations and response to bushfire risk in various ways (as preferred by respondents, see Table 18).

Ellis et al (2004) suggested that community participation is encouraged for bushfire mitigation planning processes to include various perspectives and to promote shared responsibility for bushfire management on private property. Ellis et al (2004) also acknowledged that cooperative consultation between government and local communities needs to be further developed.

Marginalisation within communities was a finding of the case study and could be a potential impediment to effective bushfire preparedness community education. Ellis et al (2004, 40) discussed the Governments' difficulties of engaging with the community and individuals:

> "Attempts at engaging with communities are not always successful because a group of people in a locality does not necessarily constitute 'a community', with common interests and a will to work together. Divergent values between individuals challenge the very existence of a community, let alone views about bushfire mitigation and management. This tests the development and delivery of community-based strategies. Education programs need to be sufficiently inclusive and flexible to engage with the diversity of individuals who may not consider themselves part of a community but live in a particular locality".

Finding 3.1 of Ellis et al (2004, 42) indicated that "effective community education, awareness and engagement programs targeted to the needs of local communities are required to achieve shared responsibility". The preface of Ellis et al (2004) noted that "community participation in fire management is vital to achieving better fire preparedness. While governing agencies are usually well represented on bushfire management planning bodies, generally the public only has marginal participation". The COAG Inquiry reported that there is a difference in how communities in northern and southern Australia face bushfire risk which transfers to how states/territories and communities manage that risk including community education. Ellis et al (2004, 37) supported respect for Indigenous Australian bushfire knowledge as being a part of furthering partnerships for appreciation and knowledge of bushfire issues, especially in northern Australia where there are more Indigenous populations and lands suitable for a

symbiotic relationship with bushfire. However, it appears that the current situation in southern Australia requires Governments to work closely with communities there in a way that develops a better of understanding and wiser attitude towards local risks of bushfire.

The *Inquiry into the 2002–2003 Victorian Bushfires* (Esplin et al 2003: 122) recommended improvements to community education and information programs to foster better community understanding of, and wiser attitudes to, bushfire:

- Develop a joint statewide fire awareness education and information program aimed at encouraging a higher degree of personal and household self-reliance.
- Each organisation remains the authority in their area (e.g. rural or urban).
- Collaboratively survey households to test the level of awareness/acceptance of fire knowledge and measure whether access to information leads to safe behaviours.

The Blue Mountains Conservation Society Submission to Ellis et al (2004, 3), reported:

- Education should target specific audiences and address a broad range of bushfire and environmental issues.
- Lack of education and preparedness of the community in general contributes to the severity of the impact of bushfires.

There are differences in perceptions and actions regarding bushfire-related matters. Ellis et al (2004, 40) particularly referred to the need for education programs to be "sufficiently inclusive and flexible to engage with the diversity of individuals who may not consider themselves part of 'a community' but live in a particular locality". Despite whether the margin is between northern and southern Australia, Indigenous Australians and other Australians, there is a need for flexibility in planning to deliver customised bushfire preparedness education for some at-risk-from-bushfire areas.

Increasing confidence in cost and capacity to protect property

Most of the survey respondents (78%) lacked confidence bushfire safety aspects, especially for the costs and equipment required for protecting property (Table 12). Respondents were overall mostly confident in how to prepare property against the risk of bushfire. Data analyses indicated that the respondents that had cleared junk out of the

yard, checked water and hoses, installed smoke alarms were generally more confident in their safety from bushfire than those that had taken no action. Those who believed in their ability to take personal action for protection from bushfire were more confident in safety aspects overall. Those who reside amongst or near bushland/forest appeared as being mostly confident. Males with fully-insured homes appeared as more confident with equipment-related preparations. Those between the ages of 41-55 and in the workforce appeared to be more confident with first aid.

Table 12 indicated that 53.9% of respondents were not confident in "the situations in which to stay or leave your home in the event of a bushfire". Furthermore, 59.5% of respondents were not confident in "what to do if you are trapped in your home in a bushfire" and 64.5% of respondents were not confident in "what to do if you are trapped in your car in a bushfire". Situations related to individual householder plans to "stay or go" in the event of a bushfire appeared as one of the most significant bushfire safety themes that survey respondents lacked confidence with. It appears that communities generally want, and perhaps need, advice on whether to stay or go in the event of a fire.

There have been numerous investigations to determine why houses burn during bushfires and the type of structures most suitable for bushfire prone environments (Bell 1985; Ramsay, McArthur and Dowling 1985; Bellamy 1993; Ramsay and Dawkins 1993; Ramsay, McArthur and Dowling 1996; Leonard in Cary et al 2003). Leonard in Cary et al (2003) identified the need for improved understanding of building loss issues from bushfire and transfer of knowledge of bushfire situations to assist people and property survival strategies in a common language that helps prepare residents against bushfire risks. "The stay and defend the home option during a bushfire is accepted as common behaviour. There is increased understanding within many communities that they need to pre-plan their strategy to either safely evacuate in a timely manner or take appropriate steps to stay and defend their homes" (Leonard in Cary et al (2003, 105).

Ellis et al (2004, 132) reported that in regards to stay or go, "individuals and communities at risk from a bushfire need sufficient information to allow them to choose between evacuating early or finalising their preparations for defending their well-prepared property". The most appropriate survival strategy for an individual depends on their particular circumstance; vulnerable people should leave early (Krusel and Petris 1992: 3). Packham (1995, 43) suggests that "public education in fire behaviour, self

protection and risk assessment" and "community involvement including neighbour concern and support" are strategies that should be implemented to improve the safety of non-evacuation. Ellis et al (2004) emphasised that an important consideration for people who choose to remain with their properties is that they must have suitable clothing and equipment and be well prepared, physically and mentally, for the impact of the passage of the fire front.

It is possible that well-prepared residents may react differently in a bushfire event than they intended with their action plans. Despite level of experience or responsibility, an important part of preparedness for bushfire is that people know what to expect when the fire front approaches (Gill in Ellis et al 2004). In past bushfire events, people who stayed with their houses have increased their chances of survival, as did those who returned to their houses soon after the fire front passed (Ramsay et al 1996: 133, Leonard in Cary et al 2003: 112).

Clear instructions to go early or stay and defend were publicised during bushfires in October 2006, (e.g. Bushfire CRC online) to reiterate expert advice to not flee late and to prepare your house early or prepare to leave. The implementation of a 'go or stay and defend' policy must be fully integrated with effective community education programs to improve preparedness and support timely and informed decision making (Ellis et al 2004: 171).

Range of media stated as preferred method for receiving information

Television advertisements which promote awareness of bushfire-related matters were the most likely medium for gaining respondents' interest and retaining their awareness of bushfire risk (Table 17). Most indicated that they would seek advice from the local fire brigade/newspaper column (Table 28 in Appendix E).

Bushnell (2006, 3) found a strong public preference for bushfire information to be disseminated via the media (e.g. television) and outlined that numerous studies have linked public knowledge, perceptions and opinions of bushfire and its management with information disseminated by the media. Wuerthner (2006) outlined that most of us get our information about bushfire from the news media rather from direct experience.

Overall, there is a wealth of information that is currently available or soon about to be in regards to how to be prepared and equipped against bushfire risks. Bushfire information and advice is only really effective if it is reaching people in at-risk-from-bushfire areas and influencing their preparations. It was outlined earlier in this chapter that there has been difficulty for fire services in Queensland with directly engaging communities for education, which is most likely to do with the case study's finding that passive methods of receiving bushfire information and advice (e.g. via safety literature, television and newspapers) were preferred over the methods which require personal communication between fire services and the community (Table 18). However, it appears that there has been success in community education and engagement programs more so in southern states of Australia.

Bushfire risk and nuclear risk are not exactly synonymous. However, both have been mentioned in the same category by researchers interested in how people could be better informed for preparations against risk. Rather than attempt to change people's perception of risk, the researchers on the problem of nuclear risk overwhelmingly recommend that more effort be made to improve public understanding by better educational campaigns. Kunreuther et al (1978, 118) outlined that "existing evidence regarding the extent to which media publicity, films or graphic displays have generated concern with future disasters is not very reassuring … in situations where government aid is deemed necessary, there is potential for misperceptions and misunderstandings". Therefore, theory suggests that it may be the manner of approach of community education which is why previous programs have been met with resistance.

Green and Brown (1981, 39) first clarified what is understood by the term "risk"; they then found that where sufficiently reliable and precise objective estimates are available, their respondents' beliefs are quite accurate. Green and Brown (1981, 45) stated that "it seems people first take a moral position – what ought to exist – and couple this with pragmatic considerations looking towards a complex future; in this light it makes sense to recommend that more and better information be given". Douglas (1985, 89) outlined that "the faith in education is a logical next step from the initial acceptance of risk perception as a problem of misperceptions by the lay public". It was outlined earlier that community education has traditionally attempted to combat misperceptions of the lay public. It was also mentioned in this chapter that community education programs are

not likely to be effective if the desired outcome is to change people's perceptions of risk. Therefore, understanding perceptions of bushfire awareness in the context of community education is necessary for helping to determine which bushfire safety information/advice work best.

It was outlined in Chapter 6 that more than one method of bushfire safety information/ advice would work best for some of the respondents. Various methods of receiving bushfire information and advice (especially safety literature, television and newspapers) were preferred rather than the methods which require personal communication with fire services or other community members such community education programs. There were thirty different types of home safety advertising or media coverage that have had impact on the way respondents thought about the safety of their property and family. This suggests that there are many different influences from home safety advertising and media coverage. Fire services compete for the community's attention; bushfire is one of the many hazards that respondents are asked to be aware of and mitigate the risks. It appears that the surveyed community prefers bushfire safety information and advice in electronic or print format so they can receive and peruse it at their leisure, however, some kind of engagement with the local fire services is still wanted by some residents.

Chapter 8
Conclusion

Introduction

The Tamborine Mountain case study aimed to identify the way bushfire risk is perceived in a rural-urban community. This aim was achieved by successfully meeting the objectives of the research which were to identify the perceptions of bushfire risk held by members of the community and fire service personnel for the area; identify the expectations held by the community and fire services regarding fire service delivery; compare community perceptions and expectations with those held by fire services and other stakeholders; and identify areas where communication might be improved or built upon.

The theoretical basis for the research was a 'Social Construction of Risk' approach (Douglas 1985, Luhrmann 1993, Lupton 1999). A case study using a multi-methods approach to research was an effective way to understand the agreements, differences and matters for further resolution from the perceptions and expectations of local fire services and the Tamborine Mountain community. That is, the identification of some of the different ways that bushfire risk is constructed in the area.

Key Research Findings

Key research findings were presented as agreements and differences in perceptions of fire services and the community. There were also some bushfire-related matters which were separate from how the perceptions/expectations agreed and differed (Chapter 6).

Agreements in perception of fire services and the Tamborine Mountain community identified areas to build upon:

- The perceptions of bushfire fire risk varied within the community ;
- Experience with fire appears to be related to awareness of associated risks;
- Risk awareness does not appear to be related to recent bushfire events;
- Fire breaks are a considered to be a necessary fire management initiative;
- Consensus on the bushfire season;
- Need for Bushfire Management Plans to be effectively implemented.

There are varied perceptions of the fire risk at Tamborine Mountain

Recognition of varied perceptions helps fire services and communities to understand and respect each other's perspective in order to build upon agreements and work on differences.

Experience with fire appears to be related to awareness of associated risks

Agreement that experience plays a significant part in a high risk perception is important because this is a step towards effective transfer of knowledge which may help people to know what to expect in the event of a bushfire and what they can do to be prepared.

Risk awareness does not appear to be related to recent Australian bushfire events

Recognition that bushfire events have had little effect on sustained awareness of the hazard is useful because it highlights that fire services/media have not effectively transferred information for being effectively equipped and prepared against the risks of bushfire and/or the information has not been well understood and put to use.

Fire breaks are a necessary fire management initiative

Consensus that fire breaks are important for fire management highlights an area where fire services and communities have made a positive impact upon the protection of life/property.

Consensus on bushfire season

Knowledge of the local bushfire is mostly encouraging; however, general awareness that the local bushfire season is different to other parts of Australia may have a negative side because residents appear to see major bushfires as not of particular concern. The last major bushfire at Tamborine Mountain was in 1991 and most residents had moved to the area after that.

Need for Bushfire Management Plans to be effectively implemented

This finding regarding the need for more attention being given to Bushfire Management Plans highlights an area which has been recognised by fires services as a persistent issue

which needs rectifying from the local level up to the federal level. The community's concern about land-use planning highlights an area which is integral to rural-urban bushfire issues.

The most interesting research findings outlined that fire services and the community differed in their views of:

- How many people would rely on the fire services in the event of a bushfire;
- The level of awareness of bushfire hazard in the community;
- The lay public's expectations of fire services;
- Perceptions of controlled burning;
- Perceptions of fire services' provision of information/advice.

How many people would rely on the fire services in the event of a bushfire?

Members of the fire services believe that most of the community would rely on fire services to respond in the event of a bushfire rather than being prepared for the risks and self-sufficient when a major bushfire event occurs.

The research findings indicate that although the public highly values and are confident in ability of the local brigades to respond in the event of a fire, slightly more than half would not rely upon help from the fire services in the event of a fire. Most survey respondents recognised that fire brigade activity can be constrained by limited resources and authority.

Recognition of reliance upon fire brigades helps determine how many people are likely to be self-reliant in a bushfire emergency and how many are likely to need assistance for the protection of life and property. Even if there is slightly less than half of the community dependent on fire services, it is of concern that this is beyond the response capacity of fire services in the event of a major bushfire which threatens a large part of the community.

The level of awareness of bushfire hazard in the community

It was broadly considered by the fire services that there is not a high level of awareness in the community because the community is generally not prepared against the bushfire risks.

Most people reported that they are aware of the bushfire risk but they were more concerned about the other matters which took priority in their life (e.g. family and themselves). It appears that most residents did not hold the view that bushfires in the local area could intensify to the extent that fire services are not able to maintain sufficient fire suppression capabilities. It appeared that residents saw major bushfires as something which happens in the southern states of Australia.

Awareness and perception levels of the bushfire risk are necessary to recognise because they are important prerequisites for there to be a belief in the purpose of preparation activities. Therefore, awareness of the local bushfire hazard is an important indicator of whether people are placing themselves and others in a potentially vulnerable situation.

Public expects things to be done for them

The fire services' perspective was that the public expects things to be done for them, that the fire services are willing and able to fight fires when called upon.

There was concession from some of the community that they do expect fire services to fight fire when called upon to protect people and property. However, there are many other factors which contribute to expectations upon fire services e.g. residence location, age, occupation, household situation, time and resources available. Personal/family matters come first for most people and cost/effort required impedes preparedness. It was not expected that fire brigades be highly visible and have regular contact with the community.

Recognition of the community's expectation of fire services helps them to understand their own role as the community perceives it and compare this with their own view of themselves. Acknowledgement of differences in perceptions can lead to operational changes so that fire services can best assist the communities that they serve.

Perceptions of controlled burning

The fire services' view was that controlled burning is not wanted by the public, that it was considered to be a nuisance.

The surveyed communities mostly supported controlled burning; it was generally accepted as necessary for maintenance of the environment and the protection of life and property. Smoke was not broadly considered a nuisance; it appeared that those who were opposed to controlled burning were mostly concerned about its biodiversity impacts in sensitive areas. Some people believe that brigades should assign a higher priority to hazard reduction activities. General housekeeping was the community's counterpart for controlled burning.

Recognition that there is mostly approval for controlled burning in the community, and some actually want it to be a higher priority for the fire services is a very important factor to be incorporated into fire service operations. It appears that the community would prefer that the fire services put more resources into bushfire mitigation than promoting preparedness.

Perceptions of fire services' provision of information/advice

For the fire services, bushfire risk is part of the routine risks of their job, while for the community it is a rare occurrence at Tamborine Mountain. Fire services are also facing difficulties in how they can provide service, information/advice, it is especially difficult to structure community education in marginal areas.

A reason that "community-based solutions" and "government-enforced policy" appear to be facing unwelcome resistance by communities may be because the pressing issues of preparedness for bushfire do not have clear precedent. Methods that were most preferred for receiving information and advice included a letter to the householder and information in the media (e.g. television). The least preferred methods for receiving information and advice were the ones which require engagement with fire services.

Recognition of how the fire services and the community construct different views regarding the provision of information and advice assists the effectiveness of outcomes. Fire services are doing their job to the best of their knowledge whilst communities deal with vast amounts of sensory input which makes it difficult for them to be available to receive information and advice. Therefore, innovative application of both "community-based solutions" and "government-enforced policy" in at-risk areas may meet fortunate outcomes, though it is possible that neither of these measures meet success.

Perceptions of bushfire risk

The different perceptions of bushfire risk emphasises that there are different constructions of risk within the community. The research findings articulated patterns of language and promoted understanding and use of a common language and unified value system so that fire authorities can collaborate to communicate messages to the lay public in a way that leads to increased community self-reliance for preparations against the risk of bushfire. Beyond the chorus of agreement for appropriate design and maintenance of dwellings as well as physical and psychological preparedness for bushfire in order for the protection of people and property, bushfire management strategies need to confront rural-urban interface cultural change issues. It is important to understand how people construct risk perception in order to improve preparedness.

The fire services are especially interested in the barriers for self-reliance against the threat of bushfire as they aim to increase the community's self-sufficiency. Lupton (1999, 36) described how lay people construct risk knowledge in the context of their everyday lives: "Risk is perceived throughout society in frames of reference shaped by our history, experience and potential to be exposed to it". Bushfire is a subset of environmental risk but it also has the potential to be a lifestyle, medical, interpersonal, economic and criminal risk. Fire services are aware of the potential for bushfire to be devastating; however, it was pointed out by auxiliary firefighters at Tamborine Mountain that road accidents were the most frequented incident response. Fire services are more exposed than the general community to the consequences of situations that were considered to be risky before they were an incident. Hence, it was necessary to investigate the way bushfire risk is perceived in a selected rural-urban community in order to identify issues that may need to be addressed by fire services. For example, fire services at Tamborine Mountain were interested to know how to inform the lay public of the need for bushfire preparedness without sensationalism.

It appears that the community does not prefer to be embroiled in matters regarding preparations for a bushfire which may or may not eventuate in the near future. Community education programs are unlikely to be effective if fire services desire to change people's perceptions of risk (Douglas 1985). Therefore, it was necessary to explore the fire services' and the community's perceptions of preparedness for bushfire. The research findings indicated that the community's preparedness for bushfire was

especially associated with the topics of risk perception, experience of fire, confidence in bushfire safety aspects and responsibility for life/property protection and less associated with controlled burning acceptance, impact of educational efforts and cost/effort required. These topics are inter-related and enable users of the research a frame of reference to the associated issues.

Development of a snapshot in time for the community's awareness of risk was important for understanding perceptions of preparedness for bushfire. Lupton (1999) informed that most in their lay public role judge everyday hazards to be safe and think of themselves as able to cope. It was realised from the case study that location is important factor for risk perception. Those who perceived the bushfire hazard as high and were concerned about it in their area were more likely to have prepared against the threat of bushfire.

Implications of research

It was a novel approach for the fire services to more closely examine how they view the bushfire risk at a location and compare that with how the community views the risk. The similarities in perspectives allow for building upon agreements; differences identify areas that need to be addressed with more care and provision of information.

Implications of the research include:

- Perceptions-based research with a case study approach is applicable to other bushfire mitigation and management educational research;
- A better understanding of rural-urban communities' risk perceptions can assist fire authorities to frame relevant issues and address difficulties at a local level;
- Research and development for efficient and effective bushfire mitigation and preparedness programs which better prepare at-risk-from-bushfire communities.
- There are a number of future challenges, some of which have been previously identified and continue to need attention, and some which need to be brought to the awareness of fire services, Governments and at-risk-from-bushfire communities.

The case study findings were based upon the construction of bushfire risk from the Tamborine Mountain community perspective and separately from the fire services'

perspective. There was an absence of ultimate truth to compare the findings with; however, the key research findings were compared to Australian State and Federal Governments' findings. The research results were interpreted and discussed in relation to the Governments' perspective, and literature was also referenced to derive information that is useful to stakeholders of the research.

Research of at-risk-from-bushfire communities in rural-urban interface areas could help understanding of values, perceptions of risk and associated issues on a wider scale. It was mentioned that GIS applications such as the Queensland Fire and Rescue Service's I- Zone program have helped to identify and classify at-risk-from-bushfire areas with geospatial intelligence. In 2004, the Governments of Australia recognised that understanding community needs, perceptions and attitudes is important for completing the picture of preparedness for bushfire and enacted such research. The COAG Inquiry (Ellis et al 2004, 102) reported that 'local knowledge' refers to the thoughts, perceptions, experiences and beliefs of residents, landholders, volunteer firefighters and others involved in fire mitigation and management at the local level: "It embraces individuals' memories and experiences of past fire events and specific knowledge of elements and processes in the current environment". This thesis' research was integral to understanding and documenting invaluable local knowledge for bushfire-related planning, management and operations.

Future research

Comprehensive planning for fire events and establishing creative incentives for encouraging homeowners to take appropriate responsibility are two actions that community and fire service leaders can work on together to improve preparedness for bushfire. However, a number of impediments get in the way. Priorities such as personal/family matters make it difficult for some householders to enact preparations for bushfire despite whether or not they take responsibility for the protection of life and property. Fire services are constrained in what they can do to prepare residents against the risks of bushfire because of a lack of adequate resources and litigation implications of providing advice in certain situations; there are also constraints in their ability to fight major bushfires. Also, insurance premium adjustments for positive action appear unlikely to eventuate, as is insurance companies willingly increasing premiums or cancelling insurance for perpetuating hazardous conditions.

Conclusion

The need for case study research extended from a recognition that fire authorities can not protect all citizens from all bushfires. Fire authorities work amidst an operational environment that is looking for ways to empower people to take responsibility for their own safety and develop their own fire mitigation strategies. Community self-reliance for bushfire prevention and preparation is the direction that is being collectively aimed towards. However, efforts primarily driven by fire services and agencies without sufficient involvement by stakeholders run the risk of rejection by the community as "just another government program". This thesis has developed a picture of the different constructions of bushfire risk within a rural-urban interface community as part of the transition towards increased self-sufficiency for bushfire preparations and shared responsibility for the protection of life and property.

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Appendix A: Major Bushfires in Australia

Year	State	Losses
1851	Victoria	At least 10 people killed. Bushfire known as 'Black Thursday'.
1919	Victoria	3 people dead and hundreds homeless. Fire burned 6 weeks
1926	NSW/ Victoria	31 people dead and 2000 left homeless.
1939	Victoria	71 people dead, 1300 buildings destroyed and 50-70% of Victoria burnt. Known as 'Black Friday' as major losses from bushfire occurred on Friday 13th of January 1939.
1939	NSW	Losses were overshadowed by those in Victoria and were not recorded in sources used.
1944	Victoria	At least 49 people dead and 700 buildings burnt. It is thought that the area burnt and damage incurred may have been more extensive if the 1939 fires had not passed through the area.
1951/ 1952	NSW	6 people killed in statewide fires.
1961	Western Australia	No lives lost. Large stock losses and over one million hectares burnt. Exceptionally severe season coinciding with a cyclone.
1962	Victoria	14 deaths and 454 houses destroyed.
1965	NSW	3 deaths and over 250, 000 hectares burnt.
1967	Tasmania	62 people dead and 1400 buildings destroyed. Winds gusting up to 110 km/ h.
1968/ 1969	Victoria NSW S.Australia N.Territory	23 people dead. No fire historically considered a major fire. 3 people dead, over one million hectares burnt Over 900, 000 hectares burnt Large area of territory burnt
1970	N.Territory	Over 30% of the whole territory burnt in this and the previous year.

Year	State	Losses
1983	S. Australia Victoria	72 lives lost, 205 properties destroyed. 2,545 buildings were destroyed and over 390,000 hectares burnt in the Ash Wednesday bushfires spanning two states.
1994	NSW	4 people died, 205 properties destroyed, while many were severely damaged, approximately 800,000 hectares burnt.
2001	NSW	Large bushfires around Sydney known as Black Christmas. 754,000 hectares of bushland were burned, 7,000 head of livestock were killed and 109 homes were destroyed.
2002/ 2003	NSW/ ACT Victoria	4 people died and over 500 homes lost in Canberra bushfires. Ten people lost their lives overall; city suburbs, rural towns, farms, plantation forests and infrastructure were damaged; property losses over $400 million; environmental impacts.
2004	S. Australia	9 people died at the Eyre Peninsula, 93 homes destroyed and many more damaged, 46,000 stock died. 77,000 hectares of agricultural and forest lands burnt.
2006	NSW Tasmania Victoria S.Australia W.Australia	7 homes lost in the Southern Highlands in September. A fire near Tumut burned over 13,000 hectares of pine plantation. Bushfires burned through Hobart's eastern on October 12 shore but no homes or lives were lost. During December, 22 homes lost in the north-east Tasmania, 17,500 hectares burnt. As at 11 December, 250,000 hectares of bushland had burnt in the north-east but only 3 houses had been lost; one alpine hut was destroyed. Eighteen homes were destroyed in the Heyfield–Walhalla area in blazes believed to have been deliberately lit. A 48-year-old man was killed falling off the back of a trailer while fighting the Gippsland fires. Nearly 120,000 hectares was burnt at Bookmark. One home lost at Kalamunda after an arson-related bushfire.

Sources for the history of major bushfires in Australia until 2006 include Luke and McArthur 1978; Pyne 1991; Packham 1992; Trevitt & Ryan 1995a&b; Angus and Robertson 1985; Ellis et al 2004, xii; Drabsch 2003; Wikipedia Encyclopedia 2006.

Appendix B: Interview Questions

Fire brigade questions:

What are the fire brigades' roles?

What kind of community education about fire is available in the local area?

Who do the community think is responsible for the protection of life/property?

Do the fire brigades provide advice to the community?

Are people in the community aware of the local bushfire hazards?

What main incidents do the fire brigades respond unto?

Who enforces, if at all, building codes in the local area?

What do the community think about bushfire hazard reduction?

What are the main issues that fire brigades experience?

When is the bushfire season?

Does bushfire get much publicity in the local area?

Do fire brigades use QFRS' I-Zone maps and if so, are they useful?

What are local people most concerned about in their everyday lives?

What can you tell me about the demographics in the local area?

Who are the most vulnerable people on the mountain?

How prepared is the community to respond to threat of bushfire?

Community group questions:

What is the history of the local area?

What are the roles of the local fire brigades?

What do you think about the job that the brigades are doing?

Are the community aware of the bushfire risk in the local area?

How do the community perceive the risk of bushfire?

What do the community think about controlled burns?

What are people most concerned about in the local area?

What are some of the hazards experienced in the local area?

What is the most common natural hazard in the local area?

What are some of the more pressing concerns in the local area?

What is community participation like in the local area?

Are people in the local area prepared against the threat of bushfire?

When is the local bushfire season?

Appendix C: Letter to Residents of Tamborine Mountain

James Cook University

Townsville campus
Townsville QLD 4811 Australia
Telephone: (07) 4781 4111 Web: www.jcu.edu.au

Tamborine Mountain Bushfire Awareness Survey – May 2005

To Residents of Tamborine Mountain:

This survey is being conducted by James Cook University on behalf of the Queensland Fire and Rescue Service (QFRS).

The Bushfire Cooperative Research Centre (BCRC) has provided funding for research into developing a greater understanding of community issues in regard to bushfire hazard. The objective of the research is to provide an overall picture of how various components of the community construct a picture of fire risk in the Tamborine Mountain area.

Tamborine Mountain is not being singled out as particularly fire prone. We are building on previous by QFRS. This is not an evaluation of fire service provision, but a project to help understand how people perceive fire risk and how fire service provision works in a particular region.

Your participation in this survey will be appreciated. Information collected will be confidential and will be used for research purposes only.

This survey will be undertaken by the following who will be wearing name badges:

Judy Newton	**Queensland Fire and Rescue Service**
Luke Balcombe	**James Cook University**
Mark Evans	**Queensland Fire and Rescue Service**
Amy Golding	**Queensland Fire and Rescue Service**
Kathy Thomas	**Queensland Fire and Rescue Service**

A report will be provided to local governments serving your area, Queensland Fire and Rescue Service and made available through the Tamborine Mountain Library. Park of the study will contribute to a Masters Degree in Environmental Science at James Cook University, by one of the research team, Mr. Luke Balcombe.

If you would like further information about the project please contact the project leader:
Dr. Alison Cottrell
School of Tropical Environment Studies and Geography
James Cook University
Townsville, QLD 4811.
Phone: 07 4781 4653 Fax: 07 4781 4020 Email: alison.cottrell@jcu.edu.au

If you have any questions regarding the ethical conduct of the research project, you may contact the Human Ethics Sub-Committee. The contact details of the Ethics Administrator are:
Tina Langford,
Ethics Administrator,
Research Office,
James Cook University,
Townsville QLD 4811.
Phone: (07) 4781 4382 Fax: (07) 4781 5521 Email: Tina.Langford@jcu.edu.au

Appendix D: Survey Questions and Response Rates

N = Number of responses out of the 163 surveys that were returned

Q1a. How long have you lived at this address? N = 160 (99%)

Q1b. Where did you live before moving to this area? N = 158 (98%)

Q1c. What is your residence surrounded by? N = 221 (+100%)
Respondents were given the options of 1. Other residences or buildings,
2. Bushland or open space, 3. Other (please specify) and 0. Unsure

Q2. Please think about the risk of fire in the area. Circle the number that shows the extent you agree or disagree with the statements listed below. N = 161 (99%)
Respondents were given the options of 1. Agree strongly, 2. Agree slightly, 3. Neither, 4. Disagree slightly, 5. Disagree strongly and 0.Unsure.

- I am less concerned about the risk of fire than about other risks to personal safety
- I moved here to be closer to nature
- I think about the risk of fire here every day
- The impact of fire is far greater than of any other risk
- I believe the bush should be left as untouched as possible
- I haven't really thought about fire risks

Q. 3 Please circle the number that corresponds to your answer for <u>each</u> action listed. N = 146 (91%)

Q3a. Of the actions listed below, what actions have you taken over the past few months to protect your home against the threat of fire?
Q3b. What actions have you taken <u>before</u> the past few months to protect your home against the threat of fire?
Q3c. What other actions to protect your home against the threat of fire are you aware of?
Q3d. Which of these actions would you also consider taking before the start of the bushfire season?
Q3e. And on which of these actions would you look for further information or advice?

- Cleared junk out of the yard
- Cleaned out the gutters
- Cut the grass
- Removed overhanging branches
- Ensured flammable items and fuel are safe
- Checked sources of water and hoses
- Talked to the neighbours about fire safety
- Established a local warning system
- Contacted the Fire Service for Safe Home visit
- Installed smoke alarms
- Installed sprinkler system (internal/external)
- Checked smoke alarms
- Purchased fire extinguisher or blanket
- Formulated an evacuation plan
- Contacted Council about clearing vegetation
- Decided on situations to stay or go
- Checked equipment
- Established fire breaks or buffers
- Brushed up on First Aid knowledge

Other Actions (please specify):

Q4. What specifically prompted the actions you took over the past few months?
N = 154 (94%)

Q5a. Please circle the number that shows the extent to which you agree or disagree with each of the following statements. N = 152 (94%)

- There is very little you can do to protect yourself and your home against bushfire (N=155)
- Protecting my home properly is too expensive (N=152)
- There is no point in me protecting my property if my neighbours don't (N=152)
- If fire were to arrive, we would leave rather than try to protect our property (N=150)
- Survival is more about instinct than planning (N=149)

- "There is no point protecting my property if Council/ other agencies don't clear foliage/ back burn" (N=152)

Q5b. Who do you consider to be responsible for keeping homes safe from bushfires? Please rank from 1 is most responsible, 5 is the least responsible. N = 146 (91%)

- The individual householder
- Groups of neighbours who live close to each other
- Queensland Fire and Rescue Service
- Local Council
- Parks and Wildlife Service
- Other (please specify):

Q6a. Which of the following aspects of bushfire safety do you feel confident that you know enough about to be able to do or use if the need arose? N = 161 (99%)

- How to prepare your property to minimise the impact of bushfire
- The equipment you need to deal with fire
- Where to get information and advice
- The situations in which you should stay or leave your home
- First Aid
- Where to buy the equipment you need
- The cost of protecting your property against fire
- What to do if you are trapped in your home in a bushfire
- What to do if you are trapped in your car in a bushfire

Q6b. Do you have an action plan for any of the following hazards? N = 229 (+100%)

Bushfire House fire Storms Other

Q6c. Can you briefly describe any actions plans you might have? N=100 (62%)

Q6d. There are Fire Meters around your area. Please indicate what you think each category on the Fire Meter means to you.

Low Moderate High Very High Extreme Fire Ban

Q7a. Who would you obtain advice from in relation to bushfire safety measures? N = 124 (77%)

Q7b. Which of these means of presenting bushfire safety information and advice do you think would work best for you? N=211 (+100%)

- Programs which bring together small groups of residents in their homes or local halls to work together with the Fire Service two or three times through the bushfire season.
- Larger community meetings to which all local residents are invited in a local park near your home. A talk is given and safety literature distributed.
- The distribution of safety literature through local letterboxes with information on where to get further assistance.
- Information in local media (newspapers, noticeboards, schools etc.).
- More general advertising and media coverage (television, newspapers, radio).

Q7c. Which of the following statements represent your views on fire breaks? Please circle the number that best corresponds to your views. N = 175 (+100%)

1. I feel safer knowing fire breaks are there.
2. I do not know anything about fire breaks.
3. Fire breaks are an essential part of bushfire prevention.

Q7d. What do you think fire breaks are used for? N = 140 (87%)

Q7e. Which of the following best reflects your views on controlled burning? N = 209 (+100%)

- An essential part of bushfire prevention
- A health hazard
- It damages the plants and animals
- The smoke is a nuisance
- A bit of a nuisance but on balance is necessary

Q8a. Which statements best describe your own experience of fire? Respondents were asked to circle the numbers that relate to their experience. N = 189 (+100%)

- I have never had experience of fire anywhere that I have lived
- I have experience of bushfire in this area
- I have experience of bushfire somewhere that I have lived before
- I have experience of fire at home in this area
- I have experience of fire at home somewhere that I have lived before

Q8b. Please indicate whether you have had experience of other kinds of hazards and write how many years ago. N = 144 (90%)

Earthquake Flood Cyclone Landslide Other (please specify)

Q8c. Please write in the box below what you think of as being the bushfire season at Tamborine Mountain. N = 144 (90%)

Q8d. What other things do you think are more important than worrying about bushfires? N = 119 (74%)

Q8e. For your area, please rank hazards in order from 1 for the most important hazard to 5 for the least important hazard. N = 154 (96%)

Earthquake Flood Landslide Bushfire Cyclone Other (please specify)

Q8f. Please indicate if and when there is a season for another type of hazard in your area. Respondents were asked to write the hazard and season in a space provided.

Q9. What home safety advertising or media coverage has had impact on the way that you think about the safety of your property and family? N = 221 (+100%)

<u>Demographics information</u>

Q10a. Please indicate whether you are male or female. N = 169 (+100%)

Q10b. Which of the following age ranges include you? N = 161 (99%)

25 years and under 26 to 40 years 41 to 55 over 55 years

Q10c. Which of these statements best describes your household here? N = 160 (99%)

- Single person living alone
- Couple with children
- Couple where children have left home
- Family where youngest child is aged under 7 years
- Family where youngest child is aged 7-12 years
- Family where youngest child is aged 13-17 years
- Family with adult children/household of related adults
- Single parent family
- Household of unrelated adults

Q10d. Write the occupations of the household's main wage earners. N = 144 (89%)

Q10e. Circle the one which best describes your employment status. N = 162 (100%)

Full time Part time Casual/ temporary Student Retired Not currently working

Q10f. Which one of the following best describes your occupation? N **=** 130 (81%)

Professional/ management Business owner Self employed Office worker/ white collar Tradesperson/ skilled worker Household manager Something else?

Q10g. Please indicate your work location and the total hours that you take commuting to and from work each day. N = 85 (53%)

Q10h. Do you own your home, have a mortgage, or rent? N = 150 (93%)

Q10i. How old is your property is in years. N = 111 (69%)

Q10j. What is your home is made of? N = 208 (+100%)

Wood Brick Fibro Plasterboard Other

Q10k. What is your level of household insurance for bushfire? N = 156 (97%)

Fully covered Partially covered Not sure of level of coverage

Q10l. Where is your location on Tamborine Mountain? N = 160 (99%)

Eagle Heights Mount Tamborine North Tamborine Tamborine Mountain

Q10m. What type of property they are you situated on? N = 178 (+100%)

Escarpment Hobby farm Bushland/ forest Residential street Rural Road Other

Appendix E: Survey Results

Table 22: Tamborine Mountain Residents' Bushfire Preparedness Survey - Where people last lived before moving to their current address (N=158)

Moved from	%
Gold Coast, Queensland	23.5
Brisbane, Queensland	20.0
Tamborine Mountain, Queensland	15.0
Rural New South Wales	14.0
Rural Queensland	7.0
Overseas	5.7
Sydney, New South Wales	4.5
Logan City, Queensland	2.5
Melbourne, Victoria	2.5
Canberra, Australian Capital Territory	2.0
Townsville, Queensland	1.0
Rural Victoria	0.5
Rural Tasmania	0.5
Rural Western Australia	0.5
Adelaide, South Australia	0.5
Total	**100**

Table 23: Tamborine Mountain Residents' Bushfire Preparedness Survey - Occupations of the household's main wage earners (N=163)

Occupation	%
Retired	38
Teacher/ Education	10
Manager	7
Landscaper/ Gardener	5.5
Administration	3.5
Sales	3.5
Self employed	3.5
Computer programmer	3
Accountant	3
Hospitality worker	3
Nurse	3
Consultant	2
Mechanic	2
Carpenter	2
Artist	1
Engineer	1
Director	1
Security	1
Massage therapist	1
Electrician	1
Miscellaneous (can not identify single occupations)	4.6
Total	**100**

Table 24: Tamborine Mountain Residents' Bushfire Preparedness Survey - Household situation of respondents (N=160)

Household type	**%**
Couple without children	34
Couple where children have left home	20.5
Single person living alone	14
Family where youngest child is aged under 7 years	9
Family with adult children/household of related adults	9
Family where youngest child is aged 7-12 years	6
Family where youngest child is aged 13-17 years	5.5
Single parent family	2
Household of unrelated adults	0
Total	**100**

Table 25: Tamborine Mountain Residents' Bushfire Preparedness Survey - Bushfire preparedness activities that respondents would consider or would like advice on * (N=146)

Bushfire preparedness activities	**Would consider action %**	**Would like advice %**
1. Cleared junk out of the yard	4	0
2. Cleaned out the gutters	5	0
3. Cut the grass	2	0
4. Removed overhanging branches	7	1
5. Ensured flammable items and fuel are safe	12	1
6. Checked sources of water and hoses	5	0
7. Talked to the neighbours about fire safety	33	4
8. Established a local warning system	36	25
9. Contacted the Fire Service for Safe Home visit	37	18
10. Installed smoke alarms	7	2
11. Installed sprinkler system (internal/external)	24	11
12. Checked smoke alarms	17	1
13. Purchased fire extinguisher or blanket	16	5
14. Formulated an evacuation plan	23	8
15. Contacted Council about clearing vegetation	32	10
16. Decided on situations to stay or go	25	16
17. Checked equipment	14	6
18. Established fire breaks or buffers	14	13
19. Brushed up on First Aid knowledge	14	7

*** The percentages separately represent whether the respondent would consider action or like advice,**

Table 26: Tamborine Mountain Residents' Bushfire Preparedness Survey - Proportion of respondents with an action plan for house fire/storms/bushfire (N=229*)

Hazard	**% ****
House fire	55.8
Storms	49.4
Bushfire	44.4
Other (please specify) ***	3.8

*** Some respondents had an action plan for more than one hazard; each considered separate.**
**** Percentages are from the base of total responses to the options.**
***** "Burglar" and "cyclone" were outlined as being hazards.**

Table 27: Tamborine Mountain Residents' Bushfire Preparedness Survey - Respondents' perceptions of what is more important than worrying about bushfires (N=162)

Matters, concerns and issues	%
Personal and family matters	12.5
Road safety	10.5
Burglary/ crime	10.5
Cyclones/ storm	10.5
Nothing, bushfire is the main concern	9
Health and well-being	7
Everyday life concerns	5
Environmental protection	5
Water issues	5
Being prepared for bushfire	4
House fire	2.5
Electricity issues	2.5
Worrying about fire achieves nothing	2.5
Child safety issues	2.5
Home safety issues	2
Snakes	2
Terror/ peace issues	2
Falling trees	1
Home maintenance	1
Sudden death/ threat	1
Disease outbreak	0.5
Mobility	0.5
Council rates	0.5
Just about everything	0.5
Total	**100**

Table 28: Tamborine Mountain Residents' Bushfire Preparedness Survey - Who respondents would obtain advice from in relation to bushfire safety measures (N=124)

Person/ Organisation	%
Local Rural Fire Brigade	48
Queensland Fire and Rescue Service	14
Local Rural Fire Brigade/ Queensland Fire and Rescue Service	7
Local Rural Fire Brigade/ Local Council	7
Invalid answer (yes/ no)	2
Local Council	2
Local Council/ Queensland Fire and Rescue Service	2
Local Rural Fire Brigade/ State Emergency Services	2
Fire warden and Local Rural Fire Brigade	1.5
Myself/ friend	1.5
Fire warden	1.5
Don't know	1.5
Police/ Local Rural Fire Brigade/ Local Council	1.5
Local Rural Fire Brigade/ Queensland Fire and Rescue Service/ Council	1.5
Queensland Fire and Rescue Service/ Local Council/ Library	1.5
Local Rural Fire Brigade/ Police/ Information Centre	1.5
Locals/ Queensland Fire and Rescue Service/ Council	1.5
Local Rural Fire Brigade/ Council/ Queensland Parks &Wildlife Service	1.5
Local Rural Fire Brigade/ Council/ Queensland Fire and Rescue Service	1.5
Local Rural Fire Brigade/ Queensland Fire and Rescue Service/ Police	1.5
Total	**100**

Appendix F: Statistical Analysis Plan

The following variables were analysed with SPSS for relationships with other variables.

Residence/ Type of Property

- How long lived at address
- Where they lived before moving to area
- Escarpment, Hobby farm, Bushland/Forest, Residential Street or Rural Road.

Perceptions of fire risk

- Less concerned about the risk of fire than about other risks to personal safety.
- Moved there to be close to nature.
- Think about the risk of fire here everyday.
- The impact of fire is far greater than of any other risk.
- The bush should be left as untouched as possible.
- Haven't really thought about fire risks.
- There is very little you can do to protect yourself and your home against bush fire.
- Protecting my home properly is too expensive.
- There is no point in me protecting my property if my neighbours don't.
- If fire were to arrive, we would leave rather than try to protect our property.
- Survival is more about instinct and common sense than planning.
- There is no point in me protecting my property if the Council/other agency don't clear foliage or back burn.
- If fire were to arrive, we would just call the fire brigade.

Experience with fire:

- Never had experience of fire anywhere they lived
- Experience with bushfire in the area/elsewhere

Responsibility for keeping homes safe from bushfire

- Individual householders/groups of neighbours more responsible
- Fire service/other agency more responsible

Bushfire preparedness actions:

- Checked sources of water and hoses
- Installed smoke alarms
- Formulated an evacuation plan
- Decided on situations to stay or go
- Established fire breaks or buffers
- Action plan or not

Confidence in actions against the threat of bushfire

- How to prepare your property to minimise the impact of bush fire
- Where to get information and advice
- The equipment you need to deal with fire
- First Aid
- The situations in which you should stay or leave your home
- What to do if you are trapped in your home in a bushfire
- Where to buy the equipment you need
- What to do if you are trapped in your car in a bushfire
- The cost of protecting your property against fire

Views on controlled burns:

- An essential part of bushfire prevention
- A health hazard/nuisance

Preferred methods of presenting bushfire information and advice:

- Programs which bring together small groups of residents to work together with the Fire Service two or three times through the bushfire season.
- Larger community meetings to which all local residents are invited in a local park near your home. A talk is given and safety literature distributed.
- The distribution of safety literature through local letterboxes with information
- Information in local media (newspapers, noticeboards, schools etc.).
- More general advertising and media coverage (television, newspapers, radio).

Appendix G: Cross Tabs & Chi-square Test Results of Key Variables

The following Cross Tabs and Chi-square test results have been reported to support the Key Variables section at the end of Chapter 5. Some of the relationships of key variables are described as the overall percentage of how many respondents had taken a certain action or were confident in their bushfire preparations or who they viewed as responsible for protection of life/property. All of the significant key variables are supported by Chi-square test results (x^2 = Pearson Chi-square, df = distribution frequency and p = significance). The relationships that are significant have been reported. As in Chapter 5, the key variables are presented under four sub-headings: Preparations against the risk of bushfire; Perceptions of bushfire risk; Confidence with bushfire safety aspects; and Responsibility for protection of life and property in the event of a bushfire.

Section 1: Preparations against the risk of bushfire

Checked sources of water and hoses:

- 97% of those over the age of 55 checked; 95% for between the ages of 41-55, 69% for between the ages of 26-40. 93% of overall respondents had taken recent action. x^2=16.439, df=3, p=0.01 (significant).

Installed smoke alarms:

- 87% of those over the age of 55 had taken action to install smoke alarms, 82% for those between the ages of 41-55, 57% were between the ages of 26-40. 90% of overall respondents had taken action. x^2=8.238, df=3, p=0.041 (significant).

Decided on situations to stay or go:

- Those who had taken no action on a decision to stay or go were less concerned about the risk of fire than about other risks to personal safety. x^2=8.289, df=2, p=0.016 (significant).
- Those who had taken no action on a decision to stay or go were more likely to disagree that they think about the risk of fire everyday. x^2=7.159, df=2, p=0.028 (significant).

Property type:

- 50% of those who lived in or adjacent to bushland had not made the decision to stay or go; 33% for those who lived on a rural road; 33% for those who lived on a hobby farm; 32% for those who lived near the escarpment; and 17% for those who lived in a residential area. 26% of overall respondents had taken recent action. x^2=14.904, df=5, p=0.011 (significant).

Established fire breaks:

- 56% of those with no children had taken action to establish a fire break compared to 24% of those who have children. 42% had taken recent action. x^2=2.455, df=1, p=0.177 (approaching significant).
- 52% of those over the age of 55 had taken action; 30% for those between the ages of 41-55; 18% for those between the ages of 26-40. 40% had taken recent action. x^2=7.783, df=3, p=0.05 (significant).
- 52% of those who had experienced fire in another area had taken action compared to 33% of those who had no experience of fire in other area. 41% had taken recent action. x^2=4.126, df=1, p=0.042 (significant).

Rural/urban background:

- 58% of respondents from an urban background had talked to their neighbours about fire safety, and 19% of those from a rural background had done so. 28% of overall respondents had taken action. x^2=6.461, df=1, p=0.011 (significant).

Risk perception:

- Those that disagreed with the statement “I am less concerned about the risk of fire than about other risks to personal safety” were more likely to talk to neighbours about fire safety. x^2=13.699, df=3, p=0.001 (significant).
- Those that disagreed with the statement “I am less concerned about the risk of fire than about other risks to personal safety” were more likely to have decided on situations to stay or go. x^2=8.289, df=2, p=0.016 (significant).
- Those that disagreed with the statement “I am less concerned about the risk of fire than about other risks to personal safety” were more likely to have a bushfire plan. x^2=7.303, df=2, p=0.026 (significant).
- Those who think about the risk of fire everyday were more likely to have decided on whether to stay or go. x^2=7.159, df=2, p=0.028 (significant).

- Those who think about the risk of fire everyday were more likely to have talked to the neighbours about fire safety. x^2=4.758, df=2, p=0.093 (significant).
- Those who think about the risk of fire everyday were more likely to have a bushfire plan. x^2=6.199, df=2, p=0.045 (significant).

Time and resources available:

- Those who had checked equipment were less likely to be renters than owners. x^2=8.025, df=1, p=0.005 (significant).
- Those who had built a fire break were less likely to be renters than owners. x^2=3.955, df=1, p=0.047 (significant).
- Those who had checked equipment were less likely to have children. x^2=4.837, df=1, p=0.028 (significant).
- Those who had checked fuels were safe were more likely to have children. 93% of those who had made sure fuels were safe had no children compared to 74% of those who had children. 86% of overall respondents had taken recent action. x^2=9.644, df=1, p=0.002 (significant).

State of previous residence:

- People from interstate were more likely to have agreed that there is little they can do to protect life and property from bushfire. 61% from interstate agreed compared to 48% who were from Queensland. x^2=6.176, df=2, p=0.046 (significant).

Gender:

- Females were more likely to have agreed that home protection is too expensive. 15% of females agreed that home protection is too expensive compared to 4% of males. 10% of overall respondents agreed x^2=7.963, df=2, p=0.019 (significant).
- Females were likely to have agreed that there is no point protecting their home if neighbours don't. 16% of females agreed that "there is no point in protecting my home if neighbours don't" compared to 6% of males. 11% of overall respondents agreed. x^2=6.131, df=2, p=0.047 (significant).
- The most significant relationship with females was that most (56%) would leave if a fire came. 56% of females agreed that they would leave if a fire came

compared to 18% of males. 37% of overall respondents agreed x^2=21.732, df=2, p=0.000 (significant).

Surroundings of property:

- Those living in bushland/forest, on a hobby farm or a rural road were more likely having agreed that preparation is pointless if Council do not undertake bushfire prevention. x^2=15.946, df=8, p=0.043 (significant).

Renter/Owners:

- Homeowners appeared to know more about firebreaks. 94% of homeowners indicated that they knew about firebreaks compared to 70% of renters. 92% of overall respondents indicated that they knew about firebreaks. x^2=3.955, df=1, p=0.047 (significant).
- Homeowners were more likely fully covered for insurance; renters were more likely to be not sure about the level of coverage. 82% of homeowners were fully insured compared to 33% of renters. 79% of overall respondents were fully insured. 15% of homeowners were not sure of their level of insurance compared to 67% of renters. 18% of overall respondents were not sure of their level of coverage for insurance. x^2=15.004, df=2, p=0.001 (significant).

<u>Section 2: Perceptions of bushfire risk</u>

Retirees:

- 60% of retirees agreed that they are less concerned about the risk of fire compared to other risks to personal safety compared to 42% of those who were not retired. 50% agreed, 20% neither agreed nor disagreed, 30% disagreed. x^2=6.959, df=2, p=0.031 (significant).
- 86% of those who were not retired disagreed that “I haven’t really thought about the fire risk” compared to 70% of those not retired. x^2=7.947, df=2, p=0.019 (significant).

Renters/owners:

- 33% of homeowners disagreed that the impact of fire is greater than other risks compared with 0% of renters. 31% of overall respondents disagreed, 12%

neither agreed nor disagreed, 57% agreed. X^2=6.334, df=2, p=0.042 (significant).

Type of property:

- 94% of those living in bushland or forest, 86% of those living near the escarpment, 83% of residential property-owners and 71% of those living on a rural road disagreed that "there is no use in preparing their property for bushfire if their neighbours don't". The most likely to have agreed were those who lived on a rural road (28%), followed by residential property owners (11%), and those who lived near the escarpment (11%). There were no property owners who lived amongst bushland that agreed with the statement. x^2=9.578, df=2, p=0.008 (significant).
- 86% of those who were living in bushland or forest were more likely to disagree that "I haven't really thought about the fire risk"; only 5% agreed and 9% neither disagreed nor agreed. x^2=7.228, df=3, p=0.027 (significant).

Experience of fire:

- Those who had experienced fire in another area were more likely to leave their property in the event of a fire. x^2=6.376, df=2, p=0.041 (significant).
- Those who had experienced fire in another area were more likely to agree that "survival is more about instinct and common sense than planning". x^2=7.294, df=2, p=0.026 (significant).

<u>Section 3: Confidence with bushfire safety aspects</u>

Property preparations:

- Those who were confident in preparing their property to minimise the risk of bushfire were more likely to remove branches. x^2=4.582, df=1, p=0.032 (significant).
- Those who were confident in preparing their property to minimise the risk of bushfire were more likely to have an evacuation plan. x^2=6.661, df=1, p=0.010 (significant).
- Those who were confident in preparing their property to minimise the risk of bushfire were more likely to have decided on whether to stay or go. x^2=6.788, df=1, p=0.009 (significant).

- Those who were confident in preparing their property to minimise the risk of bushfire were more likely to have checked equipment. x^2=6.585, df=1, p=0.010 (significant).
- Those who were confident in preparing their property to minimise the risk of bushfire were more likely to have established a fire break. x^2=3.724, df=1, p=0.054 (approaching significant).
- Those who were confident in the equipment they need to deal with fire were more likely to have checked smoke alarms. x^2=7.754, df=1, p=0.005 (significant).
- Those who were confident in the equipment they need to deal with fire were more likely to have installed sprinkler systems. x^2=4.642, df=1, p=0.031 (significant).
- Those who were confident in the equipment they need to deal with fire were more likely to have purchased a fire extinguisher or blanket. x^2=4.916, df=1, p=0.027 (significant).
- Those who were confident in the equipment they need to deal with fire were more likely to have formulated an evacuation plan. x^2=6.602, df=1, p=0.010 (significant).
- Those who were confident in the equipment they need to deal with fire were more likely to have checked equipment. x^2=9.421, df=1, p=0.002 (significant).
- Those who were confident in the equipment they need to deal with fire were more likely to brushed up on first aid. x^2=6.534, df=2, p=0.038 (significant).
- Those who were confident where to buy the equipment they need were more likely to have ensured flammable items and fuels are safe. x^2=5.77, df=1, p=0.016 (significant).
- Those who were confident where to buy the equipment they need were more likely to have established a local warning system. x^2=4.376, df=1, p=0.036 (significant).
- Those who were confident where to buy the equipment they need were more likely to have installed a sprinkler system. x^2=6.788, df=1, p=0.009 (significant).

- Those who were confident where to buy the equipment they need were more likely to have purchased a fire extinguisher or blanket. x^2=5.614, df=1, p=0.018 (significant).
- Those who were confident where to buy the equipment they need were more likely to have formulated an evacuation plan. x^2=9.064, df=1, p=0.003 (significant).
- Those who were confident where to buy the equipment they need were more likely to have decided on situations to stay or go. x^2=7.133, df=1, p=0.008 (significant).
- Those who were confident where to get information and advice were more likely to have made ensured flammable items and fuels are safe. x^2=4.358, df=1, p=0.037 (significant).
- Those who were confident where to get information and advice were more likely to have checked equipment. x^2=10.377, df=1, p=0.001 (significant).
- Those who were confident in whether to stay or go were more likely to have purchased a fire extinguisher or blanket. x^2=6.572, df=1, p=0.010 (significant).
- Those who were confident in whether to stay or go were more likely to have formulated an evacuation plan. x^2=8.938, df=1, p=0.003 (significant).
- Those who were confident in whether to stay or go were more likely to have brushed up on first aid. x^2=5.955, df=2, p=0.05 (approaching significant).
- Those who were confident in first aid were more likely to have cleaned gutters. x^2=5.507, df=1, p=0.019 (significant).
- Those who were confident in first aid were more likely have decided on whether on situations to stay or go. x^2=6.883, df=1, p=0.009 (significant).
- Those who were confident in first aid were more likely have checked equipment. x^2=5.516, df=1, p=0.019 (significant).

Property type:

- Those living within or adjacent to bushland or forest (including those living near the escarpment) were more likely to be confident that they have equipment needed to deal with fire. x^2=5.191, df=1, p=0.023 (significant).
- Those living within or adjacent to bushland or forest (including those living near the escarpment) were more likely to be confident in situations to stay or go. 50%

of those living within or adjacent to bushland or forest were confident in a plan to stay or go in the event of a fire compared to 80% of those living near the escarpment, 57% of those who lived on a rural road and 44% of those who lived in a residential area. 46% of overall respondents were confident. x^2=5.033, df=1, p=0.025 (significant).

Gender:

- Males were more likely to be confident where to buy equipment. 48% of males were confident where to buy equipment-related preparations compared to 32% of females. 40% of overall respondents were confident. x^2=3.734, df=1, p=0.05 (significant).

Children and costs:

- Those without children appeared more likely to be confident with the costs for preparing against the risk of bushfire. 27% of those without children were confident compared to 12% of those with children. 21% of overall respondents were confident x^2=4.036, df=1, p=0.045 (significant).

Insurance and equipment preparations:

- Those with full insurance for a fire event were more likely to be confident if they have equipment prepared. 82% of those who were confident were fully insured, 3% were partially insured and 15% were not sure of their level of insurance. 39% of overall respondents were confident with equipment-related preparations. x^2=5.808, df=2, p=0.05 (significant).

Bushfire plan:

- Those with a bushfire plan were more likely to be confident if they were less concerned about the risks of fire than about other risks to personal safety. x^2=7.303, df=2, p=0.026 (significant).
- Those with a bushfire plan were more likely to be confident if they think about fire everyday. x^2=6.199, df=2, p=0.045 (significant).
- Those with a bushfire plan were more likely to be confident if they disagreed that “there is no point in protecting my property if my neighbours don’t”. Out of

those with a bushfire plan, 94% disagreed with the statement. 44% of overall respondents had a bushfire plan. x^2=6.174, df=2, p=0.046 (significant).

- Those with a bushfire plan were more likely to be confident if they disagreed that they would just call the fire brigade in the event of a fire. 53% of those who were confident in preparations for bushfire disagreed that "they would just call the fire brigade in the event of a fire", 45% agreed with the statement and 2% neither agreed nor disagreed. 80% of overall respondents were confident. x^27.057, df=2, p=0.029 (significant).
- Those with a bushfire plan were more likely to be confident if they had talked to neighbours about fire safety. x^2=10.934, df=1, p=0.001 (significant).
- Those with a bushfire plan were more likely to be confident if they had ensured flammable items and fuels are safe. x^2=9.071, df=1, p=0.003 (significant).
- Those with a bushfire plan were more likely to be confident if they had established a local warning system. x^2=4.008, df=1, p=0.045 (significant).
- Those with a bushfire plan were more likely to be confident if they had formulated an evacuation plan. x^2=10.016, df=1, p=0.002 (significant).
- Those with a bushfire plan were more likely to be confident if they had decided on situations to stay or go. x^2=13.746, df=1, p=0.000 (significant).
- Those with a bushfire plan were more likely to be confident if they checked equipment. x^2=16.652, df=1, p=0.000 (significant).
- Those with a bushfire plan were more likely to be confident if they established a fire break. x^2=7.986, df=1, p=0.005 (significant).

First aid:

- Those in the workforce were more confident with first aid. x^2=4.722, df=1, p=0.030 (significant).

Decided on situations to stay or go:

- Past bushfire experience increased confidence in having decided to stay or go in the event of fire. 60% of those who had experience with bushfire were confident in a plan to stay or go compared to 41% of those who had no experience of bushfire in the local area. 46% of overall respondents were confident. x^2=4.272, df=1, p=0.039 (significant).

Section 4: Responsibility for protection of life and property in the event of a bushfire

Renters/Owners:

- Homeowners were more likely than renters to agree that the householder is more responsible than fire services for protection of life and property in the event of a bushfire (94% of homeowners viewed householders as more responsible compared to 67% of renters). x^2=9.164, df=1, p=0.002 (significant).

Less likely to just call the brigade:

- Those less likely to just call the brigade in the event of a fire are also more likely to have expressed the view that the householder is more responsible. 53% of those who viewed householders as more responsible disagreed that they would only call the fire brigade, 47% of those who viewed householders as more responsible agreed that they would call. 92% of overall respondents viewed householders as more responsible. x^2=8.705, df=2, p=0.013 (significant).
- Those less likely to just call the brigade in the event of a fire are also more likely to have expressed the view that groups of neighbours are more responsible for protecting property from bushfire. 55% of those who viewed groups of neighbours as more responsible disagreed that they would only call the fire brigade, 45% of those who viewed householders as more responsible agreed that they would call. 70% of overall respondents viewed householders as more responsible. x^2=11.077, df=1, p=0.004 (significant).

Over the age of 55:

- Those over the age of 55 were more likely to believe that neighbours are more responsible for protecting property from bushfire include (80% compared to 65% of those between the ages of 41-55, and 38% of those between the ages of 26-40). x^2=14.632, df=3, p=0.002 (significant).

Homes surrounded by or adjacent to bushland:

- Respondents with homes surrounded by or adjacent to bushland were less likely to have expressed the view that the householder is more responsible for protecting property from bushfire. 14% of those with their house surrounded by bushland expressed the view that the householder is less responsible than fire services/other agencies; 3% of those whose house was not surrounded by

bushland held the same view. Only 9% of overall respondents expressed the view that the householder is less responsible than fire services/other agency. x^2=5.47, df=1, p=0.019 (significant).

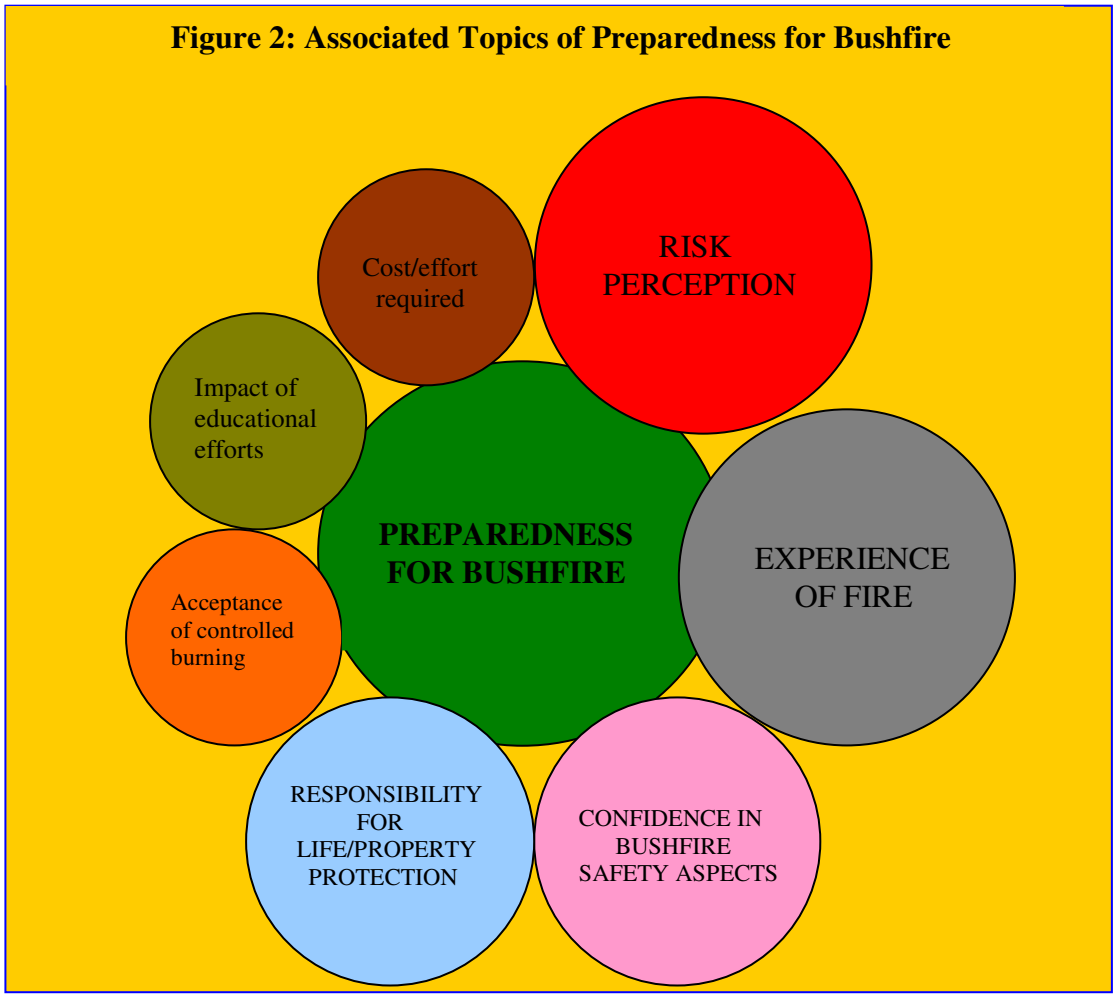
- Respondents with homes surrounded by or adjacent to bushland appear to be more likely to believe that Queensland Parks and Wildlife are more responsible. x^2=7.176, df=1, p=0.007 (significant).

Those more likely to believe that the Council is more responsible:

- Those more likely to believe that the Council is more responsible protecting property from bushfire were respondents between the ages of 41-55. 81% of those between the ages of 26-40 and 80% of those between the ages of 41-55 believed that the Council is more responsible compared to 51% of those over the age of 55. 63% of overall respondents expressed the view that Council is more responsible. x^2=13.121, df=3, p=0.004 (significant).
- Those more likely to believe that the Council is more responsible protecting property from bushfire were in the workforce. 73% of those who were in the workforce believed that the Council is more responsible compared to 52% of those who were not working. 63% of overall respondents expressed the view that Council is more responsible. x^2=7.204, df=1, p=0.007 (significant).
- Those more likely to believe that the Council is more responsible protecting property from bushfire had children. 76% of those with children believed that the Council is more responsible compared to 57% of those without children. 62% of overall respondents expressed the view that the Council is more responsible. x^2=4.741, df=1, p=0.029 (significant).

Appendix H: Conclusion of Results

Figure 2: Associated Topics of Preparedness for Bushfire



Appendix I: Key Research Findings Related to Community Education

Perceptions of bushfire awareness in the context of community education:

- There was overall agreement between fire services and the community that there were varied degrees of perception about the risk of fire.
- Survey respondents have indicated that they were not really more or less concerned about the risk of fire than about other risks to personal safety but perceived bushfire as the most important local natural hazard listed on the survey ahead of cyclones, landslides, flood and earthquakes.
- Respondents indicated that they were aware of bushfire being a hazard, but had other priorities in their everyday lives such as "personal and family matters" and "home and environmental matters" which took precedence to constant concern.
- Risk perception emerged as a significant influence on respondents' bushfire preparations. Those respondents that placed a high priority on the risk of bushfire were more likely to participate in preparation activities.
- Awareness of bushfire season/ risks are associated with experience of bushfire.
- Awareness from bushfire events decreases with increases in the distance from major bushfire events.
- Both fire services and the community held an overall view that fire breaks and controlled burning are necessary fire management initiatives.

Responsibility for protection of life and protection, as well as confidence in bushfire safety aspects was an indicator of areas that need attention for community education:

- Individual householders see themselves as the most responsible for safety.
- Householders' expectations of the fire services, Council/other agency depended on factors such as age, marital status, number of children, surroundings of residence, employment status, and commuting time to workplace.
- Most survey respondents were not confident with all of the listed aspects of bushfire safety and preparations on average were not high.
- Those who were confident in their preparations for safety against the risk of fire were more likely to take more responsibility for protection of life and property.
- The amount of respondents who indicated they would consider time-consuming preparations (e.g. before the start of the next fire season) indicated that preparations could be boosted, and the amount of responses for advice wanted

for certain preparative actions suggests that there were actions and preparation topics which some members of the community would like to be better informed about.

Overall actions not taken against the threat of fire; would consider action/ like advice:

- "Contacted the Fire Service for a Safe Home visit" action not taken (92%); would consider action (37%); would like advice (18%).
- "Installed a sprinkler system (internal/external)" action not taken (88%); would consider action (24%); would like advice (11%).
- "Established a local warning system" action not taken (79%); would consider action (36%); would like advice (25%).
- "Contacted Council about clearing vegetation" action not taken (62%); would consider action (32%); would like advice (10%).
- "Decided on situations to stay or go" action not taken (57%); would consider action (25%); would like advice (16%).
- "Talked to the neighbours about fire safety" action not taken (54%); would consider action (33%); would like advice (4%).
- "Formulated an evacuation plan" action not taken (52%); would consider action (23%); would like advice (8%).

Particular bushfire safety aspects that respondents were not confident in overall:

- "Cost of protecting property against bushfire" (77.8%);
- "What to do if you are trapped in your car in a bushfire" (64.5%);
- "Where to buy the equipment you need" (60.5% were not confident);
- "What to do if you are trapped in your home in a bushfire" (59.5%);
- "First aid" (56.9%);
- "The situations in which to stay or leave your home" (53.9%);
- "The equipment needed to deal with fire" (50%).