Bushfire Warning Systems in Australia

An investigation into the integration of the New Fire Danger Rating Scale for the Australasian Fire and Emergency Service Authorities Council

An Interactive Qualifying Project Report to be submitted to the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science

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ABSTRACT

For most of Australia's recent history of bushfire management the 'Stay or Go' policy was the generally accepted response system to wildfire emergencies throughout the country. However, the devastation incurred by the "Black Saturday" fires of February 2009 has established an urgent need to revise the Fire Danger Rating Scale (FDRS), and national response policies. This project has been commissioned by the Australasian Fire and Emergency Services Authorities Council (AFAC), to assess the efficacy with which changes to the FDRS and warning systems have been adopted by state and territory fire authorities. Research conducted by this project has enabled us to provide recommendations to AFAC and these fire authorities as a means of establishing more effective fire response policy.

AUTHORSHIP

Barton Phinney - Contributed to the introduction section of the report. He wrote the Bushfire Dynamics section, the Wildfire Management in Other Countries section, and the Implementation of 'Prepare Act Survive' section, and contributed to the Organization of the Fire Authorities section. He also contributed to the Introduction and objectives 2, 3, and 4 of the Methodology section. He wrote the Website Analysis sections, the section on the Fire Education Programs, the communications section, and the section written on the "Where Are They Going?" study. He wrote the Executive Summary and contributed to the Recommendations and Conclusions section, as well as contributed to general editing and revising of the report.

Neal J. McCloskey – He contributed through research of the history of bushfires and the current systems and practices in place across Australia. He focusing mostly on media reports and conducting the interviews. Neal wrote parts of the introduction, bushfire risks in Australia, fire response and the development of fire safety institutions, organization of fire authorities, social implications. He contributed to parts of the Executive Summary, Methodology, and Results and Analyses, and created some of the recommendations to be implemented. Beyond this his main focus was revising the format and structure of the paper.

Robert Connick- Robert contributed greatly to the Background, Methodology, Results and Analyses and Recommendations and Conclusions Chapters. He was one of the main note takers during the interviews and compiled all of the interview notes into summary. He wrote the AFAC, 'Stay or Go' policy, and Transition from 'Stay or Go' to 'Prepare, Act, Survive' sections of the background. He contributed to all sections of the Methodology, wrote sections 4.1 and 4.2 and contributed to section 4.4 of the Results and Analyses Chapter. He also contributed to designing and writing the recommendations and conclusions, and was responsible for researching and summarizing the powers of evacuation. He also served as the main editor of the paper.

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ABBREVIATIONS

ACT	Australian Capital Territory
AFAC	Australasian Fire and Emergency Services Authorities Council
BFSP	Bush Fire Survival Plan
CFA	Country Fire Authority
CFS	Country Fire Services
DSE	Department of Sustainability and Environment
FDRS	Fire Danger Rating Scale
FDWS	Fire Danger Warning System
FESA	Fire Emergency Services Authority of Western Australia
FFDI	McArthur Forest Fire Danger Index
MFB	Metropolitan Fire Brigade
NSWFB	New South Wales Fire Brigade
NTFRS	Northern Territories Fire and Rescue Service
TFS	Tasmanian Fire Service
QFRS	Queensland Fire and Rescue Service

EXECUTIVE SUMMARY

Bushfires, while necessary for the environment in many parts of Australia, continuously threaten mankind with their destructive power and speed. In order to help residents prepare for bushfires, the fire authorities of Australia adopted the 'Stay or Go' policy in the 1990s, which encouraged residents to either, stay and defend their homes during a fire, or to leave early. However, on February 7th, 2009, Australia experienced its most destructive bushfire, now dubbed "Black Saturday", which killed 173 people and destroyed over 2000 houses (Teague, 2009). With the impact of Black Saturday, a Royal Commission was called to investigate the fires and make recommendations for a new warning system to the fire authorities based on their findings. These findings included a new Fire Danger Rating Scale (FDRS) and a new bushfire policy highlighted by the slogan "Prepare Act Survive."

The ultimate goal of this project is to reduce the number of deaths and cost of property damage resulting from wildfires in Australia by working with the Australasian Fire and Emergency Service Authority Council to review how the new Fire Danger Rating Scale has been implemented throughout the various states and territories of Australia. This goal was pursued by identifying objectives of the state and territory fire authorities, assessing the extent of the implementation of the Fire Danger Rating Scale, addressing the social issues of bushfire risk, and examining the warning systems of each state or territory.

Our main method of research was conducting interviews with various representatives of the fire authorities from each state to see how they had implemented the new system, what parts of the system had been working well, and any difficulties they had in implementing the system. The interview questions involved topics such as:

- goals of the fire authority
- types of communications used
- bushfire education programs
- precautions used during a catastrophic warning
- use of last resort places
- opinions of the new warning system
- resources used to implement the new system

An evaluation of each authority's website was also conducted in order to find what information was accessible to residents online, how each site was used as a warning tool, and to research specifics about bushfire education programs offered by the fire authorities. Media reports were used to help gain a public perspective on the warning system as well as to identify bushfire incidents where the system either proved to be effective or not. The communication media of the states and territories was also examined to determine

what methods had worked well in the past, and what new media could be added to distribute the warnings and what media could be improved. Various reports were also examined to help gain information about public opinion and psychology to more fully understand how residents react to warnings. In the following, we discuss some of our findings that resulted in the use of these methods.

The fire authorities' main goal in relation to bushfire safety is "to protect life and property against fire" by providing timely and effective warnings, and assistance when possible, to residents during an emergency situation, and by educating the public on the dangers of bushfires and the proper precautions to defend against them. How each authority achieves these goals is based on several factors, such as the population density of the area, the frequency of bushfires, the resources available to manage bushfires, and the expectation of public responsibility for bushfire safety. The responsibilities of the fire authorities vary between states due to how funding is distributed and how different authorities work together. In general, if there is more than one fire authority, responsibility for bushfires and structural fires in rural areas is given to a rural fire service, while structural fires in densely populated areas are the responsibility of a city fire authority. In the past the collaboration of multiple emergency services during an incident has yielded much better results than when these organizations worked independently.

In general, Victoria, New South Wales, Australian Capital Territory, South Australia and Tasmania have implemented the new warning system by adopting the new Fire Danger Warning Scale, and switching to the new slogan of 'Prepare Act Survive'. Their websites of the main fire authorities include information such as the bushfire rating for the day, bushfire incident reports, bushfire weather, current fire bans, and information on Prepare Act Survive, and this information is displayed either on the home page or another page the like to which is clearly visible. Western Australia has also implemented the new warning system, and was the first to implement the telephone warning system but has opted to make future changes more gradually in order to allow time to conduct studies on how the new the system is working. Western Australia is also in the process of building a new website designed with the new warning system in mind. Queensland has some information about the new warning system on its website, but has yet to fully adopt the new system. This is because Queensland was in the middle of its bushfire season when the recommendations were released, and its typically wet climate does not normally provide the conditions for major bushfires similar to the ones in the southern states. However, the Commissioner of Queensland Fire and Rescue Service is aware that changes in climate can happen quickly and is planning to implement the new system fully, to prepare for the increase in the intensity of their bushfires that may result. The Northern Territory has made very little changes to their policy and is still currently using the previous system known as the Stay or Go policy. The reason that Northern Territory, like Queensland, has not adopted most of the new system is because the recommendations were released during their bushfire season, and they decided that to change the system midseason would cause too much confusion. However, the main fire authorities of the Northern Territories are planning to implement the changes to their system for the next bushfire season.

Bushfire education programs are needed to help educate residents on the new warning system and how it works. Pamphlets, flyers, and aggressive advertising campaigns have worked well in raising awareness of the new warning system. Volunteer programs in which volunteers are trained in distributing bushfire preparation information in order to educate their communities have worked well because they can educate residents about the new system without putting a strain on a fire authority's human and financial resources. Distributing bushfire safety DVD's has proved useful as well because the recipient does not have to leave his or her home or go online to find the information. Also, putting an emphasis on total family education with programs specially designed for women, children, and the elderly has worked well in ensuring each member of the family understands the new warning system. Targeting specific bushfire prone areas with educational information instead of the general public has worked well because these targeted people are much more interested in and in need of the information and take more responsibility in preparing for bushfires.

Using effective communication mediums to convey a warning is crucial to a warning system's success. There are three main types of warning messages: Advice (an incident has occurred but residents are not in danger yet), Watch and Act (bushfire is becoming more severe and may threaten residents), and Emergency Warning (residents are in danger and should take action immediately). These messages are sent either through mobile and landline phones or broadcast via local and national radio and television stations. Emergency Alert is a nationally accepted telephone warning system implemented in each state or territory by the fire authorities and while the system has been relatively successful, there are three key drawbacks. Text messages are sent only to mobiles registered in the area not the actual mobiles in the area, the information provided in these messages is limited, and in many cases warnings take too long to distribute to residents and as a result, they are often inaccurate. In most cases the radio and television broadcasts are the primary method for distributing these messages. When an Emergency Warning message is released radio and television broadcasts often precede the message with the Standard Emergency Warning Signal to help alert residents to the important information. These broadcasts have been effective in distributing the warning but have not been found to be effective at prompting residents to take action. The Internet is a popular communications medium because it allows fire services to upload information quickly to their website, and allows residents to access a large amount of information. However, this system requires the resident to be actively paying attention to the warnings and would not allow a resident to be warned when they are away from their computer. The best strategy has been found to be not trying to use one specific medium for all residents, but using as many different forms of communication as possible to ensure all residents are able to receive warnings.

Physical preparation of homes and property is essential for survival during a bushfire, but just as important is the emotional and psychological preparation. Defending against a bushfire can be an overwhelming psychological strain on residents, and many deaths have occurred when residents break down

and abandon their Bushfire Survival Plans. The best way found to combat this is to train and condition the general public to be able to deal with the anxiety of defending their homes during a bushfire. In the event a resident must defend their home from a bushfire it is important that they remain calm and collected, which can become difficult or impossible if they let their emotions control them. Because psychological preparedness is so essential to bushfire preparedness, it needs to be given equal weight to physical preparedness, and in some cases special attention depending on the targeted groups.

Based on our results and analysis, we have produced the following recommendations to help improve the implementation of the new warning system. These recommendations have been organized into four sections:

Recommendations to changes in Educational Programs

- Fire Authorities should expand and implement volunteer-run educational programs.
- Fire Authorities should distribute bushfire informational DVD's as part of bushfire awareness and preparation campaigns,
- Fire Authorities should provide Family Complete Bushfire Training, but also focus specifically on women and the elderly.
- Emergency Services and the Bureau of Meteorology should provide more information to the public on how warnings are determined and how bushfire risk is assessed.

Recommendations to changes in the 'Prepare, Act, Survive' policy and Other State and National Policies

- The Australasian Fire and Emergency Services Authorities Council (AFAC) should consider the development a national information website to promote a collective approach to bushfire preparation and safety.
- AFAC and the fire authorities should revise the terminology used in higher level warnings in order to provide an appropriate level of intensity and clarity.
- AFAC and the Fire Authorities should revise the directions to leave early provided in the 'Prepare, Act, Survive' policy
- Fire authorities should develop triage policies outlining their priorities during bushfires
- The new policy should be flexible in some areas to accommodate each state and territory's unique bushfire situation.
- The State and Territory governments should work toward revising the way in which emergency services are structured so these agencies can work more cooperatively.

- Fire authorities should emphasize the importance of the personal responsibility of the public to their safety.
- Fire authorities should encourage the public to view large scale, disastrous fires, as natural disasters.
- AFAC and the fire authorities should develop a national advertisement mascot to help raise awareness of bushfire safety.
- The States and Territories should revise the boundaries between emergency service jurisdictions to create the most efficient system.

Recommendations to changes in the National and State Warning Systems

- Fire Authorities should employ as many communication media as possible, by implementing new technologies and improving current technologies.
- Bushfire, and other hazard, information on Emergency Services' websites should be expanded and promoted.
- Fire Authorities should expand the Emergency Alert system to include multiple addresses beyond the pre-registered billing address, until the technology is developed to specifically send messages to mobiles in an area affected by a bushfire.
- Specific mobile websites and additional RSS feeds should be designed for each fire authority.
- Daily fire danger rating signs should be posted at strategic locations to advise people of the bushfire risk that day.

Other Recommendations

- Emergency Services should suggest specific places that residents can relocate to if they decide to leave their homes.
- Fire authorities should encourage the use of fire retardant plants on properties instead of native plants that burn easily.
- Reports of bushfire history and special considerations in the area should be provided to new residents.
- Emergency Services should implement media training for emergency response officials.
- Fire authorities and organizations like AFAC and the Bushfire CRC should cooperate to conduct research studies on the effectiveness of the new system, as well as the public knowledge of bushfire policy.

- Fire Authorities should create advancement opportunities for volunteer firefighters in order to strengthen the structure and implementation of volunteer programs
- Fire Authorities should implement exchange programs to strengthen relationships and spread ideas between states

In general, there are many studies underway to analyze the effectiveness of the new warning system, but little assessment has been completed. Without the results of these investigations, it is difficult to qualitatively or quantitatively assess the success of many of the new programs and warning systems under the 'Prepare, Act, Survive' policy. The majority of our recommendations are based on anecdotal evidence, but should provide a basis for how the states and territories can improve the effectiveness and implementation of the new warning system. More studies about public knowledge and opinions should be conducted to gain a better understanding of how the warning system is working, and we recommend that the fire authorities conduct detailed analytical research into the success of the current programs before any major changes are made.

CHAPTER 1: INTRODUCTION

Wildfires present serious threats to man-made and natural environments across the globe. While some wildfires are easily contained, others last for days or even weeks, incurring extensive amounts of damage to land and property and forcing people to evacuate their homes In 2008 alone over 7,000 wildfires were reported in the United States, destroying nearly 2 million acres of land, an area approximately ten times the size of New York City (NIFC, 2010). During the summer of 2009, wildfires in Greece fueled by winds with an average speed of over 30 mph caused damage to more than 30,000 acres of land in only four days (Carassava, 2009). The South African fires of September 2008 lasted for three days, killed 45 people, destroyed over 180 homes, and caused nearly forty million dollars in damages (MGO, 2008). As a result of these effects, countries around the world have implemented wildfire warning systems on national and local levels as a means of providing their residents with information about approaching fires, and crisis preparation advice should a contact fire become imminent.

Because of its climate, Australia is extremely prone to bushfires. The country's southern states and territories are extremely dry, and with strong winds providing a steady source of oxygen, a single spark can ignite a roaring wildfire, burning land and homes, and causing severe injuries and death. Since weather conditions can vary with wind strength and temperature, the danger of fires happening in a certain area can be difficult to forecast, and once a fire has started, its projection across the landscape can be equally difficult to predict. To help keep residents safe, warning systems have been placed in each state and territory to alert residents when they are in danger from bushfires, how much danger they are in given the conditions, and what they should do if a fire occurs in their area. Traditionally, when a fire warning is issued, fire officials either encourage people to stay and defend their homes if possible or, in the case of a potentially uncontrollable fire, residents are urged to evacuate and save themselves and their families. However, predictions can often be over or under exaggerated, often resulting in residents finding themselves unprepared to fight against the fires or having fled their homes, leaving them to burn when they might have been saved. This confusion has led to widespread controversy with respect to how warnings are issued, and what action people should take.

In the past, the Stay or Go policy, which was implemented throughout Australia, strongly encouraged homeowners to stay and prepare to defend their property in the event of a wildfire. Evacuation was regarded as a last resort, or recommended only for those who would not be capable of defending their homes. This approach was based on historical evidence which showed that the majority of fatalities incurred during wildfires were the result of residents either insufficiently preparing to defend their homes or attempting to evacuate at the last minute. However, despite the historical efficacy of the Stay or Go policy, on February 7th, 2009, later dubbed "Black Saturday", a series of severe fires killed 173 people and destroyed 2,000 properties,

61 businesses, and numerous community facilities. The destruction spread across nearly 430,000 hectares of land and directly impacted 78 communities, many of which were unrecognizable after the fires (DSE, 2009). The majority of deaths occurred when the fires became too intense for even well-defended homes to survive and the homeowners were forced to attempt last minute evacuations. The devastation of Black Saturday has given rise to a heated debate over the effectiveness of the Stay or Go policy, and whether or not a stronger emphasis should be placed on early evacuation.

Australia's current wildfire warning system varies between the different states and territories depending on the views and necessities of each. In general each state or territory's system is marked simultaneously by successful elements and areas needing improvement. The Victorian Bushfires Royal Commission, established in 2009 in the wake of Black Saturday, has published two interim reports with recommendations that have influenced the changes in policy. Some issues that still remain in the national wildfire warning strategy include the reluctance of all states and territories to follow a uniform system and the inability of any one warning system to reach every person. For example, the text-message warning system has created multiple opinions and points of discussion. Fire Emergency Services Authorities' (FESA) Chief of Operations, Craig Hynes, warns that "you just can't rely on getting a message straight away" (AAP, 2010). One objective of this project is to identify each warning system's flaws, and strategically attempt to minimize the risks these flaws present. In order to fulfil this objective, our research must address the specifics of each state and territory system as well and the potential and willingness of each state and territory to enact changes in their policy.

This project is designed to contribute to an improved bushfire response policy in Australia by investigating the integration of the enhanced Fire Danger Warning System into the state and territory fire control policies and the policy shift from 'Stay or Go' to 'Prepare, Act, Survive' while finding areas of possible improvement. We have examined the integration of the new Fire Danger Rating Scale into established state and territory systems and we will explore the ways in which the specific objectives of state and territory organizations affect this implementation. We also consider the effect of the new warning scale on the policy of early evacuation as opposed to active defense, and the social implications that have arisen as a result of the change in policy. This report highlights areas of strength within the policies of each state and territory as well as areas that require improvement and devise recommendations to improve these areas. Using these recommendations it is our expectation that the Australasian Fire and Emergency Services Authorities Council can work to improve problem areas that are hindering the effectiveness of the new system and thereby reduce the amount of damage caused by wildfires.[1]

[1] A broad overview of the graphic can be found in Appendix A

CHAPTER 2: BACKGROUND INFORMATION

Killing 173 people and destroying more than 2000 houses leaving thousands homeless, the "Black Saturday" (February 7th 2009) fires truly represented "hell in all its fury" (Tedmanson, 2010). After this fire a need for change became apparent and the Victorian Bushfire Royal Commission was established to investigate the causes of the fire and changes in policy that needed to be made for the following seasons to prevent such a catastrophe from occurring again.

This chapter first explains the behavior of bushfires and how the difficulty in forecasting these incidents has increased the dangers presented by bushfires. It then describes various wild fire response policies, specifically those pertaining to the United States, Greece, and Scotland, and how these policies relate to the policy in Australia. A short look at the bushfire risks in Australia with regard to the demographics and bushfire prone areas is then introduced to gain a better understanding of the current situation. Next it reports on various major fires in Australia's history and how they significantly affected the development of fire response policies. We then describe the current organization of the fire authorities within Australia and the role that AFAC plays in developing a national policy. A description of the 'Stay or Go' policy is included, as well as how it developed, and what issues developed during its implementation. This is followed by a summary of the transition from the 'Stay or Go' policy to the current 'Prepare, Act, Survive' policy, and the influences the Royal Commission, Bushfire CRC, and AFAC have had in this change. Finally, we describe the current policies and systems being implemented, and the social implications that are present due to the shift in policy and increasing bushfire risk. Check Outline

2.1 Bushfire Dynamics

Several major factors play a role in the severity and likelihood of a bushfire: fuel load, fuel moisture, wind speed, ambient temperature, and relative humidity. Fuel load refers to the type and amount of combustible materials available. Brush, which is usually comprised of small twigs and vegetation, is one of the best fuel sources for bushfires because it contains a lot of open space that promotes airflow and allows it to burn quickly and easily. Dead trees tend to be more solid, do not allow for as much airflow, and usually burn slowly for a long time. Fuel moisture pertains to the water content contained in the fuel for the fire. Plants that are dead and dry, or otherwise contain less water, burn much easier than plants that have absorbed a lot of water. Rain is a key factor in fuel moisture because even dead plants or other organic material can absorb water making them less likely to burn, and naturally areas with long periods of no rain generally have lower fuel moisture. Wind speed plays an important role in how large a fire will be and how it will move. Higher

winds bring more oxygen to the fire, which allows the fire to burn at higher temperature and more easily ignite other material. Winds can also blow embers from a current fire to other land areas, starting new fires well ahead of the main front. Ambient temperature refers to the air temperature of a given area. The risk of fire is greater in an area of higher ambient temperature because the fuel load is closer to the ignition temperature and therefore takes less additional heat to ignite than in an area with cooler temperatures. The last major fire factor, relative humidity, relates to the amount of moisture in the air. In drier areas, the air absorbs moisture more easily than in more humid areas. This means that in drier areas the moisture plants is more readily released and the plants become much drier. These fire factors are a direct result of the climate of a particular area. In general, the drier the climate the more likely it is for bushfires to occur (GA, 2010).

These factors that contribute to a fire are often measured through use of a Fire Danger Index (FDI) which ranks the likelihood of a fire and how devastating it could be. Australia currently uses the McArthur Forest Fire Danger Index, developed by A. G. McArthur in the 1960s this rating system is based on the difficulty of suppressing a fire 40 minutes after ignition (McArthur, 1958). Since then the Fire Danger Rating Scales have been broken up into sections by this index. In general a rating of anything higher than twenty was considered very high and difficult to suppress. Since then these base numbers have changed and fire authorities around the world have had to revise how they deal with the bushfire threat.

2.2 Wildfire Management in Other Countries

Because wildfires are a global natural occurrence, many countries have had to implement policies regarding how they will deal with wildfires. Wildfires occur in many areas of the U.S., and certain states and territories have implemented fire warning systems to help ensure residents' safety. California's Orange County, for example, is affected by wildfires every year, and uses a warning system called AlertOC. This system can send thousands of messages very quickly using communications such as phones, emails, and texts. Residents are automatically sent phone messages without specifically registering for the system, but are encouraged to sign up online to receive the other types of messages offered in order to have access to crucial information. These messages are issued to update residents on wildfire incidents and what areas have been issued an evacuation. Local news stations also report on the dangers and alerts for the wildfires. As a national standard, the U.S. implements mandatory evacuation procedures if residents are seriously threatened by wildfires. For this reason, residents do not necessarily have to pay as close attention to a fire warning since if the state believes they are in danger, residents will be told what to do, and when to do it. This method differs from the Australian system in which residents are not able to rely on a directed evacuation, and must decide for themselves when it is too dangerous to stay and defend their homes (BOS, 2010).

Outside of the U.S., many countries are developing or have implemented fire warning systems as well. Greece is regularly affected by wildfire and has a similar policy to the U.S. in that it forces residents to evacuate from their homes (BBC, 2009). During times of increased fire risk Greek officials use sirens and loud speakers to sound alerts and implement evacuations. Even though residents are issued mandatory evacuation orders, volunteers are allowed to stay and help fight the approaching fire. However, one of the reasons the Greek wildfires of 2009 were so devastating was because there is a lack of an official warning system specifically designed to direct volunteers where to focus their efforts (Forbes, 2009). Such a system may have allowed volunteers to concentrate on areas that were more affected by the wildfires and reduce wasted efforts. Scotland is also beginning to implement a system similar to the Australian warning system, although it is still in the developing stages. One part of the warning system is a report form that can be filled out online by residents who have observed a wildfire in their area (FireBeaters, 2010). This can help quickly alert fire authorities to a wildfire and allow for a better chance to contain it.

Educational programs also play an important role in wildfire safety. In the U.S., children grow up with the renowned Smokey the Bear, a character dedicated to protecting the land from wildfires. It is not uncommon to see a Smokey the Bear television commercial during both child and adult programming delivering a quick message about fire safety, such as how to properly put out or contain a campfire, and then ending with the renowned phrase, "only you can prevent wildfires." Smokey's fire education tips can also be found at smokeybear.com, a website with information about preventing wildfires complete with a children's section which includes games, campfire information, and stories, providing a fun way to learn about fire safety. Local fire departments also hold state fire protection programs that help educate residents. Wrightwood, California, holds an annual Wildfire and Disaster Awareness Day in which residents are educated about wildfires through fun events, workshops, exhibits, and speakers (WFSC, 2010). Such educational programs can help residents to prevent wildfires in the first place and have a better knowledge to prepare for wildfire should one occur in their area.

2.3 Bushfire Risk in Australia

Due to the extensive size of Australia, the individual states and territories experience many variations in the times and severity of their bushfire seasons. In this section we analyze the demographics throughout Australia, as well as the environmental factors that contribute to bushfires in Australia and how both determine the overall bushfire risk of an area.

2.3.1 Demographics of Australia

Throughout Australia there is a variety in the population density from region to region. Part of what determines bushfire risk is the extent of human presence in an area. If there is a substantial human population in an area then the bushfire risk in an area is high. Thus it is essential to note the demographics of an area in order to properly assess the danger presented by bushfires.

Table 1, reported by the Australian Bureau of Statistics, shows the different populations and average growths seen throughout Australia in 2009. It can be seen that New South Wales has the largest population, while the Northern territories has the smallest population. At the same time Western Australia has the largest increase in population while Tasmania has had the smallest change in population, over the last year.

State/ Territory	**Population at end Sept qtr 2009**	**Change over previous year (%)**
New South Wales	7,165,400	1.7
Victoria	5,473,300	2.2
Queensland	4,450,400	2.7
South Australia	1,629,500	1.3
Western Australia	2,259,500	2.9
Tasmania	504,400	1
Northern Territory	227,000	2.3
Australian Capital Territory	353,600	1.9
Australia(a)	**22,065,700**	**2.1**
(a) Includes Other Territories comprising Jervis Bay Territory, Christmas Island and the Cocos (Keeling) Islands.		

Table 1: Populations of Australia, by each state and territory (ABS, 2009).

Figure 1 shows the approximate current population density (left) and the projected population changes (right). These maps show that very few people live in the central region of Australia and in the future this population is expected to decrease as people move toward the shores. At the same time there is a noticeable population decrease in Tasmania but a large increase in many of the major cities of Victoria, New South Wales, and Western Australia. These changes could be attributed to the decrease in farmers and other residents who wish to remove themselves from rural areas that are often subject to bushfires.

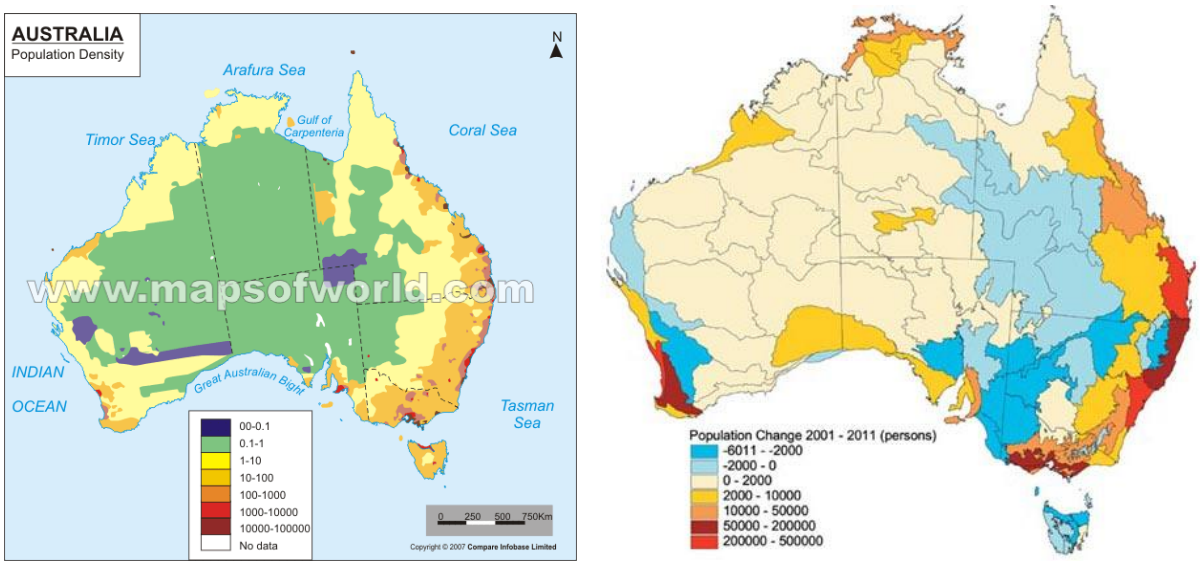

Figure 1: (Left) Population density (# of people/km^2). (Right) Projected pop. changes (ASEC, 2001)

Figure 2 shows the average ages (left) and sex ratios (right) in the various states and territories of Australia. The most significant observation is that there is a vast difference in gender and age ratios between the Northern territories and the rest of the states and territories. In general the population of the Northern Territories contains more men than women and the average age is significantly lower than most other states and territories.

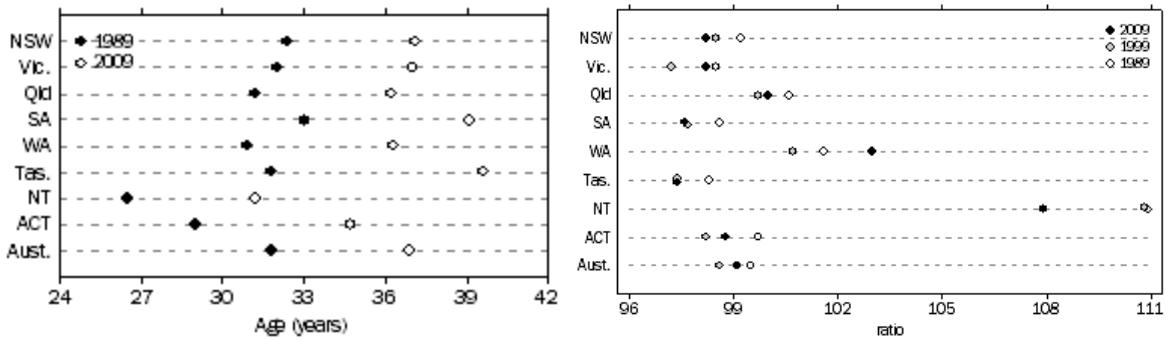

Figure 2: (Left) Average ages. (Right) Sex ratio, number of men per 100 women (ABS, 2009).

Table 2 shows the Indigenous populations throughout Australia, the percentage of the Indigenous population in a state or territory over the total Indigenous population of Australia, and the percentage of the Indigenous population over the total population, in that state or territory. Interestingly the largest number of Indigenous people resides within New South Wales yet the Northern Territories have the greatest ratio of Indigenous to non-Indigenous residents by a large margin. This can be attributed mainly to the low population of residents in the Northern Territories.

State/Territory	Indigenous population	Indigenous population (%)	state/territory population (%)
NSW	161,910	29.4	2.3
Vic	35,894	6.5	0.7
Qld	156,454	28.4	3.6
WA	74,859	13.6	3.4
SA	29,775	5.4	1.8
Tas	19,641	3.6	3.9
ACT	4,599	0.8	1.2
NT	67,441	12.3	30.2
Australia	550,818	100	2.5

Table 2: Estimated Indigenous population of Australia by state and territory, 2009 (Thomson, 2009).

From this general information about the populations and population densities we can infer that the areas of bushfire-urban interface near major cities are the most prone to devastating bushfires. While more rural areas may have larger fires, these fires typically cause less damage due to the lower number of people.

2.3.2 Bushfire Prone Areas

With the exception of Antarctica, Australia is the driest continent in the world with an average rainfall of less than 24 inches (600mm) a year (GA, 2010). As shown in Figure 3, the northern areas of the continent experience a wet climate with ample rainfall in the summer and a moderate to dry climate in the winter. Despite the low humidity, bushfires are less likely to occur up north during the winter, due to the lower temperatures. In contrast, the central states and territories of the continent experience an arid climate all year round while the southern states and territories experience wet winters and extremely dry summers. These dry conditions are due to a pressure belt in the northern area of the continent that prevents moisture from traveling down to the middle and southern states and territories. The combination of the high ambient temperature and the dry climate make the middle and southern states and territories of Australia more prone to large wildfires. When high winds are added to the mix, bushfires become extremely dangerous because of their increased size and the speed with which they travel. The combination of these variables contributes to making Australia one of the most bushfire prone continents in the world.

Figure 3 shows the seasonal rainfall zones throughout Australia (left) as well as the Bushfire seasons that take place across Australia (right). From the first figure you can tell that the north gets the majority of its rain during the summer while the south would get its rain during the winter. Thus the fire seasons would be during the winter for the north and during the summer for the south as proved in the second figure. The middle area then is a mix of both and the bushfire season appears early summer, late spring.

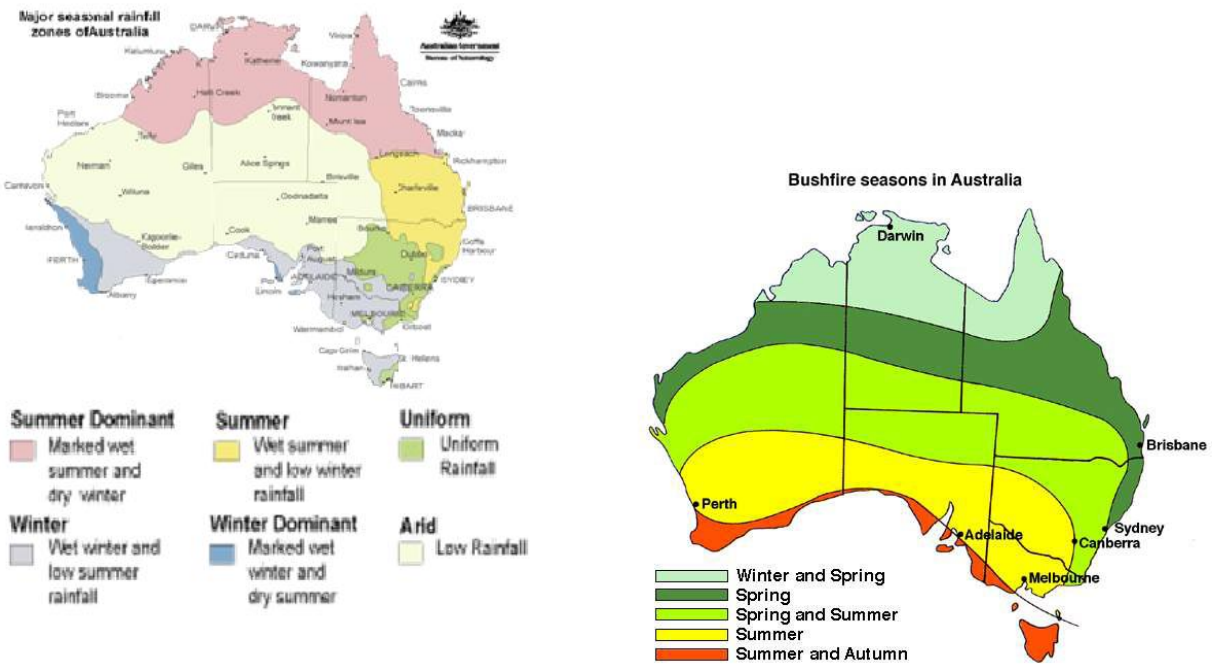

Figure 3: (Left) Map of Seasonal rainfall zones (GA, 2010). (Right) Bushfire seasons (Gould, 2005).

Figure 4 provides the potential of a disastrous bushfire (left) and the different habitats (right). From these maps, it is easy to see that the regions that have the most risk for major bushfires are in the sclerophyll forest zone. This zone is heavily comprised of eucalyptus trees, whose leaves contain oil that has flash point of 53 °C (127.4 °F). The average rate of heat transfer for a bushfire is around 100 kW/m², and is more than capable of igniting the oil in the eucalyptus leaves (Clode, 2010). However, what separates this type of forest from others is that the canopy is closed and very dense, making it easy for the bushfire to spread. The combination of these two characteristics makes the sclerophyll regions high bushfire risk areas.

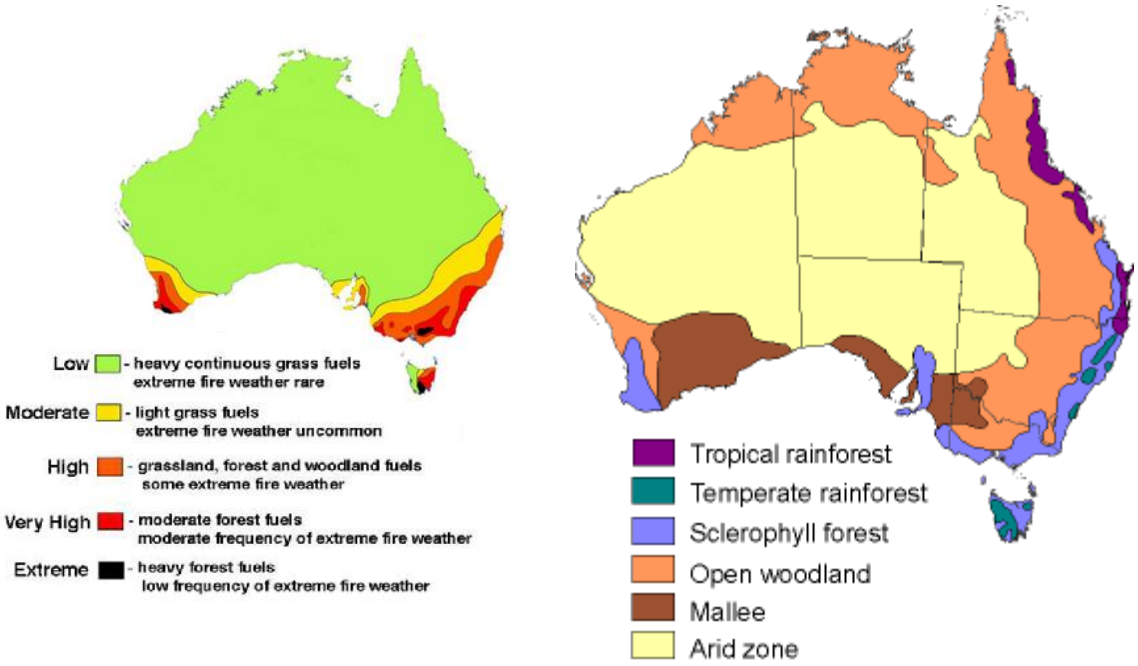

Figure 4: (Left) Potential for Disastrous Bushfires (Gould, 2005). (Right) Habitat zones (CSIRO, 2010).

From these two facets we see that the areas at risk seem to coincide with the major cities and where people are currently headed. This is interesting because it seems to be counter intuitive that people are moving towards more dangerous areas. So the question then becomes do the humans follow the fire or is the potential for fires increasing with the human population density? One factor that could be considered good is now the fire authorities would be able to focus more on these smaller areas and not waste expenses and man power on large areas of land.

2.4 Fire Response and the Development of Fire Safety Institutions

Australia's fires have strongly impacted the country physically, socially, and psychologically (UA, 2003). The fires described below are considered some of the most devastating and destructive fires in the history of Australia and a myriad of social and judicial policies have been formed as a result of these fires (DSE, 2009).

2.4.1 "Black Thursday" (February 6th 1851) - Victoria

Australia's earliest recorded major incident of the nineteenth century was "Black Thursday," occurring on February 6, 1851. During this period of history firefighters were either volunteers or brigades financed by the local insurance companies. If a resident was not on their insurance plan, the insurance

company would let their house burn and advise them then to buy insurance. Without any formal fire response system, "Black Thursday" marked a destructive day that took approximately five million hectares, one million sheep, and thousands of cattle. Yet, surprisingly for that amount of damage, only twelve human casualties were recorded (Romsey Australia, 2010). Following this intense fire, the awareness of the need for local fire brigades was recognized by local residents. After Black Thursday there was an increase in the number of company, town, volunteer, and insurance fire brigades, but disputes over territories, water, and compensation jeopardized their effectiveness. With the concurrent increase of population and wildfires, the need for an organized group was acknowledged, and in 1891 the Metropolitan Fire Brigade in Victoria was formed, becoming the first organized brigade of this kind in the country (Wilde, 1991).

2.4.2 The Great Fire of Melbourne and Red Tuesday (1897 – 1898) - Victoria

During the fire season of 1897 – 1898 two major fires took place in Victoria, the Great Fire of Melbourne and Red Tuesday. These fires caused a large amount of panic and destroyed nearly 2000 buildings, leaving thousands homeless (Wilde, 1991). The main outcome of these fires was a substantial increase in the number of fire brigades and personnel. In the years to come many more extreme fires were recorded that caused extensive damage. As a result newly organized fire brigades continued to increase in number and collaborate with each other more frequently.

2.4.3 "Black Friday" (January 13th 1939) - Victoria

Following a long drought that lasted several years, the summer of 1938 – 1939 was extremely hot and dry resulting in a massive bushfire that became known as "Black Friday". Starting off as small separate fires, numerous fires combined to create a massive fire front killing 71 people, and destroying over 2 million hectares, 650 buildings and the township of Narbethong. Following these fires, a Royal Commission was convened to determine the causes of the fire. The report showed that the fires seemed to result from humans, primarily farmers, campers, forest workers and many others who lost control of their "controlled" burns or campfires, or were operating sawmills under inappropriate conditions. The writer of the commission, Judge Leonard Stretton, offered many proposals and policies that could be implemented to prevent such catastrophes. The Forest Act of 1939 gave the Forests Commission (now known as the Department of Sustainability and Environment) full authority for fire control on public land in Victoria. Other recommendations suggested the use of fire breaks to be made during the spring and autumn, fire towers to be placed in strategic locations and the continual development of firefighting equipment. For the many years following this, fires were still commonplace yet considered to be less of a threat due to the continuous precautions (DSE, 2009).

2.4.4 "Ash Wednesday" (February 16th 1983) – Victoria / South Australia

The Ash Wednesday fires of 1983 have become known as one of the worst natural disasters in Australia's history. Australia had been suffering a 10 month drought and another hot, dry summer. On the morning of Ash Wednesday a cold front off the coast of Australia created a hot and dry northerly wind over Victoria and South Australia. Fire officials were aware of the conditions and did their best to prepare for what might come. Subsequent investigations indicated the fires were caused primarily by sparks from power lines arcing with trees and other wires. Initially the fires were thought to be under control until a change of the wind direction at night caused the fires to increase dramatically and merged with one another to create a massive front (DSE, 2009). Altogether there were 100 fires which caused 75 deaths, burned 418,000 hectares of land, destroyed 3,700 buildings, and ultimately cost approximately A$400 million, or A$1.3 billion in damages in 2007 equivalent terms (EMA, 2006).

Besides these physical losses, many Australians suffered psychologically due to the intense situation. Following the fire, Paul Valent conducted research analyzing the reactions of victims of the fire: "Victims of the bushfires were seen to have reacted during the various phases of the experience in a predictable way: during the acute danger, when survival was paramount, and immediately afterward, the usual patterns of hierarchical structure within families and in the wider community broke down and new social structures emerged" (Valent, 1984). This collapse of structure was evidence enough to show the need for more organized public responses during fires. To do this, more effective public warning systems were needed and the public needed better education about fire behavior and policy.

The Ash Wednesday fires were a prime example of this need, as could be seen by a particular incident in Macedone. Many fire officials never thought that the area of Macedone was in danger, yet with the sudden wind change, the area was suddenly straight in the path of the fire. Meanwhile the residents of Macedone were waiting by the phone for evacuation orders while watching the fire gradually grow closer (Murray, 1995). If there had been a stronger warning system in place, this town may have been spared and many deaths may have been avoided. However, this system may not have been fully at fault. The fire authorities may have failed to properly educate people on the appropriate actions to take during a period of heightened fire risk, and thus they became too dependent on advice from emergency response departments, which never reached them. Therefore, having proper public education programs may have made a difference in the response to the warning.

Following Ash Wednesday, the Country Fire Authority (CFA) began to focus on fire prevention through warning systems and public education programs, such as the Community Fireguard program which teaches communities how to prepare and plan for fire emergencies (Stafford, 2003). Newer technologies were utilized to disperse crucial information and enhance preparedness such as the Government Radio Network

system, and collaboration with the Bureau of Meteorology to rate the likelihood of a fire. The last major impact of the Ash Wednesday fires was the eventual adoption of the 'Stay or Go' Policy in the early 1990's.

2.4.5 "Black Saturday" (February 7th 2009) - Victoria

Preceded by a nearly decade-long drought, a general warming trend over the past 50 years believed to be due to greenhouse emissions, intense heat waves and strong winds over 100 km/h, Black Saturday held the perfect conditions for a "killer fire." Based on the McArthur Forest Fire Danger Index (FFDI), in which rankings of 12 -25 are considered "high", Black Saturday was rated an FFDI of 189. The majority of the Black Saturday fires were attributed to fallen power lines, lightening, and various human sources; altogether numbering over 400 individual fires. These Fires, causing 173 deaths, leaving thousands homeless, and burning over 450,000 hectares were the primary reason for the new changes that have been adopted (Teague, 2009). Satellite imaging from the National Aeronautics and Space Administration (NASA) on the Black Saturday Fires can be seen in Figure 5.

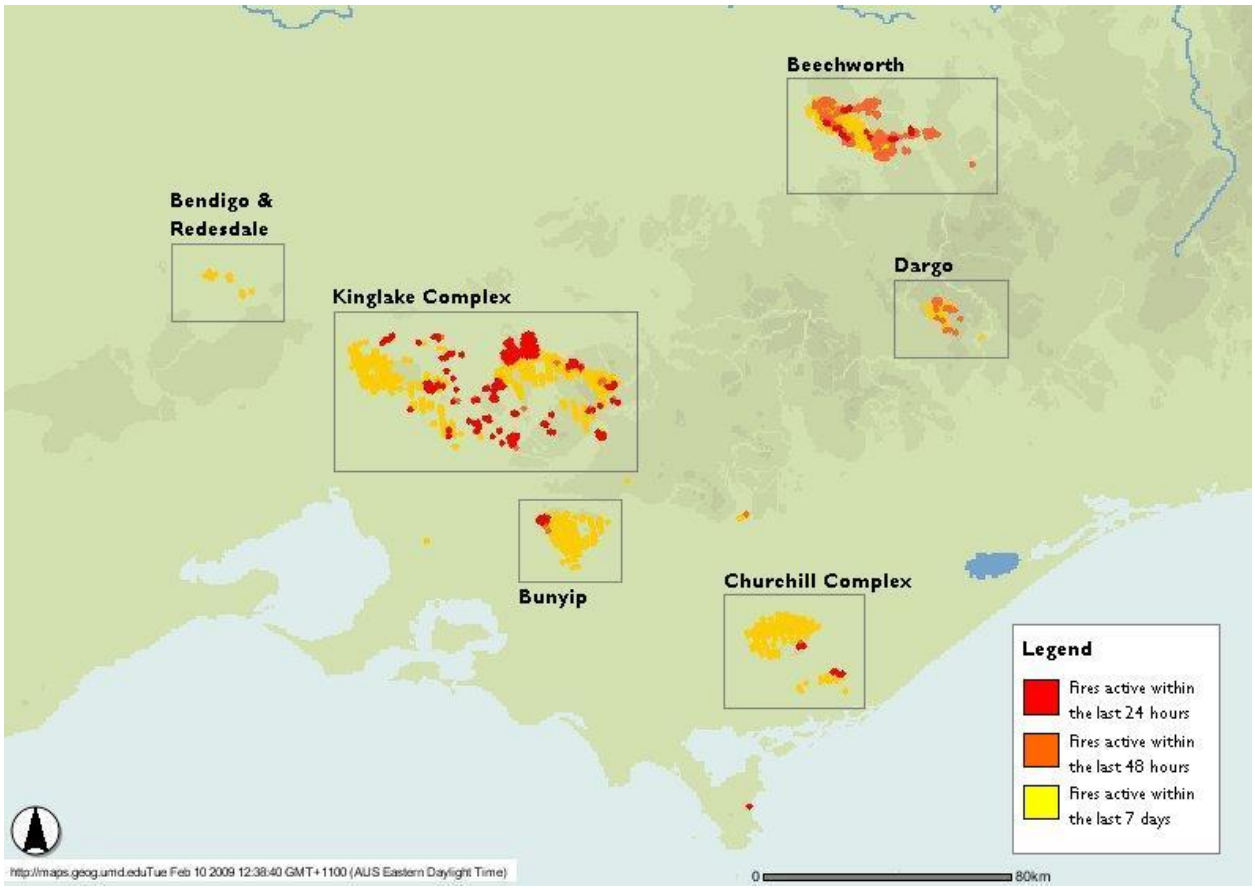

Figure 5: Black Saturday Bushfires in Victoria (NASA FIRMS)

2.5 Organization of Fire Authorities

The organization of the fire authorities and the respective departments vary from state to state. In general the state government is broken up into many parts which normally include the Department of Justice which incorporates the fire officials and police, and the Department of Environment which is in charge of maintaining and protecting the land, among various other departments. The fire officials are normally also divided into two groups, rural and metropolitan services. These groups work with the DSE to make the land safer and less prone to bushfires. A graph of how this system works from state to state can be seen in Figure 6 below

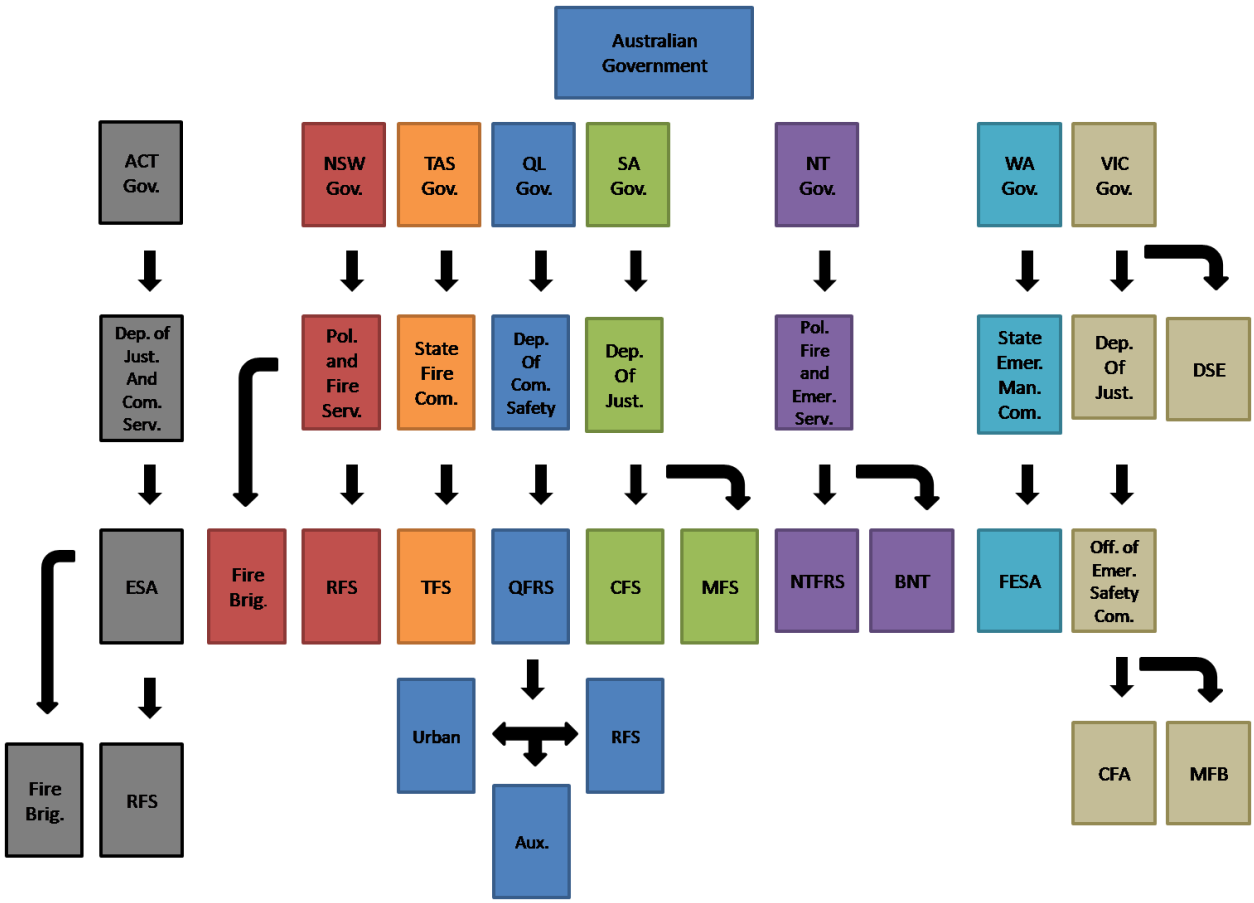

Figure 6: Organization of State and Territory Fire Authorities

2.6 AFAC

The Australasian Fire and Emergency Service Authorities Council was formed in 1993 and is now the peak industry body for fire, land management, and emergency service organizations throughout Australia and New Zealand. AFAC was established by its member organizations[2] to cooperate on matters of state and territory, national, and international importance. AFAC's vision is to strengthen the emergency services of Australia and New Zealand through collaboration, sharing, and innovation. This vision can be expressed in five main goals: to provide a leadership figure with enough visibility, credibility, and influence to have a significant impact on the development of policy and member relationships, while reducing barriers and increasing the availability of funding; to promote and encourage environmentally sustainable fire and emergency services and practices; to consistently and effectively approach service management such that integrated planning is based on risk assessment and is adaptable in all environments, and where such systems are interoperable; to provide easy access to detailed information contributed by all states and territories to create a cooperative information sharing environment; and to ensure that volunteers, staff, and contractors are safe, competent, and funded so that they can provide the infrastructure needed to provide emergency services to the community. (AFAC, 2010)

AFAC primarily works through a group structure in which senior representatives of member agencies collaborate to shape research and policy, develop national and state and territory positions, and cooperate to solve issues that cannot be solved individually. These groups produce positions[3] guidelines and policies to be adopted by the Council and provide means to increase synergy amongst members and community safety. AFAC is also involved with special research programs aimed at development of efficient training and education resources, and collaborative resource management and contract arrangements.

2.7 'Stay or Go' Policy

The 'Stay or Go' policy states that if a fire warning is issued, citizens should either leave their homes early on the day for which the warning is issued, or prepare to stay and actively defend their homes. The position held by AFAC stated that, assuming proper preparations have been made, it is a better idea to stay and defend a home rather than relocate to an evacuation location (AFAC Position, 2005). The 'Stay or Go' policy was designed to educate and advise the public on how to respond during periods of heightened fire activity. Because fires are a natural and necessary part of the ecology, there is no practical or ethical method for preventing all bushfire risk to communities. Thus it is the responsibility of the government, land managers, and householders to reduce the risks and losses caused by bushfires. In most cases, the decision to stay or leave was left to the homeowners. However, forced evacuations were occasionally considered by fire

[2] See Appendix B for list of member organizations
[3] See Appendix C for index of terminology used by AFAC

response authorities if the homes or residence did not seem adequately prepared. In these cases, forceful removal of residents was only conducted at the discretion of the lead fire combat authority, and only if the effort did not put firefighters or other citizens who still needed to be warned at risk (AFAC Position, 2005).

2.7.1 Development of the 'Stay or Go' Policy

Beginning in the early 1990s the 'Stay or Go' policy was gradually developed and embraced by multiple fire authorities as a result of historical evidence supporting this type of response. After numerous incidents occurred, in which the unnecessary loss of lives or property might have been avoided if the homeowners had not attempted to evacuate at the last minute and instead prepared to fight off the fire, many fire authorities began to emphasize the idea of staying and defending homes. These assessments were based on the fact that many homes abandoned by residents, some of whom lost their lives during last minute evacuations, were not destroyed or could have been easily preserved had the owners remained. The AFAC eventually developed the slogan "houses protect people and people protect houses", to spread the message that the best chance of survival consisted of staying and defending (Handmer, 2005).

The policy was developed on the basis of historical evidence that there had been a higher rate of survival for those who remained in their homes as opposed to those who had attempted to evacuate at the last minute. However all of that evidence referenced residents who had actively defended their homes during the fire (Handmer, 2005). The majority of houses destroyed in wildfires are the results of embers becoming lodged in cracks and starting small fires that accumulate and grow to engulf the structure. The emphasis of the stay portion of the 'Stay or Go' policy concerns these scenarios, as the defenders will be fighting these ember storms which can occur long before and after the fire front arrives.

There is always the possibility that a house will be destroyed despite preparations. However, in many cases it is safer to seek shelter within the house than attempt to make a last-minute evacuation. In these cases, it is important to be proactive in case it is necessary to leave the shelter or continue to defend against the persistent ember storms. It is possible to survive outside after the front passes, and in most cases it is safer to wait out the front indoors and then escape afterwards if the house catches fire from ember storms. By educating the public on how best to act during a fire, the 'Stay or Go' policy attempted to minimize casualties and property damage by emphasizing the success of properly defended homes.

2.7.2 Issues with the 'Stay or Go' Policy

One of the main issues with the 'Stay or Go' policy was that it called for the difficult decision of committing to active defense or the abandonment of one's home. Since bushfires are by nature difficult to accurately forecast, there is a certain amount of risk involved in either decision. Either residents must

thoroughly prepare themselves to fight the fight, which is oftentimes physically and emotionally exhausting, or put their lives on hold and abandon their homes. Most cases of late evacuations stem from residents who do not commit to either course of action and plan to simply leave as soon as they feel threatened (Handmer, 2005).

Although the catastrophe that occurred on Black Saturday led to a major investigation of the 'Stay or Go' Policy; there had been many issues with the policy that stemmed from other incidents in the past. The emphasis on staying behind to defend as the safest option prompted many people to stay who were unprepared to defend their homes safely and effectively, and had poor understanding of the risks involved in staying. This led to many cases in which people attempted to simply take shelter in their homes, and were forced to evacuate at the last minute when their homes caught fire. In one case, an incident in the Dandenong Ranges in 1997 left three people dead while they were sheltering from the fire in their garage. Reports stated that they did not intend to stay and defend but ran out of time to evacuate when the fire reached their home only fifteen minutes after igniting. Neighbors claimed that the emphasis of staying and taking shelter is what doomed them, as none of the neighbors perished during their last minute evacuations (Handmer, 2005). In this case the fire's victims did not plan to actively defend, but also did not leave early enough because of the strong warnings against last minute evacuations they thought the safest option would be to simply take shelter. The proper course of action would have been for the residents to have prepared their home, or to have left before a fire started, although it is likely they would have survived if they had left, it is equally likely that they, and possibly all of their neighbors could have perished instead. This and many other similar cases in later years led to a need to re-evaluate the 'Stay or Go' policy, in order to encourage people to adopt a more active strategy and clarify that early relocation, before a fire starts, is often the safest option.

Even before the 2009 Black Saturday fires, studies found that a large number of people who stayed to defend their homes either had no planned response strategy or only a lax strategy and planned to leave if they felt immediately threatened. This is exactly the type of behavior the policy was designed to discourage (Handmer, 2005). During the fires on Black Saturday many homes and lives were lost despite preparations, and it became more apparent that the policy needed to be re-evaluated. The policy led to an over-estimation of people's ability to defend their homes, and a sense that they could wait out the fires if necessary. The policy needed to be revised in order to emphasize the importance of active defense, and the physical and mental trials that would be required to provide an effective defense. Additionally the sheer intensity of the Black Saturday fires raised awareness of the need for revisions to the Fire Danger Rating Scale to account for fires that are too intense to be defended against.

2.8 Transition from 'Stay or Go' to 'Prepare, Act, Survive'

After the Black Saturday Fires, it was obvious that the 'Stay or Go' policy was not as effective in preparing communities for bushfires as it needed to be. In response to the incident many organizations, including the Bushfire CRC, began working towards revising the 'Stay or Go' policy and the Victorian Bushfire Royal Commission was established in order to investigate the event. The research conducted by the Bushfire CRC and the recommendations set forth by the Royal Commission had a great influence on the designshop held in August of 2009 that developed the 'Prepare, Act Survive' policy. The following section explains the role the Royal Commission and Bushfire CRC held in the development of the nationally accepted 'Prepare, Act, Survive' policy, and the main objectives of the designshop that developed the policy.

2.8.1 The Role of the Victorian Bushfire Royal Commission

In 2009, shortly after the Black Saturday catastrophe, the Victorian Bushfires Royal Commission was established to investigate the fires in Victoria, namely how they were caused, what preparations were made for them, and how the local fire authorities responded to them *(*Royal Commission, 2009). The Commission has acquired data through a combination of community consultations, online submissions, hearings and background research. The main goal of the Commission is to acquire local knowledge on how severely and in what ways the fires have impacted the community, what strategies the local fire authorities implemented and which of those strategies worked well, and what improvements could be made to these strategies. So far the Commission has filed two interim reports making fifty-eight recommendations[4] for improvements in warning systems, information management, relocation/evacuation policy, Stay or Go policy, risk and refuge information, incident management, emergency management, Commonwealth response, and emergency calls.

Of particular note are the recommendations concerning clarifications of the principles of the 'Stay or Go' policy. The commission recommended that the CFA revise its programs to convey the following key principles;

- the safest option is always to leave early,
- not all houses are defendable,
- if a property is not defendable it is advised to leave early,
- householders should factor in topography, fire weather and fire intensity when determining whether to defend,
- staying and defending includes risks of physical injury or death,

[4] See Appendix E for full list of Royal Commission recommendations

- contingency plans are advised,
- preparations for defenders to leave should be made as last resort options,
- and families with children, the elderly, or physically impaired should prepare to evacuate early and be aware of the dangers of leaving late, keeping in mind that a warning may not be received (Royal Commission, 2009).

The Commission also recommended the addition of a fire danger rating beyond extreme, and an extension of the Fire Danger Index to account for this new level (Royal Commission, 2009). These recommendations have led to the majority of the current changes in policy and a shift towards a more efficient evacuation model may be in the near future.

2.8.2 The Role of the Bushfire Cooperative Research Centre

The Bushfire CRC is an organization conducting many research projects designed to enhance the management of bushfire risks in communities in an ecologically and economically sustainable manner. The main objectives of the Bushfire CRC are to develop a world-renowned research center for Australia that will provide a research framework designed to support bushfire management agencies and help communities become increasingly self sufficient when dealing with bushfire threats.

The Bushfire CRC is currently conducting five research programs designed to achieve these objectives. The first of these is entitled Safe Prevention, Preparation and Suppression, and is designed to prevent uncontrolled bushfires from occurring, to prepare communities for instances when uncontrolled fires do occur, to suppress the fires when they endanger communities, and to help expedite the recovery process after a bushfire incident. This program has acquired a wealth of information on fire behavior and the effectiveness on various fire fighting techniques. The second program is the Management of Prescribed Fire in the Landscape, which is designed to examine the role of wildfires on the environment and the importance of implementing them in land management (Bushfire CRC, 2010).

The next two programs are more concerned with the general public. The Community Self Sufficiency for Fire Safety program is designed to help communities manage the risks of living in fire prone areas by analyzing the varying fire risks among territories and the psychological response of the public during and after a fire. The Protection, People and Property program is investigating the relationship between people, their property, and the environment. The final program is aimed at integrating the research conducted in the previous programs into varying levels of higher education in order to expand the public and expert knowledge of bushfire threats (Bushfire CRC, 2010).

Many state and territory fire authorities have been working with the programs established by the bushfire CRC to develop sound strategies for handling bushfire incidents. The research produced by the

Bushfire CRC has greatly influenced the past and current strategies implemented by the state and territory fire departments and continue to influence the changes made in correspondence to the recommendations of the Royal Commission.

2.8.3 The Role of the National Design Shop

During August 3-5 2009, AFAC held a conference in Melbourne entitled National Design Shop: Scaled Bushfire Advice and Warning. Sixty-three groups participated in the event, which had several major objectives:

- Revise the Fire Danger Ratings so that they better describe the nature and potential impact of a fire, under any conditions, and in a way that is relevant to the community and agencies.
- Develop key messages and terms relating to each level of warning, to be adopted by all agencies for public use.
- Identify the language that will align the key messages with the Common Alerting Protocol (CAP) of Australia.
- Identify a set of criteria that determine trigger points for alerting the public during existing fires
- Develop common descriptions and key messages for existing fires
- Design a model that incorporates all the previous objectives, to be used by all agencies and partners in communicating with the public.
    - Determine aspects of this model that can be expanded to other hazards
- Develop an implementation and communication plan to deliver the results of the designshop, along with a key media phrase, to the agencies

The conference led to the development of the new FDRS that incorporates the rating of "catastrophic" and revised strategies for the other warning levels. The designshop also led to the development of the new policy and the replacement of the phrase 'Stay or Go' with 'Prepare, Act, Survive'. The participants at the designshop also developed an implementation and communications plan to deliver their results to the state and territory organizations (AFAC, 2010).

2.9 Implementation of 'Prepare, Act, Survive' Policy

In response to the Black Saturday tragedy, fire officials have enhanced the Fire Danger Rating Scale[5], a warning system to help educate people on the danger of an approaching fire and how to decide when to leave their homes if a fire is too intense to handle.

The scale does not rate how a current fire is behaving, but rather how it might behave should a fire occur given the current conditions. The scale is composed of three parts: Potential Fire Behavior, Impact Potential, and Your Action. The Potential Fire Behavior section describes the fire and how it might move, should it start given the rating, including how difficult the fire may be to control and how far embers may be blown ahead of it, which indicates how fast the fire can move. The Impact Potential explains the type of damage that may result should a fire of the predicted severity occur, and includes information such as potential loss of life, material damages, and the quality of home construction required to survive the fire. The final section, Your Action, explains the actions residents should take when a warning is issued with respect to the current rating, more specifically whether residents should stay to defend their homes from the fires or evacuate depending on their level of preparation to fight fires.

2.9.1 Potential Fire Behavior

The scale is based on six different ratings of the severity of a potential fire, each with its own description in each of the three sections. The first rating is a low/moderate rating, which indicates that while there may be a threat of bushfires, the fire should be easy to control and extinguish. The scale continues with a rating of high, indicating that fires may be easily controlled, but can be spread easily due to embers blown about by the wind. A rating of very high indicates that the fire may be difficult to control given that embers may be blown as far ahead as 2km. A newly added rating called severe indicates that fires will most likely be uncontrollable, and will spread very quickly with embers traveling up to 4 km ahead of the fires (RFS, 2010). Extreme is the second to last warning, and indicates that the fires will be uncontrollable and extremely fast moving, and embers will most likely be blown nearly 6 km ahead of the fire. The last rating, catastrophic, is also a new addition to the rating scale. This rating indicates fires will be uncontrollable and devastating. Embers will be blown over 20 km ahead of the fire, making the fires spread at an alarming rate (RFS, 2010).

2.9.2 Impact Potential

[5] See Appendix F

In addition to describing the type and severity of the fire, the ratings indicate the potential damages a state and territory may experience in terms of loss of life and structures due to the fire once it has started. The first three ratings represent minimal property damages, and that loss of life is very unlikely. Low to moderate warnings have a very small chance of creating injuries or causing damages to property and buildings. A high fire rating may result in minimal property damages, but loss of life will be extremely unlikely. Homes that are properly prepared to fight against the fires should be able to handle the fires without much difficulty. Very high ratings indicate that fires can become threatening quickly, and could be very difficult to defend against. Properties may sustain severe damages if not properly prepared, but loss of life is unlikely. Properly prepared buildings will most likely offer shelter, but utilities may fail, and fire fighting agencies may not be able to assist residents in defense of the fires (RFS, 2010).

The more severe portion of the scale indicates that fires will be extremely dangerous, and will likely result in property loss, injury, and loss of life, and fire services will most likely not be available for aid. Severe ratings indicate that fires will threaten suddenly with little or no warning, and will be extremely difficult to control. Property damage is almost certain, and there is a definite chance that lives will be lost. Well prepared homes may offer some shelter, but it is likely that utility services will be lost. Extreme ratings will involves fires that are uncontrollable, and people caught in the path of the fire will most likely die. Injuries will definitely occur, and property will most certainly be destroyed. Only the very best and well-built buildings will offer protection, but utilities will definitely fail (RFS, 2010). In a catastrophic rating, any fire started will sweep across the area and destroy everything in its path. People will die if caught in the path of the fire, and even the best built buildings will not offer any shelter.

2.9.3 Your Action

The last part of the warning system provides instruction on what individuals should do if a fire starts within a given rating. It is important that whatever the risk for bushfires, residents should have a survival plan in place and be ready in case of an emergency. Residents can easily create a plan of action to properly prepare for bushfires and to maximize survival, by consulting the Bush Fire Survival Plan, a publication found on most fire authorities' websites. For ratings low through high, authorities advise residents to review their bushfire survival plan since a fire may occur in their area. After reviewing their plan, residents should monitor the fire updates via news sources, and determine what warnings have been issued. When a very high warning is issued, residents need to be prepared to implement their survival plan since it is likely that a fire will occur in their area. Live fire report sources such as news, websites, and information lines should be well monitored so that residents can be properly informed about fire activity in their area. Homes should also be properly prepared to fight against a bushfire should it reach their area, meaning that the home is structurally sound enough to withstand a fire and that the home owner is able to actively defend it (RFS, 2010).

For ratings on the second half of the scale there are specific instructions that residents should follow in addition to following their Bushfire Survival Plans. If a severe warning is issued, residents should implement their survival plans, and if they are to evacuate, they should be prepared to do so a few hours before the fire to ensure they have enough time escape from the fire (RFS, 2010). It is recommended that residents stay and defend their homes only if their homes are well prepared to be defended. If an extreme rating is issued, residents are strongly advised to evacuate their homes at least a few hours before a bushfire is expected to hit. Residents should only stay and defend if their home is specifically designed to withstand bushfires and residents are capable of defending it (RFS, 2010). If a catastrophic rating is issued, residents are strongly urged to evacuate their homes many hours or even a day in advance to fully ensure their safety. At this level of intensity, no home will be successfully defended no matter how well it was built, and since death is a serious risk, all residents should be prepared to evacuate should this warning be issued (RFS, 2010).

2.10 Social Implications and National Policy

The wild land-urban interface can be defined as the interaction between two traditional land uses, forestry and land development (Ewert, 1993). Rural communities in Australia are constantly at risk from bushfires, and this risk is increasing as more of these communities develop and expand. Using statistical data from past incidents, it has been found that the maximum distance from forest boundaries at which homes are destroyed is no more than seven hundred meters (Chen, 2004). Even so, many communities are so densely populated that fires can travel between houses, and ember storms can stretch well beyond the forest boundary. As long as communities continue to be built on the borders of bush land, they will be at risk from wildfires. The only way to completely nullify this threat would be to remove all possible sources of bushfire fuel from the areas surrounding the community (AFAC Position, 2005). This is neither practical nor ethically or ecologically acceptable, and so the threat of bushfires can only be reduced, never removed. It is a choice of the residents to live in a fire-prone area, and with this choice comes certain risks that must be addressed. Residents of fire-prone areas must be prepared to either fight for their homes and put themselves at risk for injury or death, or abandon their homes and possessions to possible destruction. While it is still the responsibility of residents to make this choice, it is also the responsibility of the local fire authorities to assist in this decision by educating the public on proper preparation. This task is made easier if local brigades cooperate to reach larger areas of the ever growing wild land-urban interface.

AFAC's main objective revolves around the collaboration of its member organizations under one nationally-accepted fire-response policy. The Commonwealth of Australia, Australia's formal name, comprises six states united under the Commonwealth Government. Section 51 of the Australian Constitution outlines the areas in which the Commonwealth Government has the right to make laws. Any matters not controlled by

the Commonwealth under Section 51 are left for the states and territories to determine their own laws and positions. The management and implementation of fire and emergency response and policies is not included under Section 51. Thus it is the duty of the states to individually determine their specific fire response policies and methods of implementation (Australian Government, 2010). This has given rise to issues with collaboration between state and territory agencies that organizations like AFAC are trying to resolve.

Australia's current form for fire management and the policies in place can be partly explained through the cultural idea of an Australian national identity. Many Australians say they have no national culture or identity, yet, as ironic as it may sound, saying that Australia has no identity is uniquely Australian (Australian Identity, 2000). Looking back on the history of Australia and the influences from other countries and varying political groups in Australia, this identity has been formed from the clashing of ideals and views. It has created an individualistic culture in which individuals are expected to be able to take care of themselves and should not need help from others. The impact on the fire system has been the formation of individual groups across Australia that wish to stay independent and free from federal and state governments.

CHAPTER 3: METHODOLOGY

The ultimate goal of this project is to help reduce the number of deaths and property damage resulting from wildfires in Australia. Through collaboration with the Australasian Fire and Emergency Service Authorities Council (AFAC), we analyzed the integration of the Fire Danger Rating Scale into state and territory policies and assessed the extent of its implementation. Our first objectives were to identify the individual public warning objectives and policies of the state and territory fire authorities and agencies, and examine the changes in policy set forth by AFAC and the Royal Commission. Our next objectives were to examine the warning systems used in each state and territory, based on their methods of communication and the clarity, detail, and availability of information, and determine how these changes have been adopted by state and territory fire organizations. Our final objective was to assess the social implications that arose from these changes in policy, specifically how the adoption of the nationally agreed position by state and territory fire brigades will lead to a more effective nationally consistent system. The data we gathered to accomplish these objectives allowed us to make recommendations to AFAC and the fire authorities on potential improvements that could be made in the implementation of the policy changes.

Figure 7 provides displays the methods we adopted to achieve each objective.

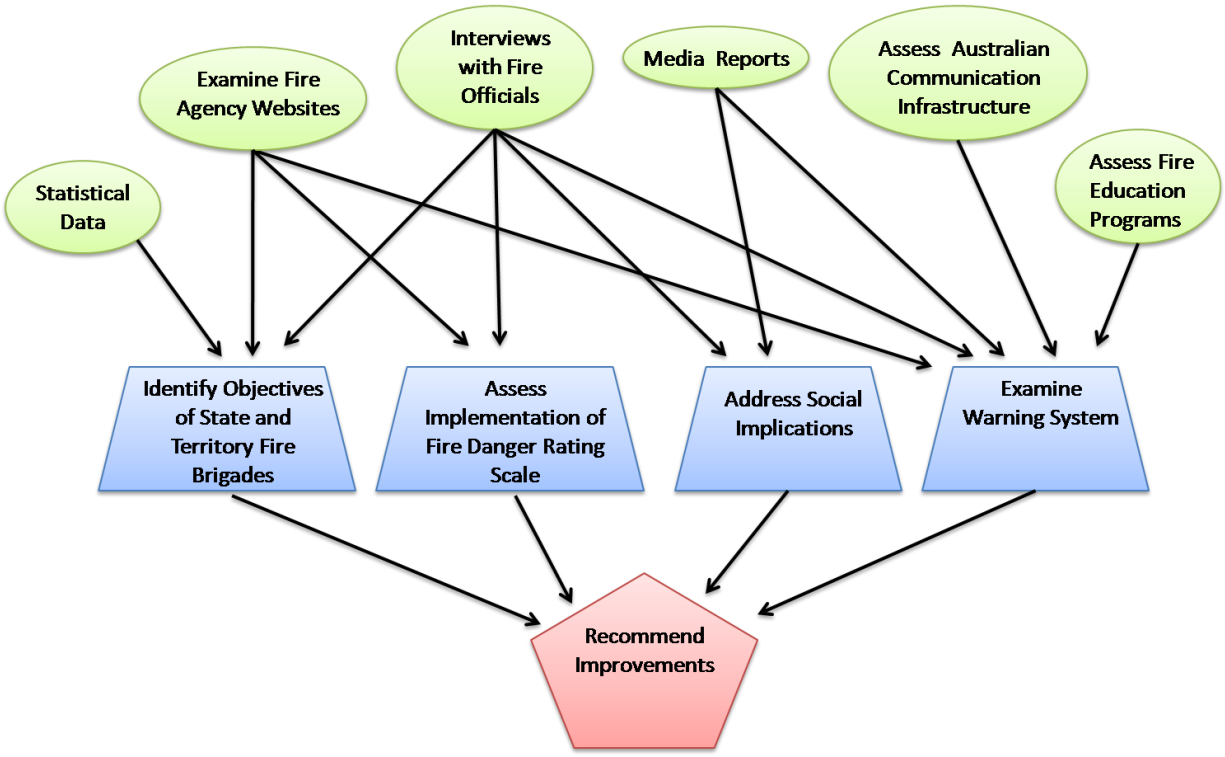

Figure 7: Overview of Methodology

3. 1 Research Objective 1: Identify Objectives of State and Territory Fire Brigades

The first objective of the project was to investigate the objectives of fire brigades within each state and territory, to determine how these objectives were developed, and to investigate how each brigade has fulfilled its specific objectives. We focused our examination on the state and territory fire authorities, including the Country Fire Authority (CFA), Country Fire Service (CFS), Fire Emergency Services Authority of Western Australia (FESA), Tasmanian Fire Service (TFS), New South Wales Fire Brigade (NSEFB), New South Wales Rural Fire Service (NSWRFS) Australian Capital Territory Emergency Services Agency (ACT ESA), Queensland Fire and Rescue Service, Bushfires NT, and the Northern Territories Fire and Rescue Service (NTFRS). A suggested list of interviewees was provided by our sponsor, and included the members Community Safety Group which advises AFAC on matters relating to "cost effective prevention and protection of life and property from exposure to fire and emergency incidents (AFAC, 2010).In order to acquire this information we implemented three main methods:

- Examination of websites and online resources pertaining to state and territory fire authorities and brigades
- Interviews with officials of state and territory fire authorities and brigades to acquire more detailed information
- Analysis of statistics and annual reports concerning fire activity in each state and territory

We began by examining the websites and other online information pertaining to these organizations in order to gain a better understanding of their objectives and methods. The information we gathered from these sources provided background information to base specific interview questions on, and helped us in analyzing the information gained from interviews. In particular we considered specific organization goals and strategies, fire response policies, fire danger forecasts, incident logs, and educational materials concerning defense strategies, fire behavior, and risk management.

We conducted interviews[6] with the officials of the state and territory agencies in order to obtain more detailed information and an in depth understanding of their views and experiences. The information we acquired addresses the individual objectives of these agencies and how they relate to the objectives of the other state and territory fire agencies and AFAC. We then examined how and why these specific objectives were developed, what communities the agencies are trying to reach; what methods they use to communicate warnings; what information these warnings convey; what their individual stance is concerning the new

[6] See Appendix D for sample interview script

'Prepare, Act, Survive' policy, and whether they encourage staying or leaving early. We then determined what strategies each agency uses to achieve these objectives and used this information to analyze possible areas of improvement for the brigades and for the overall state and territory. During the interviews with the state and territory fire authorities we looked at how they manage their relationships and efforts to collaborate between other state and territory agencies. This specific information has allowed us to understand how the states are currently working together and what can be done to increase collaboration.

Part of our assessment analyzes the effect that frequency of bushfires has on the policies of the fire brigades. This information was gathered during our interviews and through examining annual reports and other statistical information on fire incidents within each state and territory. These interviews were primarily conducted from the AFAC headquarters in Melbourne via conference calls or online Skype calls. Some in-person interviews were conducted with fire authority figures where appropriate. An additional goal during these interviews was to nurture the relationship between AFAC and these organizations and between the organizations themselves such that further cooperation and more efficient collaboration can be made. Thus, it became important to ensure that these interviews maintain an unbiased, outside stance concerning the individual policies, methods, and viewpoints. The information acquired from interviews, websites, and annual reports were primarily gathered and analyzed within the first three weeks of our team's arrival. A sample script for the generic interview with the fire officials may be found in Appendix D.

3.2 Research Objective 2: Assess Implementation of Fire Danger Rating Scale

The second objective of the project was to assess how thoroughly the new 'Prepare, Act, Survive' policy has been integrated into the fire and emergency programs of each State. This information was the starting point for examining possible deficiencies in state and territory warning systems and allowed us to determine other issues fire departments have had in implementing the changes in policy. We acquired this information through:

- Examination of websites and online resources pertaining to state and territory fire authorities and brigades
- Interviews with officials of state and territory fire authorities and brigades

During our examination of the organizations' websites we also considered what aspects of the changes in policy each department has clearly adopted. We specifically determined whether the fire authorities and brigades have adopted the revised rating scale, and how the response strategies stated on their sites

related to the recommendations of the Royal Commission. As before, this online research was designed to give us a better understanding of the fire authorities and brigades before we conducted the interviews.

Through the interviews with the state and territory fire authorities and brigades we collected information on how these organizations have responded to the changes in policy from the Royal Commission that resulted in the new warning system, and what resources they have expended to do so. We looked at what changes have been made to the policies in each state and territory since the recommendations put forth by the Royal Commission and how these policies compared to those held by AFAC. We also reviewed the opinions held by these organizations concerning whether the changes were needed or not, whether the new policies are an improvement over the old policy, and whether other policy changes need to be made. We identified the issues they have had in implementing the changes and the origins of these issues. Finally, we assessed the resources each state and territory has expended or lacks in order to accommodate these changes in terms of funds, man hours, and technology. By analyzing this information and the information on the objectives of each organization we identified reasons for differences among states and territories in the implementation of the new system.

3.3 Research Objective 3: Assess Warning Systems

The next objective was to investigate the warning messages provided by emergency organizations. Results of this assessment helped us identify problems in the new system that may have originated from a lack of knowledge whether it was because the information is not detailed enough, it is not reaching the people it needs to, or the recipients do not understand or value the information. To assess the content of warning messages we examined the websites of the state and territory fire authorities and other emergency organizations that are responsible for providing information for warnings, including the Bureau of Meteorology, and looked for areas where more detailed or specific information would be appropriate. In order to acquire information regarding public views and understanding of the information provided by these warnings we reviewed recent news articles and letters to the editor featuring fire incidents and community responses after these incidents. The information acquired from these articles was used to examine the effectiveness of the state and territory warning systems based on public reactions during and after fire emergencies.

In order to understand the ability of each state and territory to effectively communicate a bushfire warning to local residents, we also evaluated the communications media used by the Australian states and territories, such as landline and mobile phones, radio, TV, internet and press; based on their accuracy, timeliness, and coverage. By investigating each of these mediums, we were able to determine which are most effective in each state and territory, as well as which methods are less effective and should not be used as a

primary method for communication of the warning system. We then identified additional warning methods that could be implemented, considering both their effectiveness and appropriateness in each state and territory, and effort required to implement the methods, both financially and logistically. These suggestions are in the recommendations section.

The last part of our investigation consisted of examining each state and territory's efforts in educating the public about the new warning system. We determined how each system works, and what procedures the public should follow if a warning is issued. We examined each state and territory's website based on the information that is available for members of the public to research themselves. We also conducted an investigation of the fire education programs each state and territory provides for the public, which included who each program was designed for and each program's content. We focused on answering various open ended and specific questions about the site such as:

- What information is available?
- How easy is it to access this information?
- Does the site display current state of warning of the state and territory?
- Does it contain a complete explanation of each rating's meaning, potential danger and how to prepare appropriately?
- Does the site include guides on how to prepare for bushfires?

We also asked our interviewees what information they believe is important for the websites to include.

3.4 Research Objective 4: Address Social Implications

In addition to increasing community awareness and safety during periods of intense bushfire activity, the changes in policy are designed to encourage fire authorities and brigades to work together by providing a national policy that each member organization is expected to adopt. We evaluated the implications of these social issues by:

- Interviewing state and territory fire authorities and brigades
- Examining newspaper articles and letters to the editor to determine public opinions and responses to the changes in policy
- Explore the psychological aspects of how people are responding to warning systems

During our interviews we explored why some organizations have not adopted the changes in policy, the reasons behind their decisions, and how these decisions affect the collaboration of fire and emergency organizations within states and territories and on a national scale.

We also investigated the general public responses to and opinions of the change in policy throughout Australia, and how the public affects the implementation of the changes by the fire and emergency organizations. To do this we examined recent news articles pertaining to fire incidents that have occurred since the Black Saturday fires, specifically those that concern public responses to these incidents and opinions on local fire response policy. We also examined letters to editors that have been published after fire incidents to gain a more in depth view of the public opinion. We used our analysis of these articles and letters to assess how well the public is adjusting to the change from the 'Stay or Go' policy to the 'Prepare, Act, Survive' policy, and their views on what still needs to be done. By comparing this information to data gathered from our interviews and examination of state and territory fire authority websites, we have identified gaps in communications between the fire response agencies and the public concerning how effective the changes in policy and their implementation are in increasing community safety and awareness during bushfires.

3.5 Research Objective 5: Recommend Improvements

The final objective was to formulate and propose effective, realistic improvements to the problems we identified in how the new warning system is being implemented in each state or territory. This information was organized and analyzed by state and territory and as a whole in order to determine the scope and common origins of problems. We looked at relevant resources which provided starting points for possible solutions including the recommendations of the Royal Commission and past research projects concerning the Australian fire warning systems.

During the interviews we inquired into the specific needs of each organization, as well as their availability of resources. With this information we devised a set of recommendations to help the state and territory fire authorities work together to reduce the effects of bushfires on communities. Our recommendations are designed to accomplish the following:

- To create a more effective response policy based on the collaboration of different state and territory fire agencies in support of the goals of AFAC and the Royal Commission
- To improve strategies for conveying timely, extensive, and informative warnings
- To resolve social issues that have arisen that hinder the effectiveness of these policies in creating safe communities.

We also analyzed the perceptions of these organizations regarding the changes in the policy and recorded their recommendations for improvements based on their experiences before and after the changes.

CHAPTER 4: RESULTS AND ANALYSES

Our analyses of the information gained from interviews[7] and websites[8] showed many discrepancies between states on the nature of their legislature and bushfire threat, and how these discrepancies affected the bushfire policies and warning systems of the states. The main issues that seemed to arise concerned the quantity and nature of the information that was being provided to the public, as well as the public's view of personal responsibility. During the examination of education programs[9] we found several key programs that would be very beneficial if implemented on national scale. Our investigation of media reports before and after Black Saturday and the change in policy has provided us with insight on the views and expectations of the public.[10] Our final analyses of the data allowed us to identify the social issues that arise from the warning methods and policies, and the nature and views of the public.

4.1 Objectives and Policies of Fire Authorities

Although there are differences among the states on the exact nature and extent of their programs, there are a few major objectives that encompass the main goal of these organizations. The main goal is first and foremost "to protect life and property from fire" (Karen Enbom, Personal Communication). This is accomplished by providing timely and effective warnings, and assistance when possible, to residents during emergency situations and by educating the public on the dangers of bushfires and the proper precautions to take to defend against them.

The type of programs the agencies implement to accomplish these goals depend greatly on the geographical and political nature of their jurisdiction. One factor is whether the location is primarily rural, or includes a combination of urban, suburban, or rural areas. Another is the availability of resources and size of the population in these areas. Finally the frequency and severity of bushfires in the region are also important. Together these features make up the general bushfire risk, or danger that bushfires present to people, in an area. The level of bushfire risk is part of what determines the appropriate actions that must be taken by the emergency services. Another consideration is the public view of fires and the responsibilities of fire agencies, and how it relates to the fire agency's expectations of the public. These factors, along with some smaller discrepancies between states and the varying legislation of the states cause some major differences in the way the fire agencies perform.

[7] A full summary of the interviews can be found in appendix G
[8] A Full analysis of the Websites can be found in Appendix H
[9] A full analysis of the Education programs can be found in Appendix I
[10] A full summary of the media reports can be found in Appendix J

The government structure of the states differs greatly and has a strong influence on what programs are implemented by the fire agencies and how these programs are carried out. In many states the various actions that need to be taken before, during, or after an incident are split among many departments. In Victoria for example, Karen Enbom of the CFA reported that the majority of bushfire prevention and response programs are handled by the CFA, except for the planned burning and fuel reduction programs which are handled by the DSE. If the CFA wants to conduct a planned burn, they must first gain the approval of the DSE, which delays the project and makes it difficult for the CFA to plan strategic fuel reduction burns. The exact distribution of authority varies between states, but in many cases the distribution creates unnecessary complications in the bushfire prevention policy. In states where there is a distribution of authority among multiple organizations, the most effective programs seem to be those that implement a tight-knit collective of the emergency organizations. For example, Damien Killalea of the TFS states that in Tasmania there is only one fire service, one park service, and one forestry service, and that these services collaborate in an inter-agency fuel reduction program. According to David Caporn of FESA of Western Australia, FESA controls all emergency response services except the police and ambulance services, and has legislative control over all major fires. In South Australia the CFS does not conduct planned burnings, but works closely and supports the burnings of the Forestry SA. These types of arrangements make it easier for emergency response and land management to operate by helping them keep in contact and collaborate efforts during incidents. Leigh Miller of the CFS claims that this joint approach has been very good for South Australia, and Karen Enbom of the CFA states that the combination of all emergency services would be good for Victoria but may be difficult to initially establish.

The closer emergency services work together and the more they collaborate on issues the less effort, resources, and time will be required for programs to be more successful. Memorandums of Understanding (MOU's) and other agreements between fire agencies have helped to create a more collective system, but there are still many discrepancies. These MOU's are often between fire agencies within a state, between fire agencies and police services, or between fire agencies from different states. One of the main issues addressed by these agreements is the determination of which agency is granted control of a given situation. This can be determined based on the location, type, or severity of the incident.

Another topic often covered by these agreements is that of forced evacuations and roadblocks, which the police are typically responsible for implementing. In cases where these methods are employed there is typically an MOU between the police services and fire agencies stating that the police will perform these actions as directed by the incident controller designated to handle the incident. In most cases this is a senior

fire officer designated by the commissioner of the fire authority in charge of the incident. The actual legislation governing when forced evacuations can be authorized and by whom, varies between the states.[11]

There are two main types of evacuation models in place in Australia (Loh, 2007). The first is the pecuniary interest evacuation model in which residents have the right to refuse to relocate if they have a pecuniary, or financial interest in the area. This interest can correspond to the land, buildings, or goods in an area, and is based on the fact that historically a person who is not a felon, or suspected of acting unlawfully, is free to enjoy their property rights. (Loh, 2007) The other type is the mandatory evacuation model, which is present in most states and territories of Australia to some degree. In the mandatory evacuation model, the common right of property described above is overridden by other legislation that determines when emergency organizations or other authorized personnel can lawfully force residents to leave.

In general the pecuniary interest evacuation model is implemented in Victoria, except when individual conditions limiting people's right to stay are breached, in which case it is unclear if force is allowed (Loh, 2007). Forced evacuations are allowed in all other states, although mostly under certain conditions. For example in New South Wales, and the Northern Territory forced evacuations are allowed only during a state of emergency or disaster. In Tasmania the authority to conduct forced evacuations is held primarily by the police and the state controller or regional controller. It is only in South Australia, Western Australia and the majority of situations in Queensland that forced evacuations are clearly allowed. Outside of these situations it is often unclear when the mandatory evacuation model applies. In most cases the legislature gives emergency workers the ability to direct people to leave, and occasionally makes it an offense to disregard these directions, but does not explicitly say if force is allowed. However the power to use force is almost always granted allowed when people are interfering in the activities of the emergency workers.

The public's expectations for the fire agencies and vice versa differ slightly between states and agencies, for various reason, and has a major impact on what stances the agencies take on bushfire policy. In the Northern Territory a strong emphasis is placed on the personal responsibility of residents during bushfires. This strong emphasis is also reflected in the TFS's triage policy. According to Damien Killalea of the TFS the triage policy states the priorities the TFS will follow during an incident, part of which states that homes that are prepared to survive a bushfire will be more likely receive support from the TFS than will homes with no preparation. These assessments are made by the TFS and can usually only be made a short time before the fire impacts, and thus change frequently over time. Although all agencies educate the public and encourage them to make their own preparations, few are as direct as the TFS in this effort and a more explicit policy may be required in many states to get this message to sink in. Damien Killalea also states that the TFS and Bushfire CRC examined four different communities in Tasmania and determined that communities are still not doing enough to prepare. Similar anecdotal evidence has been seen by David

[11] A Full summary of the powers of Evacuation held by each state can be found in Appendix L

Caporn of FESA. The personal responsibility of the public for their own lives and property must be maintained in order to prevent the public from developing a blame mentality (discussed in Section 4.4) and because it is physically impossible for the fire agencies to protect every resident from the bushfire threat. According to members of Bushfires NT and NT Fire and Rescue large scale bushfires such as those that occurred on Black Saturday should be considered natural disasters and thus emergency response organizations should not be held accountable for not being able to control the incident. In every state or territory there is a certain amount of responsibility placed on the public for their own protection. However all organizations make an effort to educate the public to better prepare them for what must be done (discussed in Section 4.3).

The extent to which the public is held responsible, and is considered actually capable, for their own protection varies between the agencies depending on the density of population and resources available. The extreme cases would be where residents are required to take little responsibility for their own protection because of the close proximity of emergency services and resources, and where residents are almost solely responsible due to their distance from emergency services, or a lack of resources. The Melbourne metropolitan district, under the protection of the MFB, and the Northern Territories, under the protection of Bushfires NT and NT Fire and Rescue exemplify theses extreme cases. In the Northern Territories, the Bushfires NT and NT Fire and Rescue place a large emphasis on the public's personal responsibility and preparation. The MFB on the other hand often advises residents not to relocate and in some situation to take shelter and wait for fire personnel (Keith Adamson, 2010). The difference is that for the Northern Territory the at-risk population is often more spread out, and there are not enough resources or emergency response personnel to completely handle the incidents. On the other hand, in the urban districts that the MFB covers, the bushfire risk is not as great, the at-risk area is smaller, and the urban area provides plenty of resources for the MFB to effectively fight the fire. While all residents need to have some personal responsibility for their own safety and emergency preparedness, agencies in all states deal with a different set of conditions that influence how their individual policies toward public response develop.

The extent to which fire agencies focus on the bushfire threat also depends on multiple factors. The MFB for example primarily deals with structural fires due to its mainly urban jurisdiction (Keith Adamson, personal communication). Although the MFB does have programs to fight bushfires and to assist the CFA during times of heightened activity, the CFA is responsible for the majority of bushfire preparedness and control programs (Karen Enbom, personal communication) in Victoria. Likewise in Queensland where bushfire threats are not as severe as in the other states, education and awareness programs emphasize preparation for cyclones, and bushfire awareness has only recently become an issue (Gary Gilby, personal communication).

The methods used to implement these programs also depend heavily on the factors that determine the authority's objectives. In all states there is some form of public education designed to spread awareness of the bushfire threat (discussed in Section 4.3). During incidents, emergency response varies but typically includes, volunteer or career firefighters responding to an incident to either stop the spread of a fire or defend a community, while residents are advised to follow their individual Bushfire Survival Plans. The priorities of the agencies during incidents also differ from state to state. Some agencies have made special preparations for Neighborhood Safer Places (NSP's) and areas of refuge, while others have left it to the residents or unofficial community programs to determine. Also many agencies have made special preparations for vulnerable groups such as the elderly and very young, while other agencies have left this to be determined in community preparedness plans. These discrepancies often result from differences in funding or legislation, and result in varying degrees of community involvement in bushfire preparedness.

Overall, the individual policies of state and territories, and even agencies within those state and territories are, and in most cases will remain, very different. This is necessary to ensure that the specific needs of these agencies are met. However the closer states and territories can get to creating a unified national policy, the more effective all emergency response programs will be. . While flexibility is important the presence of a national policy is essential because it provides a link between the states and allows for a more cooperative approach to bushfire management. Just as the individual states have benefitted from cooperative arrangements of emergency and land management services, the country will benefit from a collective approach to bushfire issues. A national policy will create a standard for how warnings are issued and what type of information is presented. This is especially important near state borders where residents may receive mixed messages if the fire authorities do not follow the same protocols. For example, in the Australian Capital Territory, the warning signs on roads display the FDRI for the day as well as the warning level. However in New South Wales the warning signs only display the warning level. Inconsistencies like these can lead to confusion among the public. It is important for all states and territories to implement the FDRS and assess fires in the same manner otherwise a single fire may be rated at one warning level in one state, and another warning level in a different state. If both of these states also have very different approaches to handling the fire, based on these ratings, then efforts to control it will be impeded. The adoption of a national policy also has significant social implications which will be discussed in more detail in section 4.4.

4.2 Implementation of the New Fire Danger Rating Scale

The new 'Prepare, Act, Survive' policy and the accompanying revisions to the FDRS were developed late last year which made it difficult for most, and nearly impossible for some, states to implement before the next fire season. Gary Gilby of Queensland Fire and Rescue Service and members of the NT Fire and Rescue

and Bushfires NT pointed out that these states were already well into their fire danger season when the new policy came out and both decided it would be more practical to wait until the next fire season to address the changes. For the other states, the change in policy came right before the current fire season, and the rush to implement the changes caused many problems with resourcing. In most cases appropriate funding was allotted by the various state governments or other sponsors of the organizations, and most if not all of the current changes have been implemented. However some states have either not implemented all of the changes due to time constraints, or changed the policies slightly to better reflect their situation such as the removal of code red by the TFS.

Generally the policy has had a good response from the fire agencies and the general public. The fire agencies believe that the new policy will be more effective in gaining the public's attention and spreading awareness of the bushfire threat. All states agree that the development of a national standard for bushfire policy and warnings is a good move However many believe that whatever policy is eventually developed after the final recommendations by the Royal Commission and evaluations by the states, it should be flexible and allow for states to modify it according to their own needs, while still maintaining a national standard that will eliminate some of the main discrepancies between state policies. The main issues with the policy that have arisen so far mostly concern specific details. The language used for the higher level warnings is very powerful, which is one of the reasons the new warnings are influencing so many more people. However many agencies fear that the language may be too strong and is causing undue panic in communities. Some states have adjusted the warnings already, For example the TFS dropped the reference to code red in the catastrophic level and changed the color scheme to solid black (Killalea, personal communication). In general use of the catastrophic warning level has met some resistance due to fears that it will lead to exaggerated expectations of both the bushfire threat and the capabilities of emergency response organizations. One point that many states and territories make is that the new policy must, stress the need for personal preparation of residents before and during incidents. This includes physical preparedness of self, home, and property, as well as emotional and psychological preparedness (discussed in section 4.4.2). Another issue that has arisen is the proper emphasis to be placed on staying or relocating. After Black Saturday the number of residents choosing to relocate has dramatically increased, which leads to an increased number of destroyed houses that could have been saved (Bachelard, 2010). There have been many cases where a home survived the passing of the bushfire front, but later burned down due to ember storms because it was undefended (Clode, 2010). The new policy states that the safest option during a bushfire is to relocate early, this option is most likely to preserve human lives but this comes at a potential cost in loss of property. Many officials, including Rob Rogers of the NSWRFS believe that the policy should more strongly emphasize the benefits of staying to defend, but be more explicit in the limitations of this strategy.

4.2.1 Website Implementation

This section focuses on how the states and territories of Australia have implemented the new warning system on their websites by analyzing what information is available on the warning system, whether or not the website uses the new Prepare Act Survive campaign, and how accessible this information is. Table 3 shows a state-by -state analysis of the fire authorities' websites based on information available for the new warning system. The table shows how many web links were used to access information with 0 meaning that the information was on the home page and N/A meaning that the information could not be found. The one exception is for languages available in which case the number indicates how many foreign languages the bushfire information is in. The authorities that are mentioned deal with bushfires in their respective states or territories.

Authorities	FDR	Incident Reports	Weather	Fire Ban	Languages	P.A.S
CFA (VIC)	0	1	1	1	18	0
CFS (SA)	1	0	1	1	0	1
FESA (WA)	1	1	2	2	0	0
TFS (TAS)	1	1	1	3	0	1
NSWRFS (NSW)	1	1	N/A	1	22	1
ESA (ACT)	0	2	3	0	0	2
QLRFS (QL)	4	N/A	3	1	0	N/A
NTFRS (NT)	N/A	N/A	N/A	N/A	0	N/A

Table 3: Website information.

In general, the southern states and territories (NSW, ACT, VIC, Tas, and SA) have fully adopted new warning system and have changed their websites to be within the guidelines of the new policies. They have thorough information explaining how the new warning system works, what warnings mean, and how residents should act when a warning is issued, and also have the new Prepare Act Survive survival plan available to be downloaded in a PDF format. This information is relatively easy to access with clear links posted directly on the home pages. FESA of WA has accepted the new warning system and is in the process of building a new website that will better incorporate it. Their current website has extensive information on the new warning system and Prepare Act Survive, and the new website will make that information easily accessible. The RFS of QL does have some information on the new warning system, but does not have information on the new Prepare Act Survive campaign. The information available for the new warning system takes a few links to get to and does not advertise the system's information on their home page. The FRS of NT has done very little to implement the new warning system and is still using the previous policy of "Stay or Go." When interviewing the NTFRS, one fire official said that the reason for not implementing the new

system was because the changes in policy were released during the middle of their bushfire season, and thus changing to a new policy would have caused much confusion and may prove ineffective especially since the "Stay or Go" policy has been working very well for them. NTFRS and QLRFS are waiting to see how other states and territories decide to implement the new warning system and will then decide how to implement it in NT. This is primarily because the recommendations of the Royal Commission were released when Queensland and Northern Territory were in there bushfire seasons, and they were concerned that changing the warning system midseason would cause confusion with the public.

4.3 Bushfire Warning Systems

This section investigates the methods used for warning residents about bushfires in each state or territory. It includes how residents are educated about bushfire warnings, how warnings are distributed, and what information is available to residents online.

4.3.1 Analysis of State and Territories Educational Programs

As with changes to any new system, the educational aspect of the new fire warning system is crucial to its implementation and success. In order for the new system to be successful, residents must understand all of its aspects, including the fire danger rating index, how to appropriately prepare for a bushfire if one should occur, the appropriate action to take when a warning is issued, and how to react when a bushfire actually starts. A fair amount of the warning system's success also depends on residents' making proper preparations before the bushfire season starts, such as ember-proofing their homes to help prevent embers from bushfires causing their house to ignite. As such, it is important for bushfire preparation education to be readily available so residents are empowered to learn what precautions must be taken to help make their home more likely to survive a bushfire. To achieve this, each state or territory has its own community educational programs that help residents learn the details of the new system and how to prepare for an upcoming bushfire season. This section describes each state's or territory's methods for educating their residents in bushfire safety.

There are many community education programs that are common to the states and territories of Australia. Many states and territories have had issues with for the continuous expense of educating residents about the new warning system. In order to solve this problem, volunteers are trained in bushfire education so that they may continue educating their communities about how to prepare for bushfire season, and how to form an effective bushfire survival plan as well as education about the new warning system. Public education meetings are another popular program. These are informal meetings usually put on by the fire authorities in a

public place such as a town hall or street corner, and are designed to give residents information about bushfire safety. Juvenile intervention programs are very common, and are intended to stop children playing with fire. The programs are taught by fire officials and teach children to have a healthy respect for fire and the dangers and hazards of playing with fire. All states and territories have school education programs in which fire authorities visit schools and teach a fire education class, which includes information about bushfires. Other teacher information is available in most states and territories.

Besides these common programs, many of the states and territories have unique programs that work particularly well in their states. The Fiery Women's program of the CFS in Victoria recognizes the need the need to direct more education toward women so that if their spouses have done much or all of the planning for bushfire safety and are not home when the fire occurs, the women will be prepared to handle the situation themselves. Fired Up English, also administered by the CFA, goes beyond educating people who are native to Australia and speak English to people who do not use English as their first language, and addresses the social issue of preparing everyone in the state or territory for bushfires, not just the general public. Project Wakeup is a program administered by the TFS of Tasmania. This program is not specifically designed for bushfires, but it addresses the need to specially prepare people who are disabled or elderly for emergency situations. Being involved school education get children started on fire safety early and is effective in teaching children about the dangers fire can pose, but getting the parents involved is a new approach that helps parents understand what their child is learning in the fire courses to help them understand their child's knowledge of fire safety.

Beyond active educational programs like these, there are many ways that educational material is distributed to the public, or is publically accessible. Some states and territories have started distributing bushfire DVDs which contain a lot of specific information about bushfire safety. These have been particularly useful because the recipient does not have to leave his or her home or go online to find the information. Targeting high risk areas with this information has worked well because people who are in danger of bushfires are much more likely to be receptive to the information that is being distributed. Another approach to this in home education method is the Smart Sparx education pack. This pack can be taken out on loan from a local fire station and contains a great deal of useful information about fire safety, and puts the responsibility of fire education on the resident by allowing residents to be more self reliant. Some states and territories have bushfire museums, such as the Emergency Services Education & Heritage Centre of Western Australia. This method allows the public to explore the history of bushfires and provides hands on education about bushfire safety, allowing residents to come away with a better understanding of how bushfires are fought and how they can take measures to prepare themselves. These unique programs provide an alternative means for fire education.

4.3.2 Communication Media

Having an effective warning system is important, but utilizing the proper communication mediums to convey that warning is crucial to the warning system's success. Residents' decisions about bushfire safety depend on receiving bushfire warning in a timely and understandable way, and not being able to receive a warning could result in residents acting on misinformed decisions. There are many available mediums to use to distribute the warnings including radio, television, the internet, the press, and both landline and mobile phones. However, not all of these mediums are available to every resident, which can make choosing the proper medium difficult. Instead of trying to find one medium that works best for everyone, most states and territories have decided to use a variety of mediums to distribute the bushfire warnings instead, making sure every resident has at least one way to receive the warnings. This section analyses the strengths and weaknesses of the various communication mediums that have been used by the states and territories.

Emergency Alert is a nationally implemented messaging system that sends out messages to both landline and mobile phones if an emergency occurs in the area where the phones are registered. The system became operational in December of 2009, and has been adopted by almost all of the states and territories. Although the system is a national system, it is up to each states or territories' emergency services to operate and manage it. The system works by issuing one of three warnings (Advice, Watch and Act, and Emergency Warning) during an emergency. These messages can be used for many emergencies, such as cyclones or floods. In a bushfire context, an Advice message means that there is a fire incident in the area but residents are not in danger yet. A Watch and Act message is sent when a fire is becoming more severe and residents may be threatened. When this message is sent, residents are advised to start paying more attention to the fire and start preparing to initiate their bushfire survival plan. If an Emergency Warning message is sent, residents are in danger and should take action immediately or their lives might be threatened. Since the system has been activated, it has been used over 30 times and over 100,000 messages have been sent. States have had mixed results when using this system, but overall the system has the potential to effectively be used to warn residents about emergency. One mobile phone issue with the system is it sends warnings only to residents registered in a certain area rather than all the mobiles in that area. This means that if residents are away on holiday and a bushfire occurs near their home, they will receive messages about the incident, even though they are not in any danger. It also means that if residents who are on holiday are in an area where there is a bushfire, they will not receive messages on their phones, but are potentially in danger. Efforts are now being made to create a system that is based on the location of the phone rather than where the phone is registered, but it could be several years before the system is fully developed. One other issue with the messaging system, specifically with text messages, is that the information provided is very limited because of message space issues but also because bushfires can move through an area in a matter of minutes sometimes making

information outdated by the time it reaches the recipients. Residents can also call an information hotline in most states and territories which will give them automated messages about the current bushfire outlook.

The Standard Emergency Warning Signal (SEWS) is used by the states' and territories' emergency services to broadcast radio or TV warnings. A siren is played on station and then is followed by a warning message. This system is used for extreme emergencies for which residents could possibly be in serious danger. Residents are advised that if they were this warning to immediately take appropriate action, which will depend on what the warning advises. These warnings are usually played every 15 min for 2 hours, or until a new warning message is updated. This system is adopted by all the states and territories, and has worked relatively well. Because radio messages have been around for such a long time, people are comfortable with them and experienced with receiving information through this medium. However, in a recent study, residents say that a warning heard over the radio is one of the least likely ways to prompt them to leave their home in an emergency. The Northern Territory fire services commented that if warnings are issued all the time, residents will get used to them and not take them as seriously. This could explain resident's responses to the warnings provided by radios.

The press is used in some states and territories to alert residents by posting warnings in newspapers, similar to the daily weather forecast. This method can be an effective means for reaching people who read the paper, but with changes in technology and with more people starting to use the internet for their news purposes, this method could soon be outdated. The Internet is a popular communications medium because it allows fire services to upload information very quickly to their website, and allows residents to access a large amount of information. Some states and territories also use the internet to send email alerts, which can be useful even if the resident is not home because many people can access their email through their mobile phones. However, this is more of passive system because if the residents do not actively check their email account, they will not receive the warning. Furthermore, these warnings are limited by the internet's infrastructure, and residents cannot access this information if they do not have access to internet.

4.3.3 Website Warnings

Each website is unique and has different methods for posting information and warnings that have worked well in that state or territory. The most important feature of a website, no matter what information is posted, is that it must be user friendly and the information must be easy to access. In our research, we have found two main attributes that makes finding information easy on the fire authorities' websites. The first is having a link to key pieces of information, such as a fire danger rating, right on the home page and near the top of the page so that it is easy to find. The second is making the links large so they are easy to see and also designed so they stick out from the page, whether it is isolated so nothing else is near it or brightly colored.

We also looked at what information is needed in order to make good decisions in a bushfire situation. Key pieces that were often contained on a website were: the fire danger rating for certain area, fire incident reports, fire weather outlook, and current fire bans.

4.4 Social Implications

Because the new policy influences the interactions of the state and territory fire agencies with each other and the general public, nearly every aspect of the policy includes significant social concerns. The topic of personal preparedness is a major concern because of its association with a "blame mentality". This is a great concern for many states especially the Northern Territory, as stated by members of Bushfires NT and NT Fire and Rescue. The consensus among most fire authorities is that in most cases emergency response organizations cannot protect every resident that is in danger from a bushfire, there are simply too many people at risk, and not enough resources to protect every house while trying to contain the fire. Unfortunately many residents do not understand the extent to which they are at risk or, perhaps more unfortunately, choose not to heed the advice and make the proper preparations. There are increasing numbers of residents who feel they can wait for directions, or support from emergency services, which may never arrive depending on the situation. These residents then blame the fire agencies for not properly handling the situation. According to the NT this issue has been growing in the southern states and territories, and the best course of action for all states and territories is to eliminate this mentality before it become too popular. It is this way of thinking that the states and territories are trying to discourage, in order to create more self sufficient communities. Bushfires are a natural occurrence in rural parts of Australia, and residents who choose to live in these areas are making a conscious decision to put themselves at risk. Thus part of the responsibility for their safety must lie with the residents.

There are many social implications inherited in the warning systems used and the frequency with which each system is used. The most frequently used warning systems are the radio and television broadcasts sent out through ABC and local broadcasting companies. Less frequently used are the telephone and text message warning systems such as Emergency Alert and State Alert. One of the issues that arose with the telephone warning systems that has been described by multiple officers of fire authorities, including Rob Rogers of the NSWRFS, is that residents received them on a few occasions, and then expected to receive them for all emergencies. Because of this it may become necessary for fire agencies to provide more details about when a certain type of warning will be issued, or even more strongly emphasize the fact that warnings will not always be available.

The development of a national policy does more for the states and territories than provide a standard for all of them to adopt. The more closely related the policies of each state are the stronger their relationships will be, creating a more effective system across the country. A strong relationship is more important in some situations, such as the ACT and NSW, than it may be in others, such as the NT and Tasmania. However a strong relationship between all states will help the policy grow and allow for more opportunities for cross border collaborations. While a national policy is very beneficial, it is important that the policy account for differences among states and allow for variations to be developed. These variations are what will help the policy evolve in the future, as more options are tested for different situations, thus benefitting the country as a whole. This process has already begun as reflected in the changes made by Tasmania, and the examination of other state's policies by WA, the NT, and QL.

4.4.1 Resident's Bushfire Safety Decision Making Process

In order to gain a perspective of resident's opinions, understanding, and actions taken with respect to the new bushfire warning system, we have researched a document called, "Where Are They Going?,"[12]. This study, conducted by the Office of the Emergency Services Commissioner of Victoria, looked specifically at the reasons why, when, and how people leave their homes, and whether they incorporate leaving into their bushfire survival plan. The study involved 616 households in 54 areas deemed to be high risk for bushfires, and surveys were conducted by telephone interviews with one member from each household. A workshop with representatives from the emergency management sector was also used to help verify the results of the study and give their own personal experiences with the warning system and issues they have experienced. The following sections analyze the study's results, statistics, and key findings (Betts, 2009).

Residents were asked up until what point they plan to leave before a bushfire occurred. A total of 32.8% replied that they wait for emergency services to tell them when to leave, and 32.6% replied they would wait until a fire occurred in their area. This type of behavior can be dangerous because emergency services only specifically advise residents to leave under very extreme circumstances, such as when a community is under imminent threat of a bushfire, and may not advise residents to leave when they should with regards to their preparedness. What is more worrisome is that over 14% replied they would wait until threatened by a bushfire, and by this time it may well be too late to leave their homes and be able to get to safety. When asked whether or not residents would leave on a day when the new code red (catastrophic level) warning was issued, only 45% said they would plan to leave their homes. However, about 60% of these respondents replied they would leave well in advance, meaning the night before or morning of the day for which the catastrophic

[12] A full summary of the report can be found in Appendix K

warning was issued. Discussions form the focus group suggested that people's behavior with respect to a catastrophic warning being could influenced by their work schedules and that people would be more likely to stay in the bushfire risk so they could go to work. Figure 8 shows resident's decision to stay and defend, leave, or leave early on a day when a catastrophic warning was issued.

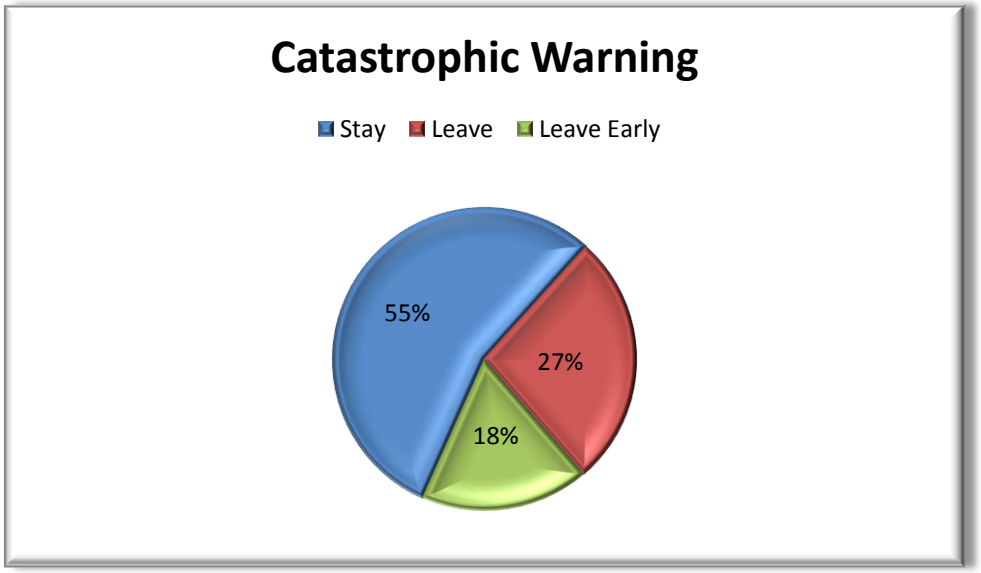

Figure 8: Resident's Decisions When a Catastrophic Warning Is Issued (Betts, 2009).

The study asked residents to choose among various prompts for deciding to leave their homes. The most effective prompts were found to be when they felt their family was threatened (83.4%), when they were told to leave by emergency services (83.1%), and when they could see the smoke and flames (60%). Again, waiting until the bushfire is so close is dangerous because of the speed a bushfire can travel and makes the option of leaving risky at best. If people were prompted by a fire reported on the radio, only 35% said they would definitely leave which is not good because in most states, radio is the primary way to communicate warnings to the public. Residents were then asked to choose the places they would go should they decide to leave their homes. The top three places people would go if a bushfire occurred were relative and friends outside of the local area (29.3%), a public place inside the local area (20.1%), and Melbourne or the provincial city (11.9%). Overall, 26% residents chose an option that was specifically inside their local area, and only 37.3% chose an option that was specifically outside the area, which is the proper place to go when leaving. Not leaving the local area means that although residents have left their homes, they are still in danger of the bushfire. Places of last resort are meant to be used only if residents fail to defend their homes and must leave at the last minute. However, when asked about how residents would utilize these places, 20% of residents said they would not use these places under any circumstances. What is more concerning is 20% of residents

said that would use these places as a first resort. In fact, only 20% of residents said they would use these places in the manner they were intended to be used.

When a Code Red (Catastrophic) warning has been issued, residents were asked what they are most likely to do or have done in the past. Only 25% responded with an answer of having left in a timely manner, and 40% leave their homes when a fire occurs in their area and go to a place outside the fire area. This means that on a day that has the potential to create bushfires like the ones on Black Saturday, a large number of people are staying in their local area even after a bushfire has started. An additional 20% leave their homes when a fire occurs in their area and intend to stay within the fire zone. The result of the study for this question's feedback means that 75% of the study's population is not taking the proper actions during a catastrophic warning day. Not only are these residents not properly prepared, but 30% of the study's population intends to make risky decisions on a catastrophic warning day. Even on days when a catastrophic warning is not issued, 50% of these residents said they will be leaving at various times during the day. The difference in responses for catastrophic warning days and non-catastrophic days could be evidence that there is too much focus on the catastrophic warning. Because there is so much emphasis on the catastrophic warning, residents may feel that this warning is the only one they must really worry about, even though a rating of extreme can still mean that a devastating bushfire could form.

The study also examined how demographics can influence decisions to leave during a bushfire. Men showed a strong intention to stay and defend their homes even if the warning forecast was a catastrophic warning. Men also felt strongly about returning to their homes as soon as possible to try and defend it against any residual fires resulting from bushfire embers. Women on the other hand were much more likely to exercise caution and leave their homes rather than stay and defend them, and were also more likely to go to places of friends or relatives outside the bushfire danger zone. Of the elderly group, many residents identified places of last resort as their first place to go in case of a bushfire. The study also notes that elderly people may not have beneficiaries such as younger members of their family living with them or close by, which would make public areas possibly their only place to go if a bushfire occurred in their area. According to the study, this age group's responses indicate they would be making risky decisions concerning their bushfire survival plans which could endanger their lives.

Because people have a tendency to leave their homes at the last minute, there is too much traffic for the roads to handle and causes residents to become trapped in traffic jams when the bushfire reaches them. This is one aspect of why it is so risky to leave as a bushfire is nearing the area. When it comes to acting during a bushfire, residents want to be told what to do and when to do it right down to the decision of staying or going. The fact the residents have come to have high expectations of the fire authorities and have become less self reliant is clear. Also, many residents who chose to leave are not going beyond their local area. This becomes a problem because the bushfire zone can cover a large area, not just an individual community. Staying in the local area means that residents have not fully removed themselves from danger even though

they have left their homes. There is also a concern about where elderly people would go to if they decided to leave their homes since many would not be likely to have family to stay with, or may not leave at all if they are not physically able to do so. In general much of the public is still making risky decisions about bushfire safety.

4.4.2 Psychological Preparedness

Living in a bushfire-prone area carries certain risks, many of which can be mitigated by being properly prepared. Physical preparation of homes and property is essential for survival during a bushfire, but perhaps more, or at least equally, important is emotional and psychological preparation.

In most cases the majority of deaths caused by bushfires result from late or last minute evacuations which typically result from one of two dangerous decisions residents make in response to the fear of fire threat. In one case the resident has prepared to defend their home, but panics in the face of the fire and attempts to escape. In another case the resident planned all along to leave but only when they felt threatened and in many cases residents either do not realize, or rationalize away, a threat until it is too late (Clode, 2010).

In the first case, residents tend to have a well-prepared home and bushfire survival plan, but are lacking the mental conditioning needed to enact the plan under extreme conditions. During periods of intense anxiety the primitive, survival-oriented part of the brain takes over, adjusting the body's behavior and redirecting blood to increase the efficiency of the organs necessary for immediate survival such as the heart lungs and muscles. Unfortunately this part of the brain tends to overrule other parts of the brain that are essential when defending against a bushfire, specifically the problem-solving capabilities (Clode 2010). When this occurs residents become panicked and lose the ability to consciously follow their Bushfire Survival Plans and typically try to flee their homes. It is this reaction that is causing residents with well prepared homes to abandon their property in the face of a fire, even if they know it is unsafe to do so.

In the second case, residents do not prepare their homes to be defended, and have every intention of leaving, but not unless they are directly threatened. The problem with this strategy is that in many cases human nature prevents them from feeling threatened until it is too late. Many residents will see signs of an approaching fire, most often the smoke or floating embers, but try convince themselves that they are not threatened, that perhaps the fire is heading somewhere else, or that it is a planned burn of some sort. People have a tendency to not want to believe bad things will happen to them, and once they begin to prepare they have admitted that there is a good probability they are in danger. Thus many residents wait until the last minute, when the fire threat is undeniable, to prepare. In some cases, even when danger is at their doorstep residents have a tendency to freeze and become paralyzed. This is a natural reaction, as their minds to convince them that this is not happening. It often takes some other event or person to shake them out of this

stupor so they can properly react to the situation (Clode 2010). This is a very dangerous reaction during a bushfire, and it is behaviors like these that are putting so many residents at risk, and need to be eliminated.

Humans are social creatures by nature, and thus it is no surprise that during periods of high tension, anxiety, and confusion, we turn to others to see what course of action we should take. It is during these times that residents with experience and even training dealing with fires, take control of the situation and direct people on what to do. The problem with this scenario is that in most cases these individuals are not present because they are needed elsewhere. Thus, the general public is left to make their own decisions, which can be difficult in their panicked state.

The best way to combat this is to train and condition the general public to be able to deal with the anxiety of defending their homes during a bushfire. The Australia Psychological Society has a number of published documents designed to mentally prepare residents to respond to bushfire threats. One form of advice they give is to "AIM" for psychological preparedness. AIM includes the three focus points of psychological preparation; Anticipation, Identification, and Management. In order for residents to be properly prepared they must anticipate the behaviors and feelings they will exhibit. The feelings residents are expected to experience usually include stress, panic, apprehension, anxiety, and fear. These feelings are dangerous because they are what cause people to become paralyzed, preventing them from accomplishing what needs to be done to protect their homes. If these feelings are to be properly managed residents must understand that they will experience these feelings during an incident and that they will impede the residents' ability to survive. In order to manage these emotions the residents must learn to identify these emotions based off of bodily response, such as dry mouth or butterflies in the stomach from anxiety, and understanding the types of thinking that result from these feelings. In the event a resident must defend their home from a bushfire it is important to remain calm and collected, which can become difficult or impossible if they let their emotions control them. Conversely, the behaviors that must be anticipated are the behaviors that the residents must exhibit to survive. These behaviors must be part of the residents' bushfire survival plan, and must be rehearsed if they are to be performed properly under the stress of a bushfire attack. The final step is to actually manage these emotions and behaviors in order to properly enact the survival plan. To do this it is important to practice techniques designed to help remain calm during these situations such as relaxing the body, breathing slowly, and behaving in a focused and direct manner (APS, 2009).

The only way to remain in control during a high tension situation is to learn to expect the involuntary reactions the mind and body will undergo and practice techniques to control these reactions. This is the essence of psychological preparation for bushfires, and ultimately any emergency situation. Because psychological preparedness is so essential to bushfire preparedness, it needs to be given equal weight to physical preparedness, and in some cases special attention depending on the targeted groups.

CHAPTER 5: RECOMMENDATIONS AND CONCLUSIONS

The 'Prepare, Act Survive' policy and revised Fire Danger Rating Scale were developed late in 2009 and so far there has not been sufficient time for the states and territories completely implement the new policy. For Queensland and the Northern Territories the change in policy came in the middle of the bushfire season, making it impractical, and in many cases impossible for the changes to be made immediately. All of the other states have put forth a strong effort to implement the new changes and ensure that the warning and educational materials are up to date. However, little assessment has been completed on the effects of the new policy. Without the results of these investigations it is difficult to qualitatively or quantitatively asses the success of many of the new programs and warning systems under the 'Prepare, Act, Survive' policy. The majority of the conclusions in this section are based on anecdotal evidence and we recommend that the fire authorities conduct detailed analytical research into the success of the current programs before any major changes are made. However there are several cases where immediate revisions by the fire authorities may be beneficial.

The following recommendations address specific warning systems or education programs that have shown areas of promise or needed improvement, as well as areas that should be investigated further. These recommendations also address the development of a national policy and its importance in developing a strong bushfire response for all states. Furthermore there are specific details of the newly developed 'Prepare, Act, Survive' policy that have been modified or questioned by individual states, such as the type of language used in warnings. These changes have been investigated to determine the factors that caused them and whether or not they are applicable for national implementation. Lastly we have made recommendations designed to improve bushfire education and warning systems through analysis of social issues, such as the blame mentality and psychological preparedness, and examination of technical solutions, such as fire potential mapping, and usage of fire retardant plants.

5.1 Recommendations to changes in Educational Programs

Fire authorities should strive to **create and expand volunteer bushfire education programs**. This kind of program provides education on a personal level and allows volunteers to make sure people in their communities are properly prepared for bushfires. If properly trained, volunteers can educate residents from their own communities about bushfire safety, and be a resource for residents seeking more information. If Firefighters know that communities are being educated, it will let them focus on fighting fires. It will also give them some peace of mind knowing that residents will have a better idea of how to respond in an emergency situation. Also since the educators are volunteers, fire authorities will not have to spend as much money on bushfire education and will be able to allocate those funds elsewhere in the department.

Fire authorities should **distribute educational bushfire DVD's** because they can provide more information than is normally distributed in a pamphlet, through a more convenient and appealing medium. Residents do not have to worry about trying to make it to a public meeting, or going online to try and research the information. All of the information can be accessed in one place whenever a resident has time to view it. It also means that the information can easily be accessed if a resident needs to refresh their memory at the beginning of the fire season about what to do in a bushfire situation or if a particular warning is issued and they forget what it means. Currently the TFS and FESA implement the use of DVD's as educational materials, primarily distributing them to communities in bushfire risk areas, but also making them available for any resident who requests them. The DVD's distributed in Tasmania are approximately 30 minutes in length and focus on the meaning of the new Fire Danger Rating Scale and the importance of developing and following a Bushfire Survival Plan. (Killalea, personal communication) We recommend that the emergency organizations of other states consider the distribution of DVD's prior to the beginning of each bushfire season.

Fire authorities should **put an emphasis on complete family bushfire training**. All members of the household should be educated on what to do if a bushfire warning is issued, or if a bushfire occurs in the area. Specialty programs for women, children and the elderly would ensure that in the event the main decision maker of the household is separated from the family, the family still understands the proper course of action to take with respect to their bushfire plans. In South Australia, the CFS implements the Fiery Women program, which is designed to educate women to make decisions independently in order to reduce the reliance many families have on the leading male figure (CFS website, 2010). The elderly especially need help preparing for bushfires because they often do not have the strength to stay and defend their homes, and may not have family or friends nearby that they can stay with should they decide to leave. Furthermore, some elderly people may have health issues that prevent them from leaving their home, or require them to have special accommodations should they need to relocate to a shelter.

We recommend Emergency Services and other agencies such as the Bureau of Meteorology **provide more information on how warning levels are determined**, and how bushfire risk is assessed in communities. If more information is provided to the public on how warning levels, particularly higher level warnings, are forecast it may result in more action by residents, and a better response from the public when higher level warnings are announced without incident

5.2 Recommendations to changes in the 'Prepare, Act, Survive' policy and other State and National policies

AFAC and the fire authorities should **consider the development of a master national website** to display some or all of the bushfire information. It would display all the information in one place and would require that all states and territories use a similar system for the fire danger rating scale. This would be important for residents traveling to another state or territory during a bushfire season, as they would know exactly where to get bushfire information for the areas they are visiting. It would also be helpful to other fire authorities, especially for states or territories that border each other. Each authority can easily monitor incidents that occur near the boundary and quickly decide if they need to be prepared to fight a bushfire, which would also allow fire authorities to coordinate better with each other. Another option would be to incorporate some or all of this information on the AFAC website possibly on their knowledge web.

The specific language used in some of warnings has also received mixed feelings during the implementation of the new policy. AFAC and the fire authorities should **revise the specific terminology used in higher level warnings,** specifically the use of the term catastrophic.. Although the strong language has been successful in reaching more residents, it may be having a negative effect on their behavior. The language must be strong enough to gain the public's attention but not so strong as to incite panic or a loss of faith in emergency response organizations. The use of "catastrophic" as a warning level may be too extreme and leave the impression that total destruction is unavoidable. If this term is to be used in the future it may be necessary to explain in more detail exactly what residents are to expect from the fire, and emergency services and why the conditions are as dangerous as predicted.

In the 'Prepare, Act, Survive' policy the direction to leave early is not explicit on whether to leave before or after a fire starts. Most states advise this direction, although the specific wording is vague in most cases. We recommend that AFAC and the fire authorities **revise the directions to leave early given as part of the 'Prepare, Act, Survive' policy**. The policy and fire authorities should clearly state whether residents are advised to leave before or after a fire has started. If residents are advised to leave only in the event of an active fire, they should be clearly warned that depending on the location and size of the fire it may be unsafe to evacuate and preparations should be made in case they are forced to stay.

Due to the lack of resources needed to protect all communities during the most intense bushfires, fire authorities need a set of priorities that determine where they will focus their efforts. The TFS has implemented a triage policy that determines what aspects of a community are protected first, and whether or not an undefended home will be protected by the fire authorities depending on how well it is prepared. We recommend that all state and territory fire authorities **develop a triage policy**, that clearly explains what the goals of the fire authority are during an incident, the priority of each of those goals, and how homes and other community structures are assessed for defensibility.

In some states and territories, bushfires are much more of a threat than in others. Because of this fact, a national policy should **allow for flexibility among states and territories** in order to accommodate the individual characteristics of each. Although the aspects of the national policy should be followed it is

understandable that some states and territories will need to mold the system to their own needs in accordance with how their state functions. However, specific aspects of the policy, such as how warnings are determined and what information they convey, should be consistent throughout the states.

The manner in which some state governments are structured seems to be causing problems in situations where agencies need to cooperate. It may be beneficial for states to **assess the way in which emergency services are structured**, and rework legislation to create more efficient inter-agency approaches to major issues.

In order to prevent residents from becoming too lax in preparations and developing a blame mentality with respect to emergency services, fire authorities should **emphasize the personal responsibilities of the public during an emergency.** Putting an emphasis on the fact that it is the resident's responsibility to prepare properly and take proper action during a bushfire has worked well in NT. Residents are aware that they need to be self reliant and cannot expect the fire authorities to defend personal property when they are trying to fight a bushfire. This self reliant attitude has led to residents being well prepared during the bushfire season.

Fire authorities should also encourage the public to **treat large scale, disastrous bushfires as natural disasters**. This will help emphasize the fact that the public cannot explicitly rely on the assistance of emergency services which will usually not have the resources or time to assist every person in these types of conditions.

Within the United States and various other countries it has been proven that national symbols hold a stronger significance and meaning to the public. For this reason we advise AFAC and the fire authorities to **develop a national mascot** to be used for promoting bushfire, and possibly other hazard, awareness. For the United States the use of Smokey the Bear has impacted young children across America for years, and this form of advertisement for fire safety may be well received and useful in Australia.

In some states and territories boundaries between emergency service jurisdictions are outdated and in many cases are ignored when considering bushfire threat. We recommend that the state and territory governments **revise the operational boundaries of different emergency response services** in a state in order to create a more efficient system.

5.3 Recommendations to changes in the National and State warning systems

To reach as many communities and individuals as possible, fire authorities should **continue using, and improve, current technologies** that have been around for a while, such as radio broadcasting, as part of the warning system. Residents are used to these means of communications and comfortable using them. It is unrealistic to try to get every resident to switch to a new communication method and learn how to use it

because not everyone is able to learn about new technology quickly. In addition, the infrastructure for older communications is usually much further along, which means that these media will be able to reach people that new ones will not.

Fire Authorities should continue to **add new media to the warning system**. Younger generations are used to watching television, using the internet and social networking sites, and having a mobile phone on them at all times. Utilizing these media will be much more effective in warning younger people than using the radio. Fire authorities should also invest in improvements in communication technology as they allow for faster and better communication. This is key for warning against a fast moving bushfire. Investing in new communication infrastructure now means that states and territories will be more prepared when better communication technologies become available. It is important to use as many communication mediums as possible because it ensures that residents will have the best chance of receiving information.

Emergency Service and Land Management websites should **promote and expand their web resources** ensuring they include important warning web links leading to the fire danger rating for specific areas, incident reports, bushfire weather outlook, current fire bans, and information on Prepare Act Survive. These links should be on the homepage of fire authorities' websites and should be, large, and easy to see. This will make finding information easy, and make it much more likely for people to spend time looking up information. Websites should also have information available in other commonly spoken languages of Australia, not just English. All warnings that are issued by a fire authority should be posted on the website because it is a quick way to update bushfire information. A system where a desktop alert can be downloaded to a computer so that the resident doesn't have to monitor the website all the time would be very useful as well.

Until the technology is available to send messages to mobile phones based off of current location rather than billing address, fire authorities should **expand the Emergency Alert telephone systems** to be more inclusive. The implementation of the Emergency Alert system on a national scale is a positive step towards more inclusive and direct warning methods. However it does contain some problems. The current system sends messages to landlines and mobile phones based on billing address, and does not account for mobile phones away from the billing address. While technology is in the development to target mobile phones in an area at the time of an incident regardless of billing address, there is an option to help resolve this issue now. The State Alert system implemented in Western Australia gives the option to register up to three additional addresses in addition to the billing address. Implemented on a larger scale this would help warnings reach residents who may spend time away from home during the fire season at locations that do not have landlines.

Because websites have been found to be an effective means to issue warnings quickly, fire authorities should **develop a mobile version of their website and expand the information provided on RSS feeds**. Full websites, though accessible by some mobile phones, take long time to download and can use up a fair

amount of data. A specific mobile site only displays certain information and is much quicker to download. This way, if residents are not at home, they can still check bushfire warnings on the websites. These mobile websites, and additional RSS feeds, can also provide basic bushfire survival information to residents who may need to review information but cannot access a computer.

Signs which specifically give the days warning in an area are a valuable warning system. They are the primary way to warn people who may be traveling or exploring an area. If the sign just states to go online or call to find info, it may not be worth the passerby's time to investigate and they may put themselves at risk. We recommend that fire authorities and local park and forestry organizations **post Fire Danger Rating signs** at the entrances to cities, towns and national parks, outside of local fire houses, and other fire prone areas that are easily accessible to officials. These signs should include the current warning level for the day, the current Fire Danger Index rating, and the basic considerations corresponding to each warning level as detailed in the 'Prepare, Act, Survive' policy. The signs should also include any other considerations specific to the area, as well as suggestions for resources to find more information.

5.4 Other Recommendations

When the fire authorities advise people to leave, many residents expect to be told where to go. In order to avoid confusion and improve the efficiency and safety of residents who choose to relocate early, emergency services should **suggest places for residents to relocate**. This can be a broad description but should be included in either the scale or warning itself. They should be told which direction they should be headed (i.e. North, South, etc.) and if possible be given example such as head into the city, go to the mall, visit the beach, etc. Without such examples in a state of panic it is easy for the public to become irritated and frantic.

The use of Fire Retardant plants has only started appearing through forums and plant guides online. If these could be incorporated into the education programs and advised to be used around the house instead of plants such as the Eucalyptus which are very prone to fire, the dangers bushfires pose to resident's property could be lessened. We recommend that fire authorities **encourage the use of fire retardant plants** for homeowners in bushfire prone areas.

Whenever an owner or buyer is examining property in a bushfire risk area, it is important that they understand the extent of the bushfire risk in that area. We recommend that fire authorities work with local governments to **ensure that bushfire incident information is available** for new residence; specifically a brief history of the bushfire activity in the area and a report on what should be considered during an incident should be available. With this info the new owner will be able to gain some knowledge of the area and what to be prepared for during an emergency.

Emergency services should **train major officials and incident controllers to interact with the media** in order for them to be prepared to give full and correct information during an incident. The training should also focus on ways to improve relationships with the media and strengthen the public's faith in Emergency Response Agencies.

We recommend that fire authorities and other emergency organizations work with AFAC and the Bushfire CRC to **conduct research studies to gain a better understanding on public knowledge and opinions** about the new warning systems. In conducting our research, finding information about public opinions was very difficult because there were very few studies on the subject that were available. In our interviews, we were about to gain some information about the opinions of the new warning system, but these statements, although useful, were based on speculation, not on actual public response. Conducting this research would help the fire authorities identify areas of the system which could be improved in order to reach more of the public, and use education programs to target areas of the warning system that are not fully understood.

Throughout most of Australia, volunteer firefighters comprise a majority of the fire fighting power. Based from the media reports there has been some discontent from the volunteers and a lack of acknowledgement of individuals skills. Many of the volunteers are highly trained and yet their skills are not recognized because they are still volunteers. To create a more efficient and welcoming environment we recommend that fire authorities create **advancement opportunities for volunteer firefighters** in which the volunteers would gain recognition and be put into leadership roles where their skills could be utilized to their fullest extent.

To nurture the idea of camaraderie between the different fire authorities, we would recommend that the fire authorities **implement exchange programs** to create stronger connections and communications between fire authorities**.** In these programs a member of a fire authority or other emergency organization would spend time working at a different agency to learn how that agency works, and to exchange ideas and solutions to problems that they may have seen elsewhere. By implementing this program fire authorities would have more opportunities to learn from one another, create deeper connections and relationships, and provide unique learning opportunities for the involved members.

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APPENDIX A: PROJECT OVERVIEW

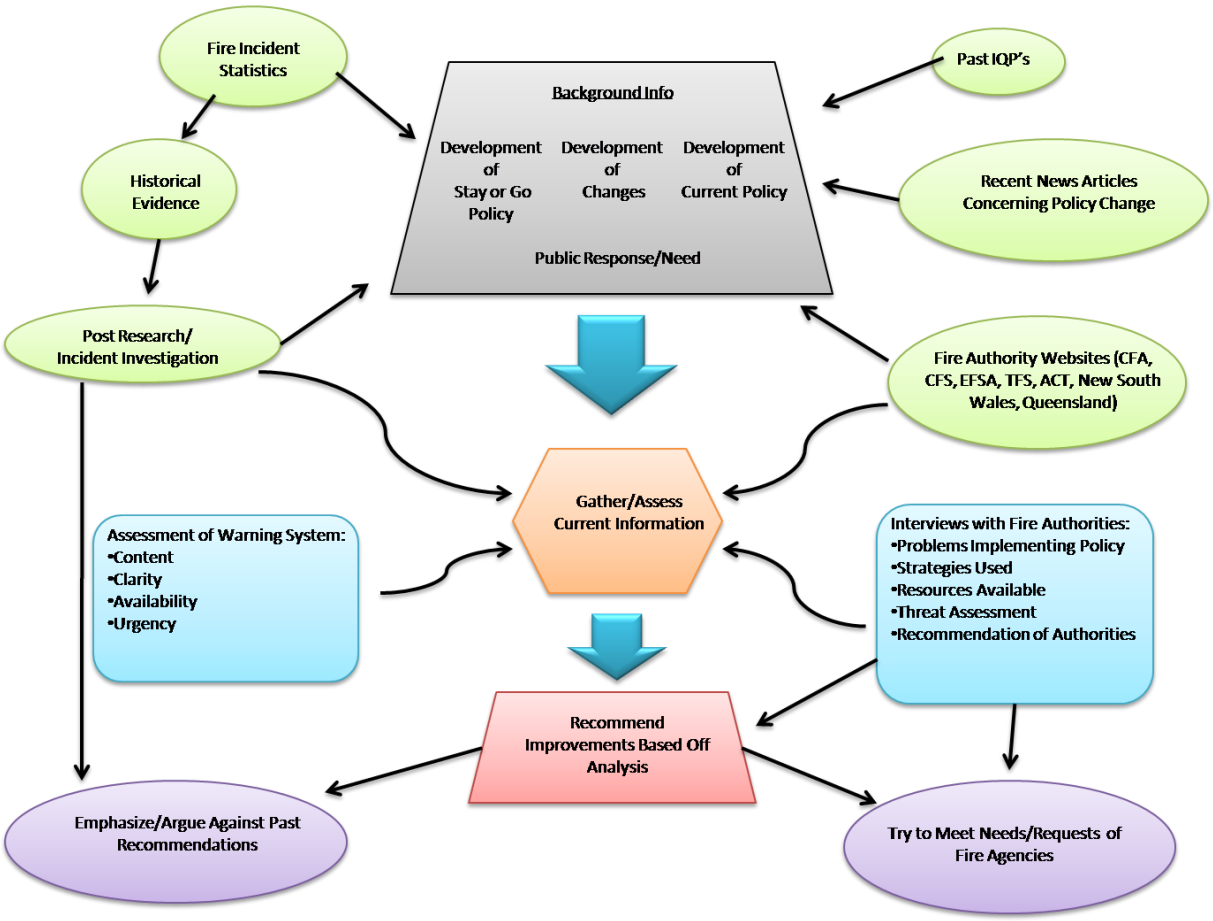

Figure 3 Project Overview

APPENDIX B: AFAC AFFILIATIONS

AFAC Member Organizations

AirServices Australia

Australian Capital Territory Emergency Services Agency

ACT Parks, Conservation and Lands

Attorney General's Department National Security Capability Division

Australian Council of State Emergency Services

Bushfires NT

Country Fire Authority, Victoria

Country Fire Service, South Australia

Department of Community Safety Queensland Government - Queensland Fire and Rescue Service

Department of Environment Climate Change and Water, NSW

Department of Environment & Conservation, Western Australia

Department for Environment & Heritage, SA

Department of Sustainability & Environment, Victoria

Fire & Emergency Services Authority of Western Australia

Forests New South Wales

Forestry Plantations - Queensland

Forestry Tasmania

Metropolitan Fire and Emergency Services Board, Melbourne

New South Wales Fire Brigades

New South Wales Rural Fire Service

New Zealand Fire Service

New Zealand National Rural Fire Authority

Northern Territory Fire and Rescue Service

Parks Victoria

Parks & Wildlife, Tasmania

Queensland Parks and Wildlife Services

South Australian Metropolitan Fire Service

Tasmania Fire Service

Affiliate members whose interests are consistent with AFAC's Goals and Objectives are:

Bureau of Meteorology
CSIRO Forestry & Forest Products
Hong Kong Fire Services Department
Melbourne Water
Pacific Islands Fire Service Association (PIFSA)
New Zealand Department of Conservation
Papua New Guinea Fire Service
Australasian Road Rescue Organisation (ARRO)
South Australian Fire and Emergency Services Commission (SAFECOM)

APPENDIX C: AFAC DEFINITION OF TERMS

Position: A Position is an agreed statement of opinion, a way of viewing a matter, a stand. If a Position is approved there is an expectation member agencies will support it, for example the Bushfires and Community Safety position; Gamba Grass; Smoke Alarms in Residential Accommodation.

Policy: A Policy is a statement of a course of action decided upon as necessary. If a Policy is approved there would be an expectation that member agencies will implement it. Policy in this context would apply to AFAC business, for example, the Information Sharing and Management of Intellectual Property Policy.

Approach: A method of how an outcome can be achieved; to deal with a particular problem; or a way of doing things. For example, AFAC Leadership Capability Framework.

Guideline: A preferred or advisable course of action; a statement of desired, good or best practice. For example, Class A Recycled Water; Guidelines for People in Cars.

Discussion Paper: A Discussion Paper is intended to alert the reader to an issue, explain the background, contributing factors and subject matter and to prompt and inform debate. It provides evidentiary support to the resolution of Policy and Position statements.

APPENDIX D: AFAC INTERVIEW SCRIPT

Name of Interviewee **Date/Time of interview** **Interview type/place**

Office held **State/Territory** **Fire Department / Brigade**

What do you consider to be the major objectives and goals with respect to warning systems in your state or territory?

What forms of communication for warning the public does your state or territory provide?

- **Which appear to be the most effective? Least effective? Reasons?**

Under what circumstances and how often do emergency services advise residents to leave?

What precautions are taken when a Catastrophic Rating is issued? (Close schools, work, etc.)

What Shelters are recommended/available to receive people who have left their homes?

- **For 65+?**

What is the overall presence and success of bushfire bunkers?

- **Have there been any efforts to establish or operate interim regulations for bushfire bunkers?**

Do you have specific evacuation plans in place? If so, how are they implemented?

- **Do they account for heavy volumes of traffic?**

Do you have any public educational programs? If so, what information is provided?

How do you view the changes in policy recommended by the Royal Commission, specifically the addition of the catastrophic warning level?

What resources have you expended in order to accommodate the changes in policy recommended by the Royal Commission?

- **Have you had any issues in adjusting to these changes? (funding, resources, time management, public response)**

Are there any noticeable affects seen in this past season due to the changes to new warning system?

Have you conducted any research since the implementation to the new warning system?

Are there any other areas of improvement you are currently focusing on or would wish to implement besides the ones you've mentioned?

Any views, opinions or suggestions for AFAC?

For any of the other major state or territory fire authorities?

Other information

APPENDIX E: ROYAL COMMISSION INTERIM RECOMMENDATIONS

E.1 Royal Commission Interim Report I Recommendations - August 17th 2009

Chapter 4 Warnings

RECOMMENDATION 4.1

The State ensure that bushfire warnings issued in Victoria:

- are founded on the principle of maximising the potential to save human lives;
- embody the principles encapsulated in Recommendation 8.5 of the Council of Australian Governments report, the *National Inquiry on Bushfire Mitigation and Management* (2004);
- embody the principles endorsed in the Australasian Fire and Emergency Service Authorities Council Draft Discussion Paper, *A National Systems Approach to Community Warning* (May 2009); and
- incorporate the use of the Common Alerting Protocol, as adapted for the Australian context.

RECOMMENDATION 4.2

The State ensure that the content of bushfire warnings issued in Victoria reflects the principles set out in the Commonwealth policy paper *Emergency Warnings — Choosing Your Words* (2008). In particular, all bushfire warnings issued in Victoria must use clear language, avoid euphemisms, and contain explicit information in relation to:

- the severity, location, predicted direction and likely time of impact of bushfires on specific communities and locations; and
- the predicted severity of impact of the bushfire and whether a specific fire poses a threat to human life.

RECOMMENDATION 4.3

The State commission research into the development of a new fire severity scale that denotes the risk posed by dangerous and extremely dangerous bushfires (similar to the cyclone categories 1 to 5).

RECOMMENDATION 4.4

The State ensure bushfire warnings in Victoria are confined to two categories or stages:

- Bushfire Information — a message providing information to the community on a bushfire that is 'going' and has the potential to threaten public safety; and

• Bushfire Warning — a warning to the community about any dangerous or extremely dangerous bushfire, particularly one that is burning out of control and poses a threat to human life.

RECOMMENDATION 4.5

The State ensure that the Standard Emergency Warning Signal (SEWS) be used in Victoria to precede each bushfire warning or group of warnings for bushfires that are dangerous or extremely dangerous, particularly for a fire that is burning out of control and poses a threat to human life, subject to appropriate limits on the maximum frequency of use.

RECOMMENDATION 4.6

The State invite commercial operators to enter into a Memorandum of Understanding (MOU), similar to its MOU with the ABC, on the dissemination of bushfire warning messages and the use of the Standard Emergency Warning Signal by those operators.

RECOMMENDATION 4.7

The Office of the Emergency Services Commissioner and the CFA develop guidelines for the use of sirens in communities that decide to use a siren as part of their response to bushfires.

RECOMMENDATION 4.8

The Australian Government, Council of Australian Governments and the State determine whether it is technically possible to implement the second phase of the national telephony-based warning system (that is, the delivery of warning messages to mobile phones based on the physical location of a handset at the time of the emergency) with a view to implementation for the 2009–10 bushfire season.

Chapter 5 Information

RECOMMENDATION 5.1

The Australasian Fire and Emergency Service Authorities Council and the Bureau of Meteorology collaborate with researchers to explore options for the fire danger indices and fire danger ratings including:

- an additional fire danger rating beyond 'Extreme';
- adjusting the existing fire danger ratings to correspond to higher Fire Danger Index values; and
- developing a revised fire severity scale for use in bushfire warnings based on new fire danger ratings.

RECOMMENDATION 5.2

The Bureau of Meteorology include the Forest Fire Danger Index and the Grass Fire Danger Index in its fire weather warnings and general weather forecasts on its website and in material distributed to the media.

RECOMMENDATION 5.3

The State ensure that a single, multi-agency portal for bushfire information be established that uploads information simultaneously to both CFA and DSE websites.

RECOMMENDATION 5.4

The State ensure that the single multi-agency portal for bushfire information be designed to allow Incident Control Centres to directly post information and warnings.

RECOMMENDATION 5.5

The State ensure the Victorian Bushfire Information Line is funded to enable it to provide greater surge capacity during extreme events and to improve the efficiency of its internal information function.

Chapter 6 Relocation

RECOMMENDATION 6.1

The State amend the *State Emergency Response Plan* so that the word relocation is used in preference to the word evacuation (except in cases where evacuation is clearly more appropriate).

RECOMMENDATION 6.2

The CFA amend its policy *Advice to the Community Before and During Wildfire* to enable trained CFA personnel to recommend to particular households, communities or locations that they plan to leave early, based on an assessment of defendability, the vulnerabilities of the people there, and the degree of ease with which people are able to leave the area in relative safety.

RECOMMENDATION 6.3

The CFA and DSE amend operational policies to require the Incident Controller to assess whether relocation should occur and to recommend relocation when warranted.

RECOMMENDATION 6.4

Municipal councils review their Municipal Emergency Management Plans to ensure there is appropriate provision for relocation during bushfires, in particular, to indicate the location and arrangements associated with designated emergency relief centres.

Chapter 7 Stay or Go

RECOMMENDATION 7.1

The CFA revise the publications and programs by which it communicates with the community about preparing for bushfires and what to do in the event of a bushfire to:

- reinforce existing advice that community members should prepare, and decide, well before a fire occurs, whether to leave early or stay and defend their homes; and
- clearly convey the following principles:
- the safest option is always to leave early rather than to stay and defend,
- not all homes are defendable in all circumstances and householders are advised to undertake an individual assessment of defendability,
- unless a property is defendable the advice is to leave early,
- the impact of topography, fire weather and fire intensity on defendability should be factored into household assessments,
- the risks of staying to defend include the risk of physical injury and death,
- contingencies are needed as the best-made plans may fail,
- even if a plan is to stay, preparations to enable leaving should also be made, including the preparation of a 'relocation' kit specifying the location of designated community fire refuges,
- there could be psychological impacts of staying to defend a property, it is inadvisable for children to be present during the defence of properties, practical steps are needed to protect the vulnerable. Families with young children, older people, and disabled people are advised to plan for early relocation, advice on triggers for when to leave to incorporate the need for flexibility, the dangers of leaving late and the undertaking that a warning may not be received, and advice in relation to the policy specifically targeted to urban communities on the urban/rural interface.

RECOMMENDATION 7.2

The CFA consider the means of providing individual advice to residents in bushfire prone areas, as to the defendability of their homes.

RECOMMENDATION 7.3

The CFA ensure its members are fully trained as to the changes to the advice to the community set out in Recommendation 7.1.

RECOMMENDATION 7.4

The CFA train facilitators and educators and ensure manuals, brochures and other materials are enhanced to incorporate changes to the advice to the community in relation to the 'stay or go' policy and the changes recommended elsewhere in this report.

RECOMMENDATION 7.5

The State and its agencies implement an advertising and awareness campaign on the changes to policy and practices as set out in this report, such as the Standard Emergency Warning Signal, telephony-based warning system, use of sirens by local communities, refuges and relocation.

Chapter 8 Risk and Refuge

RECOMMENDATION 8.1

The CFA report to the Commission on the outcome of the trials of the Victorian Fire Risk Register and progress with its implementation.

RECOMMENDATION 8.2

The Municipal Association of Victoria report to the Commission on the progress of amendments to Municipal Emergency Management Plans by those municipal councils trialling the Victorian Fire Risk Register.

RECOMMENDATION 8.3

The CFA give priority where possible to provide resources to assist in the defence of designated community fire refuges and neighbourhood safer places at times when they are likely to be in use.

RECOMMENDATION 8.4

The State replace the 2005 *Fire Refuges in Victoria: Policy and Practice* following its current review by the Office of the Emergency Services Commissioner.

RECOMMENDATION 8.5

The State promulgate criteria for the identification and operation of neighbourhood safer places, and involve councils and local communities in their development and implementation as appropriate.

RECOMMENDATION 8.6

The State to have commenced progressively identifying, establishing and advertising designated community refuges and neighbourhood safer places, giving priority to areas where bushfire risk is identified as high.

RECOMMENDATION 8.7

Municipal councils record the location of designated community fire refuges and neighbourhood safer places in Municipal Fire Prevention Plans and Municipal Emergency Management Plans, and inform residents and visitors about their use and location.

RECOMMENDATION 8.8

The State to have developed uniform signs for designated community fire refuges and neighbourhood safer places in Victoria.

RECOMMENDATION 8.9

The CFA maintain an up to date, state-wide list showing the precise location of all designated community fire refuges and neighbourhood safer places, and provide the list to DSE, Victoria Police, the State Emergency Service, the Municipal Association of Victoria, the Office of the Emergency Services Commissioner, and the Victorian Bushfire Information Line.

RECOMMENDATION 8.10

The State report to the Commission on the results of the implementation and effectiveness of its township protection plan program and neighbourhood safer places program.

RECOMMENDATION 8.11

The Department of Education and Early Childhood Development complete a review of all refuges in all schools in areas at risk of bushfire.

RECOMMENDATION 8.12

The Department of Education and Early Childhood Development give priority to rectification works to refuges identified in the Victorian Managed Insurance Authority report.

RECOMMENDATION 8.13

The Department of Education and Early Childhood Development review the adequacy of bushfire fire protection measures in children's services facilities including kindergartens, child care centres, preschools and early learning centres.

Chapter 9 Incident Management: a Case Study

RECOMMENDATION 9.1
The State ensure that State Duty Officers of the CFA and DSE be given direct responsibility for ensuring pre-designated level 3 Incident Control Centres within their respective control are properly staffed and equipped to enable immediate operation in the case of a fire on high fire risk days.

RECOMMENDATION 9.2
The CFA and DSE agree procedures to ensure the most experienced, qualified and competent person is appointed as Incident Controller for each fire, irrespective of the point of ignition of the fire.

RECOMMENDATION 9.3
The CFA and DSE ensure that where a level 3 Incident Controller or officer of equivalent ranking is satisfied that a bushfire warning is required, then such Incident Controller is authorised to release a warning where the designated Incident Controller is temporarily unavailable.

RECOMMENDATION 9.4
The State amend the *Country Fire Authority Act 1958* to provide that the Chief Officer has responsibility to issue warnings and provide information to the community concerning the risk of bushfires.

RECOMMENDATION 9.5
The CFA effect a standing delegation of the responsibility for providing information and issuing warnings to the DSE Chief Fire Officer where a fire is directed to be under the control of a DSE Incident Controller.

Chapter 10 Emergency Management

RECOMMENDATION 10.1

The State amend the *State Emergency Response Plan:*

so the control agency for a fire is responsible for issuing and communicating warnings; and to remove from emergency response coordinators the responsibility of ensuring the control agency gives consideration to alerting the public to dangers and potential dangers arising from an emergency.

RECOMMENDATION 10.2

The State revise the *Emergency Management Manual Victoria* consistent with the interim report recommendations in relation to the 'stay or go' policy, warnings and relocations.

RECOMMENDATION 10.3

The State settle the higher level emergency management and coordination arrangements that will apply during the bushfire season, noting that the Commission intends to take evidence on longer-term arrangements during its 2010 public hearings.

RECOMMENDATION 10.4

The State report to the Commission on the outcome of the current review by Victoria Police of the *State Emergency Response Plan.*

RECOMMENDATION 10.5

Victoria Police, in consultation with CFA and DSE, review the guidelines for the operation of roadblocks during bushfires, including how to:

formulate the terms of a discretion to police on roadblocks to allow entry to:

residents returning to their homes;

people delivering relief and aid to residents and to animals;

essential services crews; and

expedite the exercise of the discretion in favour of persons able to establish their bona fides.

RECOMMENDATION 10.6

The CFA and DSE amend operating protocols to ensure that when an Incident Controller requests Victoria Police establish a roadblock to an area threatened by a bushfire, the Incident Controller simultaneously issues a bushfire warning to residents of that area.

Chapter 11 Commonwealth Response

RECOMMENDATION 11.1

The Commonwealth facilitate discussions between relevant Commonwealth agencies (including Emergency Management Australia, Defence, Defence Imagery Geospatial Organisation and Geoscience Australia) and state and territory fire services to identify ways in which Commonwealth resources might be applied more rapidly and effectively during extremely dangerous bushfires, including investigating the potential for these resources to be used for detecting, tracking and suppressing bushfires.

RECOMMENDATION 11.2
The Commonwealth, through Emergency Management Australia, provide briefings at least once a year to state and territory agencies regarding arrangements available (including through Defence) to support jurisdictions during disasters and emergencies, including bushfires. State and territory representatives should advise relevant Ministers and the Chief Officers of emergency services (including fire services) of the outcomes of these briefings.

Chapter 12 Emergency Calls

RECOMMENDATION 12.1
The Office of the Emergency Services Commissioner formally advise the Emergency Services Telecommunications Authority and Telstra Triple Zero of forecast severe fire risk days and particularly days where there is a risk of extremely dangerous bushfires.

RECOMMENDATION 12.2
The State ensure the Emergency Services Telecommunications Authority (ESTA) is funded to provide greater surge capacity during extreme events, including establishing additional work stations for fire calls at ESTA centres.

RECOMMENDATION 12.3
The State further promote, through the Council of Australian Governments, more effective emergency call service arrangements throughout Australia.

E.2 Royal Commission Interim Report II Recommendations - November 24th 2009

RECOMMEN DATION 1

The Australian Building Codes Board continue to progress the development of a standard for bushfire bunkers, that addresses matters including, but not limited to, fire resistance, structural strength, resistance to high winds, maintenance of tenable conditions, minimum functional size, maximum period of occupancy, visual communication with outside, siting, access and egress and signage, and make it publicly available no later than 30 April 2010.

RECOMMEN DATION 2

The Australian Building Codes Board amend the Building Code of Australia (BCA) to include bunkers in the classes of building regulated by the BCA. This amendment should take effect with the publication of the 2010 edition of the BCA.

RECOMMEN DATION 3

The Australian Building Codes Board reference the national standard for bushfire bunkers in the Building Code of Australia (BCA) as soon as possible, ideally in the 2010 edition of the BCA.

RECOMMEN DATION 4

The Commonwealth, through the Building Ministers' Forum, encourage all jurisdictions to adopt the standard for bushfire bunkers as soon as practicable once it is developed and/or referenced in the Building Code of Australia.

RECOMMEN DATION 5

The Victorian Government prescribe the national standard for bushfire bunkers as a minimum standard for Victoria by amending the Building Regulations 2006, no later than 31 May 2010.

RECOMMEN DATION 6

Standards Australia, no later than 31 March 2010:

- publish amendments to AS3959-2009 that address inclusion of unmanaged grassland in the vegetation types and classifications, and use of sarking as a secondary ember protection measure; and
- report to the Commission on progress of amendments to AS3959-2009 to increase ember protection measures at lower Bushfire Attack Levels, in particular in relation to subfloor requirements and materials prescribed for doors, windows and wall barriers.

RECOMMEN DATION 7

Standards Australia publish a fully revised Handbook to replace *HB-36 – Building in Bushfire Prone Areas*, for use as a companion to AS3959-2009, no later than 31 December 2009.

APPENDIX F: FIRE DANGER RATING SCALE

Fire Danger Rating	Potential Fire Behaviour and Impact
CATASTROPHIC (CODE RED) FDI 100+	Fires will be uncontrollable, unpredictable and fast moving – flames will be higher than roof tops. Many people will die and be injured. Thousands of homes and businesses will be destroyed. Well prepared, well constructed and defended homes may not be safe during the fire. Construction standards do not go beyond a Fire Danger Index of 100. Thousands of embers will be blown around. Spot fires will move quickly and come from many directions, up to 20 km ahead of the fire. **Leaving is the safest option for your survival.**
EXTREME FDI 75-99	Fires will be uncontrollable, unpredictable and fast moving – flames will be higher than roof tops. People will die and be injured. Hundreds of homes and businesses will be destroyed. Only well prepared, well constructed and actively defended houses are likely to offer safety during a fire. Thousands of embers will be blown around. Spot fires will move quickly and come from many directions, up to 6 km ahead of the fire. **Leaving is the safest option for your survival.**
SEVERE FDI 50-74	Fires will be uncontrollable and move quickly– flames may be higher than roof tops. There is a chance people may die and be injured. Some homes and businesses will be destroyed. Well prepared and actively defended houses can offer safety during a fire. Expect embers to be blown around. Spot fires may occur up to 4 km ahead of the fire **Leaving is the safest option for your survival. Your home will only offer safety if it and you are well prepared and you can actively defend it during a fire.**
VERY HIGH FDI 25-49	Fires can be difficult to control – flames may burn into the tree tops. There is a low chance people may die or be injured. Some homes and businesses may be damaged or destroyed. Well prepared and actively defended houses can offer safety during a fire. Embers may be blown ahead of the fire. Spot fires may occur up to 2 km ahead of the fire. **Your home will only offer safety it is and you are well prepared and you can actively defend it during a fire.**
HIGH FDI 12-24	Fires can be controlled Loss of life is highly unlikely and damage to property will be limited Well prepared and actively defended houses can offer safety during a fire. Embers may be blown ahead of the fire. Spot fires can occur close to the main fire. **Know where to get more information and monitor the situation for any changes**
LOW-MODERATE FDI 0-11	Fires can be easily controlled Little to no risk to life and property **Know where to get more information and monitor the situation for any changes**

Figure 9: Fire Danger Rating Scale (CFS, 2010)

APPENDIX G: INTERVIEWS

Overall, we conducted 10 interviews with various organizations from each of the Australian States and Territories. The interviews were conducted with the following members of these organizations:

Karen Enbom- CFA

Keith Adamson- MFB

Darren Cutrupi- ACT

David Caporn- FESA

Leigh Miller- CFS

Damien Killalea- TFS

Rob Rogers- NSWRFS

Steven Pearce- NSWFB

Glenda Rammage - NT Fire and Rescue

Mick Ayer- NT Fire and Rescue

Paul Herrick- NT Fire and Rescue

Steve Sutton- Bushfires NT

Gary Gilby- QL Fire and Rescue Service

These interviews provided detailed answers to many questions we had concerning the individual policies and objectives of each organization, as well as a better understanding on how each organization works in the state government. These interviews also led to more questions and topics of study, which were investigated, and provided us with access to some reports conducted by the individual organizations concerning the implementation and effects of the policy changes. The interviews also provided a better understanding of how specific factors in each state, such as weather, demographic distribution, and communications availability, affect the implementation of the changes in policy.

G.1 New South Wales

Two interviews were conducted for organizations within New South Wales, one for the New South Wales Rural Fire Service (NSWRFS), and one for the New South Wales Fire Brigades (NSWFB). Both of these agencies operate under the New South Wales Police and Emergency Services, which in turn operates under the Parliament of NSW. The NSWFB maintains over 340 stations throughout NSW and covers over 90% of the population. This area includes a significant amount of bushland-urban interface and thus it is

often NSWFB that initially responds to the majority of bushfires. There is a Memorandum of Understanding (MOU) between the NSWFB and NSWRFS about how to coordinate efforts during a bushfire, it states that during a large fire (class two) or bushfire emergency (class three) typically when the fire is out of control of local authorities or requires multiple aircraft support, the Commissioner of the NSWRFS takes command and appoints an incident controller to handle the situation.

The main objectives of the NSWRFS and NSWFB in respect to bushfire incidents is to educate residents on what to expect during a fire, in terms of emergency response and warnings, fire behavior and impact, and necessary precautions essential for surviving a fire. Losses in the past have been caused by an incomplete understanding of bushfire impacts and warning systems by the residents, and the consequences of ignoring warnings and encouragements to prepare. The NSWRFS believes that the new policy, specifically the strong implications of consequences if caught unprepared, will provided a context for bushfires that more residents will understand and recognize the implications of.

In NSW the main forms of communication for public warnings are the radio and television broadcasts sent out through the Australian Broadcasting Corporation and local radio stations. These messages are primarily fed to the media through RSS feeds sent out by the NSWRFS. During bushfire incidents in which the NSWFB is in control and needs to send messages to the public, they contact the NSWRFS which then relays the messages to the media. In rare and urgent circumstances the Standard Emergency Warning Signal is broadcast prior to messages which are then repeated until the NSWRFS updates or cancels the messages. There are also other forms of communication implemented in distributing warnings and information, such as the Emergency Alert telephone system and community meetings held by fire authorities to provide direct information on fires. There are also more informal methods of communicating warnings in place in individual communities such as phone and email trees.

Currently the radio and television broadcasts are considered the most effective because they are well known and encompass the majority of the populated area. The other forms of communication seem to be well received since their implementation, except for the Emergency Alert system because there has been some confusion among the public on how often this warning method will be used. As of now not enough data have been gathered on the newer forms of warning systems to make a qualitative assessment of them.

During an incident residents are advised to act according to the directions in the new fire Danger Rating Scale, and their individual Bushfire Survival Plans. So far there have only been a few cases in which residents were advised to completely evacuate and these were small, localized incidents. Typically residents are not told specifically when to leave, however they are advised to not be within an area that is at risk on a day

that is forecast for catastrophic conditions. All schools in NSW have been assessed and those deemed at risk under certain circumstances are evacuated and the students are relocated to schools outside of the fire danger zone. The NSWRFS employs grip officers who transmit situational reports from the fire front to the NSWRFS central headquarters in order to update current and predicted fire behavior information.

The NSWRFS advises residents to nominate their own neighborhood safer place (NSP) as part of their Bushfire Survival Plan. These areas are advised to be open spaces the residents can retreat to in the event they can no longer defend their home and cannot go anywhere else. There is a list of the NSP's that have been verified by the NSWRFS on the NSWRFS site, as well as details about what to expect from these places. The NSWRFS and NSWFB do not have any specific plans for elderly or vulnerable residents. However local police keep records of these groups for special consideration during emergencies. In most cases it is the task of these groups and the rest of the community to develop emergency plans for these groups. Also neither the NSWRFS nor the NSWFB advises the use of bushfire bunkers as there are no national standards for bushfire bunker building regulations. The NSWRFS states that there are contingency plans in place in communities for evacuations, should enough time and resources be available, however these plans are not implemented very often as the NSWRFS and NSWFB would rather residents prepare themselves for early departure or defense. One issue the NSWFB has had during incidents is the increased flow of traffic into bushfire prone areas caused by residents attempting to return to defend their homes.

The educational programs of NSW revolve around community engagement strategies designed to educate residents on fire behavior and how to reduce the danger presented by fires, as well as Community Fire Units (CFU) which are fire wise groups designed to help members of their community prepare for bushfire incidents. There is also an Aboriginal Communities Program, in development that is not yet being implemented. These programs will be explained in more detail in section 4.3.

In response to the recommendations set forth by the Royal Commission and the nationally agreed upon policy changes, the NSWRFS and NSWFB agree that the changes have provided a better level of understanding and awareness throughout the community. They believe that the new policy has given communities a better focus on the potential extent and impact of fires and the consequences they will face if they do not prepare themselves. After black Saturday, more and more residents were electing to leave their homes rather than stay and defend, even if the houses could have been easily defended. This and intense scrutiny from the media on days forecast for catastrophic conditions that did not result in any significant incident have led to a need to stress the benefits of staying to defend, but with a strong consideration of the dangers and limitations inherit in this course of action. The NSWRFS also believes that the language used in the new Fire Danger Rating Scale needs to be revised, and it may be too extreme and cause undue panic or

unwanted impressions during bushfires. If this language is changed it should be done so on a national scale in order to avoid discrepancies among states. The NSWFB supports the campaigns designed to educated women and children on how to make decisions during a fire in the event that the men of the household are away fighting the fire, and believes that fire authorities should include an assessment of the effectiveness of the warning and information management methods used during an incident in the debrief of the incident.

Although all of the policies are nationally accepted it has been difficult to adopt them all in such a short time period. The NSWRFS is still undergoing an internal campaign to adopt all of the changes, and has spent millions of dollars on media campaigns to spread bushfire awareness and survival information. This has led to an increased funding provided to the NSWRFS from the State Government in order to accommodate these changes. As part of their campaign the NSWRFS hired a well known Australian actor for commercials advertising the importance of having a bushfire survival plan. The NSWFB has also required an increase in funding in order to adopt the changes in warning system and internal protocol. So far these campaigns have had a positive response as more residents seem to be aware of the bushfire danger and necessary preparations; however they have not reached the entirety of the public yet. For now the NSWRFS plans to review the changes that have been made, and assess the public understanding of the new policy and bushfire danger in general to determine what still needs to be done to increase public understanding of these issues. The NSWFB which has primarily held a supportive role for the NSWRFS during this process will continue to support the NSWRFS during its investigation and future campaigns.

The NSWRFS regularly cooperates with the fire services of Victoria and Queensland during incidents to control fires near or across borders. There are local arrangements in place near state borders and there is an annual meeting held at the beginning of the fire season between Victoria and NSW in order to discuss cross border strategies. NSW fire authorities also employ a Static Water Supply program in which residents are encouraged to post SWS plates on the front of their property that identify nearby static water supplies that can be used as a last resort in firefighting.

G.2 Victoria

Bushfires, and land management issues concerning bushfires, in Victoria are primarily handled by the CFA, MFB and Department of Sustainability and Environment (DSE). The MFB has jurisdiction over the metropolitan area of Melbourne, while the CFA controls the majority of Victoria, including all rural settlements. The boundary between the MFB and CFA territory is historical and is not always practical; sometimes one block of a neighborhood is considered CFA territory while the next block is under the MFB.

The main goals of the CFA and MFB with respect to bushfires are to provide timely warnings and assistance to residents who are at risk. The MFB and CFA operate under the Department of Justice which itself operates under one ministry. Control over a given incident is determined by the Emergency Management Act, which typically gives control of the incident to the authority in whose jurisdiction the incident occurs. The DSE works under a different ministry, the State Cooperation Center, which handles the majority of large land management issues. Because the MFB works primarily within the city limits they have less direct confrontation with bushfires, and due to the increased water availability in the city, they have a much different approach for handling bushfires. If a bushfire threatens a metropolitan area the MFB advises residents to stay and defend their homes, and in some case to simply take shelter while the MFB fights the fire and uses the city's extensive water resources to prepare the areas at risk. There is an MOU in place between the CFA and MFB detailing how each authority will respond in a given situation. The computer dispatching system implemented by both authorities determines which station responds based on proximity to the incident, regardless of jurisdiction. The MFB states that the boundary separating the jurisdictions is solely historical and not always practical. Every year before the fire season begins the MFB and CFA have a meeting to determine how the MFB can best support the CFA during incidents. The MFB implements strike teams and task forces that are sent to ten stations beyond the boundary between jurisdictions to cover CFA stations while CFA units are out handling bushfires. These units are trained to defend against bushfires and are typically implemented in the protection of important community assets.

At the beginning of the bushfire Season the CFA implements the CFA Connect program, which consists of a series of vehicles that travel the state in order to spread bushfire information and awareness. During an incident the CFA and MFB both make use of the nationally adopted radio and television broadcasted warnings, and the CFA has recently added 137 new broadcasting companies including Sky News. These messages are transmitted to the media via email, RSS feeds, or through the CFA website. There is also the Victorian Bushfire Information line that provides recorded messages and live operators for residents seeking more information on current bushfires, health information, and fire ready kit information. The CFA also uses the National Early Warning System, which consists of recorded phone messages and text messages sent out to residents considered by the CFA to be in immediate danger. The MFB also implements these types of warnings, although the MFB typically has less than 15 minutes to respond to an incident. Because of the short time frame, radio and television broadcasts are usually poor methods of communication, especially in the middle of the night. The MFB usually focuses on telephone and text messages, as well as door knocking in order to alert citizens of an emergency and the proper course of action to take. The MFB is also currently developing the One Source One Message (OSOM) program that will collect data concerning an incident at one location, and send out an accurate message based on the collected reports. In order to get information from the field to residents the CFA implements Situation Units who collect and analyze data that

is then sent back to headquarters to be released as warnings and fire behavior predictions. It typically takes 15 to 20 minutes for this information to be gathered and processed for the public's use.

The CFA has had success with the website resources, as they provide residents with an opportunity to check on incidents and find more details on warnings sent through other forms of media. The MFB also provides information via their website, and as part of the OSOM program, all websites will display standardized warnings and reports in order to eliminate discrepancies between messages.

During an incident residents are usually advised to follow the instructions set forth by the new Fire Danger Rating Scale and their personal Bushfire Survival Plans. The CFA and Police can recommend that people relocate during dangerous conditions however the CFA does not have the authority to force evacuations. The police can set up roadblocks to prevent residents from returning during dangerous conditions, and there is an agreement between the CFA and police that the police will follow the directions of the incident controller during bushfire threats. If the incident controller decides that an area needs to be evacuated it is the responsibility of the police to organize and direct the evacuation plans. The MFB rarely conducts evacuations during bushfire incidents because they have the resources to defend the residents, and they are often working in a very small time frame. In other cases such as chemical or gas leaks, small scale evacuations have been conducted through phone messages or emergency personnel going door to door.

During Catastrophic conditions certain schools and other public facilities may be closed according to the Department of Justice and Department of Education. Endangered schools will be closed on catastrophic days, and residents are advised to follow their Bushfire Survival Plans. There are currently fifty two township protection plans maintained by the CFA and Department of Justice that include maps of nearby water sources and bushland areas. These plans are provided to the MFB strike teams when they are assisting the CFA with bushfire incidents.

The CFA does not maintain any NSP's but does provide information for communities and residents to determine their own NSP's. There has been some issue with this in areas where NSP's could not be found, mostly due to a lack of open space, and the CFA does not have the authority to clear land. There is currently no legislation or funding to cater toward vulnerable groups, however the CFA provides information to communities and residents on how to properly prepare these groups for an emergency. The MFB is also in the process of training carers who will assist vulnerable people during emergencies. The MFB has determined some NSP's to be used as last resort location, but is currently having problems with residents using these as first resort locations and causing traffic problems.

Bushfire bunkers were generally not recommended or supported by the CFA or MFB due to the lack of standard regulations for them. However one bunker has recently been certified, is in place, and is now accepted by the MFB. Both authorities still believe that bushfire bunkers should be used as a last resort, and not as an alternative to actively defending a home or leaving early.

The CFA provides fire authority facilitators to help communities prepare for bushfires and hold presentations and community meetings as part of the Fire Ready program to spread information and awareness. There are also partnership with local CFA brigades and schools to provide fire education programs. The MFB also has educational programs for students twice during primary school. The MFB's other educational programs typically target high risk or vulnerable groups. Last year the MFB distributes 20,000 leaflets to residents in high risk areas to provide information on the risks and necessary preparations for bushfires. Some areas of especially high risk were advised to relocate during certain conditions. These educational methods are explained in more detail in section 4.3.

Overall the CFA and MFB response to the changes in policy have been good. The changes have provided a means for the CFA to enact a massive change in a short amount of time. There was some internal struggle at first but adjustments have become easier as more and more positive changes have been seen. The MFB was heavily involved in the creation of the new policy and had already begun assessing and correcting problems within its policy after Black Saturday and is using this to compliment the recommendations of the Royal Commission. The MFB believes that the use of the word catastrophic may be too extreme and create unwanted impressions of bushfires or fire service capabilities, and advises residents to be aware that once the FDI reaches above 50 it is not an exact scale and variations may occur.

Every year the Operations Improvements Department of the MFB investigates areas where MFB can improve its operations during bushfires and other emergencies. The equipment used by the MFB, including equipment used to fight bushfires, is also revised and improved every year. Due to the fact that the MFB has less to do with bushfires than the CFA little public knowledge has been spread about the MFB's changes, except to those in high risk areas. The CFA required a lot of additional resources which were provided by the State despite the short time frame, and an increase and relocation of staff has occurred, one case being the Community Development Department which increased from a membership of 6 to 30.

The CFA and MFB have noticed varying effects of the changes in the public's response and behavior. Although many of the changes were rushed and hindered by politics overall the changes look positive as more information is being provided to the public, and the public seems to have a better understanding of the issues. There has also been a shift in the objectives of the incident controllers set by the

CFA who now have a bigger hand in contributing to the information sent out during incidents. During the last year the CFA conducted research to determine the level of understanding held by the public on bushfire warnings and precautions, and there is other research currently being conducted on the effects of the changes. The Bushfire CRC also has conducted some research on the effects of the changes in policy (We are currently trying to get a copy of this research and determine if we can officially use it).

For future improvements the CFA is looking into using the new warning systems for other types of emergencies, and working with the DSE to solve public communications problems concerning planned burns. The MFB is currently working on other improvements determined by its self examination and is also putting a lot of effort in public education, and setting realistic expectations for the public. The CFA believes that the collective emergency services operations in Western Australia, discussed in section M.6, are a good idea and hopefully will take effect in Victoria soon, although the transition will be difficult. Like other organizations, the MFB feels that the public needs to be more aware of their personal responsibilities during a bushfire, and cannot explicitly rely on emergency services.

G.3 Northern Territories

The Northern Territories have two major emergency authorities that deal with bushfires, NT Fire and Rescue, and Bushfires NT. The climate of NT is unique, experiencing two separate but overlapping bushfire seasons for the "Top End" and the southern parts of the territory. This causes NT to be in a fire danger season for 8-9 months of the year. According to a risk assessment conducted by the Department of the Chief Minister, about 150,000 square kilometers of land is burned every year, this is about 17% of the jurisdiction covered by Bushfires NT and NT Fire and Rescue. The return periods, the time between fire incidents in an area, for fires was found to be about one year and in some cases less than 7 months. Both bushfires NT and NT Fire and Rescue are government funded departments and NT Fire and Rescue is part of the police and Emergency Services organization, which in turn is governed by one ministry. The CEO for NT Fire and Rescue is actually the Commissioner of Police. Bushfires NT is governed by a separate piece of legislation called the Bushfires Act, and is actually part of the conservation department. Both organizations work according to the Bushfire Management plan, which is revised every year, where NT Fire and Rescue covers most of the large urban areas, while Bushfires NT works with the environment department to manage the large areas of rural land. The main objectives of both organizations is to provide information and warnings in order to give the residents the ability to make informed decisions on how best to protect themselves before and during a fire. They are also trying to ensure that all residents are physically and psychologically prepared to defend against fires.

One of the other major goals of Bushfires NT is to produce such a knowledgeable and prepared community that emergency warnings are not needed. Bushfires NT believes that warning systems alone are a poor way to protect people, and that proper protection comes from public knowledge, preparation, and action. Most of the communications methods Bushfires NT and NT fire and rescue are designed to spread knowledge throughout the population, most of who are of working age however there are a number of warning systems in place. NT currently uses radio and television broadcasts as their main form of communicating warnings, and has developed the capabilities for telephone and text message warning systems. However due to the lack of internet and mobile service access in many areas, they expect the dominant form of warnings to remain radio broadcasts. There is a Standard Emergency Warning System (SEWS) in place however it is rarely used and only for cyclone warnings. During a fire warnings are sent out thorough radio broadcasts or by door to door visits by police or volunteers. Residents can call 000 to report an emergency, which is the national standard, and Bushfires NT also has a direct line that residents can call. Volunteers are typically sent first, before career firefighters, unless conditions are especially bad in which case one or two stations will be dispatched to the fire.

There are a number of education programs conducted by NT Fire and Rescue and Bushfires NT, one of the most prominent being the Smart Sparx program. NT Fire and Rescue also has educational programs that explain how and where fire breaks are implemented and how to properly prepare ones property and determine safe areas. There are also media campaigns conducted before the beginning of the fire season in order to spread awareness of the upcoming fire risk. These programs will also be covered in more detail in section 4.3

Currently the NT has not implemented the changes in policy and has not adopted the new Fire Danger Rating Scale. When the new policy was issued NT was in the middle of its fire danger period and it was impossible to conduct a change in policy at the time. Bushfires NT and NT Fire and Rescue believe that a movement toward a nationally consistent system is good, but that system must allow for some flexibility to account for the differences in government structure and bushfire activity among states. Both organizations believe that 'Prepare, Act, Survive' is a better policy than 'Stay or Go' which both had voted against when it was proposed. The reason for this opposition was the lack of emphasis of the 'Stay or Go' policy on residents preparing their property as well as themselves and their homes. Bushfires NT and NT Fire and Rescue also believe that there should be a stronger emphasis on personal responsibility of residents in bushfire prone areas, and a need to stop residents from developing a "blame mentality". According to these organizations events like Black Saturday should be considered natural disasters and often are unavoidable. They are also concerned that over-playing of catastrophic warnings will lead to warning fatigue and residents will become

unresponsive. NT Fire and Rescue and Bushfires NT are still looking at the recommendations of the Royal Commission and looking to see what future recommendations are published along with what methods adopted by the other states have worked before they adapt their own policy to the changes. They are specifically looking for more recommendations concerning fire and risk prevention strategies.

In addition to the information provided for preparing people and homes for bushfires, NT Fire and Rescue and Bushfires NT have done a lot of work in the bushland-urban interface in educating residents on how to prepare their property, which in NT can extend for hundreds of kilometers. There has also been a lot of effort by both organizations to clear fire-safe areas for residents in these rural areas. Bushfires NT and NT fire and Rescue also provide landholders with maps of their property displaying fire activity in the past in order to help them prepare against future incidents. This and the fact that they do not require residents to report their last resort options as part of their bushfire survival plan shows the emphasis they have on personal responsibility.

G.4 South Australia

The majority of bushfires in South Australia are handled by the Country Fire Service (CFS). The main goals of the CFS's policy are to alert residents to the first instance of fire danger, specifically people who will be directly affected by an ongoing fire, and to educate the residents of SA on bushfires.

For the past five years the CFS has been working on its bushfire warning system and it currently implements the nationally accepted radio broadcasts which project Advice, Watch and Act, and Emergency Warning messages. There is a MOU between the CFS and radio broadcasters under which messages will be read every 15 minutes for 2 hours at which point the message will be updated by the CFS. The CFS also implements the Alert SA program which follows the national standard for emergency telephone and text messaging alerts. Currently the MOU only extends to radio broadcasters, however messages are sent out to all forms of media. So far only anecdotal evidence is available, but the public seems satisfied so far with the telephone warning systems. Further investigations will be conducted by the CFS in the future, after the fire season, when there are more data to be analyzed.

During an incident the CFS encourages the same course of action advised by the new Fire Danger Rating Scale. Risk ratings conducted on schools determined 20 schools which were rated at an extreme fire risk, which are evacuated on days with catastrophic conditions. This year the CFS has also introduced Neighborhood Safer Places and other forms of refuge. There are currently three types of refuges; Safer

Settlements, Bushfire Safer Precincts, and Refuges of Last Resort. The CFS has yet to officially determine any Refuges of Last Resort, instead focusing on Safer Settlements and Bushfire Safer Precincts which residents are more likely to relocate to. In order to assist vulnerable groups the CFS is working with them to determine what special precautions they should take, and has adopted EMA documents in order to assist with this goal. When considering Bushfire bunkers the CFS has remained cautious due to the lack of standardized regulations, and has implemented a task force to release a cautionary note to residents warning of false advertising for bunkers. In general the CFS is avoiding mass evacuations as it is better if they can stay and defend their homes during most situations. The Safer Settlements and Neighborhood Safer Precincts are designed to provide a safe place for residents to go to if they decide to leave early, and are mapped out for communities to avoid massive traffic jams.

The educational programs provided by the CFS are similar to programs in other states, with two notable additions. The Fiery Women's program is designed specifically to educate women to make decisions on their own instead of relying on their husbands who may be unavailable when a fire occurs. The Volunteers in Community Education (VOICE) program is also a very effective program, which is training volunteers to spread bushfire knowledge and awareness throughout their communities. These programs will also be described in more detail in section 4.3.

In general the changes in policy have been well received by the CFS and SA. For years the CFS has been looking for trigger points, or areas to peak the public interest, to expand community awareness and the new policy seems to have accomplished that. Already there has been an increase in the number of organizations and companies approaching the CFS in order to have their Bushfire Survival plans assessed, and the CFS believes that the longer the new policy is implemented the more educated the public will become. In order to accommodate these changes the CFS required an increase in funding, which was provided by the State government. The changes have yet to be fully implemented, there are currently 4 or 5 recommendations that have not been adopted, and a change in legislation is still in the works. The CFS is also waiting for the Royal Commissions final report in order to see what further recommendations will be made. In the future an even more increased level of funding may be required for education programs; however the legislation will closely link emergency organizations creating a more cohesive system. Overall the CFS believes that a nationally accepted policy will be beneficial throughout Australia, and work towards these types of policies is a good example of how AFAC has helped create a more cooperative system.

For the future the CFS is considering the development of controls for fire usage after the Fire Danger Period has passed, currently the issue can only be addressed through media warnings and community awareness programs. SA is primarily English speaking however the Metropolitan Brigade has identified 14

other primary languages and the CFS is currently working on providing information in these languages. The CFS also wants to stress the personal responsibility residents have for protecting their property and introduce changes to the native vegetation clearance legislature. A process has already been developed where a CFS official can organize clearance of vegetation, thereby making the fuel reduction programs in SA a more strategic process. Currently the CFS does not conduct planned burnings, which are under the authority of the Department of Environment and Heritage (DEH), however these organizations share government funding and the joint efforts by emergency organizations has provided good results for SA.

G.5 Tasmania

In Tasmania there is only one fire service, one forestry service, and one park service, all of which collaborate on the issue of bushfire threats. The Tasmanian Fire Service (TFS) receives the majority of its funding from insurance companies and property and vehicle owners and thus the TFS does not have to depend on government funding. So far there has been no push by these insurance companies to encourage citizens to stay and defend their property, and any attempts by the TFS to convince the insurance companies to create a policy benefitting those who stay have failed. The main goal of the TFS is to provide better warnings and information to residents, in order to resolve the issues caused by a lack of public knowledge in the past. The TFS has developed and published a Triage Policy which explains what buildings will be given priority when fire fighters are defending communities. Part of the policy states that a well prepared home that has been abandoned will be more likely to be protected than one that has not been prepared at all. In effect the TFS is trying to encourage citizens to develop a stronger personal responsibility for their homes during fire danger periods.

The TFS implements the same standard warning messages as the rest of the country, focusing mainly on radio broadcasts and telephone and text message warnings. The TFS has a MOU with the Australian Broadcast Corporation (ABC) that states that ABC will routinely check the TFS website and broadcast messages. IF for some reason the website is down the TFS will forward warning directly to the media, and if this fails then the TFS is prepared to broadcast messages themselves. The TFS also advises residents and all forms of media to check the website regularly during an incident. The telephone warning system is available but is still in its early days and has not been used or assessed yet in Tasmania. The radio broadcasts remain the dominant form of releasing warnings, however during incidents there has been a noticeable increase in traffic on the TFS site, which has been revised in order to cope with the heavy traffic.

During an incident the TFS works according to a set of priorities established in its community protection plans. The first priority is the identification and protection of vulnerable people such as the elderly, very young, sick, or injured. Secondly is the protection of valuable public assets such as schools, large employers, communications facilities, bridges, and other public buildings. Thirdly is the prevention of the fire from spreading from building to building, followed by the protection of undefended homes. The last priority, which in particularly bad cases is unfeasible and not attempted, is the actual fighting of the fire. During catastrophic conditions the TFS does not require residents to leave, but encourages them to enact their Bushfire Survival Plan. Some properties in Tasmania have been assessed by the TFS and have been deemed safe to be defended during catastrophic conditions. Likewise the TFS has arranged for all but 2 out of 240 schools in Tasmania to be safe for children up to a FDI of 120.

The TFS has identified community refuges that are only opened outside of fire danger areas, and are used as a place for residents to relocate to if they want to leave early but have nowhere to go. These locations provide food, shelter, sanitation, and sleeping accommodations for the residents, but are only opened during incidents as directed by the TFS and are staffed by state emergency service and local government personnel. The TFS has also identified NSP's but advises residents that these do not provide any sort of services and are mostly large open spaces designed for a last resort. Also, until a national design standard is developed, the TFS strongly discourages the use of bushfire bunkers. In the event of an incident the TFS has an MOU with the Tasmanian Police on how and when evacuations should be conducted. Evacuations rarely occur in Tasmania unless there is a group of vulnerable people who are not prepared to deal with a fire threat.

One of the most influential bushfire education campaigns produced by TFs was the Bushfire Prepare to Survive DVD, which was mailed out for free to all residents in a bushfire risk area. This DVD was designed to spread information on the dangers of bushfires and necessity of having a Bushfire Survival Plan through a medium that required less effort by the residents in an attempt to reach more people. The DVD was supplemented by a media campaign running 6 weeks prior and 6 weeks after the DVD was sent out to encourage people to watch it. This and other forms of community education will be explained in more detail in section 4.3.

The TFS strongly endorses the recommendations set forth by the Royal Commission and the nationally agreed changes in policy, however there have been a few minor changes specific to Tasmania. Firstly the catastrophic warning level is no longer referenced as code red, and the color scheme used in warning messages is now solid black instead of black and red stripes. The TFS has conducted huge marketing campaigns in order to spread awareness of bushfire dangers and the changes in policy. These messages began before the start of the bushfire season and are planned to continue beyond the end of the season in order to

ensure that the information is received. These change and campaigns required a drastic increase in funding, which was provided and will continue in the future. However more staff and resources may be needed in the future to accommodate the Community Protection Plans and Community Development Program.

For the Future the TFS is working with the Bushfire CRC and University of Tasmania to develop a Community Development Program, and is also working on the Bushfire CRC's Communications project. Post-campaign research is also underway to determine how effective the media campaigns have been in educating the public. The TFS expects that this research will be completed within the next few weeks. The TFs is also working towards reducing fuel on privately owned property and encouraging residents to adopt a more self sufficient stance on bushfire management. Overall the TFs supports the changes in policy and new Fire Danger Rating Scale, but believes that it will require some tweaking, and that other states would benefit from coordinating their emergency services more closely with the parks and forestry services. The TFS also recommends that other states develop and publish their own Triage Policy and increase the Fire Authorities participation in community recovery.

G.6 Western Australia

In the state government of WA all state emergency organizations, except the ambulance and police, work under the Fire and Emergency Services Authority of Western Australia (FESA). FESA has legislative control over all major fires in the state. The main goals of FESA are to reduce the injuries, loss of life, and property damage throughout WA through proactive measures and emergency response. The warning systems in WA include the standard radio and television broadcasted messages, telephone and text message warnings, and website resources. FESA also has a Community Engagement program in which community meetings are held to determine and communicate the bushfire risk in local areas. The goal of FESA's information programs is to create a more self-sufficient community that does not need to rely on website information, community meetings, and the assistance of fire authorities to protect themselves during bushfires. FESA is also implementing a slightly different version of the Emergency Alert system, called Stat Alert. This system automatically registers landlines and billing addressed for mobile phones for the purposes of sending out localized warnings; however it also includes the option to register three additional addresses for which residents will receive warnings. There have been some issues with this system so far, mainly with the accuracy and speed of the warnings, and so far it has not been used very often.

During an incident FESA advises residents to follow the guidelines set by the new Fire Danger Scale and their Bushfire Survival Plans. Evacuations are not mandatory and very rarely advised especially in

particularly remote areas, unless there is an ongoing fire that poses an immediate threat and there is ample time to relocate. There are general evacuation plans in places as well as detailed plans for specific instances and communities. FESA also provides advice and resources depending on the risk posed to areas for residents to consider, and directs a liaison group that provides specific advice and assessments for schools and medical centers. This group has worked with the education department to assess the risks of bushfires to schools in order to determine which facilities are vulnerable. Generally there is no detailed information provided concerning shelters for residents besides the information provided in the 'Prepare, Act, Survive' policy, although FESA releases specific information during fires catering to the incident. FESA has also developed assistance plans for vulnerable groups to be implemented during incidents. Due to the lack of national standards FESA also does not recommend the use of bushfire bunkers, but believes that when national building codes do develop it is important for fire authorities to acknowledge them as part of Bushfire Survival Plans.

As part of their educational programs FESA has distributed DVD's warning of bushfire danger through community meetings and other methods, and maintains an Education and Heritage center that provides educational material and activities to promote preparedness for all hazards. Additionally, FESA implements Bushfire Ready program where facilitators are trained to educate communities and help residents take action during fires. FESA also encourages residents to conduct winter burns to reduce fuel buildup during the summer and implements an educational program based around this. Overall these programs have been most effective when targeting high risk groups and their overall success has increased along with the public awareness of fires since Black Saturday. These programs will also be explained in more detail in section 4.3.

Overall FESA believes that the new policy is better because it is leading residents to be more aware of and prepared for bushfires. The new policy resolves some of the issues by using explicit language to clearly state warning messages and the actions residents are expected to perform. However one issue that still seems to persist is the gap in information concerning relocation plans, as many homes are still being abandoned that likely could be saved had the residents stayed. In order to accommodate these changes FESA had to expend more effort and resources than ever before, finalizing a complete framework by October and greatly increasing the amount of staff and administration aimed toward the spread of information. So far not all of the recommendations have been adopted yet; however the new warning system has been fully implemented. There has also been an increase in the demand and accountability concerning the distribution of timely and relevant information

Since Black Saturday there has been an increase in public interest and wariness of bushfires. This increased attention and the new policy has helped to explain the shared responsibility of fire agencies and the community in the community's protection, but the issue has not been resolved yet. Many residents are electing to simply leave their homes or only prepare in minor ways, ignoring some of the most vital preparations such as fuel reduction. This has increased the amount of property damage and FESA hopes to reduce this in the future by resolving issues with communicating information to communities. Currently there has not yet been any evaluation of the new system in WA. However there is ongoing research at local universities designed to understand community behavior.

For the future FESA is working on the issue of NSP's and other evacuation centers and refuges of last resort. There is a new committee that will bring the chief fire agencies and the local government together and to establish key sub-committees, such as the Fuel Load Management committee, to better deal with major issues. The Fuel Load Management committee is specifically designed to create more synergy between communities and agencies to reduce fuel buildup and the effort needed to manage it. Although the Royal Commission is still making recommendations, FESA will not be altering the current policy until another season has passed and the current changes can be assessed. FESA will also be examining the fire agencies of other states in order to acquire solid evidence on what methods did or did not work in order to make improvements to their own system.

G.7 Australian Capital Territory

In the ACT the ACT Emergency Services Agency (ACT ESA) works under the Department of Justice and Community Service and encompasses all emergency services except the police. One of the main objectives of the ACT ESA is to have consistent messaging systems throughout the country specifically with NSW which entirely surrounds the ACT. Because the ACT and NSW share the same media outlets, it is essential that their messaging systems are the same. Unfortunately inconsistencies are still occurring such as the issue with the FDI in which it is posted along with the FDRS in the ACT but not in NSW.

In the past the ACT used a series of phone calls to inform the media of incidents so that warnings could be sent out. However a new system has recently been developed to inform the media more efficiently. In the new system information is sent to the on-call media officer who prepares a message to be sent as a text message and email to chiefs of staff for media outlets and the commissioner of the Minister's office. The text message is sent to media personnel who need to know immediately and can take immediate action, the email is sent to an extended group who will be responsible for responding to and dealing with the incident later.

The email system is used daily regardless of whether there is an incident in order to ensure the system is working and the media can rely on the ACT ESA. The email is also received by an account on the ESA website and the three most recent updates are posted on the site. During periods of intense activity the log can be manually extended to display more updates. Canberra Connect also operates a website and call center that can provide the latest information on updates or advice. This new system reduces the number of calls from the media allowing for more time to handle incidents and issue information. It has worked especially well during larger incidents in which a lot of media agencies would be trying to contact the ESA. The only issues so far are when the system needs to be shut down for 24 hours for routine maintenance. However there are two backup systems in place that are implemented during this time. The ESA has also provided NSW with a contact list for media groups

During an incident the ACT ESA does not force evacuations and typically does not advise them although the idea of advising evacuations has been under discussion. The ESA has developed Recovery Centers that are predetermined locations which can facilitate support services during incidents. These facilities are typically public buildings that have the capabilities to support emergency services and thus are maintained on a daily basis for their own purposes. The locations of these facilities are not advertised until an incident occurs in order to prevent residents from automatically going to a facility that may be in the path of the fire. In general residents are advised to determine their own relocation point in the event of a fire and these locations are mostly implemented for residents who have nowhere else to go. The ACT Community Recovery Department is responsible for preparing and activating these facilities as directed by the ESA. On catastrophic days schools between the urban and rural edge of Canberra, named the ember zone, are closed due to the high risk in the area. The topic of bushfire bunkers has not been a major issue in the ACT but the ACT is interested to see what national standards are developed. In the event of an overwhelming incident in which the current plans will not be sufficient the ACT Coordination Center is activated in which all government agencies and media groups come together to deal with communications issues during the incident. So far this has not been activated since it was developed in 2003 but has been exercised in the past and will be exercised in the future.

The ACT implements a range of programs for public education, the most prominent being the Storm Safe and Bushfire Awareness programs. This bushfire awareness program typically begins in October but is most effective in November and December when the hot weather increases public awareness of bushfires. As part of this program the ESA distributed flyers to every mail box alerting residents to the change in policy and other bushfire information. The only complaints so far are from residents who for some reason did not receive the flyer, and it seems that most residents are willing to accept the changes and plan accordingly. Every year the ESA runs a Winter Home Fire Safety campaign with the Urban Fire Brigade. Last year the

campaign led to an 18% reduction in the number of house fires in Canberra due to additional advertising funds from insurers. The ESA also implements Community Fire Units and there are currently 44 implemented throughout the ACT with six more to be added in the next year. These units are designed to train local residents to protect their homes and pass on knowledge to the rest of the community. These programs will be explained in more detail in section 4.3.

One of the ACT ESA's primarily responsibilities is sending messages to the public and thus agrees with the Royal Commission's recommendations on timely and accurate warnings, and believes that these messages are just as important as handling the fire. Within a short time from the start of an incident the public wants to know what the smoke is from, where it is, how far away it is, where it is expected to go, what emergency services are doing, and what emergency services want the public to do. The ESA believes the Royal Commission has done a good job in highlighting the importance of providing this information to the public. The ESA has spent a lot of time preparing an analyzing materials sent to the community to ensure all public documents were up to date. By Christmas time the Fire Danger Rating Brochure, the 'Prepare, Act, Survive' brochure, and the Bushfire Survival Plan document were developed and distributed. Many of these documents where adapted from NSW documents. So far the ACT has had a fairly quite fire season and has not conducted any research concerning the success of the new policies. There is an ongoing review of community education programs and an assessment of the Emergency Alert system was conducted before and after Christmas however funding for other investigations is limited.

For the future the ESA is actively participating in the review of the changes, but currently is focusing on reinforcing the messages sent to the public and the specifics of what the messages mean. The ESA also believes that it is vital for processes to be in place to ensure that warning systems are properly in place and active.

G.8 Queensland

In QL the Department of Community Safety (DCS) heads all other emergency response organizations including the QL Fire and Rescue Service, QL Ambulance, and Emergency Management QL. The main objectives of the QL DCS concerning warning systems and bushfires are to warn residents of an impending incident and educate them on proper response. In the past QL has had a much lesser issue with bushfires than the other states and until 2004 bushfire preparedness was not a major concern. QL has recently recovered from a drought stretching from 2003 to 2008, and has now returned to its usual wet climate. However there has been an increase in bushfire activity over the past few years, most likely due to

climate change, and the commissioner of QL Fire and Rescue believes that QL will become hotter and drier in the future. One important note is the Public Safety Preservation Act that allows QL police to order residents to evacuate. Unlike in the other state where residents are allowed to stay if they have a financial interest in the building, any residents who remain during an ordered evacuation can be arrested.

Until recently the warning systems for emergencies in QL consisted primarily of radio broadcasts through ABC and direct door knocking by emergency services. Recently the Emergency Alert telephone system has been developed and is now in place although it has only been used in a couple of instances.

During an incident the fire fighters are the primary emergency response personnel weather the hazard be a fire, flood, or cyclone. Because bushfires are significantly less of an issue in QL, the programs implemented to combat them are somewhat less sophisticated. There is no liaison between incident controllers and the public for bushfires. This is partially because bushfires are not as serious a threat, and because bushfires in QL tend to begin and end quickly and information may not be able to be relayed to residents until the fire strikes. Due to the recent changes in policy NSP's are being developed in QL, although these locations are currently only open spaces for use as a last resort, and do not offer any services to residents. However, this may change in the future considering QL's forced evacuation policy. Some argue that if residents are forced to evacuate by police then the police should provide shelter for the residents. In 2004 the QL Fire and Rescue Service negotiated with the police to allow for residents to remain if they are properly prepared. However there is no indication that the act will be revised. After Black Saturday emergency services are more likely to err on the side of caution and call for evacuations rather than risk residents lives by advising them to stay. Currently there are no programs to account for vulnerable groups, or to regulate bushfire bunkers, but these will most likely be developed in the future as fires become more intense and changes in other states are evaluated. There have been a couple of incidents that were considered catastrophic conditions at which point some communities were evacuated. These instances did not receive a good response after the incident turned out to be far less destructive than originally thought.

Because QL was in the middle of its fire danger season when the new policy was developed it elected to wait until the next season to implement the changes in order to create a smoother transition and gain more insight from other states. QL begins its fire season in April and has successfully implemented the new policy of 'Prepare, Act, Survive' and the new FDRS. The transition required a lot more funding which was provided by the State Government. In the past fire season QL kept the majority of the old policies but implemented the new policy where possible. During the few major bushfires that occurred last season residents were advised to leave but some confusion resulted from the partial change in policy.

Overall the new policy has been well received by the QL Fire and Rescue Service, although the public, due to their lack of concern for the bushfire threat, is not as interested in the change. The QL Fire and Rescue Service commissioner has every intention of implementing the new policy and fears that despite the relapse back into the wet climate, QL will continue to grow hotter and drier and the bushfire threat will continue to grow. The majority of educational material is comprised of booklets and DVD's sent to specifically targeted risk groups. There are also presentations provided by local fire brigades to help spread bushfire awareness throughout communities through direct interaction.

Research was conducted in 2003-2004 that concerned the level of bushfire understanding held by the public, and whether they felt they were at risk. The research showed that only 50% of the at-risk population actually realized this risk, and only a percentage of that claimed they would prepare for a threat. Because serious bushfire threat is so new to QL there is a lesser consideration for it by the public. QL Fire and Rescue Services wants to educate the public to have a similar awareness for bushfires as they do for cyclones.

APPENDIX H: WEBSITE ANALYSIS

In order to acquire a better understanding of the State and territorial Fire Authority organizations we have conducted an analysis of the websites and other online resources provided by these organizations. This analysis focused on assessing the availability of information, specifically information pertaining to; the new Fire Danger Rating Scale, incident reports, weather and fire forecasts, fire bans and restrictions, and the nationally agreed upon 'Prepare, Act, Survive' policy. We have also examined websites for information available in languages other than English, and information on the methods of communicating warnings in the State or Territory. Additionally we are using this examination as a method of acquiring background information to aid us in our interviews.

Most of the information was analyzed based on its availability and accessibility, with a N/A corresponding to an absence of the information, and a number begging at zero, corresponding to the number of links followed to access the information. The number of available languages other than English is also given, starting at zero for no other languages other than English. The methods of communication and official broadcasters are described, along with the warnings announced via websites. We have also included additional information that assisted in our interviews or otherwise related to the implementation of the changes in policy. A list of the Websites used can be found in Appendix I, while the table used to tabulate some info can be seen in Appendix K.

H.1 CFA

The CFA website has most of the information concerning the new Fire Danger Rating Scale and 'Prepare, Act, Survive' policy readily available on the first page. Links to incident reports, warnings and advice, fire ban and fire restriction status, fire danger forecasts, household bushfire self assessment tools, guides to creating a fire plan, and detailed information concerning the change in the Fire Danger Rating Scale and other policy changes are available on the home page. There is also a link to important CFA publications containing information essential during the fire season that are available in eighteen languages other than English. In addition to the warnings provided on the CFA website, there are Really Simple Syndication (RSS) feeds available for incident summaries, warnings and advice, total fire ban status, CFA latest news, CFA media releases, and CFA regional news. The site also lists an information hotline that provides useful information from operators and recorded messages as well as the number of the Victorian Bushfire

Information Line which can be accessed by the hearing impaired who have access to a TTY (teletext) machine.

H.2 CFS

The CFS website shows links to current warnings, fire ban information, and current incidents on the home page. There are links in the top drop down menus, under community information, that lead to information concerning the 'Prepare, Act, Survive' policy and a display of the new Fire Danger Rating Scale. There are no resources available in languages other than English and the fire danger forecast and warning levels only extend to the current day. The website includes regional and statewide warnings, and media broadcasts and provides a place to register for RSS feeds for current incidents and warnings. The website also describes the emergency alert system that is in place in South Australia, and provides information how the warnings are issued and under what conditions, and to whom, they are issued. The website also provides and emergency response number (000) and instructions to callers along with the type of information that will be requested by the operator.

H.3 MFB

The MFB website does not contain much information relating to the 'Prepare, Act, Survive' policy or the new Fire Danger Rating Scale. The MFB site links to the CFA site for information on total fire ban alerts and other bushfire information. There is also a section on what can and cannot be done during total fire ban periods. The only links to the CFA site are the fire ban information link and the current fire danger ratings link, and there is little mention of bushfires throughout the entire site. There is also a link to current and forecasted weather warnings for the next 4 days via the Bureau of Meteorology.

H.4 DSE

The DSE website has a section specifically dedicated to bushfires in the State of Victoria. There is a link to a section describing the current and future planned burns for the season including the dates, locations, and status for each, as well as a description of the purpose and nature of planned burns. The first page of the Fire's today section shows the origins and status of current fires. The site also includes a section on the current emergency, watch and act, and advice warnings and provides detailed information on ongoing bushfires that may threaten communities. The site also includes a section listing the various information

services including, the CFA (for more bushfire information), the official emergency broadcasters, the Department of Health, Parks Victoria, The Department of Human Services (for recovery procedures), VicRoads, Environmental Protection Authority (for smoke information), Victoria Police (for traffic management points), Melbourne Water (for information on water catchments), Bureau of Meteorology (for weather information), and Help for Wildlife or Wildlife Victoria. The site also includes a description of the new Fire Danger Rating scale and a link to the CFA site for more information on the sale. There is also a section that explains the fire bans and restrictions, as well as a link to the CFA site for current restrictions. There is a chart showing the fire prohibition period for each region of Victoria and rules for acquiring a permit during fire ban periods. There is a section describing the methods of fire management in effect in Victoria that includes: Living with Fire: Victoria's Bushfire Strategy, Living with Fire: A Community Engagement Framework, Road Management Plan, Fire Areas and Districts, Fire protection Plans, Fire Protection, Fire Suppression, Causes of Bushfires, and Major Reviews and inquiries.

H.5 SAMFS

The SAMFS website does not contain much information on Bushfires, although there is a link to the CFS site on the home page for current incidents and warnings. There is also a link to the CFS site for information on the 'Prepare Act Survive' policy, the latest fire ban information, and the latest bushfire information.

H.6 FESA

The FESA website has a large link on the home page leading to a section containing information concerning the 'Prepare, Act, Survive' policy and other bushfire information. RSS feeds are provided for Alerts, Fire Danger Ratings, Total Fire Bans, and Media Releases. In addition to the website alerts, RSS feeds, and television and radio broadcasts, FESA is implementing a Statealert telephone warning system in which residents can register up to 3 addresses in addition to the normal billing address which is already registered. The FESA site contains information for all types of hazards, the bushfire information is available under the Hazards->fire section, while the alerts and warnings information is available under the News and Media-> Emergency Alerts section.

H.7 TFS

The Tasmania Fire Service's website is well organized and easy to use. Links to the current fire rating, current fire incidents, fire weather, and information on Prepare Act Survive are large and near the top of the page which makes them easy to find quickly. The site also includes a specially designed mobile page which people with web capable phones can access to keep up to date on fire information in areas with cell phone coverage. However, there are several areas which can be improved. It takes two links to find both the total fire bands page as well as the fire permits page. Since these are pages that would be accessed quite often, the website could be improved by putting links to these pages on the home page that are similar to other bushfire information links. Also, the only language of the website is English. Adding a few more language options for the website would insure that visitors who may not speak English would be able to access information from the Website. Note: communication for warning systems is website and radio, so more communication methods could be useful.

H.8 NSWRFS

The New South Wales Fire Brigade website does not contain information on bushfires, but instead has a link to the New South Wales Rural Fire Services (NSWRFS) website, which deals exclusively with bushfire information for New South Wales. The NSWRFS's website contains large links for the current fire rating, current fire incidents, current fire bans, and information on Prepare Act Survive on the home page. Besides these links, there are many other large links for bushfire information such as a bushfire home assessment tool, safer places for local neighborhoods, and basic home training materials. These large links make information easy to find, but most of the links are in the middle and bottom areas of the home page, which can make finding the actual link difficult. Also, a link to weather information such as current outlook and forecasts for bushfires would be useful for people in the state to use for planning purposes. There are 22 languages that residents can access information about bushfires in. Note: communication is web, radio, and television.

H.9 ACTFB

Both the Australian Capital Territory Fire Brigade (ACTFB) and the Australian Capital Territory Emergency Services (ACTESA) websites have a link that connects to a specific page which contains all the

available information for bushfires in the area. The link to bushfire page on ACTFB is very large and at the top of the home page which makes it easy to find. The link on the ACTESA site is to left and near the bottom of the home page, which isn't difficult to find but could be made larger and put closer to top to make it easier to find. On the actual bushfire page, the current fire rating and fire ban are at the top and to the left, which makes finding them easy and quick. It takes two links to find information on current fire incidents and Prepare Act Survive, and three links for fire weather information. The website could be improved by providing visually larger and more direct links to this information. The site could also be improved by providing more language options to view the site for people who may not speak English. Note. ACT utilizes many communication mediums such as web, television, press, radio, and phone.

H.10 QFRS

The Queensland Fire and Rescue Services' website has a link to the Rural Fire Service (RFS) website which contains all the available information for bushfires in the state. This link does not connect to the homepage of the RFS, but the just the bushfire information page. On this page, fire bans are reported and on the left near the top which makes finding ban information easy. In order to find more relevant information for bushfires such as warnings or fire weather reports, the user has to travel back to the home page. From there, the fire danger rating is accessed using three other links and the weather by using two. No information of bushfire incidents or on Prepare Act Survive is contained on the website. If the link from the QFRS to the RFS was made to connect directly to the homepage of RFS, finding information about bushfires would more direct and easy. Links directly to the fire danger rating and fire weather information would improve the ease of finding this information, and providing information about fire incidents and Prepare Act Survive would be useful to provide residents with information about fires in their areas and how to prepare for them. Providing more language options for the website would be useful as well. Note: communication includes the web, and the region would benefit from using other communication mediums.

H.11 NTFRS

The Northern Territory Fire and Rescue Service's website contains very little information about the new fire warning system. The website could be improved by providing links on the main page for information about these areas of the new warning system: current fire rating for various areas of the territory, current bushfire incidents, fire weather information, current fire bans in effect, and a complete section on the new

Prepare Act Survive policies. Providing this information would allow the website to better educate the residents of the new policies regarding bush fire warnings, possible danger and fires in their area, as well as how to respond when threatened by bushfires. Providing more language options would help people who may not speak English access information about bushfire warnings and response. Note: communication includes the web, and the territory would benefit from using other mediums to communicate warnings.

H.12 Conclusion

In general, the southern state and Western Australia have fully adopted the new warning system and have made efforts to educate their residents about changes they have made to their specific warning policies, and Queensland is still working on adopting the new warning system and educating their residents about changes to their policies. The Northern Territory has done very little to adopt the warning systems and is acting under the previous polices of the stay or go policy. The southern states and Western Australia have the fire rating posted either on the home page of specific fire authorities, or need one link to arrive at a page with the rating. Also, most of the websites have links to incidents, fire bans, weather, and prepare act survive on their home pages. Queensland does have all this information on their site, but I can take up to four links in order to access the information needed. Northern Territory has only certain information about the new fire warning system and does not contain information such as fire ratings, incidents, or fire bans. As for communications, VIC, SA, WA, NSW, and ACT utilize many different mediums, such as web, radio, television, sms, phones, mobile, and press, to communicate warnings to their residents. Tasmania, Queensland, and NT use the web and radio to communicate their residents. Most states and territories could benefit from adding more languages for information on bushfires to their websites, which would allow all of their residents to access this information easily.

Table 4, shows the grid that was used to gain an initial idea of what was contained in each of the websites.

State or Territory	Fire Rating	Incidents Reports	Communication	Weather Report	Fire Ban	Languages	Googleable	Prepare Act Survive	Notes
VIC	0	1	website, (tv, radio through ABC and Skynews), RSS feeds	1	1	18	1	0	
VIC	N/A	1	website, RSS feeds	N/A	1	14	1	N/A	
VIC	3	2	website, (tv, radio through ABC and Skynews), links to information sites	N/A (Link to CFA)	N/A (Link to CFA)	0	2	N/A (link to CFA)	
SA	1	0	website, (media communication channels including ABC, and FIVEaa radio stations, RSS feeds	1	1	0	1	1	
SA	N/A	0	website, emergency alert telephone warning system,	N/A	1	0	1	1	
WA	1	1	website, Media releases, Statealert telephone warning system, RSS feeds, tv and radio)	2	2	0	1	0	
Tasmania	1	1	Website, Radio	1	1	0	1	1	
New South Wales	N/A	N/A		N/A	N/A	N/A	1	N/A	Have link to rfs; no bushfire info
New South Wales	1	1	Website	N/A	1	0	1	1	
Australian Capital Territory	0	2	Radio, TV, Press, Website, TelePhone	3	0	0	1	2	
Australian Capital Territory	0	2	Radio, TV, Press, Website, TelePhone	3	0	0	1	2	
Queensland	4	N/A	Website	3	1	0	1	N/A	Have link to rfs
Northern Territory	N/A	N/A	Website	N/A	N/A	0	1	N/A	Not much info
New Zealand Fire Services	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	Not much info

Table 4: Website analyses

APPENDIX I: COMMUNITY EDUCATION PROGRAMS

As with changes to any new system, the educational aspect of the new fire warning system is crucial to its implementation and success. In order for the new system to be successful, residents must understand all of its aspects, including the fire danger rating index, how to appropriately prepare for a bushfire if one should occur, the appropriate action to take when a warning is issued, and how to react when a bushfire actually starts. A fare amount of the warning system's success also depends on residents' making proper preparations before the bushfire season starts, such as ember-proofing their homes to help prevent embers from bushfires causing their house to ignite. As such, it is important for bushfire preparation education to be readily available so residents are empowered to learn what precautions must be taken to help make their home more likely to survive a bushfire. To achieve this, each state or territory has its own community educational programs that help residents learn the details of the new system and how to prepare for an upcoming bushfire season. This section describes each state's or territory's methods for educating their residents in bushfire safety.

I.1 Country Fire Services

The Country Fire Service (CFA) of South Australia uses a public information program called Bushfire Ready Public Meetings. The goal of these meetings is to improve the general public knowledge of actions to take during a bushfire, and about how CFS operates. Through conducting research, CFS determined that one issue of safety was that in general the men of the house were in charge of deciding on bushfire preparations. Consequently, the women of the household were unsure of what actions should be taken if the men left to fight a bushfire. In order to address this issue, the CFS conducts Fiery Women Workshops. These workshops provide women with a safe non-threatening learning environment in which they can learn new skills to help protect their families from bushfires. Topics of the workshops include emotional preparation, understanding the new bushfire danger ratings and warnings, deciding on when to leave or stay and defend, preparing a bushfire survival plan, identifying hazards that may endanger their homes, and learning how to operate firefighting equipment, such as home pumps. They also include sections on bushfire behavior, and how to prevent injury from bushfires. The sessions are conducted from 9:00 am to 3:00 pm, and given on certain dates which are listed on the CFS website. The CFS also conducts other community and volunteer programs such as bushfire planning workshops, land management meetings, and a community safe open day, which provides residents with an opportunity to speak with CFS staff and volunteers and gather information about bushfire survival, as well as suggestions for community plans.

Most states and territories were given an increase in funding to help implement the new warning system and educate their residents about the new catastrophic level warning and what actions to take. However, this funding is not expected to be maintained, and information campaigns will not be able to continue through the use of the fire authorities resources. To compensate, the CFS has introduced a program called VOICE. This program utilizes volunteers from each community by giving them training in bushfire education by CFS officials. The volunteers are then capable of educating their own communities about the new warning system and how to properly prepare for bushfires. The CFS also provides school safety sessions in which children from kindergarten to grade 12 are educated on general bushfire safety. Teachers are also provided with education materials that help with the problem of children starting arson bushfires, or bushfires that result from fires started intentionally.

I.2 Country Fire Authorities

The Country Fire Authorities (CFA) of Victoria uses similar community programs in order to educate their residents about the new bushfire warning system. Living with Fire is a program aimed to increase bushfire awareness and preparedness of the community. It is either conducted in city halls, or just on street corners, and has been very effective at educating people about the new warning system and their actions regarding bushfires. The CFA also conducts a program called Community Fire guards in which volunteers are trained to educate their communities. Topics of the program include introduction and fire behavior, understanding personal survival, understanding house survival, and developing bushfire survival plans. Some of the benefits that result from the program are an understanding of key essentials for a bushfire survival plan, an understanding of proper preparation, physical and emotional support from neighbors during a bushfire, emotional recovery after a bushfire, and building strong social networks with neighbors. This program does not train volunteers to be firefighters, nor are volunteers responsible for the safety of others in the community. They are simply trained educate their communities and help others prepare incase a bushfire starts in their area.

CFA also concentrates on child education, and provides in-school lessons for kids, as well as information for teachers and parents. Brigades in Schools is a program in which CFA members go to schools and teach children about general fire safety, which includes a section on bushfires. This program works in partnership with the Mobile Education Unit, which travels to schools in rural areas and provides fire education to children in these areas. In order to provide teachers with fire safety information, Fire Safe books are distributed. They are catered to children from kindergarten to grade 6, and let teachers educate children

about general fire safety, including bushfire information. Some children have a tendency to play with fire, and sometimes these fires can ignite a bushfire that can become very destructive. The Juvenile Fire Awareness program target children that engage in fire-lighting activities and works with them so that they understand the dangerous consequences of playing with fire, and build up a healthy respect for it. Fire education information is also given to teachers who teach adult classes. Fire up English is a program designed for adults from non-English speaking countries who are studying English as a second language. This program does not have a set structure, but instead gives teachers a range of activities and ideas for conducting fire education.

The website of the CFA includes an education section designed for children. The CFA has a mascot, Captain Koala, who provides fun and entertainment with his friends, which are various animals and people of the fire brigade. Activities include flash games, puzzles and mazes, word games, and coloring sheets. There is also information available for school projects and a junior volunteers program, which focuses on providing young people with a sense of place in their community, enhance personal values, and increase the opportunity for future recruitment. Skills learned in the program include Social recreational development, skill development, personal development, and community service through the CFA involvement. CFA focuses on providing other tools and seminars to help educate the residents of Victoria. Farm fire safety provides information on how to minimize the risk of haystack fires for farms. Summer fire safety provides information for the upcoming bushfire seasons, including survival guides, household assessment tools, and fire danger ratings. They also provide meetings on emergency planning, roadside management to decrease fuel by roadsides, and municipal fire prevention, in which coordinated approach is taken for defining risks and responsibilities of the public.

I.3 Metropolitan Fire and Emergency Services Board

The Metropolitan Fire and Emergency Services Board (MFB) is specific to Melbourne and the surrounding region. As such, they have a different approach to bushfire education. They target the high-risk communities, such as elderly and people who are disabled, and work with these communities for preparing for emergencies, such as a bushfire, as well as distribute flyer and pamphlets that have more information about fire safety. MFB also works with hazardous facilities that hold dangerous chemicals, and plan how to minimize damages that could be cause by such a facility catching on fire. They provide school education programs in which a brigade goes to every primary school from kindergarten to 6th grade and educate children about bushfire safety. Public meetings are also held to distribute information about bushfires, and have been found to be very effective in reaching a large amount of people from a community.

I.4 New South Wales Fire Brigade and Rural Fire Service

Although there are specific pieces of educational material given online by the New South Wales Fire Brigade, the New South Wales Rural Fire Service (RFS), which focuses on issues associated with bushfires, provides most of the bushfire education to local communities. Each area has an education program that tailored to a specific community. To help achieve this, the Community Fire Units program educates volunteers from different communities to help prepare their areas for bushfires. Objectives of the program include increasing community preparation and resilience to ember attack (embers blow ahead of the fire and onto houses) from bushfires, providing basic operational training and firefighting equipment, engage local communities in basic hazard reduction, fire safety, and prevention activities, empowering residents in urban bush land areas through education, training, and the provision of basic firefighting equipment, and to increase the communities' knowledge of bushfire behavior in their local area. Activities include attending induction and annual skills maintenance training, fire hazard reduction activities (such as property protection and reducing fire fuel), using supplied equipment to protect their home's from spot fires of ember attack until fire services arrive, and extinguishing small fires after a bushfire front has moved through. The RFS also provides a children education program called FireEd, which is unique because not only do teachers and students participate, but parents are a part of the program as well. Firefighters contact local primary school principals and teachers to request an approval to deliver the program within their school. Once they have permission, firefighters visit schools and present the FireEd material to students. Students, parents, and teachers then participate in selected fire activities after the firefighter's presentation. After the program has been completed, parents and teach provide feedback on the success of the program with respect to student learning and Fire Ed in general.

I.5 Tasmanian Fire Services

The Tasmania Fire Services (TFS) has taken a different approach to fire education. The TFS targets bushfire prone areas that are assessed and deemed to be at risk, and sends a bushfire DVD education video. The video covers a broad range of bushfire education complete with an explanation of the new warning system and what proper actions to take in order to prepare for bushfires, and to help residents decide whether they should stay and defend their home, or leave early. The video uses strong language and makes a clear point that bushfires are dangerous and need to be taken seriously. Anyone not living in a bushfire prone

area can request the DVD, but will not be sent one automatically. The TFS also has a Juvenile Fire Lighting Intervention Program (JFLIP). The JFLIP program is a free program for kids who demonstrate fire lighting behavior taught by specially trained firefighters. The program aims to teach children about the dangers of playing with fire and to have a healthy respect for fire through a series of activities, discussions, and role playing games. No official community education program that educates volunteers to relay bushfire safety information to their community exists yet, but the TFS is working on creating such a program and hopes to deploy it soon.

Project Wake Up is a program aimed at improving home fire safety for people with disabilities and the elderly, such as people who are in community nursing as well as independent health care and doctors the deal with care assessment consultants. The way the program works is health organizations submit a list at the beginning of every month of residents with special needs who require a safety check. The Community Education Unit then contacts each individual person on the list to set up a time to conduct the safety check, and help install smoke alarms or other fire equipment. TFS also runs a number of school education programs, the goal of which is to promote broad fire awareness in all primary schools in Tasmania. The program works closely with the Education Department to ensure that all children participate in the program, which is delivered by specially trained firefighters. The program includes topics such as basic fire prevention, fire safety procedures, and survival skills. When the children complete the program, they receive a Fire Safety Certificate.

I.6 Fire Emergency Services Authority of Western Australia

The Fire Emergency Services Authority of Western Australia (FESA) uses multiple tools to conduct bushfire education. Like the TFS, FESA distributes a bushfire safety DVD to residents in high risk areas to help educate and prepare residents for bushfires. FESA also uses a program called Bushfire Ready Facilitators. These facilitators are trained in bushfire education and are used to help their communities be properly prepared for bushfire. The program is coordinated by a Bushfire Ready facilitator, and is a self management program and very flexible as members can decide when, where, and frequency of meetings as well as the subjects that will be covered. Topics of the program include experiencing a fire, bushfire behavior, how to reduce bushfire risk in your home, street walk or property assessment, personal survival, bushfire survival plans, passive fire protection, and community strategies and warnings. One of the unique educational tools in Western Australia is the Fire and Emergency Services Education and Heritage center. This center provides education and activities to help promote a broad fire education, and includes programs on bushfire safety. FESA also incorporates a winter burning program which encourages residents to conduct winter

burnings of brush and other bushfire fuels as a way to reduce these fuels on resident's properties and thereby reducing their bushfire risk.

I.7 Northern Territories Fire and Rescue Service

The Northern Territories Fire and Rescue Service (NTFRS) use a different method of community education. Rather than train volunteers to educate communities, the NTFRS prefers to sue their own staff to educate communities. The NTFRS feels that the information is more reliable and better trusted by residents if it comes straight from the fire authorities, and because of the Northern Territory's relatively small population, this method has worked very well. The NTFRS Conducts many school education programs in the classroom and encourages schools to visit their local fire stations for hands on learning experiences. The NTFRS also uses a program for children called Smart Sparx which uses a DVD, musical CD, story book, and lesson plans, as well as games and puppets. These programs are available through a lending program conducted by local fire stations. As many of the other states and Territories, NTFRS has a Juvenile Fire Awareness and Intervention Program. A two page brochure is posted online and explains possible reasons why children play with fire at certain ages, and encourages parents to get help if they are concerned about their child's behavior and how to do so appropriately.

I.8 Analysis of State and Territories Educational Programs

There are many community education programs that are common to the states and territories of Australia. Many states and territories have had issues with continuous funding for educating residents about the now warning system. In order to solve this problem, volunteers are trained in bushfire education so that they may continue educating their communities about how to prepare for bushfire season, and how to form an effective bushfire survival plan as well as education about the new warning system. Public education meetings are another popular program. These are informal meetings usually put on by the fire authorities in a public place such as a town hall or street corner, and are designed to give residents information about bushfire safety. Juvenile intervention programs are very common, and are intended to help stop children playing with fire. The programs are taught by fire officials and teach children to have a healthy respect for fire and the dangers and hazards of playing with fire. All states and territories have school education programs in which fire authorities visit schools and teach a fire education class, which includes information about bushfires. Other teacher information is available in most states and territories.

Besides these common programs, many of the states and territories have unique programs that work particularly well in their states. The Fiery Women's program of the CFS recognizes the need the need to direct more education toward women so that if their spouses have done much or all of the planning for bushfire safety and have left the home or are simply not home when the fire occurs, the women will be prepared to handle the situation themselves. Project Wakeup is not specifically designed for bushfires, but it addresses the need to specially prepare people who are disabled or elderly for emergency situations. Fired Up English goes beyond educating people who are native to Australia and speak English to people who do not use English as their first language, and addresses the social issue of preparing everyone in the state or territory for bushfires, not just the general public. Being involved school education get children started on fire safety early and is effective in teaching children about the dangers fire can pose, but getting the parents involved is a new approach that helps parents understand what their child is learning in the fire courses to help them understand their child's knowledge of fire safety.

Beyond actual education programs, there are many pieces of educational material that is distributed to the public or publically accessible. Some states and territories have started distributing bushfire DVDs which can contain a lot of specific information about bushfire safety. These have been particularly useful because the recipient doesn't have to leave their home or go online to find the information. Targeting high risk areas with this information has worked well because people who are in danger of bushfires are much more likely to be receptive to the information that is being distributed. Another approach to this in home education method is the Smart Sparx education pack. This pack can be taken out on loan from a local fire station and contains lots of useful information about fire safety, and puts the responsibility of fire education on the resident allowing residents to be more self reliant. Another interesting public education method is use of a bushfire museum. This method allows the public to explore the history of bushfires and hands on education about bushfire safety, allowing residents to come away with a better understanding of how bushfires are fought and how they can take measures to prepare themselves. These unique programs provide an alternative means for fire education.

APPENDIX J: MEDIA REPORTS

To gain a clearer view of the public's view on the new FDRS and warning system in the various states we have analyzed many news articles to assess how the public has responded to these changes. To easily see the changes the next three sections will give some common examples of reports from after Black Saturday, this past years' pre-fire season and post – fire season.

J.1 After Black Saturday

After Black Saturday there was a great call for the fire authorities to implement changes such that such a catastrophe would not happen again. At this point fear had set in and took its form in rushing to enact changes before the next fire season. This included the quick response of a Royal Commission and an Interim Report that outlined national policies and recommendations that needed to be made.

Immediately following the fires there were articles honouring the dead firemen and looking for consolation for the victims and their families. (Pain of Fire, 2009) Following this response the media and the survivors looked at who to blame: arsonists, the fire officials, the government? People began to look at how the stay or go policy had worked and what could have been done differently. The first response was to start forced evacuations which had the highest probability of saving lives yet as Terry O'Gorman states:

"The right to defend your most valuable asset is to some people a major right. If it is to be taken away, it should be accompanied by a change in the law which says if people are made to leave, and robbed of the opportunity to save their house … they will be given by the government full replacement compensation …" (O'Gorman, 2009).

This would force the government to cover losses which could be impossible to cover. The other argument is during these evacuations you would be putting more people at risk. David Packman states:

"You can't evacuate an area in less than hours and hours, you can't put all those people on the road and expect them to get through, added to the fact that you're likely to have dropped trees over major roads, power lines, even fires." (Packman, 2009).

With these arguments at the fore front the decision was to keep the choice of leaving or staying on the residents yet change how the warning system worked and where the emphasis would be put. The final major issue that sprouted up was how many people had very little to no warning, leaving them little time and less information to work with, people frantically tried to escape in their cars or find places of refuge in their property. They were uninformed and uneducated to what should be done is such situations (Doherty, 2009). The following months continued to find people and processes that could be at blame but by this point the job had been assigned to the royal commission to find what needed to be done.

J.2 Pre Fire Season

Before the fire season and during the first few months was the time when most states began to implement the new fire danger rating scale. The public began criticizing where the money was going such as separate funding to the CFA, MFB, and DSE within Victoria for similar needs yet separate due to its structure. Due to this many fire fighting volunteers have called for the need to merge these groups and create a more fluid line of authority (Cooke - 1, 2009). When the changes to the new fire danger rating scale was made public, many people feared that during ratings such as Catastrophic would cause a hysteria in which large unplanned evacuations would take place possibly putting people in more danger than if the rating hadn't been issued (Akerman, 2009). The other issue is if it had gone by without any major event people would eventually become complacent. The language used is considered too strong by many people and could possibly create the effect of "the boy who cried wolf" (Extreme distribution, 2009)

One minor issue that has seem to come up a few times within Victoria is how during the change to the new FDRS the authorities posted new signs over the old ones recommending passerbys to look in the appropriate places for fire information and detailing the new system. The main issue is that it does not give the actual danger in the area and the amount of information on it is too great for a driver to read and understand what it is trying to tell him (Jackson, 2009).

Throughout this time period the media and Royal Commission lawyers were making sure each area was in fact ready for the fire season. Many changes were made yet some of the same old faults that had been seen during Black Saturday were still present. The number of qualified incident controllers and teams was considered inadequate if there was a large distribution of severe fires. Training was to continue yet time was still needed (Cooke – 2, 2009). Finally with the interim report out questions were raised as to the implementation of Neighborhood Safer Places (NSPs) and the apparent "lack of urgency" for further

research and plans. Certain places were deemed as possible safe places but were often private property that did not offer facilities that people would need in such situations (Kissane, 2009).

Overall many changes were made yet seemed to merely add more work to the already understaffed fire units. While many changes were needed to give the public more information less was done to give them more options during a fire and much of the public's discontent came from this. From their point of view much time and funds were used for pointless things and was not an efficient use of time.

J.3 Post Fire Season

When the fire season had finally began to come to a close the public and media looked back and saw how many of these changes were a good start yet as Dr. Packham points, " We're very fortuanate this year has been a gentle year." It's believed that many of the changes came out of an "accelerated solutions environment" that was forced due to the fear of the Black Saturday fires and choices were made that were considered too "simplistic". John Brumby states that "too many" people were still complacent about fire danger. Dr. Tolhurst comment on a survey that people "were saying, 'We'll wait until we know that there's a fire in our vicinity,' and that's a reasonable thing to do." The new system has yet to take the vegetation, topography and probability of ignition in an area when deciding how dangerous it may be to stay. Without any immediate threat it will be hard to convince residents to leave (Bachelard – 1, 2010).

One more issue that has turned up is while focusing on these changes and the future of the fire authorities, some places have seem to forgotten the place of the volunteers. In Victoria alone volunteers comprise 97 per cent of its workforce yet have been forgotten and underutilized. Many of these volunteers qualified for leadership roles and left little room to advance and gain recognition for their work. As Garth Head states "Emergency service volunteers are an irreplaceable asset. The choice is ours: invest in and utilize them – or lose them." (Head, 2010).

Overall the post fire season media reports has shown that improvements may have been done, more effective and efficient ones are still needed.

APPENDIX K: ANALYTICAL DATA

K.1 "Where Are They Going?"

In order to gain a perspective of resident's opinions, understanding, and actions taken with respect to the new bushfire warning system, we have researched a document called, "Where Are They Going?," a study conducted by the Office of the Emergency Services Commissioner of Victoria on specifically the reasons why, when, and how people leave their homes, and they incorporate leaving into their bushfire survival plan. The study used 616 households in 54 areas deemed to be high risk for bushfires, and surveys were conducted by over the phone interviews with one member from each household. A workshop with representatives from the emergency management sector was also used to help verify the results of the study and give their own personal experiences with the warning system and issues they have experienced. Although the sample size of this survey study is considerably small given the size of the population, both with respect to the areas identified and Victoria, we believe the research was conducted in a proper scientific manner, and the results offer an insight to the public's response to the new bushfire warning system. The following sections summarize the study's results and key findings, as well as our own interpretations of the data.

K.1.1 Deciding To Leave

When asked up until what point residents plan to leave before a bushfire occurred, 32.8% replied that they wait for emergency services to tell them when to leave, and 32.6% replied they would wait until a fire occurred in their area. This type of behavior can be dangerous because emergency services only specifically advise residents to leave under very extreme circumstances, such as when a community is under imminent threat of a bushfire, and may not advise residents to leave when they should with regards to their preparedness. Not that, but if residents wait until authorities advise them to leave, then the warning system is defeated since its main purpose is to alert residents to bushfires in their area and advise them on what actions to take. What is more dangerous is over 14% replied they would wait until threatened by a bushfire, and by this time it may well be too late to leave their homes and be able to get to safety. Only about 15% replied they would follow the proper action of leaving in advance for a high fire danger day. However, there is an improvement from bushfire season 2008-2009 in that only 10% said they would stay and defend their properties no matter what for the bushfire season of 2009-2010, which is down from the 28% figure for the 2008-2009 season. The results from this question are in Table 5.

When planned to leave	Respondents (n = 445) %
When threatenened by the bushfire	14.2
When advised by emergency services	32.8
As soon as aware there was a fire in the area	32.6
Before or early on a high fire danger day	15.7
Don't Know	3.6
Other	1.1

Table 5: When did you plan to leave? (2008 - 2009)

When asked whether or not respondents would leave on a day when the new code red (catastrophic level) warning was issued, only 45% said they would plan to leave their homes. In addition, more than 26% replied they would only leave when advised to do so by emergency services. 5.4% did not know what they would do in this situation, and although it is a relatively small percentage, there are still people who do not have a good understanding of the warning and are unsure of what actions to take when it has been issued. However, about 60% replied they would leave well in advance, meaning the night before or morning of the day for which the catastrophic warning was issued. Discussions form the focus group suggested that people's behavior with respect to a catastrophic warning being issued could change depending on the day of the week. On a weekend, people may be more likely to leave their homes since they will not be missing work. On weekdays, schools may be officially closed, but work areas and farms will not be closed, unless doing so is specifically in their bushfire plan. The potential loss of work could increase resident's tendency to stay if they in they are planning on working that day.

When leave on Code Red day	Respondents (n=616) %
The night before the forecast code red day	24.5
When advised by emergency services	26.3
In the morning of the code red day	35.6
Sometime during the code red day	3.6
Don't Know	5.4
Other	4.7

Table 6: Would you plan to leave on a Code Red day?

The study then asked residents what they would their decisions about leaving would be for various prompts, such as a fire being reported by radio, told by officials, can see smoke from the flames, etc., and were given the choice of definitely leave, likely to leave, unlikely to leave, and definitely wouldn't leave. The most effective prompts were found to be when they felt their family was threatened, told by emergency services, and when they could see the smoke and flames, with the response of definitely leave being 83.4%, 83.1%, and 60%, respectively. These kinds of prompts are the most dangerous because they only occur at the last minute and by then might be too late to get to safety. If people were prompted by a fire reported on the radio, only 35% said they would definitely leave, and yet, in most states, radio is the primary way to communicate warnings to the public. Lowest response for prompts to leave was if residents were advised to leave by neighbors or family with a response of only 27% that would definitely leave. This may not seem like a big issue, but many states have community volunteer programs in which volunteers are trained to help their neighbors prepare for and act during bushfires. It is important to note that for the least effective prompts, there were a fair amount of people who reported they would be likely to leave or unlikely to leave. Since these are not definitive responses, it is important to focus on what residents would definitely do in a situation. With respect to this, very few residents said they would definitely stay behind (fewer than 10%). The results of this question are given in Table 7.

Prompts for leaving if threatened	Definitely leave %	Likely to leave	Unlikely to leave	Definitely not leave
Fire was reported on the radio	35.6	32.0	25.2	7.2
You were told to leave by the emergency services	83.1	9.7	4.4	2.8
You were advised to leave by neighbours or family	27.0	34.6	32.1	6.3
You could see the smoke and flames	62.4	15.7	13.5	8.4
You felt that you and your family were in danger	83.4	7.9	4.9	3.8

Table 7: Prompts for leaving if bushfire threatens

K.1.2 Places to Go

After analyzing the aspects of why and when residents leave during a bushfire warning or actual fire, residents were the asked to comment on where they would go if they decided to leave. The top three places people would go if a bushfire occurred were relative and friends outside of the local area, a public place inside the local area, and Melbourne or the provincial city with responses of 29.3%, 20.1%, and 11.9%, respectively. It is unsettling that 20% of the respondents would leave to a place inside their local are because this is most likely not far enough aware from a bushfire if one should occur. Local authorities generally advise residents to go to an area that has a much lower risk of bushfires on the day residents leave. Overall, 26% residents chose an option that was specifically inside their local area, and only 37.3% chose an option that was specifically outside the area, which is the proper place to go when leaving. Table 8 shows the results of the respondents.

Plan to Go if Bushfire in General Area	Responses %
Relatives/friends outside local area	29.3
Public place inside local area	20.1
Melbourne/provincial city	11.9
Beach/lake/water	8.7
Public place outside local area	5.7
Local town/village	5.2
Where directed by emergency services	3.7
Relatives/friends inside local area	3.0
Assembly point inside local area	2.7
Accommodation/motel outside local area	1.2
Out of fire zone	1.1
Assembly point outside local area	0.7
Depends on fire direction	0.5
Accommodation/motel inside local area	0.2
Other	1.2
Don't Know	4.8

Table 8: Where specifically would you go?

Last resort places are places that people should go if they fail to defend their homes. However, residents are using these places as a place of first resort instead of using areas designated as safer places. When asked about how residents would utilize these places, 20% of residents said they would not use these places under any circumstances. What is more concerning is 20% of residents said that would use these places as a first resort. This decision presents two issues. If residents use these places as first resorts, whey will not find things like refreshments or accommodations that they may be expecting to find, and since these areas may become overpopulated when others come planning to use these places a true last resort. In fact, only 20% of residents said they would use these places in that manner. Safer places are public areas in a community outside of the fire zone where refreshments and even accommodations may be available.

K.1.3 Demographics

The study found that the differences between male and females can determine how decisions about bushfire survival are made in a household. Men showed a strong intention to stay and defend their homes even if the warning forecast was a catastrophic warning, and for those who said they would leave would go to a place less than 10 min away from their homes. Men also felt strongly about returning to their homes as soon as possible to try and defend it against any residual fires resulting from bushfire embers. It was also mainly male respondents who replied that there were no occasions on which they would leave their homes or would incorporate places of last resort into their bushfire survival plans. The responses from women in the study's population were completely different from the response of the men. Women were much more likely to exorcise caution and leave their homes rather than stay and defend them, and were also more likely to go places of friends or relatives outside the fire safety zone. Women were also more likely to listen to the radio, as well as use advice from neighbors and friends to help them make a decision on what to do in a bushfire situation. Women also seemed to be much more organized and methodical when making decisions about bushfire survival.

There is not only a difference in the decision making process between males and females, but the composition of a family can greatly influence bushfire survival decisions as well. For example, families with children or supporting elderly people were found to be the highest group that had made changes to their bushfire survival plans, as well as were much more likely to leave their property when a bushfire was reported in the area. However, only one in seven families were found that would actually leave their area when a high fire danger day was forecasted (). Of the elderly group, many residents identified places of last resort as their first place to go in case of a bushfire, and getting to these places takes less than ten minutes. The study also notes that elderly people may not have beneficiaries such as younger members of their family living with them or close by, which would make public areas possibly their only place to go if a bushfire occurred in their area. According to the study, this age group's responses indicate they would be making risky decisions concerning their bushfire survival plans which could endanger their lives.

K.1.4 New Catastrophic Warning (Code Red)

In addition to the various questions previous about the catastrophic warning level, the study asked participants what their plans were on days of weather associated with high bushfire risk, and especially if a fire occurs in their area. When a code red warning has been issued, residents were asked what they are most likely

to do or have done in the past. Only 25% responded with an answer of having left in a timely manner, 40% leave their homes when a fire occurs in their area and go to a place outside the fire area, but 20% leave their homes when a fire occurs in their area and intend to stay within the fire zone. Still, 10% said they would stay and intend to defend their homes when catastrophic level warning was issued. The result of this feedback means that 75% of the study's population is not taking the proper actions during a catastrophic warning day. Not only are these residents not properly prepared, but 30% of the study's population intends to make risky decisions on a catastrophic warning day. Even on days when a catastrophic warning is not issued, 50% of these residents said they will be leaving at various times during the day. This decision is extremely risky because not preparing a set time to leave during the day could leave residents unprepared to leave if a bushfire occurs earlier than the residents expected, and could cause a large amount of people to leave at the same time and be caught in the bushfire. Of this 50%, half (25% of the study's population) said they intend to stay in the bushfire zone, which is a poor decision since staying in the fire zone is not safe. Table 9 shows the results of this study.

Circumstance	Population percentage	Actions
Code Red days – if a fire occurs	25%	Have left in a timely way and will be outside of their high fire risk area
	45%	Will be deciding to leave their property and travel to an area outside of the fire zone
	20%	Will be deciding to leave their property and travel to a safe place inside the fire zone
	10%	Will decide to remain at their property and defend
Non-Code Red days – if a fire occurs	20% maybe	Will make safe decision to leave their property early and travel outside of the fire zone
	10%	Will stay and defend their properties
	20%	Will stay and do what they can to defend but leave if they can't manage
	50%	Will leave their properties at various times with at least half of this group remaining in the fire zone – Major risk groups are women and people aged 65 years and over

Table 9: Planned actions on high bushfire risk days

K.1.5 Summary of Study's Results

The study summarizes its results in mainly two sections: positives and weaknesses. On positive of the study's research is that despite there is an issue of a lack of knowledge about bushfire safety among women, there are many women who are well organized and plan to leave their homes if a bushfire warning is issued, especially if the catastrophic warning is issued. At least 20% of the study's population understands that the special areas designated as places of last resort are a last measure of defense and intend to use them as such. Also, 10% of residents appear to be able and willing to defend their homes during a bushfire, and understand how to make safe decisions while doing.

Some of the weaknesses found by this survey are as follows. People who are above 65 years of age have trouble traveling and are unlikely to have places nearby they can stay at, such as family or friends. Because people have a tendency to leave their homes at the last minute, there is too much volume for the roads to handle and residents are caught by the fire since they cannot leave quickly enough. When residents leave their homes, there is too much usage of places for last resort when residents should be evacuating to safer areas. Men do not leave early enough, and have the most tendency to go against the advice of a warning that has been issued, while women tend to choose caution and leave their homes early on a day of high fire risk. When a fire occurs, the day on which it occurs with respect to weekdays or weekends affects the decisions of people whether to stay and defend or leave to go to a safer place.

K.1.6 Analysis of the Study

One of the biggest themes we've noticed in this study is that people are becoming more dependent on emergency services. When it comes to acting during a bushfire, residents want to be told what to do and when to do it right down to the decision of staying or going. The reason for this behavior is most likely because of the amount of effort people feel is required to take on the responsibility of defending themselves from bushfires. Residents are also waiting too long before they try to leave their houses and get to safety when in the path of a bushfire. They are waiting until they are being told to leave by emergency services or even until they can actually see the flames or smoke. Since bushfires can sweep over an area of land in a matter of minutes, residents only have a short time to get out of their homes if they wait this long, let alone try to escape from it. By waiting this long, residents are putting themselves and their families at risk. In terms of prompting people to leave, most information on bushfires is given to people through radio messages. However, warnings provided by radio services were only effective for about a third of the people in advising them to leave, which indicates that radio messages may not be the best method to issue bushfire warnings.

The study found that more than half the population of the study would not leave if a catastrophic warning was issued. This seems to be a result of two issues: residents have either failed to understand the warning, or, as more likely indicated by the study, residents simply do not wish to adopt the new catastrophic warning, probably because it requires them to leave every day it is issued. While this may keep residents safer, it can disrupt people's lives, and if it is issued often enough, residents will not want to follow its advice, especially if a fire does not occur or does not pass through the area. This theory would especially hold true if a catastrophic warning was issued during the week when residents are working, and could require people to choose their safety over income. According to this study, three quarters of the population will not take the proper action on a day when a catastrophic warning is issued.

There is also an issue with residents knowing where to go when they leave their homes. One quarter of respondents said that when they decide to leave their homes, they will be staying in the local area. This becomes a problem because the bushfire zone usually covers a local area, not just an individual community. Staying the local area means that residents have not fully removed themselves from danger even though they have left their homes. Also, there is an apparent lack of knowledge with how residents should use places of last resort. A fifth of residents say they will use places of last resort as a first option to go to after leaving their house. As was mentioned before, using these places as first resort locations is a problem because residents will not be provided with such amenities as refreshments or beds, and could overpopulate the area if it is needed for people who are fleeing their homes at the last minute.

The study also made some interesting observations of about how the demographics of a house hold comes into play when making decisions about bushfire survival. Men tend to be the decision makers in the household about bushfire survival. They tend to make decisions that support staying and defending their property. This is not surprising piece of information as men are often characterized as needing to appear strong and capable of defending themselves. Women tend to make decisions that air on the side of caution, and usually support leaving and going to a safer area rather than staying and defending the home. According to the study, women seem to be more concerned about personal and family safety rather than property. Women also tend to be more organized and methodical when planning their bushfire survival. Having to support children or elderly also plays a role in decision making, and most families with dependents support leaving and relocating to a safer area, but only when they feel threatened by a bushfire. As noted before, only one in seven families would leave on a catastrophic warning day. There is also a concern about where elderly people would go to if they decided to leave their homes since many would unlikely have family to stay with, or may not leave at all if they are not physically able to.

APPENDIX L: POWERS OF EVACUATION

State	Powers of Evacuation
Victoria	The chief officer of the CFA may only remove a person from an area if they are interfering with fire fighting operations and they do not have a pecuniary interest in the area. This also applies to police officers acting under the Country Fire Authority Act 1958 (Vic). MFB members and police within the metropolitan area may forcibly remove a person only if they do not have a pecuniary interest n the area. Police may use force regardless of pecuniary interest if they are interfering with brigade operations within the metropolitan area and where there has been an 'alarm of fire'. The Coordinator in Chief of Emergency Management may remove a person from a declared 'disaster area' (defined in section 23 of the Emergency Management Act 1986 (Vic)) after the state of disaster has been declared and only if they do not have a pecuniary interest in the area. Forced evacuations typically involve interference of the evacuee's body by the emergency service member, which can be classified as assault if unlawful. Because assault is a serious matter courts usually find that force can only be used if legislation clearly allows for it. The Emergency Management Act 1986 allows police to direct any person found out in the open or in a vehicle to immediately leave an emergency area (declared by the most senior police officer under section 36A of the Emergency Management Act 1986 (Vic)). If an offence against the Act is suspected then 'reasonably necessary force' (Loh, 2007) may be used to remove people. Otherwise the use of force is not authorized. Even people with pecuniary interests may be prohibited from entering their property and some residents with pecuniary interests may have conditions placed on their staying, although the authorization to use force in these situations is not clear.
South Australia	In any case where there is a fire, or a state of emergency has been declared emergency workers are granted the power to remove any person to a location deemed fit by the officer at the time. The movement of people and vehicles can also be directed and prohibited by the officer during these situations. In either case fines of up to $20,000 are applicable if the person does not adhere to the directions of the officer.
Western Australia	When a 'rescue operation' (defined as 'the rescue and extraction of any person or property endangered as a result of an accident, explosion, or other incident' in section 4 of the Fire Brigades Act 1942 (WA) is being carried out, the Director of operations, members of the fire brigade in charge, or authorized officers of the Fire and Emergency Services can order a

	person to evacuate and may use reasonable force to ensure enforcement. Emergency Service Officers (ESO's) cannot order or force people to evacuate in any other situations unless they are interfering with brigade operations. A bushfire control officer holds the same powers as the Director of Operations under the Bush Fires Act 1954, under the conditions that it is 'necessary or expedient' (Loh, 2007), for extinguishing or preventing the spread of a bushfire. Land Management and Conservation officers may also exercise these powers on or near Crown or forest land. The SES and FESA units may direct and prohibit movement of people and vehicles, with reasonable force, but are usually not given the power to evacuate unless an emergency situation or state of emergency is declared. Whether or not SES and FESA units have the right to evacuate under declared emergencies depends on whether they have received authorization under section 61 of the emergency Management Act 2005 (WA). When an emergency situation or state of emergency is declared, the most senior police officer present and the hazard management officer (defined under section 61 of the Emergency Management Act 2005 (WA)) can direct the evacuation and removal of people from the area. During a state of emergency the most senior police officer or authorized officer may remove any person who interferes with emergency management activities.
New South Wales	Forced evacuations are only allowed when a state of emergency has been declared by the Premier in accordance with section 33 of the State Emergency and Rescue Management Act 1989 (NSW), or if an area has been deemed a disaster area (defined as 'the area specified by a senior police officer as the area in which an emergency is causing of threatening to cause injury or death' in section 60KA of the State Emergency and Rescue Management Act 1989 (NSW)) by a senior police officer. In a state of emergency only authorized emergency service officers can forcibly evacuate people regardless of pecuniary interests, and only a senior police officer may force evacuations or authorize others to force an evacuation in a disaster area. If there has been no declaration of a state of emergency of disaster area, the powers to force evacuations are only implied by the broad powers given to officers in the Fire Brigades Act 1989 (NSW) and Rural Fires Act 1997 (NSW). It is subject to interpretation whether these broad powers overrule the common law position. However the Fire Brigades Act 1989 (NSW) states that an officer may remove a person from a fire district if they are interfering with the brigade operations.

Tasmania	Forced evacuations are only clearly allowed if specifically authorized by the State Controller or relevant Regional Controller. The Fire Services Act 1979 (Tas) and emergency Management Act 2006 (Tas) do not provide any general conditions for forced evacuations. The only indication that forced evacuations can be conducted by fire officers are the broad powers outlined in the Fire Services Act 1979 (Tas), in which case it is up to interpretation whether these powers override the common law position. Regardless, a person can be removed by fire officers if they are interfering with brigade operations. Police may also remove people from an area that is being threatened by fire, by request by fire authorities or of their own accord, even if the people are not interfering with brigade activities.
Queensland	In Queensland authorized officers under the Fire and Rescue Service Act and Disaster Management Act may evacuate and prohibit people from an area using reasonable force during any fire incident or when a disaster or emergency situation has been declared. However, an authorized rescue officer, a district disaster coordinator, or a person authorized by the Chairperson of the State group may only direct a person to leave. In this case the official has no clear power to force the evacuation however it is an offense to not comply with the direction.
Australian Capital Territory	In any circumstance it is a power of the emergency services to order an evacuation of an area, although there is no power to forcibly evacuate people, unless it can be shown that they are interfering with emergency service activities. However it is considered an offense if a person refuses to heed these orders. The Emergencies Act 2004 gives emergency workers the power to direct people to leave an area or direct their movements during a state of emergency, and whether or not forced directions of movements are allowed is unclear.
Northern Territory	Under the Fire and Emergency Act 1996 (NT) the Incident Commander, members of the NTFRS and police officers (if authorized) can order an evacuation of an area. The act does not offer any powers to enforce the evacuation and therefore it is up to interpretation whether the officers can force an evacuation. The act does state that a person can be forcibly removed and charged with an offence if they interfere with fire-fighting activities. The Bushfires Act 1980 gives the fire control officer broad powers to do 'any act' necessary to protect property and life. It is not clear whether forced evacuations are implied under this statement. It is only clear that forced evacuations are authorized during a disaster or state of emergency in an area where the Administrator has declared an evacuation should occur.