



Australian Government

Department of the Environment, Water, Heritage and the Arts



Australian Government

**Department of Families, Housing,
Community Services and Indigenous Affairs**

Department of the Environment, Water, Heritage and the Arts (DEWHA)

**Department of Families, Housing, Community Services and Indigenous Affairs
(FaHSCIA)**

***Submission to 2009 Senate Select Committee on Agricultural
and Related Industries
Inquiry into the Incidence and Severity of Bushfires Across Australia***

14 August 2009

Summary

This submission to the Select Committee on Agricultural and Related Industries *Inquiry into the Incidence and Severity of Bushfires across Australia* has been prepared by the Australian Government Department of the Environment, Water, Heritage and the Arts (DEWHA) on behalf of the Australian Government. This submission provides a factual overview of the Australian Government's role in relation to bushfires across Australia.

The Australian Government has responsibility for a number of matters of relevance to the Select Committee on Agricultural and Related Industries *Inquiry into the Incidence and Severity of Bushfires across Australia*: meteorology, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the Caring for our Country Bushfire Recovery Program, and building stronger communities including helping communities prepare, cope, and recover from bushfires.

This submission provides information relevant to terms of reference a, b, c, d, h, j and k of the Inquiry.

Introduction

The Australian Government Department of the Environment, Water, Heritage and the Arts (DEWHA) and the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) welcomes the opportunity to provide a submission to the Senate Select Committee on Agricultural and Related Industries *Inquiry into the Incidence and Severity of Bushfires across Australia*. This submission has been prepared by DEWHA, with contributions from FaHCSIA, on behalf of the Australian Government in response to a request from the Commonwealth Victorian Bushfires Taskforce.

Terms of Reference

On 12 May 2009, the Senate referred the following matter to the Select Committee on Agricultural and Related Industries for inquiry and report on 26 November 2009:

The incidence and severity of bushfires across Australia, including:

- a. the impact of bushfires on human and animal life, agricultural land, the environment, public and private assets and local communities;
- b. factors contributing to the causes and risks of bushfires across Australia, including natural resource management policies, hazard reduction and agricultural land maintenance;
- c. the extent and effectiveness of bushfire mitigation strategies and practices, including application of resources for agricultural land, national parks, state forests, other Crown land, open space areas adjacent to development and private property and the impact of hazard reduction strategies;
- d. the identification of measures that can be undertaken by government, industry and the community and the effectiveness of these measures in protecting agricultural industries, service industries, small business, tourism and water catchments;

- e. any alternative or developmental bushfire prevention and mitigation approaches which can be implemented;
- f. the appropriateness of planning and building codes with respect to land use in the bushfire prone regions;
- g. the adequacy and funding of fire-fighting resources both paid and voluntary and the usefulness of and impact on on-farm labour;
- h. the role of volunteers;
- i. the impact of climate change;
- j. fire – its causes (accidental, natural and deliberate) and remedies;
- k. the impact of bushfires on biodiversity and measures to protect biodiversity;
and
- l. insurance against bushfires.

The Australian Government

The Australian Government Department of the Environment, Water, Heritage and the Arts (DEWHA) has a mission to “protect and enhance Australia’s environment, heritage and culture.” DEWHA’s role is to develop and implement national policy, programs and legislation to protect and conserve Australia's environment, water resources and heritage and to promote Australian arts and culture.

DEWHA’s responsibilities relating to this Senate Select Committee Inquiry into the incidence and severity of bushfires across Australia are:

- the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- the Caring for our Country Bushfire Recovery Program.

In addition, the Environment, Water, Heritage and the Arts (EWHA) portfolio includes the Bureau of Meteorology, the statutory agency with responsibilities for meteorology, which is also relevant to this Inquiry.

The role of the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) is to improve the lives of Australians by creating opportunities for economic and social participation by individuals, families and communities. A key element of FaHCSIA’s role is to build stronger Australian communities by providing better support and services to those in need, including helping communities prepare for, cope with, and recover from adverse events such as bushfires.

Throughout Australia on-ground land management, including fire management and prevention, and the management of environmental impacts arising from bushfires are the responsibility of state and territory government agencies. Furthermore, states and territories also have primary responsibility for the protection of life and community.

This submission provides information relevant to the Commonwealth environment-related responsibilities under the EWHA portfolio and community-related responsibilities of FaHCSIA.

Environment, Water, Heritage and the Arts Portfolio

Meteorology

1. The Bureau of Meteorology

The Bureau of Meteorology (the Bureau) is part of the Environment, Water, Heritage and the Arts Portfolio. The Bureau is mandated to issue essential fire weather services under the *Meteorology Act 1955*.

Bushfire behaviour and activity are critically affected by the prevailing weather. All of the most damaging bushfires in Australia have occurred on days of extreme fire weather with conditions compounded by a long period of antecedent rainfall deficiency.

A successful fire weather service to the community and fire agencies depends critically on the understanding and effective communication of what differentiates the extremely bad day from the average hot day during a fire season.

Remote sensing from radar, satellite, and ground-based lightning networks offer the potential for more accurate and timely observations to support fire weather prediction. The applications of these systems include additional direct input to fire danger indices and wind change structure through the atmosphere and frontal movement.

The provision of early seasonal forecast information assists fire and land management agencies with pre-season strategic planning. Such planning is intended to enhance community safety through the improved effectiveness of pre-season fire hazard reduction and deployment of fire fighting resources.

When extreme fire weather appears likely, whether imminent, in coming days or even months, the information must be communicated to fire managers and the public. The goal is to provide effective warning information that captures the extreme weather with sufficient accuracy and detail to be optimally useful for strategic planning by fire managers.

Many bushfires, particularly those occurring in remote areas, are ignited by lightning. The Bureau's Numerical Weather Prediction models provide early guidance on "dry lightning"⁴. These models predict conditions that favour thunderstorm development, including whether precipitation is likely to be absent in the storms should they occur.

The community and fire agencies benefit from the Bureau's provision of a professional, efficient and reliable fire weather service. Fire weather forecasts and warnings issued by the Bureau allow users to monitor changing weather conditions, and provide advanced notice of extreme fire weather events, including temperature, humidity, possible wind changes, and fire danger indices. Demands on this service are

⁴ "Dry lightning" – lightning from a thunderstorm that is associated with little or no rain reaching the area around a ground strike.

increasing: both pre-season for controlled burns and during summer; in emergency coordination centres (as the interface to agency controllers and fire spread specialists); and, in the level of detail required, such as specialised spot fire forecasts for incident controllers at the fire site.

2. Response to the Inquiry Terms of Reference (b, d and j)

The Bureau's response is limited to the **terms of reference b, d and j** of the Inquiry. The impact of climate change (terms of reference i) has not been directly referenced in this document, as the CSIRO submission to this Inquiry addresses this term of reference. However, this submission contains relevant references to sharp changes in fire weather conditions in recent years that are related strongly to changes in climate patterns over south-eastern Australia, as derived from the observed national climate record maintained by the Bureau.

The Bureau's response to the terms of reference has been prepared in the context of the following:

- The Bureau's role in the provision of fire weather forecasting and warning services;
- Meteorological factors contributing to the causes and risks of bushfires across Australia (terms of reference b), including historical meteorological information and predictive capabilities;
- The identification of measures that can be undertaken by government, industry and the community and the effectiveness of these measures in protecting agricultural industries, service industries, small business, tourism and water catchments (terms of reference d), including monitoring and predicting meteorological conditions, seasonal prediction of fire potential and communication of information services;
- Fire – its causes (accidental, natural and deliberate) and remedies (terms of reference j); and
- Summary of potential routes to improved fire weather services.

3. Role in fire weather forecasting and warning services

The Bureau is mandated to issue fire weather services under the *Meteorology Act 1955*. Funds are appropriated to the Bureau by the Australian Government to enable the Bureau to fulfil its obligations under the Act. Section 6(c) of the Act defines the relevant functions of the Bureau in relation to fire weather services as:

“the issue of warnings of gales, storms, and other weather conditions likely to endanger life or property, including weather conditions likely to give rise to floods or bushfires;”

In order to meet these obligations, the Bureau has the following two primary objectives for its fire weather service:

- i. To provide the public with:
 - Routine forecasts of fire danger during the fire season; and
 - Fire Weather Warnings when the fire danger is expected to exceed a certain critical level.
- ii. To provide fire management authorities, police and other emergency service organisations with:
 - Detailed routine forecasts during the fire season;
 - Fire weather warnings when the fire danger is expected to exceed a certain critical level;
 - Operational forecasts to assist in combating ongoing fires;
 - Advice regarding the installation and operation of special meteorological stations operated by fire authorities; and
 - Consultative advice and climatological information to assist with the assessment of risk, development of fire prevention strategy, and other aspects of fire management.

The community and fire agencies benefit from the Bureau's provision of a professional, efficient and reliable fire weather service. Fire weather forecasts and warnings issued by the Bureau allow users to monitor the current weather conditions and provide notice of extreme fire weather days so preparations can be made in advance of such days. The fire weather service is largely delivered by the Regional Forecast Offices in each capital city.

The Bureau has been a stakeholder and research partner in the Bushfire Cooperative Research Centre for its first six years, with research activity winding down at present. Areas of research with particular focus and outcomes were:

- A national system for forecasting smoke transport pathways to assist land managers in mitigating the effects on communities of smoke from prescribed burning operations.
- Spatial forecast fire weather products, including drought factor, Forest and Grassland McArthur Fire Danger Indices (FFDI/GFDI), and wind gusts;
- Comparison between the Australian FFDI and the Canadian Fire Weather Index (FWI) for Australian conditions.
- An objective verification of numerical model forecast wind change arrival times.
- An increased understanding of the processes that lead to the intensification and movement of dry cool changes, and the development of forecast guidance products that highlight these processes.
- Studies of the factors that are intrinsic to the most extreme fire weather events, and their likely trends under future climate scenarios.
- Studies of variations in fire climate over Australia, including the development of homogenised and quality-controlled historical data sets, and the relations between global circulation anomalies and regional anomalies in seasonal fire weather severity.
- The convening of seasonal bushfire assessment workshops, which systematise a multi-disciplinary assessment of bushfire potential for the coming fire season.

4. Meteorological factors contributing to the causes and risks of bushfires across Australia

Terms of reference b: Factors contributing to the causes and risks of bushfires across Australia, including natural resource management policies, hazard reduction and agricultural land maintenance.

4.1. Historical meteorological factors

Bushfire behaviour and activity are critically affected by the prevailing weather. All of the most damaging bushfires in Australia have occurred on days of extreme fire weather with conditions compounded by a long period of antecedent rainfall deficiency. "Fire danger" in Australia is typically quantified using McArthur's Forest Fire Danger Index (FFDI), (or its grassland equivalent, the GFDI) which is a measure of underlying fuel dryness (the Drought Factor), temperature, relative humidity, and wind speed. It has been shown that 98% of house losses to bushfires occur on days when the FFDI exceeds 45, which is at the upper end of the "very high" range. The fire weather warnings issued by the Bureau are based on the numerical value of the FFDI or the GFDI.

Rapid changes in the wind speed and direction normally accompany the passage of a frontal system (a "cool change"). When combined with an active bushfire, this can lead to highly dangerous conditions as people, livestock and property are suddenly caught in the path of a fire that has changed course. In the 40 years to the end of the 2003 summer approximately 80% of bushfire deaths in south-eastern Australia occurred on days of the most extreme frontal passages.

The events of 7 February 2009 will make these statistics even more dramatic when these studies are revisited. The weather on this day, now known as Black Saturday, was undoubtedly extreme, with the highest temperatures on record across much of Victoria. An event of this magnitude has not been observed in Victoria since the 1982-3 fire season, when extreme FFDI values occurred twice at Melbourne during that season (24 November 1982 and 16 February 1983). The devastation on the second day is well known (Ash Wednesday).

During the past 15 years or so, many locations in southern Australia have seen changes in fire weather conditions which have exceeded the range of these natural fluctuations. Fire seasons are starting earlier, and on an annual basis, dangerous "very high" and "extreme" fire weather days are occurring more frequently. Much of this change has come relatively quickly - over a few years rather than as a gradual increase over several decades.

Since 1997, a sudden sharp change has occurred in weather conditions conducive to fire over the State of Victoria. Reflecting this sharp change, the number of "extreme" fire weather days in Melbourne has increased by a factor of three. Extreme fire weather, once a rarity before December, has been observed five times in the month of October since 1997, as opposed to twice in the previous 24 years.

Changes in fire weather are not confined to Victoria. Adelaide has seen a similar increase in the frequency of dangerous fire weather conditions since 2006, with earlier season starts and devastating fires. One fifth of Kangaroo Island burned in 2007-8. Perth and Sydney too have noted an increase in the number of dangerous fire weather days in recent years. Adelaide and Perth are also consistently seeing the fire seasons extend well into autumn. The autumn 2008 fire season was by far the most intense ever experienced in Adelaide, while Perth experienced its highest autumn fire danger in 2009.

4.2. Predicting bushfire weather

The provision of a successful fire weather service to the community and fire agencies depends critically on the understanding and effective communication of what differentiates the extremely bad day from the average hot day during a fire season.

The primary methodology used by the Bureau's weather forecasters to predict fire weather parameters for several days to several hours into the future is numerical weather prediction (NWP) modelling. NWP models provide a time-varying three-dimensional picture of atmospheric conditions and evolution for several days into the future, based on observed conditions at the start of the period. NWP models are the main tool for predicting weather in Australia and internationally. NWP models can indicate conditions that are favourable for thunderstorm development, as well as provide details of wind, temperature, and humidity fields that are necessary for predicting fire behaviour.

The Centre for Australian Weather and Climate Research (CAWCR)⁵ has undertaken to significantly improve its modelling capability through the development of the Australian Community Climate and Earth System Simulator (ACCESS) modelling system. The ACCESS model will simulate the interaction of atmosphere, land, and ocean processes on time scales from hours to centuries, enabling the seamless prediction of weather and climate. For numerical weather prediction ACCESS uses sophisticated data assimilation techniques to incorporate measurements from satellite and surface observing systems, thus providing accurate initial conditions for starting the numerical forecast. Climate prediction on time scales of months/seasons gives greater emphasis to the exchanges of water and energy occurring between the atmosphere, land, and ocean, to simulate the occurrence of El Niño and other climate-scale phenomena that can affect the overall severity of a coming fire season.

⁵ The Centre for Australian Weather and Climate Research (CAWCR) is a joint venture of the Bureau of Meteorology and CSIRO. It is a jointly operated research operation focussing on weather, climate and earth system science. CAWCR replaced the Bureau of Meteorology Research Centre as the main organisational unit tasked with generating research outputs for the Bureau.

These ACCESS systems have been developed and tested by research staff from the CAWCR and are currently undergoing operational trials within the Bureau. The Bureau plans to replace all of its existing operational Numerical Weather Prediction (NWP) systems with the new ACCESS system in late 2009. Ultimately, the ACCESS model will provide a unified national framework for assessing bushfire risk at all time scales.

An abrupt change in the meteorological environment is often linked to an abrupt change in fire behaviour. The most well known of these changes is the dry cool change that commonly occurs in south-eastern Australia however, there can also be other more subtle changes in the atmosphere. It is well-known that topography influences local circulations, and that these effects vary depending on the general wind direction and the time of day. Most weather observations are taken in populated (less complex topography) localities, rather than in regions of complex topography. Major forest fires tend to occur in areas where fuel loads are heavier and the topography is more complex. While forecasters use conceptual models to account for local effects that take place in particular weather situations, high resolution modelling will likely provide the best means of understanding and predicting the occurrence and behaviour of local circulations within complex topography.

Wind changes can seriously elevate the danger to fire fighters and to the community. The contemporary practice in forecasting such changes is to use high resolution NWP forecasts to provide the earliest possible estimates of weather changes and, in particular, significant frontal wind changes. However, there is considerable variation in the weather on small space and time scales, which must be accounted for in developing management plans for actual fires. A range of meteorological factors needs to be considered and, while acknowledged to varying degrees in current practice, there is a great deal yet to be learnt in terms of the underlying science, means of forecasting, and means of communicating this fine scale information if there are to be advances in the way meteorological information is used in mitigating and fighting bushfires.

5. Measures to improve protection

Terms of reference d: The identification of measures that can be undertaken by government, industry and the community and the effectiveness of these measures in protecting agricultural industries, service industries, small business, tourism and water catchments.

5.1. Monitoring and predicting meteorological conditions

Remote sensing from radar, satellite, and ground-based lightning networks offer the potential for more accurate and timely observations to support fire weather prediction. Developing applications of relevance include the detection of fuel composition and state from airborne instruments, hyperspectral and lidar satellites; burn severity and detection of smoke; definition of grassland biomass and fire radiative power; and, retrieving soil moisture.

The Bureau has already shown that Doppler radar measurements of radial wind speed offer great potential to benefit very short-range wind change forecasts, with measurements taken every 1-2 km and every 5-10 minutes. The reflectivity data from radars can also show smoke plumes, providing information about changes in fire activity, and pyrocumulus (fire-initiated cumulus cloud) development. Lightning observations can be made from high quality remote sensing and lightning detection networks. Radar and *in situ* gauge measurements of rainfall can be used to confirm whether lightning is "dry" and likely to lead to sustained burning.

Bushfires have significant impacts on human health, especially when communities are exposed to bushfire smoke, requiring the initiation of mitigation strategies by government. CSIRO Climate and Atmosphere are currently working on projects related to bushfires-CO₂ emission accounting; regional air quality impacts of prescribed burning; mercury sources and transport; dioxins and persistent organic pollutants; air quality and climate change; and, the impacts of smoke in Tasmania. Information gaps in relation to understanding smoke behaviour and the impacts include: characteristics of the Australian bushfire aerosol; quantifying emissions (CO₂, PM and gaseous pollutants); smoke dispersion; and, model performance.

It is widely accepted in the fire behaviour research and operational community that variations in atmospheric stability affect fire behaviour. However, the understanding of the physical processes that govern the relationship are still very immature, and recent research in CAWCR suggests that perhaps a combination of processes comes into play, depending on circumstances.

The heat released from the fire affects the circulation patterns influencing the fire, potentially producing a positive feedback effect on fire activity. These interactions can be studied using so-called coupled fire-atmosphere numerical models. Such modelling is scientifically demanding and very computer intensive, requiring large supercomputer resources. Linking weather forecasts to fire spread and behaviour models would be beneficial. The real time application of high resolution research models is not currently feasible. However, scenario modelling with application to tactical real time events and strategic planning is feasible.

5.2. *Seasonal prediction of fire potential*

The provision of early seasonal forecast information assists fire and land management agencies with pre-season strategic planning. This planning is intended to enhance community safety through improved effectiveness of pre-season fire hazard reduction and deployment of fire fighting resources.

Prescribed burning programs are used to mitigate the risk of wildfires. The annual window of opportunity during which prescribed burning can be completed safely, however, appears to be narrowing. A challenge is to develop accurate forecasting tools that, on the one hand, minimise the number of lost opportunities for prescribed burning in this diminishing window, and on the other avoid prescribed burning events at times when current prescription rules fail to account for unusual weather events.

There is substantial evidence that bushfire season duration and severity is predictable using links to seasonal climate variability caused by phenomena such as El Niño. Tropical intra-seasonal forecasting (up to several weeks) also has demonstrated skill in forecasting dry-season (winter) low-level wind patterns over northern Australia which could be incorporated into bushfire management processes.

Advance warning of severe or benign fire seasons is a very real possibility, which would also provide potential to manage fuels and preparedness outside the fire season. At present, the seasonal information provided to fire managers only qualitatively deals with the potential for bushfire risk. This is a function of the limitations in temporal resolution, skill and measures of the risks of extremes in current seasonal prediction products. To provide additional information to fire managers a wider range of products and delivery methods may be required. Dynamic models, such as the Bureau's current Predictive Ocean Atmosphere Model for Australia (POAMA), offer a possible pathway to achieving these outcomes.

CAWCR has been developing successive versions of the POAMA dynamic coupled modelling system for probabilistic seasonal forecasting. The first version was implemented in Bureau operations in 2002 and generated forecasts of El Niño related sea surface temperature variations. Skill for El Niño related sea surface temperature forecasting has been evaluated from retrospective forecasts and is useful out to at least 9 months into the future. Future versions of POAMA will make use of the improved assimilation, dynamics, and physics of the ACCESS modelling system.

The Bureau's National Climate Centre (NCC)⁶ aims to use the outputs of the POAMA dynamic seasonal forecasting model and its ACCESS-based successor, to enhance the value and robustness of seasonal bushfire outlooks. The enhanced service offers the possibility of more accurate, longer lead-time forecasts, the development of fully objective forecasts for seasonal fire weather, and a much wider range of forecast products, including fire season severity and duration and risks of climate extremes.

5.3. Communication of Information – Working with the fire community

When extreme fire weather appears likely, whether imminent, in coming days or months, the information must be communicated to fire managers and the public. The goal is to provide effective warning information that captures the extreme weather with sufficient accuracy and detail to be optimally useful for strategic planning by fire managers. In the future, graphical forecasts of wind, temperature, relative humidity, and fire indices will be provided at spatial resolutions down to 3kilometers. Weather forecasters will be able to generate graphical information products by applying their local knowledge and expertise to modify NWP-based objective guidance using a tool called the Graphical Forecast Editor (GFE). Fire managers will be able to access the high resolution products via the internet. The GFE will be rolled out nationally over

⁶ The National Climate Centre is a section in the Bureau of Meteorology's Head Office in Melbourne and its outputs include: a quality-controlled archive of Australian climate data in basic and processed forms; the provision of basic and processed climate data and information from that archive in various formats and on various media; routine Australian, southern hemisphere and global analyses of the monthly, annual and longer-term behaviour of climate; seasonal climate outlooks for Australia; and information on climate change.

the coming five years as part of the Next Generation Forecast and Warning System recently funded in the 2009-10 Budget by the Australian Government.

A challenging issue in communicating extreme conditions is to provide warnings whenever danger is likely and avoid undermining public confidence, which can be caused by over warning. There are always levels of uncertainty in meteorological forecasts and the uncertainty normally increases the further the forecast extends into the future. Carefully phrased or displayed information about the level of uncertainty in a weather forecast would likely help in the interpretation of warnings, especially for extreme conditions. New methods for displaying probabilistic forecasts on time scales from one hour to several months have recently been developed by the Bureau, including the probabilities of exceeding certain rainfall thresholds and outlook scenarios at different probabilities. These methods offer more intuitive ways of viewing forecasts and provide more complete information for decision makers.

To aid the communication of fire weather information, over the past three years Seasonal Bushfire Assessment Workshops (SBAW) have been held. Due to the different timings of the Australian fire seasons, the workshop is split into two: one each for the northern and southern regions of Australia. The most recent northern workshop was held in Cairns on 18 June 2009.

The emphasis of these workshops is primarily strategic. The intended audience are fire managers and administrators, preparing for the upcoming season. The workshops provide a scientific basis for making decisions on special funding, preparedness messages and so on. They bring together fire and land managers and meteorologists to discuss recent events, and attempt to understand the state of the fuels and where problem areas may arise in the coming season. Current seasonal climate outlooks from POAMA and statistical models are also examined to provide guidance for the future. The cross-pollination of information from different states and agencies allows this information to be combined to create a national picture.

The response of participants has been favourable. The workshops have brought "science, procedure and rigour" to what would otherwise be a very limited and informal process. The reports produced have been used by fire managers to inform their decision making.

6. Fire – its causes and remedies

Terms of reference j: Fire – its causes (accidental, natural and deliberate) and remedies.

Many bushfires, particularly those occurring in remote areas, are ignited by lightning. NWP models provide early guidance on "dry lightning" by predicting conditions that favour thunderstorm development, including whether precipitation is likely to be absent in the storms should they occur. Better understanding of the mechanisms for dry lightning would lead to its more accurate representation in NWP models. Once thunderstorms have developed, the question becomes whether any fire ignition due to lightning is likely to be sustained. Therefore, some measure of fuel dryness is required. The Canadian or United States fire danger rating system provides one existing approach. An additional approach could be the use of emerging earth-system

modelling developments in the Bureau's ACCESS numerical modelling system, perhaps combined with physically-based fuel moisture models.

Thunderstorm-initiated fires can give birth to new thunderstorms and new fires as a result of feedback processes. A pyrocumulonimbus can occasionally form on the smoke plume of an existing fire and subsequently ignite new fires from its lightning strikes downstream of the initial fire. Further research would assist understanding of the convection dynamics under heavy aerosol loads in smoke plumes.

7. Summary of potential routes to improved fire weather services

The work described above represents a solid foundation for the Bureau's role in both fire weather services and the research supporting that service. The Bureau is currently working to improve seasonal prediction of bushfires for fire agencies to undertake pre-season strategic planning and for fire hazard reduction burning. The Bureau is also working with fire agencies on the possibilities for enhanced services through more detailed and targeted information and local interpretative expertise within incident command centres, over longer periods during events, and for extended fire weather seasons.

In summary, the issues relating to weather and climate that the Bureau is addressing in consultation with fire agencies include:

- i. Provision of weather forecasts supporting tactical and strategic decision-making relevant to bushfires requiring very high resolution numerical modelling, effective access to *in situ* and remotely sensed data together with measurement (observation) and analysis programs to validate forecasts.
- ii. Fire danger aspects which depend on the interactions between the vegetation and the atmosphere. ACCESS modelling has the capability to utilise dynamic vegetation modelling to simulate the interactions between the various 'spheres' (for example atmo-, bio-, etc).
- iii. The gap between short- to medium-range (out to 7 days) and seasonal fire weather forecasting needs to be bridged to assist with tactical decision making. The Bureau is investigating the feasibility of forecasts with an outlook of one week to one month to assist fire authorities with medium range planning.
- iv. Many statistical models are used as the basis for the seasonal outlook presented today. A combination of statistical and dynamic approaches for seasonal forecasting is likely to lead to improved predictions.
- v. Increasing collaboration with fire agencies in order to provide weather and climate information in a way that allows it to be used rapidly and effectively by the fire managers. Utilisation of common inter-agency infrastructure with integrated decision support systems will be important.
- vi. Effective fire forecast methodologies that include research into the dependence of fire behaviour through coupled fire-atmosphere numerical modelling approaches could be beneficial. Close interaction between meteorological and fire spread researchers may provide improved estimates of fire spread, and also may provide a probabilistic form of output if coupled with the ensemble forecasts described above.
- vii. The ACCESS earth system modelling that needs to be linked directly with such activities as fire behaviour modelling and air quality forecasting to meet a range of future needs.

EPBC Act

1. Bushfire mitigation strategies and practices

Terms of reference c: The extent and effectiveness of bushfire mitigation strategies and practices, including application of resources for agricultural land, national parks, state forests, other Crown land, open space areas adjacent to development and private property and the impact of hazard reduction strategies.

In terms of fire prevention and management outside of fire emergencies, the Commonwealth Government is generally not involved in assessing or approving measures taken by state and territory governments for preventing or fighting fires, such as back-burning, building fire breaks or clearing native vegetation.

The Commonwealth Government may have a role in fire management plans where national environmental matters may be significantly impacted by those management measures, such as through impacts on threatened species. In these circumstances state and territory governments submit fire management plans that take these matters into account. Since 2001, 13 bushfire management related projects have been referred under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (not including burns for research purposes).

All bushfire management related projects referred under the EPBC Act have been assessed as not requiring formal assessment or approval and have not been further regulated.

2. Bushfires and biodiversity

Terms of reference k: The impact of bushfires on biodiversity and measures to protect biodiversity.

This part of the submission provides information addressing terms of reference k of the Inquiry in relation to the responsibilities of the Minister for the Environment, Heritage and the Arts as administrator of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

“Contemporary fire regimes resulting in the loss of vegetation heterogeneity and biodiversity throughout Australia” has been nominated for listing as a key threatening process (KTP) under the nomination and listing process of the EPBC Act whereby people are invited each year to make such nominations. This nomination is currently under assessment by the Threatened Species Scientific Committee (TSSC) which will make a recommendation to the Minister as to whether or not the nomination should be listed as a KTP.

This nomination states that in some areas of Australia the current frequency, intensity, location, scale and timing of fires may be reducing biodiversity by altering vegetation composition and reducing food and habitat for fauna. Inappropriate fire regimes are believed to be detrimentally affecting a wide range of species, including granivorous birds, a number of medium-sized mammals and fire-sensitive plants. The nomination recommends that the burning practices prescribed in each situation are appropriate for

the specific ecosystems involved. This may involve an increase or a decrease in prescribed burning in particular areas, using particular patterns of burning or considering the appropriate timing for controlled burns.

Should the nomination be approved for listing as a KTP, there would be no reduction in the priority that the Australian Government places on the protection of life and property. Even if “Contemporary fire regimes resulting in the loss of vegetation heterogeneity and biodiversity throughout Australia” were to be listed as a KTP, such a listing does not provide any authority for the Australian Government to require any changes in prescribed burning practices in the states and territories.

The listing of a key threatening process has no regulatory implications other than requiring the Minister to decide whether or not to have a threat abatement plan (TAP). A TAP provides for the research, management, and any other actions necessary to reduce the impact of a listed key threatening process on native species and ecological communities. Commonwealth agencies must implement TAPs in Commonwealth areas and must not taken action that contravenes a TAP.

If the process were to be listed, the Minister would need to decide whether a TAP would be an efficient, effective and feasible way to abate the threats. In making that decision, the Minister would be required to seek the advice of the TSSC as well as each of the states and territories.

If the Minister then decided to have a TAP, any TAP would need to be developed through a process of very broad consultation. The Minister would be required to seek the advice of the TSSC and consult all the states and territories as well as the general community. As a matter of course, as part of its assessment of this nomination, the TSSC would consult widely with government agencies, fire ecologists and the public.

The TSSC is currently due to provide advice on this nomination to the Minister for the Environment, Heritage and the Arts by 30 September 2010. Should the Minister decide to accept the nomination, a subsequent decision would then need to be made as to whether or not to proceed to a TAP.

Caring for our Country Bushfire Recovery Program

The Caring for our Country Bushfire Recovery Program will provide \$10.8 million in assistance over two years (2008-09 and 2009-10). The program will provide assistance to community, local government, non-government organisations and landholders to undertake targeted Natural Resource Management bushfire recovery works for eligible fire affected regions. The Policy Guidelines are at **Attachment A**.

A wide range of activities are eligible for assistance, including mitigating potential weed outbreaks at fodder sites, restoration of woodland and riparian corridors, soil stabilisation (addressing hillslope and gully erosion and to reduce declining water quality), and weed and pest animal control.

The scope of the support available under the Caring for our Country Bushfire Recovery Program is guided by the relevant Caring for our Country National Priority Areas and Outcomes (2008-2013). Eligible activities should:

- contribute to the recovery of the natural environment and sustainable farm practices in bushfire affected areas of Victoria.
- deliver tangible natural resource benefits while aligning with the Caring for our Country outcomes.
- provide assistance to communities including landcare groups and volunteers, individual landholders, non government organisations, catchment management authorities, local government and other agencies.
- deliver environment protection and NRM outcomes in fire affected areas as part of a regional re-building initiative.

Department of Families, Housing, Community Services and Indigenous Affairs

A key part of the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) role in building stronger Australian communities is providing better support and services to those in need, including helping communities prepare for, cope with, and recover from adverse events such as disasters.

The Disaster Preparedness and Recovery Branch in FaHCSIA has a lead role in facilitating whole-of-government preparedness for, and recovery responses, to natural and non-natural disasters. The Branch also helps to facilitate resilient communities from the ground up, working with all levels of government and the third sector.

FaHCSIA, as chair of the Australian Government Disaster Recovery Committee, has a lead role in facilitating preparedness for, and recovery from disasters. FaHCSIA also seeks to facilitate more resilient communities from the ground up, working with the third sector.

This part of the submission provides information addressing terms of reference a, d and h in relation to the responsibilities of FaHCSIA.

Communities

1. Impact of bushfires

Terms of reference a: The impact of bushfires on human and animal life, agricultural land, the environment, public and private assets and local communities.

In the Australian context, states and territories have primary responsibility for the protection of life and community. The Australian Government complements the relevant state or territory response, where appropriate, to lessen the impact on individuals and communities and assist in their recovery.

The Australian Government responds to the impact of bushfires, if required through arrangements appropriate to the circumstances. The Natural Disaster Relief and Recovery Arrangements, administered by Emergency Management Australia in the Attorney-Generals Department, are the primary mechanism used. In addition, the Australian Government Disaster Recovery Payment may be provided when warranted. Other financial and non financial assistance may also be provided through relevant agencies.

2. Measures to improve protection

Terms of reference d: The identification of measures that can be undertaken by government, industry and the community and the effectiveness of these measures in protecting agricultural industries, service industries, small business, tourism and water catchments.

Disasters are common occurrences in Australia and it is predicted that disasters will increase. The consequences of disasters are determined less by the magnitude of the hazard itself and more by the readiness of affected communities. Although disasters can not be prevented, some of the impacts on communities can be mitigated.

The Australian Government is working towards facilitating more resilient communities that can manage and recover more effectively from disasters and other adverse conditions. This requires a collaborative effort across all levels of government, non-government organisations and communities.

FaHCSIA employs a social policy approach to build stronger and more resilient communities. This approach complements the work of the Attorney-General's Department on mitigating the impact and cost of natural disasters. The approach also aligns with the work of the Council of Australian Governments on re-examining Australia's arrangements for the management of natural disasters and identifying ways to build greater resilience.

Volunteers

1. The role of volunteers

Terms of reference h: The role of volunteers.

The Australian Government recognises and greatly appreciates the extensive efforts of volunteers in the Australian community.

Spontaneous volunteers (in particular those with relevant skills and qualifications) have the potential to contribute significantly to disaster recovery efforts. However, spontaneous volunteers require effective management. Furthermore, the response from members of the public wishing to volunteer in the event of a disaster can overwhelm those volunteer organisations already struggling to meet the needs of the communities impacted by the disaster event.

FaHCSIA, working collaboratively with all jurisdictions and the non profit sector, is currently undertaking a project to develop a nationally consistent approach to the management of spontaneous volunteers in a disaster. This project is expected to be completed by the end of 2009-10.

In addition, Senator the Hon Ursula Stephens, the Parliamentary Secretary for Social Inclusion and the Voluntary Sector, is leading the development of a national volunteering strategy. As part of this work, the Australian Government will be considering approaches that support and encourage volunteering, including in response to disasters and recovery from disasters.

Conclusions

This submission presents an overview of the role and responsibilities of the Australian Government, relevant to the environment and the community, in relation to the terms of reference of the Select Committee on Agricultural and Related Industries *Inquiry into the Incidence and Severity of Bushfires across Australia*. In particular, this submission presents information on:

- Bureau of Meteorology's role in the provision of fire weather forecasting and warning services.
- Meteorological factors contributing to the causes and risks of bushfires across Australia, including historical meteorological information and predictive capabilities.
- Assessment of "contemporary fire regimes resulting in the loss of vegetation heterogeneity and biodiversity throughout Australia" as a key threatening process under the *Environment Protection and Biodiversity Conservation Act 1999*.
- Caring for our Country Bushfire Recovery Program provision of assistance to undertake natural resource management bushfire recovery projects.
- Australian Government role to provide assistance to those affected by the impact of bushfires.
- Australian Government work towards building stronger and more resilient communities.
- Role and management of volunteers in the Australian community.

ATTACHMENT A

Caring for our Country Bushfire Recovery Policy Guidelines

Scope

Element	Detail
Objective	<p>The objectives of the Caring for our Country Bushfire Recovery Project are to:</p> <ul style="list-style-type: none"> • contribute to the recovery of the natural environment and sustainable farm practices in bushfire affected areas of Victoria • deliver tangible natural resource benefits while aligning with the Caring for our Country outcomes • provide assistance to communities including landcare groups and volunteers, individual landholders, non government organisations, catchment management authorities, local government and other agencies • deliver environment protection and NRM outcomes in fire affected areas as part of a regional re-building initiative
Priorities	<p>The Caring for our Country priorities that are relevant to the bushfire impacted areas are:</p> <ul style="list-style-type: none"> • Community Skills, Knowledge and Engagement <ul style="list-style-type: none"> - support regional groups, landcare groups, traditional owner groups and aboriginal communities - foster partnerships with corporations and the philanthropic sector • Biodiversity and Natural icons <ul style="list-style-type: none"> - reduced impact of invasive species - enhanced connectivity of native habitats and ecological communities - improved protection of nationally threatened species • Coastal environments and Critical Aquatic Habitats (and waterways) <ul style="list-style-type: none"> - improved protection of environmental values of Ramsar sites and high conservation value aquatic ecosystems - reduced sediment and nutrient discharge into waterways, Ramsar sites and coastal hotspots • Sustainable Farm Practices <ul style="list-style-type: none"> - improved protection of natural assets including soil, water and biodiversity - reduced impact of invasive species
Outputs/ activities	<ul style="list-style-type: none"> • Community Skills, Knowledge and Engagement: <ul style="list-style-type: none"> - Provision of advice and support to the community and other landcare and community organisations - Landscape rehabilitation and associated training - Biodiversity conservation - Building community engagement including coordinating large scale volunteers in a safe and efficient manner - Identifying and protecting exposed Indigenous sites • Biodiversity <ul style="list-style-type: none"> - Fencing to protect native habitats, populations of threatened species and ecological communities including replacement of fencing

	<p>previously funded that is still necessary to meet program objectives</p> <ul style="list-style-type: none"> - Pest animal control activities to protect native wildlife and plant communities vulnerable to predation - Strategic control and containment of new and emerging or high risk environmental weed infestations - Restoration of woodland and riparian corridors - Activities that support affected nationally threatened and endangered species <ul style="list-style-type: none"> • Coastal Environments and Critical Aquatic Habitats (and waterways) <ul style="list-style-type: none"> - Fencing of river reaches, riparian areas and wetlands to protect important remnant vegetation areas now under threat from animals such as wandering stock, deer etc including replacement of fencing previously funded that is still necessary to meet program objectives - activities that minimise declining water quality including fencing and bank stabilisation work- Erosion control associated with stream banks and wetlands - Weed control activities • Sustainable Farm Practices <ul style="list-style-type: none"> - Fencing (limited to cost of materials only) for improved natural resources management activities such as protecting, conserving fragile soils or regrowth that is integral to implementing more sustainable management practices; to protect remnant vegetation and to allow for the re-establishment of wildlife corridors including replacement of fencing previously funded that is still necessary to meet program objectives - Activities that address the potential weed outbreaks of fodder sites. - Soil stabilisation that address hillslope and gully erosion - Weeds and pest animal control
Stakeholders	<ul style="list-style-type: none"> • Community and industry organisations and landholders • Traditional Owner communities • NGOs • Local Government • Bushfire affected Catchment Management Authorities • Victoria Department of Sustainability and Environment and other state government agencies
Guidance on fencing	<p>The fencing component of the regional package will be restricted to the cost of fencing materials and must clearly demonstrate that it is for the purpose of protecting priority environmental assets. Standard boundary and internal fencing will be ineligible for funding.</p> <p>Funding for fencing will have an upper limit.</p>