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Mrs K. Paluzzano MP  
Chair, Standing Committee on Natural  
Resource Management (Climate Change)  
Parliament House  
Macquarie Street  
SYDNEY NSW 2000

19 DEC 2007

Your Ref:

Our Ref: G07/3732, NES/0034

**Attention: Cheryl Samuels**

Dear Mrs Paluzzano

**LEGISLATIVE ASSEMBLY STANDING COMMITTEE ON NATURAL RESOURCE  
MANAGEMENT (CLIMATE CHANGE)**

I refer to your request of 24 October 2007 seeking a submission from the NSW Rural Fire Service (RFS) in relation to the terms of reference for the above Standing Committee.

The RFS does not have direct responsibility in relation to management of natural resources such as water, vegetation or land, but does have a keen interest into the likely consequences of human induced climate change on these natural resources in relation to bushfire management.

This interest arises from the RFS consideration of the impacts of its activities on the natural, cultural and built environment as well as the capacity of the RFS to service the broader community in the protection of that environment from the effects of bush fires in the landscape.

Section 3 of the *Rural Fires Act 1997*, provides "..... (d) for the protection of the environment by requiring certain activities referred to in paragraphs (a) – (c) to be carried on having regard to the principles of ecological sustainable development ....." The activities referred to include prevention, mitigation and suppression of bush fires in rural fire districts and the coordination of bush fire fighting and prevention across the State.

The potential effects of human induced climate change are therefore a key factor in the strategic positioning of the RFS to meet the challenges of climate change on its activities and the broader community. In this regard, the RFS is not only involved in bush fire prevention, mitigation and suppression, but also as a support agency to other emergency services in the areas of flood, storm damage and other emergency situations.

## NSW Greenhouse Plan

The RFS is indirectly involved in the implementation of the NSW Government's "NSW Greenhouse Plan" and specifically in relation to the implementation of Action 2.1 of that plan. This action revolves around the establishment of a \$2m research program investigating the impacts of climate change, including bush fires, and a range of other issues such as coastal impacts and health (Table 1). The focus is therefore largely on adaptation requirements to improve the management of these impacts. These are discussed below.

Adapting to climate change	Type of measure	Emission abatement	Existing funding \$m (05/06-08/09)	Innovation Fund \$m (05/06-08/09)	Responsible agency
Improve our understanding of impacts					
<p>2.1 Establish a research program, including impacts on bushfires, coastal impacts, water availability, flooding, biodiversity, weeds and pests and human health</p> <p>Improved knowledge of the impacts of climate change will be developed through research in: bushfire risk; coastal erosion hazard and storm surge; estuarine inundation; water availability and flooding in the Greater Metropolitan Region; water availability in the Murray-Darling Basin; flooding on the NSW North Coast; biodiversity; weeds and pests in natural and agricultural systems; and human health risks from climate change.</p> <p>Priorities for research will be identified on the basis of their potential to negatively impact on the economy, society and the environment. Stakeholders will be included in the development and operation of research projects to help to build regional expertise, relevance and acceptance of the findings. Involvement mechanisms include participation in steering committees or reference groups.</p>	Research and development	NA	0.5	\$2.0	TCO

*Table 1 - Action 2.1 from the NSW Government's Greenhouse Plan*

Importantly therefore, the RFS needs to consider the likely impact scenarios on its activities, what support it can give to research in addressing these scenarios (including adaptation strategies), the pattern and possible future pattern of losses from bush fire and to be mindful of actions which may assist in reducing the Service's contribution to climate change which arises from its activities. (See also Appendix 1 – References)

### Likely Impact Scenarios:

Work of the Bushfire Co-operative Research Centre (CRC) involving CSIRO and the Bureau of Meteorology suggest that the cumulative fire danger indices (FDI) for certain seasonal periods will increase and that the return period for the severe (FDI 75) and catastrophic (FDI 100) fire event in many areas of NSW will increase with increased global warming (Lucas, et al, 2007).

Such changes may impact on the role of the RFS through:

1. changes in the spatial arrangement of fire events across the landscape;
2. changes in the opportunity for hazard reduction activities within the landscape;
3. whether climate change will impact on the capacity and role of volunteers; and
4. whether fire protection measures incorporated within the planning system will be adequate for the life of the development.

Work by the Australian Greenhouse Office (AGO) identifies a number of relevant climatic issues that need to be considered for emergency services in NSW and the RFS in particular. These include an increase to:

- fire frequency and intensity
- drought frequency
- rainfall intensity and flooding
- incidence and levels of storm surge
- invasion by exotic animal and plant species, and
- vulnerability of settlements, industry and infrastructure to extreme weather events.

The overall effect of climate change could see reduced rainfall in SE Australia and increased evaporation leading to prolonged drought and warming to continue after any stabilisation of greenhouse gas concentrations. This may be at a slower rate, while sea levels continue to rise. A less secure water supply would see increased competition for water between agriculture, power generation, urban areas, and environmental flows.

At present, the changes in Australian ecosystems cannot be easily attributable to climatic changes, however, the AGO report notes:

- temperatures have increased 0.7<sup>0</sup>C over the past century
- rainfall has decreased in SE Australia, especially in winter
- effects of reduced runoff are potentially serious, with near record low water level storages in SE Australia
- average temperatures could increase to produce greater evaporation, fewer frosts and increased inland warming with temperatures of -
  - +0.4 to 2.0<sup>0</sup>C by 2030
  - +1.0 to 6.0<sup>0</sup>C by 2070
- strong El Nino – Southern Oscillation phenomenon leading to severe flooding followed by drought in SE Australia.

### **Support of research:**

The RFS is currently supporting further research and in particular how climate change will alter concurrent risks posed by bush fires to biodiversity, ecosystem services and human settlement. This is currently being developed through the RFS involvement in the Bushfire CRC and working directly with individual researchers.

Of particular interest is the relationship between the RFS and the University of Wollongong, *Centre for Environmental Risk Management of Bushfires* and the projects of Dr Ross Bradstock.

For example some projects aim to:

- quantify changes in fire regimes at landscape scales resulting from predicted changes in climate
- quantify resultant changes in risks posed by adverse fire regimes to biodiversity, ecosystem functions people and their property
- predict the sensitivity of bush fire risk to a range of mitigation strategies and the performance of these alternatives under climate change (explore the cost/benefits of alternative mitigation strategies)
- investigate trade offs among risks to key management values that will be needed to adapt to climate change in the Sydney Basin – where high value assets, key

resources such as water and air, and vulnerable and diverse ecosystems coexist in fire prone bushland

- Report findings through technical publications and reports and workshops involving key stakeholder groups in government and the community.

In addition to the above, the RFS is supporting some important research through the University of Western Sydney (UWS). One project already completed examined 'Fire Frequencies for Western Sydney Woodlands' under the ARC program for a PhD student Penny Watson (2005). UWS is also currently negotiating RFS staff involvement in their Bush Fire Design Program at a Post-Graduate level which leaves open interesting research on the implications of climate change of urban areas and land use decision making.

A copy of a briefing paper (Fire Note) produced in September 2006 (CRC, 2006) is attached which also considers the focus of research in relation to climate change and its impact on the management of bush fires.

### **Pattern of losses arising from bushfire:**

In NSW, there has been a substantial increase in the spatial extent of bush fire activity, corresponding to the higher patterns of average temperatures, associated with prolonged dry periods.

Appendix 2 attached shows the pattern of area subject to bush fire and resultant losses experienced in NSW over the more than a decade (1993/4 – 2006/7) during which significant increases in average temperatures have been experienced. This does not include the significant losses of over 500 homes in the ACT in January 2003 which is similarly affected by fire weather conditions as NSW.

The RFS recorded some 800 fires in 1993/4, some 250 fires in 1997/98, more than 450 fires in 2001/2 and nearly 460 fires in 2002/3 and a significant increase in the number of days subject to total fire bans. Data prior to 1993/4 is incomplete and less reliable.

These records indicate an increasing trend in the cost and deployment of resources for fighting fires. This could have a significant impact on the capacity of the RFS to maintain the level of volunteer involvement. In addition, the RFS has increasingly obtained from and provided resources to other jurisdictions in suppressing fires. In 2007, for example, the RFS has deployed fire fighters to South Australia. In 2001/2 some 5,200 interstate (and international) fire fighters came to NSW to assist in fire fighting operations.

The RFS has adopted a more integrated risk management approach to the prevention, mitigation and suppression of bushfires. This is evident in the adoption and subsequent implementation of risk management planning processes for bush fire within the landscape, the improvements in ignition management through the fire permit system, the management of community complaints related to hazard management, improved and streamlined environmental assessment procedures for hazard management activities and responsibility for development control of sensitive land uses within bush fire prone areas.

With the review and subsequent release of *Planning for Bush Fire Protection* in 2007, the RFS is already addressing the potential impacts of differing fire weather scenarios across the State. This is a new and critical role that the RFS plays in improving the resilience of communities to the impacts of future fire events. Future research will consider whether and how climate change should be addressed in this area. A copy of *Planning for Bushfire Protection* (2006) is enclosed.

It is this area of improvements in development control within bush fire prone areas that can give the greatest reductions in the direct economic impacts of bush fires on the losses within the built environment experienced by the community. This approach to improved development control is also now a key strategy in the management and improvement to risk reduction to local communities.

**Measures undertaken by RFS in reducing its impact on energy use and water conservation:**

The RFS has some limited programs in seeking to meet its objective of providing for ecological sustainability.

In the past, little regard was had to the likely impacts of its activities upon energy or water conservation.

The RFS infrastructure program seeks to implement the following principles:

- Use of construction materials which can be either recycled or which utilise recycled materials for fire control centres and fire stations;
- Water saving devices incorporated as part of new fire stations and fire control centres;
- Water tanks for all new fire stations and fire control centres with future incorporation of water tanks in existing facilities (subject to funds); and
- Orientation of all new facilities for energy conservation and passive solar heating/cooling.
- Green fleet targets of Government

In addition, the RFS Headquarters at Homebush Bay was purpose designed and built and was rated as 4.5 stars by the CEDA rating scheme when this scheme was in operation.

**Conclusion:**

Human induced climate change has the potential to have significant impacts on the manner in which emergency services, such as the RFS, undertakes its activities into the future.

In addressing this, the RFS seeks to support and where possible undertakes research which recognises or improves adaptation to climate change scenarios.

The effects of climate change may already be evident in the increased frequency and intensity of severe and extreme fire weather and consequently on fire events within the State. Increased fire frequencies and/or intensities (i.e. the changes in fire regimes) could have dramatic impacts on environmental values within the landscape and in particular on our native vegetation and forest resources. This in turn can impact on our water catchment values and soils.

It is therefore important that the RFS works with land managers such as the Department of Environment and Climate Change, Department of Primary Industries and Department of Lands, as well as private land holders, on improving our knowledge of such impacts.

The RFS believes that its role in improving outcomes for safer communities through the development control process is a critical one, which can lead to significant improvements in

safety to the community and its built assets. This also improves overall safety for the lives of residents in bush fire prone areas.

The RFS would welcome the opportunity to clarify any questions raised by the Committee. Please feel free to contact Mr Grahame Douglas on (02) 8741-5435 in this regard.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Shane Fitzsimmons', written in a cursive style.

**Shane Fitzsimmons AFSM  
Commissioner**

## Appendix 1 - REFERENCES

Allan Consulting Group, 2004, Responding to Climate Change: An Issues Paper. Prepared for the Australian Greenhouse Office.

Australian Greenhouse Office (2007) Climate Change in Australia: Technical report 2007. (<http://www.climatechangeinaustralia.gov.au/resources.php>) (Chapter 5.6 Fire Weather, pp. 90-91).

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Hennessy K., Page C., McInnes K., Jones R., Bathols J., Collins D., and Jones D., 2004. Climate Change in New South Wales: Part 1: Past Climate variability and projected changes in average climate. CSIRO. Consultancy Report for the NSW Greenhouse Office.

Keith D., 2004. Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT. NPWS. Sydney.

Lucas C., Hennessey K., Mills G. and Bathols J. (2007) Bushfire Weather in Southeast Australia: Recent Trends and projected Climate Change Impacts. Bushfire CRC and Bureau of Meteorology Research Centre, Melbourne.

Luke, R.H. (1982) Hazard Reduction for the Protection of Buildings in Bushland Areas. NSW Fire Brigades. Sydney.

NSW Rural Fire Service (2001). Planning For Bushfire Protection – A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners, NSW RFS, Sydney.

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## Appendix 2 - Comparison Statistics for Fire Seasons

As at 21/03/07

ITEM	1993/94	1997/98	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
S44 Declarations including pre-emptive Declarations	33 (41f)	15	17	27	61	10	20	38	36
S44 Pre-emptive Declarations (no fires)	0	0	0	0	1	0	15	17	1
S44 Pre-emptive Declarations (with fires)	0	0	0	0	0	0	3	4	0
Number of Local Government Areas involved in S44s	35	20	20	44	81	23	41	67	47
Area Burnt (plotted by GIS Unit)	800,000ha	500,000ha	292,836	754,000ha	1,465,000ha	57,600ha	16,309ha	92,613ha	438,218ha
Number of days Total Fire Bans declared including statewide tobans 1 April to 31 March	15	48		38	97	53	24	23	45
Number of statewide Total Fire Bans declared	9	3		12	13	Nil	1	5	0
RFS Firefighters and IMT personnel used in S44s	18300	Not known		42,000	35,000	6,000	850	3,750	18,650
Number of strike	Not known	Not known		Not known	485	74	31	99	204



ITEM	1993/94	1997/98	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
teams used in S44s									
Maximum number of strike teams used in one day	Not known	Not known		Not known	53	23	4	16	23
Aircraft used 1 April to 31 March	76	60		109	121	80	66	76	79
Number of Aircraft Taskings 1 April to 31 March	Not known	Not known		Not known	2098	365	90	721	1766
Maximum number of aircraft used in one day	Not known	Not known		Not known	103	35	7	45	63
Number of aircraft days	Not known	Not known		Not known	9986	907	186	5,980	20432
Interstate firefighters and IMT personnel used S44s in NSW	1954	Not known		5,200	1160	Nil	Nil	Nil	466
States assisting NSW	VIC, TAS, WA, QLD, SA, NT, ACT, NZ	QLD*		VIC, TAS, WA, QLD, SA, NT, ACT, NZ	VIC, TAS, WA, QLD, SA, ACT	Nil	Nil	Nil	VIC, QLD, ACT
RFS firefighters and IMT personnel assistance to other States	Nil	Nil		Nil	VIC 140 ACT 950	SA 2	QLD 220	SA 130 VIC 550	VIC 969 1040 reported to the Minister
Estimated Number of Residential Homes threatened in S44s	28,270	5,070		39,340	33,280	620	860	1,700	1591

ITEM	1993/94	1997/98	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
Residential Homes destroyed in bush fires 1 April to 31 March	206	10		109	86	5	1	13	8
Number of other major structures destroyed in bush fires 1 April to 31 March	Not known	Not known		33	33	Nil	5	Nil	8
Number of outbuildings destroyed in bush fires 1 April to 31 March	Not known	Not known		433	188	Nil	6	40	17
Stock loss in bush fires 1 April to 31 March	Not known	Not known		7043	3400	Nil	640	26,730	3
Vehicles, boats, caravans, farm machinery, etc. destroyed in bush fires 1 April to 31 March	Not known	Not known		222	102	1	2	14	71