



ANNUAL REPORT 2006/2007 Bushfire Cooperative Research Centre

EXECUTIVE SUMMARY



Established and supported under the Australian Government's Cooperative Research Centres Program



EXECUTIVE SUMMARY

The Bushfire CRC is addressing many of the key questions for the fire industry. Leading researchers are working closely with our industry partners on issues that have been identified as critical to their business. The work is exciting and is now starting to deliver outcomes to the partners who had the foresight to invest in the future of long term bushfire research.

These outcomes are starting to make a difference across Australasia and are attracting international attention. The successful and ongoing transfer of knowledge remains a challenge for the partners of the Bushfire CRC and this annual report is a timely occasion to show how the Bushfire CRC is currently delivering on its commitment to build a sustainable research capacity in fire and emergency management.

The current financial year sees the completion of the fourth of the seven-year life of Australia's first attempt to focus nationally on the bushfire related research needs of fire and land management agencies. The industry, which includes the Bushfire CRC's 18 core partners and eight associate partners, is now benefiting increasingly as a number of current research projects reach advanced stages, while others with longer term horizons are now comprehensively established.

Among a number of research-related highlights the year has seen the release of an analysis of *The Effectiveness and Efficiency of Aerial Firefighting in Australia Part 1*. Given the escalating cost of fire suppression both at a national and international level, the industry has identified the need for considerable rigour in the on-going evaluation of both the effectiveness and efficiency of the various technologies, and particularly of aircraft.

An earlier, interim copy of this report was provided to the National Aerial Firefighting Centre (NAFC) and to the Federal Department of Transport and Regional Services (DOTARs). NAFC subsequently secured additional funding support of \$2.5m for the 2006/07 fire season. The report was also helpful in terms of subsequent negotiations regarding on-going federal support in this area.

In another national first an Australian Seasonal Bushfire Outlook for 2006-7 Workshop was held. This workshop, which participants agreed should become a regular pre-fire season event, was coordinated by the Bushfire CRC with its partner the Bureau of Meteorology as part of its Fire Weather and Fire Danger project. The report from the workshop was subsequently widely circulated and played an important role in informing pre-season preparations in all States and Territories, including being tabled in the Western Australian Parliament by the Minister for Environment and Conservation.

Other research related highlights over the twelve months have included;

- Two CRC projects (one on arson, and the other on smoke prediction) featuring prominently in the Australian Government's Innovation Report for 2006/07, the report citing the arson work as "*a great example of how the Cooperative Research Centre scheme is bringing government and industry together to tackle issues facing Australia*"
- The completion of an evaluation of the effectiveness and efficiency of smoke alarms, for the Australasian Fire Authorities Council (AFAC) to reach a national position on smoke alarms.

A critical milestone in the life of the Bushfire CRC this year was the completion of the Third Year Review, in accordance with DEST guidelines. The Review Panel's report emphasized the progress made by the Bushfire CRC in three years in forging linkages between a large and geographically spread industry and a strong cohort of researchers working in a wide range of disciplines relevant to bushfire. In its response, the Bushfire CRC's Governing Board noted that the Review found the

Bushfire CRC was working well in the key areas specified in its 'vision' and 'mission', and in the Commonwealth Agreement.

One of the key reasons for establishing the Bushfire CRC was to address the serious and growing national shortage of bushfire related researchers – as such it is pleasing to report that post-doctorate fellows and post-graduate students now number over 80 – a lasting legacy of the Bushfire CRC. One of the resultant challenges now confronting the industry is to ensure that a good number of these promising young graduates find suitable employment within the fire and land management agencies.

Conferences and workshops provide a regular opportunity for researchers and practitioners to come together, and as the work of the Bushfire CRC progresses, for the ever important 'technology transfer' to occur within the broader industry.

Important examples of this transfer of knowledge over the twelve months have included:

- A Bushfire CRC Fire Managers' Research Workshop at the University of Wollongong in July, that saw some 200 agency fire managers, researchers and students in attendance
- The annual joint Bushfire CRC/AFAC conference, which was held in Melbourne in August and attended by around 1300 national and international delegates
- Bushfire CRC representation at the 3rd International Fire Ecology and Management Congress in San Diego (USA) in November (over 1000 delegates), and at the 5th International Conference on Forest Fire Research in Portugal later in the same month (around 300 delegates)
- The Bushfire CRC was also prominently represented at the 4th International Wildland Fire Conference in Seville, Spain in May, with a capacity crowd workshop on Bushfire CRC research and with the Bushfire CRC becoming a founding member of the Fire Management Action Alliance
- Research Program end user/researcher workshops in November and December at Mt Macedon, in Perth in May, and two in Melbourne in June. Regular briefings were also provided to relevant AFAC policy groups and to the Forest Fire Management Group, a part of the national Primary Industries Ministerial Council
- A one day forum at Parliament House Canberra in March 2007 specifically to address the issue *Are Big Fires Inevitable?* The forum, which was attended by around 150 invited participants and several federal ministers and politicians, was designed to address several themes including drought and related climate factors, the fire and water relationship, community related interface issues and forest land management strategies
- Agency executive briefings by a Bushfire CRC sponsored, US based international wildfire expert in Brisbane, Hobart and Adelaide and related public seminars in Canberra and Melbourne
- A public forum at Cooma in April that focussed on the range of research programs currently underway in the Australian Alps, and a public forum at Wangaratta in June that was attended by some 90 people
- A fire research and education program in the Territory Wildlife Park in the Northern Territory, which receives 70,000 visitors a year.
- *The Day the Flames Came* – an educational documentary DVD on the lessons learnt from 1961 fires in the small town of Dwellingup, Western Australia. Produced by the Bushfire CRC and Western Australian partners, the Department of Conservation and Environment, and the Fire and Emergency Services Authority. The DVD was launched at the Melbourne annual conference and was distributed widely to fire managers.

The media again assisted in informing the wider community of the role the Bushfire CRC is playing. Commentary was regularly sought at the height of the bushfire season. Other public communication included:

- The broadcast of a 23 minute radio documentary on BBC Worldwide that prominently featured the Bushfire CRC's work.

- Support from the ABC national radio network facilitated widespread coverage of the bushfire forum at Parliament House including dedicated website coverage. This was followed up with an ABC TV *Four Corners* national television current affairs program that used the forum as a focus on the current state of bushfire management in New South Wales and Victoria.
- A segment on ABC TV *Catalyst* program focused on Bushfire CRC research into vehicle safety during a bushfire.
- The Bushfire CRC and the Australian Science Media Centre organised a national media briefing on bushfires in mid-October.
- The Bushfire CRC took advantage of the World Science Journalists' Conference in Melbourne in April to promote bushfire research to 500 science journalists and communicators from around the world including a field trip to a bushfire affected area.
- A six page Bushfire CRC research feature in the February edition of *Australian Farm Journal*, a nationally distributed farm business magazine.
- In January the *Canberra Times* ran a front page story "Threat to Bushfire Research" highlighting the issue of ongoing funding for the Bushfire CRC.
- Four issues of the industry journal *Fire Australia*, a joint venture between the Fire Protection Association, the Australasian Fire Authorities Council and the Bushfire CRC.

Early in the life of the Bushfire CRC the Board recognised the value in establishing an enduring industry and community resource and this led to the formation of the Fire Knowledge Network. The latest research and lessons from the past are now being enhanced as part of the development of the Fire Knowledge Network. It is being designed to become a focal point for fire knowledge within Australia, New Zealand and linked globally. It is bringing together the broad spectrum of research, both within the Bushfire CRC and from the many researchers in other organisations, together with local knowledge and lessons from history.

Utilising the principles of knowledge management to acquire, create, share and use knowledge the Fire Knowledge Network is being designed with a number of components for connecting fire research, information and experience.

Context and major developments during the year

In a report co-authored by the Bushfire CRC, and released by the Federal Minister for the Environment and Heritage in February 2006 titled *Climate change impacts on fire-weather in south-east Australia*, the CSIRO observed that "The south-east region of Australia is particularly vulnerable to bushfire – along with southern California and southern France it is identified as one of the three most fire-prone areas in the world. It is therefore critical that we prepare for the potential of increased fire risk associated with the hotter and drier years we may experience in the future..."

Meanwhile, in northern Australia, the Tropical Savannas CRC has reported that evidence from climate change models under enhanced greenhouse conditions is that "...the frequency of extreme events such as floods and droughts will probably increase..." but that "higher temperatures may also cause fuels to become drier thus the rates of fire spread may increase with a resultant rise in fire intensities."

In much of Australia, and in parts of New Zealand, fire, park and forest management agencies are confronting increasing urbanisation, prolonged drought and global warming, increasing strains on forested water catchments, and concerns about their continued ability to adequately manage fire.

As scientists begin to better understand the probable impacts of global warming it is vital that Australia first consider the broader issues of fire management as the nation develops policies in areas ranging from water and biodiversity conservation, to urban planning, carbon sequestration, and the maintenance of key aspects of indigenous culture.

The Bushfire CRC is providing the fire management knowledge for Australia's land management agencies to actively participate in these critical issues.

The last 10 years has seen an unprecedented level of scrutiny of the management of Australian bushfires, particularly in Victoria and the ACT/NSW (a long running Coronial Inquiry in South Australia is yet to report). During the year the Bushfire CRC was invited to make a submission to a Victorian Parliamentary Inquiry into the *Impact of Public Land Management Practices on Bushfires in Victoria* (This can be found on the Bushfire CRC website). In addition, four researchers have provided considerable assistance to the on-going South Australian Wangary Coronial Inquiry.

In the latter part of the year the Board and, in particular its industry partners, through the Australasian Fire Authorities Council, commenced development of a proposal for a new Cooperative Research Centre that would build on the achievements of the current Bushfire CRC.

The industry recognises that, with the Bushfire CRC, Australasia has a nationally coordinated research program that must continue. Much of the research is long term and is only beginning to be taken up by the broader fire industry.

The industry and the current CRC Board are now seeking expressions of interest from potential new partners who wish to be involved in this post-Bushfire CRC venture. The new CRC bid for Commonwealth funding is due to be submitted in the 2008 grant application round. It will form a critical part of the national infrastructure in its management of fire for the community.

The tentatively titled *Fire - Environment and Society CRC* is being designed to support the continuing evolution of the Fire Knowledge Network as a means to share research findings. It will also continue to build a new generation of researchers for the industry while it makes Australian businesses more stable in the face of a changing climate.

The proposed new CRC will be designed to undertake research projects that will deliver economic and social benefits to individuals, communities and industry throughout Australasia. It will be designed to build on the work of the current Bushfire CRC and to conduct research that confronts the issues of the next two decades.

The Governing Board of the Bushfire CRC saw a number of changes during the year. Resigning Board members were: Raymond Canterford, Leonard Foster (resigned in December), Anne Gardiner, Philip Koperberg, Ian MacDougall (Chairman, resigned in March), Robyn Owens and Timothy Vercoe. Board appointments during the year were: Neil Bibby, Jo-Anne Bloch, Naomi Brown, Murray Dudfield, Leonard Foster (re-appointed, and elected Chairman in April), Brian Richardson, Alistar Robertson and Ewan Waller. [See Table 2 for details]

There was only one change in specified staff in the Bushfire CRC office during the year, with Education Manager Kellie Watson taking up a position with Sustainability Victoria.

In terms of its core partners, the year saw the finalisation of arrangements that resulted in the New Zealand Rural Fire Service and the University of Canterbury taking out joint core membership, for the remainder of the current Bushfire CRC's term, while the University of Wollongong became an associate partner. Memoranda of Understandings were signed with the University of California, Berkeley, the Forest Fire Research Institute at the University of Coimbra, Portugal, and the US Department of Agriculture Forests Service.

Finally, we would like to place on record my thanks and our appreciation for the efforts of the entire Bushfire CRC family (stakeholders, researchers, Board members, staff and colleagues) for their efforts over the year. Efforts that have so capably helped to keep Australasia at the forefront of the international bushfire management challenge. Stimulating and productive times would seem to lie ahead.

Len Foster

Chairman

Gary Morgan

Acting Chief Executive Officer

Core partners

- Bureau of Meteorology
- Country Fire Authority of Victoria
- CSIRO - Divisions of Manufacturing & Infrastructure Technology, Forestry and Forest Products, and Sustainable Ecosystems
- Department of Sustainability and Environment, Victoria
- Emergency Management Australia
- Fire and Emergency Services Authority of Western Australia
- Melbourne Metropolitan Fire and Emergency Services Board
- New South Wales Fire Brigades
- New South Wales National Parks and Wildlife
- New South Wales Rural Fire Service
- New Zealand Rural Fire Service
- Queensland Fire and Rescue Service
- State Forests of New South Wales
- Tasmanian Government (Tasmania Fire Service, Forestry Tasmania, Parks and Wildlife Service)
- University of Canterbury, New Zealand
- University of Melbourne, School of Forestry and Ecosystem Science
- University of Tasmania
- University of Western Australia
- University of New South Wales

Associate Partners

- ACT Department of Justice and Community Safety
- Australian National University
- ACT Emergency Services Authority
- James Cook University
- La Trobe University
- RMIT University
- South Australian Country Fire Service
- South Australian Department of Environment and Heritage
- South Australian Metropolitan Fire Service
- University of New South Wales
- University of Wollongong
- Charles Darwin University
- Department of Industry and Resources, Chemistry Centre, Western Australia



RESEARCH PROGRAMMES

Key Research Achievements

The Effectiveness and Efficiency of Aerial Firefighting in Australia

This report has provided additional rigour in the ongoing evaluation of the effectiveness and efficiency of aerial Firefighting, which has been helpful in negotiations for federal support for aerial firefighting initiatives and has lead to additional funding support for these activities.

Seasonal Bushfire Outlook Workshop 2006-2007

This is a national first though which fire service agencies have been provided with significant information on weather and fire danger outlooks for the period as compiled by Bushfire CRC researchers. This information has had a major influence informing pre-season preparations in all states and Territories. Fire service agencies have agreed for this to be a regular event.

National Bushfire Forum – Are Big Fires Inevitable

Attended by more that 150 invited participants, this one day forum at Parliament House Canberra in March highlighted the interaction of drought and related climate change issues, fire and water, community interface and forest land management strategies in addressing the question – Are Big Fires Inevitable?

Developing an ongoing capability in bushfire research

One of the key reasons for establishing the Bushfire CRC was the national shortage of bushfire researchers. The Bushfire CRC now has more than 80 post-doctoral fellows and PhD students working in the area, many with international recognition. This will provide a lasting research capability for the industry.

Contribution to Australian innovation

Two Bushfire CRC projects (bushfire arson and smoke prediction) have been recognised in the Australian Government's *Innovation Report 2006/7* as making a significant contribution in bringing together government and business to tackle the major issues facing Australia.

Milestones reached

The majority of agreed milestones have been met. Where milestones have not been met these predominately relate to weather conditions that have not been conducive to data collection including projects where fire events have destroyed data collection points. Other delays in meeting milestones have been associated with a shortage of researchers in the industry and the difficulty in appointing suitable candidates to research projects. In some instances, working with the industry has identified that individual pieces of work are better merged into larger projects that can provide greater benefits – this has lead to some milestones being replaced. Where this has occurred or is proposed a variation to the Commonwealth Agreement will be sought.

RESEARCH PROGRAMMES

Research Activities and Achievements

Program A: Safe Prevention, Preparation and Suppression

End User Leader: Phillip Koperberg, NSW Rural Fire Service (to April 2007)
Shane Fitzsimmons (April - end June 2007)
Program Leader: Jim Gould, Ensis - Bushfire Research Group (CSIRO)

Overview

Bushfire management has four related goals – to prevent an uncontrolled bushfire occurring, to prepare in case it does, to suppress it if it arrives, and to enable rapid recovery after the event.

Fire managers need reliable tools that make the best use of emerging technologies to support their decisions in how best to manage the landscape, before, during and after a bushfire.

This program is providing a better understanding of key issues such as fire behaviour, fire weather, bushfire danger rating, smoke management and strategies for aerial and ground suppression.

A key feature of Program A has been its ability to use field-oriented, empirically based approaches to knowledge generation in combination with the development of decision support tools and techniques. The program has a strong collaborative working relationship with the operational fire and land management agencies in Australia and New Zealand. It has an underlying focus on risk-based decision making.

Research projects on weather and the behaviour of fire under different conditions, the effectiveness of aerial fire fighting (the year saw the release of an eagerly awaited research report) and the effects of different tactics used to put fires out – these are a few of the areas that scientists in Program A continue to study.

The development of Australia's first, holistic risk management model for bushfires is now well advanced. The resulting decision support system has been partially trialled, and its ability to assist fire and land management agencies, threatened communities, town planners, water catchment authorities and power companies has been advanced considerably. Program scientists are also addressing fuel dynamics and fire behaviour simulation modelling to fill the current gaps in our knowledge about bushfire behaviour and fuel management.

Program A is taking a strong leadership role in addressing key fire management issues through interdisciplinary, multi-agency initiatives in six sub-disciplines of bushfire research (fuel and fire behaviour modelling, remote sensing, fire weather and seasonal outlook, suppression technology, risk management and computer simulation). National and international collaboration, within the context of the Bushfire CRC's national and international goals, also continues.

The Program currently includes 23 researchers and post graduate scholars at seven establishments, who are involved, at least partly, in bushfire research.

Four PhD projects are well advanced with field and laboratory experimental studies. One PhD project on predicting fuel moisture in varied heathland ecosystems is scheduled for completion in 2007. Two new PhD projects have commenced; one involving adult education programs and fire behaviour, while the other is investigating aspects of fuel consumption modelling.

| Project title | Project Leaders | Objective |
|---|----------------------------------|--|
| A1.1 Fire behaviour modelling | Jim Gould, Wendy Anderson | To improve firefighter and community safety in the management of bushfires, by providing better knowledge and understanding of the interaction of fire, fuel, weather and topography across Australia. |
| A1.3 Fuel classification and availability | Peter Ellis | To develop a single fuel classification system in Australia to be used in smoke emission models, fire behaviour predictions and habitat modelling. To develop a model of fuel availability based on fuel, weather and fire behaviour characteristics. |
| A1.4 Improved methods for the assessment and prediction of grassland curing | Stuart Anderson | To develop improved methods for the assessment and prediction of grassland curing as an input into fire danger rating systems and fire behaviour models. |
| A2.1 Fire weather and fire danger | Graham Mills | To improve the operational utility of fire weather forecasts and outlooks by providing a better understanding of wind, temperature and humidity structures and distributions, on the very short-term (1-12 hours), short to medium term, and seasonal time scales. |
| A3.1 Evaluation of suppression techniques and guidelines (aerial and ground) | Jim Gould | To optimise the effectiveness and efficiency of aircraft use during firefighting operations. |
| A4.1 Bushfire risk management | Kevin Tolhurst | To develop a risk management decision support system for communities living in the rural/urban interface, town planners, power companies, firefighters and land managers. |
| A5.1 Fire spread simulation | George Milne | To develop a physically accurate modelling, simulation and animation toolset that will permit rapid execution of a model of a specific bushfire situation to permit the prediction of fire development and the effect of containment strategies. |



Program B: Fire in the Landscape

End User Leader: Ewan Waller, Victorian Department of Sustainability and Environment

Program Leader: Mark Adams, University of New South Wales

Researchers within this Program are increasingly focussed on producing outputs from their research in ways that will benefit stakeholders. The features of this past year can be summarized as:

- More than 20 peer-reviewed journal papers and book chapters
- More than a dozen papers presented at major national and international conferences and forums. A number of Program researchers (including Andersen, Bradstock, Cary, Roxburgh and Adams) have given invited keynote lectures at a range of conferences. A few stand out for their significance. They include the Australasian Bushfire Conference 2006 (Brisbane), the Nature Conservation Council Bushfire Conference 2007 (Sydney), the International Wildland Fire Conference 2007 (Madrid, Spain), the North American Forest Ecology Workshop 2007 (Vancouver) and several climate change meetings in Canberra and Sydney. In all of these, lead researchers from Program B have featured prominently
- Providing assistance in the revamping of university subjects and courses to strengthen fire ecology and management components – (course revamps included those conducted at the University of Tasmania, Charles Darwin University, the University of Melbourne, the University of NSW, the University of Wollongong and at the Australian National University)
- A significant number of presentations by researchers at public meetings and forums throughout Australia. From Darwin to Paraburdoo, from Perth to Sydney, from Cooma to Manjimup, from Coffs Harbour to Hobart – a Program researcher has been provided to talk to local volunteers, to communicate with school groups or to meet and discuss the way forward with politicians and policy makers
- Program B researchers have also featured extensively in media appearances at both the regional and national level.

The research program has also benefited from an expanding list of research grants, consultancies and contracts. Notable here are the successes of Cary, Bradstock *et al.* (AGO), Grierson, Adams *et al.* (ARC Linkage) and Andersen *et al.* Much of what is being done in these additional projects builds on research supported by the Bushfire CRC. This evolving aspect of the Program contributes to a key deliverable for the Bushfire CRC (“the production of the next generation of fire researchers; maintaining a viable fire research community”). In a similar fashion, PhD and other post-graduate students involved in Program B are making an increasingly valuable contribution to published scientific output.

Program B is well on its way to meeting its overall Bushfire CRC contribution in terms of published output and in relation to successful PhD graduates. Notable here, publications-wise, are the continued strong contributions from Alan Andersen’s northern Australia program (based with CSIRO Sustainable Ecosystems) and the significant numbers of PhD students involved in the programs lead by Pauline Grierson at the University of Western Australia, and by Alan York and Tina Bell at the University of Melbourne.

Many elements associated with the study of ‘Fire in the Landscape’ are, of necessity, a long-term research proposition. The spectre of climate change has caused several original projects to expand their horizons and significant progress in a number of areas will require new sources of funding and/or support from a new CRC.

| Project title | Project Leader | Objective |
|--|---|--|
| B1.1 Managing fires in forested landscapes in south-western Australia | Lachlan McCaw | To identify patterns of change in the abundance and richness of biota as a result of different fire regimes in forested landscapes in south Western Australia. |
| B1.2 Managing bushfire risk in a changing world | Ross Bradstock | To provide optimal solutions for sustainable bushfire risk management, in differing ecosystem, management and global/climate change contexts. |
| B2.1 Behaviour of smoke plumes and hazes | Graham Mills | To assist in the reduction of impact of smoke from an urban or rural fire on community health and safety by predicting the transport, dispersion and concentrations of smoke particulates. |
| B2.2 Smoke composition and impact on health and ecosystems | Tina Bell | To identify and quantify the chemicals in smoke produced from biomass burning. |
| B3.1 Effect of fire on ecosystem processes and biodiversity | Alan York | To understand the interaction between fire, vegetation, invertebrates and soil organisms in carbon and nutrient cycling, and how this contributes to biodiversity conservation and ecosystem function. |
| B3.2 Prescribed fire and biodiversity in northern Australia | Alan Andersen | To enhance the effectiveness of fire management for biodiversity conservation in northern Australia. |
| B4.1 Synthesis and integration | Mark Adams | To synthesise existing data and integrate with world literature and produce plain language text on prescribed burning. |
| B4.2 Multi-scale analysis of patterns in ecological processes in relation to fire regimes | Pauline Grierson | To integrate ecological information derived at smaller scales with larger scale management perspectives. |
| B6 HighFire: underpinning evidence-based policy for fire regimes and their management in the high country | Maria Taranto, Mark Adams, John Handmer, Rick McRae, Rod Weber. | To contribute to the current evidence-base for fuels management, understanding and improving human resilience and managing bushfire risk in high country landscapes. |

Program C: Community Self-Sufficiency for Fire Safety

End User Leader: John Gledhill, Tasmania Fire Service

Program Leader: John Handmer, RMIT University

The work of Program C has continued as planned, and is summarised below. As part of our commitment to making our research results accessible, we have compiled an interim report of key research in the Program. This material, together with the results of community safety research being conducted elsewhere in the Bushfire CRC is now with CSIRO for publishing as a commercially available book: *Community safety for bushfires*. This volume is the first collection of social science related research for bushfires or wildfires to be published internationally. This is a significant achievement, and positions the Bushfire CRC as a leader in this area.

In the final years of this CRC our efforts are turning increasingly towards the transfer of research results. All projects have contributed to the CSIRO volume, and all projects have material published or 'in press' in the scientific literature. Reports have also been produced targeting practitioners, either through the Bushfire CRC's *Fire Note* and *Fire Update* series, the monthly *Bushfire Arson Bulletins* or through detailed specific reports.

More 'hands-on' approaches are also being employed with workshops being conducted on economics, law, evaluation, community profiling and arson (including the running of a fire investigators' workshop). Discussions have also continued with user groups in relation to most projects, as has the testing or interactive application of initial research results in locations across Australia. In this aspect of our work we have been helped greatly by the 'user reference groups' for each project. These groups are coordinated by Damian Killalea of Tasmania Fire Service.

While our focus is predominately in the more settled areas in southern Australia, some of our work has been in the far north and much has been in rural areas. As an example, a community engagement workshop 'Weather matters in Indigenous communities' was held in Townsville in April 2007. Specialist meetings have also been a feature of this Program - for example, in October 2006 a 'roundtable' for arson investigators from police and fire agencies in Victoria, New South Wales and the ACT was held. It helped inform the research project and provided a valuable networking opportunity.

Where appropriate our work has also been publicised outside the fire and land management sectors. Again, and as examples, the Understanding Communities project contributed three chapters to the recently published Queensland-based Centre for Disaster Studies book *Communities Living with Hazards*; Alison Cottrell was a speaker at the Queensland Premier's Cyclone Summit; and John Handmer participated in the United Nation's 'Expert Working Group on Vulnerability' workshop in Prato, Italy in November 2006.

In line with the Bushfire CRC's performance indicator of international engagement, Program C has conducted seminars and workshops in the US and in Europe, where there is considerable interest in Australia's "Prepare stay and defend or leave early" policy for householder protection.

It is also important that politicians and the public 'at risk' understand how this work can help manage the bushfire threat. With this in mind Program C has taken part in a number of important public fora, including the National Bushfire Forum at Canberra's Parliament House in February and a related public forum at the State Library of Victoria in March. Through our participation in the HighFire project we have supported regional gatherings in the New South Wales and the Victorian high country.

This research into local knowledge and community resilience, and our work on the 'Prepare, stay and defend' policy has attracted sustained media interest. This has enabled us to disseminate our




bushfire CRC

research results widely, and to concurrently reinforce the fire agencies' community safety positions. The media exposure has also allowed us to promote the value of bushfire research. During the year the Program Leader (John Handmer) participated in a high profile ABC TV series on bushfires and bushfire management: *Bushfire Summer*.

| Project title | Project Leader | Objective |
|--|--|---|
| C1 Understanding communities | Alison Cottrell and Judy Newton | To contribute to the understanding of community needs, expectations, behaviours and attitudes to bushfire risk, response and recovery. |
| C.3 Bushfire arson | Matthew Willis, Toni Makkai and Derek Jory. | To reduce the impact of deliberate and negligent fire lighting in Australian bushland environments. |
| C4 Effective risk communication | Douglas Paton, Peter White and Peter Hughes | To investigate the factors in a risk communication program to promote readiness for bushfires and to respond effectively on receiving warnings. |
| C5 Bushfire economic costs | John Handmer | To coordinate research in Australia to increase the self-sufficiency of communities in managing the risk from bushfires. |
| C6 Stay or go | John Handmer | To identify impediments to the full implementation of the "Prepare, Stay and Defend or leave early" policy. |
| C7 Development of an evaluation framework for community safety policy and programs for bushfire | Gerald Elsworth | To develop an evaluation framework and associated methodology for the community safety approach to bushfire risk. |



Program D: Protection of People and Property

End User Leader: **Naomi Brown, Country Fire Authority (until December 2006)**
 Noreen Krusel, Country Fire Authority (December 2006 to end June 2007)

Program Leader: **Bob Leicester, CSIRO**

This program is examining methods to increase the safety at the interface between people, property and the natural bushland environment. It is focussed on the health and wellbeing of the community and of firefighters through research into building protection, and firefighter health and safety. Understanding the drivers of demographic and attitudinal changes affecting volunteerism is also a major focus of this program.

Program D comprises several apparently discrete Projects. However, one of the features of the projects during the past year has been an increasing level of interaction between the various researchers. As an example, the demographics of volunteers is relevant to research related to firefighter performance, and research related to heat stress and the toxicity of smoke has some relevance to research related to unsafe decisions on the fire-ground. Interaction with researchers of Programs A and C is also occurring on an increasingly regular basis.

Most of the Projects took advantage of the fire season to make many useful field measurements. Two Projects that were late starters in this Program, D2.1 (Fire Fighter Health and Safety) and D5 (Incident Management Teams), are now well developed and producing exciting results. The Program has also benefited from supplementary funding that was obtained for specific projects from BlueScope Steel and from the NSW Rural Fire Service. With respect to the relevant Bushfire CRC milestones, all Projects are effectively 'on track'.

For all Projects, technology transfer is now the major challenge. End user groups to assist in the transfer of research findings into practical application are being set up. In relation to this task considerable assistance is being provided by members of the various AFAC sub-committees. Several Project teams (D1, D2.1, D2.2, and D2.3) were invited by FESA to present extended workshops in Western Australia and this provided an opportunity to develop an effective element in the technology transfer process. Several Projects are also benefiting through the use of interstate fire agency personnel to undertaking field measurements in a range of situations and at a variety of locations.

Justin Leonard of CSIRO is now an 'invited' member of Paradox, a European-based consortium set up to action research on wildfires. Claire Johnson, a La Trobe University PhD student in Project D2.3, was awarded an overseas Best Student Paper award by the company Aptima, for her paper on 'The Use of Worst Case Scenarios in Decision Making by Bushfire Fighters'. A paper by Sean Cowlshaw and Jim McLennan (Project D3) on the impact of volunteerism on families is now a required reading text at Deakin University.

| Project title | Project leader | Objective |
|---|---|--|
| D1.1 Building and occupant protection | Justin Leonard | To improve awareness and understanding of the issues surrounding building loss in bushfires, through research, communication and education. |
| D 2.1 Fire fighter health and safety | David Nichols | To improve the safety, health and general well-being of volunteer and career fire fighters in their fire fighting duties. |
| D 2.2 Personal exposure of firefighters to air toxics and OHS risk management strategies | Steve Brown (until December 2005), Donovan Marney (from January 2006) | To develop and apply capabilities for measuring the personal exposures of bushfire fighters to a wide range of air toxics in different fire scenarios. |
| D2.3 Safety in decision-making and behaviour | Mary Omodei | To identify the human factors that lead bushfire fighters to make decisions that place themselves or others at risk. |
| D2.4 Safe, cost-effective equipment for reduced firefighting risks to firefighters | David Nichols | To increase the safety of firefighters through improvements in equipment, vehicles and processes. |
| D3 Enhancing volunteer recruitment and retention | Mary Omodei (Manager: Jim McLennan) | To carry out joint research with fire agencies that will assist them to maintain sufficient numbers of volunteers and brigades to meet community needs. |
| D4 Respiratory health of firefighters | Phil Weinstein, Angus Cook, Phil Thompson, Brian Devine | To investigate the respiratory health effects of occupational exposure to combustion products from bushfires as well as the efficacy of the protective filters on firefighters' masks. |
| D 5 Optimising information flow through collaborative work performance: Enhancing emergency incident management team effectiveness and organisational learning | Christine Owen | To improve teamwork effectiveness and subsequent organisational and cross-organisational learning. |

Program F – Community Outreach

The Bushfire CRC's Community Outreach program has achieved considerable success during the year in promoting the Bushfire CRC's work and raising awareness of the science of bushfire research outcomes to the broader community, and fire and land management personnel. A variety of briefings, public forums, seminars and media initiatives have been conducted across metropolitan and regional Australia that provided opportunities to connect community, researchers and the fire industry in the exchange and sharing of information and experience.

The Community Outreach program (Program F) complements the activities of the Bushfire CRC's Education and Training program (Program E). The Education and Training program emphasises vigorous, proactive, targeted efforts to encourage adoption by CRC end user partner agencies of the specific results from new research. This is supported by the Community Outreach program through its emphasis on improved access to, and communication of, bushfire science more generally. Both programs are key features of the Bushfire CRC communication strategy.

The Fire Knowledge Network

A service of the Bushfire CRC, the Fire Knowledge Network is providing a focal point for access to leading national and international fire research and knowledge. It gives unprecedented access to various forms of fire-related knowledge by drawing on research from a range of recognised organisations such as Bushfire CRC, AFAC, CSIRO, other CRC's, universities, international fire research agencies and experts.

During the year the Fire Knowledge Network brand was launched. The Network logo now appears on all knowledge transfer initiatives from the CRC including information products, events and communications. This has led to increased recognition and visibility of the Network as well as providing the opportunity to engage with stakeholders in the promotion of Bushfire CRC research learnings.

Highlights of this year's program include:

- Completion of extensive stakeholder engagement, online survey and user needs analysis that built an understanding of the information and knowledge requirements of the fire industry in Australia and New Zealand
- Launch of the Fire Knowledge Network brand with a series of Executive Briefings with international guest speakers and Public Events across Australia demonstrating the value of the Networks ability to connect people and offer opportunities for exchange of information and experience
- "Are Big Fires Inevitable?" – A National Bushfire Forum held at Parliament House in Canberra provided a platform to hear the views of practitioners, politicians, policy advisors and researchers to further our understanding of large bushfires in populated areas of southern Australia
- Significant collaboration with the fire industry's peak body, the Australasian Fire Authorities Council (AFAC) aimed at supporting the industry's knowledge management initiatives. This has resulted in engagement of industry representatives in providing content and resources for the Network
- Fire Knowledge Network prototype web site developed for pilot testing prior to full technical design, build and launch. Key features of the Network website will be the ability for the general public to access research about Bushfires and a secure *agencyCONNECT* extranet that will enable fire and land management agencies across Australia to easily share learnings and experiences.



bushfire CRC

re CRC

Bushfire CRC Forums

Aligned with the knowledge transfer activities of the Bushfire CRC's Education and Training Program the Community Outreach program has successfully engaged with a significant number of community groups and government agencies, including: Federal and State government ministers, politicians, local government, community interest groups, volunteer associations, students, researchers, fire and land management agencies and local residents.

Highlights of this year's program include:

- A series of Executive Briefings were conducted around Australia in 2006 and 2007 on the 'Mega-fire Phenomenon'. International expert Jerry Williams from the Brookings Institution presented on the US experience and the lessons for Australia. These briefings received significant media coverage
- The HighFire research site was launched by the Federal Member for Indi, Mrs Sophie Mirabella at Howmans Gap in north east Victoria in June
- Free public forums have been held in various states of Australia in metropolitan and regional areas. These events were well received by the general community. The aim of the events was to showcase Bushfire CRC research and its relevance to the local communities. The Federal Member for Eden-Monaro, Mr Gary Nairn, MP attended and presented at a public forum held in Cooma in April.

EDUCATION AND TRAINING

Developing a new generation of bushfire researchers

This year has seen a continuation of activity in the Bushfire CRC's Education Program with a stronger focus on research adoption. The Bushfire CRC is well positioned to achieve its target of achieving 30 PhD qualified researchers with a current total of 32 PhD students in the program and 5 Masters. All students work with a team comprising an academic supervisor and an end user (industry) support leader. All scholarships must be sponsored by an industry agency and have regular contact with end users to ensure the research meets targeted industry needs.

| Bushfire CRC Students 2006 / 2007 | |
|--|-----------|
| PhD Students | 32 |
| Masters Students | 5 |
| Honours Students | 2 |
| Vacation Students | 2 |
| Total | 41 |







This is an edited summary of the Bushfire CRC Annual Report 2006/7 that was submitted to the Department of Education, Science and Training in October 2007.

The full Annual Report can be viewed at:
www.bushfirecrc.com/publications

Photo Credits:

Department of Sustainability and Environment
Ensis Bushfire Research
Greg McCarthy, DSE
All others Bushfire CRC

Bushfire Cooperative Research Centre
Level 5 / 340 Albert Street | East Melbourne
Victoria 3002 | AUSTRALIA

Phone: 03 9412 9600 Fax: 03 9416 3717

www.bushfirecrc.com