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SCIENTIFIC DIVERSITY, SCIENTIFIC UNCERTAINTY AND RISK MITIGATION POLICY AND PLANNING

Annual project report 2015-2016

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Cover: A prescribed burn near the Darwin River Northern Territory.,Timothy Neale (2016)

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EXECUTIVE SUMMARY

What is the problem?

There is a significant knowledge deficit concerning how science and other forms of knowledge are used and integrated into sector policy and practice, leading to incorrect and counter-productive misunderstandings. The emphasis on the value of scientific knowledge within the natural hazards sector – and particularly in regards to risk mitigation – is legitimate. However, to this point, this valuing of science has not been accompanied by research into the actual opportunities and challenges of using science in policy and practice.

Why is it important?

Without greater insight into how science and other forms of knowledge are used and integrated into sector policy and practice, the ability of policymakers and practitioners to explain risk mitigation and translate its scientific basis is compromised. The sector is also vulnerable to the perpetuation of received ideas and 'myths' about science, its use and its utility.

How are we going to solve it?

This research project will provide insight into the opportunities and challenges of using science in policy and practice through case studies. In doing so, it will provided an improved understanding of scientific integration pathways and an improved basis for articulating and defending science-based decision-making in natural hazard risk mitigation.

END USER STATEMENT

John Schauble, *Emergency Management Victoria, VIC*

Creating a common understanding among emergency management practitioners of the relevance and importance of a diverse variety of scientific knowledge available to them remains a significant challenge. In an environment where the incidence and impact of natural hazard events is increasing exponentially, the need for informed strategic decision making has become critical.

This project is already delivering outcomes that can support the capacity of practitioners to explain and justify mitigation actions to their peers, the public, the media, and the legal system.

Developing a common language between risk professionals, policy makers and the broader community remains central to understanding and managing the challenges of the uncertainties that natural hazards create. The outcomes will be better policy and management decisions – which can only lead to safer and more resilient communities.

INTRODUCTION

This Annual Report reports on Year 3 (July 2015-June 2016) of the Scientific Diversity, Scientific Uncertainty and Risk Mitigation Policy and Planning project (or 'RMPP project'). This project commenced in January 2014 and is part of the Governance and Institutional Knowledge cluster of the Bushfire and Natural Hazards Cooperative Research Centre. The RMPP project is led by Western Sydney University and the Australian National University, in collaboration.

PROJECT BACKGROUND

New public policy positions for bushfire and flood risk planning, preparedness, response and recovery rely on best practice scientific evidence, however, scientific evidence does not always meet the knowledge needs of practitioners. Scientific studies are fragmented and highly specialised, constantly evolving, and span diverse disciplinary approaches. Further, scientific evidence is produced, understood and used in relation to other sources of knowledge – professional expertise, local knowledge, law, politics and so on. Given that uncertainty is an inherent part of scientific practice and method, how do those engaged in risk mitigation manage these scientific uncertainties in their decision-making?

Efforts to anticipate and mitigate natural hazards have generated a diverse field of natural science that is drawn upon by a wide range of practitioners and decision makers who need to understand the character and influence of these sciences, their uncertainties and their contribution amongst diverse scientific and other knowledges. They do so as part of making strategic decisions to anticipate and mitigate natural hazard events. By moving beyond simplistic assumptions that science can be directly translated into policy and practice, we instead analyse how risk professionals and others express and manage differing opinions about the different uncertainties inherent to mitigation practice, including in terms of their relative influence and changeability. This work supports the capacity of risk management practitioners to explain and justify mitigation practices to other risk mitigation professionals, the public, the media, and courts and inquiry processes.

The RMPP project seeks to achieve a better science-governance match in risk mitigation through three key tasks:

1. Investigating the diversity and uncertainty of bushfire and flood science, and its contribution to risk mitigation policy and planning;
2. Exploring how diverse individuals use and understand scientific evidence and other knowledges in their bushfire and flood risk mitigation roles; and,
3. Analysing how this interaction produces particular kinds of opportunities and challenges in the policy, practice, law and governance of bushfire and flood risk mitigation.

This project uses qualitative social science methods including scenario exercises, theoretical tools and case studies, to analyse how diverse knowledges are ordered and judged as salient, credible and authoritative, and the pragmatic meaning this holds for emergency management across the PPRR (prevention, preparedness, response and recovery) spectrum.

Our research activities are supported by the in-kind contributions of the end user panel and the research team, including the international collaboration with the University of Alberta, Canada and the University of Gothenburg, Sweden.

WHAT THE PROJECT HAS BEEN UP TO

STAFFING

Dr Timothy Neale was recruited as principal investigator and commenced in July 2014. Dr Neale is stepping down from this position, effective 21 July 2016, in order to take up a new position at Deakin University. Once a new principal investigator is recruited, Dr Neale will transition to being a member of the project team.

CASE STUDIES AND SCENARIO EXERCISES

Three case studies for the scenario exercises are at different stages.

1. Bushfire risk mitigation in the Barwon-Otway area, Victoria

Since 2009, the Barwon-Otway area in south-western Victoria has been a pilot site for a new approach to bushfire risk calculation and mitigation led by the Department of Environment, Land, Water and Planning (DELWP). This approach utilises new scientific tools to plan mitigation activities, quantify mitigation effects, and inform community stakeholders. For this case study:

- 21 in-depth interviews were completed in November-December 2014
- A survey was conducted in February-March 2015
- A scenario exercise with 12 Barwon-Otway participants was convened in April 2015, and
- 10 final in-depth interviews were completed in October 2015.

2. Bushfire risk mitigation in the Greater Darwin area, Northern Territory

Though a significant portion of its grassland is burnt each year, the Greater Darwin area is not historically a high-risk bushfire area. However, the recent spread of highly flammable gamba grass (*Andropogon gayanus*) and the continuing subdivision of floodprone and marginal lands in peri-urban Darwin are changing the level of risk and the need for mitigation solutions. For this case study:

- 30 in-depth interviews were completed in July-August 2015
- A survey was conducted in September-October 2015
- A scenario exercise with 14 Barwon-Otway participants was convened in December 2015, and
- 14 final in-depth interviews were completed in May-June 2016.

3. Flood risk mitigation

The project team scoped a case study of flood risk mitigation in the Hawkesbury-Nepean Valley, however this may no longer be viable as practitioners and policymakers are awaiting the release of a crucial report, delayed since early 2015. On the advice of project team member Prof Dovers, a case study of flood risk mitigation in the Queanbeyan area is being considered.

CANADIAN CASE STUDY

Dr Neale and Associate-Professor McGee are in the process of developing a Canadian case study in Alberta. A-Prof McGee has had extensive conversations with sector contacts about this and is investigating funding through the Alberta provincial government and has recruited a PhD student to assist. Dr Neale is pursuing funding options to support his travel to Canada.

FIELDWORK AND SECOND SCENARIO EXERCISE

This year has been a period of extensive fieldwork for the Greater Darwin case study:

- In July-August 2015, Dr Neale travelled to Darwin to complete in-depth interviews with 31 participants engaged in bushfire risk mitigation in the Greater Darwin area.
- In mid-December 2015, Dr Neale returned to the case study area to facilitate a scenario exercise with Professor Paul James (Western Sydney University) and Dr Elspeth Oppermann (Charles Darwin University). The scenario exercise brought together 14 participants from the Greater Darwin area to discuss the future of the area, the challenges of bushfire risk mitigation, and the forms of knowledge required to meet those challenges.
- In May-June 2016, Dr Neale returned to Darwin to complete final interviews and fieldwork for this case study.

This year has also been a period in which fieldwork for the Barwon-Otway case study was finalised:

- In October 2015, Dr Neale returned to the Barwon-Otway area to complete final interviews and fieldwork for this case study.

PUBLICATIONS

Several papers based upon the Barwon-Otway case study have now been published or accepted for publication. These include:

- Neale T, Weir JK and McGee TK. (2016) Knowing Wildfire Risk: scientific interactions with risk mitigation policy and practice in Victoria, Australia. *Geoforum* 72: 16-25.
- Neale T, Weir JK and Dovers S. (2016) Science in Motion: integrating scientific knowledge into bushfire risk mitigation in southwest Victoria. *Australian Journal of Emergency Management* 31: 13-17.
- Neale T. (In Press) Burning Anticipation: wildfire, risk mitigation and simulation modelling in Victoria, Australia. *Environment & Planning A*.

These publications build on the publication success of the project team in Year 2. Details of these earlier publications can be found later in this report. Dr Neale also published two briefs of the RMPP project for the BNHCRC blog (later included in *Fire Australia* magazine and *Asia Pacific Fire* magazine):

- Neale, T. (2016) Mitigating future risk with science, 2 March, BNHCRC, <http://www.bnhcrc.com.au/news/blogpost/timothy-neale/2016/mitigating-future-risk-science>.
- Neale, T. (2016) The social life of science in policy and planning, 2 March, BNHCRC, <http://www.bnhcrc.com.au/news/blogpost/timothy-neale/2016/social-life-science-policy-and-planning>.

PRESENTATIONS AND POSTERS

Over the past year, project team members have presented their research in a variety of forums at venues across Australia. These forums have included both natural hazards sector and academic audiences, including:

- Neale, T and Weir JK. Science in motion, *2015 AFAC/Bushfire and Natural Hazards CRC conference,* Adelaide, SA.
- Eburn, M. (2015) Science, knowledge and liability, *West Australian Local Government Association*, Perth, WA.
- Neale, T. (2015) Practising Calculability: wildfire, risk mitigation, and simulation modelling in southwest Victoria, *Research Institute for the Environment and Livelihoods Seminar Series*, Charles Darwin University, Darwin, NT.
- Neale, T. (2015) Practising Calculability: wildfire, risk mitigation, and simulation modelling in southwest Victoria,' *Institute for Culture and Society Seminar Series*, Western Sydney University, Parramatta, NSW.

- Neale, T. (2015) Inexistent Fires: imagining risk, knowledges and uncertainties in south-western Victoria, *Institute of Australian Geographers Conference*, Canberra, ACT.
- Neale T. (2016) Scientific Diversity, Scientific Uncertainty and Risk Mitigation Policy and Planning: Project Update. *Research Advisory Forum.* Hobart, TAS.
- Neale T. (2016) RMPP Project: Barwon-Otway case study. *Presentation to Department of Environment, Land, Water and Planning*, Melbourne, VIC.

The project team also presented the following poster:

- Neale T and Weir JK. (2015) Navigating scientific uncertainty in wildfire and flood risk mitigation, *2015 AFAC/Bushfire and Natural Hazards CRC conference,* Adelaide, SA.

END USER ENGAGEMENT

The RMPP project team have worked to establish and build strong end user engagement in the project's development and outputs from the start. End users have been vital to the successes of Year 3, and the project team is committed to continuing to meet regularly with end users to continue these successes. Engagement with end users and sector representatives has taken five primary forms.

- An 'End User newsletter' is circulated to end users every five to six weeks to brief end users of project progress, foreshadow emerging challenges and opportunities and solicit feedback on case studies and project outputs (see figure 1.1). The newsletter has been well received by end users, and is regularly republished on the BNHCRC website.
- The circulation and discussion of project outputs. These exchanges have been very important in guiding the project team and the development of project outputs.
- In-person and teleconference meetings between project team members and end users (see figure 1.2). These have provided important opportunities to discuss the project, its case studies and the utilisation of its research.
- Online engagement via social media platforms and the BNHCRC blog (see 'publications' above). Dr Neale (@tdneale) has 441 followers on Twitter and Dr Weir (@drjkweir) has 105 followers on Twitter and both actively user the platform to disseminate research findings and project news.
- Attendance at industry events, specifically the annual FAC Conference and BNHCRC Research Advisory Forum.

Figure 1.1: End User Newsletters in Year 3

Activity	Date

Newsletter 7	9 July 2015
Newsletter 8	29 September 2015
Newsletter 9	11 December 2016
Newsletter 10	2 March 2016
Newsletter 11	20 May 2016

Summary of End User Newsletters in Year 3

Figure 1.2: Key end user and sector meetings in Year 3

Activity	Date	Project team
Meeting with cluster researchers, BNHCRC lead end user and end users regarding research cluster	1 September 2015	Weir, Neale
Meeting with lead end user regarding project planning	30 November 2015	Neale
Meeting with BNHCRC colleagues regarding Darwin case study	5 September 2015	Weir, Neale
Seminar reporting Barwon-Otway findings at DELWP, attended by lead end user and project team member	19 April 2016	Neale, Handmer
Meeting with cluster researchers, BNHCRC lead end user and end users regarding project planning and utilisation	11 May 2016	Weir, Neale, Eburn

Summary of Key engagement activities in Year 3

PUBLICATIONS LIST

JOURNAL ARTICLES

- Neale T and Weir JK. (2015) Navigating scientific uncertainty in wildfire and flood risk mitigation: a qualitative review. *International Journal of Disaster Risk Reduction* 13: 255–265.
- Wodak J and Neale T. (2015) A critical review of the application of environmental scenario exercises. *Futures* 73: 176-186.
- Neale T, Weir JK and McGee TK. (2016) Knowing Wildfire Risk: scientific interactions with risk mitigation policy and practice in Victoria, Australia. *Geoforum* 72: 16-25.
- Neale T, Weir JK and Dovers S. (2016) Science in Motion: integrating scientific knowledge into bushfire risk mitigation in southwest Victoria. *Australian Journal of Emergency Management* 31: 13-17.
- Neale T. (In Press) Burning Anticipation: wildfire, risk mitigation and simulation modelling in Victoria, Australia. *Environment & Planning A*.

POSTERS

- Wodak J and Neale T. (2014) Can We Better Understand How Scientific Knowledges Work in Risk Mitigation Through Scenario Exercises? 2014 AFAC/Bushfire and Natural Hazards CRC conference. Wellington, NZ.
- Neale T and Weir JK. (2015) Navigating scientific uncertainty in wildfire and flood risk mitigation. 2015 AFAC/Bushfire and Natural Hazards CRC conference. Adelaide, SA.

PRESENTATIONS

- McGee, T (2014). Social science research insights into public support for wildfire mitigation. *Forest Fuels Management Workshop*. Hinton, Alberta, Canada.
- Weir JK. (2014). Scientific Diversity and Uncertainty: Bushfire and Flood Risk Mitigation. *BNHCRC Research Advisory Forum*. Adelaide.
- Eburn, M. (2014). Science and Fire Litigation. ANU College of Law. Canberra.
- Weir J and Neale T. (2015) Scientific Diversity, Scientific Uncertainty and Risk Mitigation Policy and Planning: Project Update. *Research Advisory Forum.* RFS NSW.
- Neale T. (2015) Inexistent Fires: imagining risk, knowledge and uncertainty in southwestern Victoria. *Fenner School Seminar, The Australian National University.* Canberra.

- McGee TK. (2015) Exploring Indigenous Peoples' Experiences of Wildfire Evacuation: First Nations Wildfire Evacuation Partnership. *Fenner School Seminar, The Australian National University.* Canberra.
- McGee TK. (2015) Exploring Indigenous Peoples' Experiences of Wildfire Evacuation: First Nations Wildfire Evacuation Partnership. *Institute for Culture and Society, Western Sydney University.* Parramatta.
- Neale, T. (2015) Scientific Diversity, Scientific Uncertainty and Risk Mitigation Policy and Planning, *Information Share,* NSW Rural Fire Services, Homebush.
- Neale, T. (2015) Practising Calculability: wildfire, risk mitigation, and simulation modelling in southwest Victoria, *Research Institute for the Environment and Livelihoods Seminar Series*, Charles Darwin University, Darwin, NT.
- Neale, T. (2015) Practising Calculability: wildfire, risk mitigation, and simulation modelling in southwest Victoria,' *Institute for Culture and Society Seminar Series*, Western Sydney University, Parramatta, NSW.
- Neale, T. (2015) Inexistent Fires: imagining risk, knowledges and uncertainties in southwestern Victoria, *Institute of Australian Geographers Conference*, Canberra, ACT.
- Neale T. (2016) RMPP Project: Barwon-Otway case study. *Presentation to Department of Environment, Land, Water and Planning*, Melbourne, VIC.
- Neale T. (2016) Scientific Diversity, Scientific Uncertainty and Risk Mitigation Policy and Planning: Project Update. *Research Advisory Forum.* Hobart, TAS.

REPORTS

- Wodak J. (2014) Scientific Diversity, Scientific Uncertainty and Risk Mitigation Policy and Planning: Scenario Methods literature review. Parramatta, NSW: Institute for Culture and Society, Western Sydney University.
- Neale T and Weir JK. (2014) Scientific Diversity, Scientific Uncertainty and Risk Mitigation Policy and Planning: Annual project report 2014. Melbourne, Vic: Bushfire & Natural Hazards CRC.
- Neale T. (2015) Scientific knowledge and scientific uncertainty in bushfire and flood risk mitigation: literature review, Melbourne, Vic.: Bushfire & Natural Hazards CRC.
- Neale T and Weir JK. (2015) Scientific Diversity, Scientific Uncertainty and Risk Mitigation Policy and Planning: Annual project report 2015. Melbourne, Vic: BNHCRC.

CURRENT TEAM MEMBERS

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Associate Professor Michael Eburn, College of School, Australian National University
Professor Stephen Dovers, Fenner School, Australian National University
Professor John Handmer, RMIT University

END USERS

Will Luker, Department of Premier and Cabinet, South Australia
Don Cranwell, Metropolitan Fire Service, South Australia
Chris Irvine, State Emergency Service, Tasmania
Leigh Miller, Country Fire Service, South Australia
Ed Pikusa, Fire and Emergency Services Commission, South Australia
Dylan Rowe, Department of Environment, Land, Water and Planning, Victoria
John Schauble, Emergency Management Victoria, Victoria
Patrick Schell, Rural Fire Service, New South Wales