ATTACHMENT A

FS1010081 – Reeder (PE) The dynamics of subtropical anticyclones and the connection to drought, heatwaves and bushfires in southern Australia. Total funding - $556,800

The research will answer two questions. 1. What controls the strength and location of the sea level pressure in winter over Australia? Because of the very strong correlation between the two, simulating the mean wintertime anticyclone correctly is a prerequisite for simulating the wintertime rainfall. 2. Are the summertime anticyclones associated with heatwaves and the most severe fire conditions, simulated well and for the correct physical reasons in climate models? Answering these questions are of fundamental importance when assessing the likely effects of climate change on rainfall, heatwaves and bushfires in southern Australia.

LP100200158 – Parris (BSB) The impact of severe bushfires on the ecology, demography and genetics of frogs in the Victorian Kinglake region. Total funding - $210000

Fire is an important ecological disturbance in Australia and worldwide. Fire can impact on wildlife populations through mortality during a fire, and reduced survival, dispersal and breeding success after a fire. In February 2009, the Kinglake region of Victoria was burnt by high-intensity fires. Uniquely, we have been studying three frog species in this area since 2006. In the first study of its kind, we will use pre- and post-fire data to measure impacts of these fires on the ecology and genetics of frog populations, and identify habitat features that will help frogs to persist during and after fires. We will also work with local communities and water authorities to develop management strategies for frog populations in fire-prone areas.

LP100200164 – Waters (SBE) Bushfires, social connectedness and mental health. Total funding - $1,285,047

This research program aims to profile the trajectories of individual and social response to the Victorian 2009 bushfires using multiple methodologies and involving multiple community partners. It will survey affected and unaffected communities to map the predictors and outcomes of mental health and social functioning in children, adolescents, and adults. Conducting the research over five years and focussing on social networks will provide new insights into the interplay between individual and community factors and their influence on recovery from natural disaster over time. The research findings will thereby expand understanding of long term disaster recovery needs for individuals and communities.

DP0557416 – Lynch (PE) Climate, Vegetation and Fire in the Australian Paleomonsoon: An investigation using paleodata synthesis, contemporary observations and model experiments. Total funding - $280,000

Interactions between climate, the ocean and land, and the Australian monsoon are complex, as they result from feedbacks operating on a variety of spatial and temporal scales. We will use a synthesis of paleoenvironmental and contemporary data and climate system modeling to understand these interactions over the late Quaternary period. The synthesis will aid in the generation of hypotheses to explain key transition periods in the region's past history, and will be used to achieve an improved understanding of climate variability and forcing mechanisms in the region, leading to an enhancement of climate modeling tools used to predict global change.

DP0557638 – Mueller (EE) The role of bush fires in the formation and fate of dioxin like chemicals in Australia. Total funding - $178,000

Dioxins are persistent, highly toxic and bioaccumulative compounds subject to the global POPs treaty, currently under review for ratification by the Australian government. Previous extrapolation from combustion chamber (emission) studies implied that bushfires contribute substantially to the total dioxin emissions in Australia. Recent work demonstrates: a) dioxin formation in chamber experiments is not representative of bushfires b) dioxin emissions from bushfires are not necessarily the result of formation, but re-emission processes. We propose a systematic approach to quantify dioxin formation and re-emission from bushfires. The outcomes are essential for appropriate management actions to reduce dioxin emissions.

DP0665083 Kirkpatrick (BSB) Grazing-fire interactions and vegetation dynamics. Total funding - $276,000

The influence of vertebrate grazers on fire regimes has been little explored, while being highly likely to be critical for the management of native vegetation and biodiversity in reserved and pastoral areas in relatively fertile places. Six hypotheses related to this influence will be tested in field experiments in Tasmania. The novel hypotheses are: the more even the fodder production through time the less will be the fuel available for a fire; the ratio between the fodder available in unburned vegetation and that available in post-fire regeneration will influence the impact of vertebrate grazers on regenerating vegetation. The results from these experiments will be used in the development of predictive models of vegetation change.

DP0666122 Reeder (PE) Coupled Atmosphere-Bushfire Modelling with Application to Canberra 2003. Total funding - $309,000

Bushfires often cause great damage and loss of life, and are especially dangerous in those areas where Australia's large urban communities merge with their rural surroundings. The most recent example is Canberra in 2003. The huge advances made in computer technology and mathematical numerical modelling will be applied directly to bushfire meteorology problems. This project will determine how best to represent combustion in such a model; will develop computational methods to more accurately predict the behaviour and spread of bushfires in complex terrain, especially when affected by the passage of a cold front; and will investigate the dynamics of the bushfire smoke plume. The project will use the Canberra fires of 2003 as a test bed.

LP0775145 Clarke (BSB) Fire severity, habitat heterogeneity and life histories. Resolving the persistence ability of plants in frequently fired landscapes. Total funding - $319,003

Fire regimes are changing and new concepts and methods are needed to unravel the effect of fire intensity on biodiversity. This study is significant because it will answer theoretical and management questions about the influence of fire intensity on plants at landscape scales. It is particularly relevant because of widespread community debate after wildfires and the impact of hazard reduction. This research will predict plant persistence patterns across fired landscapes so management thresholds can be set for fire regimes to maintain biodiversity. A key outcome will be a modelling tool to assess risk of future fires exceeding sustainable biodiversity levels.

LP0775172 Enright (EE) Management of fire-prone shrublands in Western Australia: testing the effects of frequent fire. Total funding - $210,000

This study investigates the effects of fire frequency on SW Australian shrublands in collaboration with CALM, WA. Fire regime has changed dramatically since displacement of Aborigines by European settlement according to recent (controversial) grasstree fire histories, but the ecological effects of frequent fire on high diversity shrublands is uncertain. We will quantify historical and modern fire regimes using satellite imagery and grasstree fire histories, and use experimental fires to explore the relationships between fire regime, plant community attributes, fuel dynamics, fire risk and biodiversity conservation. New fire management prescriptions for shrublands will be proposed.

LP0882579 Grierson (BSB) Fire management of complex rehabilitated forests - quantifying and understanding spatial variability of forest structure and fuels. Total funding - $343,500

Fire can be a risk to human and ecological values, and its management complicated by landscape fragmentation. Improved management is dependent on understanding factors that determine fire behaviour and its ecological consequences. We will investigate fuel distribution, fire behaviour and vegetation recovery across a complex forest mosaic. Our objective is to understand how fine-scale fuel patterns and vegetation characteristics evolve in rehabilitated eucalypt forest and how these patterns affect subsequent fire behaviour and impacts. This research will define the way prescribed fire is used to integrate young rehabilitated forest into management of the broader landscape and develop more cost-effective tools for fire management.

LP0992107 Milne (MIC) Simulation Technology for Modelling Extreme Bushfire Behaviour. Total funding - $220,000

The speed at which bushfires spread depends on weather, vegetation type and time since last fire. Data from historic bushfires has been collected using satellite imagery. Computer simulation of these fires and state-of-the-art evolutionary algorithms will be used to infer appropriate rate-of-spread behaviour for specific fuel types, particularly during extreme weather conditions which are responsible for the most dangerous bushfires. The result will be models of fire spread validated against bushfires in extreme weather. This contrasts with current approaches using observations from fire experiments in mild conditions. The models will be utilised by a website that forecasts fire spread in real-time using live fuel and weather data.

DP1093148 Lane (EE) The dynamics and predictability of fire weather over southern Australia. Total funding - $210,000

The prediction of fire weather and fire spread is currently hampered by an incomplete knowledge of the underlying meteorological processes and their effect on fire behaviour. This project seeks to examine the key processes that induce local enhancements in extreme fire weather in regions of complex terrain. These will be examined using numerical modelling at very high resolutions and utilize state-of-the-art methods to explore the dynamics and predictability of these processes.

DP1097170 Lindenmayer (BSB) An unprecedented opportunity to quantify biodiversity recovery after major wildfire. Total funding - $1,499,339

Understanding post-disturbance ecological recovery is essential to understanding ecosystem processes, community composition and population persistence. The 2009 Victorian wildfires provide an unprecedented scientific opportunity to address significant knowledge gaps about ecological recovery. By building on 25 years of research and long-term (pre-fire) data in Victorian forests, we will establish a powerful longitudinal study to answer key new questions about post-fire recovery. Wildfire effects on forest biodiversity and ecological processes are further complicated by post-disturbance salvage logging. We will implement a carefully designed split-plot experiment to address major knowledge gaps in ecological recovery after salvage logging.

LP1020825 Adams (BSB) Fires, black carbon, greenhouse gas emissions and the carbon balance of southern sclerophyll forests. Total funding - $533,335

This project will address key gaps in knowledge of the effects of bushfires and prescribed fires on carbon budgets of southern forests, especially the mixed species forests at intermediate elevations that dominate foothils of the Great Divide. The project will elucidate relationships between fire intensity and the amounts and nature of different fractions of black carbon. It will provide a first analysis of the chemical and physical properties of recently produced black carbon and its chemical and biochemical reactivity in soils. The project will establish how black carbon fractions of different physical and chemical properties affect major processes such as heterotrophic respiration, methane oxidation and production of nitrous oxide.

*** All figures are GST Free**