 PROGRAM A

Understanding the interactions of climate and bushfire in Australia

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Objective

• Summarize climate issues as they relate to bushfires

• Highlight research that the CRC is doing in these areas

  • Understanding the past and present climate/bushfire interactions

  • Identifying future fire/climate interactions
Why study climate and bushfires?

- Observed seasonal variations are reflection of climate

Fire Seasons in Australia

Why study climate and bushfires?

- Observed seasonal variations are reflection of climate
- Impacts on the day-to-day weather variability

Surface Map -- 16 February 1983
Why study climate and bushfires?

- Observed seasonal variations are reflection of climate
- Impacts on the day-to-day weather variability
- Long-term effects on vegetation
Understanding the past and present

- Compile a historical dataset for fire weather
- Understanding the variability of fire weather

Creating the FFDI dataset

- 54 climate stations across Australia
- Extends from 1957 through 2003
- Use high-quality humidity and maximum temperature data sets
- Station data rainfall and wind speed
- Drought factor based on KBDI
- ‘Extreme’ FFDI - daily worse case scenario
- Use as a relative weather index rather than a fire-behaviour index
- See my poster!
Wind data problems

Historical Fire Weather Dataset
Interpreting the plots

- Portion of frequency distribution shown for different time periods
- Box-and-whiskers plot
- Focus on upper percentiles
- Some plots show red line or mark above indicating highest observation over period

Canberra weekly distribution - all years
Interannual variability of seasonal FFDI

El Nino-Southern Oscillation (ENSO)

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**ENSO and Rainfall in Australia - El Nino**

*Map showing mean rainfall in Australia with color codes for different rainfall categories.*

**ENSO and Rainfall in Australia - La Nina**

*Map showing mean rainfall in Australia with color codes for different rainfall categories.*
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⇒ ENSO phase and the distribution of FFDI

⇒ Fire danger rating and ENSO
Other possible climate factors affecting Australian bushfires

- Indian Ocean dipole
- Madden-Julian Oscillation
- Southern Annular Mode
- Antarctic Circumpolar Wave
- etc

Identifying future interactions

- Seasonal forecasting
- Climate change
Seasonal Bushfire Assessment Workshop

- To support decision-making needs and provide information that can assist fire managers with determining budgets, priorities, resource allocations and public education
- To improve the capabilities of states to incorporate new and long-term information into their decision-making processes
- To implement a standardized product that is evidence-based and defensible
- To build capacity between states and fire management and weather/climate partners

Workshop attendees

- Australasian Fire Authorities Council
- Bushfire CRC
- Bureau of Meteorology
- Bushfires Council NT
- Conservation and Land Management (CALM)
- Cape York Fire Management Project
- Country Fire Authority (CFA)
- Country Fire Service (CFS)
- Department of Environment and Heritage (DEH)
- Desert Research Institute
- Department of Sustainability and Environment (DSE)
- Fire and Emergency Services Authority (FESA)
- Forest NSW
- NSW Fire Brigades
- NSW Rural Fire Service
- Queensland Fire and Rescue
- Tasmania Fire Service
Fire potential definition

The chance of a fire or number of fires occurring of such size, complexity or other impact which requires resources beyond the area in which it or they originate.

The potential for a significant fire situation is a sum of factors that includes fuels, ignition triggers, significant weather triggers and resources.
Effects of Climate Change on Fire Weather

- Modelling study with Kevin Hennessy of CSIRO (see his talk tomorrow for complete details!!)
- Two forcing scenarios on two climate models (CCAM2 and CCAM3)
- Apply changes in model distributions of temperature, humidity, wind and rain to observed data
- Recompute FFDI using new distributions
- SE Australia (NSW, VIC, TAS, ACT) only
- Report commissioned by various state government agencies
Limitations of the study

- Only SE Australia -- expand to other areas
- How will climate change affect ENSO?
  - Changes in intensity and/or frequency?
  - Changes in La Nina?
- Climate/vegetation interactions not included
  - These are already occurring
  - Increase in woody biomass, linked to increasing CO$_2$
  - Expansion of rain forest at expense of eucalypt forest and grassland, linked to increasing rainfall
  - See Chambers (2006) for review