bushfire CRC

BCRC Research Project - F.I.R.E. D.S.T.
Fire Impact and Risk Evaluation Decision Support Tool

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Outcomes from recent extreme fires have demonstrated a need for a tool to assess future bushfire impacts on regional and periurban communities. Such a tool will enable fire and land management authorities to develop appropriate fire risk treatment options at local, regional and national levels. The tool will characterise vegetation, extreme fire weather, firespread, smoke production and dispersion, and estimate the consequences of extreme fires in three case study scenarios. The case studies will be directed at extreme fires

Research Questions

To answer the fundamental question 'What are the impacts and risks of extreme fire events on regional populations and infrastructure in Australia?' research questions include:

(1) What is the sensitivity of extreme fire behaviour to atmospheric conditions and complex terrain?
(2) What definitions of fuels are appropriate?
(3) What are the requirements of asset databases?
(4) What models are required to describe potential house loss (neighbourhood scale)?
(5) What are the risks to population health and mortality from extreme fire smoke?
(6) What are the potential impacts to movement of emergency services and local residents from reduced visibility?
(7) How will the tool improve strategic fire management through 'what if' scenarios?

Methodology

The methodology is outlined in Figure 1. A software platform will integrate the components and deliver 'what if' scenarios, based around the further development of the Phoenix RapidFire fire-spread model (Figure 2). The project will also explore the model sensitivities and their effects on outputs. End user collaborators will play a major role in choosing and preparing the scenarios. At the end of three years a research tool will be available to agencies for beta-testing, training and evaluation. However, the tool will still be without valuable capabilities such as a capability for probabilistic risk assessment, which are dependent on the outcomes of PhD investigations.

Participant Roles

Geoscience Australia: Impact and risk assessment framework and 'impact zone' infrastructure mapping and loss tool.

University of Melbourne: Phoenix RapidFire fire-spread model (3-D dynamic parameterisation).

Bureau of Meteorology: high-resolution ensemble numerical weather prediction

CSIRO: neighbourhood scale vulnerability model and smoke emission model
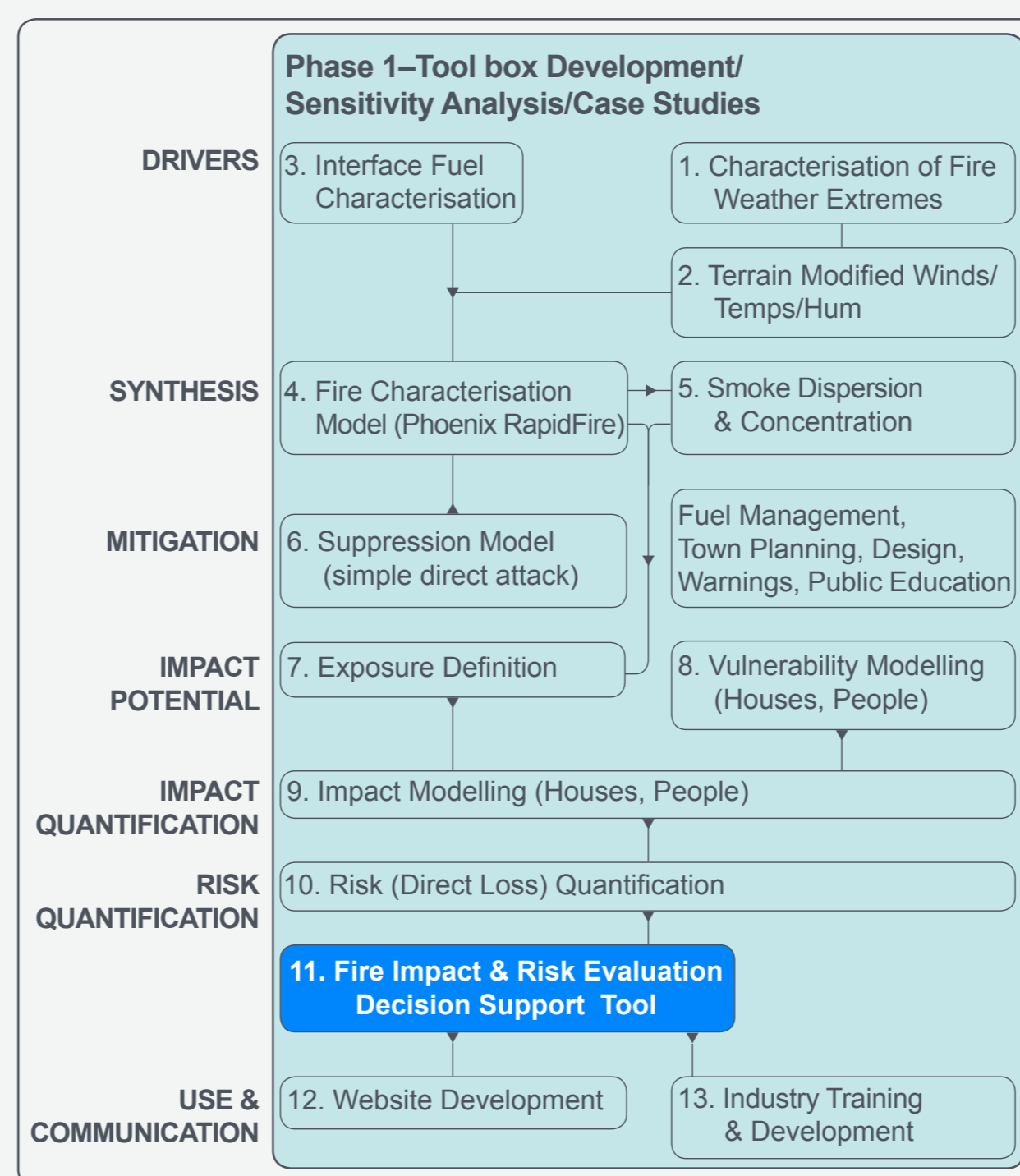

Figure 1. Project components for FIRE DST. Activities will be undertaken by project researchers with CRC and in-kind support.
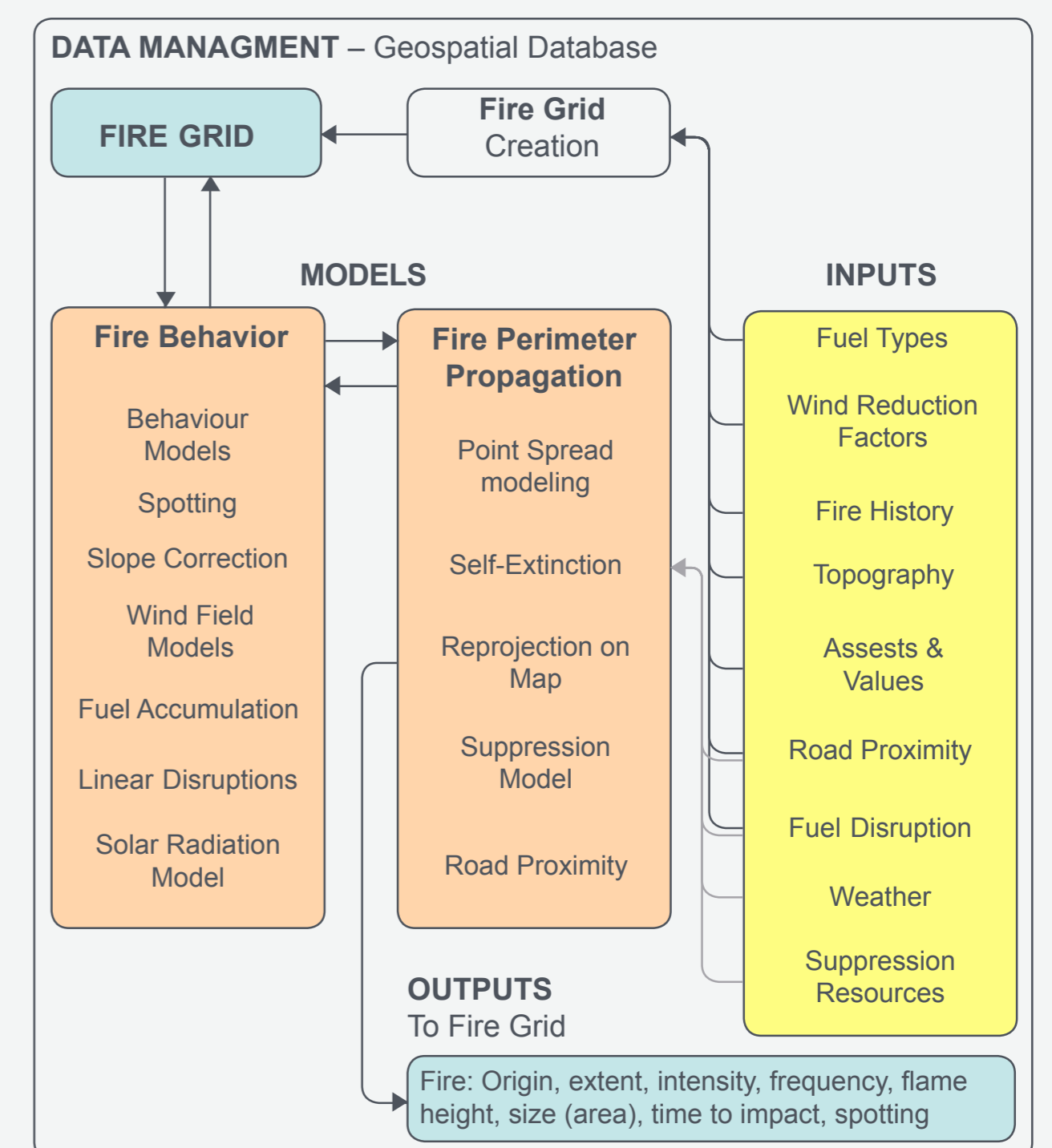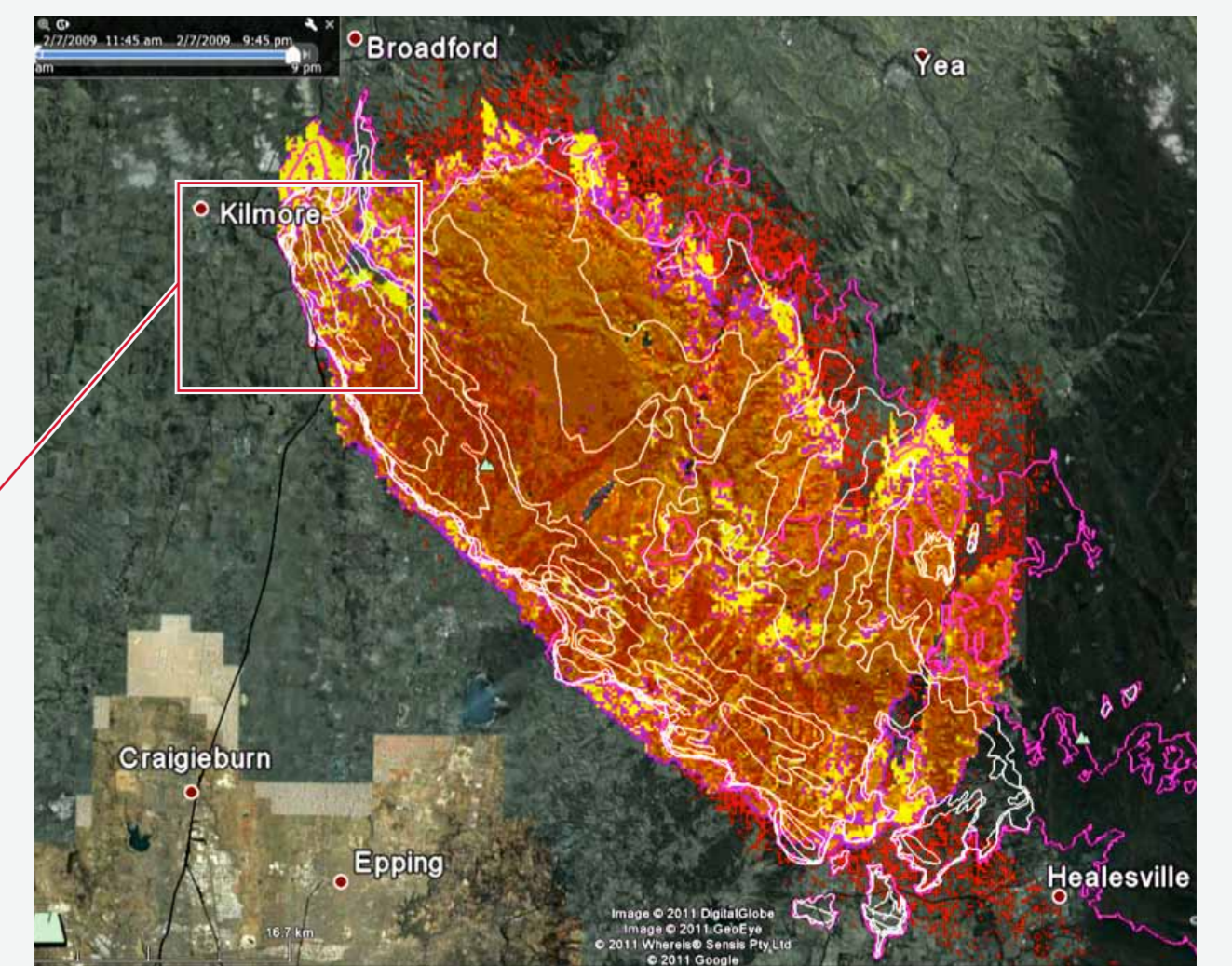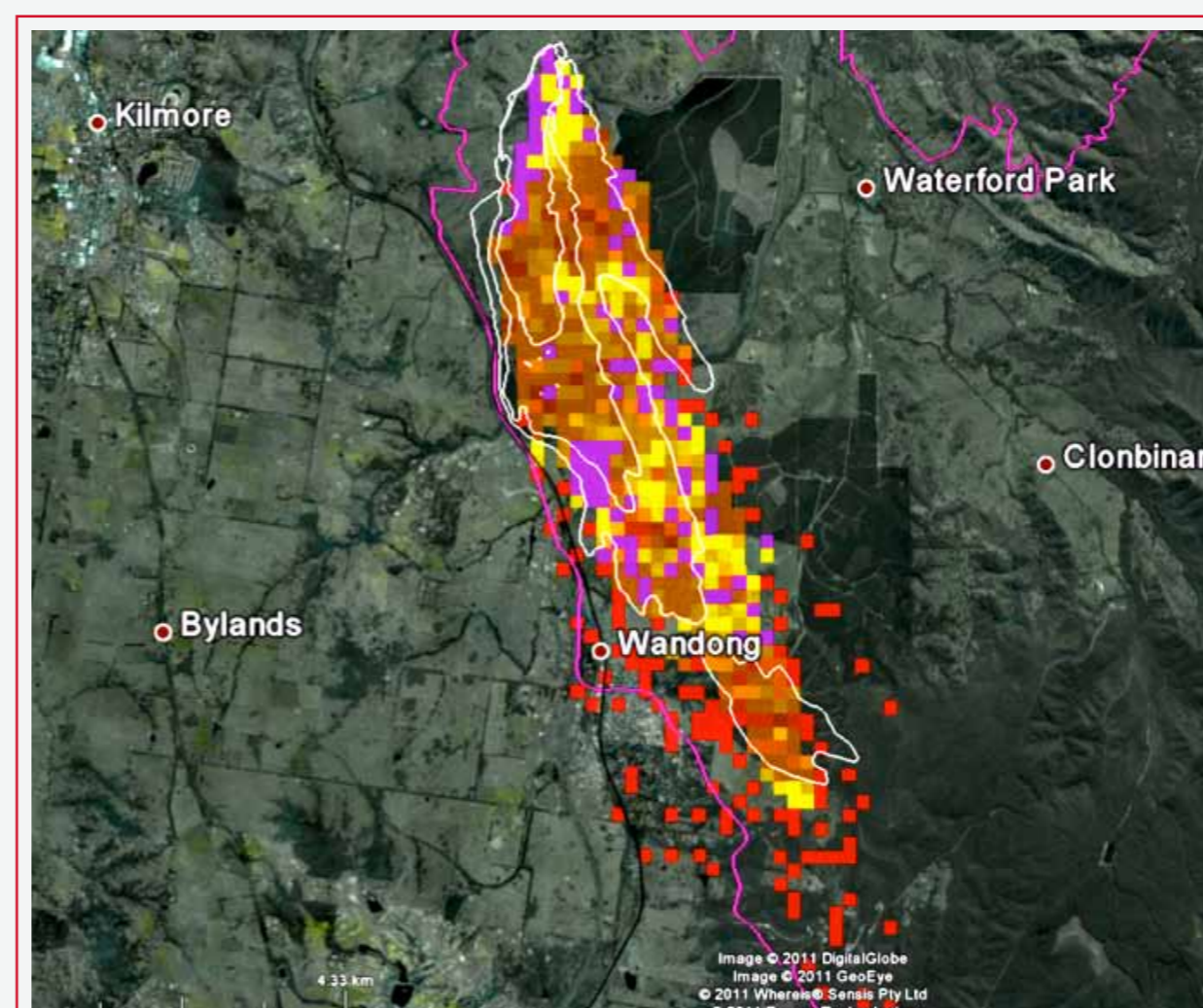

Figure 2. Schematic diagram of Phoenix Rapidfire with inputs, outputs and data storage.

Figures 3 and 4. Phoenix Rapidfire simulation of Black Saturday "Kilmore" fire which started on farmland about 2:30pm. White lines show reconstructed fire isochrones. Brown to yellow cells show modelled flame height (brown high, yellow low), red cells show possible extent of spotting, purple cells show ignited cells that have self-extinguished due to lack of fuel or fuel moisture. Pink line shows the final extent of area burnt after several days. Each cell is 180m x 180m (3.24ha).