



# Fire Masterclass

## Predicting fire behaviour from plant species

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## What and Why I model...

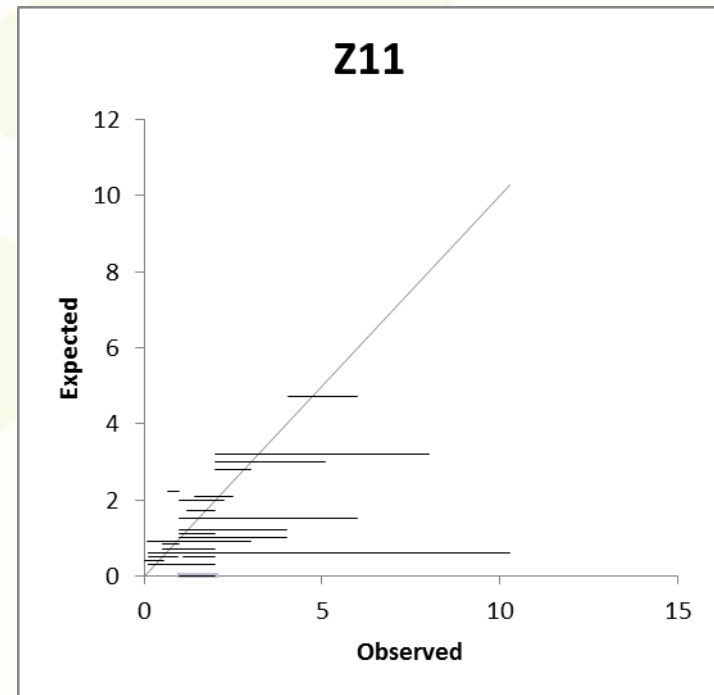
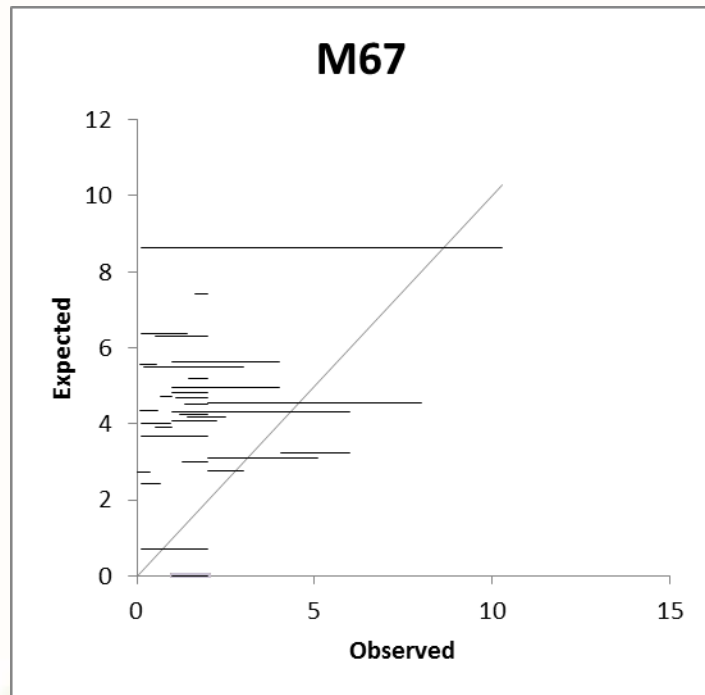
- How do plant species affect fire behaviour? What about climate/disturbance induced changes in plant attributes such as leaf dimensions or chemistry?
- The model operates at a stand level giving dynamic (1s time step) flame dimensions and characteristics averaged for the location. Spatial software is in development to apply it across a landscape.
- As the model is a snapshot, climate/weather and ecological details are inputs.

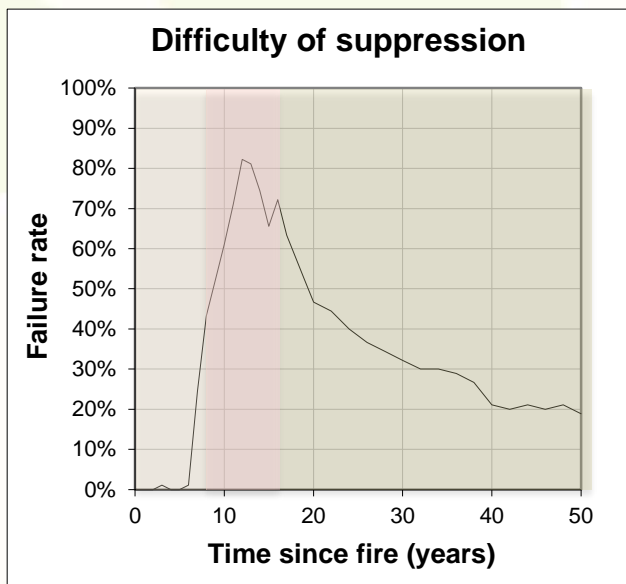
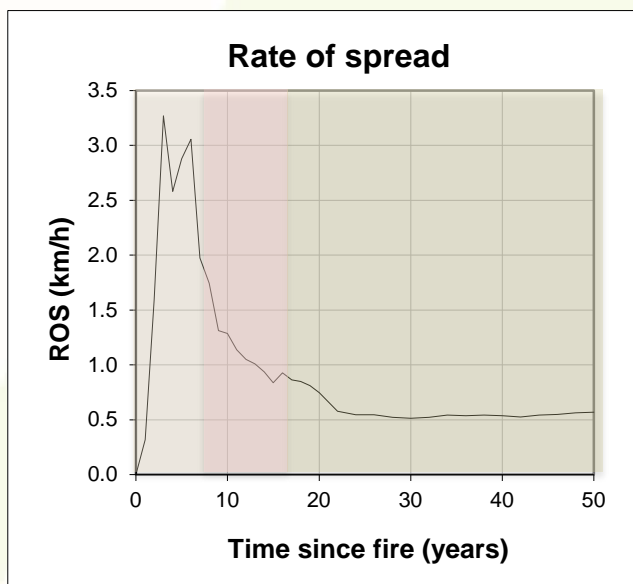
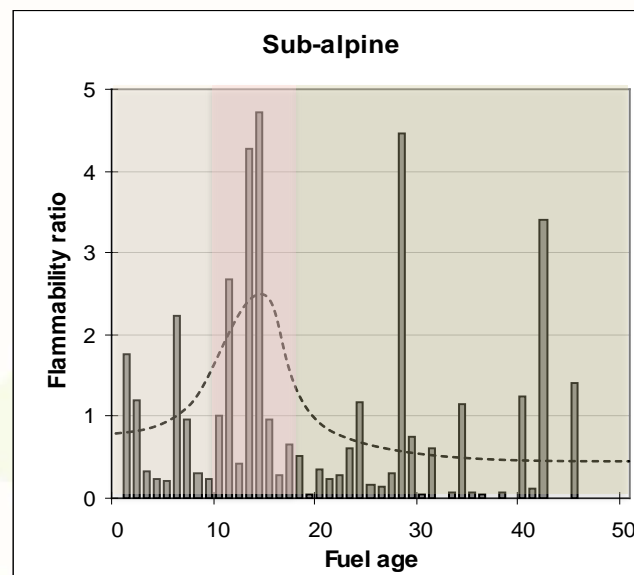
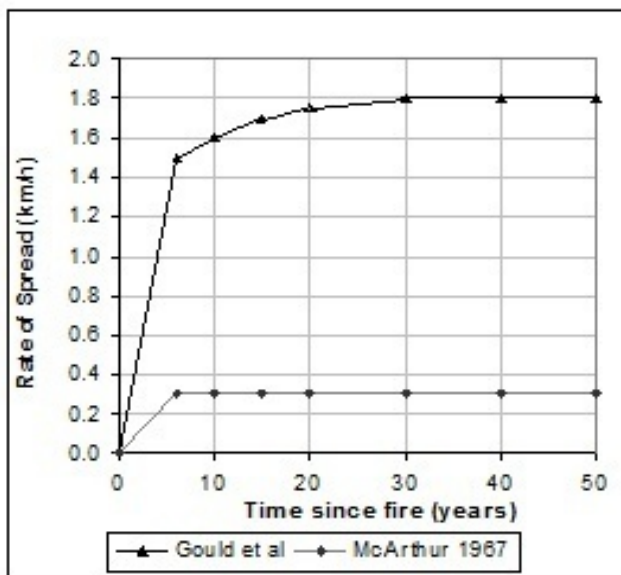




Site 90: McArthur 6.3m, FFM 0.7m, Actual 0.5 – 2m







Zylstra P (2011) Forest flammability: modelling and managing a complex system. PhD Thesis, UNSW@ADFA

Zylstra P (2013) The historical influence of fire on the flammability of subalpine Snowgum forest and woodland.  
Victorian Naturalist (In press)

# What does my modelling mean?

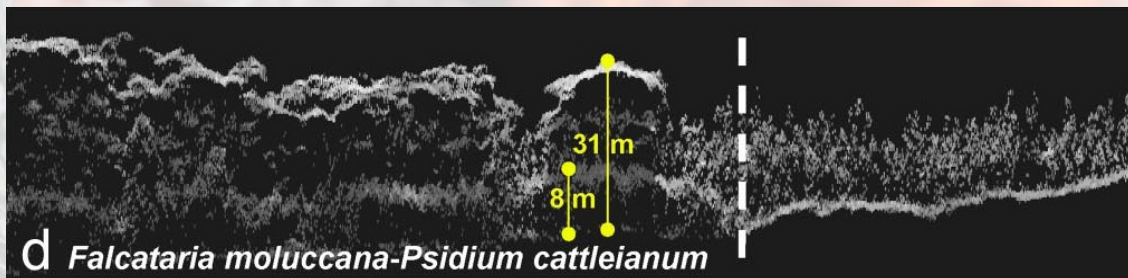
- Fire ecology studies the influence of fire on plant species, the FFM models the influence of plant species on fire.
- Allows analysis of fine-scale changes in vegetation such as shifting phenology, effects of succession/disturbance/invasive species, or climatic influences. Operational applications include incident management, risk modelling and better planning of prescribed burns.

# Modelling Caveats

- Models convective transfer using vectors rather than Navier-Stokes
- A range of assumptions around radiative fire spread
- Only as good as component sub-models
- Identifies thresholds in changed behaviour, so is highly sensitive to certain inputs under certain conditions.

## My 3 biggest modelling challenges

1. Fuel structure inputs
2. Species descriptors
3. Plant moisture per species



Asner *et al* (2008) Invasive plants transform the three dimensional structure of rainforests. *PNAS* **105**(11), 4519-4523