Flame propagation in shrubland fuels

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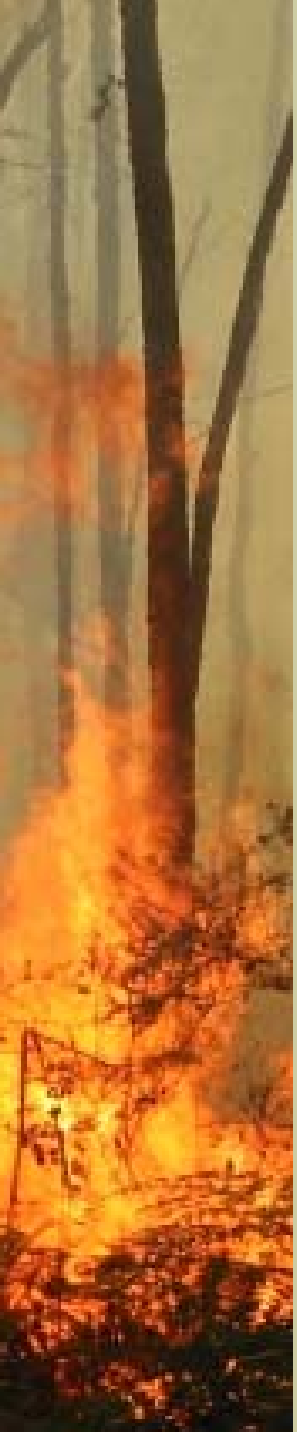

Fire in Heath

- Usually a crown fire
- A “Go” / “No Go “ way about them
- Little lateral spread
- Still holds surprises for land managers and researchers.

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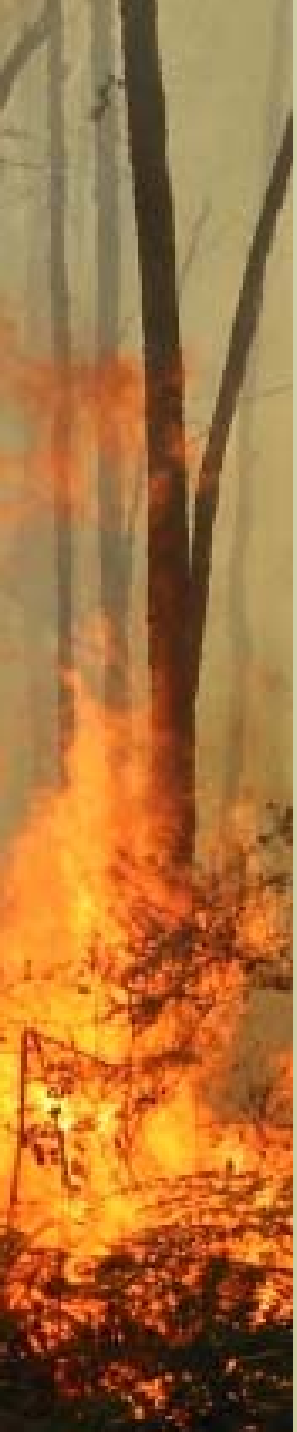

Scaled down forest crown fires?

- As green canopy is removed drier material is exposed to greater wind.
- This is not unlike crowning forest fires but contrasts with surface litter fires and grass fires.
- Height and bulk density are major differences
- Under-running surface fire can occur in heath

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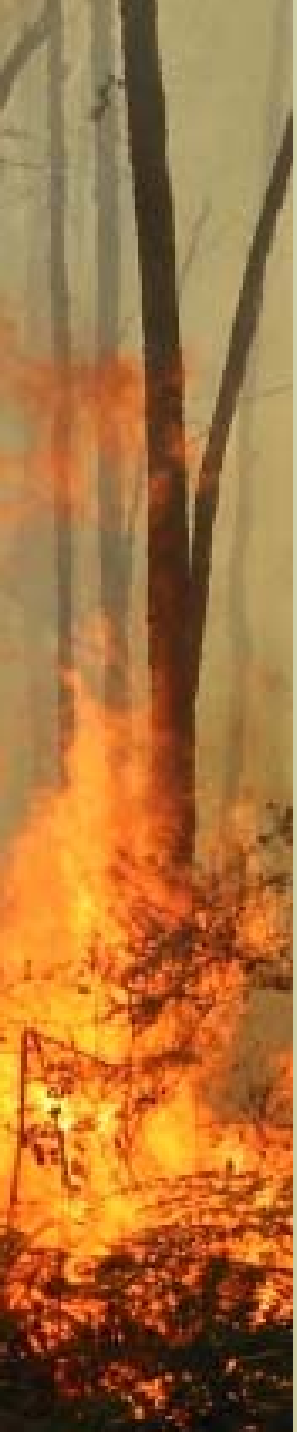

Canopy removal

- Exposes the more flammable lower layers to more wind
- But- provides a mechanism which can moderate escalating fire behaviour.

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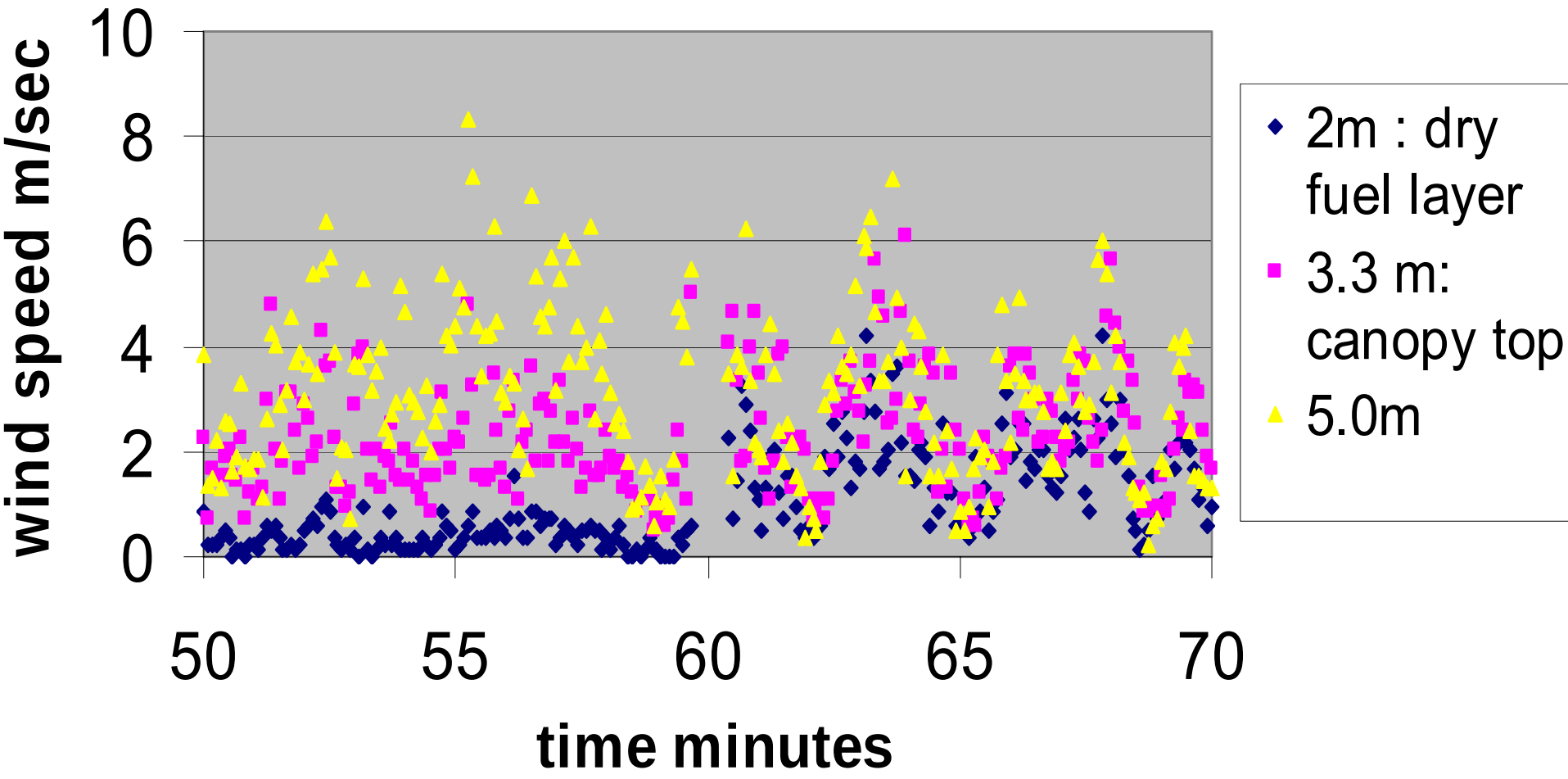
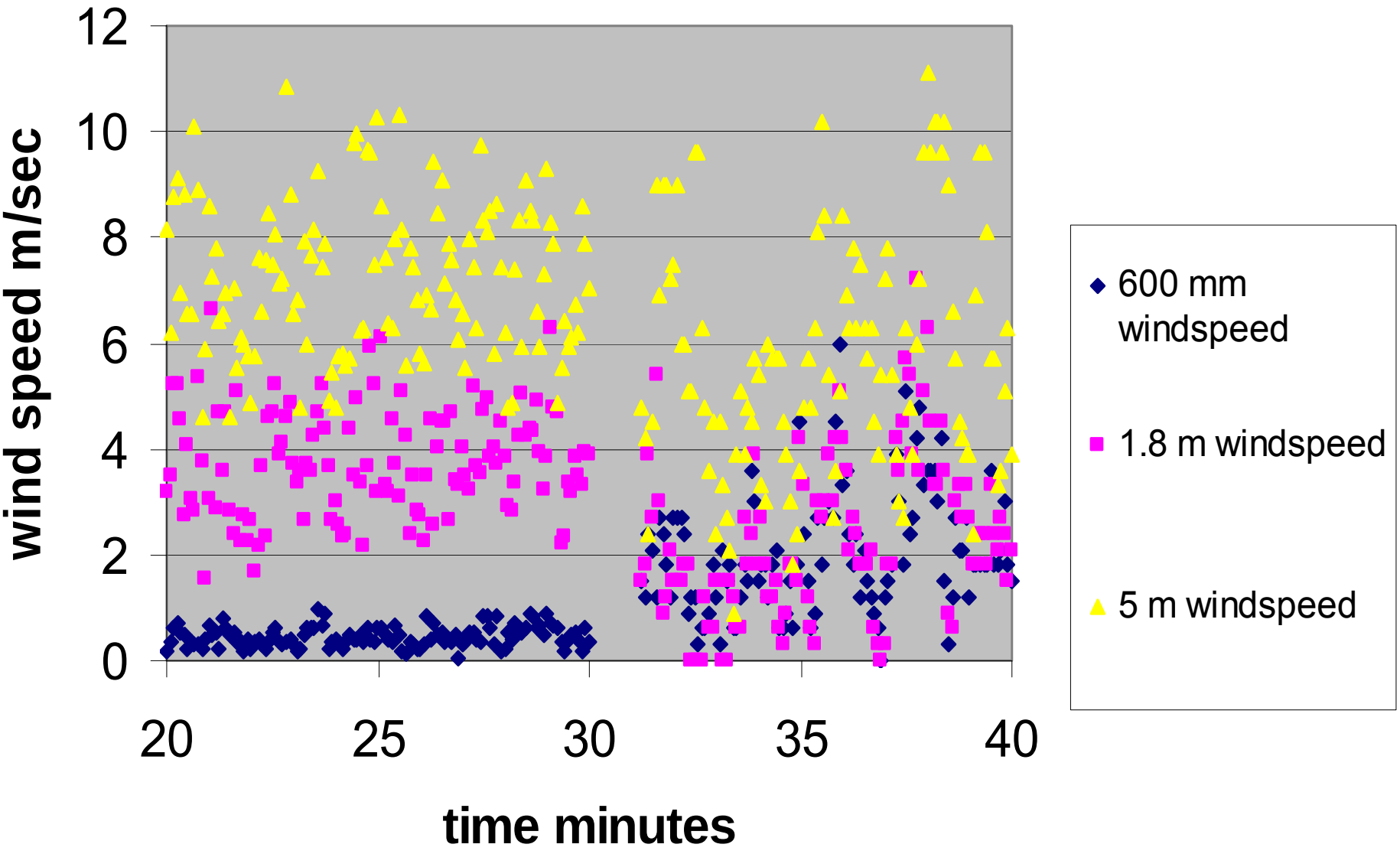
9 12:06PM

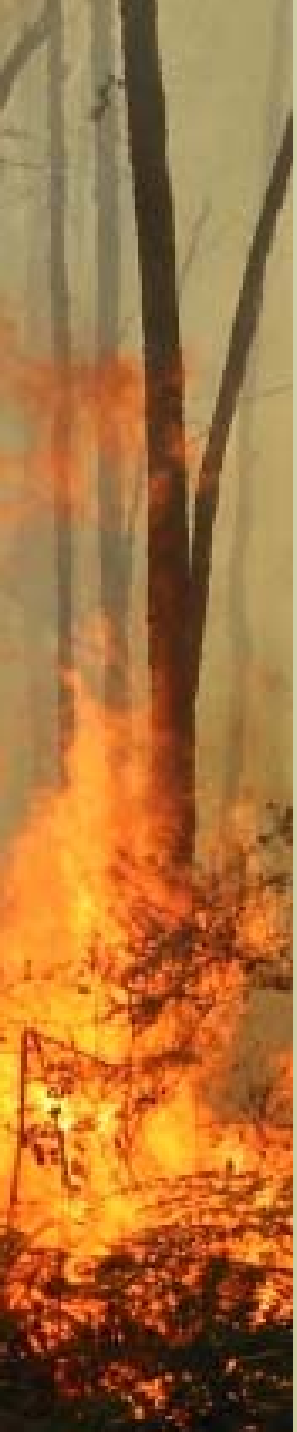

9 12:07PM

wind profile changes with canopy removal



wind profile change in low heath





Moderators of fire behaviour

- Convective wind feedback.
- Volatile gas release – thermal transfer limitations
- Protection of most-flammable zone by green cap.
- Green cap burnout time less sensitive to FDI parameters.

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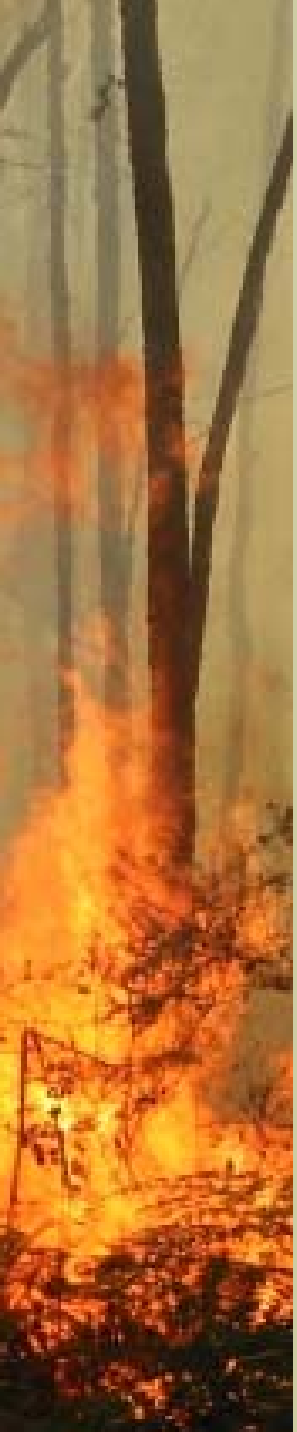

Downwind video at Ngarkat

- Note 10 sec removal of canopy.

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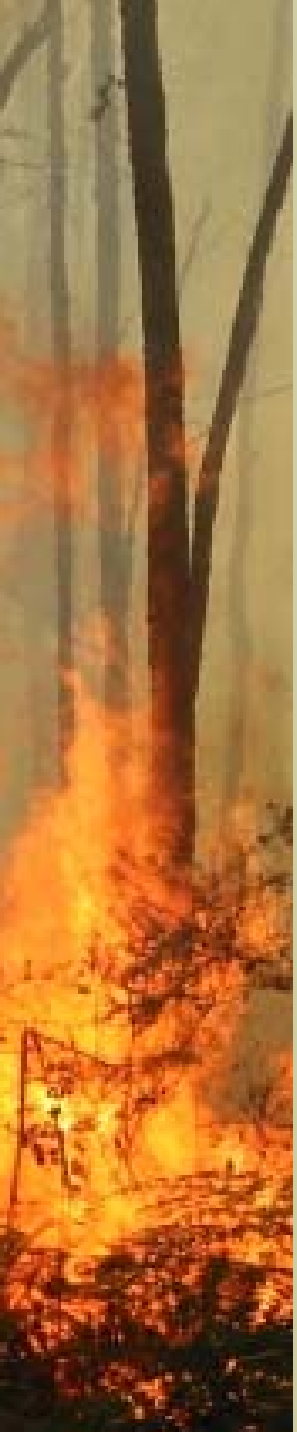

Canopy removal

$U_f = U_o / (1 + {}_{fd}\int D\, dx)$

ie wind at flaming zone decreases with increasing flame depth

$F_d = R * 11sec$

ie. constant green cap burnout.

Combining

$R \alpha \sqrt{(1 + K U)} - C$ … a threshold to get started,

less than linear at higher windspeeds.

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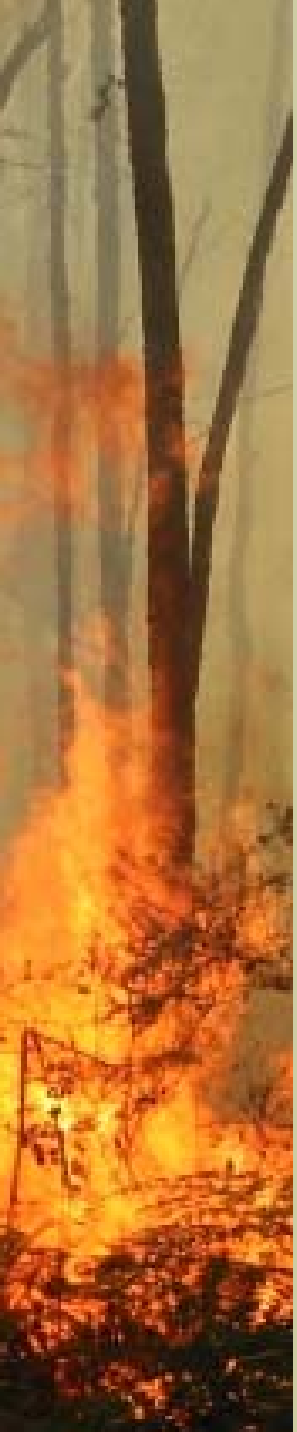

Conclusions

- Changing canopy drag as green material is removed is a moderator of fire behaviour in both heath and forest vegetation.
- Should be observed as a less-than-linear response to wind at the upper end of fire behaviour.

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