


Fire Danger Rating and Fire Behaviour Prediction

Current and Future Research Needs

User Perspective by Victorian Department of Sustainability and Environment

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Fire Behaviour Prediction - What We Talking About?

A way of consistently assessing how fuel, weather and topography influence:


How quickly fires spread

Fuel consumed and intensity

Fire size and shape









Fire Danger Rating - What We Talking About?

Combines, simplifies and represents how fuel, weather and topography influence:



The Chance of Fire Starting
(ease/likelihood of ignition)



The Chance of Fire Spreading
(difficulty of control/continuity across the landscape)



The Chance of Fire Doing Damage
(how intense, how fast, embers)




Are They Different?

Common Basis:

- An ability to predict fire behaviour.

Fire Danger Rating Needs More:

- **Difficulty of control:**
 - suppression thresholds and construction rates;
- **Ability to do damage:**
 - fire intensity;
 - embers;
 - asset exposure and vulnerability.





How Are They Used?

Fire Danger Rating:

- Broad scale/general decision making (eg.):
 - Statewide resource allocation (fire climate) and deployment (seasonal);
 - Regional preparedness/stand up levels/operational controls;
 - Prescribed burn program management (should we or shouldn't we);
 - Public awareness about seasonal/daily severity.

Fire Behaviour Prediction:

- More accurate decision making (eg.):
 - Burn prescriptions and implementation;
 - Incident Action Plans (achievable objectives and suitable strategies);
 - Consistent and timely predictions used to alert communities of pending bushfire threat (that we have confidence in!).




What do we need now?

Recognise that:

- Basis is the same, but uses are different;
- McArthur Forest Fire Danger Rating System has served us well but....
- We rely too much on local adaptation (mobile workforce/volunteer retention);
- We need more knowledge transfer - use what we know, acknowledge what don't!






What do we need now?


Recognise that:

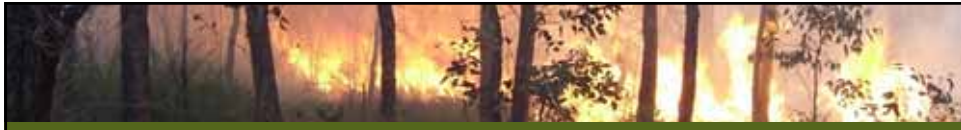
- **Worst Case Fire Danger (Black Friday and Mangoplah) has been exceeded several times - scales need to better reflect this;**
- **Forest Fire Danger Rating needs to better reflect:**
 - Regional fuel/fire behaviour differences (big impact at lower fire dangers),
 - Real fuel moisture and fuel availabilities (Drought Factor is too blunt, not all fuels are surface fuels),
 - Influence of atmospheric stability on fire behaviour (Haines Index in Tasmania, Warm Slots in SE Australia); and
- **Fire behaviour, suppression effectiveness and asset vulnerability data and knowledge are essential for basis and constant improvement.**

What do we need in the future?

- **Quantify our critical fire environment factors and how these change in time and space, and influence fire behaviour/danger:**
 - fuel moisture;
 - fuel/hazard availability;
 - fuel continuity (especially drought/curing impacts);
 - wind flow in different stand structures/terrain types;
- **More effort to quantify fire environment, fire behaviour, suppression effectiveness and impacts during fire events - LEARN IN AN INTEGRATED WAY;**
- **Fire Danger Rating Systems and Knowledge Transfer updated to reflect latest knowledge on an ongoing basis;**
- **High level applications developed with users, using their data and systems;**
- **Users more involved!**





*unexpected fire behaviour only occurs when
we have failed to properly evaluate the
conditions, influences and forces that are in
control of the fire*

- Countryman 1972

