USING AUTOMATED FUEL MOISTURE SENSORS TO PLAN PRESCRIBED BURNS

bushfire&natural HAZARDS CRC

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DELWP is trialing a statewide Automated Fuel Moisture Monitoring Network (AFMMN) to improve the planned burn program. We conducted a preliminary assessment of AFMMN data as a tool for decision making by fire managers planning prescribed burns.

INTRODUCTION

The decision to burn is only made if **F**uel **M**oisture **C**ontent (**FMC**, mass of water per unit mass of dry fuel) falls within a narrow, **Good** range.

FMC categories:
-**Dry** (0-10 %): High intensity fire, difficult to control
-**Good** (11-16 %): Effective, safe prescribed burn
-**Damp** (17-22 %): Patchy , ineffective burn
-**Wet** (≥ 23 %): Ignition difficult

FMC values predicted by sensors may not align with (observed) FMC *in situ*, leading to costly incorrect decisions (Fig. 1).
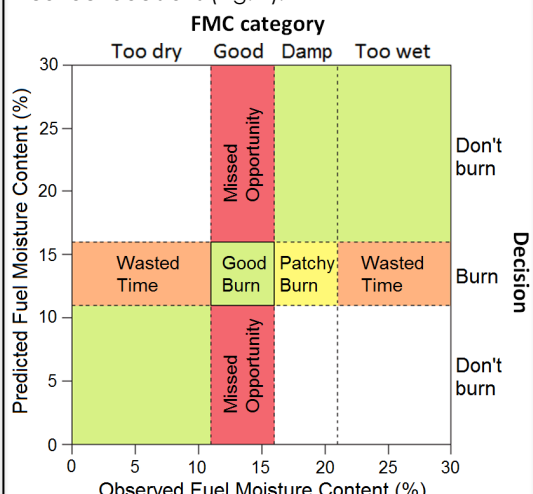
Fig. 1 Operational consequences of decisions based on predicted (sensor) FMC. Correct decisions are made in green and white cells, but predicted FMC in white cells is incorrect. Figure adapted from Slijepcevic et al. (2015)

Fig. 2 Typical Array of four Fuel Moisture Sticks

METHODS

Using data from 8 sites (40 x 40m), 8 EVCs, Victoria-wide, we compared:

Predicted FMC:
Measured with a vertical array of 4 fuelsticks per site (Fig. 2):

-**Soil contact:** beneath litter
-**Exposed:** resting on top of litter
-**Near surface:** 10 cm above ground
-**Elevated:** 50 cm above ground

Observed (gravimetric) FMC:
6-8 samples/site, 15 quadrats/sample, 5 fuel types:

-**Surface litter** (top 1 cm)
-**Sub-surface litter**
-**Elevated fuels**
-**Stringybark**
-**Ribbon bark**

Sites

RESULTS
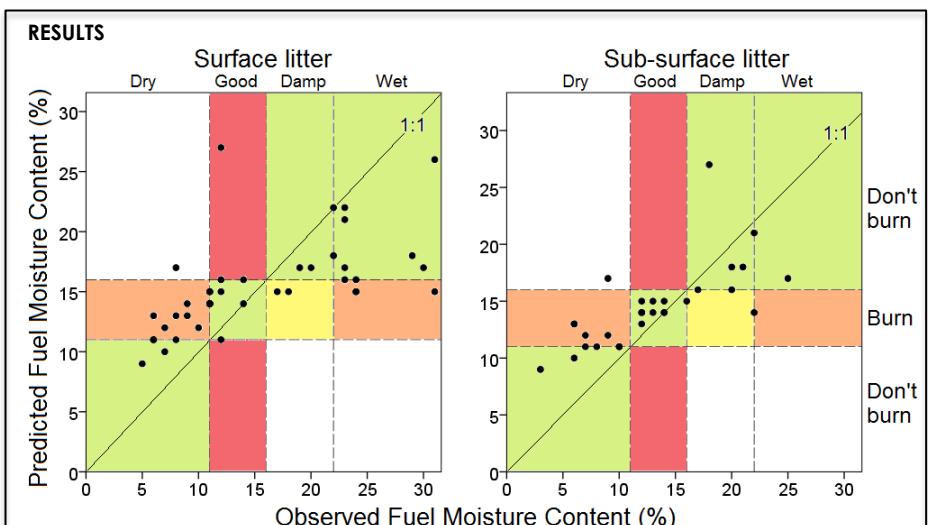
Fig 3. Comparison of gravimetric (observed) and Fuelstick (predicted) FMC within the range of interest (i.e. wetter samples excluded).

Table 1. Performance of the best fuelstick (Soil contact) as a decision making tool that can correctly identify FMC categories and inform correct decisions.

Fuel type	n	Within the burn window (11-16% FMC) Burn windows	Good Burns	Missed Opps.	Success Rate %	Patchy Burns	Wasted Time	Correct decisions
Surface litter	59	12	11	1	92 %	2	14	69 %
Sub surface litter	59	10	10	0	100 %	3	14	69 %
Elevated fuels	52	19	14	5	74 %	3	6	69 %
Stringy Bark	29	12	7	5	58 %	3	4	55 %
Ribbon Bark	17	6	3	3	50 %	1	1	59 %

- **Fuelsticks resulted in few missed opportunities** (92-100% of burn windows for litter fuels identified, Table 1)

- **~70% of decisions correct using fuelsticks** without any calibration (Table 1).

- Site-specific calibrations (data not shown) show **potential for dramatic improvement** of fuelstick performance. A full analysis of the new data is underway.

REFERENCES
Slijepcevic, A., et al. (2015). "Evaluating models to predict daily fine fuel moisture content in eucalypt forest " Forest Ecology and Management **261**: 261-269.

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