IMPROVED ASSESSMENT OF GRASSLAND FUELS IN MULTIPLE JURISDICTIONS ACROSS AUSTRALIA

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Protecting lives and property

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Outline

Grassland Curing Assessment

Grassland Fire Behaviour

Grassland Fuel Load Assessment

Grassland Curing Assessment

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Grassland curing

Grassland Curing (defined as the drying out of grass):

- has a significant impact on the **ability for fires to spread** in grasslands

- is an essential input in **fire spread models** and in the Australian **Grassland Fire Danger Index (GFDI)**

- **Operational curing assessment varies between jurisdictions** providing inconsistent FDRs from one state to the next.

We need more accurate and consistent curing data for accurate FDRs across the country!

Satellite and Ground Observations

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Satellite and Ground Observations

Satellite Observations

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MapVictoria Model

Satellite and Ground Observations

Satellite Observations
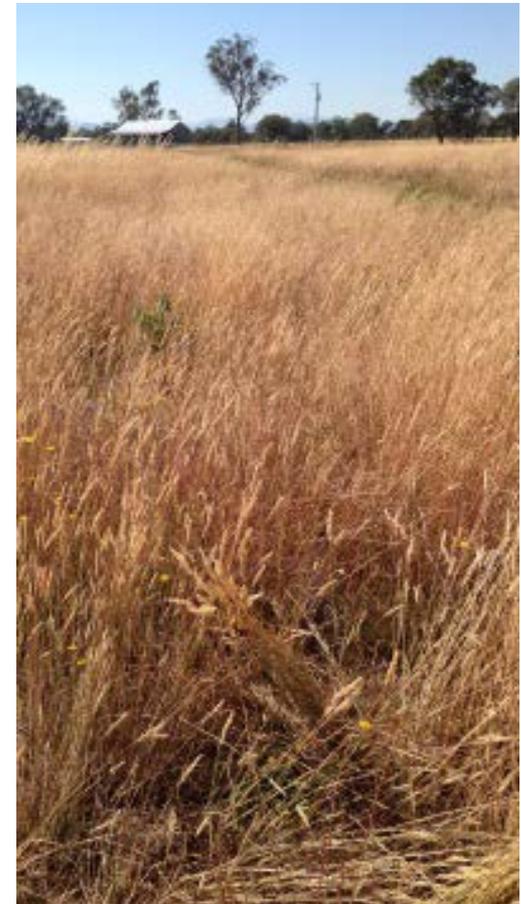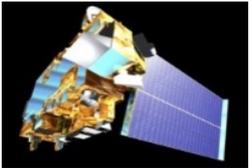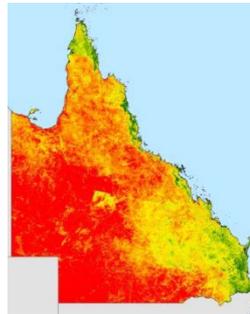
MapVictoria Model

Ground-based Curing Observations

Satellite and Ground Observations
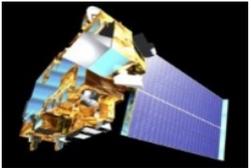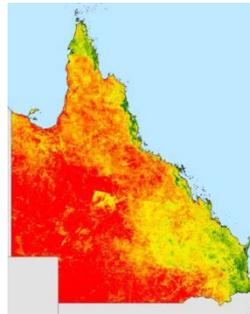
Satellite Observations

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MapVictoria Model

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Ground-based Curing Observations

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Automated Online System

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Satellite and Ground Observations

Satellite Observations

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MapVictoria Model

Ground-based Curing Observations

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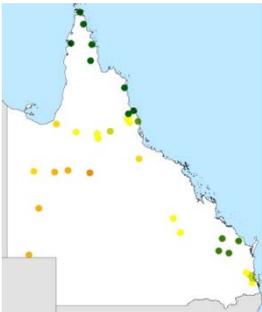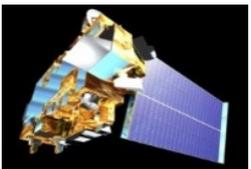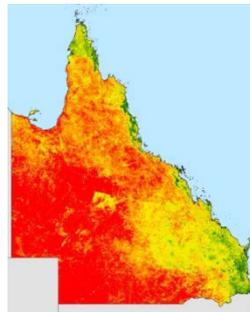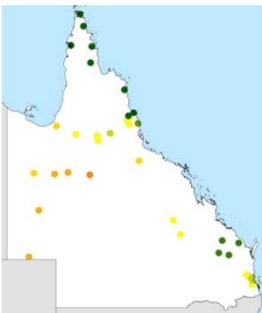
Automated Online System

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VISCA Curing Map

(Victorian Improved Satellite Curing Algorithm)

VISCA Process

Satellite Observations

MODIS

MapVictoria Model

Curing (%) 0 10 20 30 40 50 60 70 80 90 100
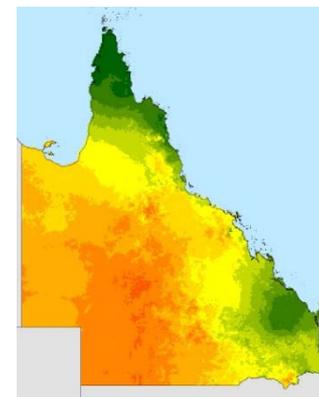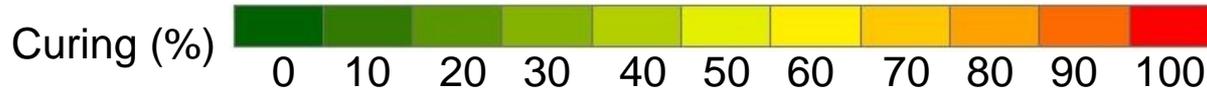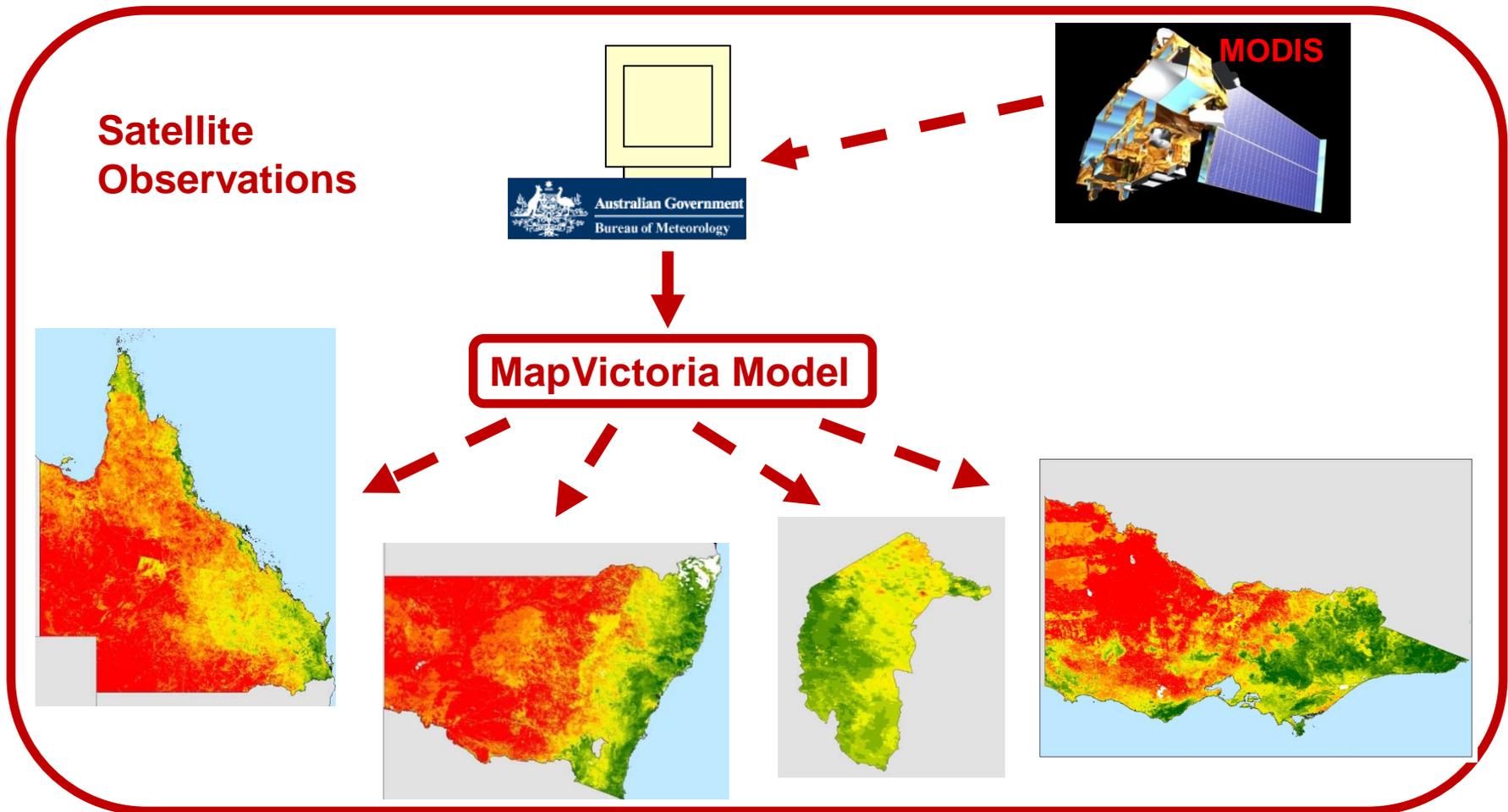
VISCA Process

Ground Observations

Online System

Curing (%) 0 10 20 30 40 50 60 70 80 90 100

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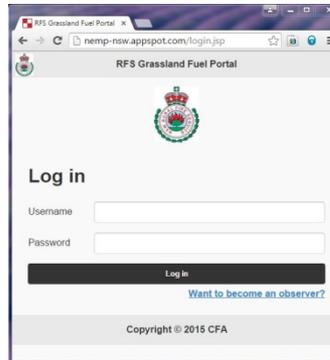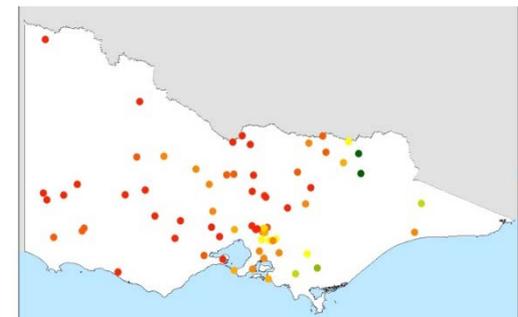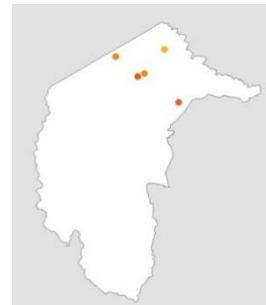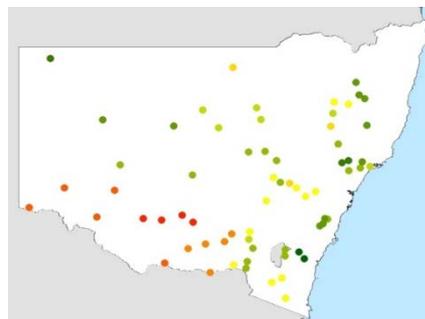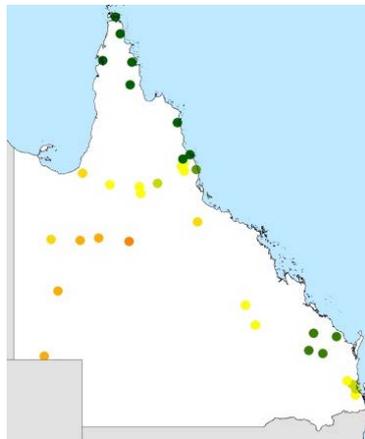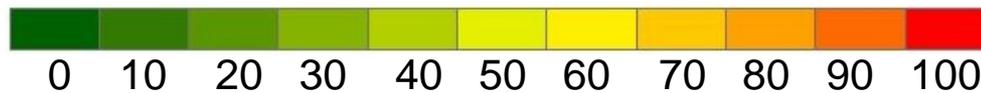
VISCA Process

Ground Observations
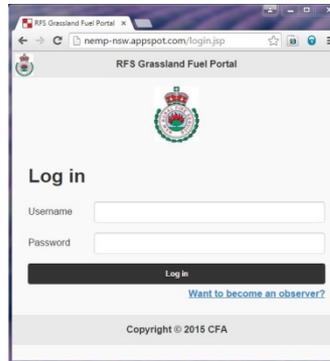
Online System

Training Package

Curing (%)
0 10 20 30 40 50 60 70 80 90 100

VISCA Process

Final Product

Curing (%)

0   10   20   30   40   50   60   70   80   90   100

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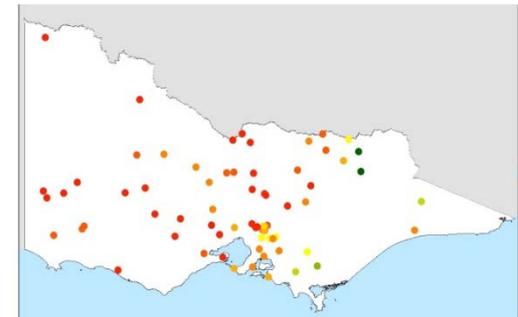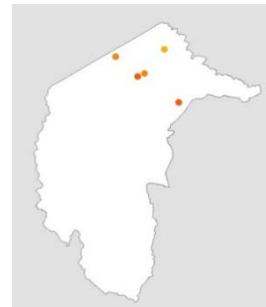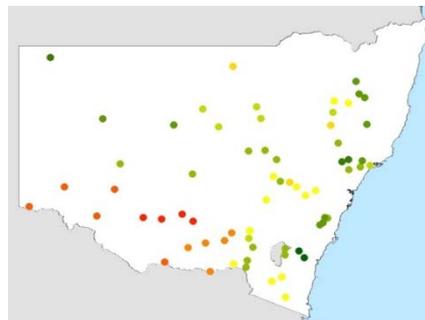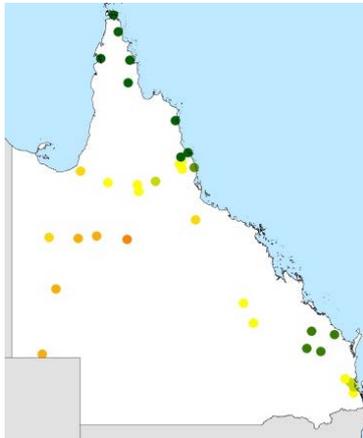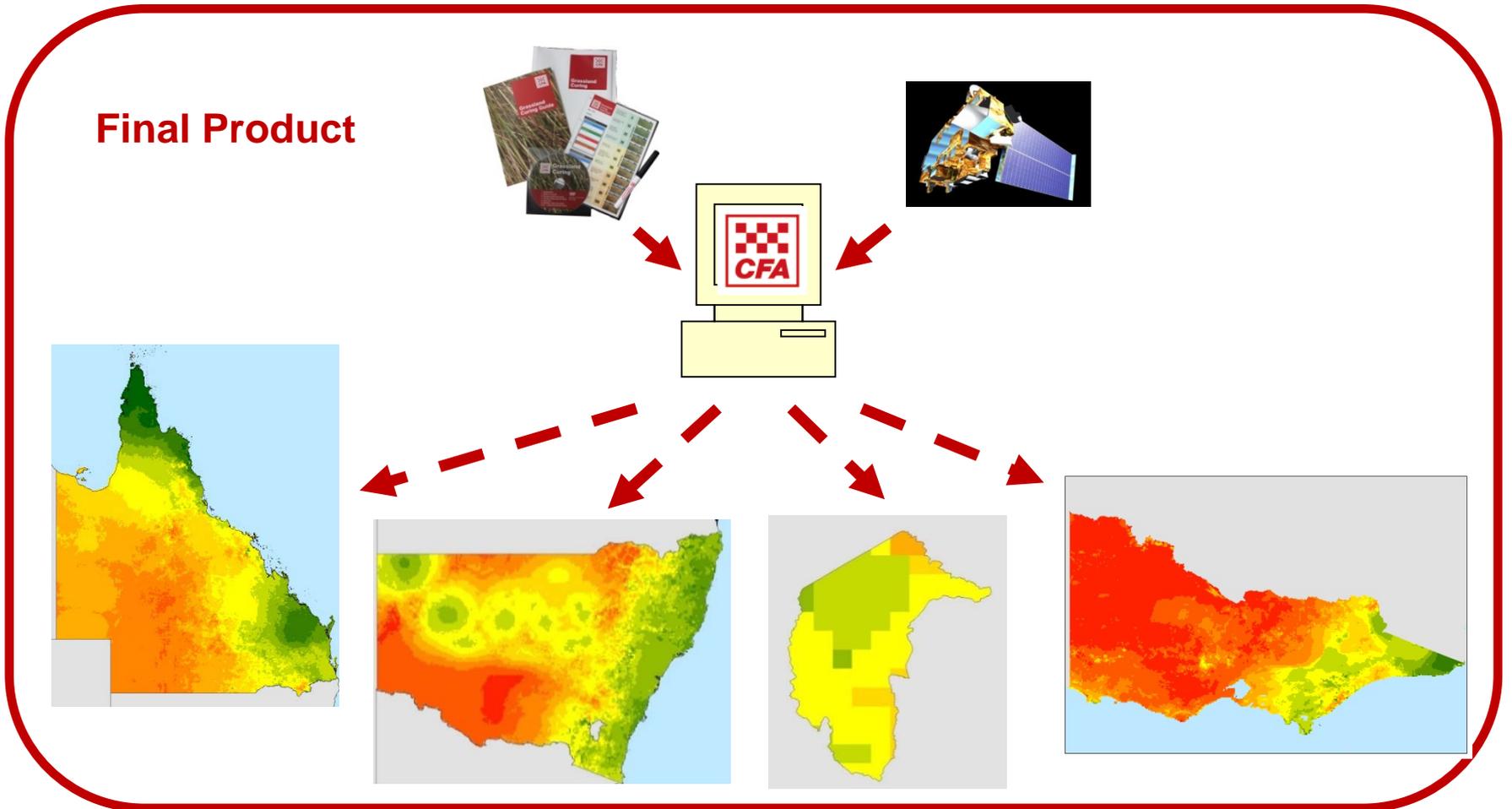
Performance of MapVictoria

Root Mean Square Error

| MapVictoria |
| QLD: 26% |
| NSW: 23% |
| ACT: 12% |
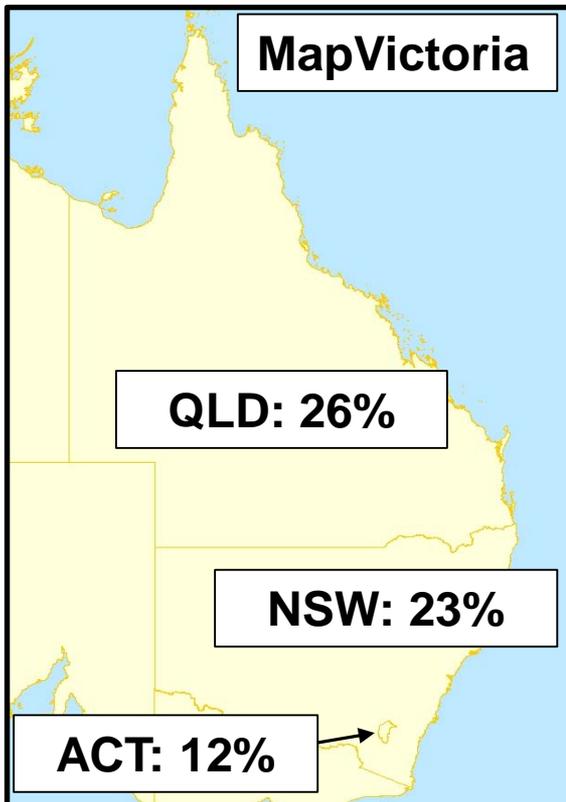
- **Over-estimation**
  - Urban areas
  - Bare soil/sand
  - Yellow flowers

- **Under-estimation**
 - Woody vegetation
  - Secondary grass growth after rainfall

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Performance of MapVictoria and VISCA

Root Mean Square Error

MapVictoria	VISCA
QLD: 26%	QLD: 3%
NSW: 23%	NSW: 4%
ACT: 12%	ACT: 3%
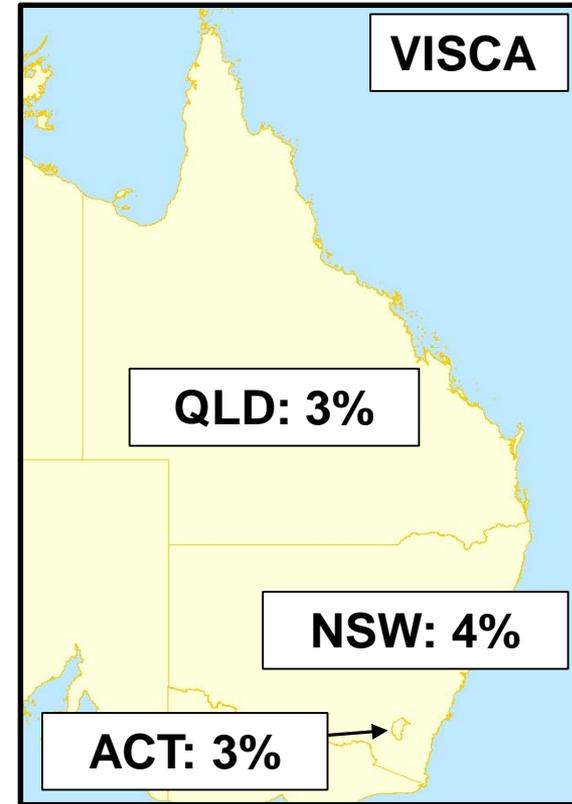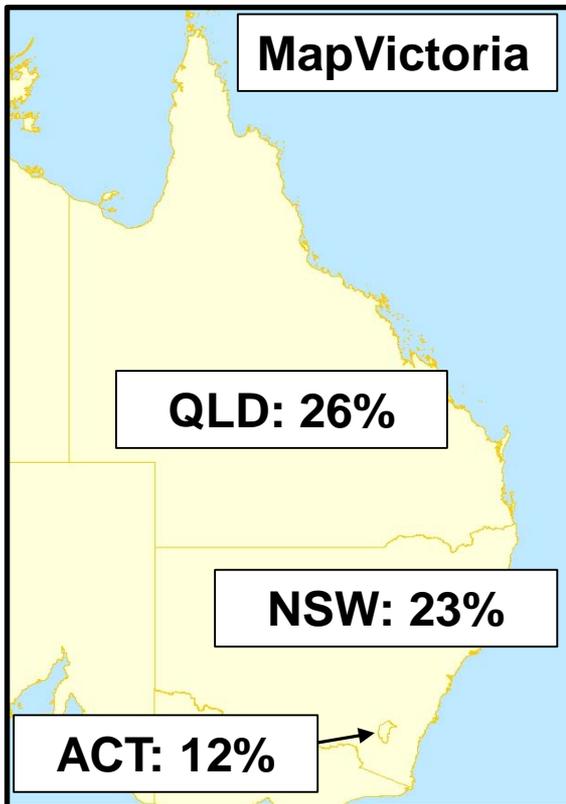
VISCA has reduced the RMSE dramatically!

Summary

So far

- We need more accurate and consistent curing data for accurate FDRs across the country

- MapVictoria has been used operationally for GFDI input or fire behaviour modelling in VIC, QLD, NSW, ACT, and TAS.

- VISCA and the online system has been trialled for QLD, NSW, and ACT.

- VISCA has already improved the accuracy of grassland curing.

In the next phase

- Ground observations need to be accessed by neighbouring jurisdictions to improve consistency across borders.

- For future operational deployment, CFA is continuing the trial for QLD, NSW, and ACT, and is commencing the trial for SA and TAS

Grassland Fire Behaviour

Grassland Curing Experimental Burns

- From 2013-2014, CFA and CSIRO conducted grassland experimental burns in Victoria to determine the effect of curing on Rate of Spread (ROS) in partially cured grasslands.

- From 2015 onwards, CFA and CSIRO have collaborated with QFES and NSW RFS to conduct further burns in Queensland and NSW.

Victorian Results
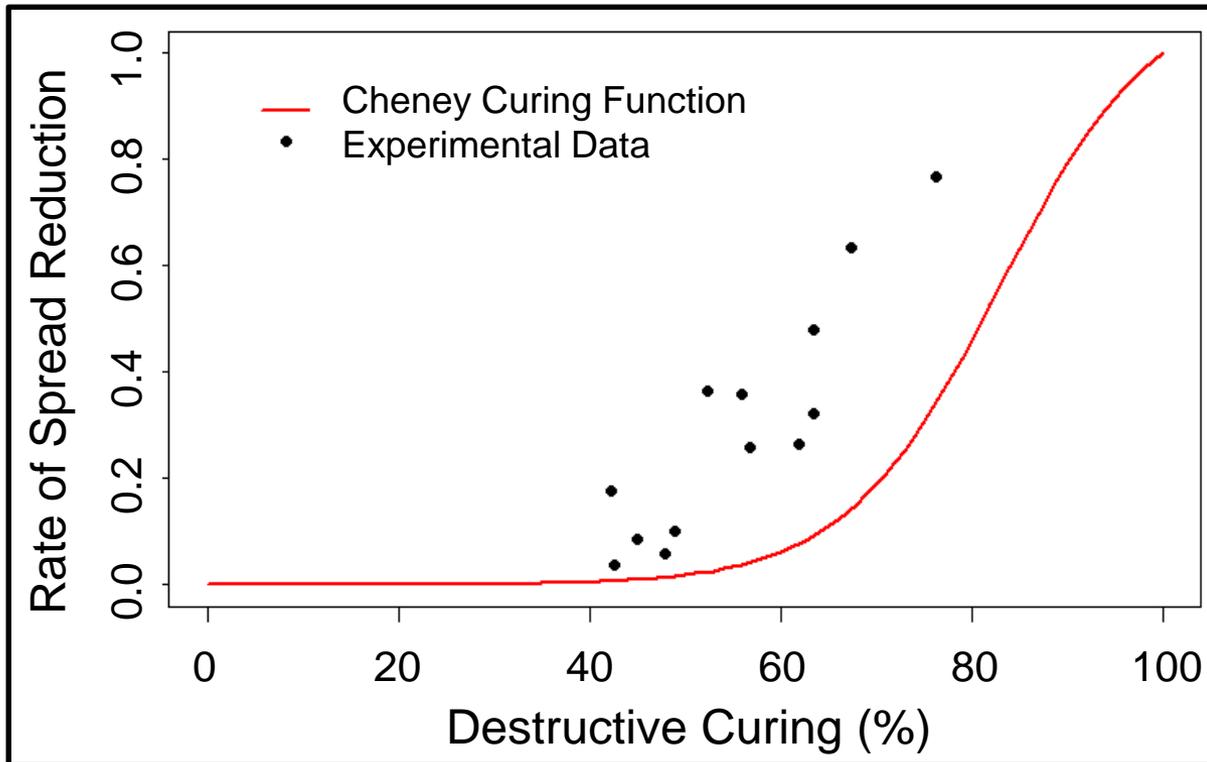
Existing fire spread models under-predict the rate of spread in partially cured grasslands

Fire can spread at lower curing levels than previously believed

Cheney Curing Function vs Experimental Data (Source: Susan Kidnie, CFA)

Summary

So far

- Results from Victoria demonstrate that existing fire spread models under-predict the rate of spread in partially cured grasslands

- Fire can spread at lower curing levels than previously believed

In the next phase

- Further experimental burns in NSW and QLD will improve our understanding of grassfire behaviour for different grass types.

- The fire behaviour research will improve the curing function in existing fire behaviour models

Grassland Fuel Load Assessment

Operational Fuel Load

Fuel load has a significant impact on FDRs!

Legend
Fuel Load (t/ha)
4.5

In Victoria: a single fuel load value of **4.5 t/ha** is used state-wide for GFDI input.

- **4.5 t/ha** does not represent the variability of fuel load across the state

- **4.5 t/ha** is generally an over-estimate of fuel load, resulting in over-estimating FDRs

Across Australia: various fuel load values are used, providing inconsistent inputs into FDRs

Fuel Load Methods

CFA and Melbourne Uni have tested field methods for fuel load assessment throughout Victoria.

- Destructive Sampling
- **Robel Pole (most accurate)**
- **Rising Plate (most accurate)**
- Photos (horizontal/vertical)
- Visual assessment

CFA aims to incorporate a number of datasets to better estimate fuel load operationally:

- Remote sensing
- Pasture growth models
- Ground-based validation

Summary

So far

- Methods have been investigated in Victoria.

- The most accurate methods are the Robel Pole and Rising Plate meter

In the next phase

- Field methods are being tested in other jurisdictions

- Overall, improved estimates of fuel load should provide more accurate GFDI calculations and fire behaviour predictions.

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Final Comments

We need more accurate and consistent curing data for accurate FDRs across the country! The combination of ground-based data and satellite data has already improved operational curing assessment in Victoria

Fuel load has a significant impact on FDRs. Operational input needs to be improved in all jurisdictions.

Existing fire spread models under-predict the ROS in grasslands. Fire can spread at lower curing levels than previously believed

Overall, with support from multiple jurisdictions, the NEMP grassland research will improve inputs into FDRs and fire behaviour predictions

Thank you