AusCover products for bushfire management and research: Pre-fire

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AusCover for Bushfire

- Not near-real-time to support real-time operations
- Historical data
  - Time series for research
  - Evaluate suitability for operational intelligence of seasonal/annual state of landscape
- Some datasets are indicators
  - Need further work to calibrate as fire-relevant biophysical variables

Dataset groups

- Fuel state
- Fuel load proxies
- Fuel continuity
- Meteorology

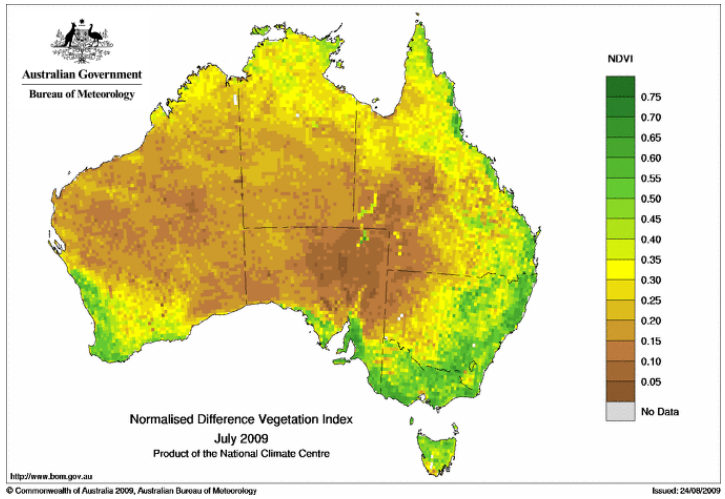
- Curing development

Fuel state

- NDVI
- Grassland curing
- Fractional cover

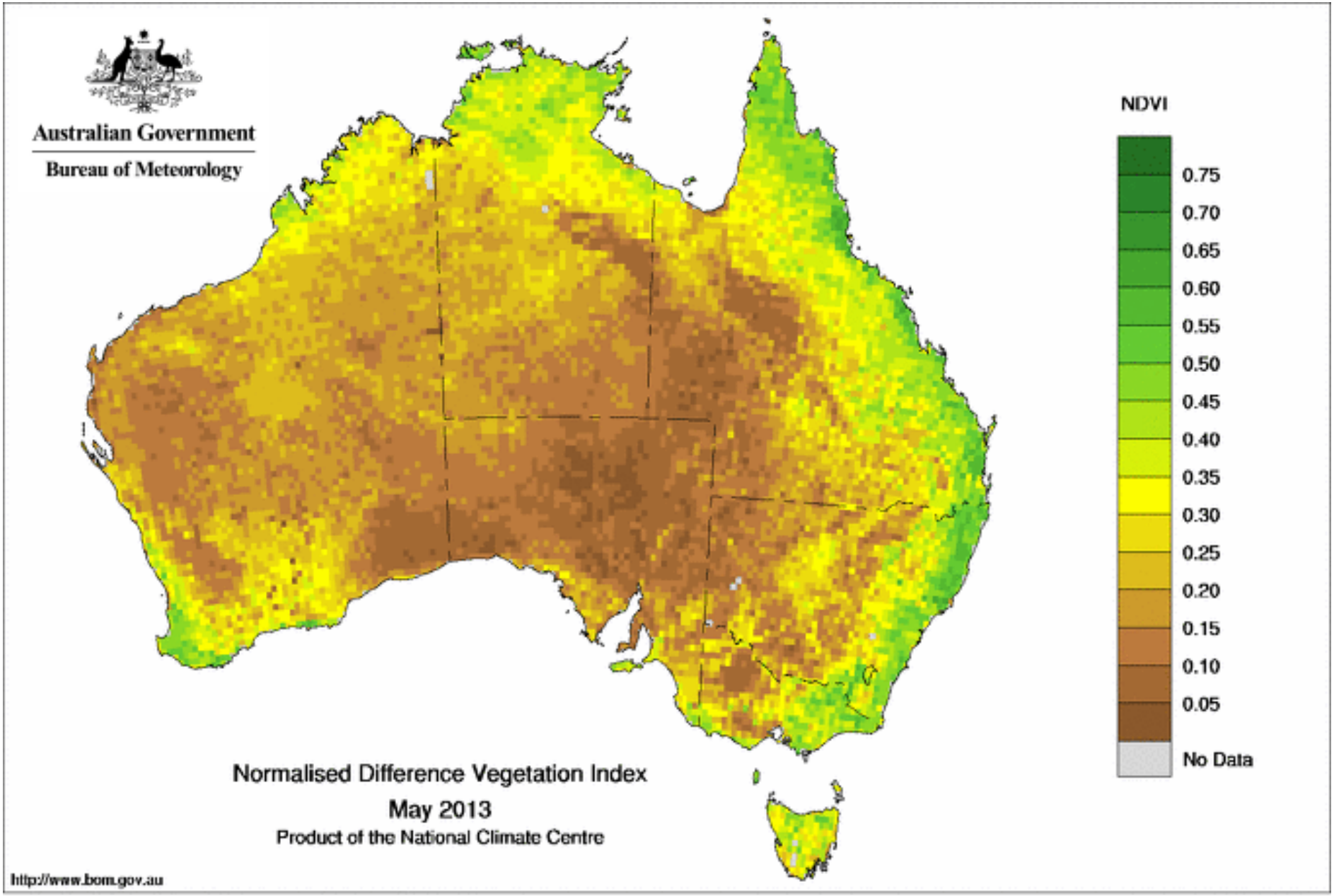
What is NDVI?

- NDVI: Normalised Difference Vegetation Index
- NDVI is an index of vegetation greenness
- Developed for derivation from satellite data
  - Sensor dependent (e.g. AVHRR vs MODIS)
- NDVI is influenced by both
  - Plant vigour and health
  - Vegetation cover fraction
- NDVI indicates
  - Biomass production



What is NDVI?

- NDVI is an *index*
  - Full range -1 to +1
  - Usual range is:
    ~0.1 (bare soil *and* dead vegetation), to
    ~0.7 (thick green vegetation)
  - ~0 for water bodies, snow, cloud, etc.
- The value does not have a direct interpretation
- Enables year-to-year comparisons
- NDVI anomaly assesses the departure from normal for vegetation condition



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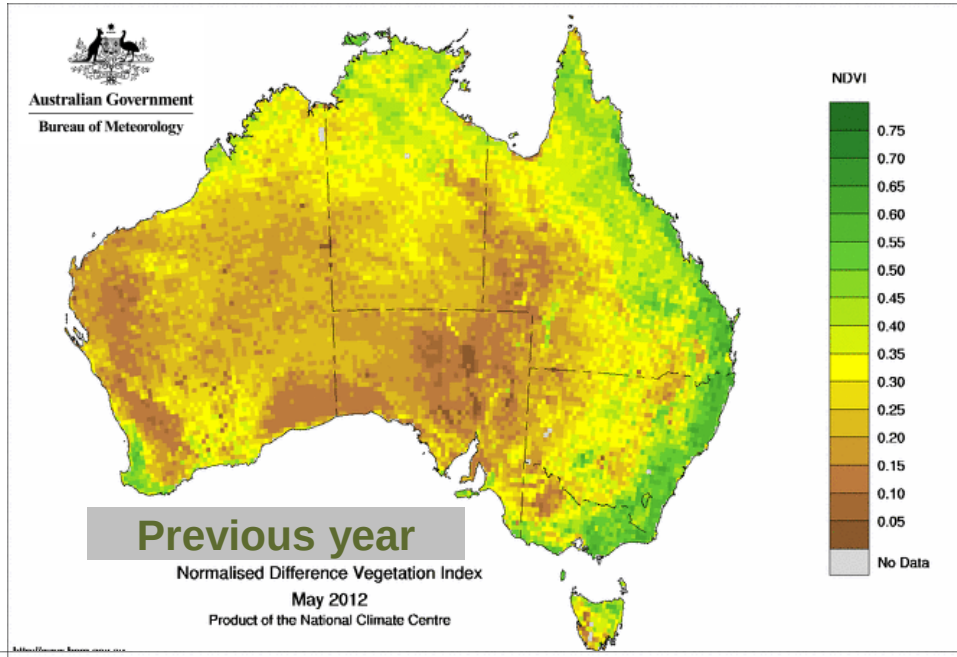
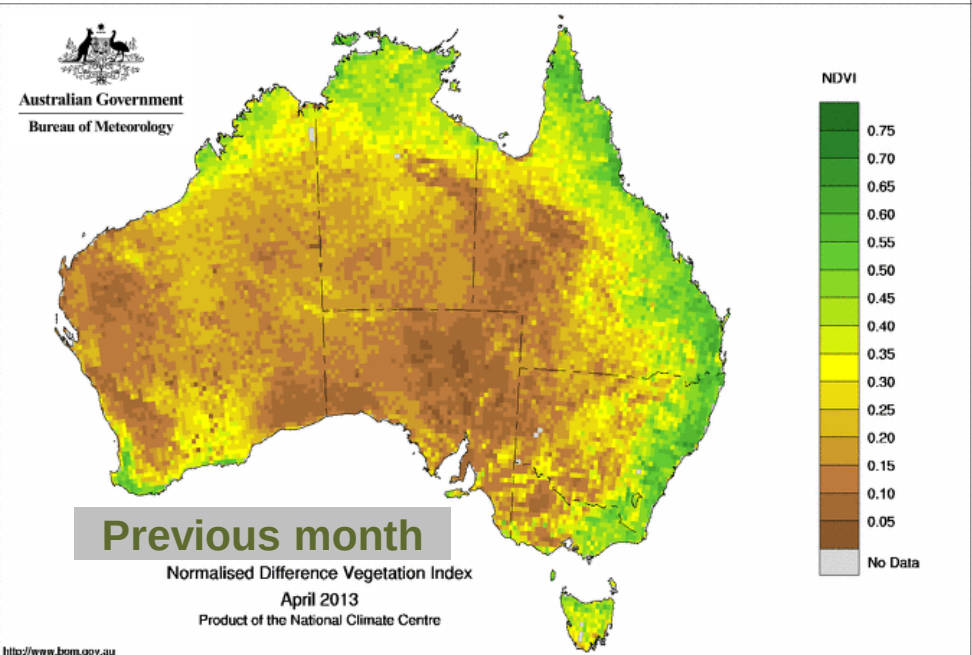
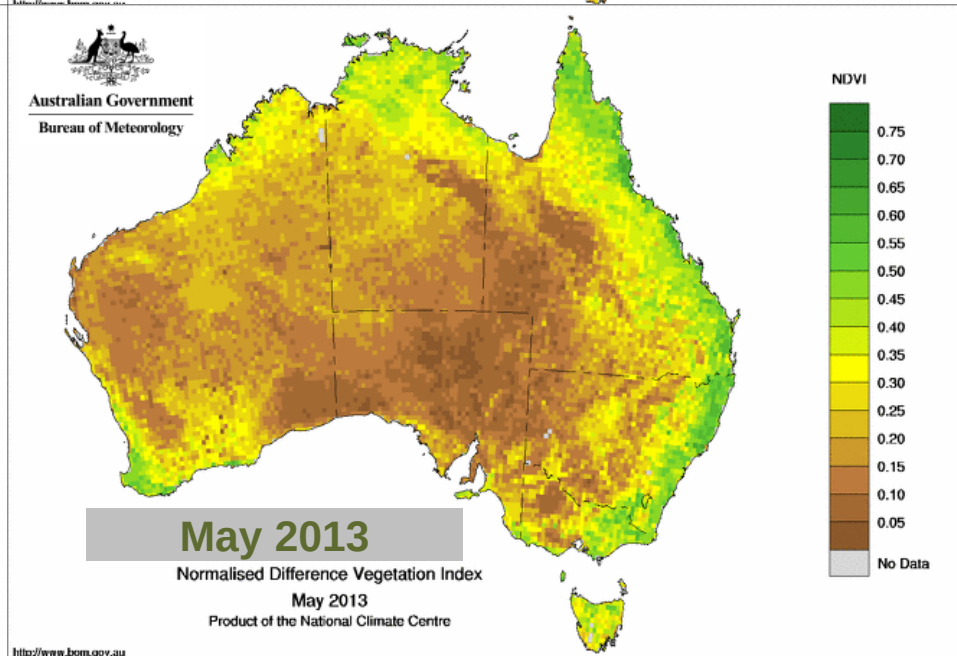
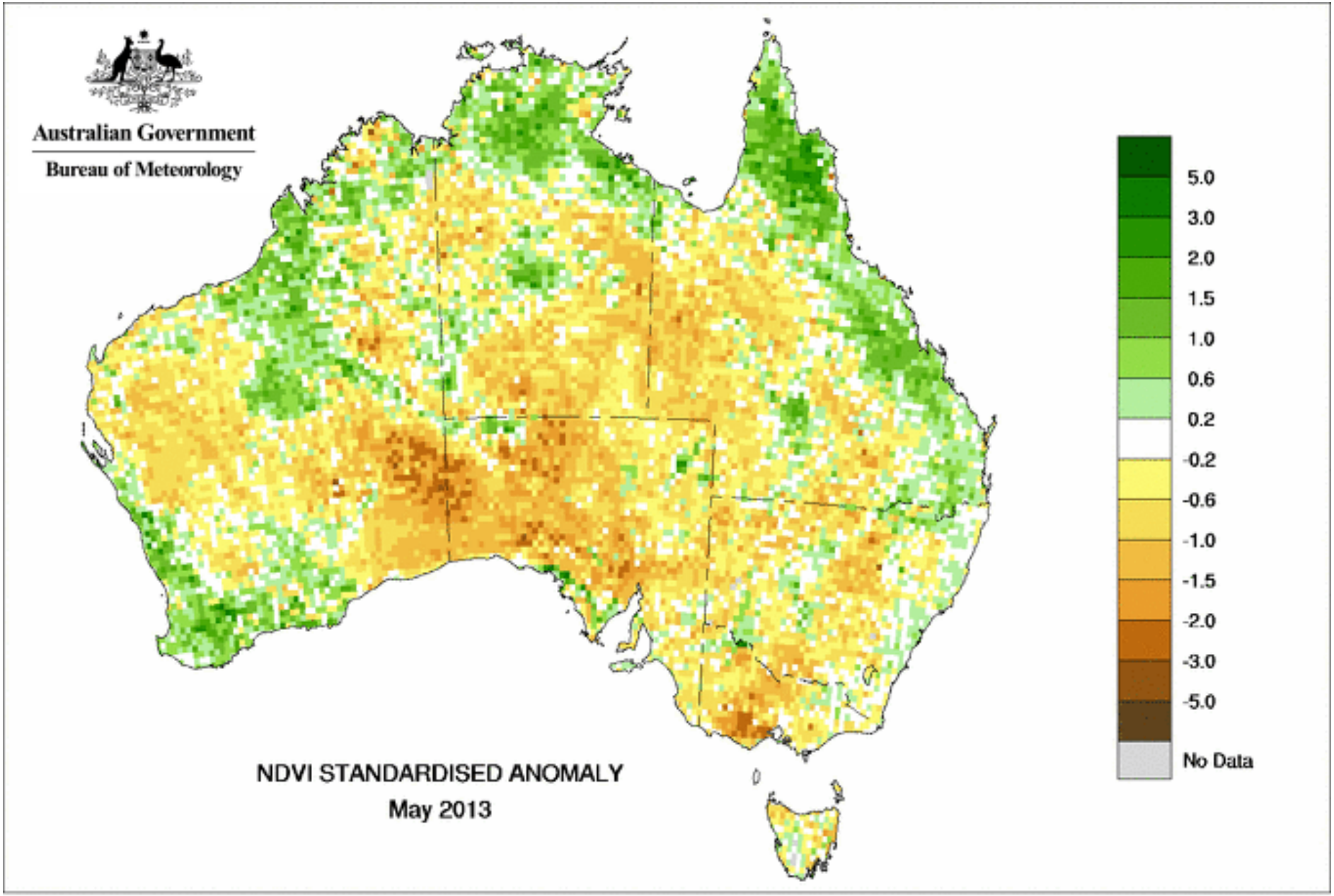
NDVI (Vegetation greenness)







Standard deviations from 17-year mean



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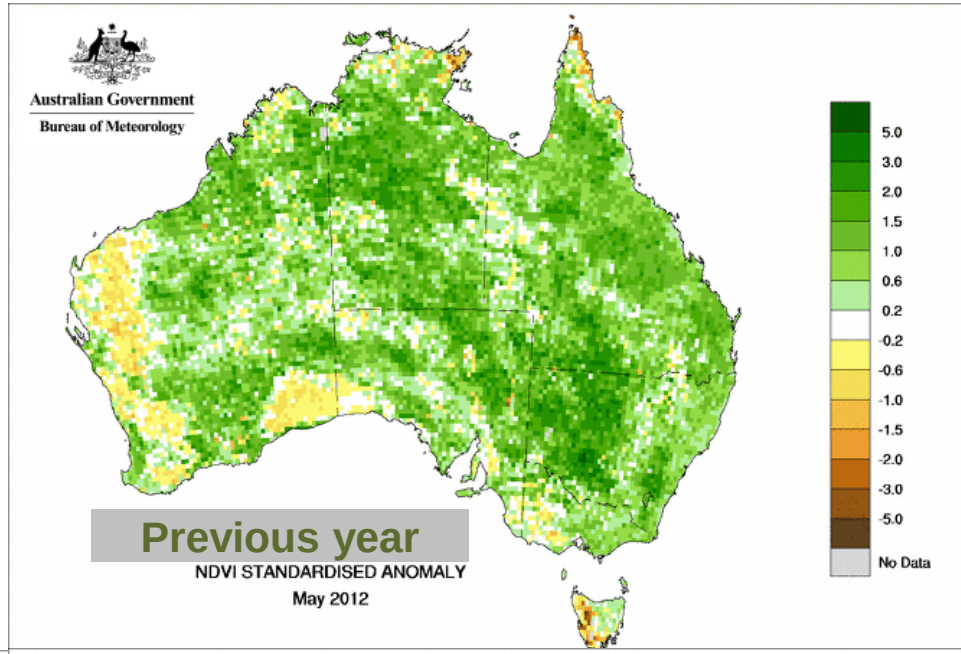
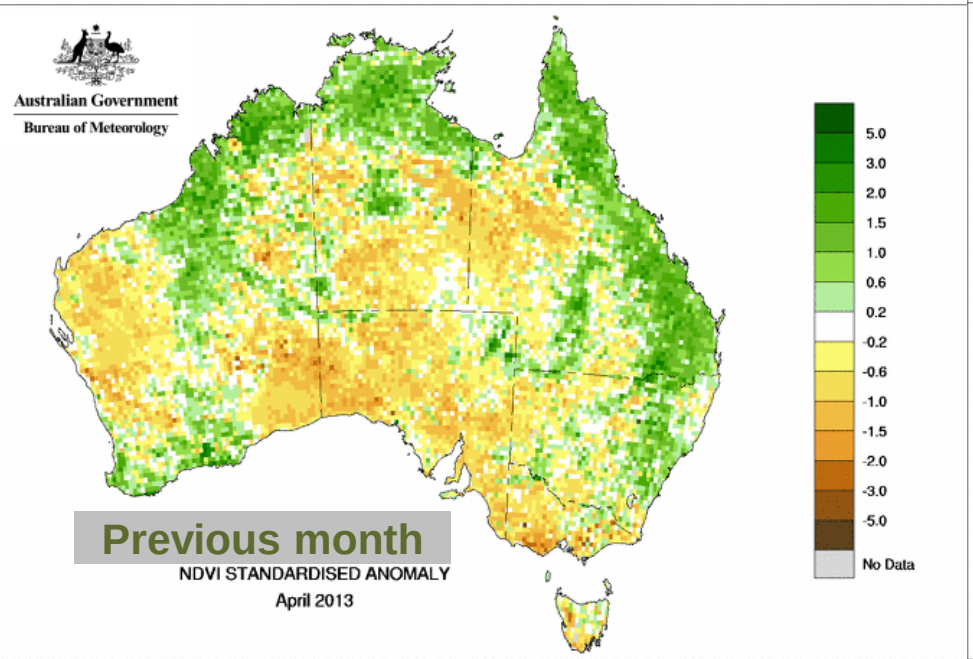
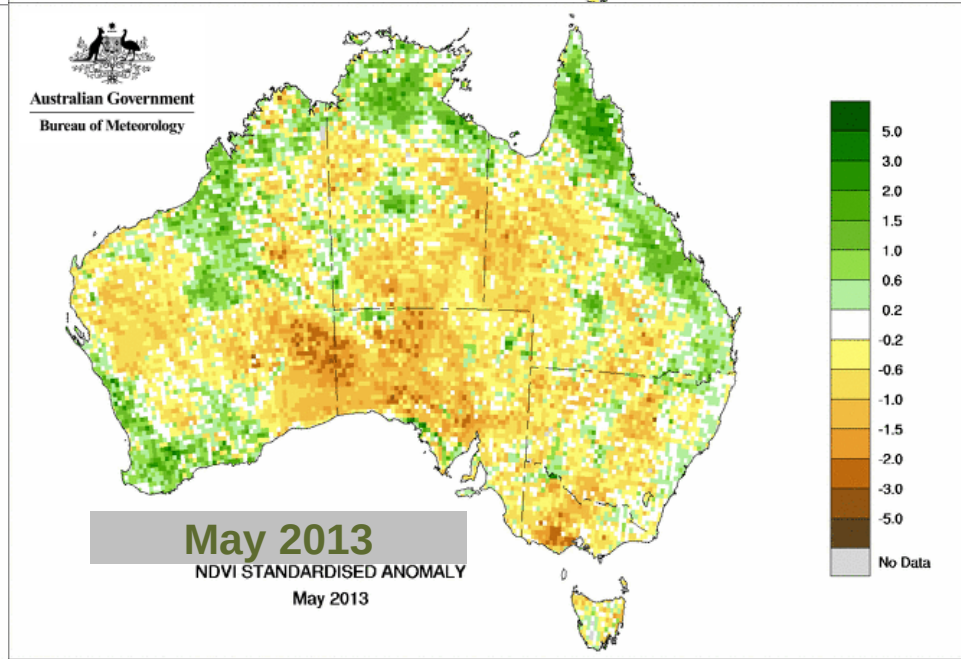
NDVI standardised anomaly

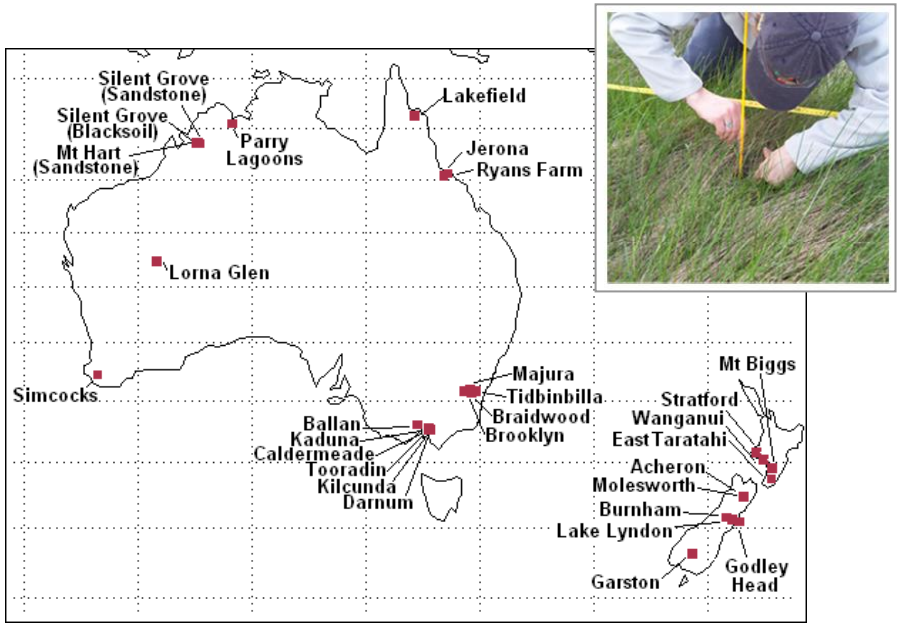


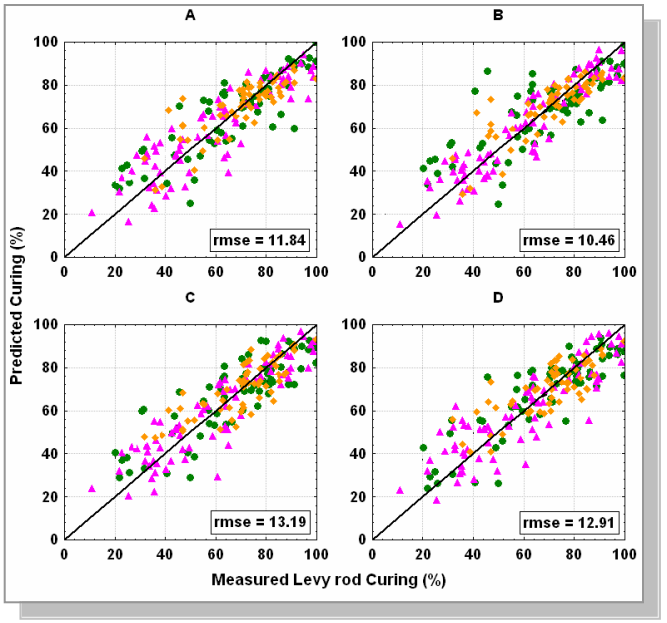




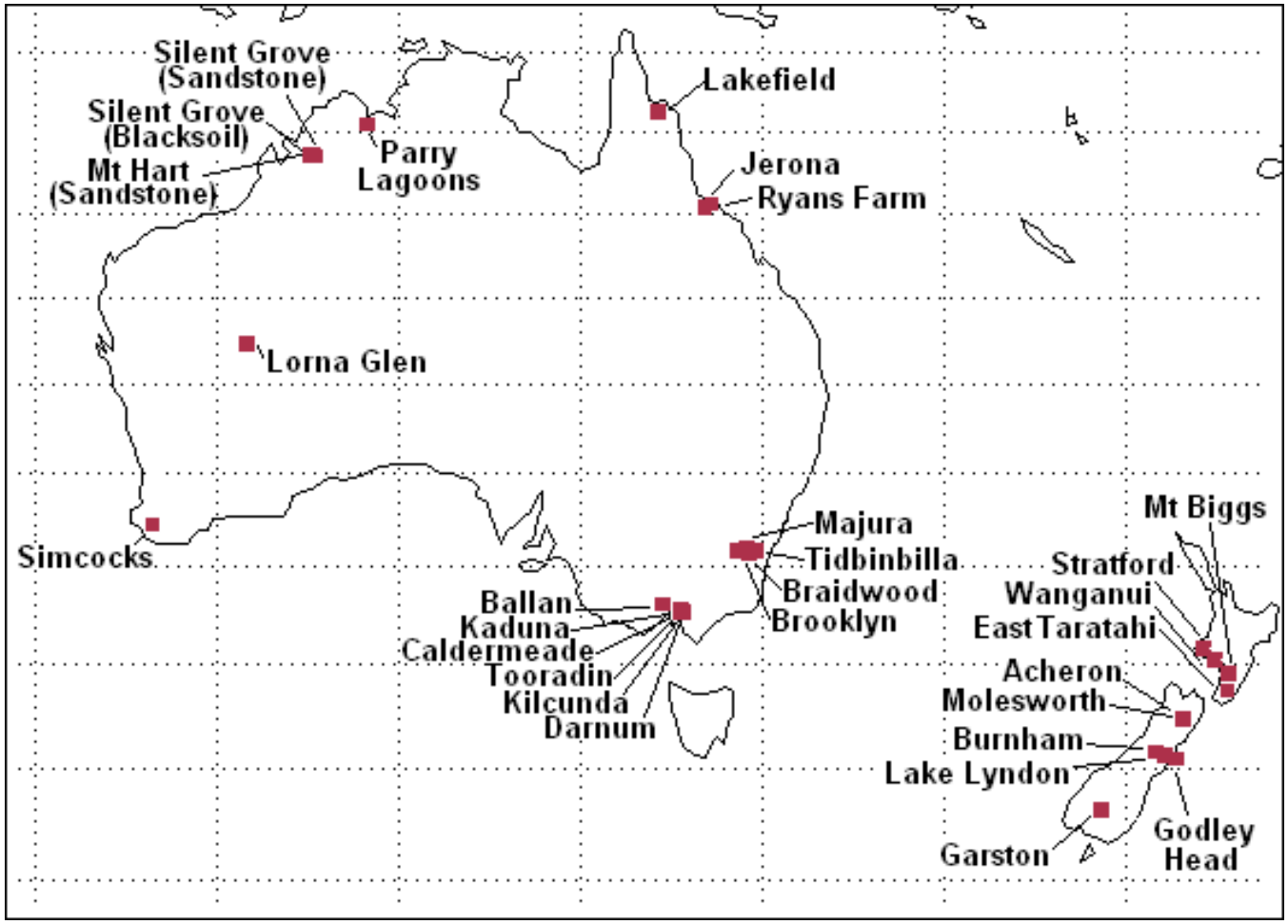
MODIS grassland curing

- **Curing estimated from MODIS satellite data**
- Developed from field data – RMSE 11%
- Bushfire CRC project
- Agency feedback on 4 methods: Map B preferred





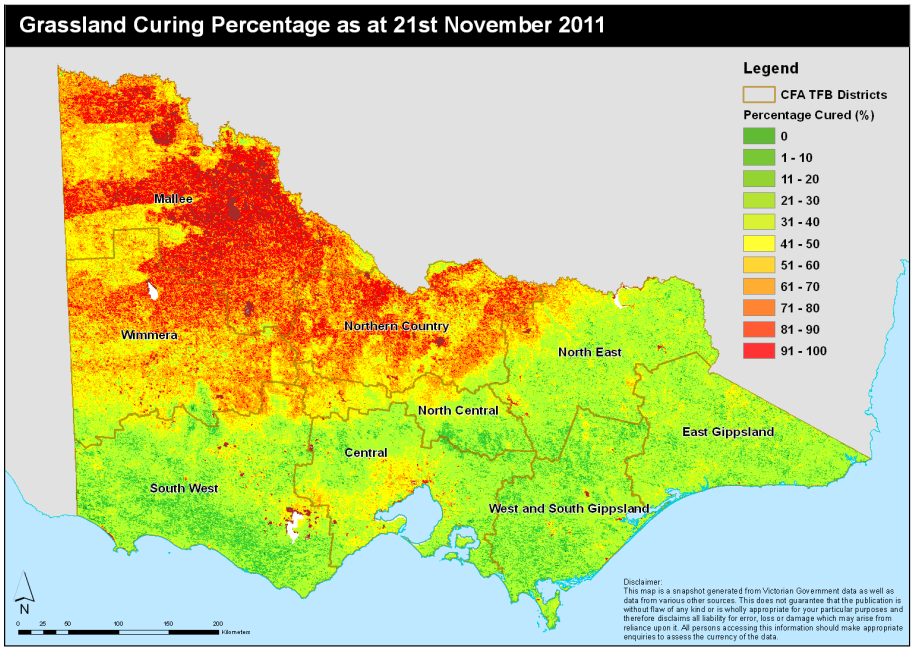
Curing field Sites



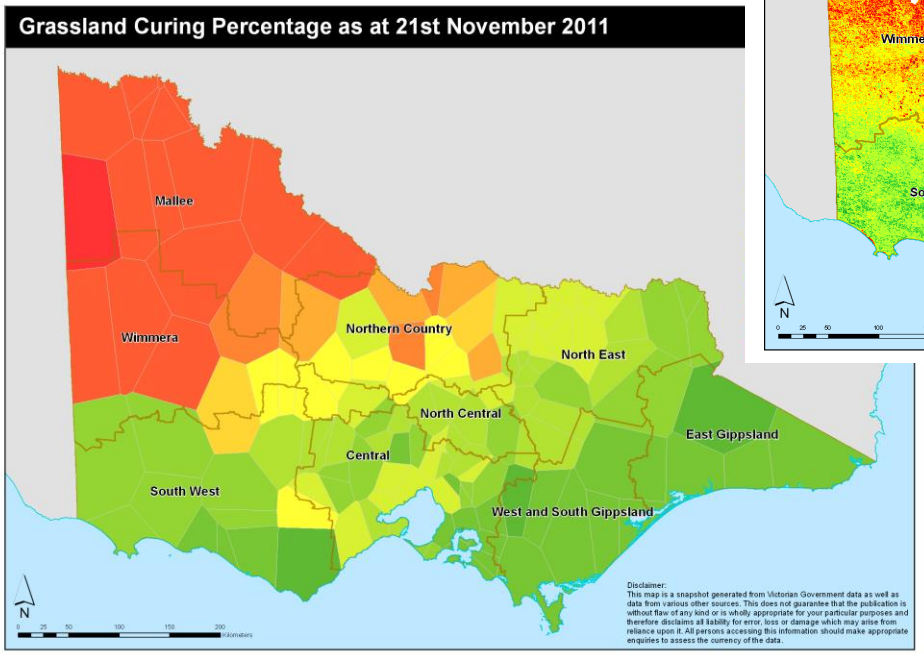
MODIS grassland curing

Evaluation in Victoria by CFA

MODIS curing map



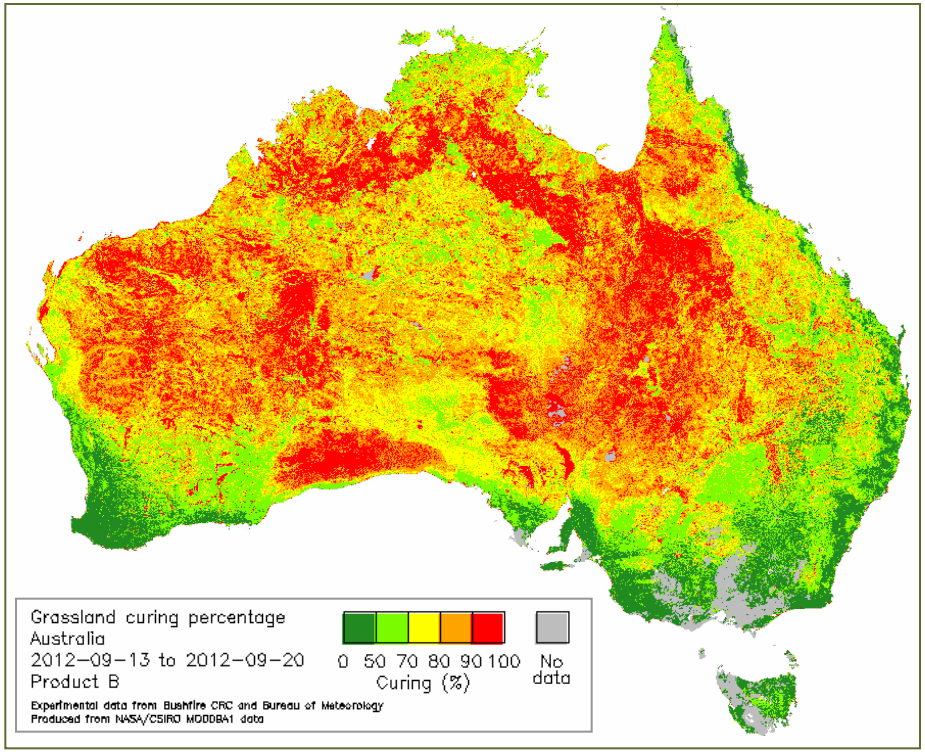
One visual estimate per polygon

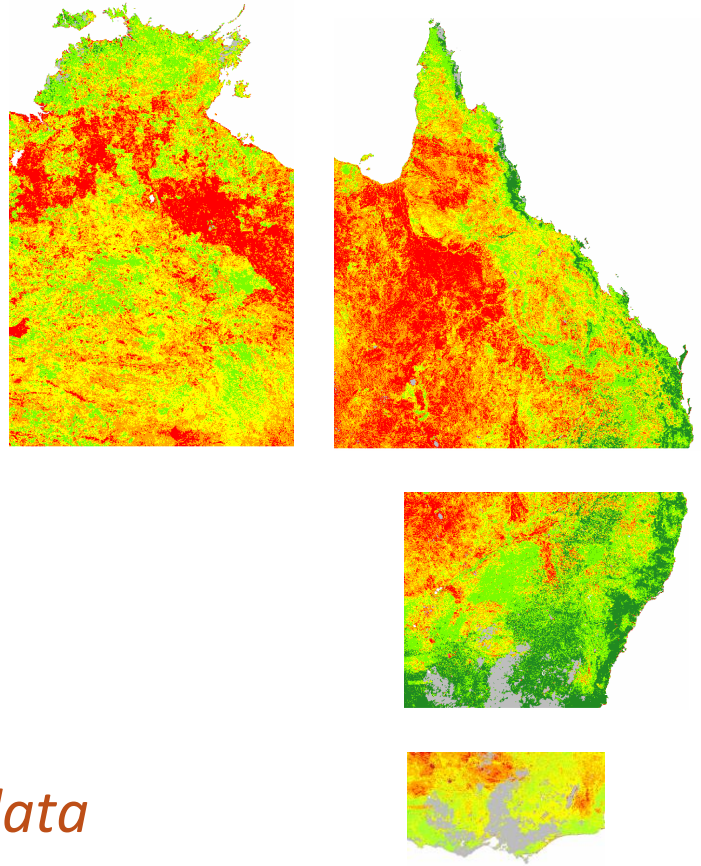


— Other states have sparser visual networks

Curing on AusCover

- Bushfire CRC curing project maps (A, **B**, C, D)
- National maps and state cut-outs



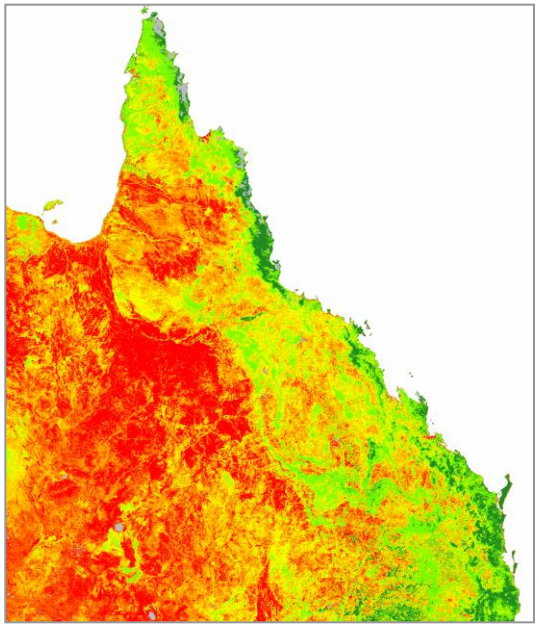


Not current data

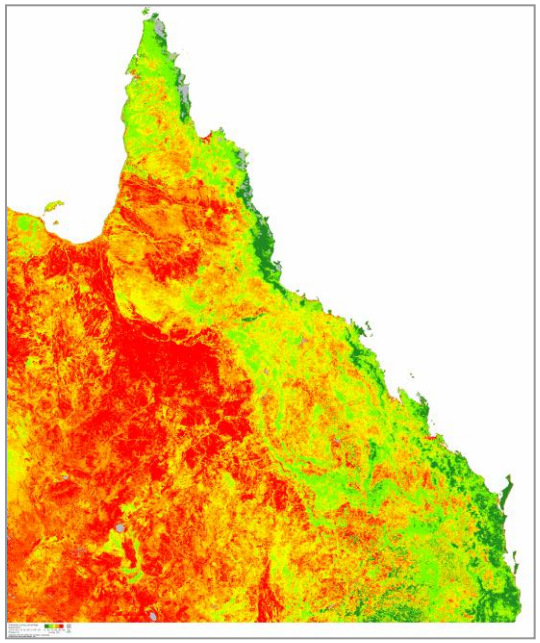
Curing on AusCover

- Formats

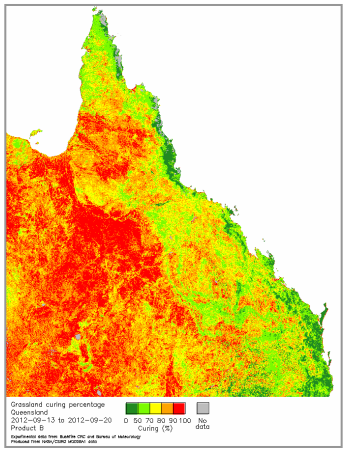
GeoTIFF, netCDF



GeoTIFF + legend

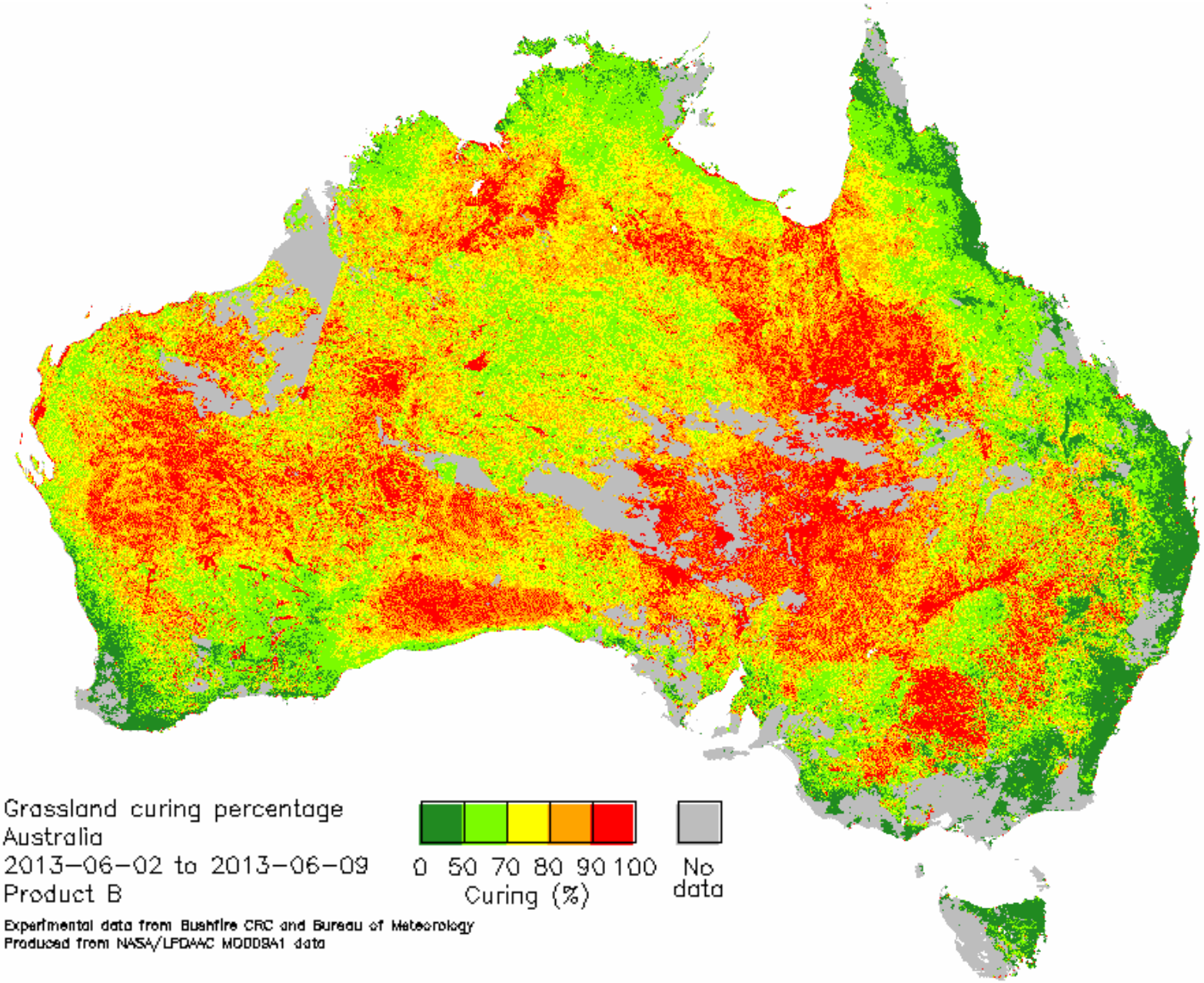


Reduced resolution
GeoTIFF + legend

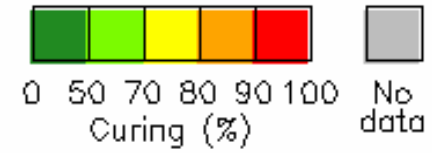


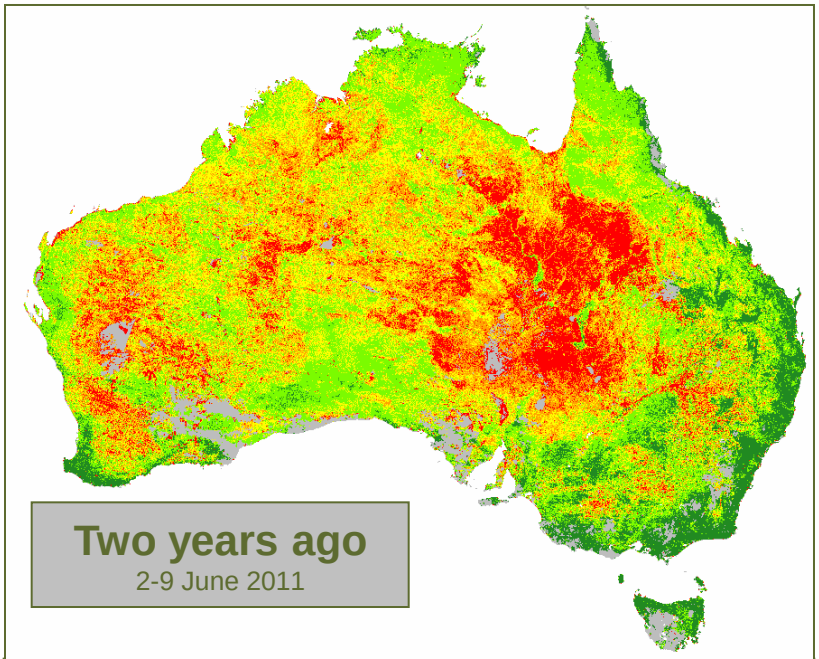
Not current data

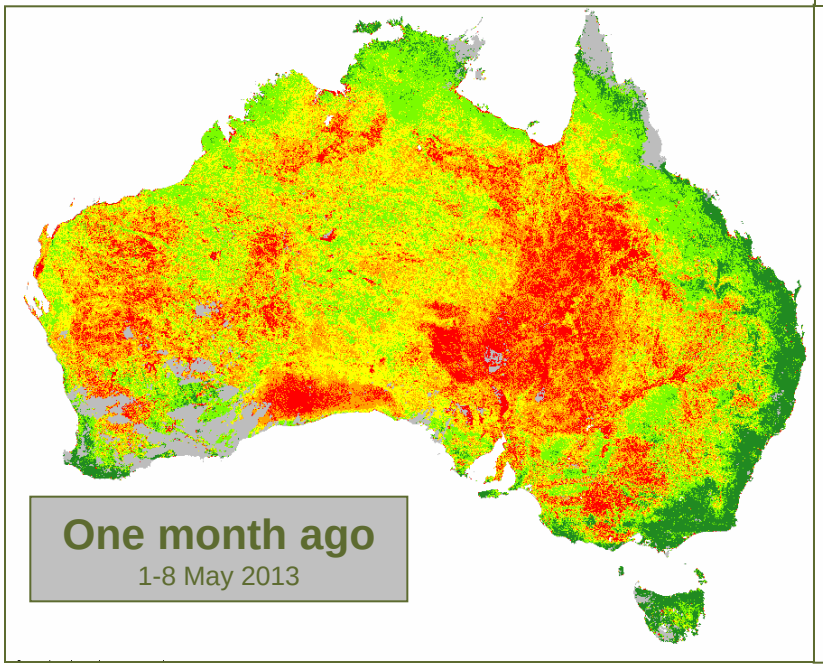
Grassland curing (Map B)

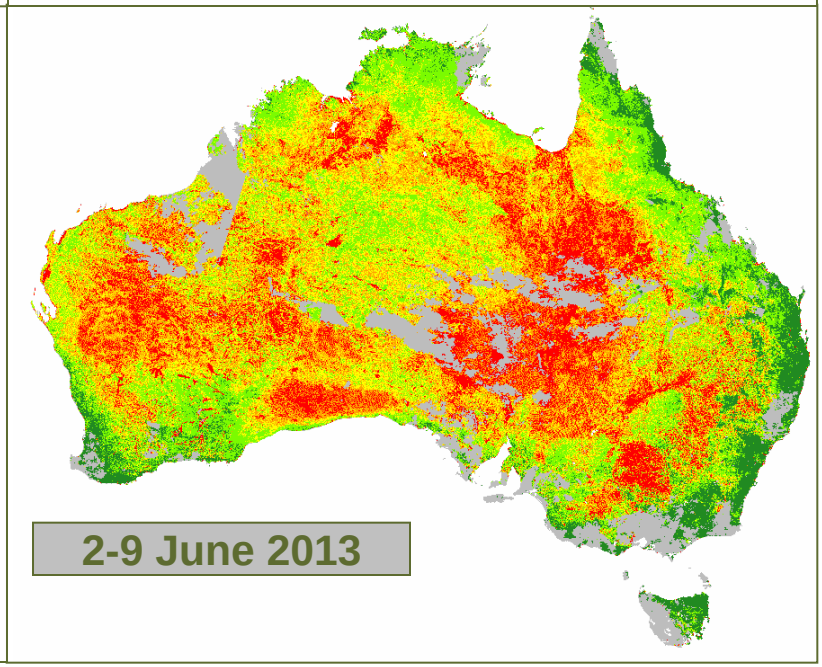


Grassland curing (Map B)



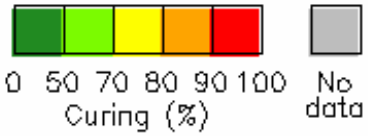


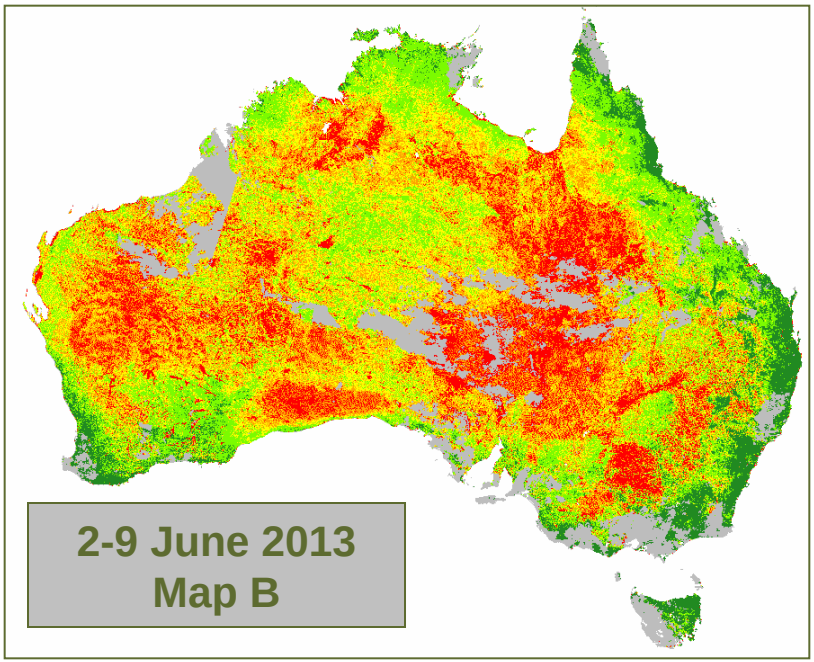


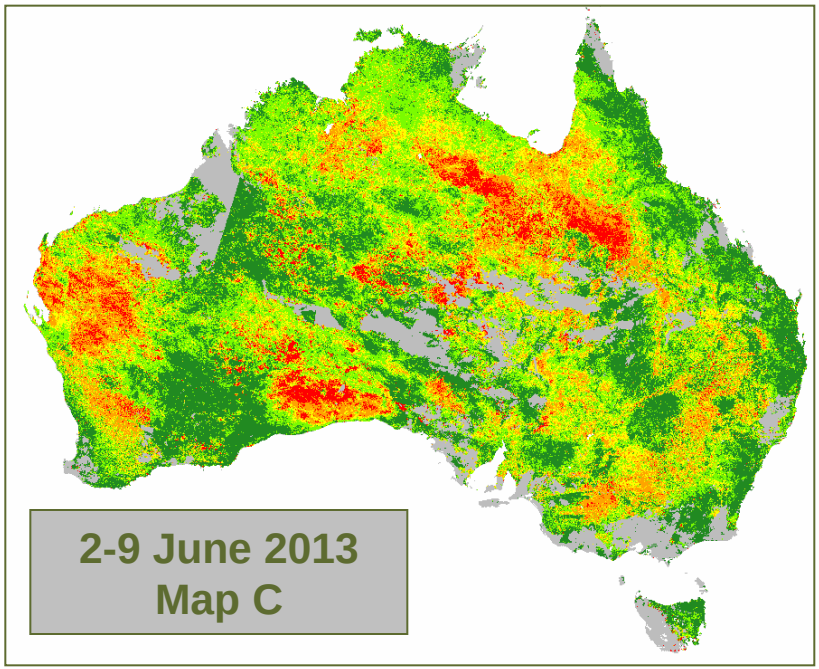


Grassland curing

- Recommend evaluation of several algorithms
- Here Maps B and C have similar spatial patterns but the curing values shift







Fuel continuity?

Vegetation cover fraction

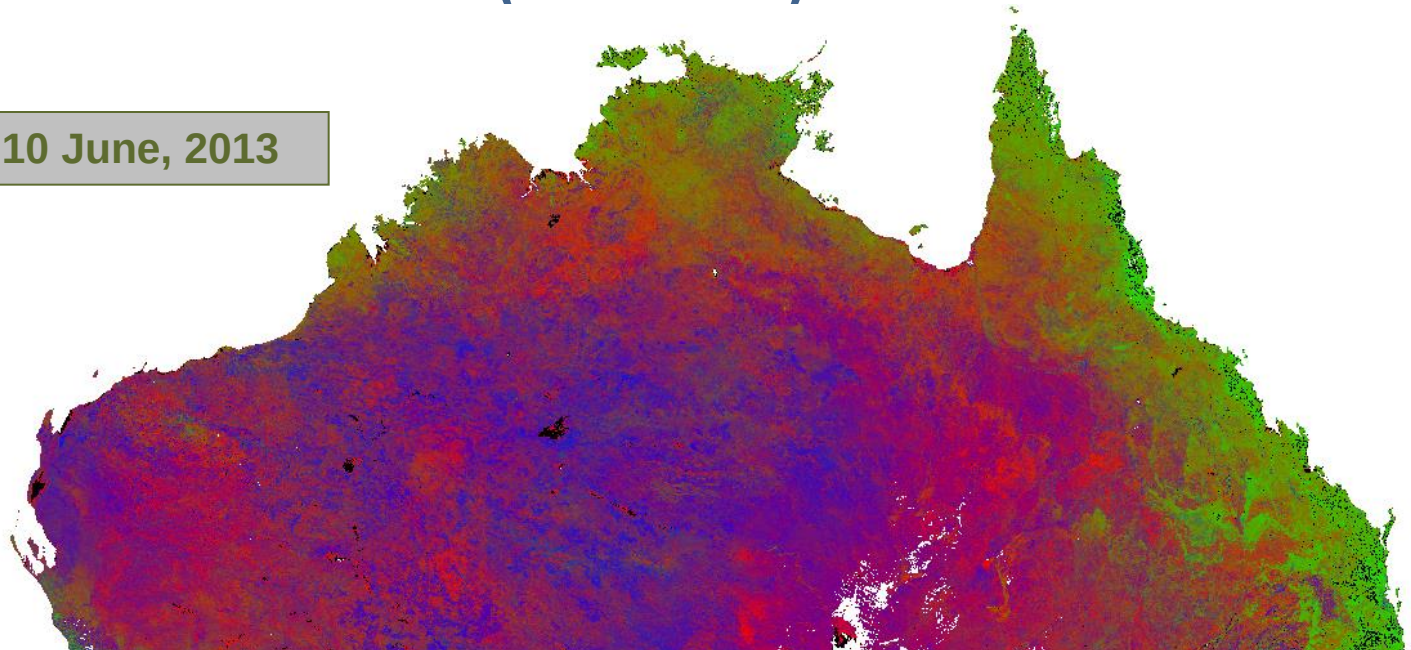
- Guerschman (CSIRO Land & Water), extensive field validation

Red = Non-green vegetation (0% - 100%)

Green = Green vegetation (0% - 100%)

Blue = Bare soil (0% - 100%)

25 May – 10 June, 2013

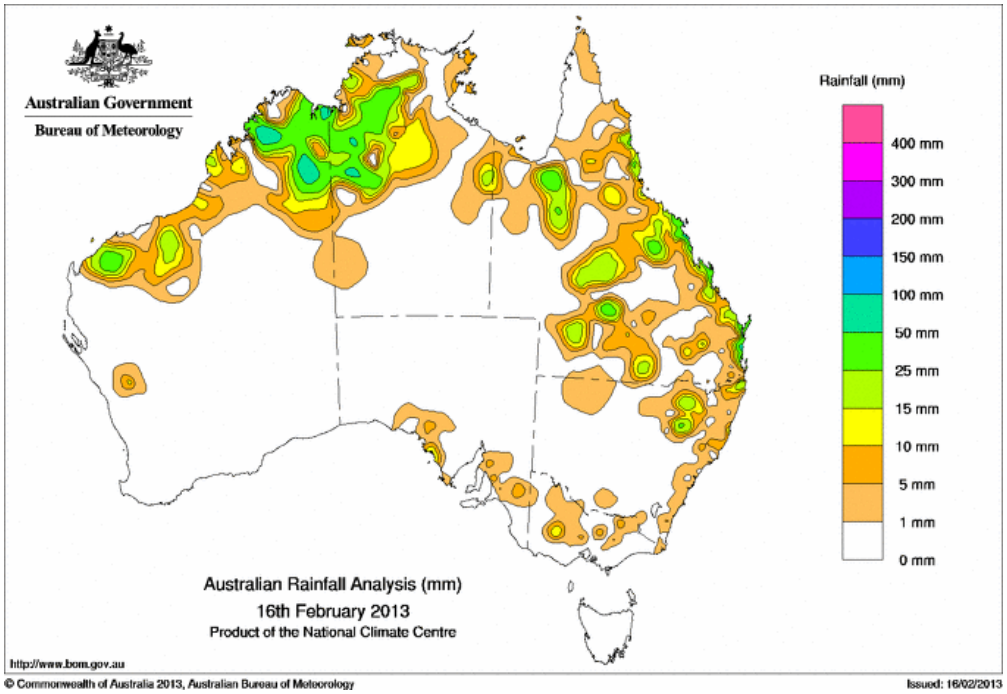


Fuel load

- Grass, leaf litter
- Indicators or calibrated load could be developed from some AusCover datasets
- For instance, time integration of
  - **NDVI**
  - **NPP** = Net Primary Productivity
  - **GPP** = Gross Primary Productivity
- Issue: Some carbon goes into wood, not leaf litter

Daily gridded meteorology

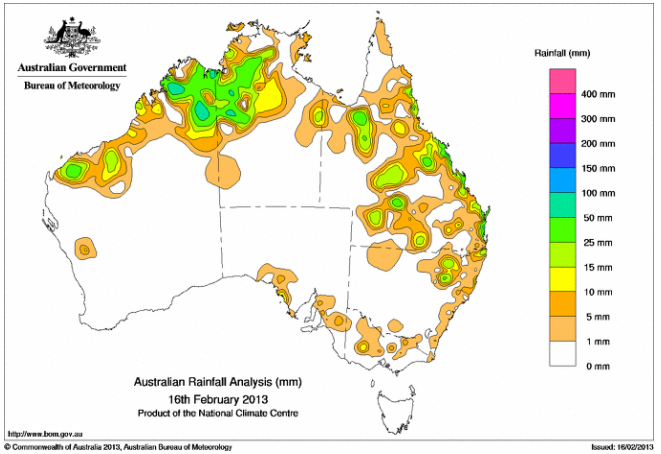
- Produced by Bureau of Meteorology
- “AWAP” grids (Australian Water Availability Project)
- Point observations interpolated to 0.05° grid

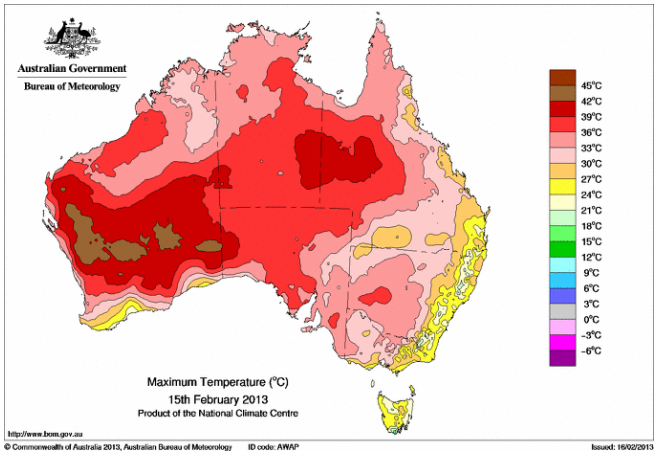


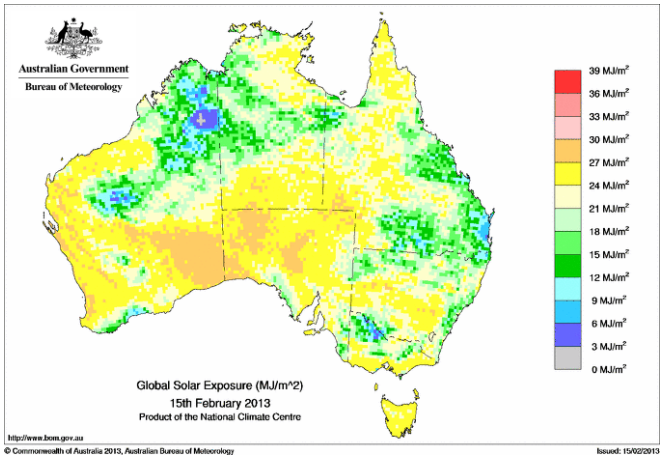
Daily gridded meteorology

Daily (available next day)

- Rainfall
- Temperature (min, max)
- Vapour pressure (9am, 3pm)
  (Humidity)
- Solar radiation (satellite)







BoM AusCover THREDDS server

Catalog http://opendap.bom.gov.au:8080/thredds/catalog/catalogs/bmrc-tern-catalog.html

Dataset	Size	Last Modified
AVHRR-NVDI 1km Monthly Composite/		--
AVHRR-NVDI 5km Monthly Composite/		--
AVHRR-NVDI 1km One-Third-of-Month Composite/		--
Mean Daily Rain Gauge Precipitation 5km Gridded/		--
Mean Monthly Rain Gauge Precipitation 5km Gridded/		--
Mean Daily Thermometer Maximum Air Temperature 5km Gridded/		--
Mean Daily Thermometer Minimum Air Temperature 5km Gridded/		--
Daily Horizontal Surface Solar Radiation Exposure 5km Gridded/		--
Daily Air Water Vapour Partial Pressure at 3pm 5km Gridded/		--
Daily Air Water Vapour Partial Pressure at 9am 5km Gridded/		--

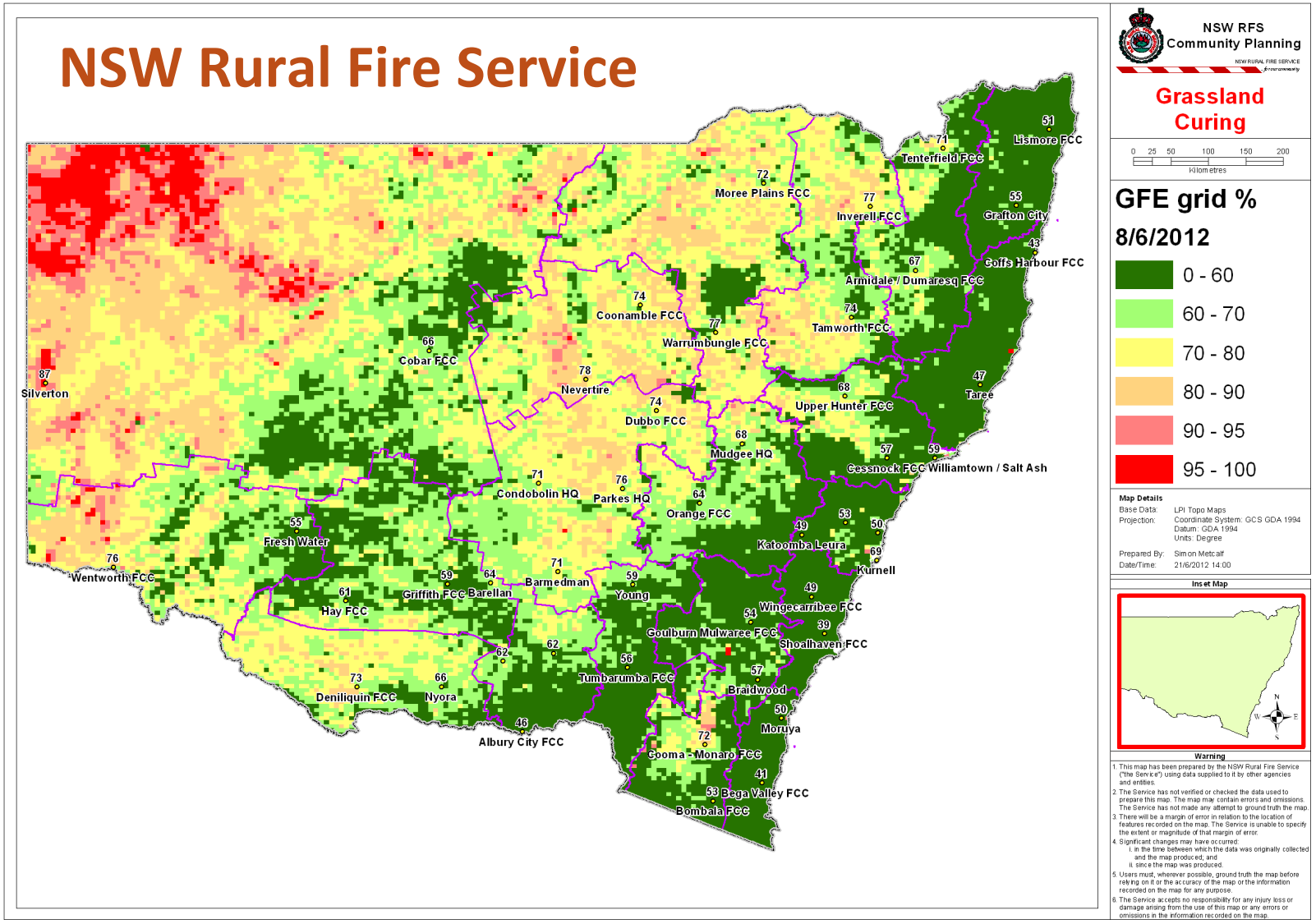
Grassland curing development

Timeliness

- Currently MODIS data is preprocessed by NASA then CSIRO
  → Delays of ~2 weeks
- Change to MODIS data from BoM direct downlink
  → Rolling 8-day window available next day : 500-m curing

Postprocess for GFE

- Mask nongrassland
- Aggregate to GFE resolution (3 km or 6 km)
- Interpolate to nongrassland
- Fill holes (cloud) with older values

Available August 2013

MODIS grassland curing