



***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

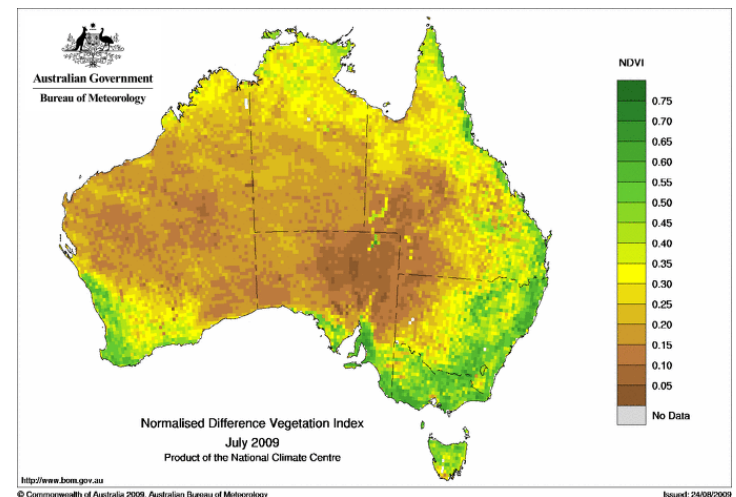
- Fuel state
 - Fuel load proxies
 - Fuel continuity
 - Meteorology
-
- Curing development

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



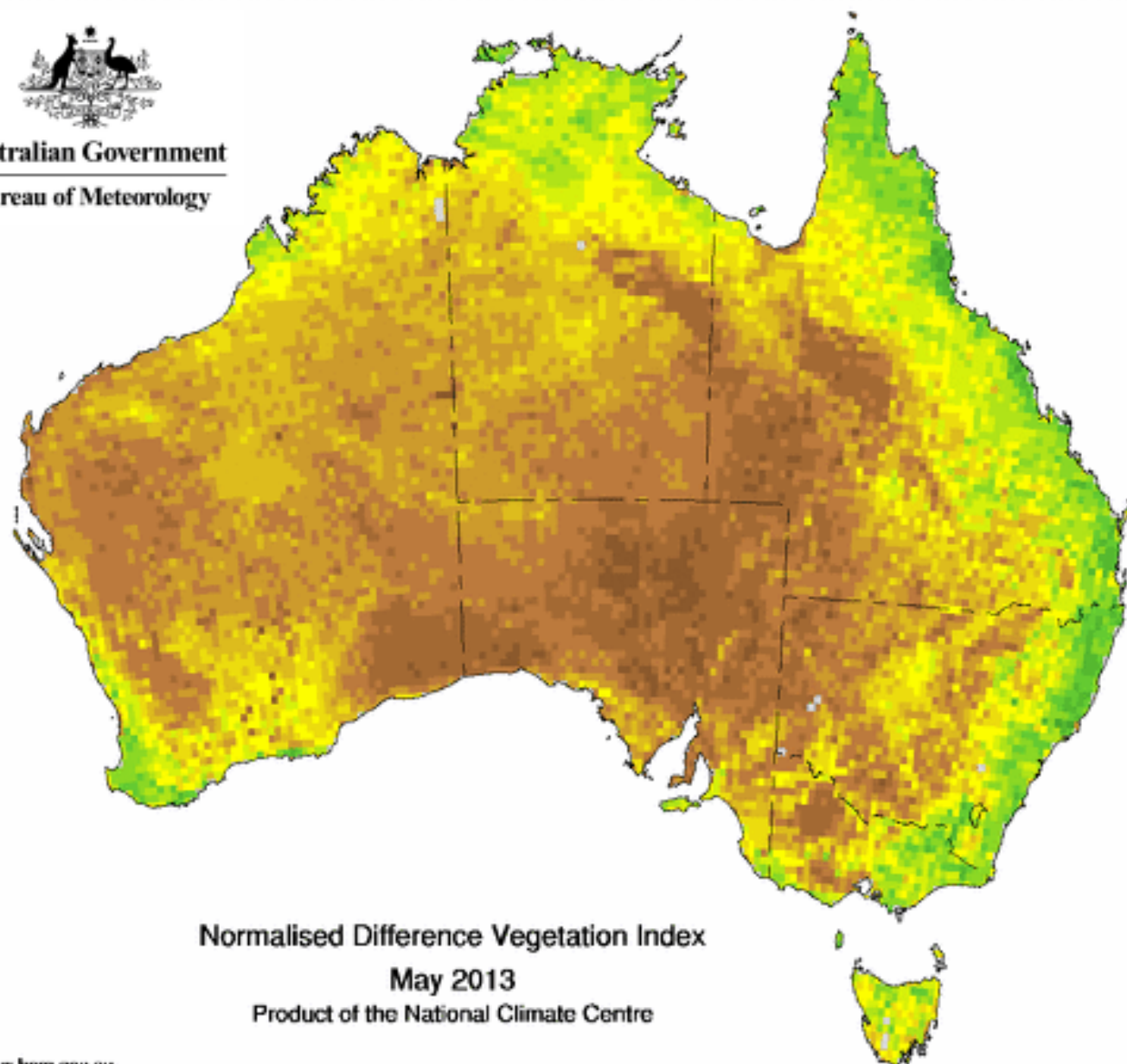
What is NDVI?

- 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

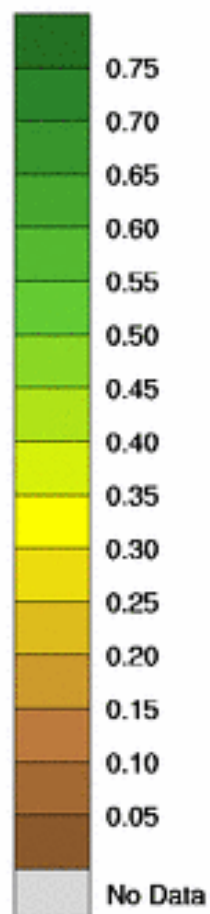


Australian Government

Bureau of Meteorology



NDVI

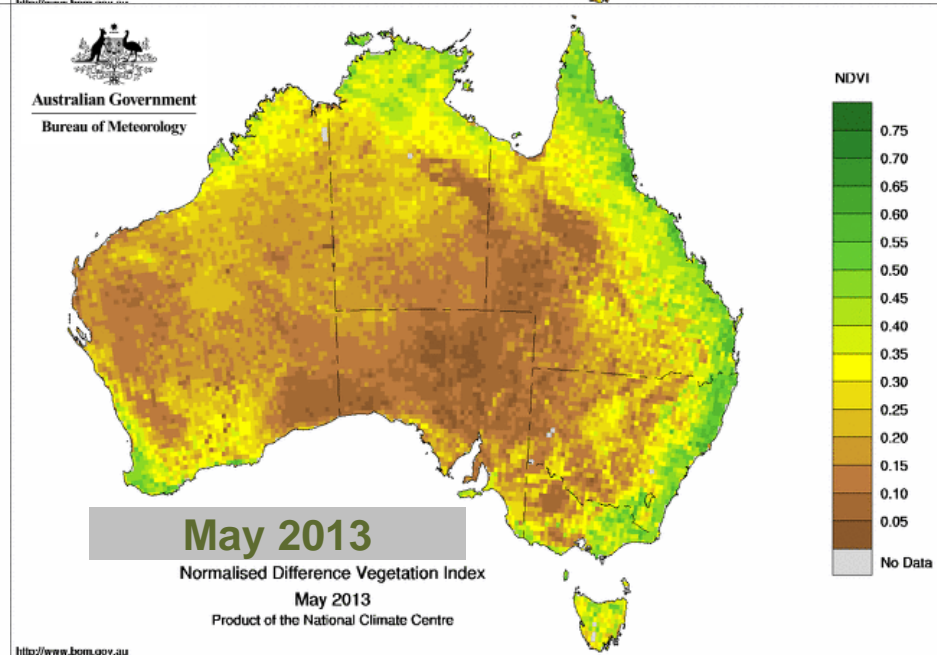
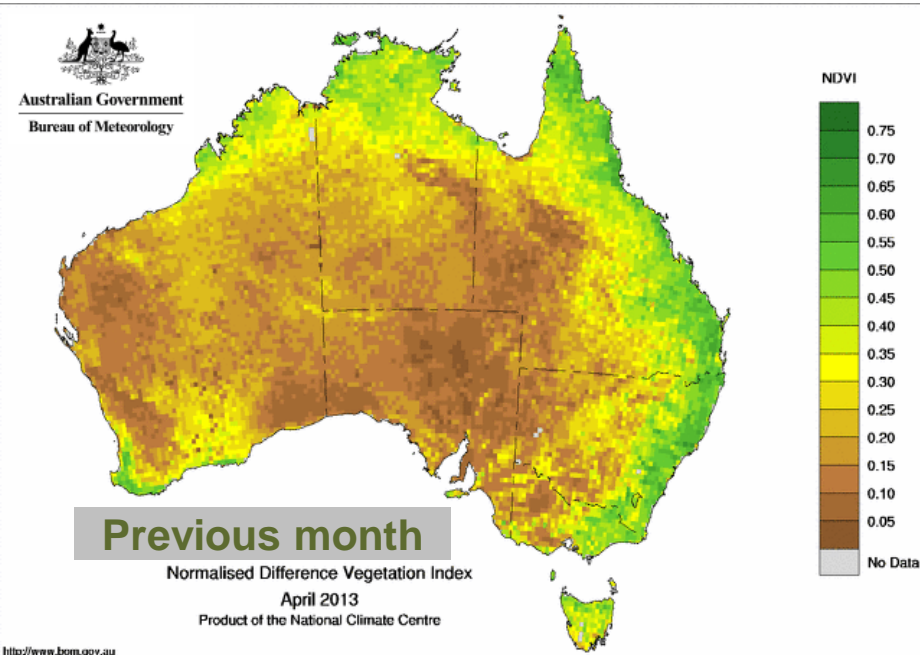
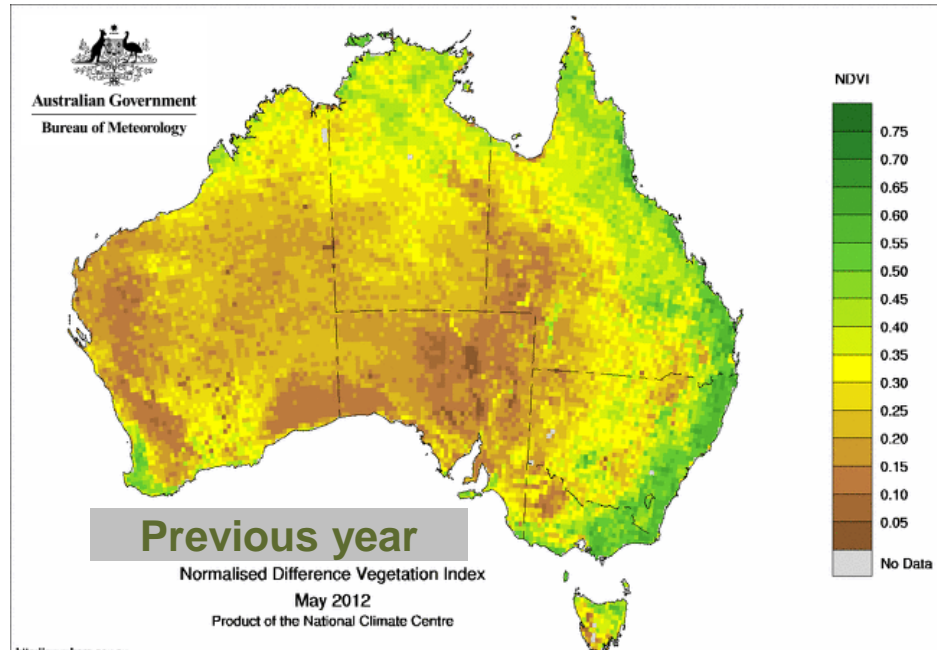


Normalised Difference Vegetation Index

May 2013

Product of the National Climate Centre

NDVI (Vegetation greenness)

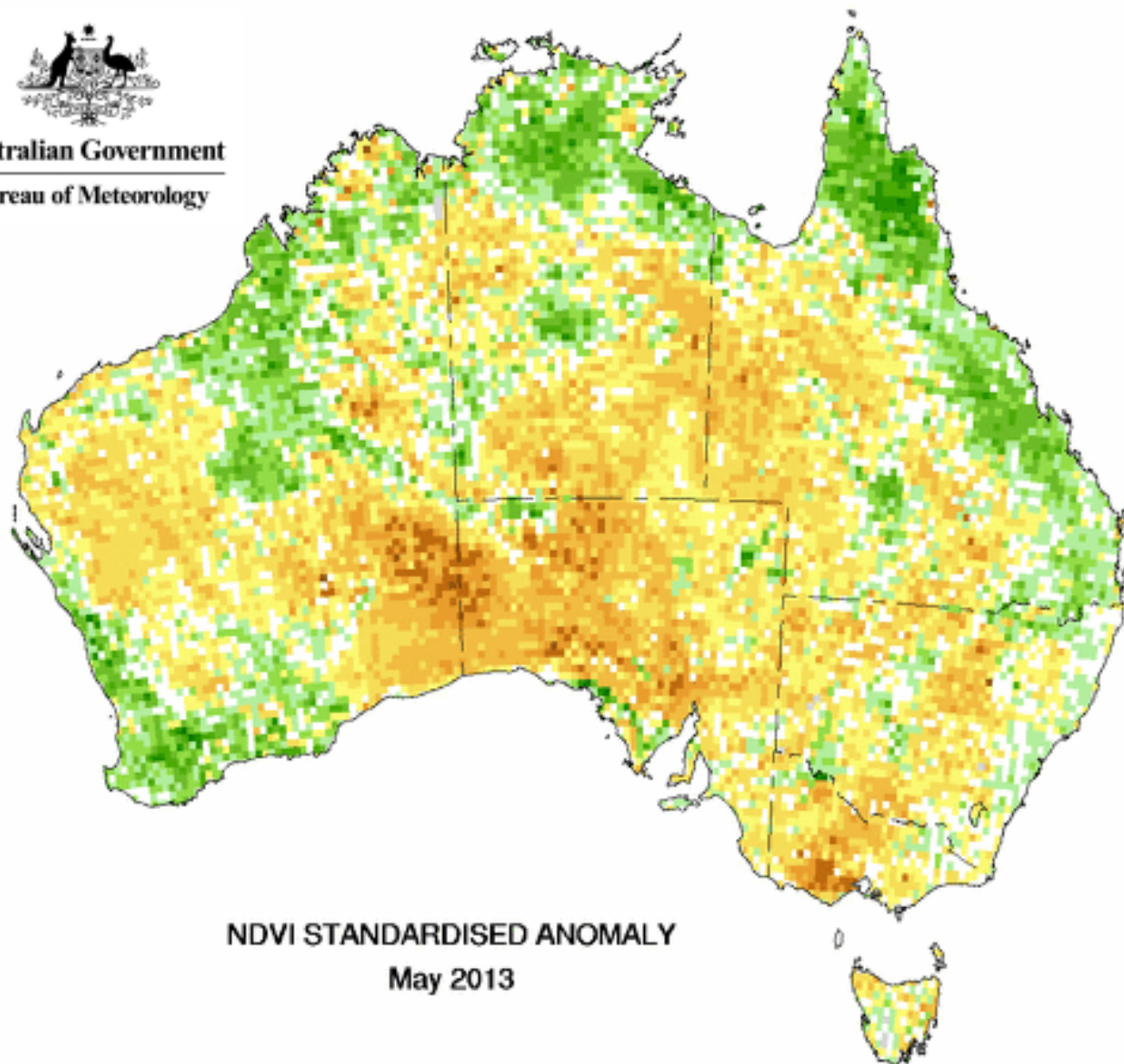


Standard deviations from 17-year mean



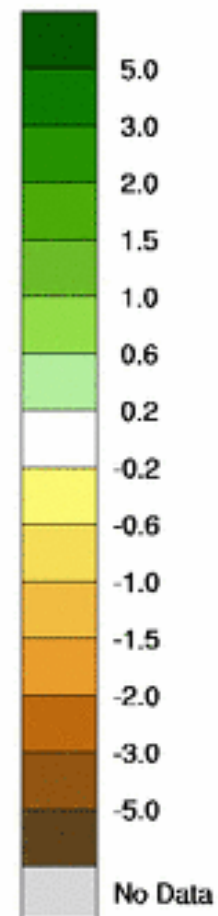
Australian Government

Bureau of Meteorology



NDVI STANDARDISED ANOMALY

May 2013



5.0

3.0

2.0

1.5

1.0

0.6

0.2

-0.2

-0.6

-1.0

-1.5

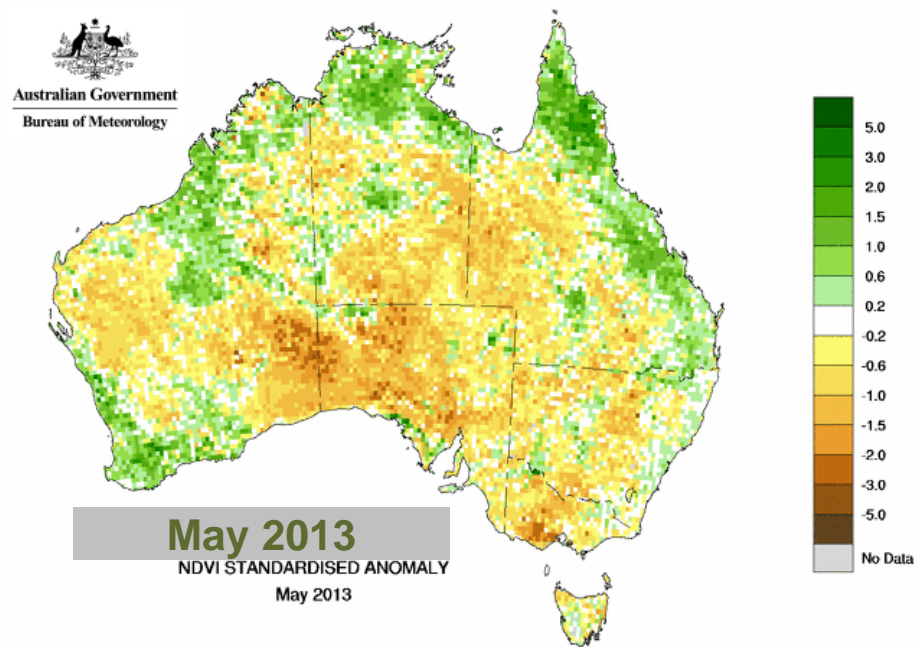
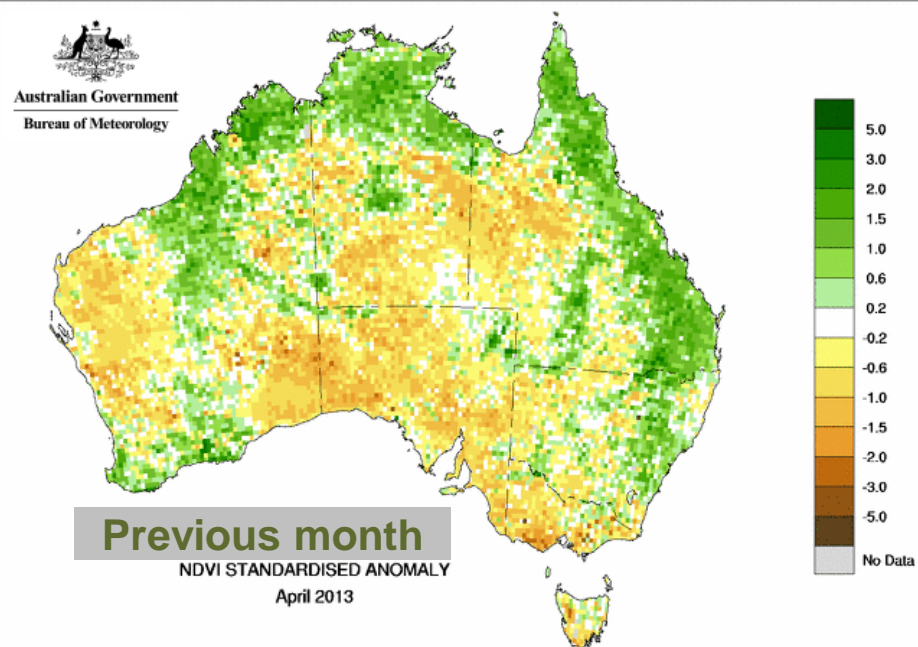
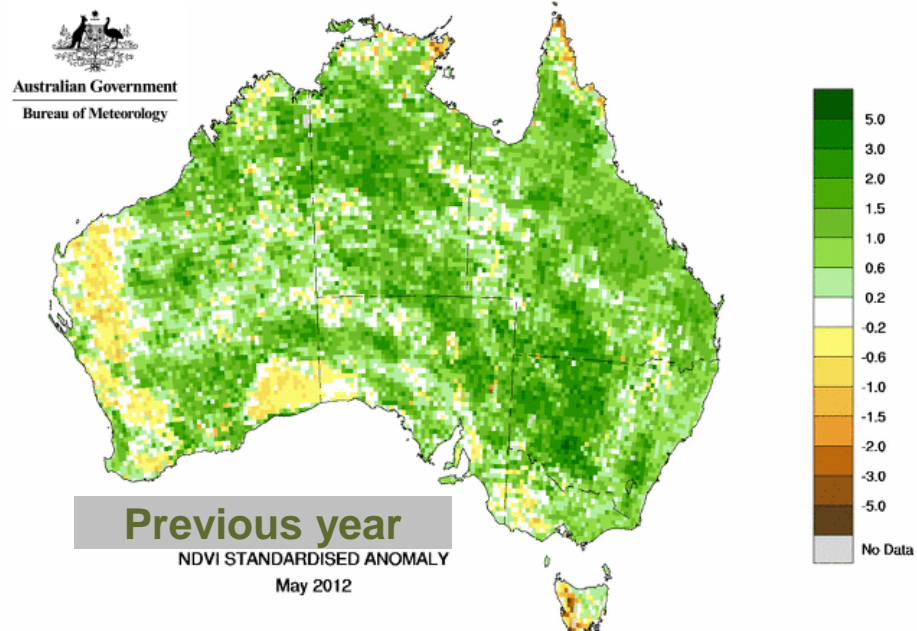
-2.0

-3.0

-5.0

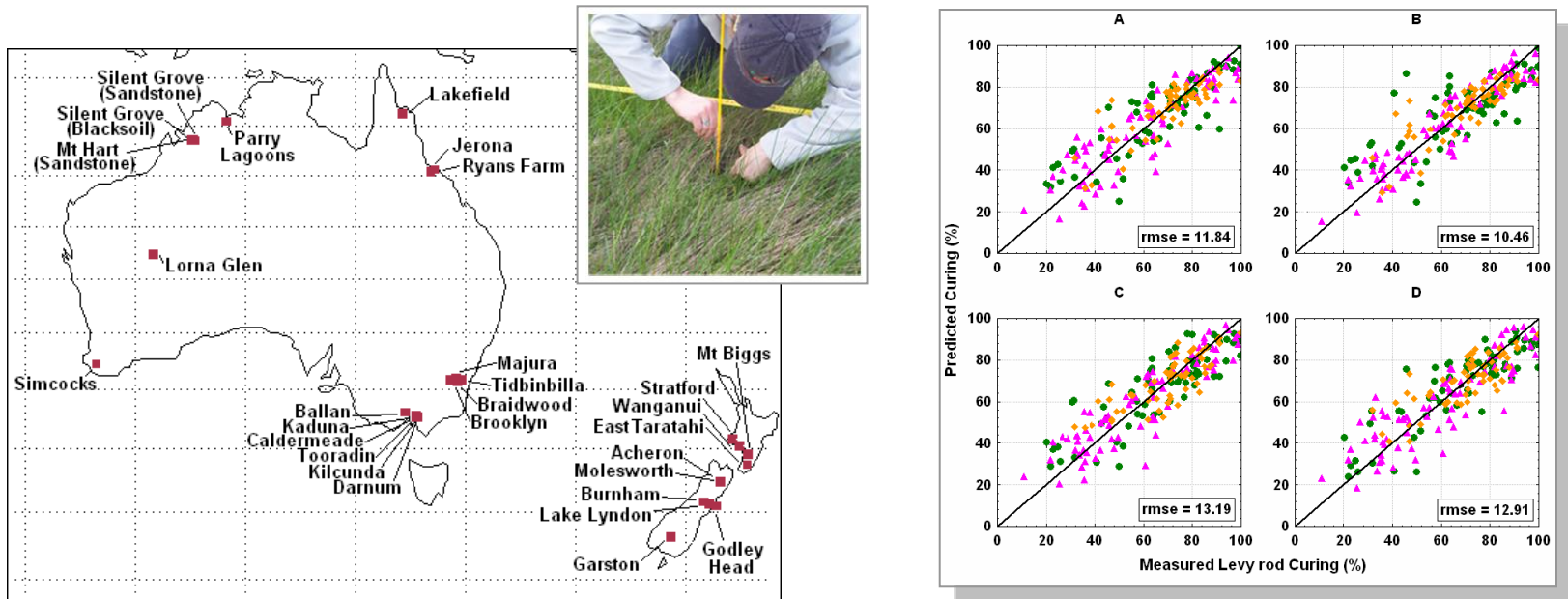
No Data

NDVI standardised anomaly

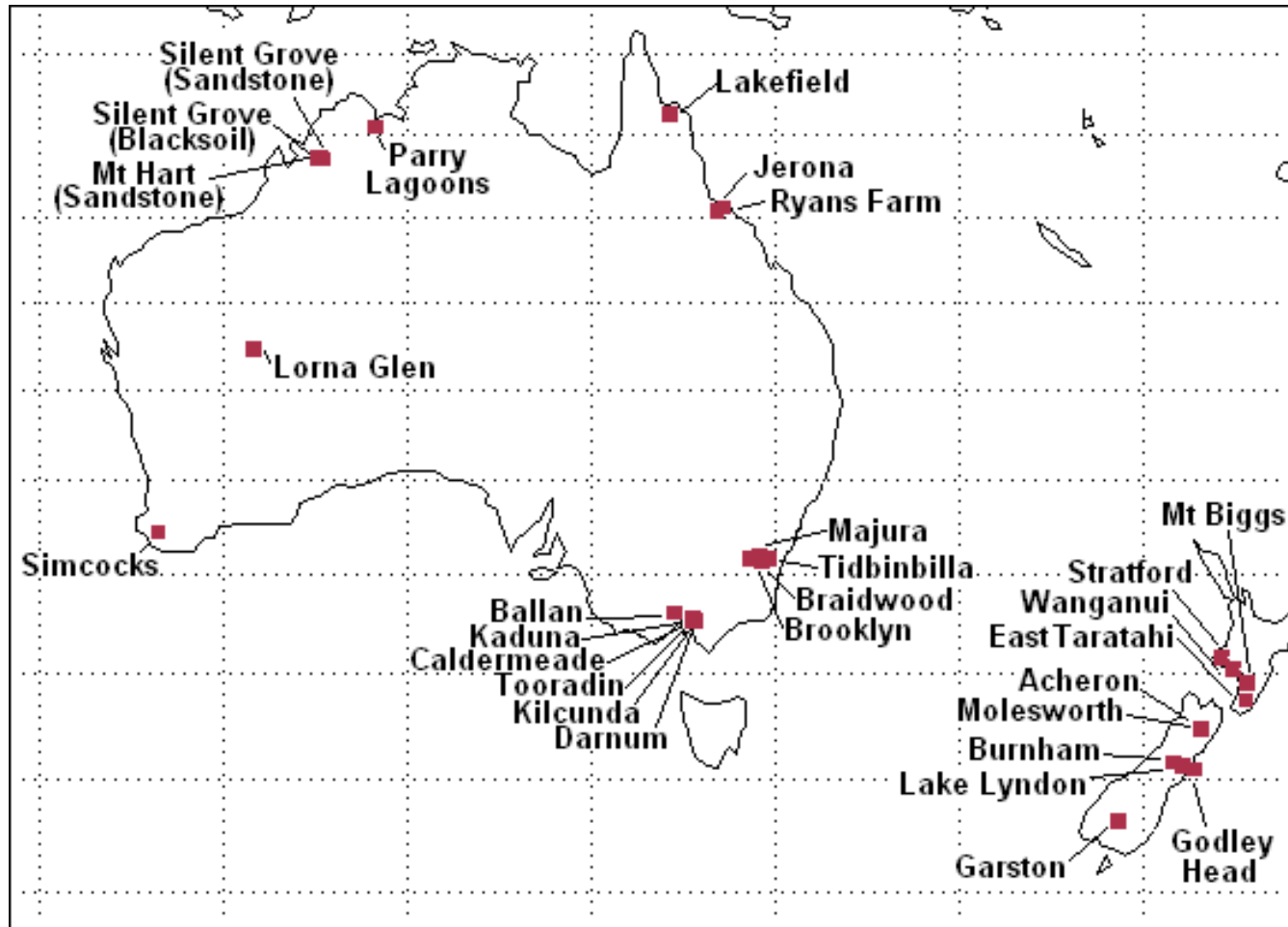


MODIS grassland curing

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



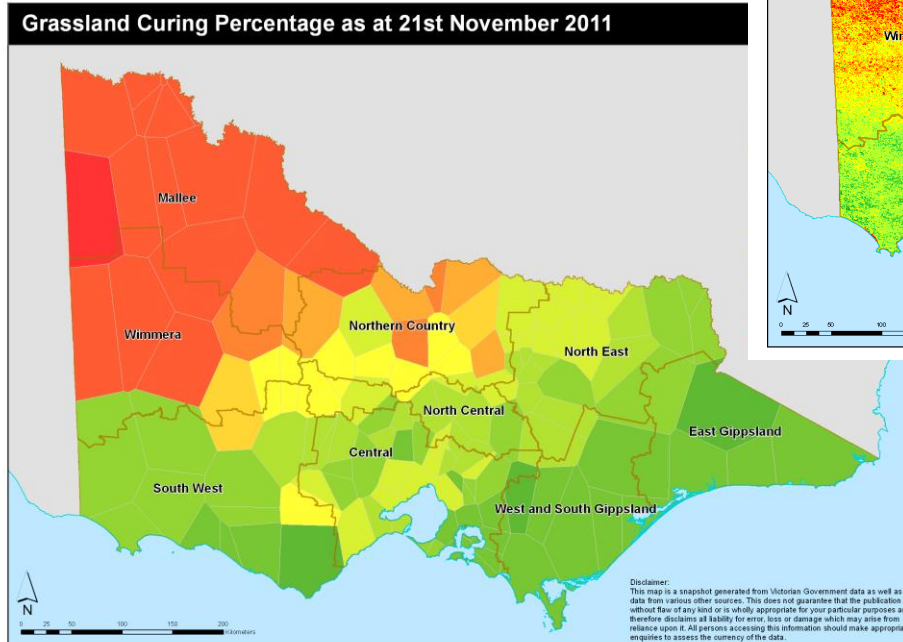
Curing field Sites



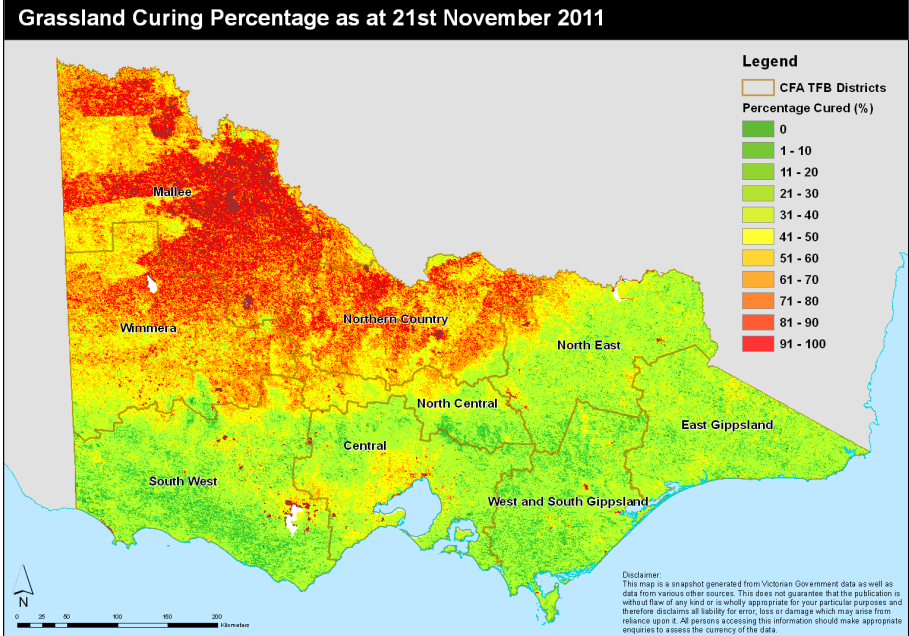
MODIS grassland curing

Evaluation in Victoria by CFA

One visual estimate per polygon



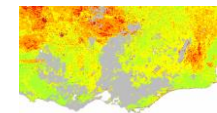
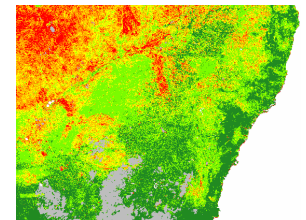
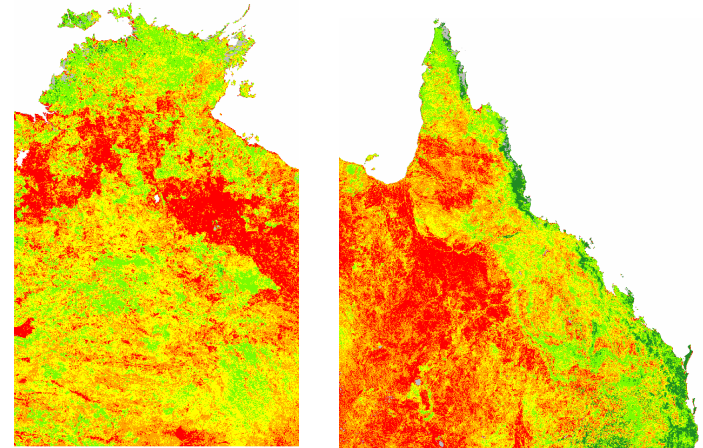
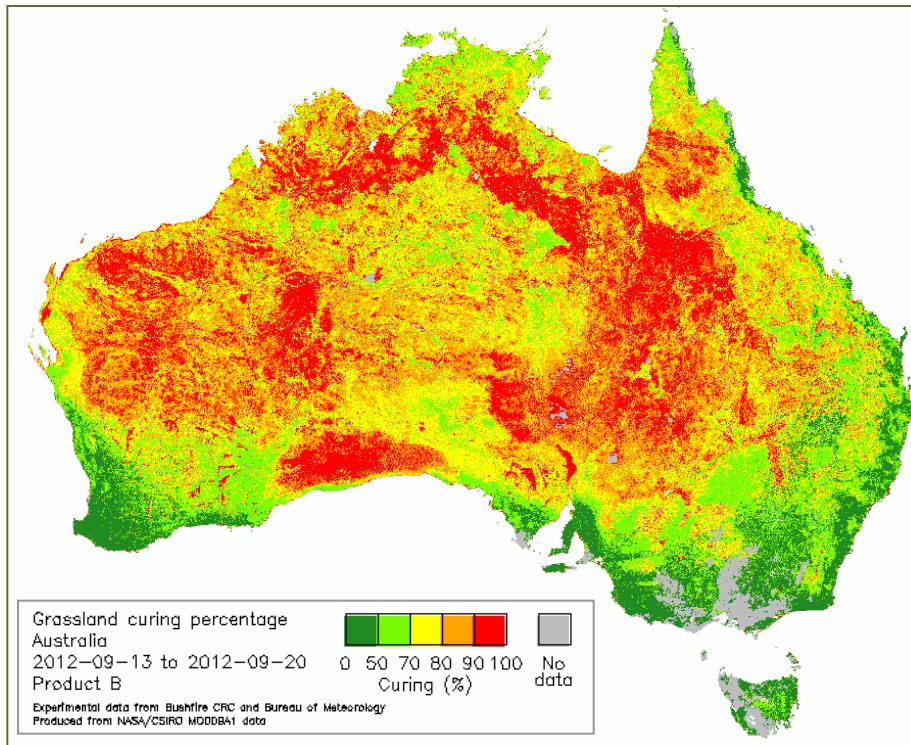
MODIS curing map



— Other states have sparser visual networks

Curing on AusCover

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

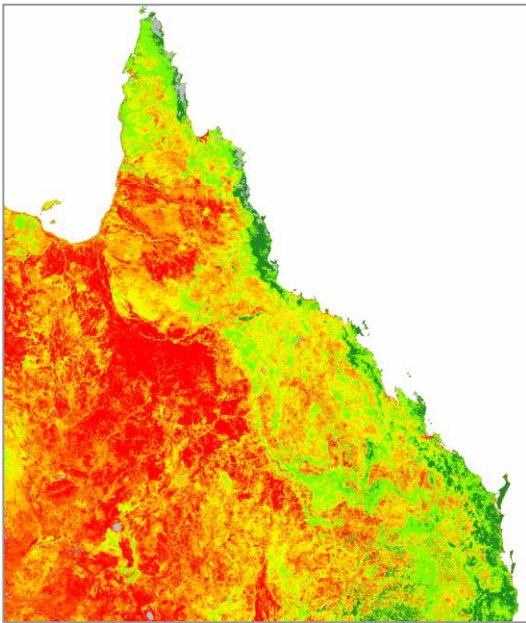


Not current data

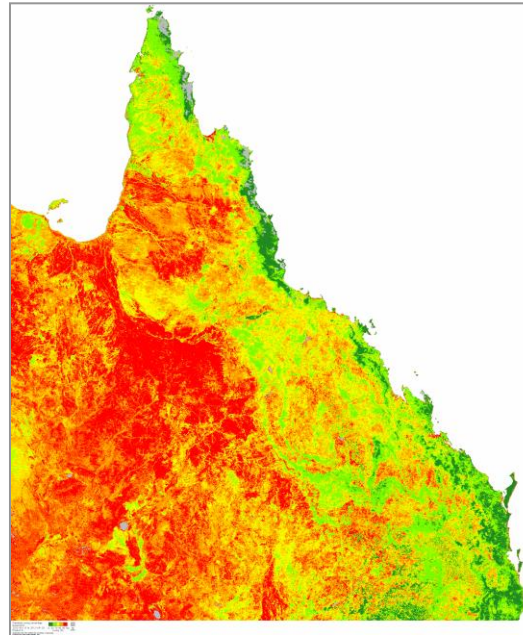
Curing on AusCover

- Formats

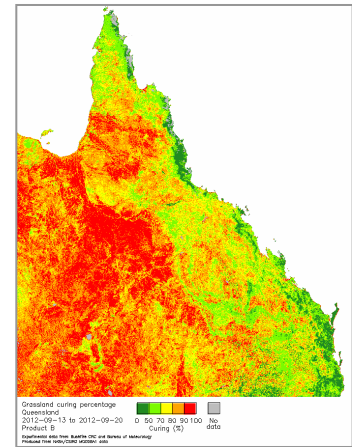
GeoTIFF, netCDF



GeoTIFF + legend

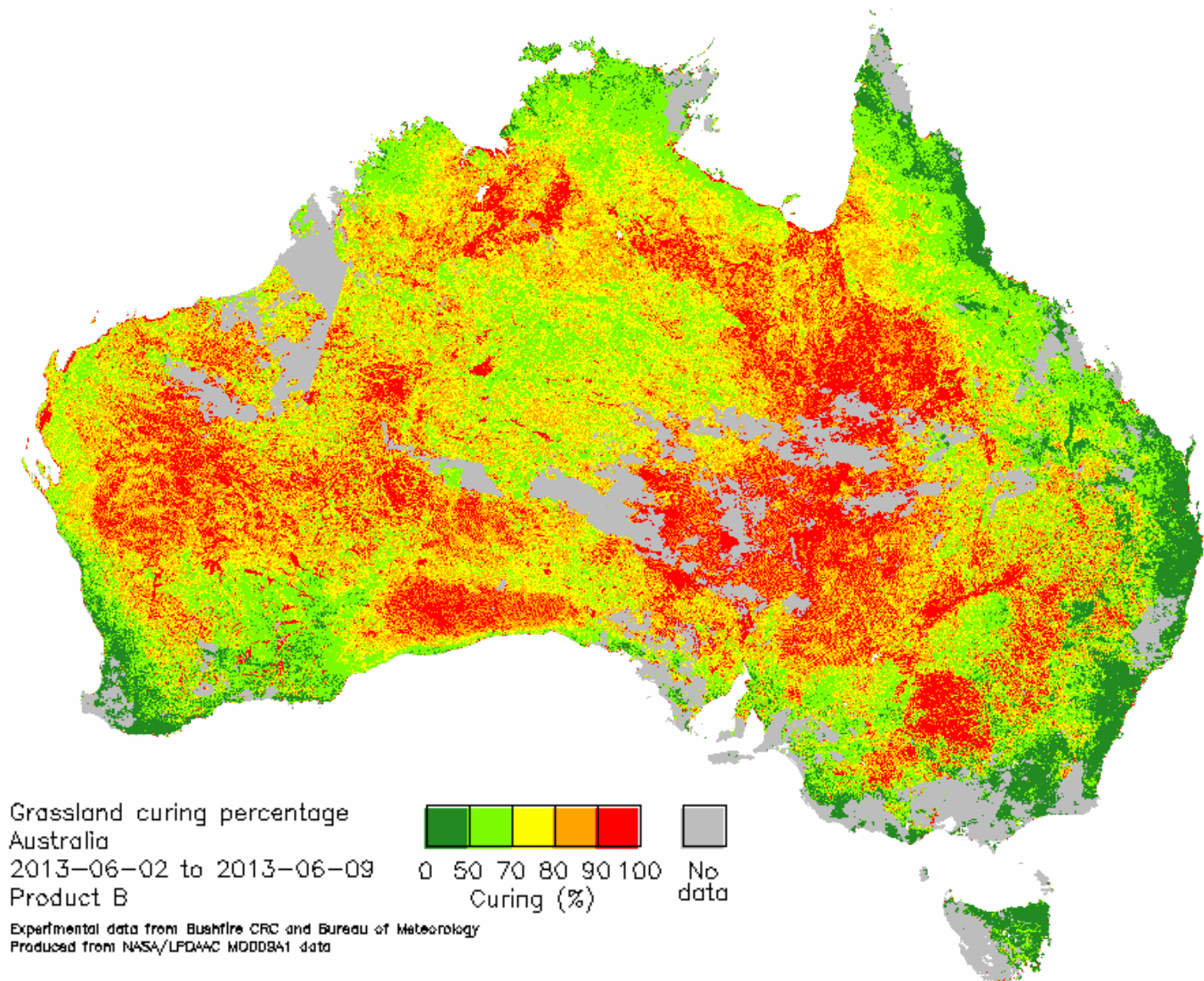


Reduced resolution
GeoTIFF + legend

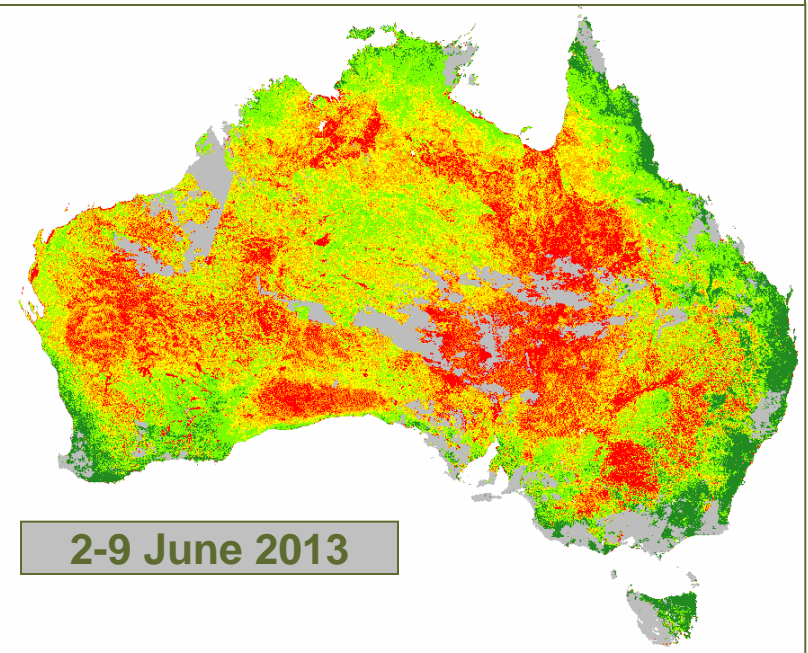
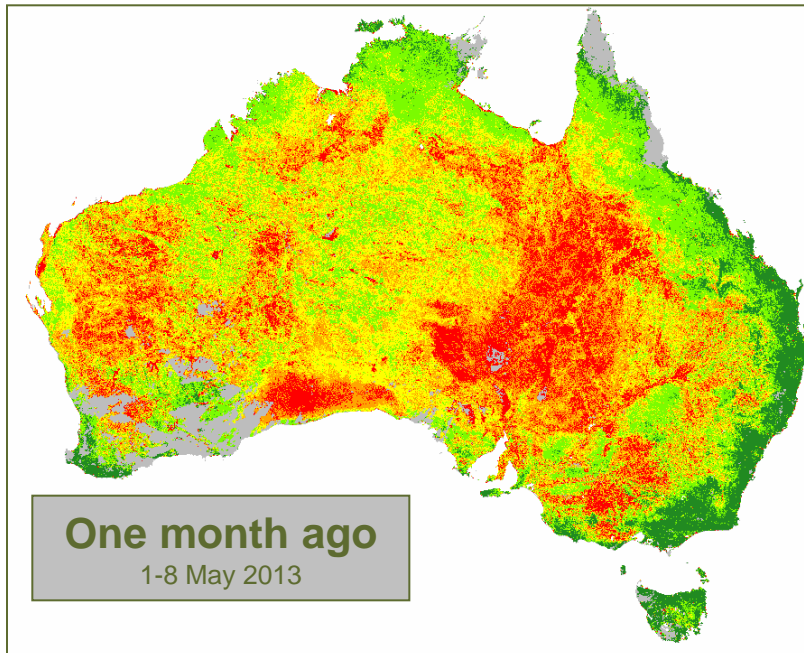
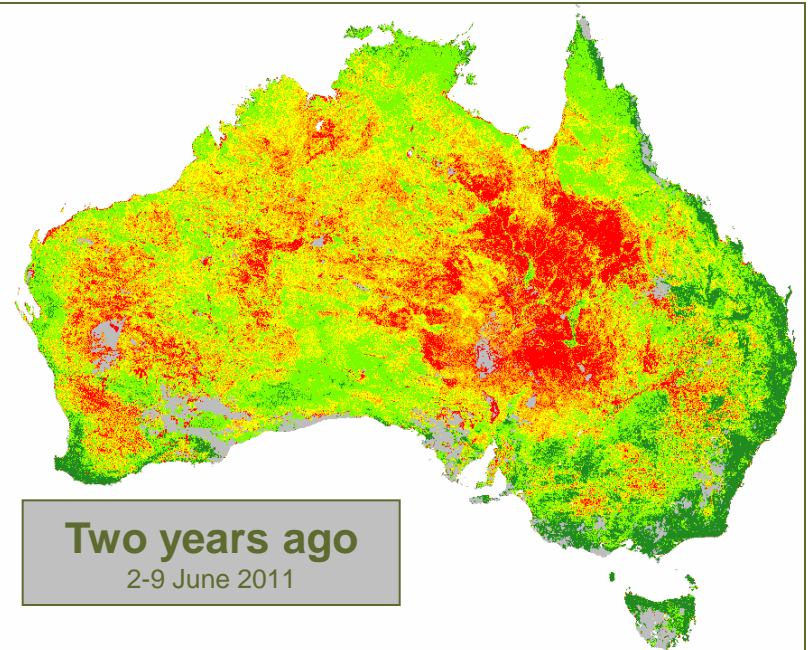
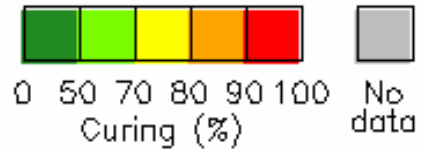


Not current data

Grassland curing (Map B)

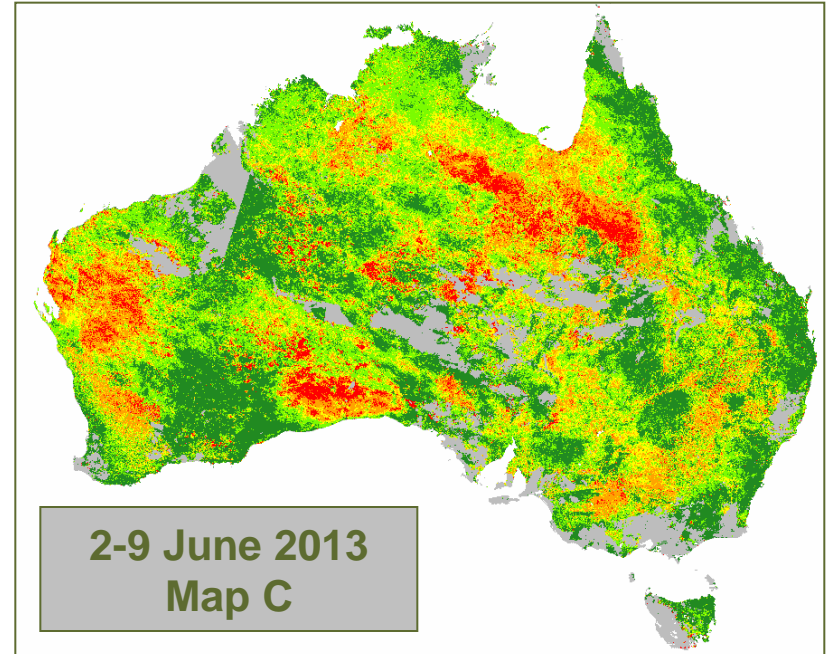
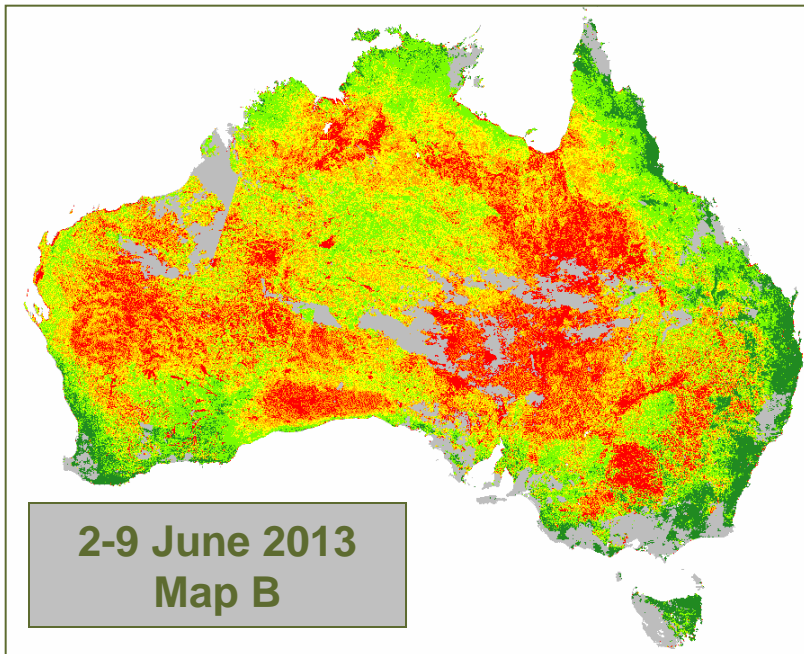
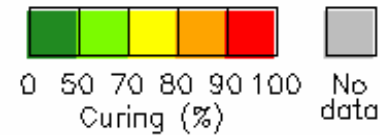


Grassland curing (Map B)



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

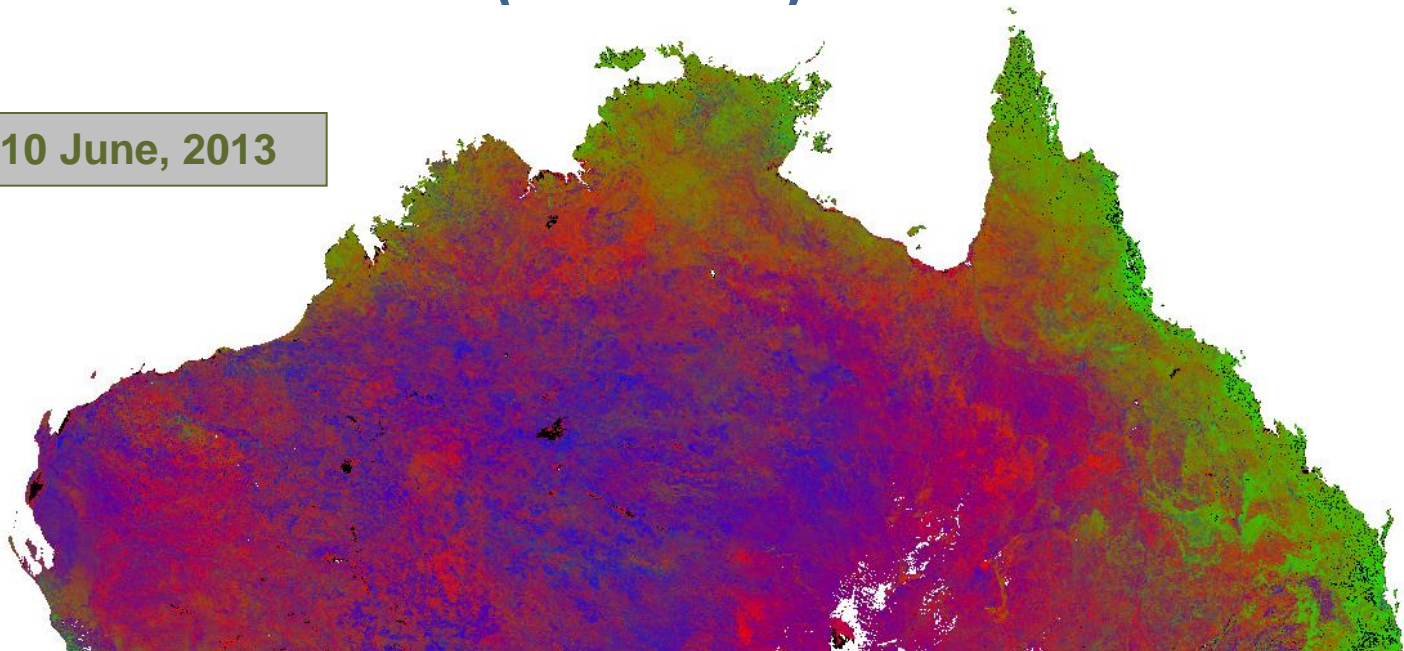
- Guerschman (CSIRO Land & Water), extensive field validation

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

Green = Green vegetation (0% - 100%)

Blue = Bare soil (0% - 100%)

25 May – 10 June, 2013

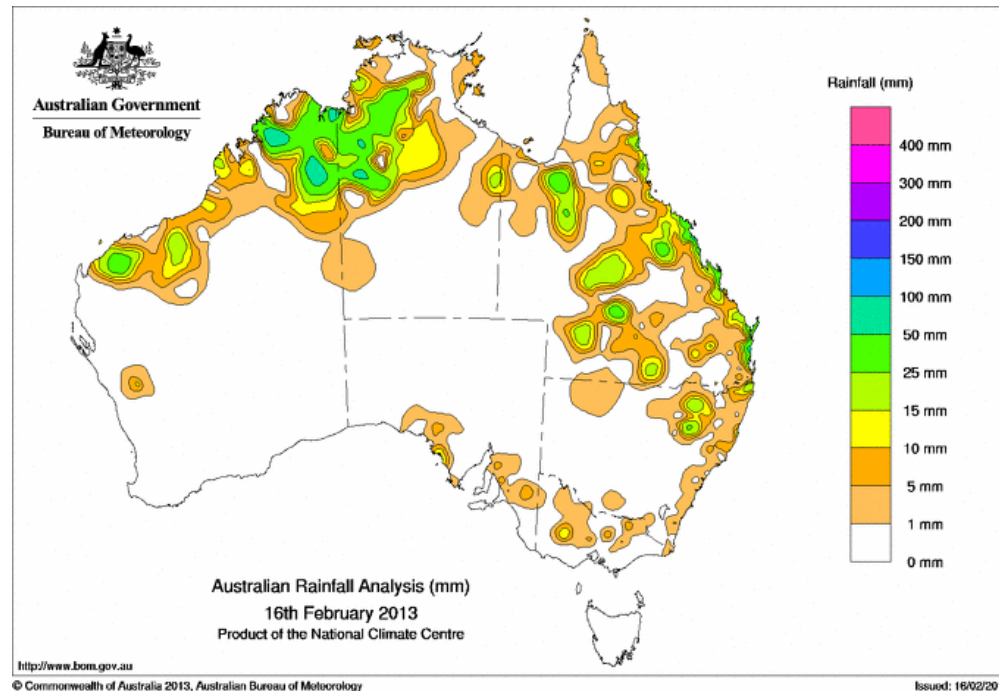


Fuel load

- 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

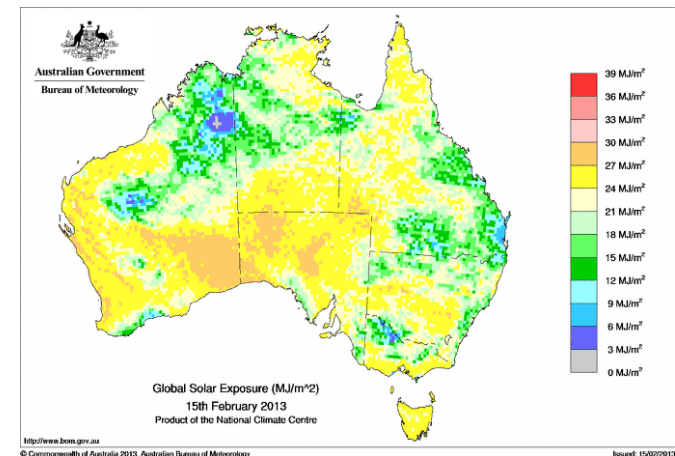
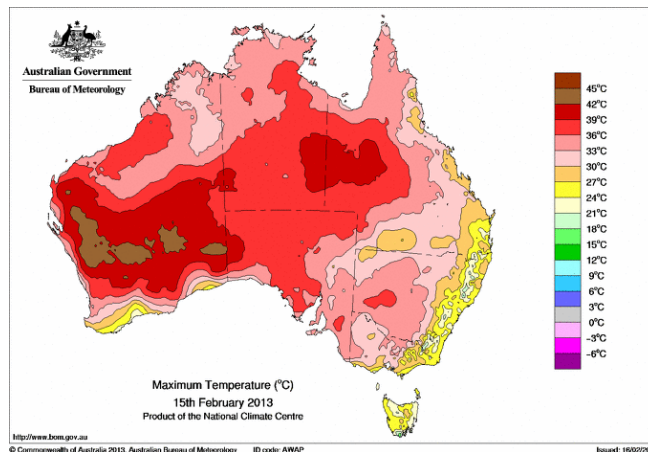
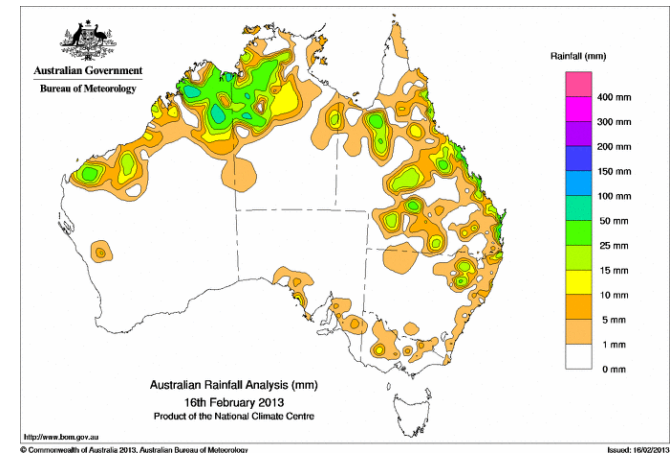
- Produced by Bureau of Meteorology
- “AWAP” grids (Australian Water Availability Project)
- Point observations interpolated to 0.05° grid



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

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

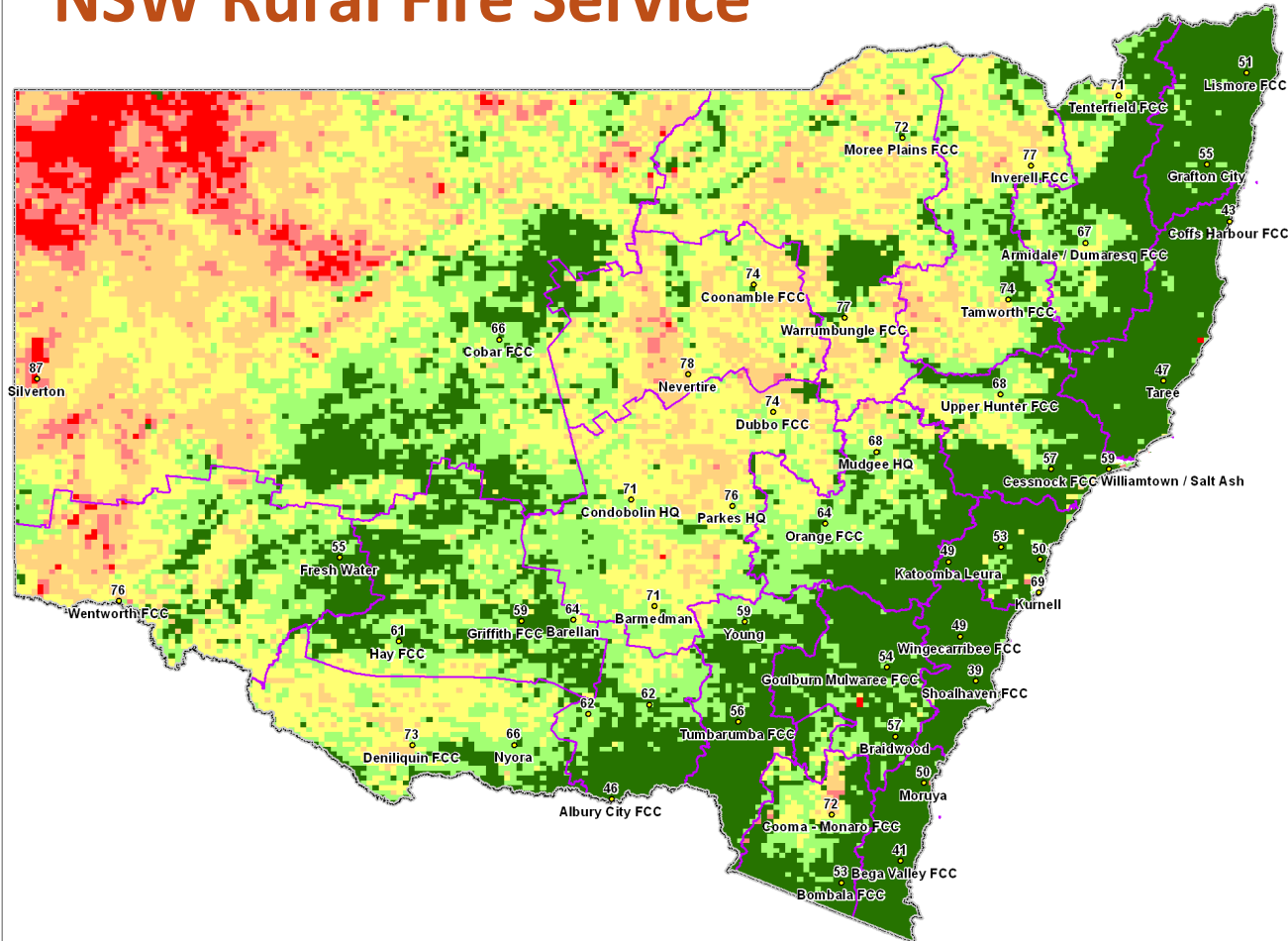
Postprocess for GFE

- 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

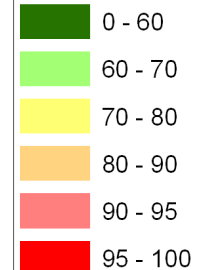
NSW Rural Fire Service



Grassland Curing

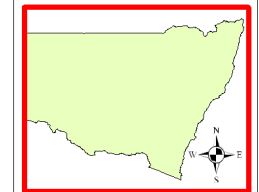


GFE grid % 8/6/2012



Map Details
Base Data: LPI Topo Maps
Projection: Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree
Prepared By: Sim on Metcalf
Date/Time: 21/6/2012 14:00

Ins et Map



Warning

1. This map has been prepared by the NSW Rural Fire Service (The Service) using data supplied to it by other agencies and entities.
2. The Service has not verified or checked the data used to prepare this map. The map may contain errors and omissions.
3. There will be a margin of error in relation to the location of features recorded on the map. The Service is unable to specify the extent or magnitude of that margin of error.
4. Significant changes may have occurred:
 - i. in the time between which the data was originally collected and the map produced, and
5. Users must, wherever possible, ground truth the map before relying on it or the accuracy of the map or the information recorded on the map for any purpose.
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