Australian Government
Department of Agriculture and Water Resources
ABARES

National data, myrtle rust, and Australia's production forests

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15 August 2017

Research by the Australian Bureau of Agricultural and Resource Economics and Sciences

This presentation will cover

Australia's State of the Forests Report

Spatial underpinnings – National Forest Inventory datasets and derived maps

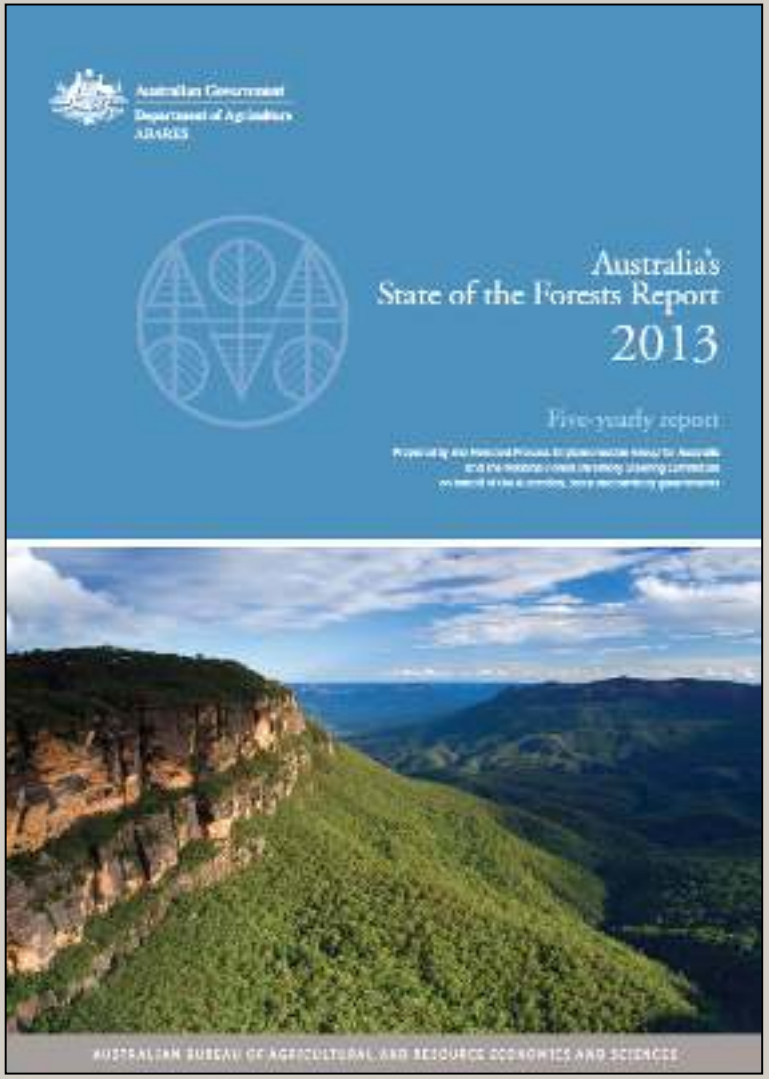
Myrtle rust

- climate suitability
- production forests with predicted high climatic suitability for myrtle rust
- regions where a high proportion of modelled future wood availability derives from areas of predicted high climatic suitability for myrtle rust

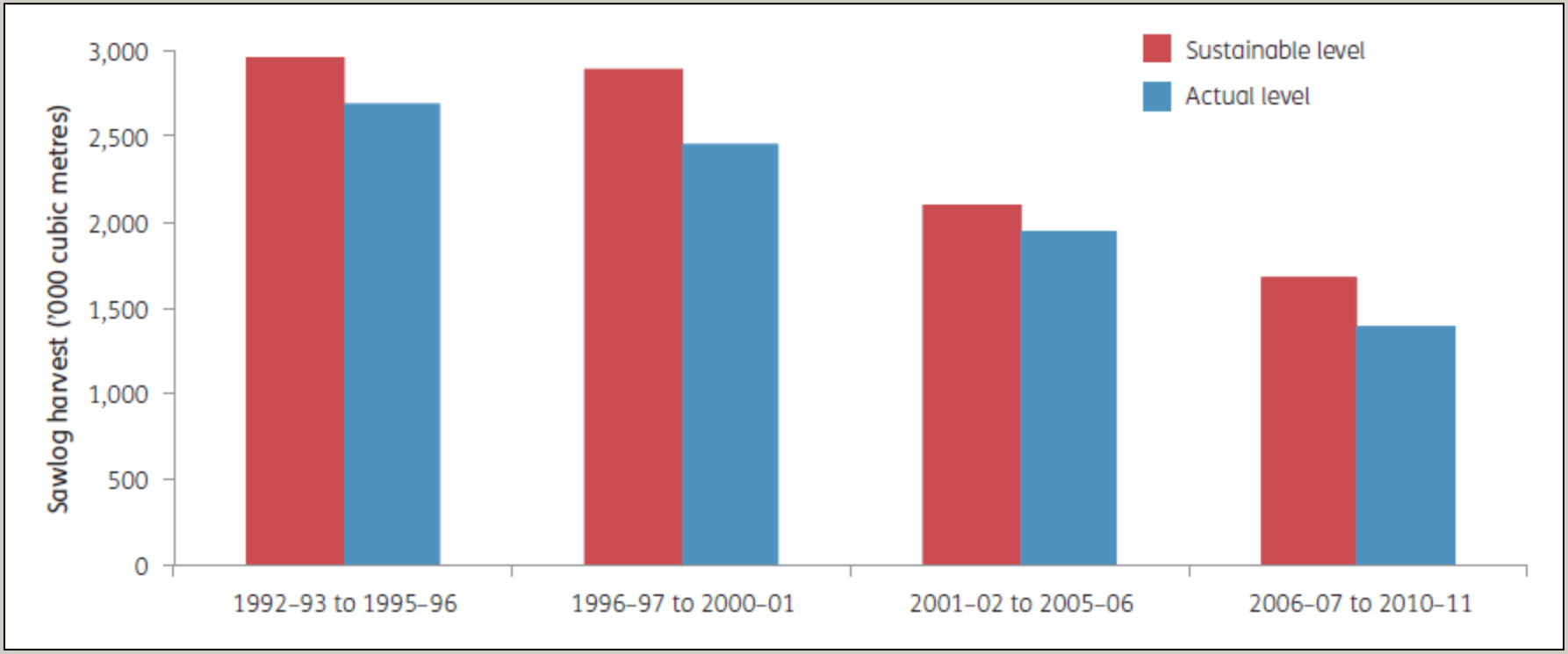
The *Australia's State of the Forests Report* series

The *Australia's State of the Forests Report* series

- Consistent national data
- Standardised framework
  - across the diversity of forest values
- Used by a wide range of forest and forest industry stakeholders
  - national policy
  - Parliamentary and other enquiries
  - industry documents and proposals
  - research, consultants and academia
  - community requests for information
- Efficient input from state-based reporting
- Efficient output to Global Forest Resource Assessment

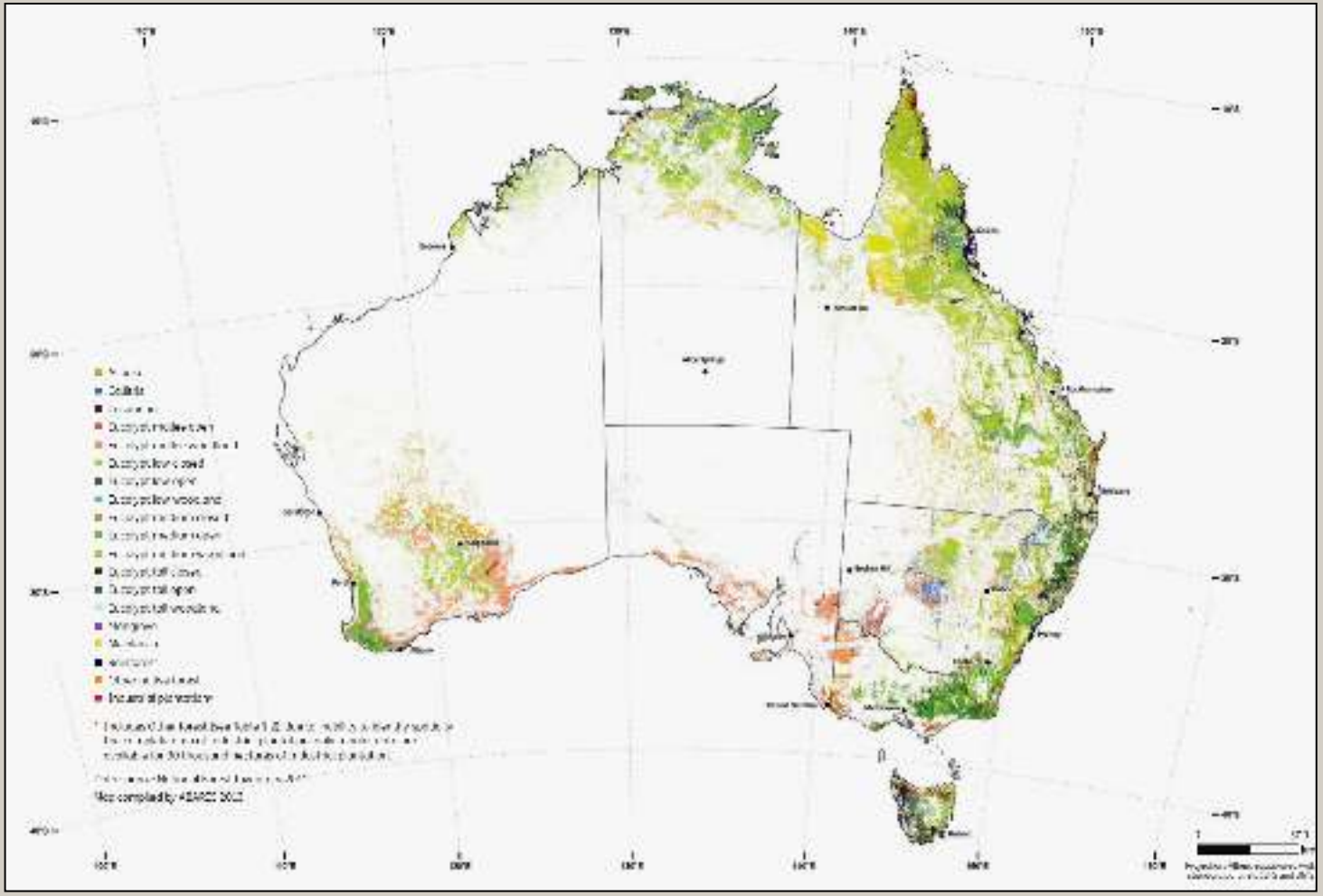


Sawlog harvest levels



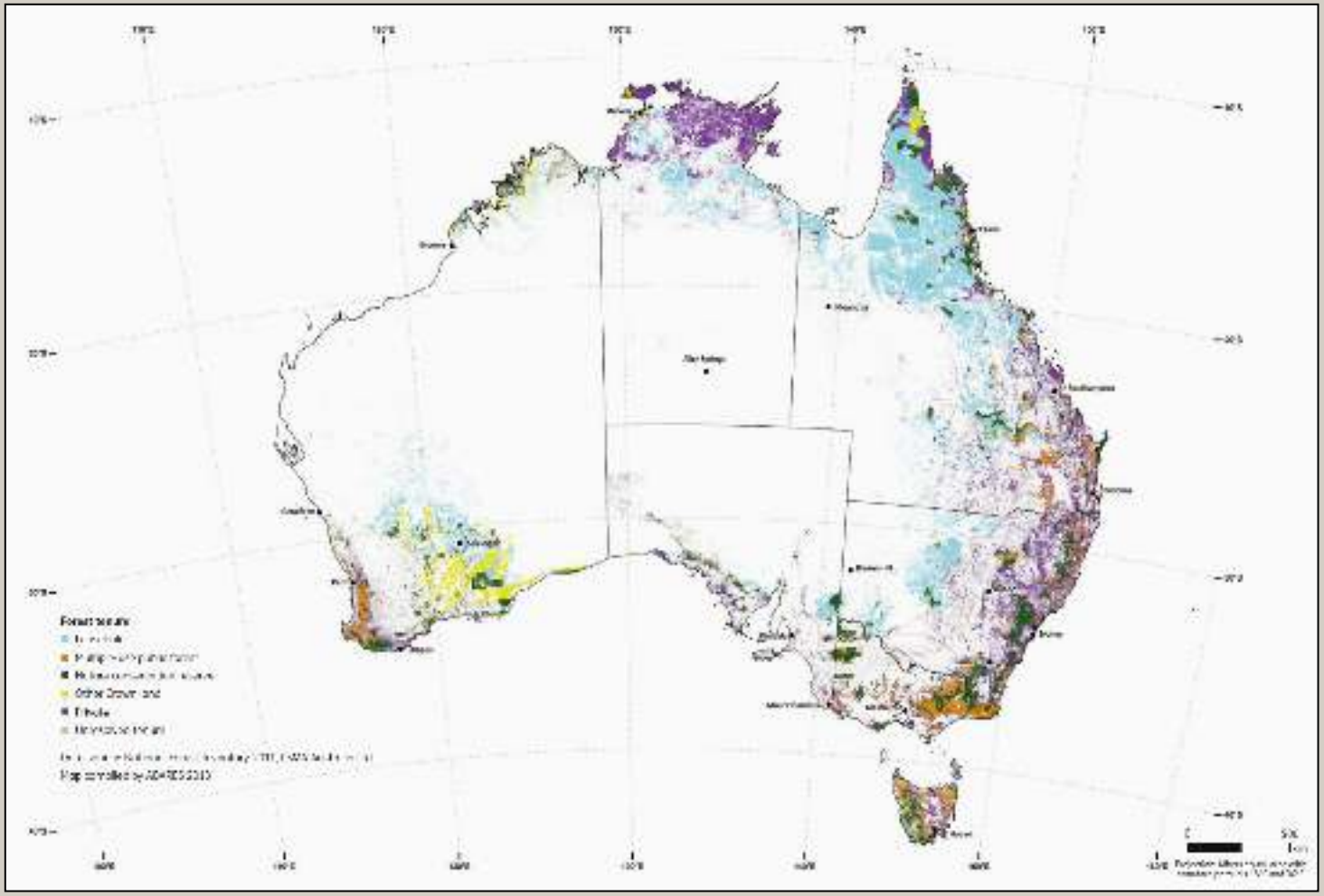
Average annual harvest and sustainable yield for multiple-use public native forests in Australia, by SOFR reporting period

Australia's forest cover 2013, by type



124.7 million hectares, including 2.0 million hectares of plantations

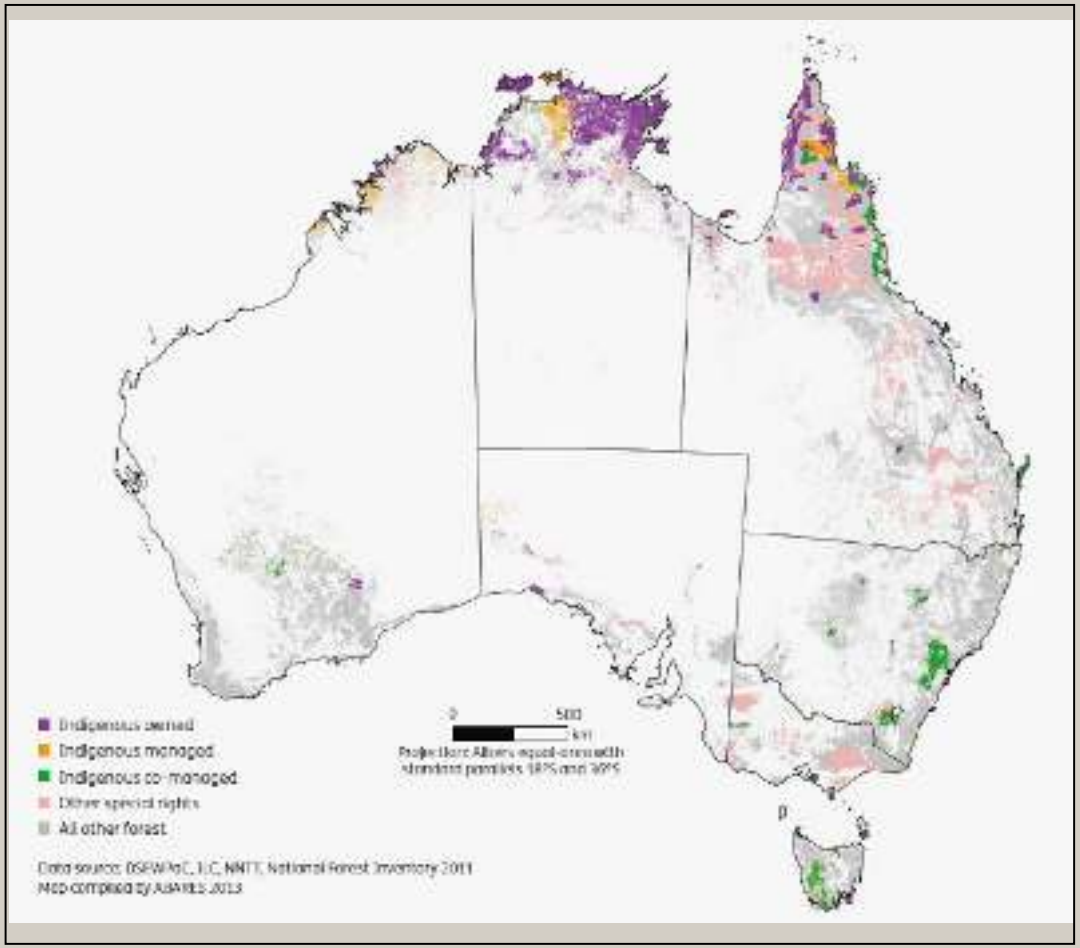
Australia's forest cover 2013, by tenure



124.7 million hectares, including 2.0 million hectares of plantations

Australia's Indigenous forest estate, 2013

Owned and managed
NT Land Rights lands, Qld Indigenous Protected Areas, private tenure



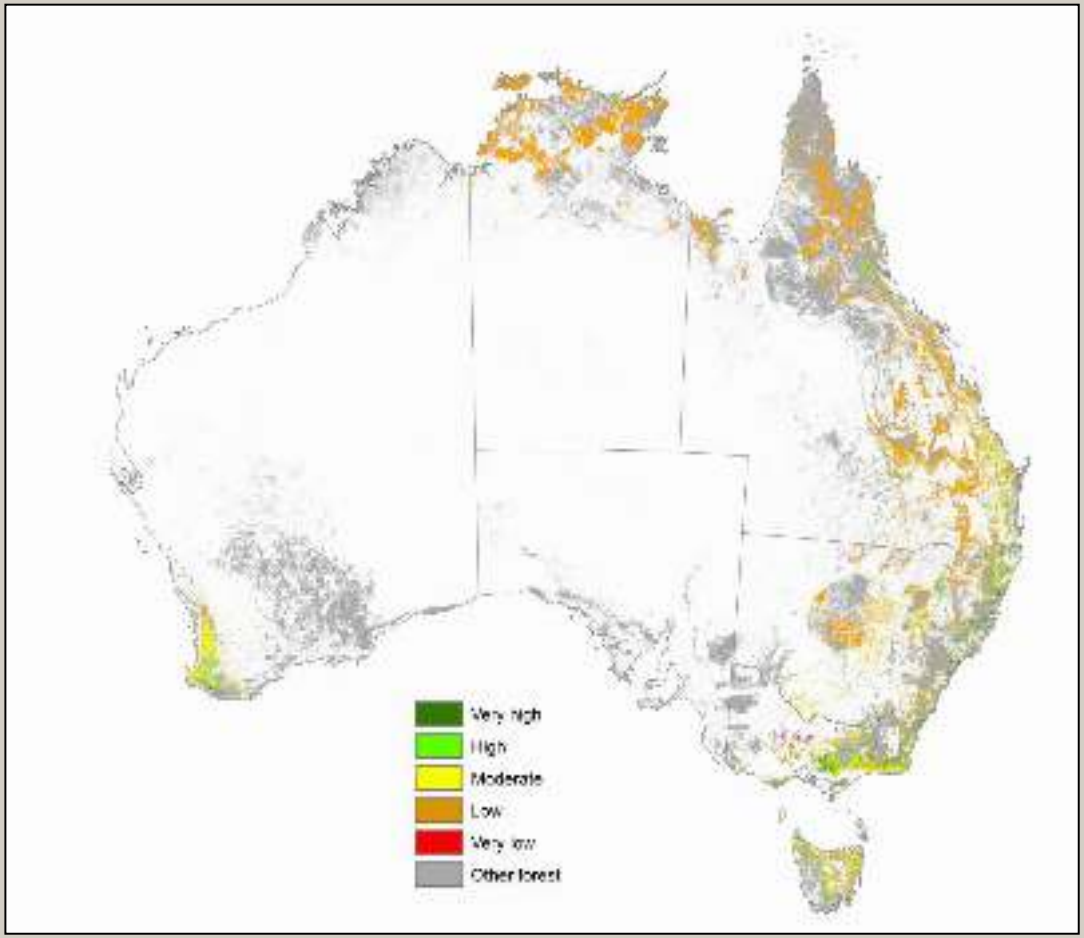
Managed
Kakadu NP, private tenure

Other special rights
Qld native title lands under leasehold

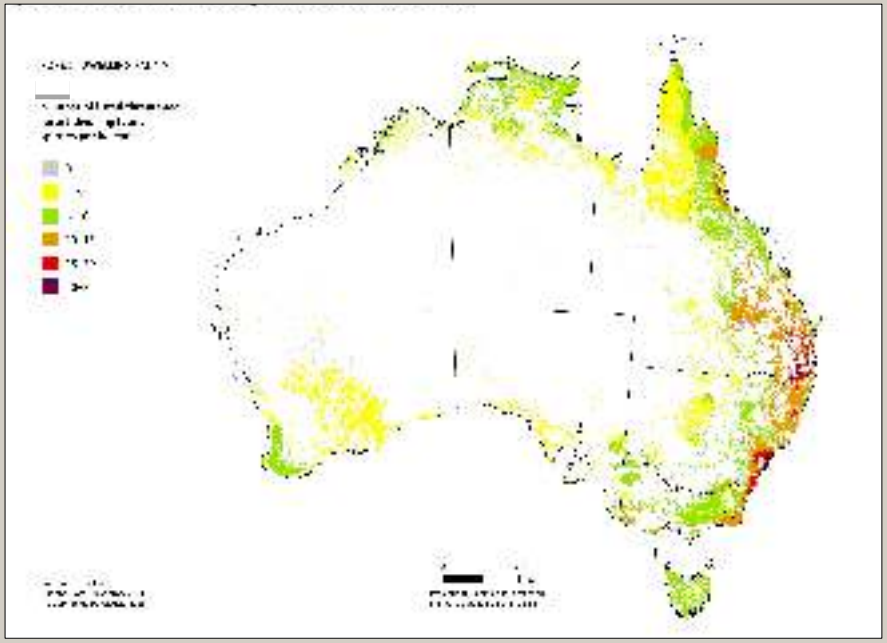
Co-managed
World Heritage Areas

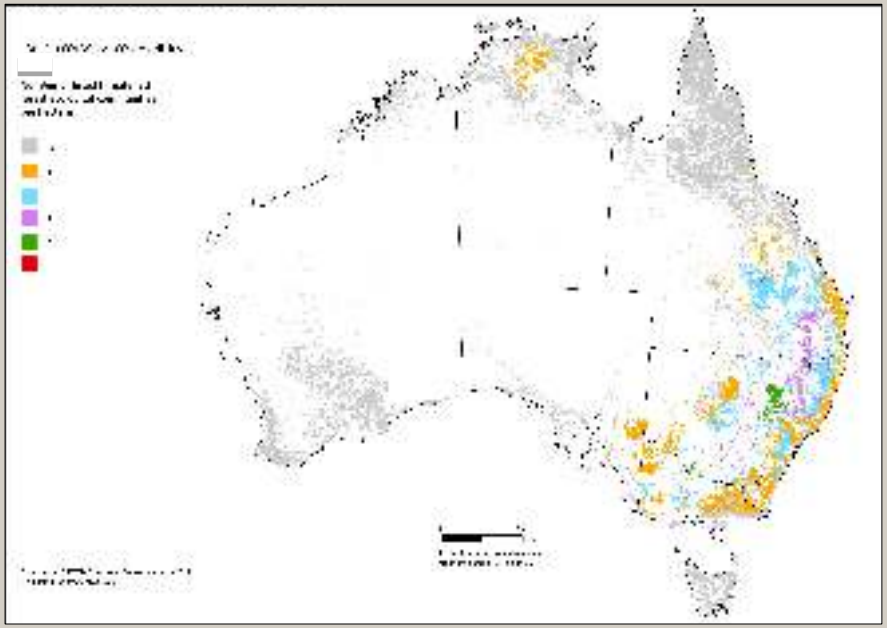
National Indigenous forest estate of 41.9 million hectares

Commerciality of Australia's leasehold, private and public multiple-use native forest, 2011



Commercial forest of 36.6 million hectares (of which 29.1 million hectares private or leasehold). Does not take account of restrictions on commerciality due to accessibility or remoteness.





Distribution of threatened species and communities

- Forest-dwelling flora
- Forest-dwelling fauna
- Forest-dependent flora
- Forest-dependent fauna
- Forest ecological communities

Quantitative analysis of threats to listed threatened forest-dwelling flora, fauna and communities

Myrtle rust, guava rust, eucalyptus rust
Austropuccinia (Puccinia) psidii s.l.

on *Syzygium* sp; Technigro

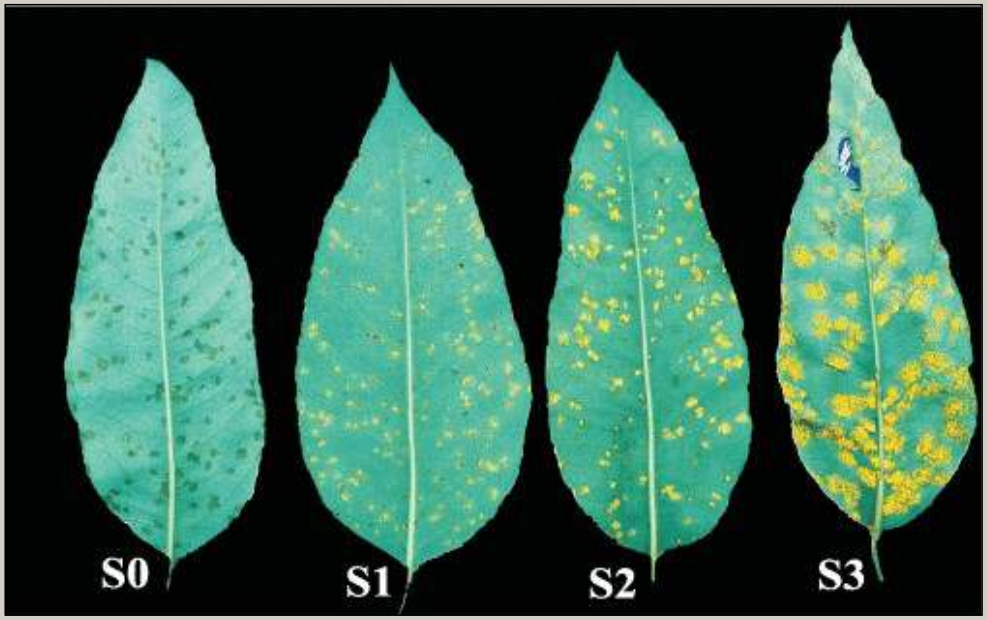
Myrtle rust, guava rust, eucalyptus rust
Austropuccinia (Puccinia) psidii s.l.

"For *R. psidioides*, we saw exceptionally high levels of tree mortality, with over half the trees surveyed dead and 40% of stands with greater than 50% tree mortality, including two stands where all trees were dead."

Impact of the invasive rust *Puccinia psidii* (myrtle rust) on native Myrtaceae in natural ecosystems in Australia. Carnegie A et al (2016) Biological Invasions 18:127-144

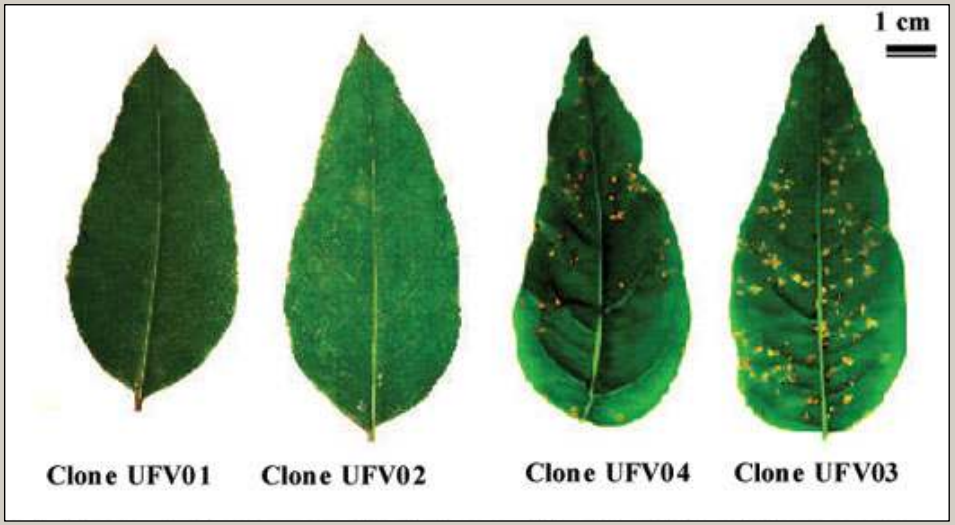
on *Rhodomyrtus psidioides* (native guava); P. Entwistle

Damage to forestry plantations in South America



Eucalyptus rust severity scale

Xavier AA et al. (2007) Resitência de *Eucalyptus globulus* e *Eucalyptus nitens* à ferrugem (*Puccinia psidii*). *Rev. Árvore* [online], 31(4)



Clonal differences in susceptibility to rust

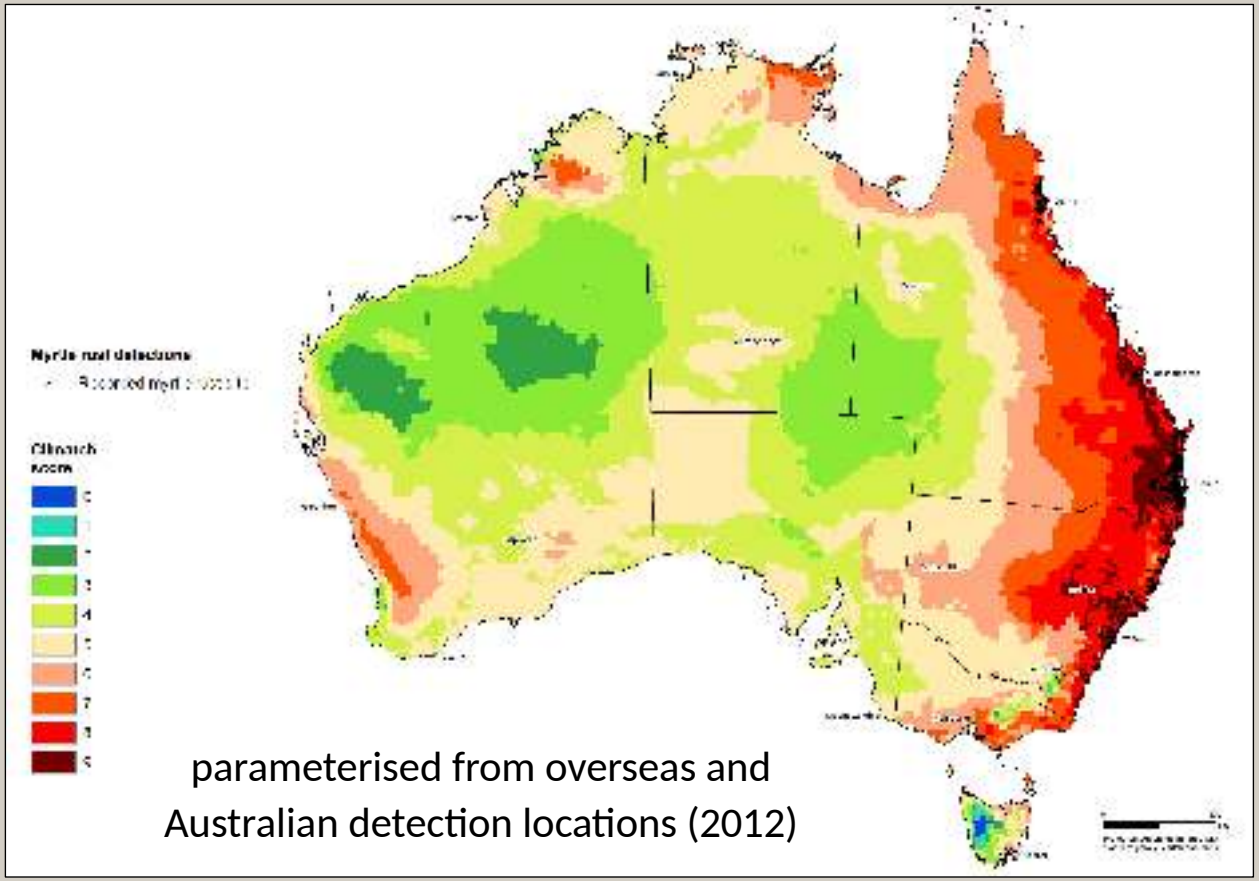
Tuffi Santos et al. (2007) Glyphosate sobre a resistência à ferrugem (*Puccinia psidii*) do eucalipto. *Planta daninha* [online], 25(1)

Aims

- can national spatial forest coverages be used to allow prediction of areas at risk from a forest pathogen?

- can national data on forecast regional wood availability be used to allow prediction of the risk to industry resource availability from a forest pathogen?

Climatic suitability for myrtle rust



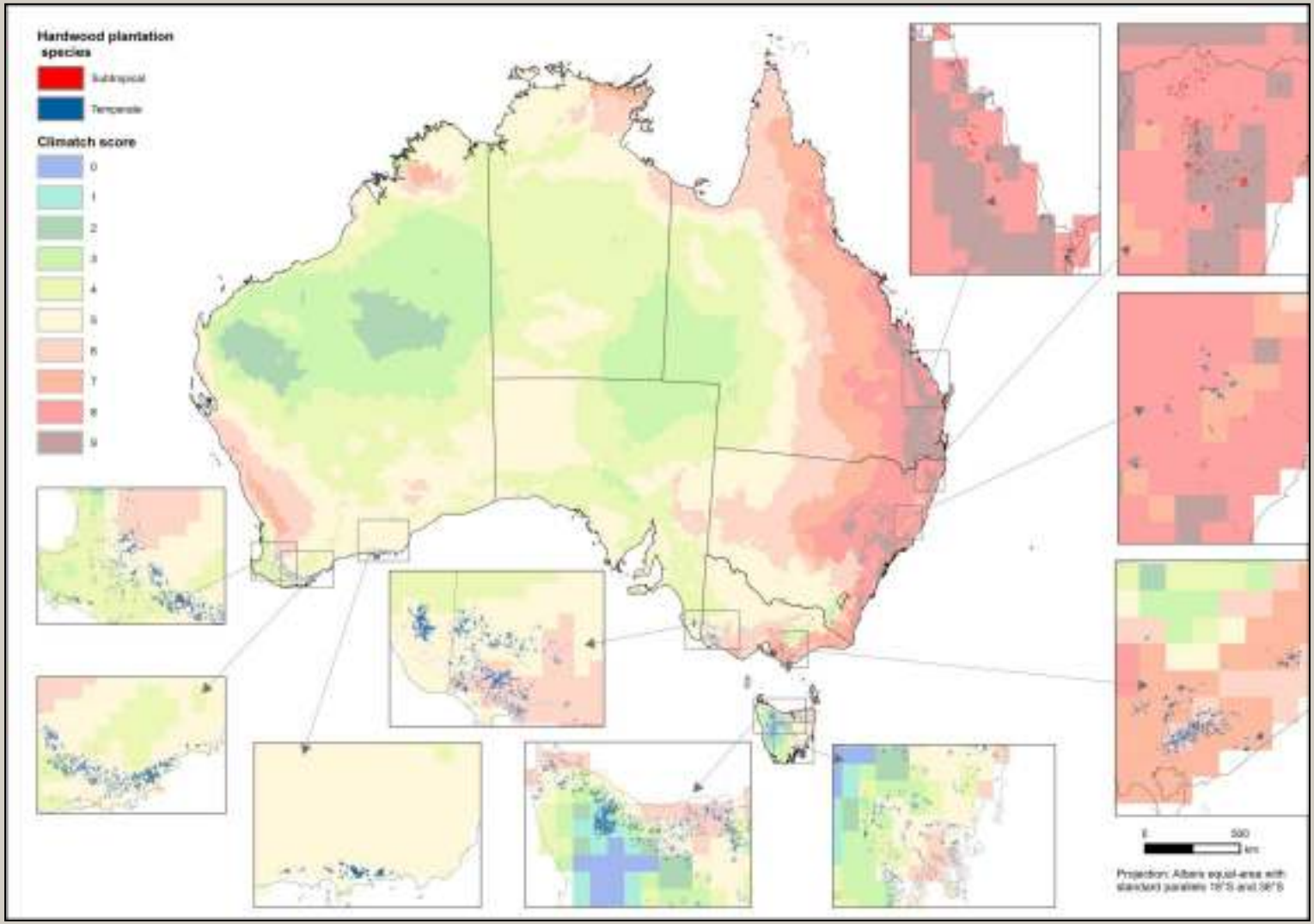
Climatch scores 8-10:

areas that are

highly suitable climatically

for myrtle rust

Eucalypt plantations by climatic suitability for myrtle rust



Eucalypt plantations by climatic suitability for myrtle rust

Climatch score	Climatic suitability for myrtle rust	Eucalypt plantation area (ha)	Proportion of total eucalypt plantation area (%)
0	Less suitable	175	0.0
1	Less suitable	35,021	4.3
2	Less suitable	4,771	0.6
3	Less suitable	39,834	4.9
4	Less suitable	114,787	14.1
5	Less suitable	366,045	45.1
6	Suitable	150,163	18.5
7	Suitable	37,715	4.6
8	Highly suitable	37,877	4.7
9	Highly suitable	25,559	3.1
10	Highly suitable	0	0.0
Total 0-10		**811,947**	**100.0**
Total 8-10	**Highly suitable**	**63,436**	**7.8**

Eucalypt plantations by climatic suitability for myrtle rust

Climatch score	Climatic suitability for myrtle rust	Eucalypt plantation area (ha)	Proportion of total eucalypt plantation area (%)
Total 8-10	Highly suitable	63,436	7.8

Eucalypt plantations in areas highly suitable climatically for myrtle rust:

- 45 thousand ha in NSW (88% of NSW eucalypt plantations)

  18 thousand ha in Qld (100% of NSW eucalypt plantations)

- 55 thousand ha of subtropical species (*E. dunnii*, *E. grandis*)

  8 thousand ha of temperate species (*E. globulus*, *E. nitens*)

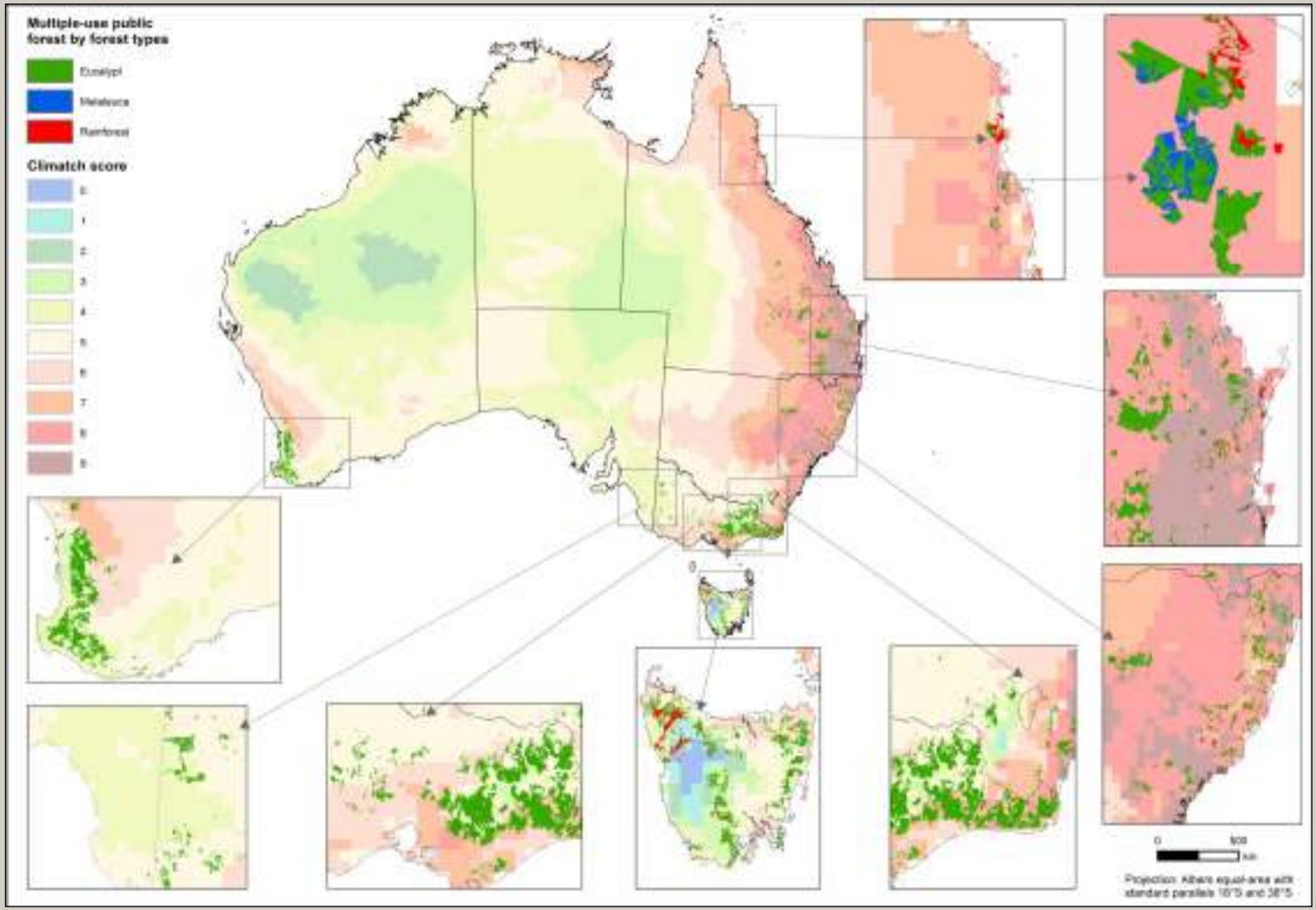
Eucalypt plantation log availability, by Wood Supply Region

Wood Supply Region	Eucalypt plantation			Average annual plantation eucalypt log availability 2010-54		
	Total	Highly suitable (Climatch scores 8-10)		Total	From climatically highly suitable areas	
	Area (ha)	Area (ha)	Proportion of area (%)	m³/year	m³/year	Proportion of log availability (%)
Bass	39,898	0	0	844,636	0	0
Central Gippsland	34,440	2	0	373,463	22	0.0
Central Victoria	28,829	0	0	292,958	0	0
Derwent	40,492	0	0	352,063	0	0
East Gippsland Bombala NSW	1,793	943	53	32,422	17,744	55
East Gippsland Bombala VIC	4,816	314	7.4	68,886	5,012	7
Green Triangle SA	41,979	0	0	653,293	0	0
Green Triangle VIC	132,101	0	0	1,064,911	0	0
Huon	10,240	0	0	185,919	0	0
Mersey	39,759	0	0	585,917	0	0
Mildura VIC	172	0	0	0	0	
Mt Lofty & Kangaroo Is SA	12,529	0	0	116,916	0	0
Murchison	72,197	0	0	1,326,533	0	0
Murray Valley NSW	10	0	0	148	0	0
Murray Valley VIC	6,075	0	0	73,843	0	0
North Coast NSW	43,178	38,374	89	767,606	682,581	89
Northern Tablelands NSW	6,078	5,499	91	92,496	83,733	91
Other SA	8	0	0	0	0	-
Pilbara	1,514	0	0	37,701	0	0
South Coast	109,683	0	0	879,861	0	0
South East Queensland	18,579	18,279	100	221,769	221,769	100
Swan	4,859	0	0	61,311	0	0
Warren	79,191	0	0	1,346,949	0	0
WA South West	31,038	0	0	677,873	0	0
Western Queensland	25	25	100	0	0	-
Wheatbelt WA	18,727	0	0	302,496	0	0
Total	**811,947**	**63,436**	**7.8**	**11,149,673**	**1,010,581**	**9.1**

Wood Supply Regions with no forecast plantation eucalypt wood availability omitted

Native forest by climatic suitability for myrtle rust

eucalypt, melaleuca and rainforest on multiple-use public native forest



Native forest by climatic suitability for myrtle rust

eucalypt, melaleuca and rainforest on multiple-use public native forest

Climatch score	Suitability for myrtle rust	Forest type				Proportion of total area of Eucalypt, Melaleuca or Rainforest forest types (%)
		Eucalypt	Melaleuca	Rainforest	Total	
		Area (ha)				
0	Less suitable	11,443	0	6,559	18,002	0.2
1	Less suitable	42,847	53	25,446	68,346	0.7
2	Less suitable	81,665	519	21,073	103,257	1.1
3	Less suitable	392,663	645	58,425	451,733	4.8
4	Less suitable	1,090,524	2,773	35,037	1,128,334	12
5	Less suitable	1,631,324	2,745	21,174	1,655,243	18
6	Suitable	781,135	657	18,069	799,861	8.5
7	Suitable	1,613,963	1,036	50,827	1,665,826	18
8	Highly suitable	2,716,424	14,540	155,544	2,886,508	31
9	Highly suitable	591,833	8,819	40,325	640,977	6.8
10	Highly suitable	0	0	0	0	0
Total 0-10		**8,953,821**	**31,787**	**432,479**	**9,418,087**	**100**
Total 8-10	**Highly suitable**	**3,308,257**	**23,359**	**195,869**	**3,527,485**	**37**

Native forest by climatic suitability for myrtle rust

eucalypt, melaleuca and rainforest on multiple-use public native forest

Climatch score	Suitability for myrtle rust	Forest type				Proportion of total area of Eucalypt, Melaleuca or Rainforest forest types (%)
		Eucalypt	Melaleuca	Rainforest	Total	
		Area (ha)				
Total 8-10	Highly suitable	3,308,257	23,359	195,869	3,527,485	37

Native eucalypt, melaleuca and rainforest on multiple-use public forest in areas highly suitable climatically for myrtle rust:

- 1.23 million ha in NSW

  2.17 million ha in Qld

  0.13 million ha in Vic.

Tall eucalypt forest, and medium closed and open eucalypt forest, on multiple-use public forest in areas highly suitable climatically for myrtle rust:

- 1.56 million ha (27% of these subtypes nationally)

Public native forest eucalypt log availability, by Wood Supply Region

Wood Supply Region	Eucalypt forest sub-types used for wood production, on multiple-use public forest			Average annual eucalypt log availability from public native forest 2010–54		
	Total	Highly suitable (Climatch scores 8-10)		Total	From climatically highly suitable areas	
	Area (ha)	Area (ha)	Proportion of area (%)	m³/year	m³/year	Proportion of total log availability (%)
Bass	108 949	0	0	315,595	0	0
Central Gippsland	530 829	20,590	[illegible]	571,320	32,256	[illegible]
Central Tablelands NSW	23 057	14,575	62	0	0	-
Central Victoria	179 556	0	0	10,314	0	0
Derwent	147 769	0	0	236,491	0	0
Dubbo NSW	5 577	4,584	84	2,100	1,764	84
Eden/East Gippsland Bombala NSW	121 812	61,506	51	269,158	136,142	51
East Gippsland Bombala VIC	816 712	104,164	13	297,592	38,353	13
Green Triangle VIC	42 854	0	0	17,701	0	0
Huon	90 270	0	0	224,193	0	0
Mersey	53 953	0	0	86,340	0	0
Mildura VIC	14 996	0	0	856	0	0
Mt Lofty & Kangaroo Is SA	226	0	0	0	0	-
Murchison	108 226	0	0	181,871	0	0
Murray Valley NSW	112 151	0	0	106,609	0	0
Murray Valley VIC	912 252	0	0	390,578	0	0
North & Central Queensland	119 936	95,402	80	25,260	20,129	80
North Coast NSW	601 202	293,296	49	366,359	307,015	[illegible]
Northern Tablelands NSW	152 580	122,267	80	0		
Other SA	491	0	0	0	0	
South Coast	4 001	0	0	0	0	-
South East Queensland	190 451	190,451	100	60,697	60,697	100
Southern Tablelands NSW	85 230	64,000	75	190,261	137,064	75
Swan	248 550	0	0	29,306	0	
WA South West	392 131	0	0	76,034	0	
Warren	248 919	0	0	227,514	0	-
Western Queensland	431 676	370,237	86	82,757	71,219	86
Total	5,710,346	1,561,871	27	3,662,399	787,564	22

Wood Supply Regions with no forecast native forest eucalypt wood availability omitted

Conclusion

- 63 thousand hectares of eucalypt plantations are in areas highly suitable climatically for myrtle rust
  - mostly *E. dunnii* and *E. grandis* in NSW and Queensland
  - 7.8 per cent of eucalypt plantations nationally
  - responsible for 9.1 per cent of forecast eucalypt plantation log availability

- 1.56 million hectares of potential production public native eucalypt forests are in areas highly suitable climatically for myrtle rust
  - predominantly in New South Wales and Queensland
  - 27 per cent of these forest subtypes nationally
  - responsible for 22 per cent of forecast eucalypt native forest log availability

Climatic suitability modelling, risk and impact

- This work predicts areas that are climatically highly suitable for myrtle rust
  - climatic suitability is only one contributor to potential future myrtle rust outbreaks
  - no impact to date of myrtle rust on wood production in Australia
- Impact on wood supply from a myrtle rust outbreak requires:

susceptible species	many eucalypt species are resistant to moderately resistant to myrtle rust
at a susceptible stage of their life cycle	the myrtle rust pathogen generally infects only the young growth stage of eucalypts
in appropriate climatic conditions	results assume that the distribution of the myrtle rust pathogen will extend over time to the full area modelled as climatically highly suitable
with a sufficient inoculum of spores	fungus present locally, and previous consecutive years of suitable temperature and rainfall
and no mitigation measures	such as planting of resistant species or genotypes, and use of fungicide.

National spatial forest coverages allow analysis of national risks from a forest pathogen