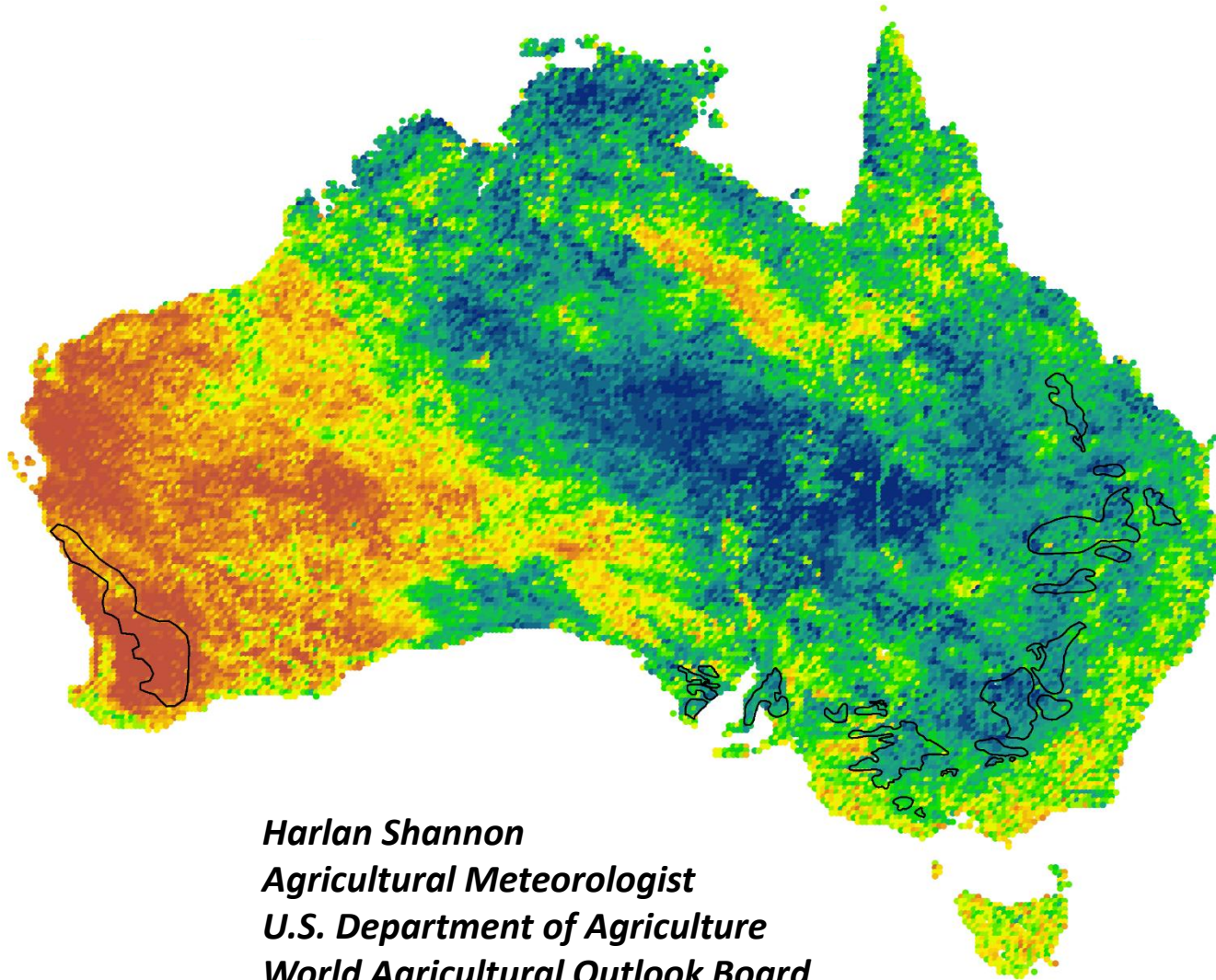


Vegetation Health Index:

*Integration into Australia
wheat yield forecasting*

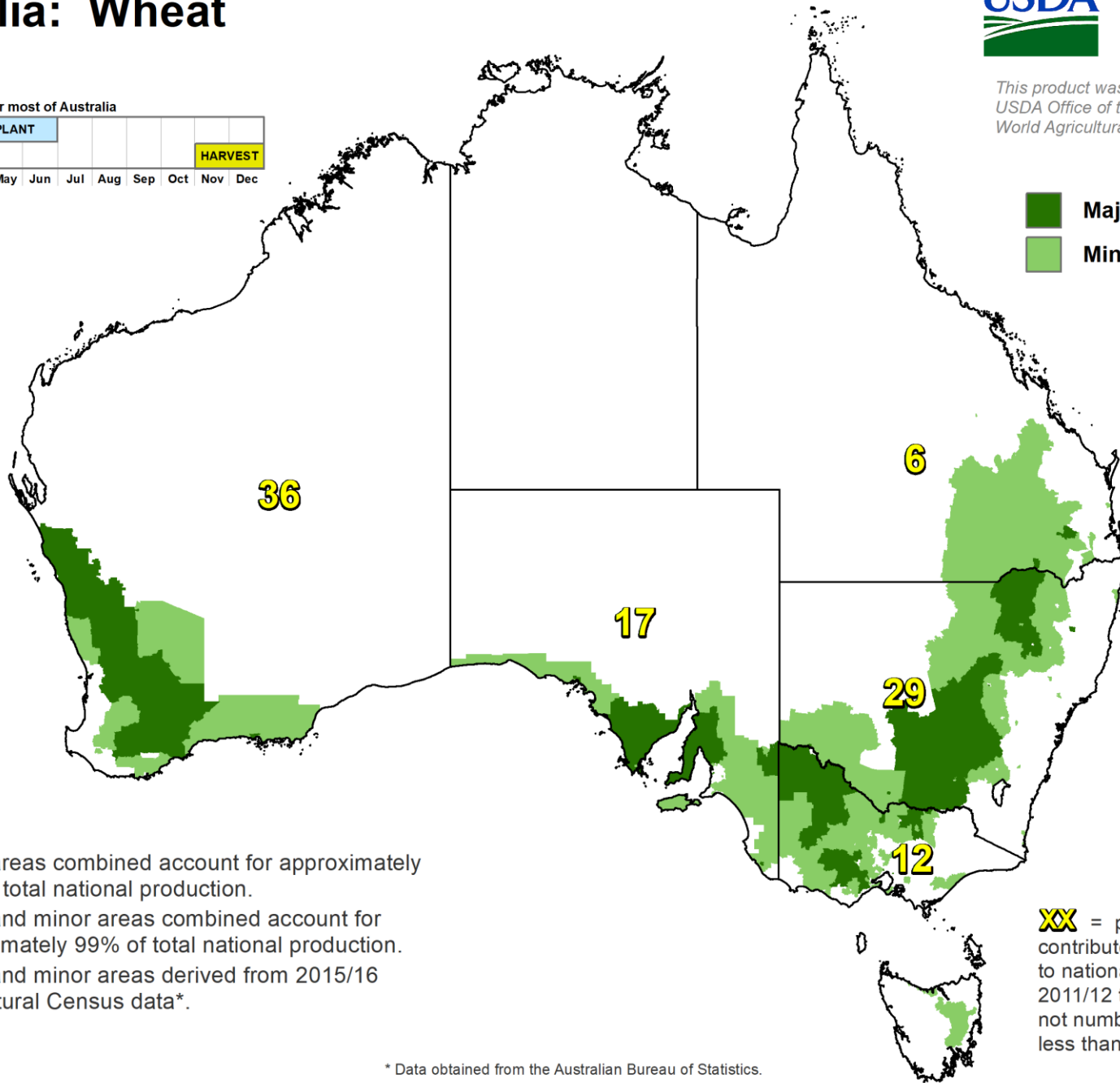
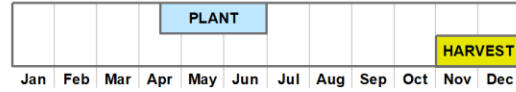


*Harlan Shannon
Agricultural Meteorologist
U.S. Department of Agriculture
World Agricultural Outlook Board
Washington D.C., U.S.A.*

Australia: Wheat

*This product was prepared by the
USDA Office of the Chief Economist
World Agricultural Outlook Board*

Wheat crop calendar for most of Australia



- Major areas combined account for approximately 75% of total national production.
- Major and minor areas combined account for approximately 99% of total national production.
- Major and minor areas derived from 2015/16 Agricultural Census data*.

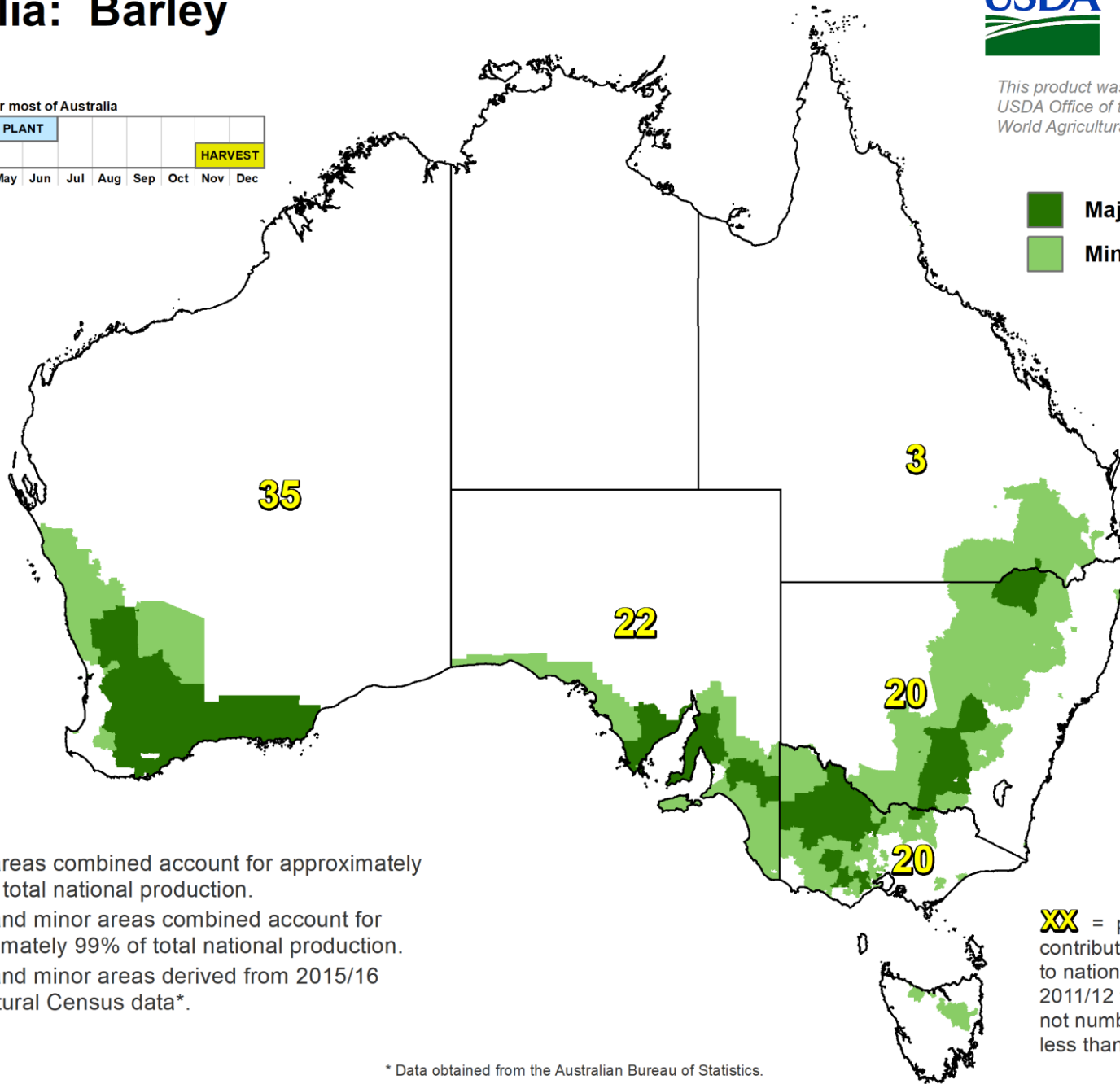
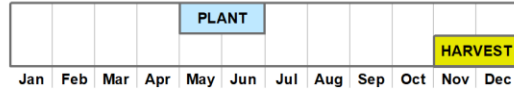
XX = percent each state contributed, on average, to national production from 2011/12 to 2015/16*. States not numbered contributed less than 1%.

* Data obtained from the Australian Bureau of Statistics.

Australia: Barley

This product was prepared by the USDA Office of the Chief Economist World Agricultural Outlook Board

Barley crop calendar for most of Australia



- Major areas combined account for approximately 75% of total national production.
- Major and minor areas combined account for approximately 99% of total national production.
- Major and minor areas derived from 2015/16 Agricultural Census data*.

XX = percent each state contributed, on average, to national production from 2011/12 to 2015/16*. States not numbered contributed less than 1%.

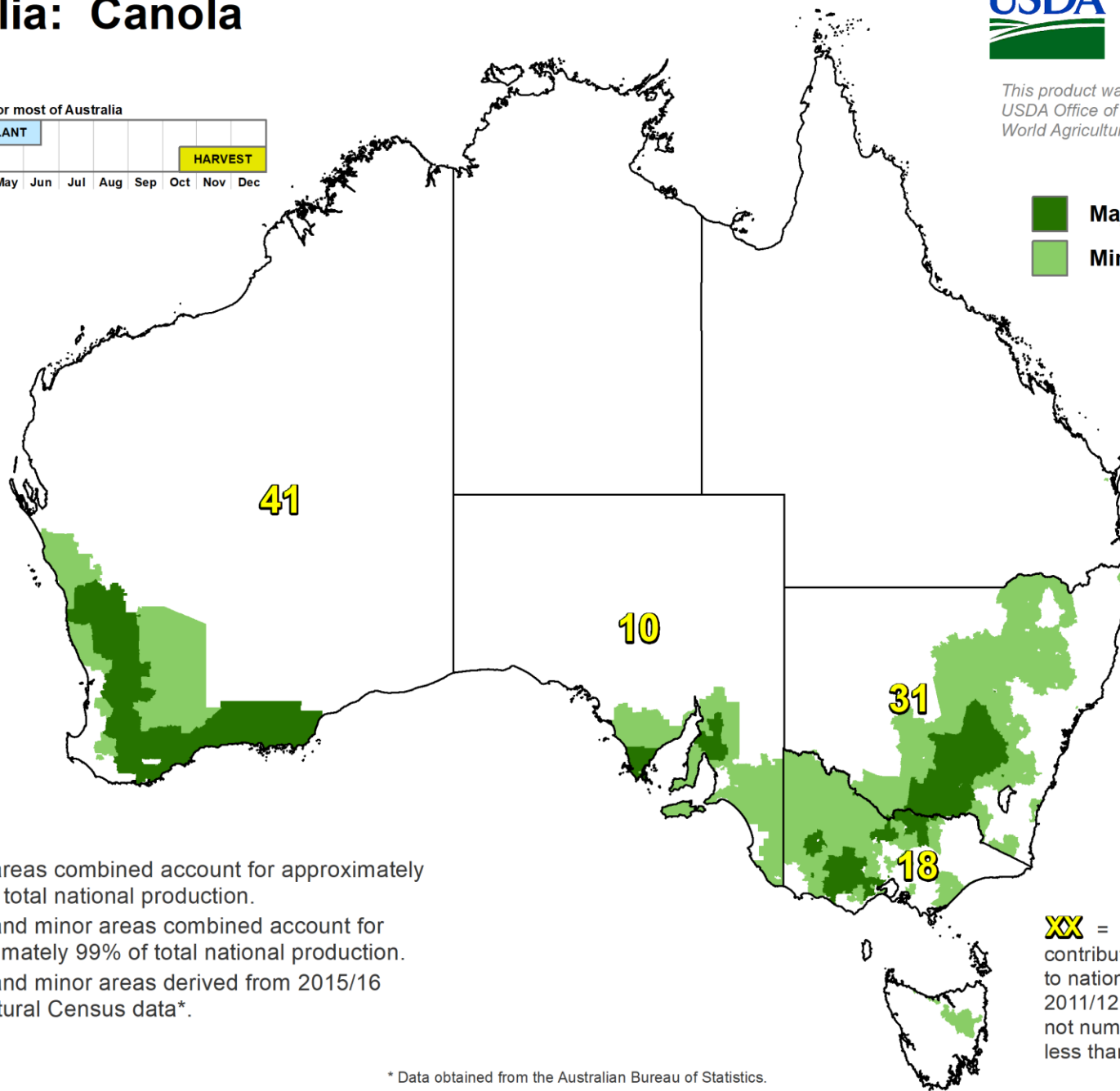
* Data obtained from the Australian Bureau of Statistics.

Australia: Canola

*This product was prepared by the
USDA Office of the Chief Economist
World Agricultural Outlook Board*

Canola crop calendar for most of Australia

Canola crop calendar for most of Australia											
				PLANT							
										HARVEST	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec



- Major areas combined account for approximately 75% of total national production.
- Major and minor areas combined account for approximately 99% of total national production.
- Major and minor areas derived from 2015/16 Agricultural Census data*.

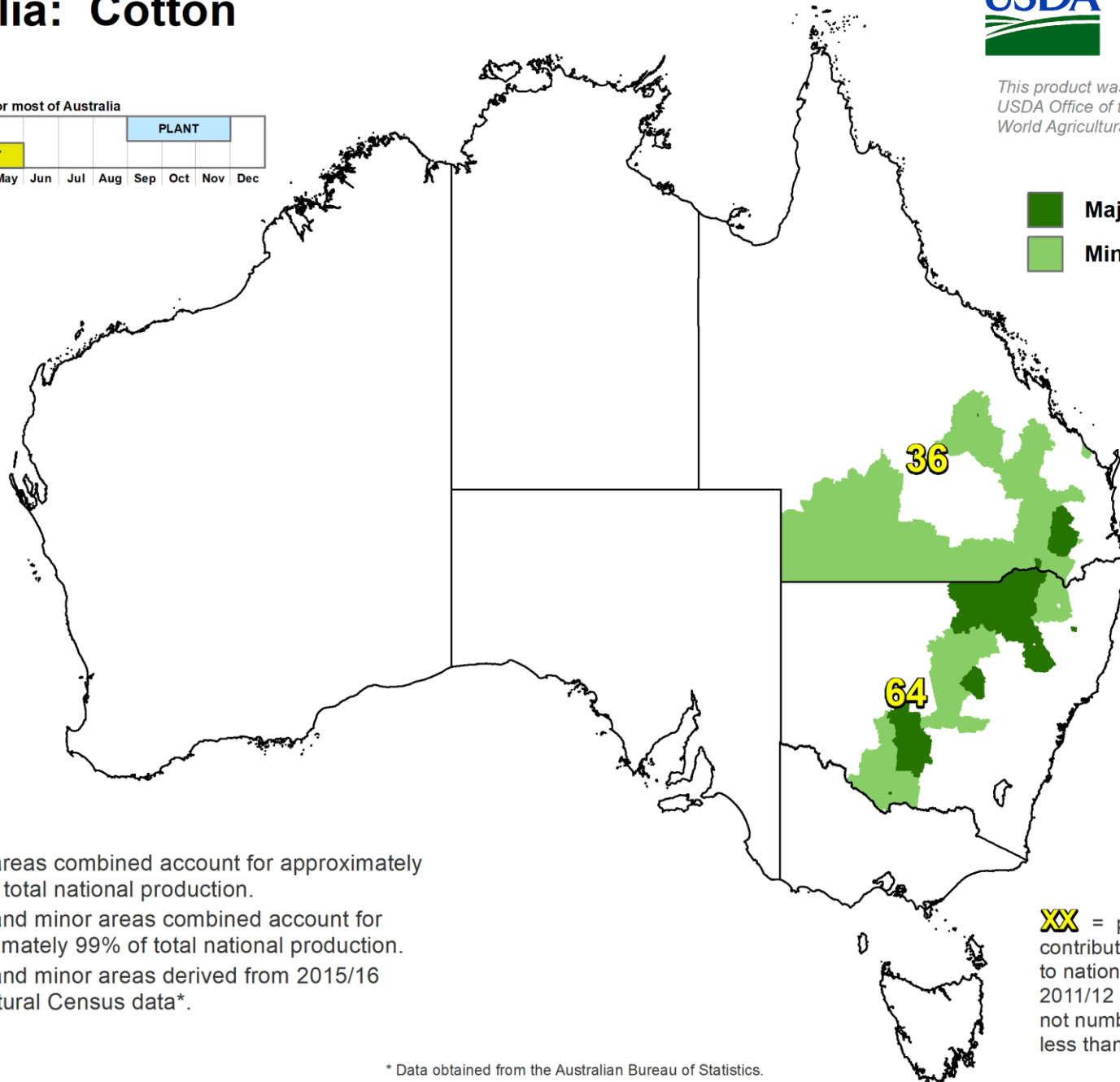
XX = percent each state contributed, on average, to national production from 2011/12 to 2015/16*. States not numbered contributed less than 1%.

Australia: Cotton

*This product was prepared by the
USDA Office of the Chief Economist
World Agricultural Outlook Board*

Cotton crop calendar for most of Australia

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
			HARVEST									
									PLANT			



■ Major Crop Area
■ Minor Crop Area

- Major areas combined account for approximately 75% of total national production.
- Major and minor areas combined account for approximately 99% of total national production.
- Major and minor areas derived from 2015/16 Agricultural Census data*.

XX = percent each state contributed, on average, to national production from 2011/12 to 2015/16*. States not numbered contributed less than 1%.

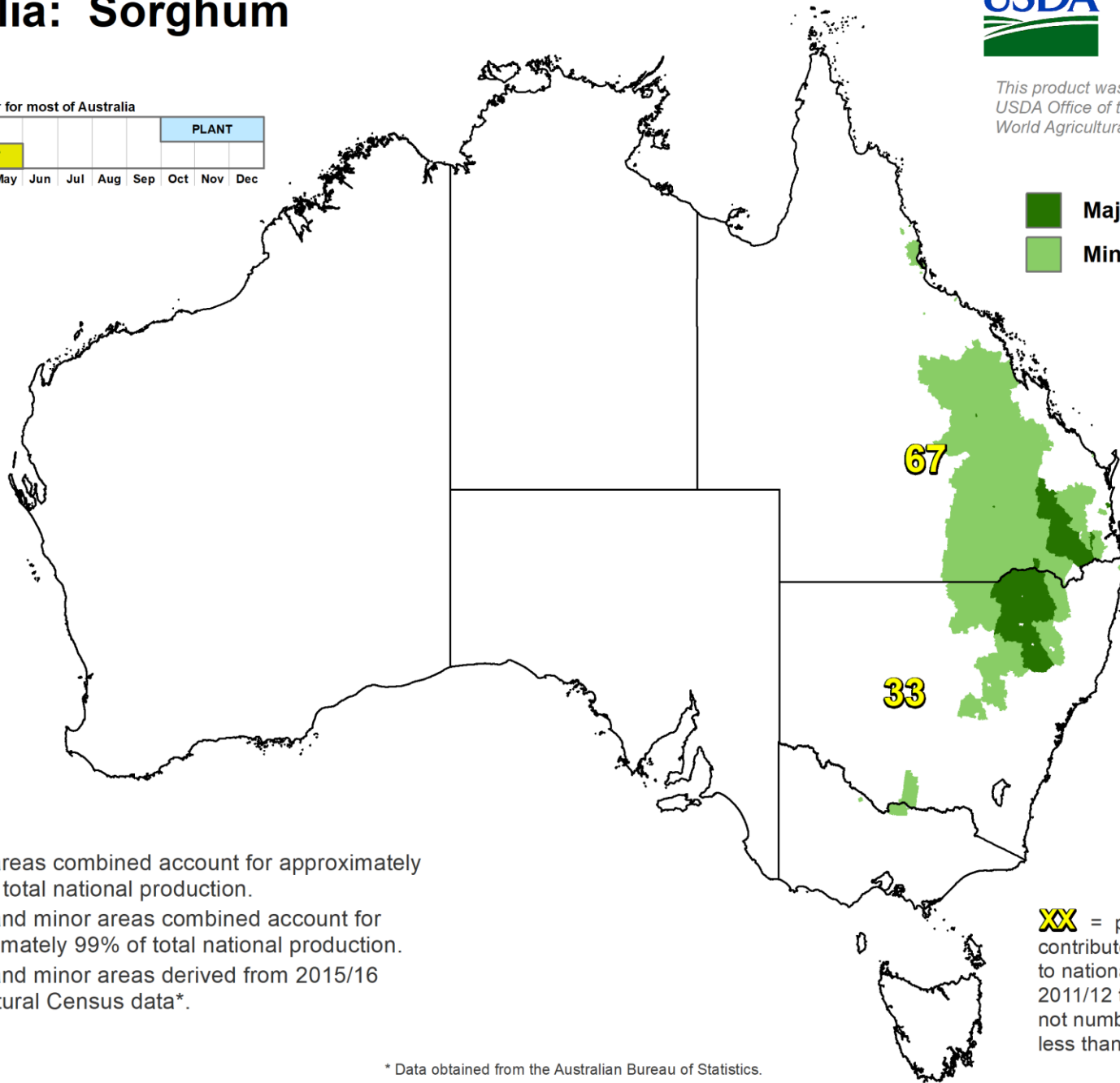
* Data obtained from the Australian Bureau of Statistics.

Australia: Sorghum

*This product was prepared by the
USDA Office of the Chief Economist
World Agricultural Outlook Board*

Sorghum crop calendar for most of Australia

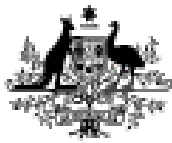
PLANT												PLANT					
		HARVEST															
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						



- Major areas combined account for approximately 75% of total national production.
- Major and minor areas combined account for approximately 99% of total national production.
- Major and minor areas derived from 2015/16 Agricultural Census data*.

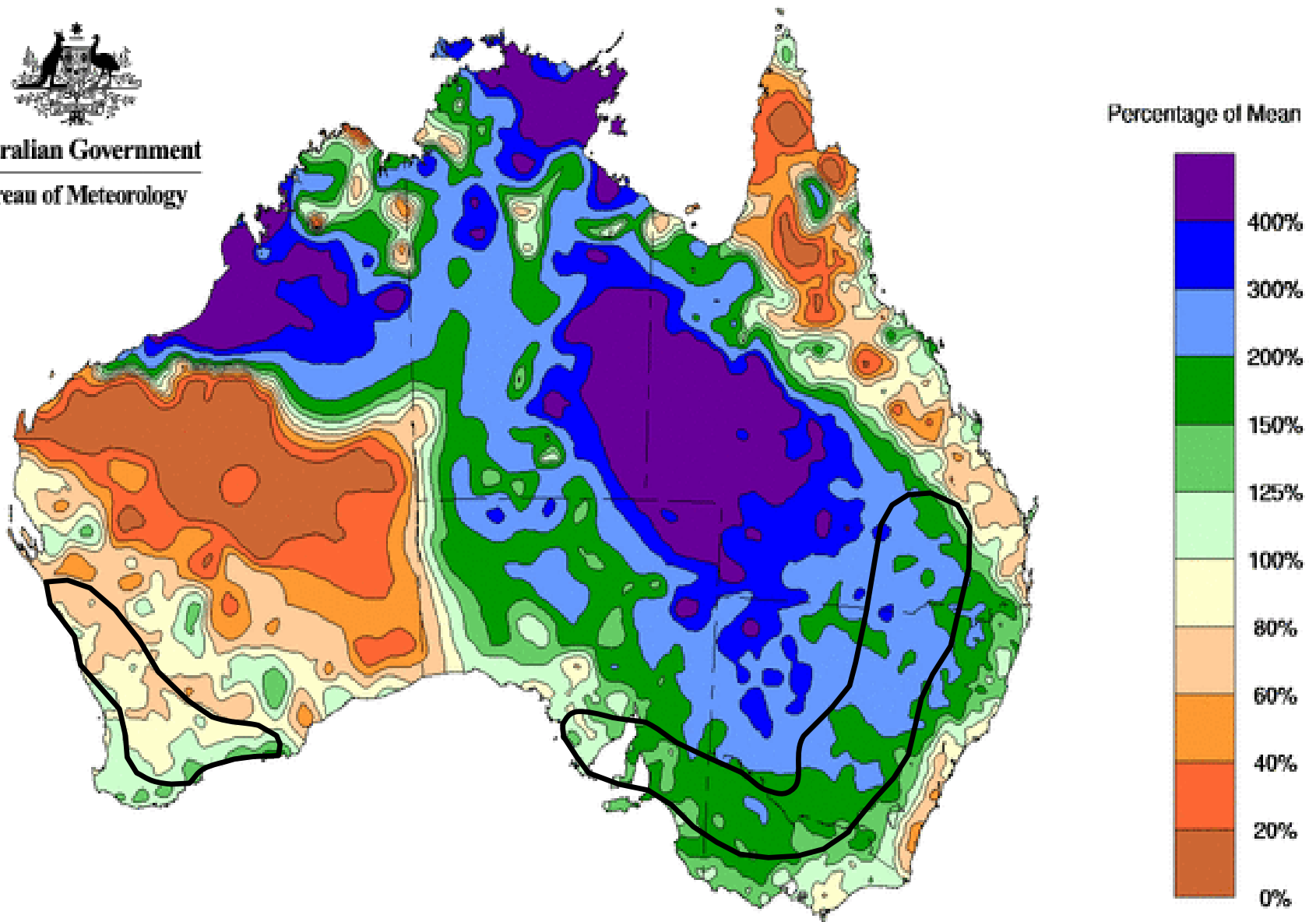
XX = percent each state contributed, on average, to national production from 2011/12 to 2015/16*. States not numbered contributed less than 1%.

* Data obtained from the Australian Bureau of Statistics.



Australian Government

Bureau of Meteorology



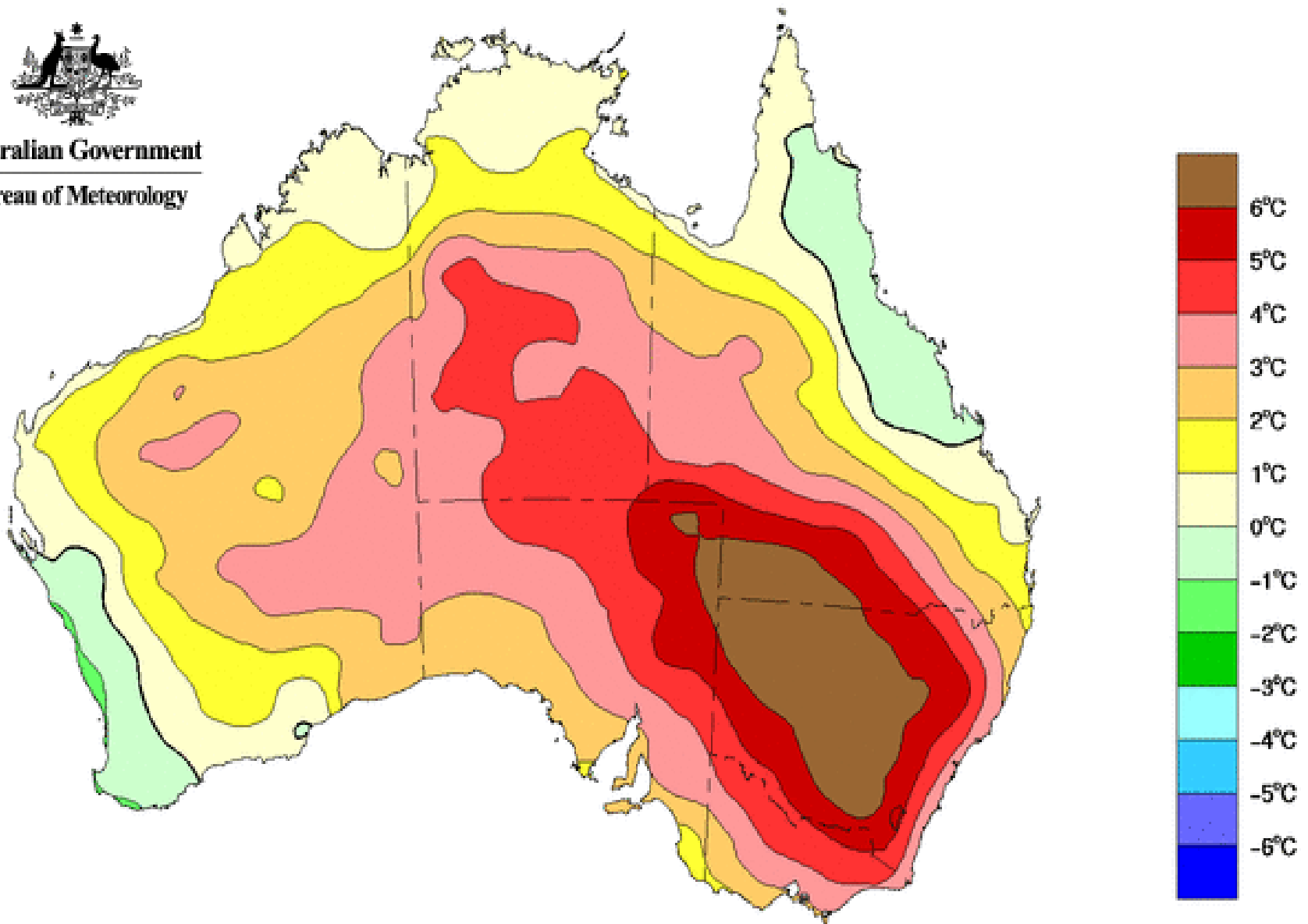
Percent of Normal Rainfall
Aug – Sep – Oct 2016

Abundant rainfall in the south and east led to *record wheat production*.



Australian Government

Bureau of Meteorology

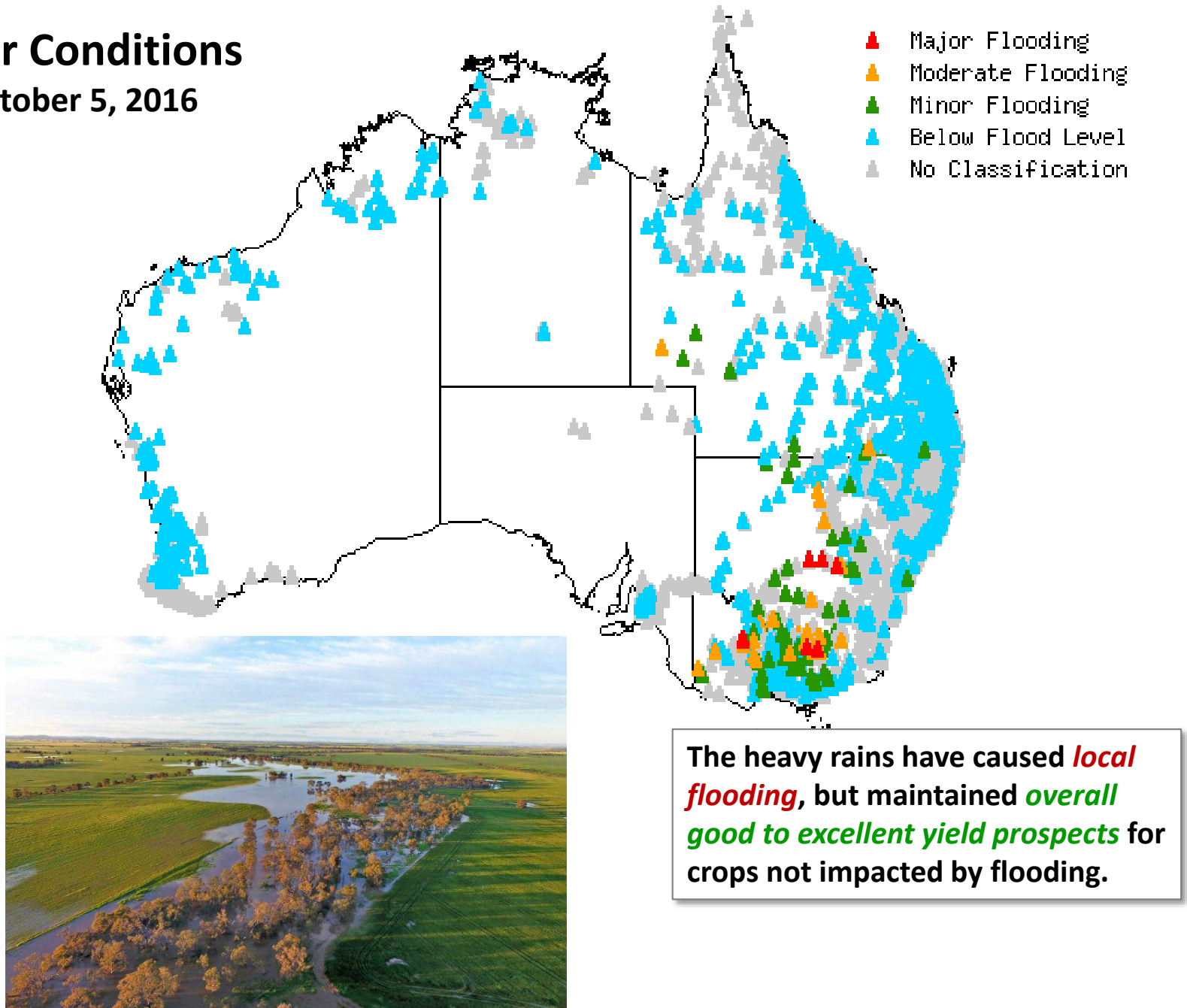


Temperature Anomaly
January 2019

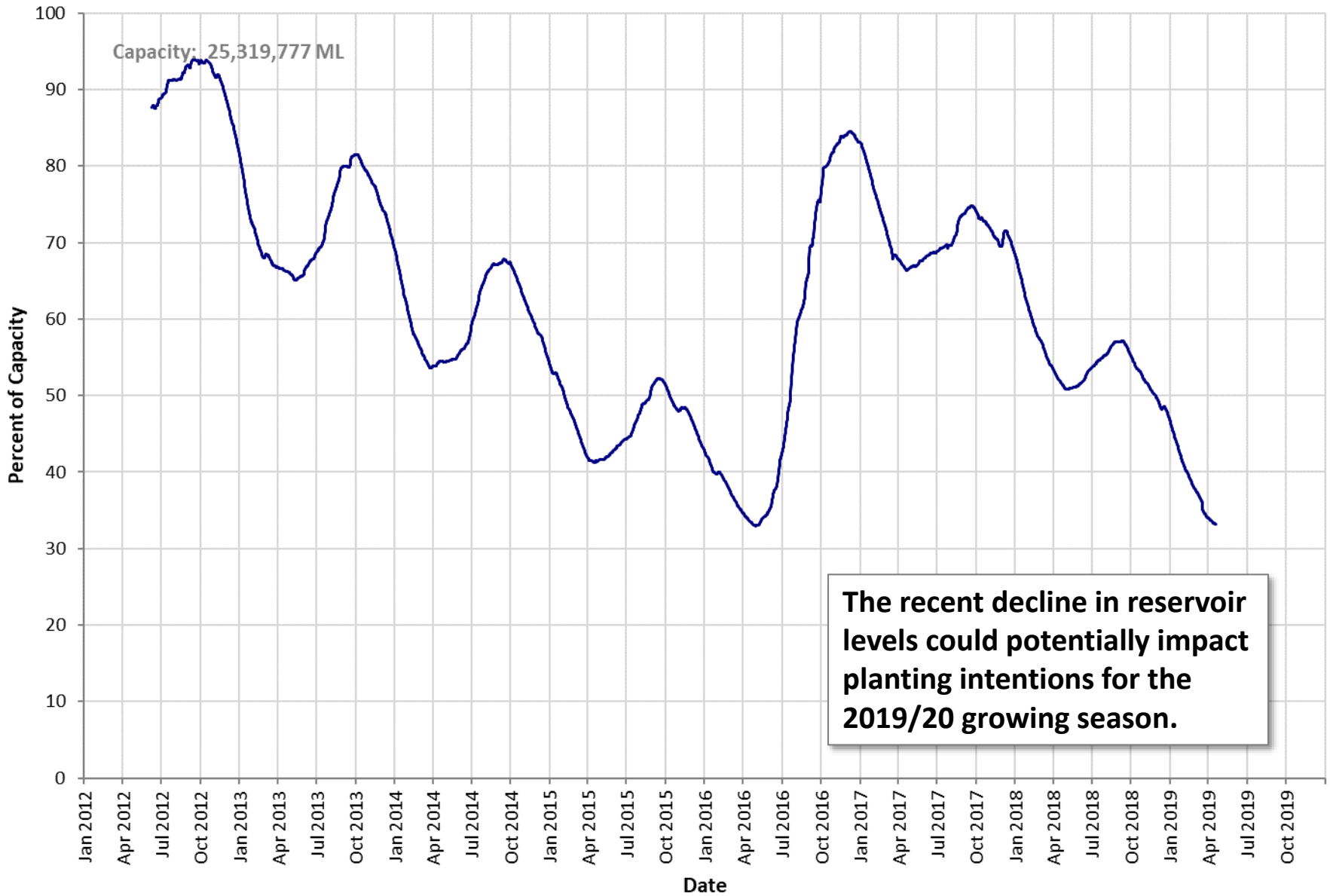
*Persistent heat greatly
reduced dryland crop
prospects in the east.*

River Conditions

October 5, 2016

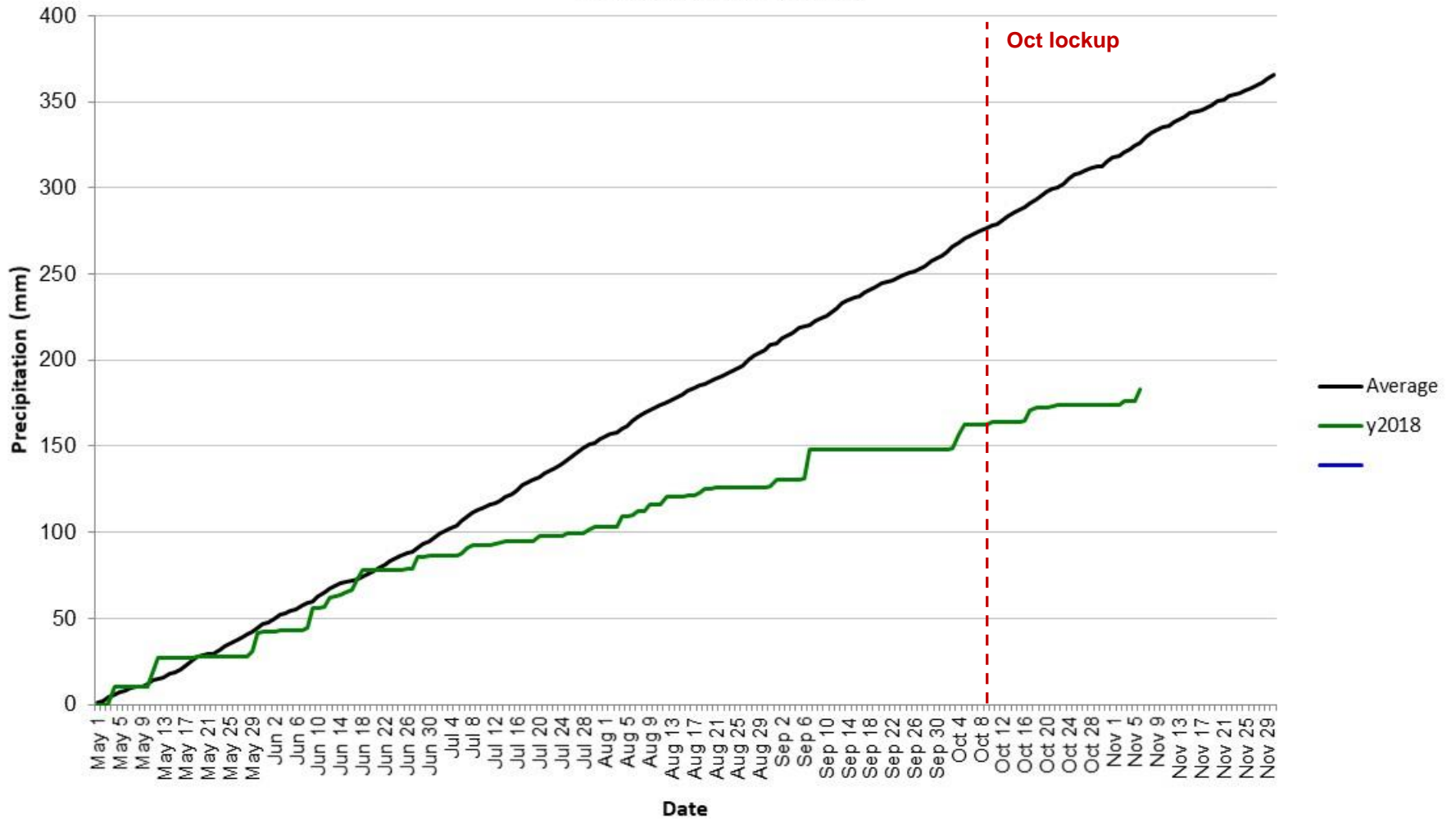


Murray-Darling Basin – Water in Storage



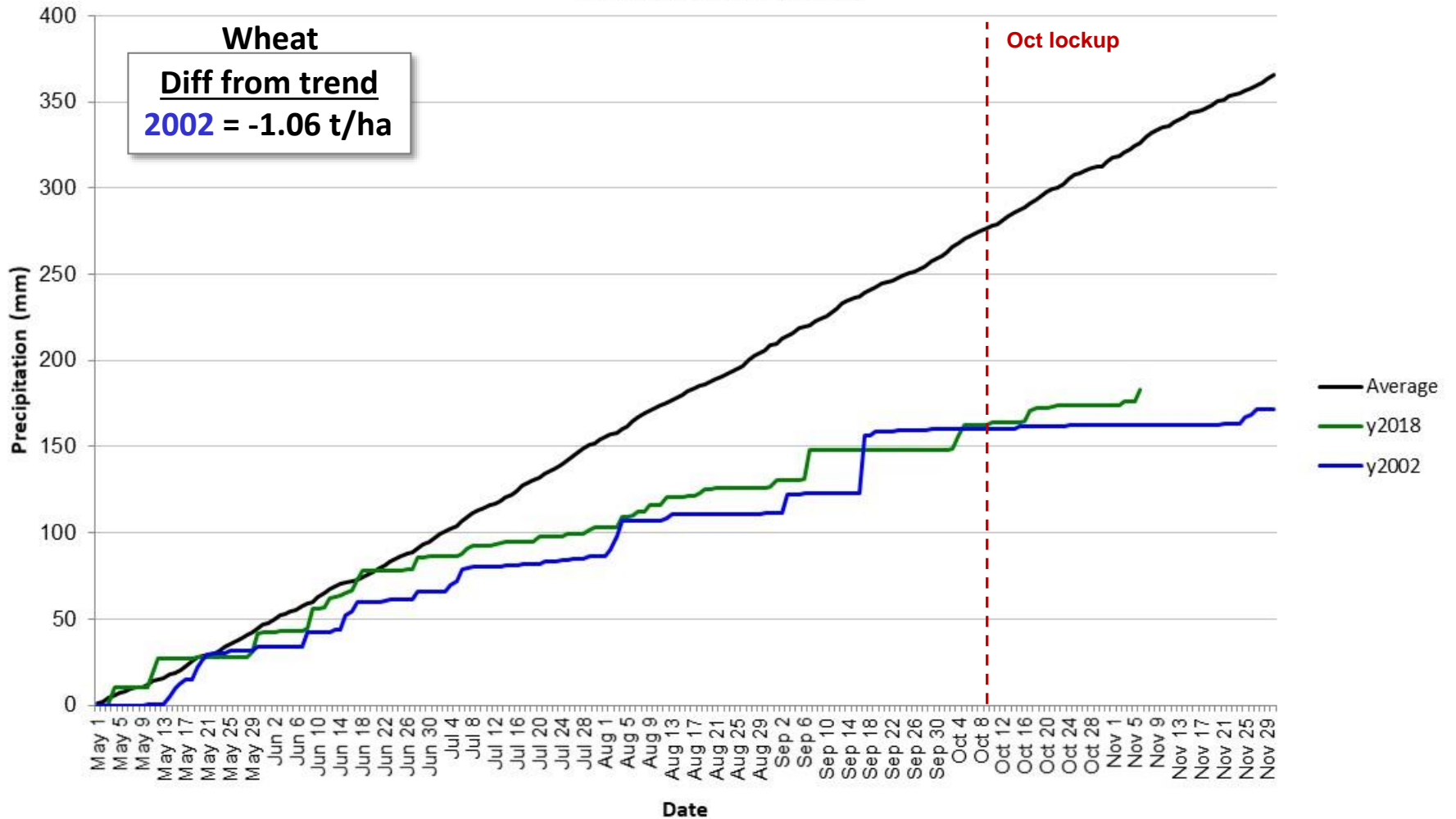
New South Wales - Southern

Cumulative Precipitation



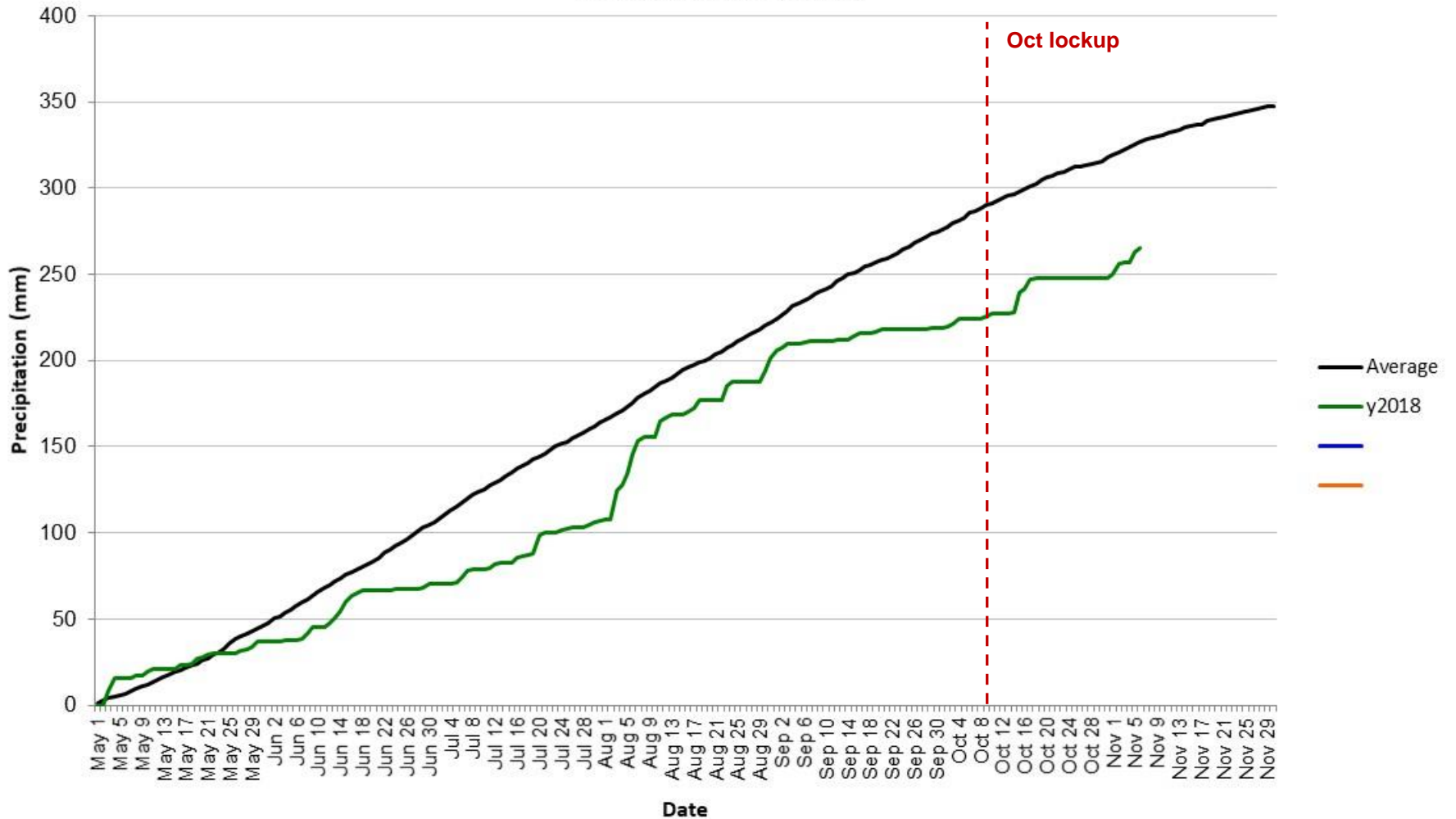
New South Wales - Southern

Cumulative Precipitation



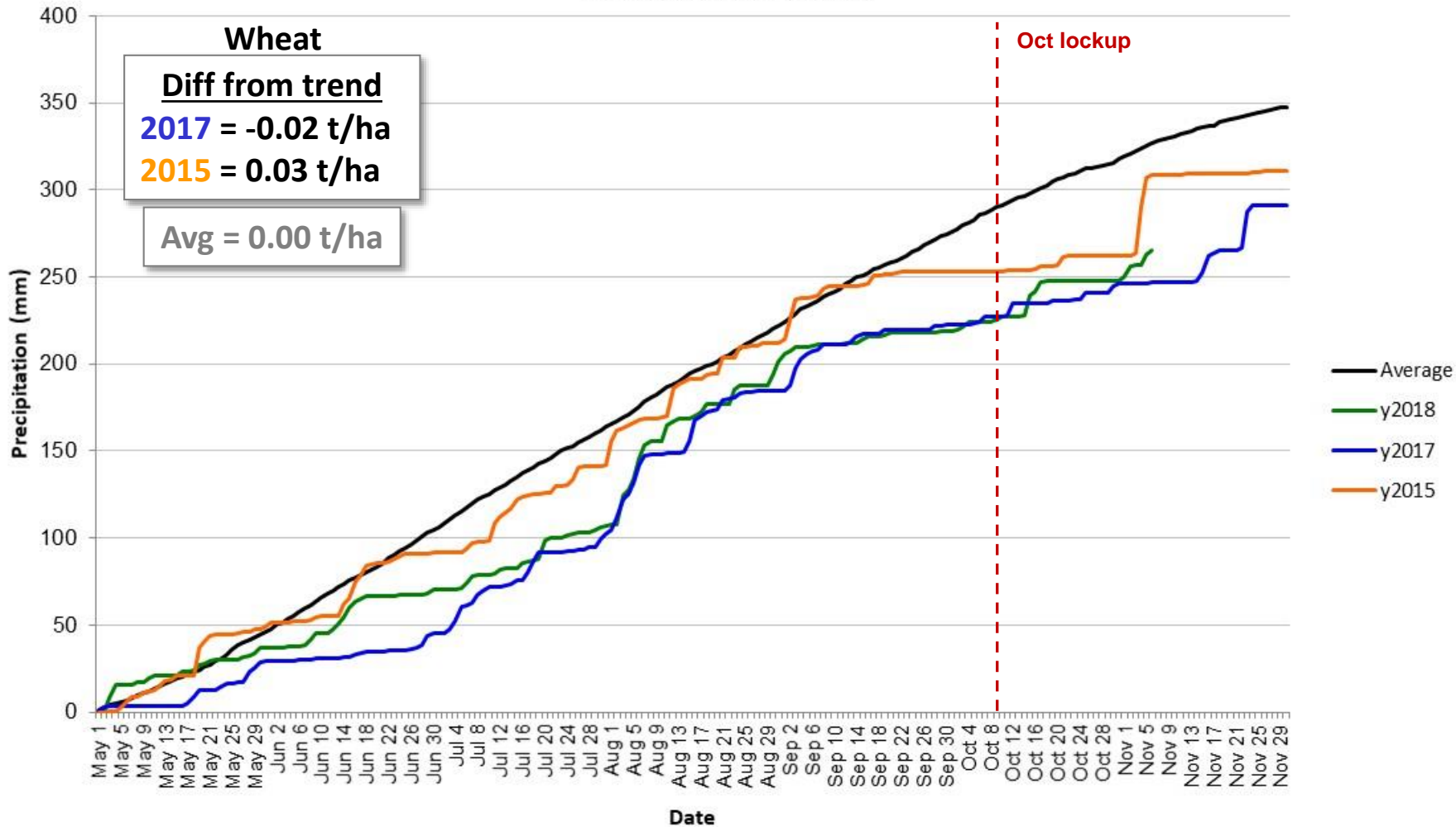
South Australia - Central

Cumulative Precipitation



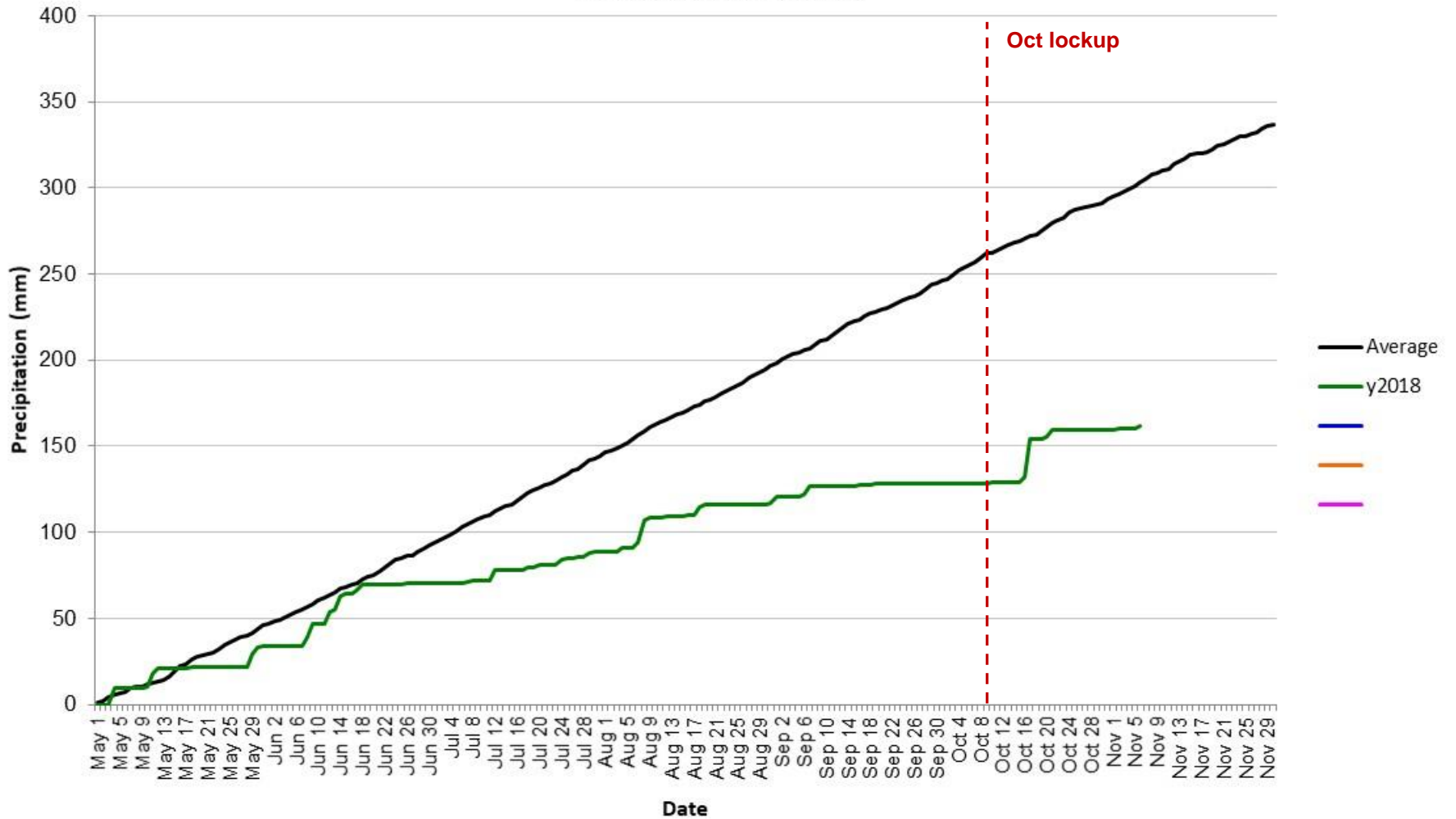
South Australia - Central

Cumulative Precipitation



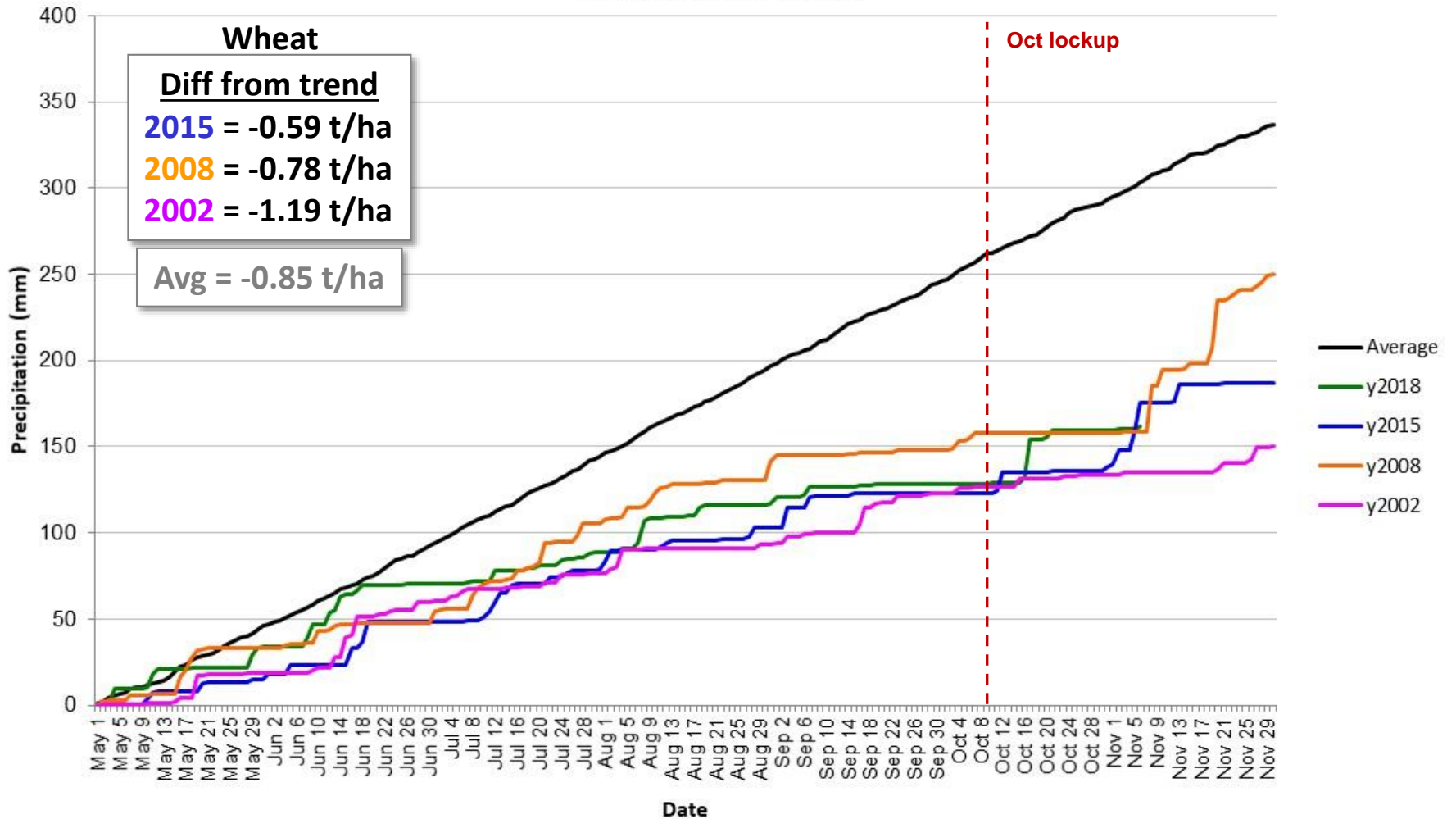
Victoria - North Central

Cumulative Precipitation



Victoria - North Central

Cumulative Precipitation



Wheat Yield Estimate

Analog year analyses

Yield
estimate
(t/ha)

Western Australia		1.99	
South Australia		2.13	
Victoria		1.10	
New South Wales		1.05	
Queensland		1.48	

**National
Estimate**

Wheat Yield Estimate

Analog year analyses

	Area estimate (Mha)	Yield estimate (t/ha)	
Western Australia	4.8	1.99	
South Australia	2.1	2.13	
Victoria	1.6	1.10	
New South Wales	2.1	1.05	
Queensland	0.5	1.48	

**National
Estimate**

11.0

Wheat Yield Estimate

Analog year analyses

	Area estimate (Mha)	Yield estimate (t/ha)	Production estimate (Mt)
Western Australia	4.8	1.99	9.6
South Australia	2.1	2.13	4.4
Victoria	1.6	1.10	1.7
New South Wales	2.1	1.05	2.2
Queensland	0.5	1.48	0.7
National Estimate	<i>11.0</i>		<i>18.6</i>

Wheat Yield Estimate

Analog year analyses

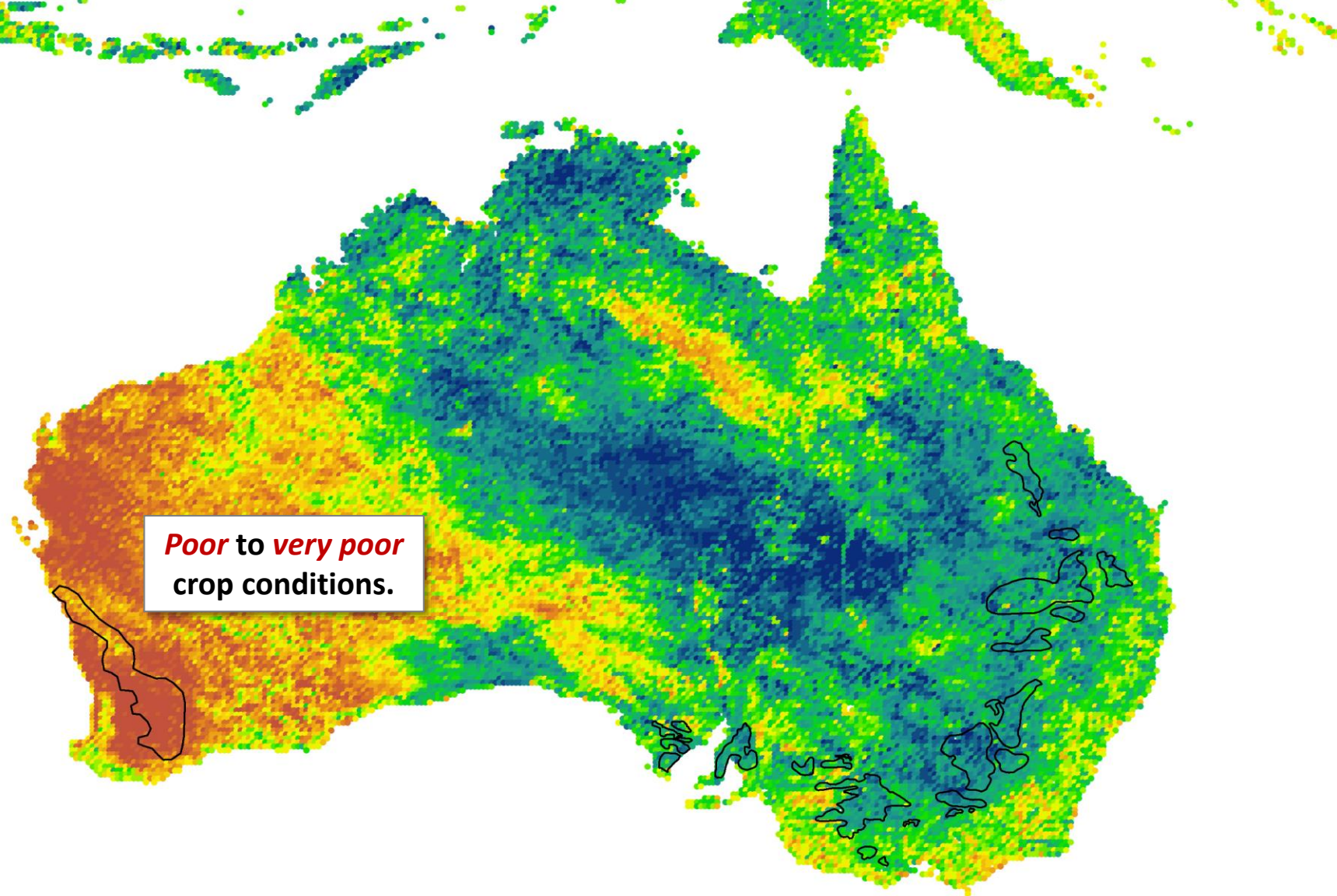
	Area estimate (Mha)	Yield estimate (t/ha)	Production estimate (Mt)
Western Australia	4.8	1.99	9.6
South Australia	2.1	2.13	4.4
Victoria	1.6	1.10	1.7
New South Wales	2.1	1.05	2.2
Queensland	0.5	1.48	0.7

**National
Estimate**

11.0

1.69

18.6



Vegetation Health Index

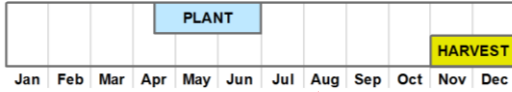
October 2010

Very good to excellent
crop conditions.

Vegetation Health Index vs. Wheat Yields

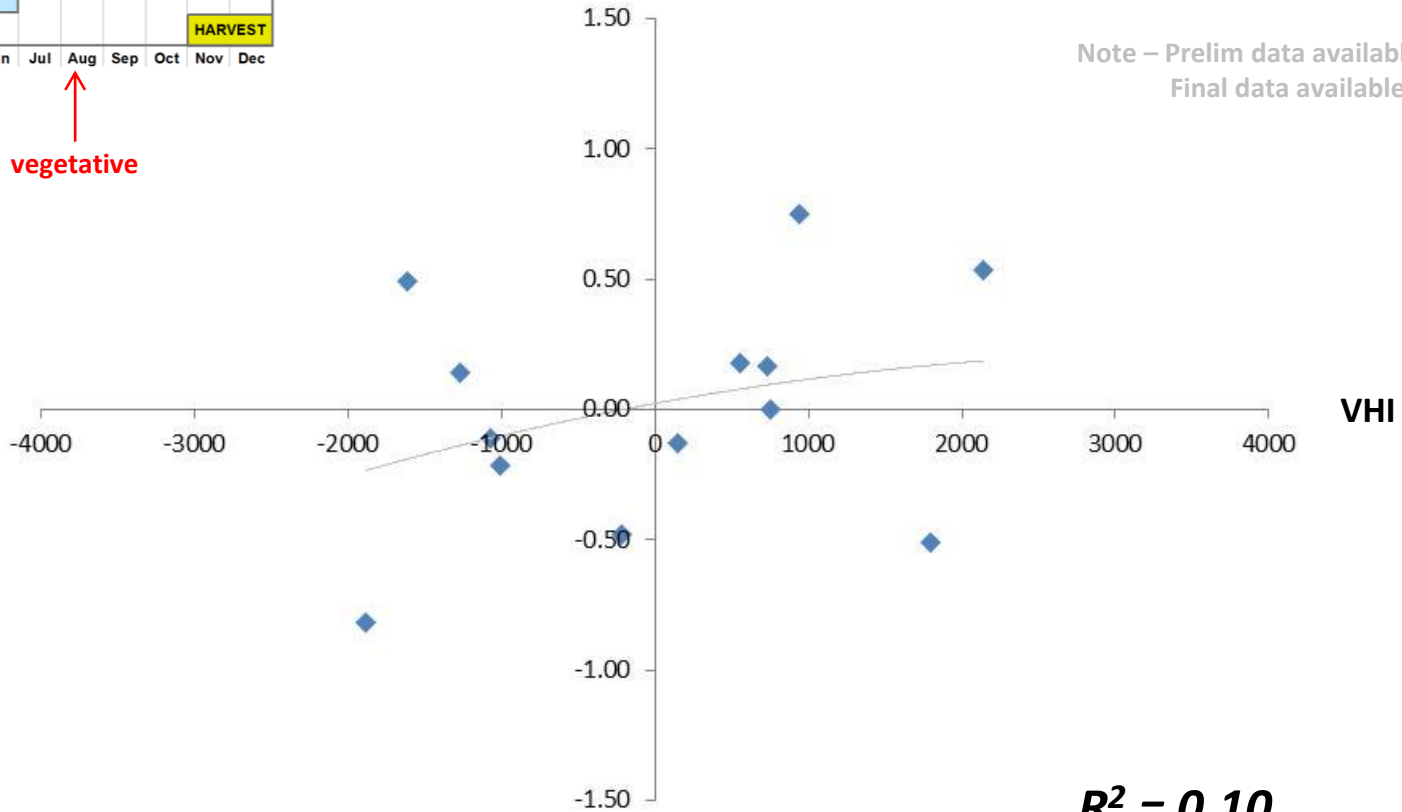
South Australia

Wheat crop calendar for most of Australia



↑
vegetative

Yield (vs. trend)

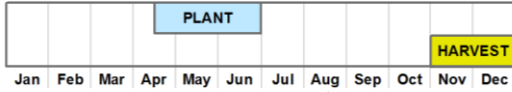


Based on 13 years of data (2002-2014)

Vegetation Health Index vs. Wheat Yields

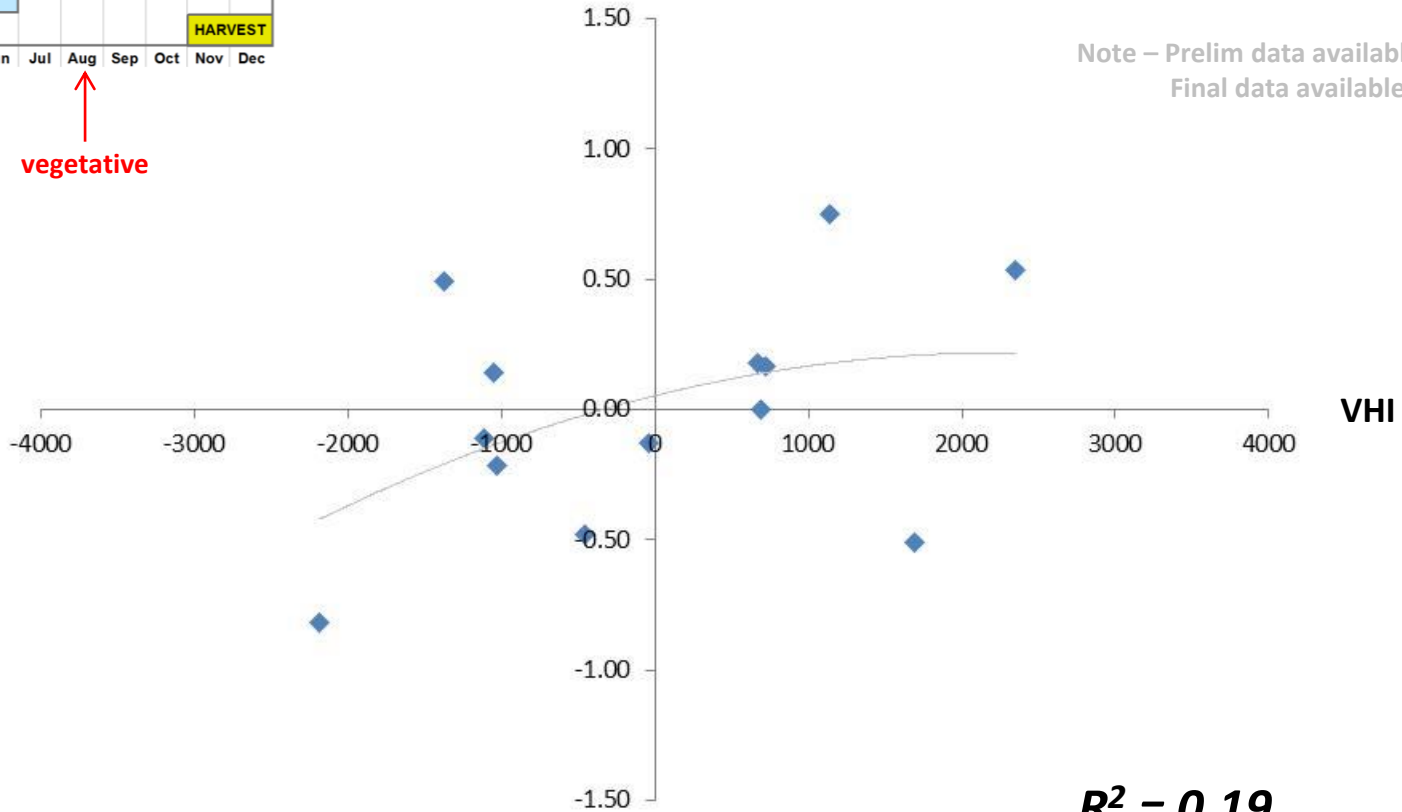
South Australia

Wheat crop calendar for most of Australia



↑
vegetative

Yield (vs. trend)

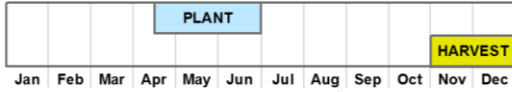


Based on 13 years of data (2002-2014)

Vegetation Health Index vs. Wheat Yields

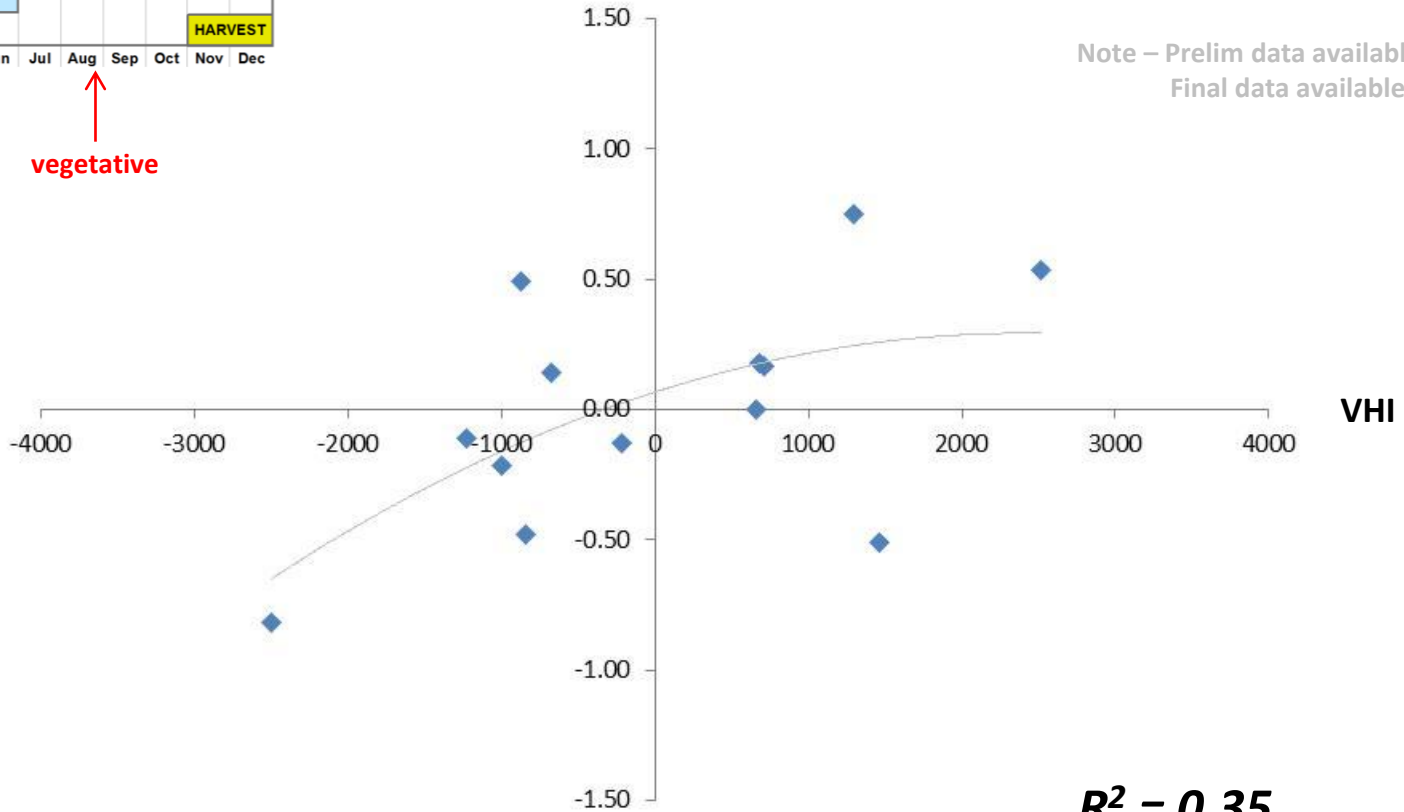
South Australia

Wheat crop calendar for most of Australia



↑
vegetative

Yield (vs. trend)

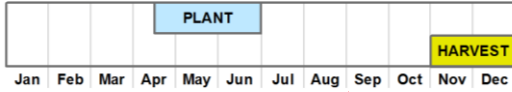


Based on 13 years of data (2002-2014)

Vegetation Health Index vs. Wheat Yields

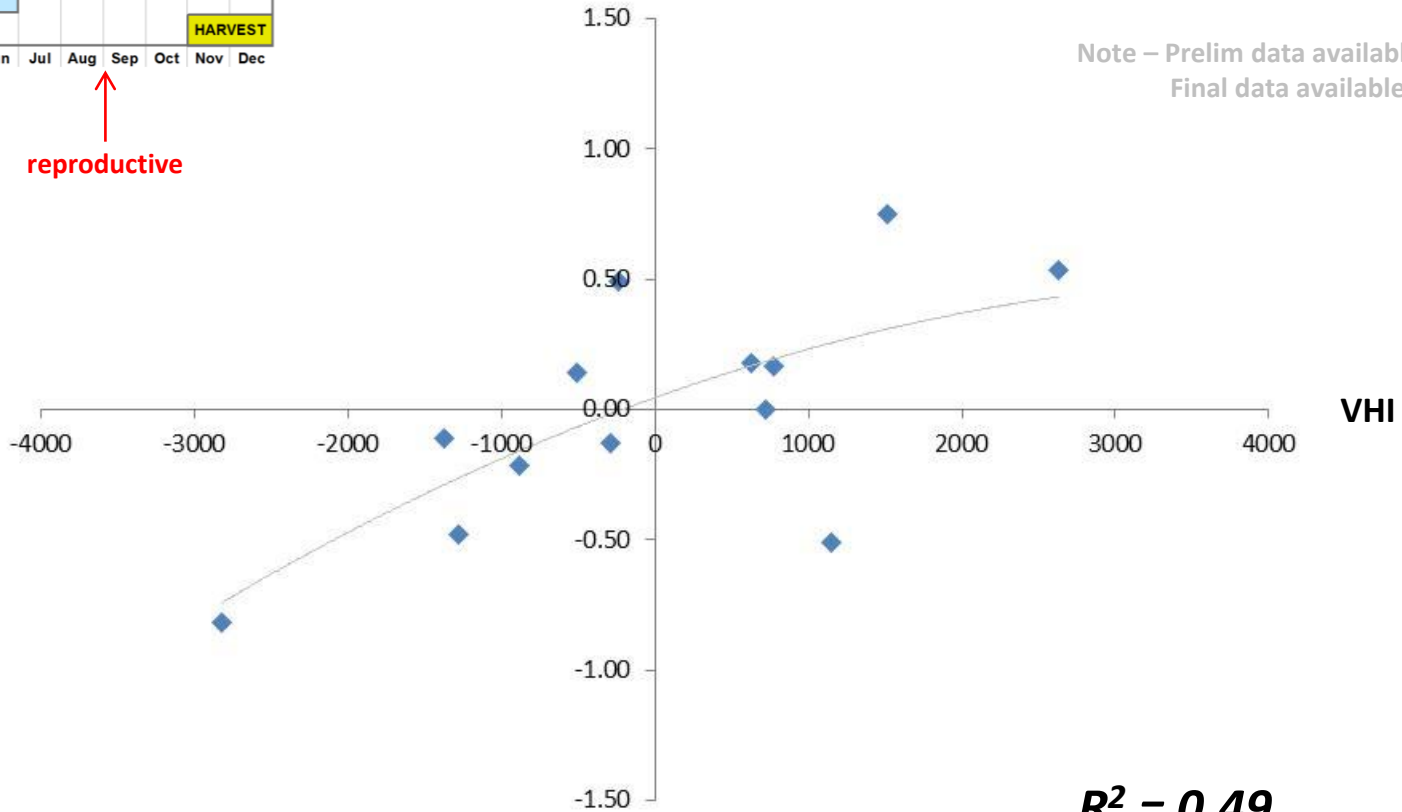
South Australia

Wheat crop calendar for most of Australia



↑
reproductive

Yield (vs. trend)

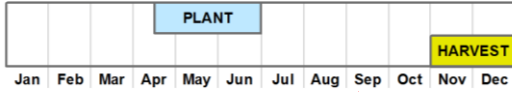


Based on 13 years of data (2002-2014)

Vegetation Health Index vs. Wheat Yields

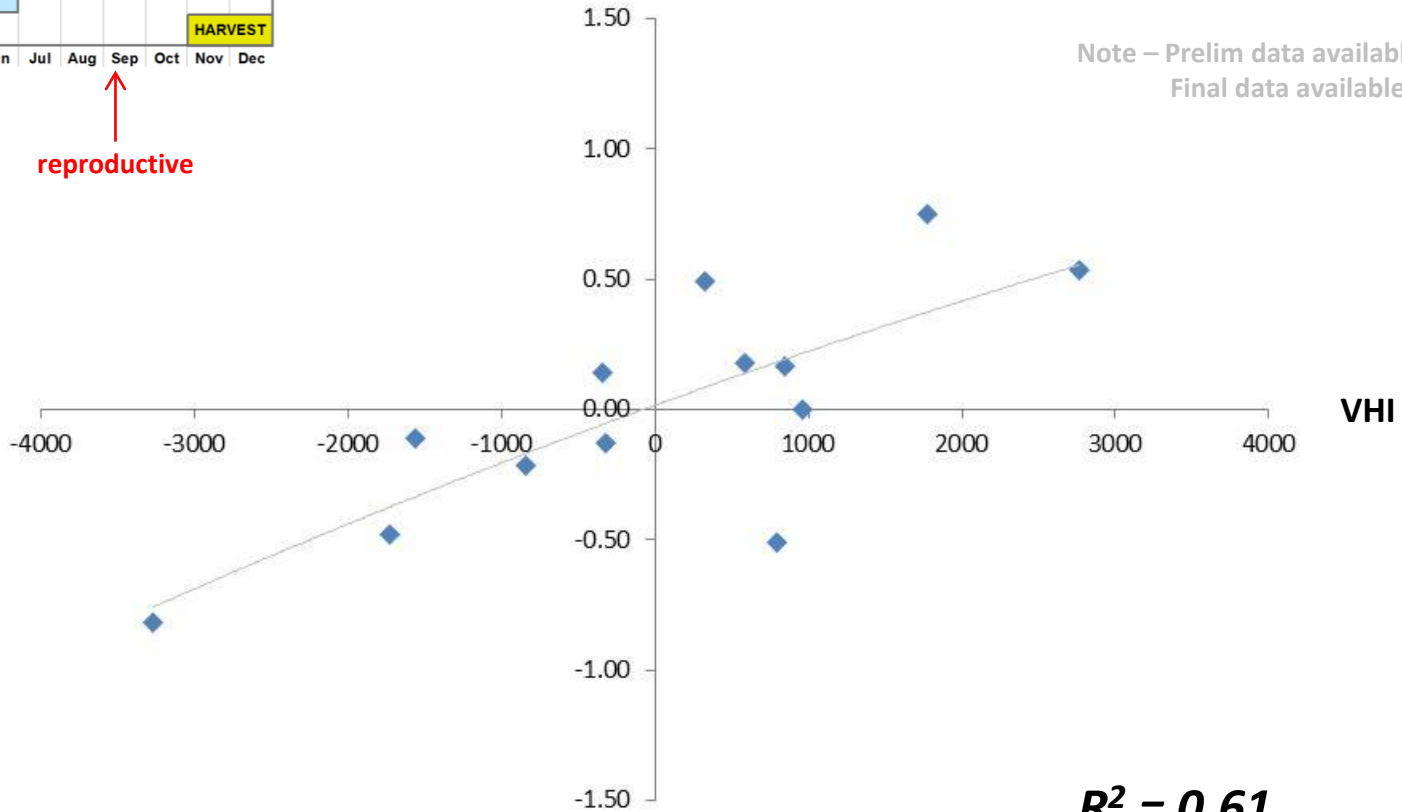
South Australia

Wheat crop calendar for most of Australia



↑
reproductive

Yield (vs. trend)

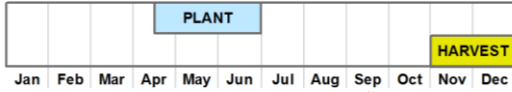


Based on 13 years of data (2002-2014)

Vegetation Health Index vs. Wheat Yields

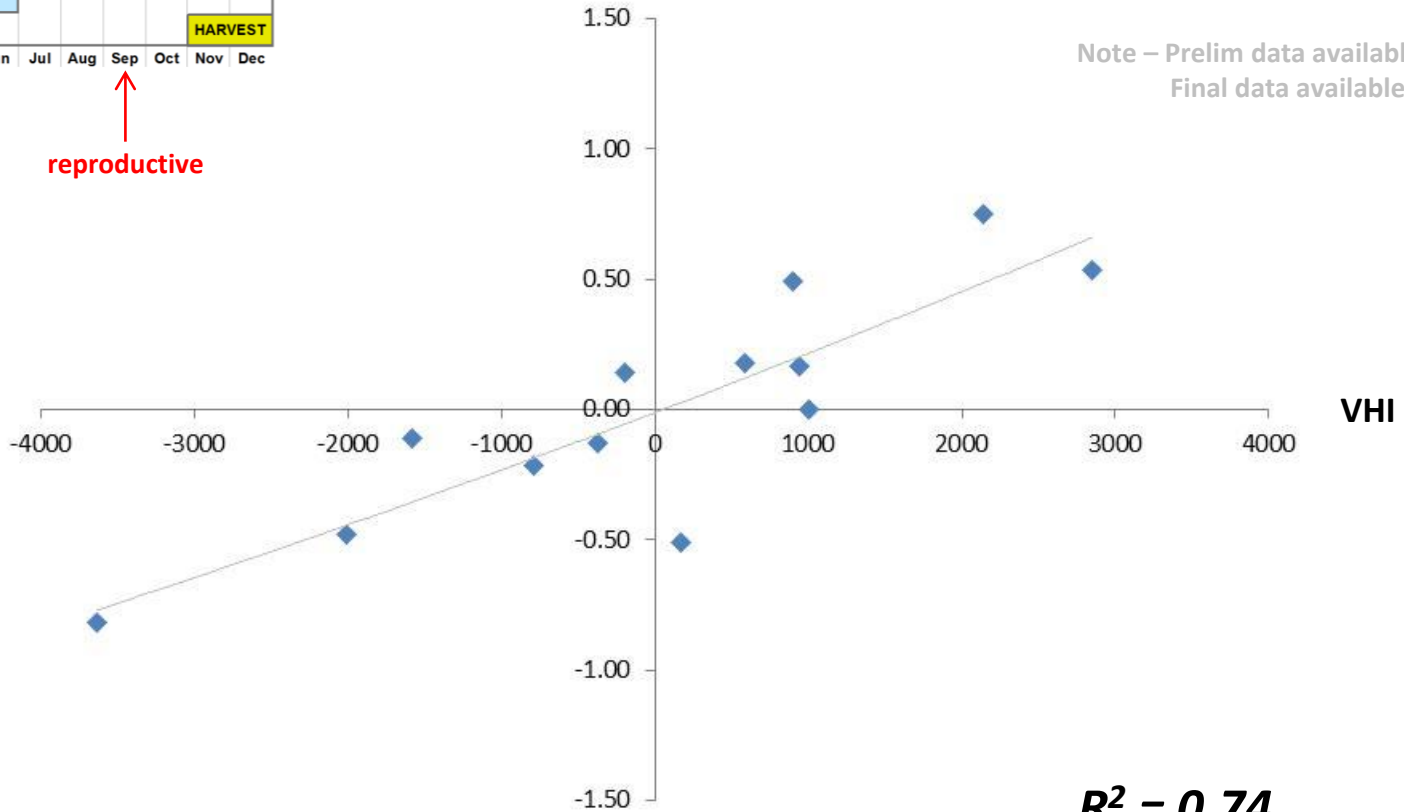
South Australia

Wheat crop calendar for most of Australia



↑
reproductive

Yield (vs. trend)

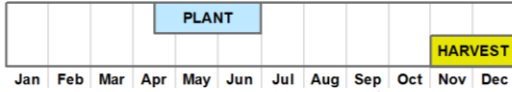


Based on 13 years of data (2002-2014)

Vegetation Health Index vs. Wheat Yields

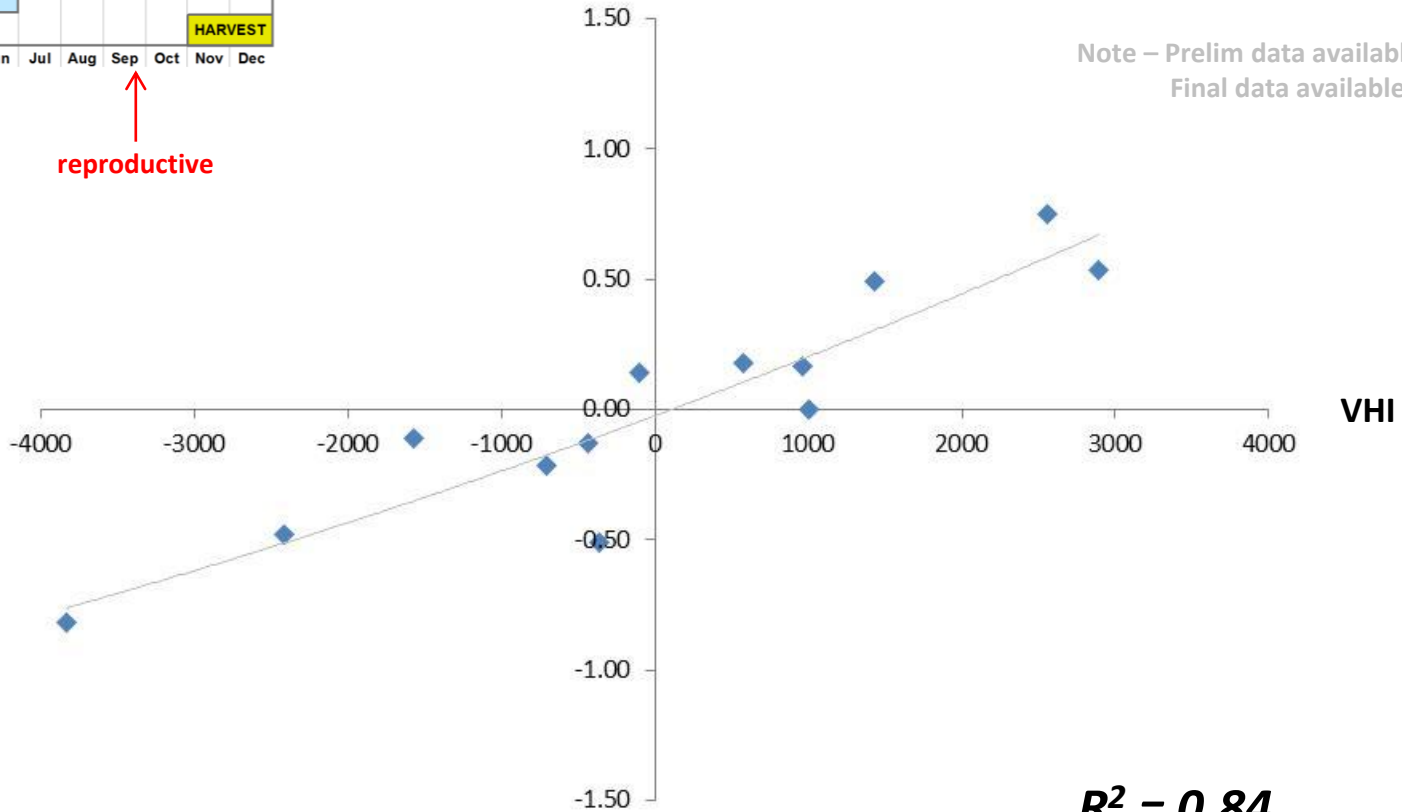
South Australia

Wheat crop calendar for most of Australia



↑
reproductive

Yield (vs. trend)

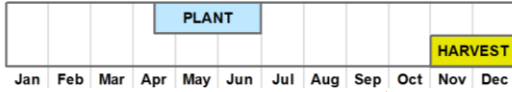


Based on 13 years of data (2002-2014)

Vegetation Health Index vs. Wheat Yields

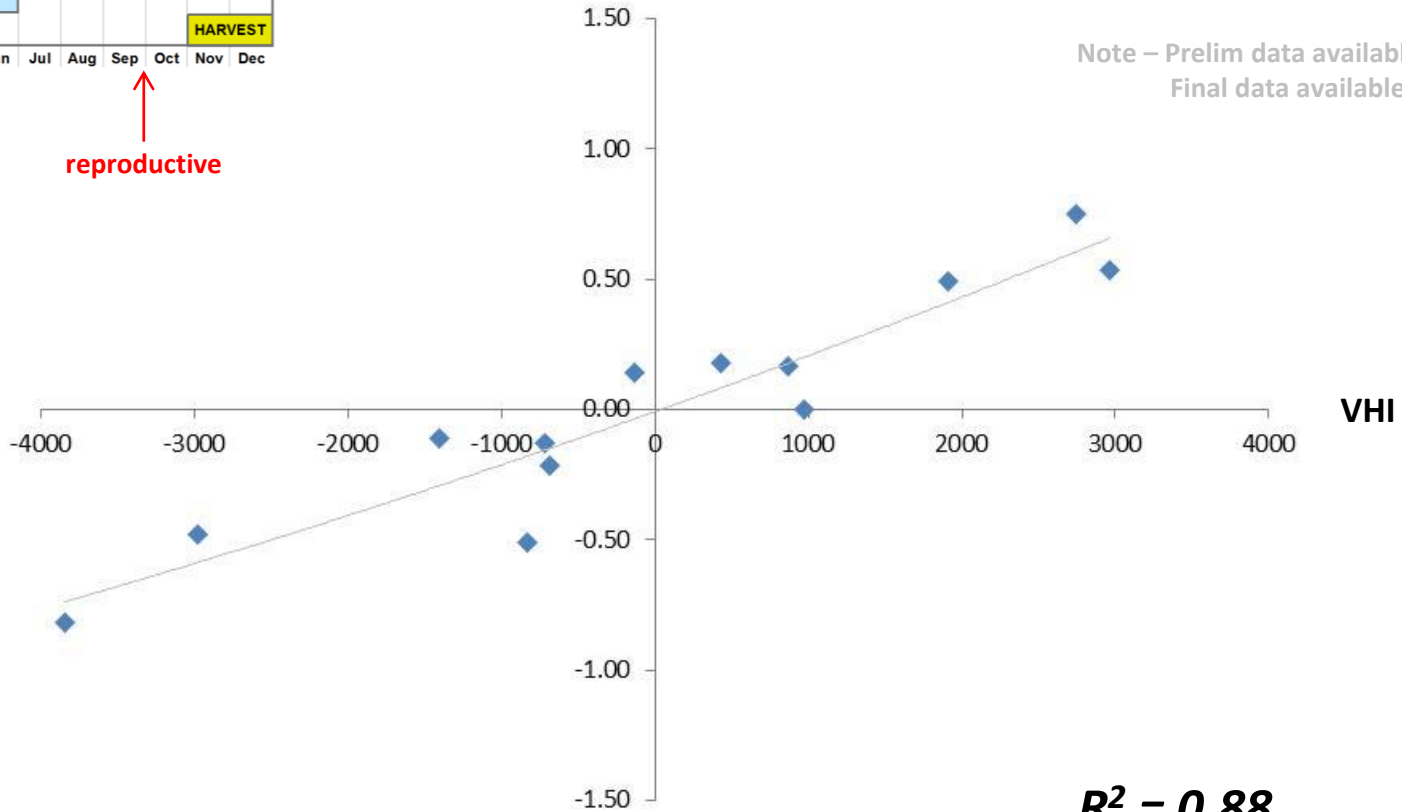
South Australia

Wheat crop calendar for most of Australia



↑
reproductive

Yield (vs. trend)

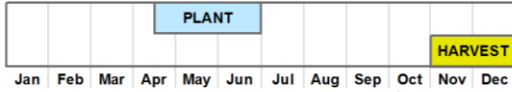


Based on 13 years of data (2002-2014)

Vegetation Health Index vs. Wheat Yields

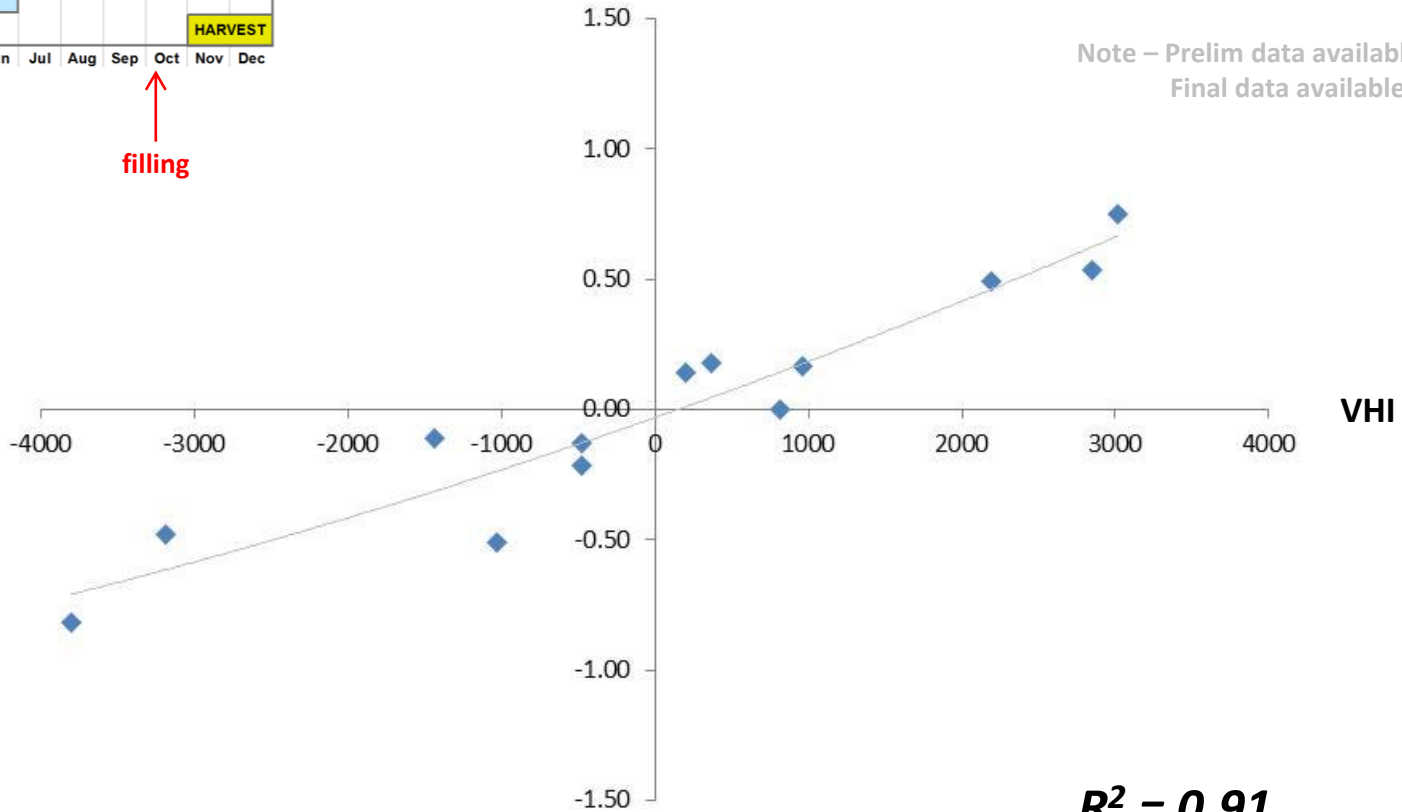
South Australia

Wheat crop calendar for most of Australia



↑
filling

Yield (vs. trend)

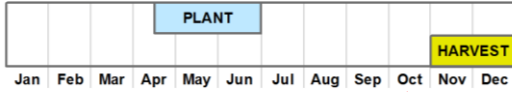


Based on 13 years of data (2002-2014)

Vegetation Health Index vs. Wheat Yields

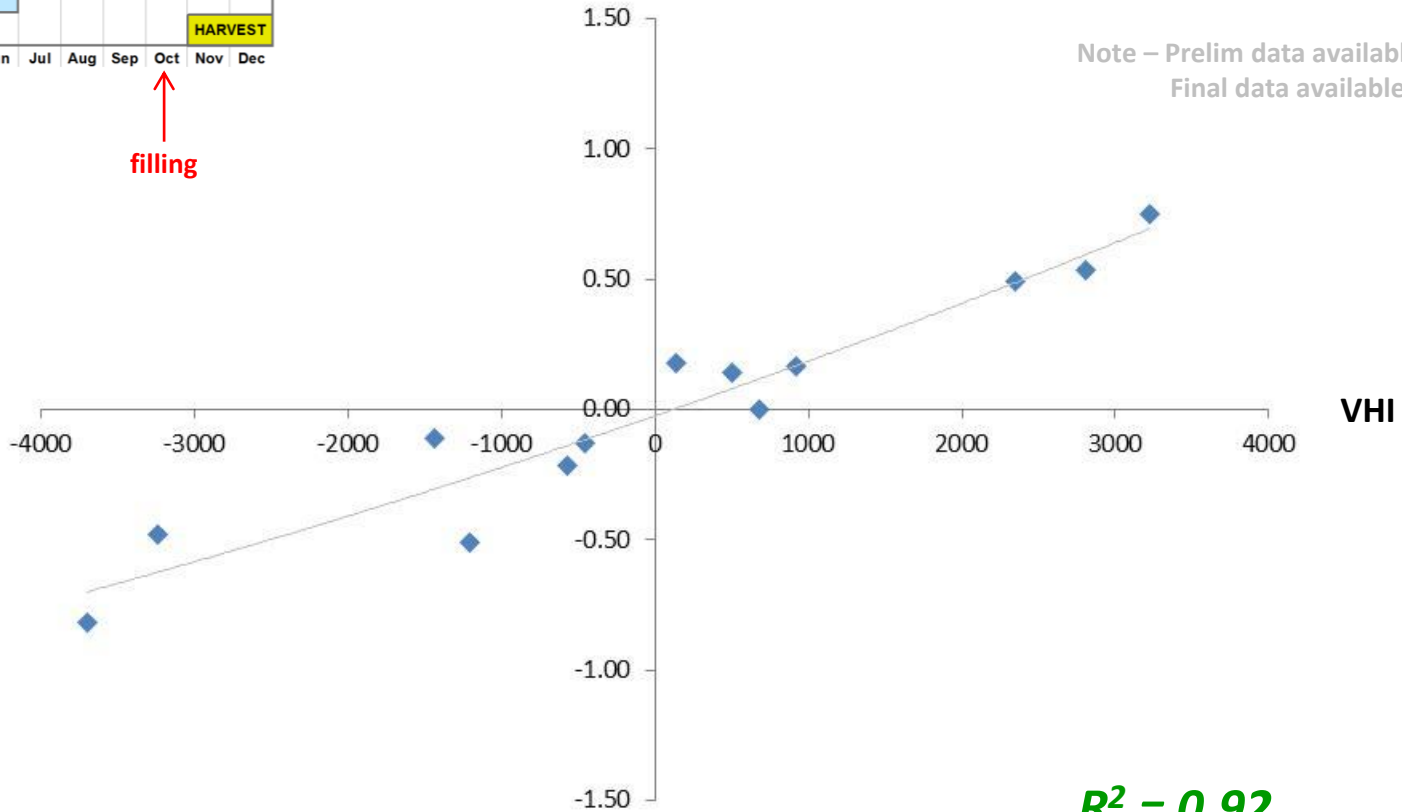
South Australia

Wheat crop calendar for most of Australia



↑
filling

Yield (vs. trend)

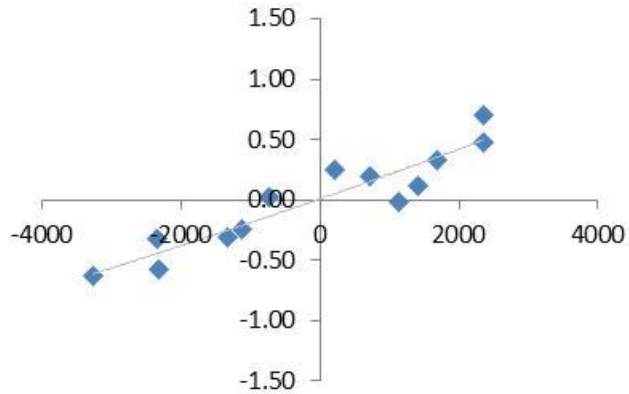


Based on 13 years of data (2002-2014)

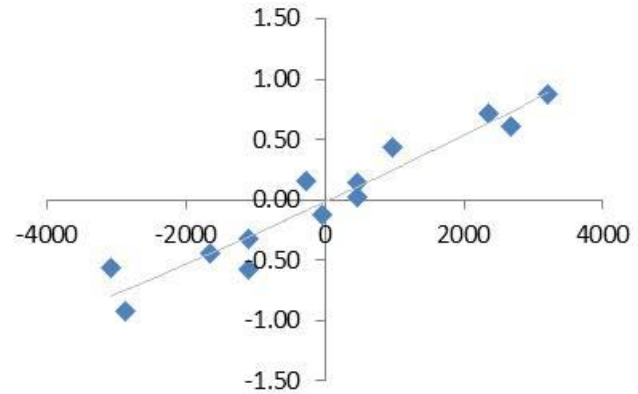
Vegetation Health Index vs. Wheat Yields

The relationship between VHI and wheat yields is strong in these states as well...

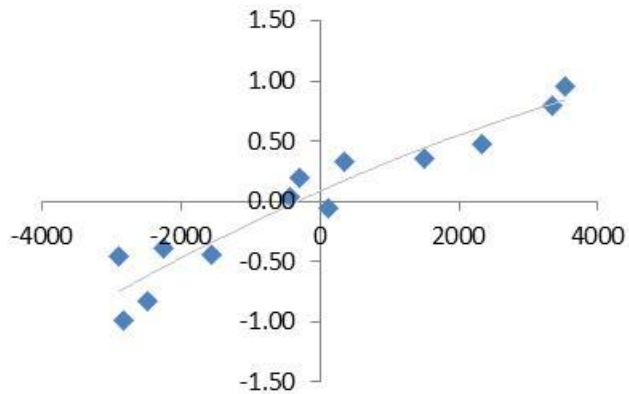
Western Australia: $R^2 = 0.87$ (week 44)



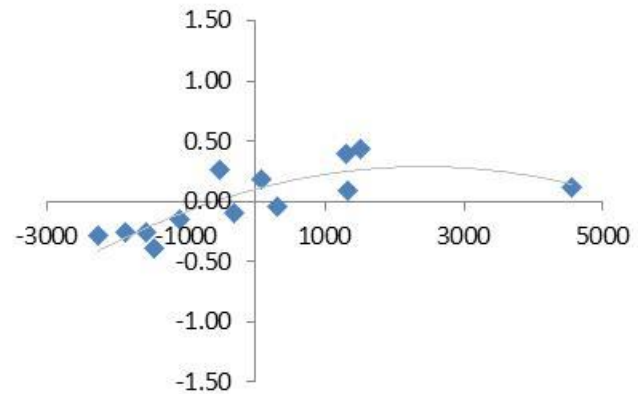
Victoria: $R^2 = 0.92$ (week 42)



New South Wales: $R^2 = 0.91$ (week 42)



Queensland: $R^2 = 0.70$ (week 42)



Yield Estimates – Dec 2015

Winter Wheat

	Estimated area (ha)	VHI yield (t/ha) prod (Mt)
Western Australia	5,150,000	1.71 8.8
South Australia	2,360,000	2.09 4.9
Victoria	1,625,000	1.61 2.6
New South Wales	3,900,000	2.08 8.1
Queensland	750,000	1.69 1.3
National Estimate	13,785,000	1.87 25.7

Yield Estimates – Dec 2015

Winter Wheat

	Estimated area (ha)	VHI yield (t/ha) prod (Mt)	ABARES yield (t/ha) prod (Mt)
Western Australia	5,150,000	1.71 8.8	1.69 8.7
South Australia	2,360,000	2.09 4.9	1.85 4.4
Victoria	1,625,000	1.61 2.6	1.54 2.5
New South Wales	3,900,000	2.08 8.1	1.82 7.1
Queensland	750,000	1.69 1.3	1.67 1.3
National Estimate	13,785,000	1.87 25.7	1.74 24.0

Yield Estimates – Dec 2015

Winter Wheat

	Estimated area (ha)	VHI yield (t/ha) prod (Mt)	ABARES yield (t/ha) prod (Mt)
Western Australia	5,150,000	1.71 8.8	1.69 8.7
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National Estimate	13,785,000	1.87 25.7	1.74 24.0

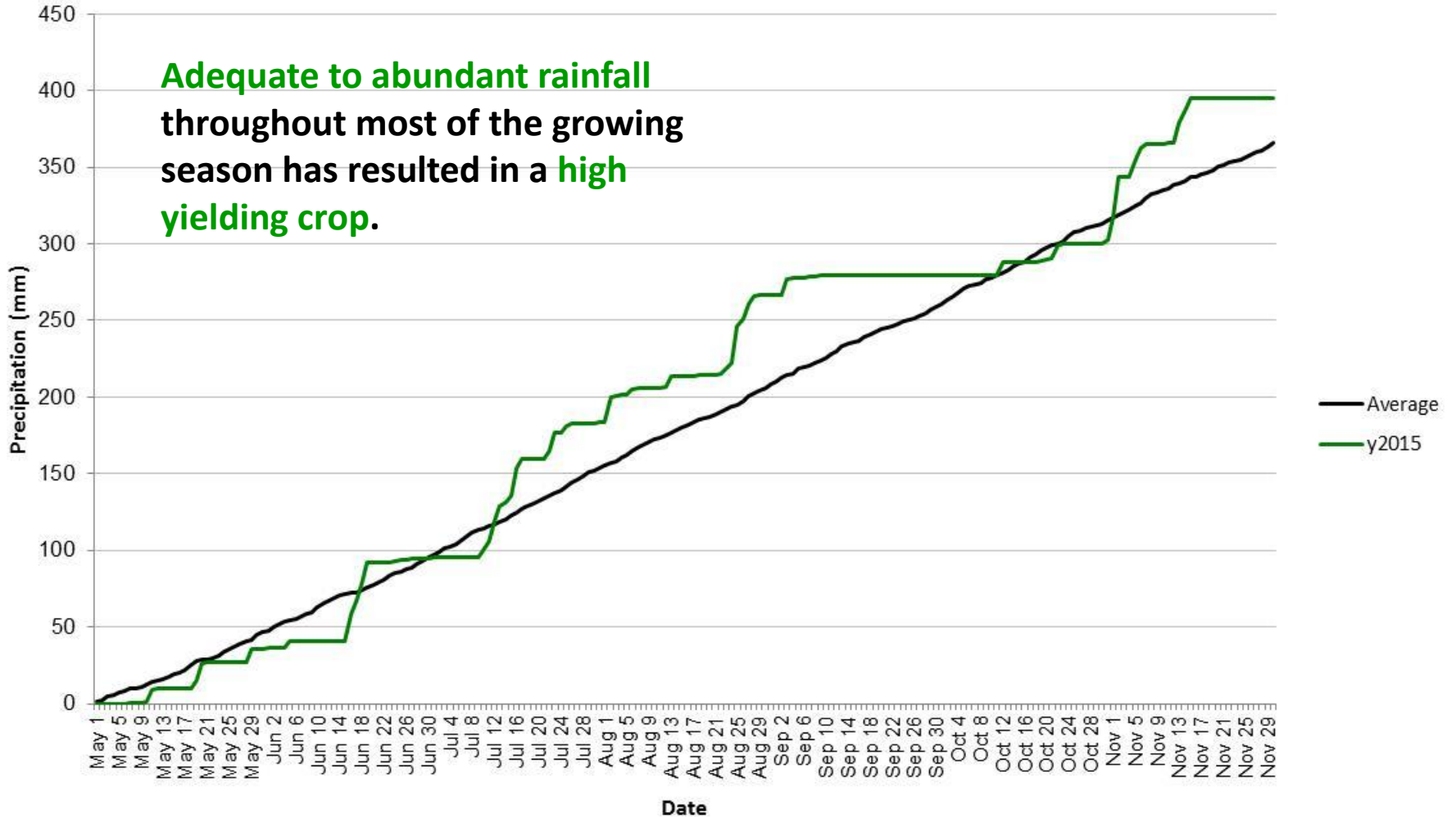
Yield Estimates – Dec 2015

Winter Wheat

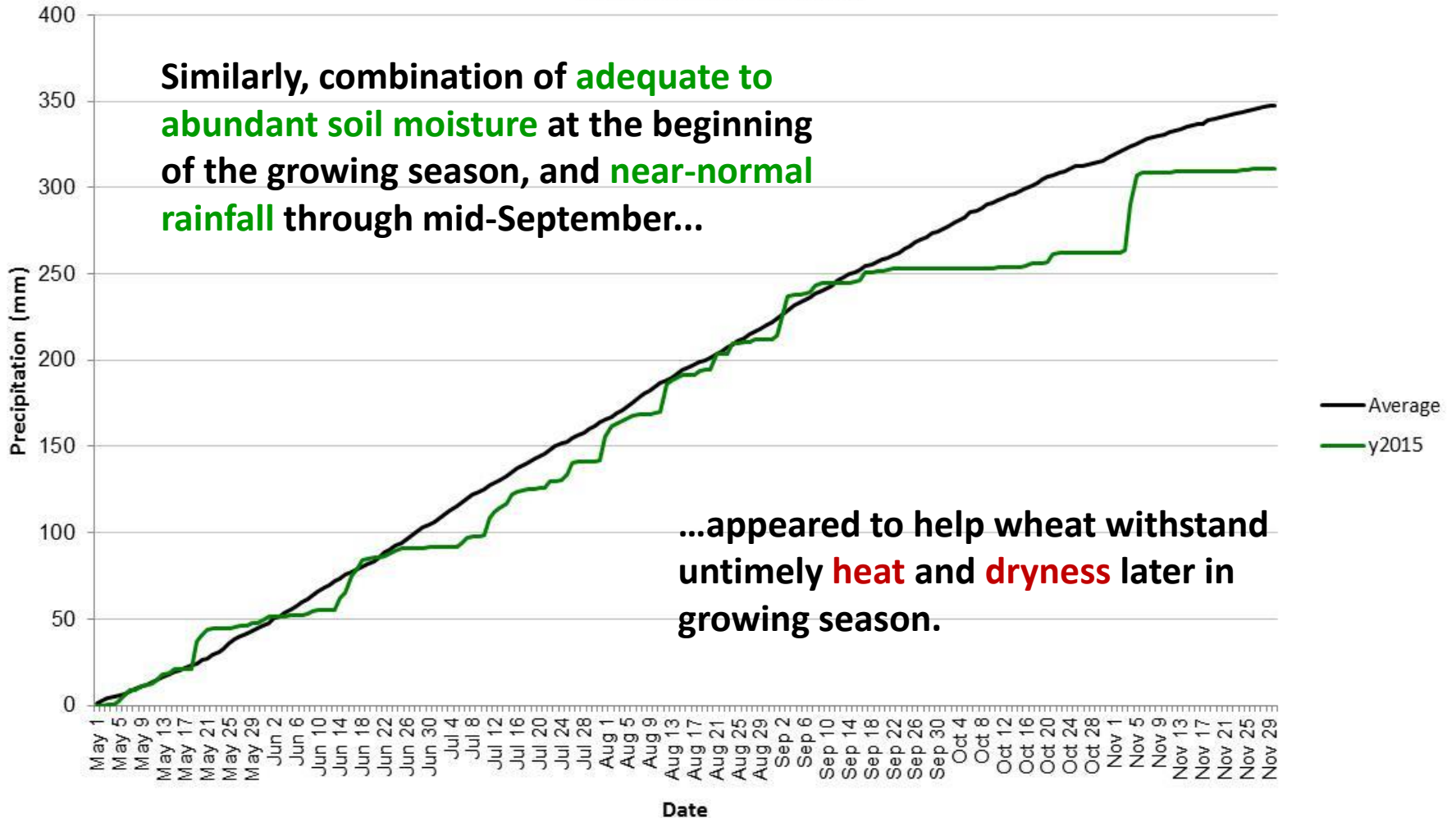
	Estimated area (ha)	VHI yield (t/ha) prod (Mt)	ABARES yield (t/ha) prod (Mt)
Western Australia	5,150,000	1.71 8.8	1.69 8.7
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New South Wales	3,900,000	2.08 8.1	1.82 7.1
Queensland	750,000	1.69 1.3	1.67 1.3
National Estimate	13,785,000	1.87 25.7	1.74 24.0

New South Wales - Southern

Cumulative Precipitation

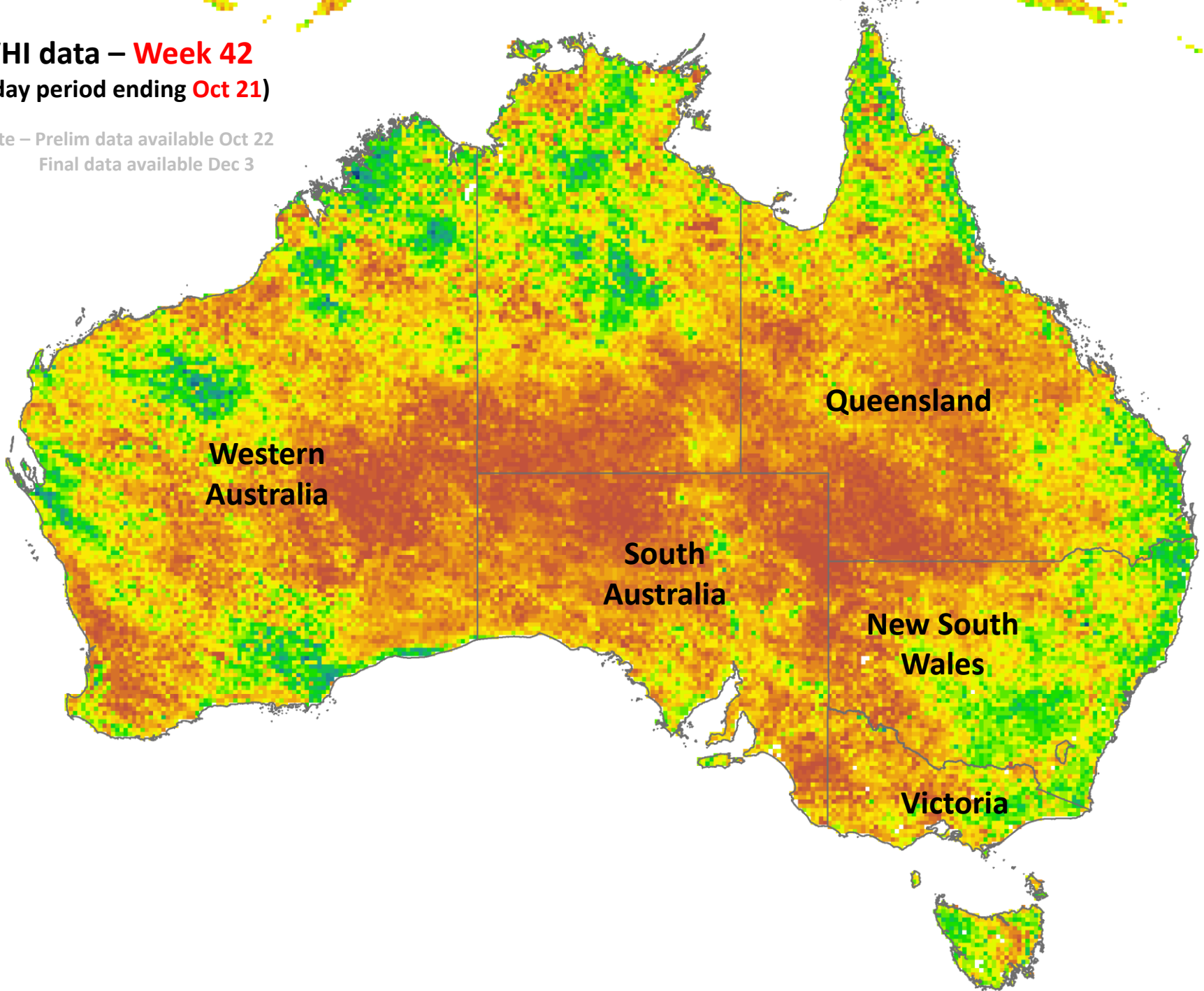


South Australia - Central Cumulative Precipitation



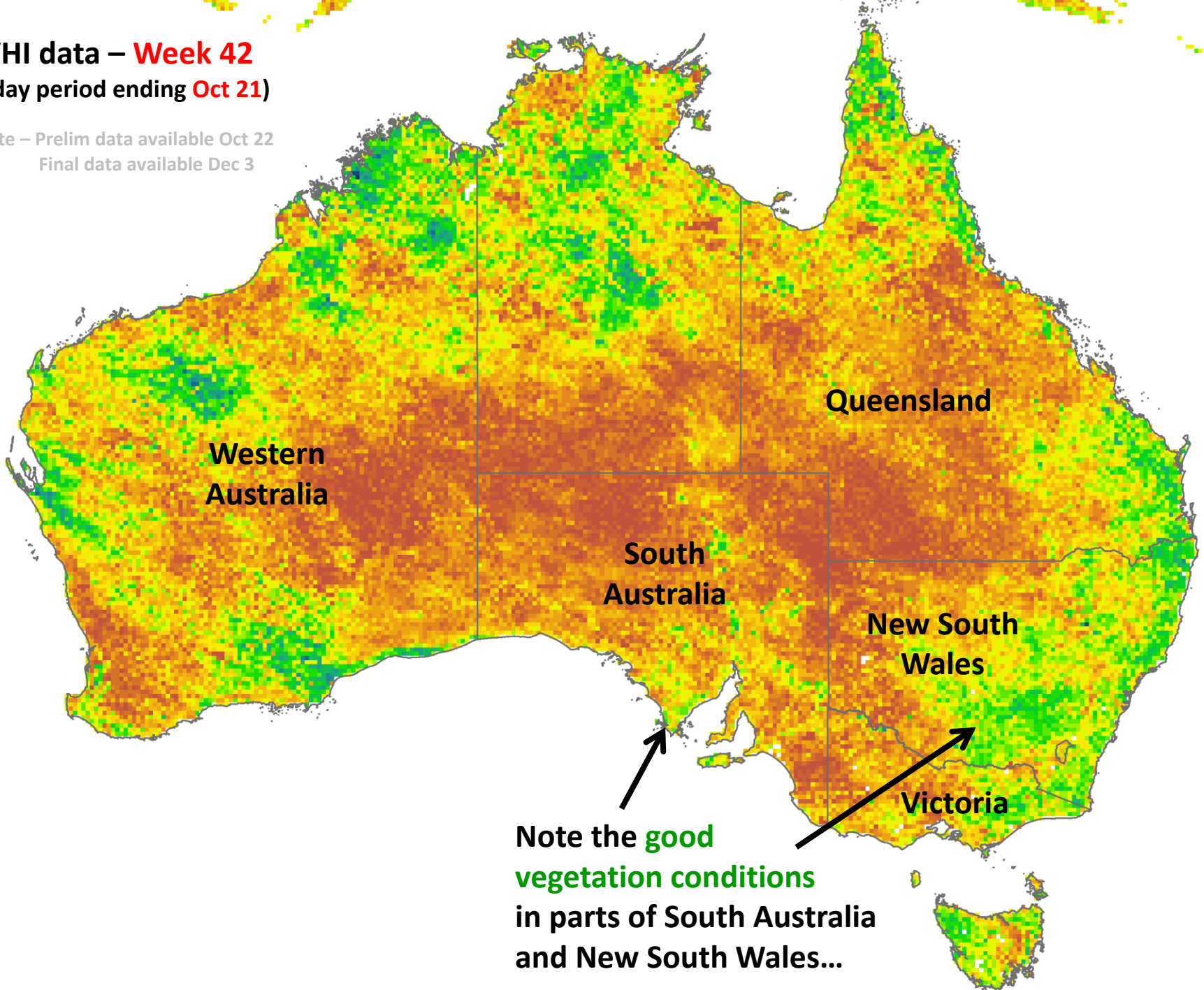
VHI data – Week 42
(7 day period ending Oct 21)

Note – Prelim data available Oct 22
Final data available Dec 3



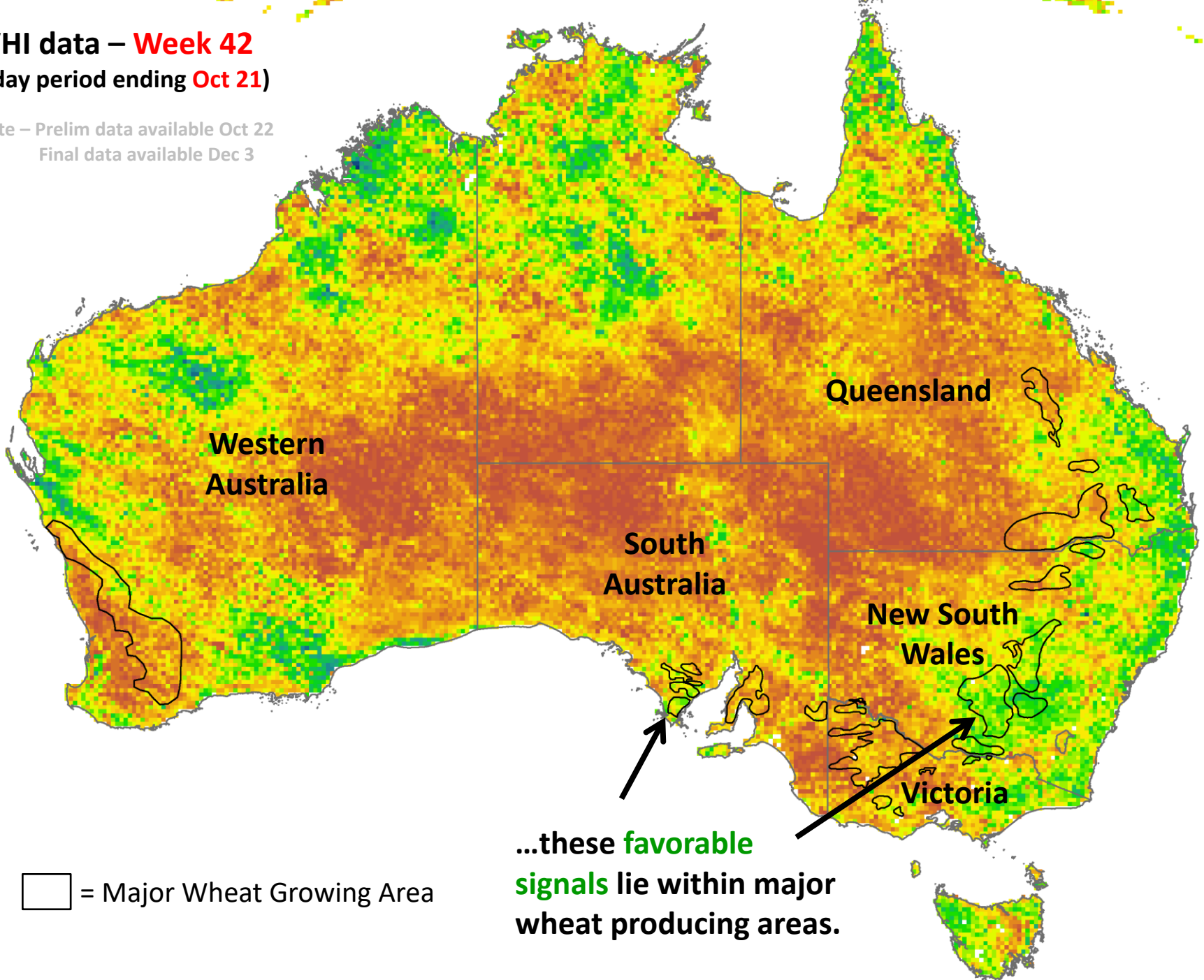
VHI data – Week 42
(7 day period ending Oct 21)

Note – Prelim data available Oct 22
Final data available Dec 3



VHI data – Week 42
(7 day period ending Oct 21)

Note – Prelim data available Oct 22
Final data available Dec 3



Yield Estimates – Dec 2015

Winter Wheat

	Estimated area (ha)	VHI yield (t/ha) prod (Mt)	
Western Australia	5,150,000	1.71 8.8	
South Australia	2,360,000	2.09 4.9	
Victoria	1,625,000	1.61 2.6	
New South Wales	3,900,000	2.08 8.1	
Queensland	750,000	1.69 1.3	
National Estimate	13,785,000	1.87 25.7	1.74 (ABARES)

Yield Estimates – Feb 2016 update

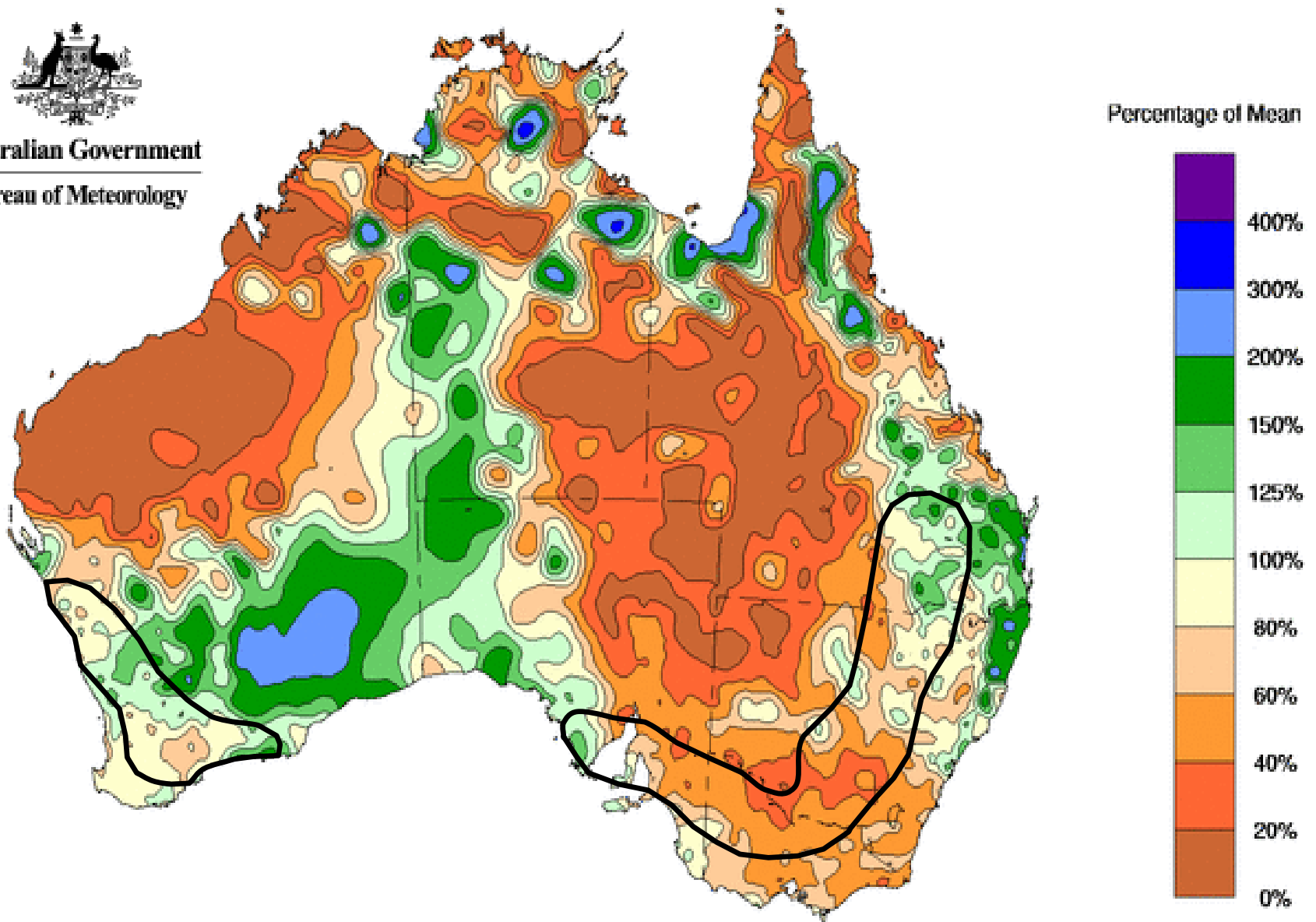
Winter Wheat

	Estimated area (ha)	VHI yield (t/ha) prod (Mt)	
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South Australia	2,360,000	2.09 4.9	
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New South Wales	3,900,000	2.08 8.1	
Queensland	750,000	1.69 1.3	
National Estimate	13,785,000	1.87 25.7	1.90 (ABARES)



Australian Government

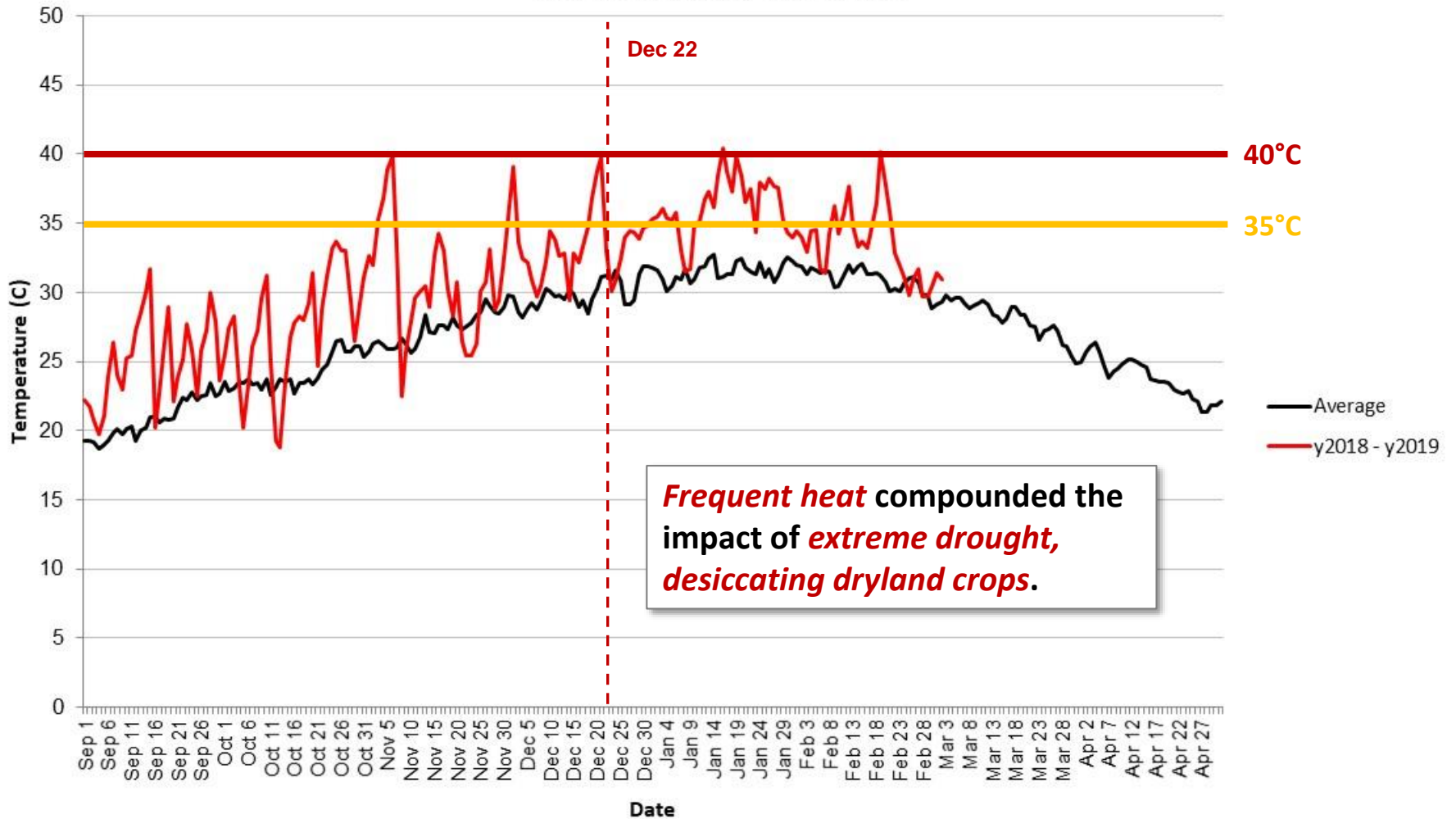
Bureau of Meteorology



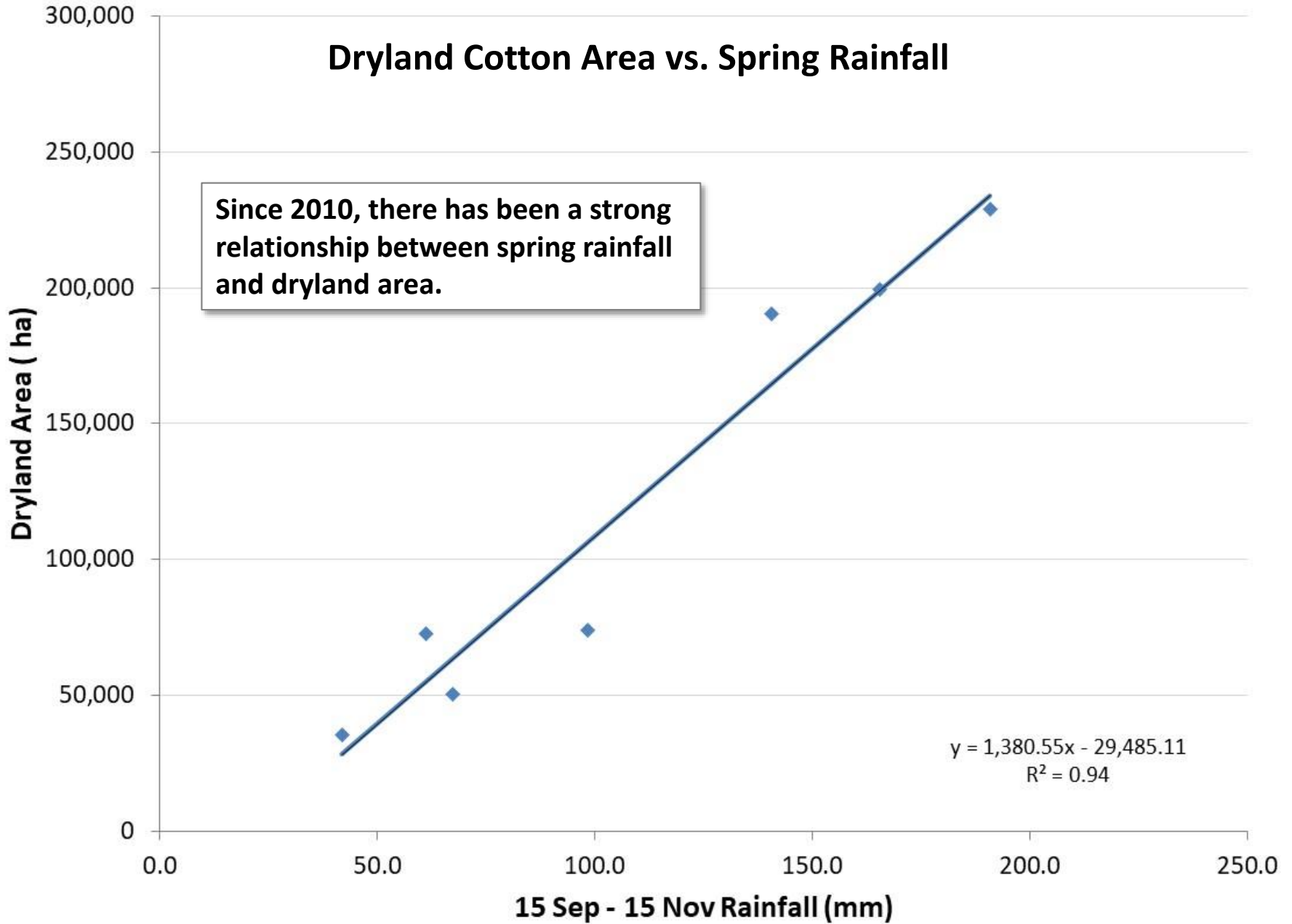
Percent of Normal Rainfall
Aug – Sep – Oct 2018

In contrast, *extreme drought* during the last growing season *significantly reduced crop production*.

NSW/QLD Border Region Average Maximum Temperature

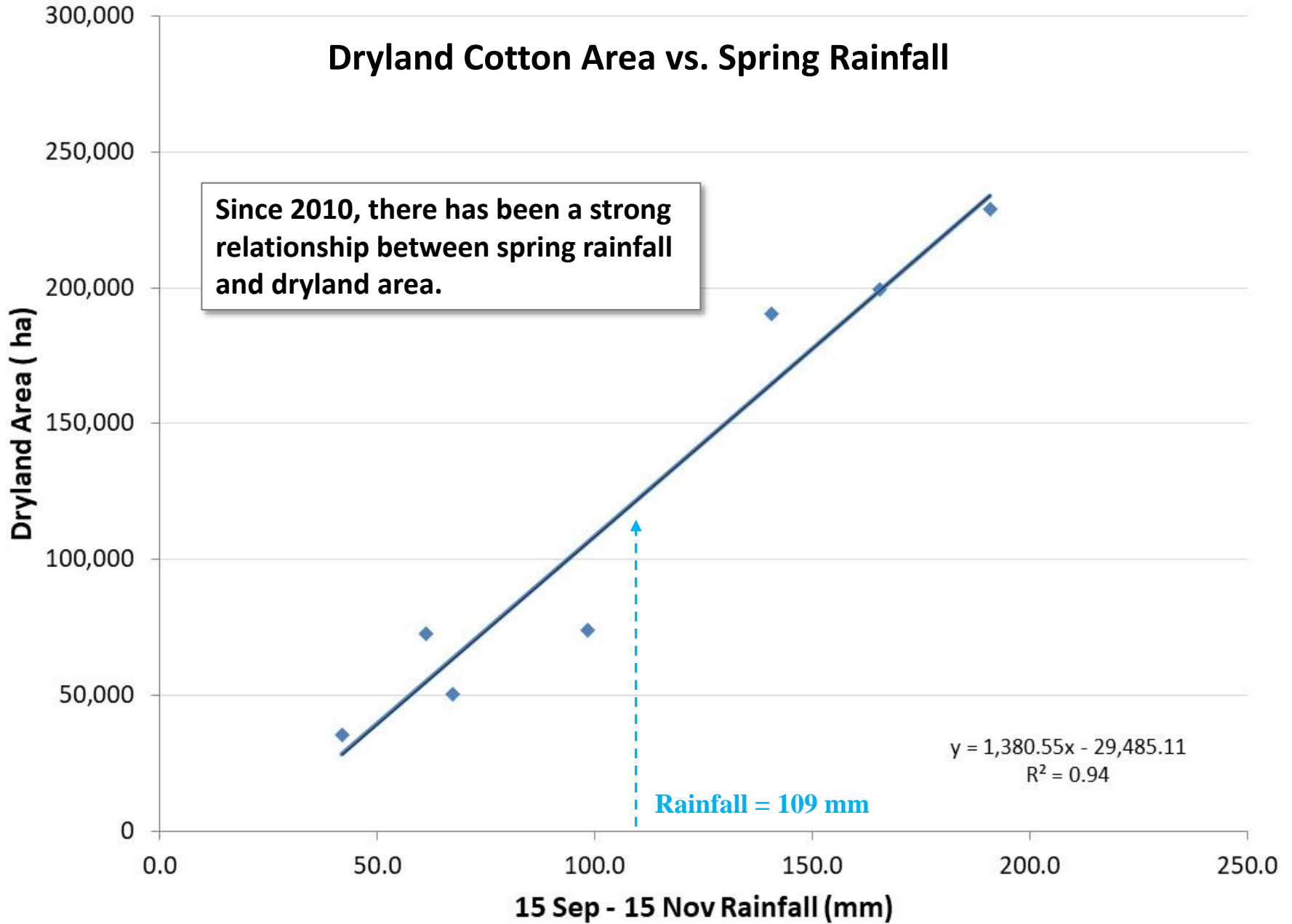


Dryland Cotton Area vs. Spring Rainfall



Dryland Cotton Area vs. Spring Rainfall

Since 2010, there has been a strong relationship between spring rainfall and dryland area.



Dryland Cotton Area vs. Spring Rainfall

