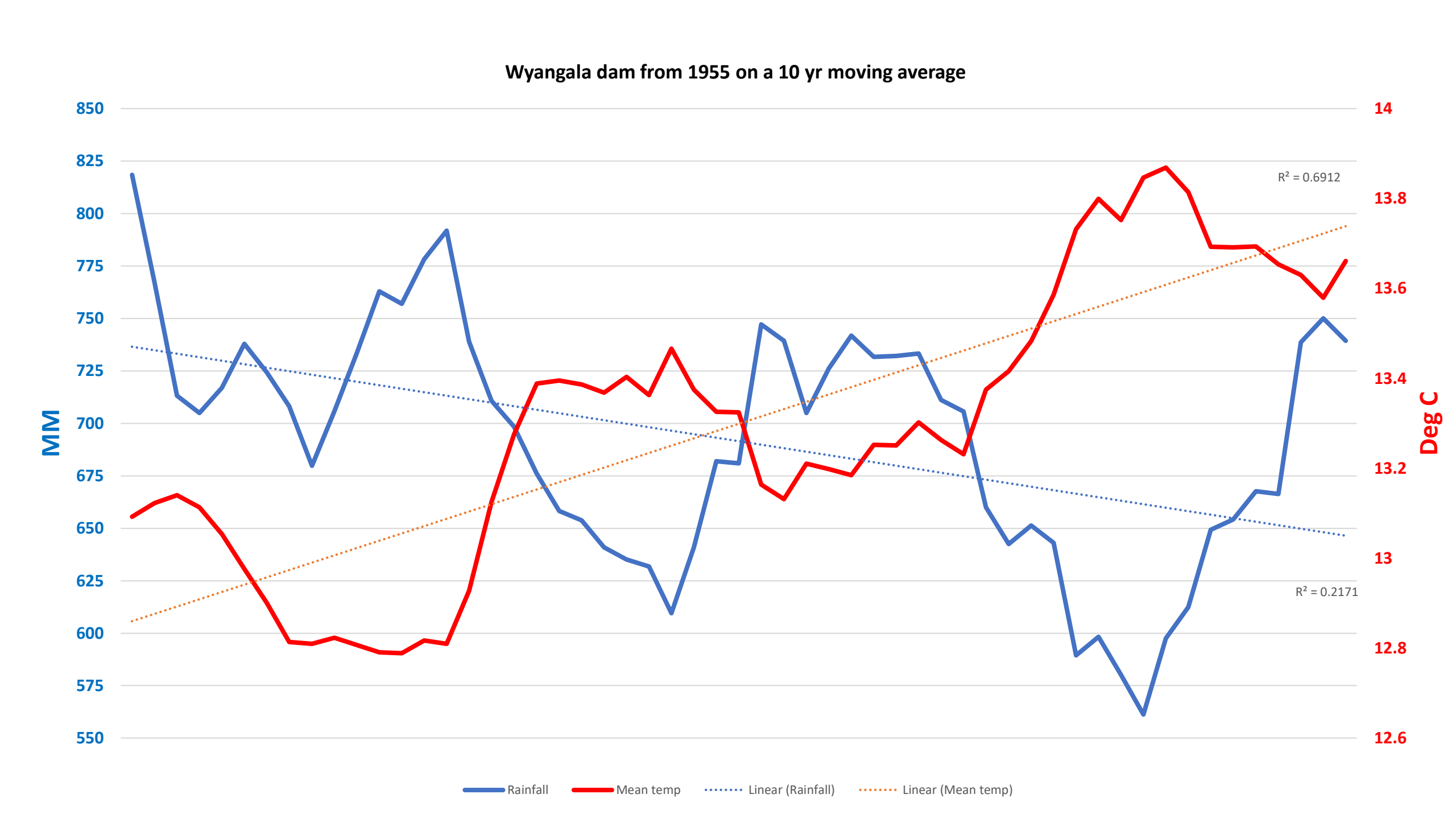
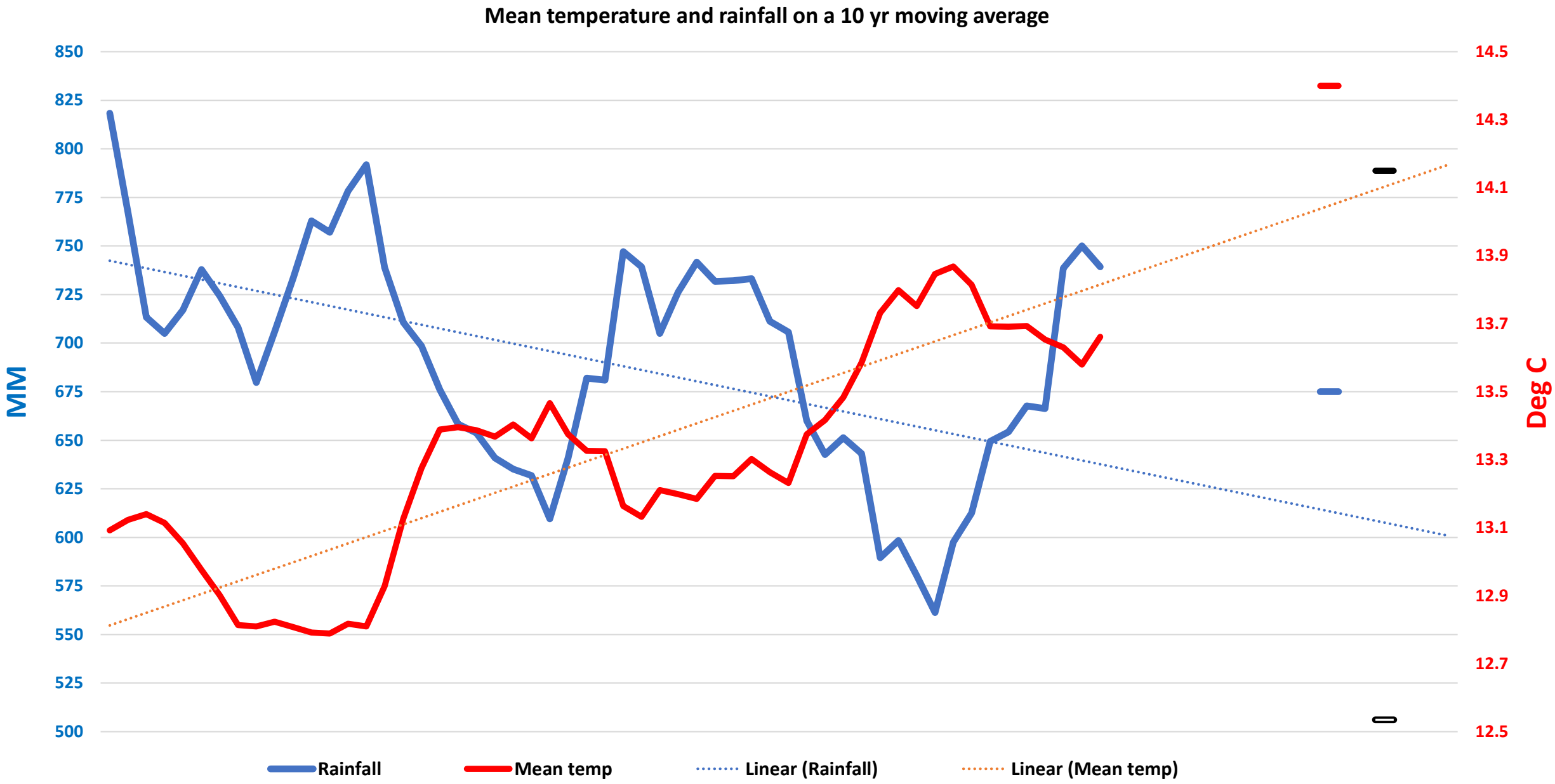
Hovells Creek – what will 2030 present?

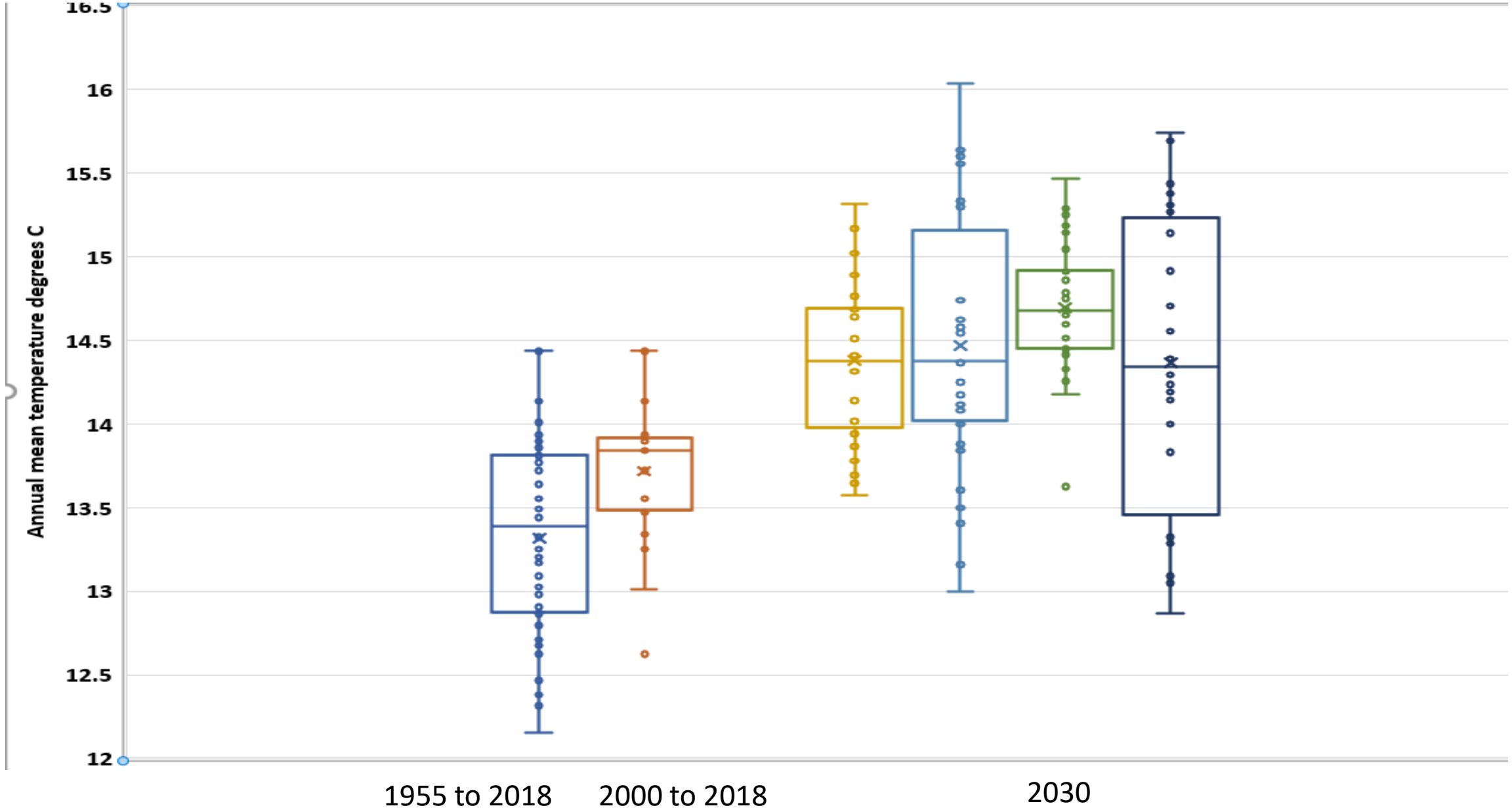
Phil Graham

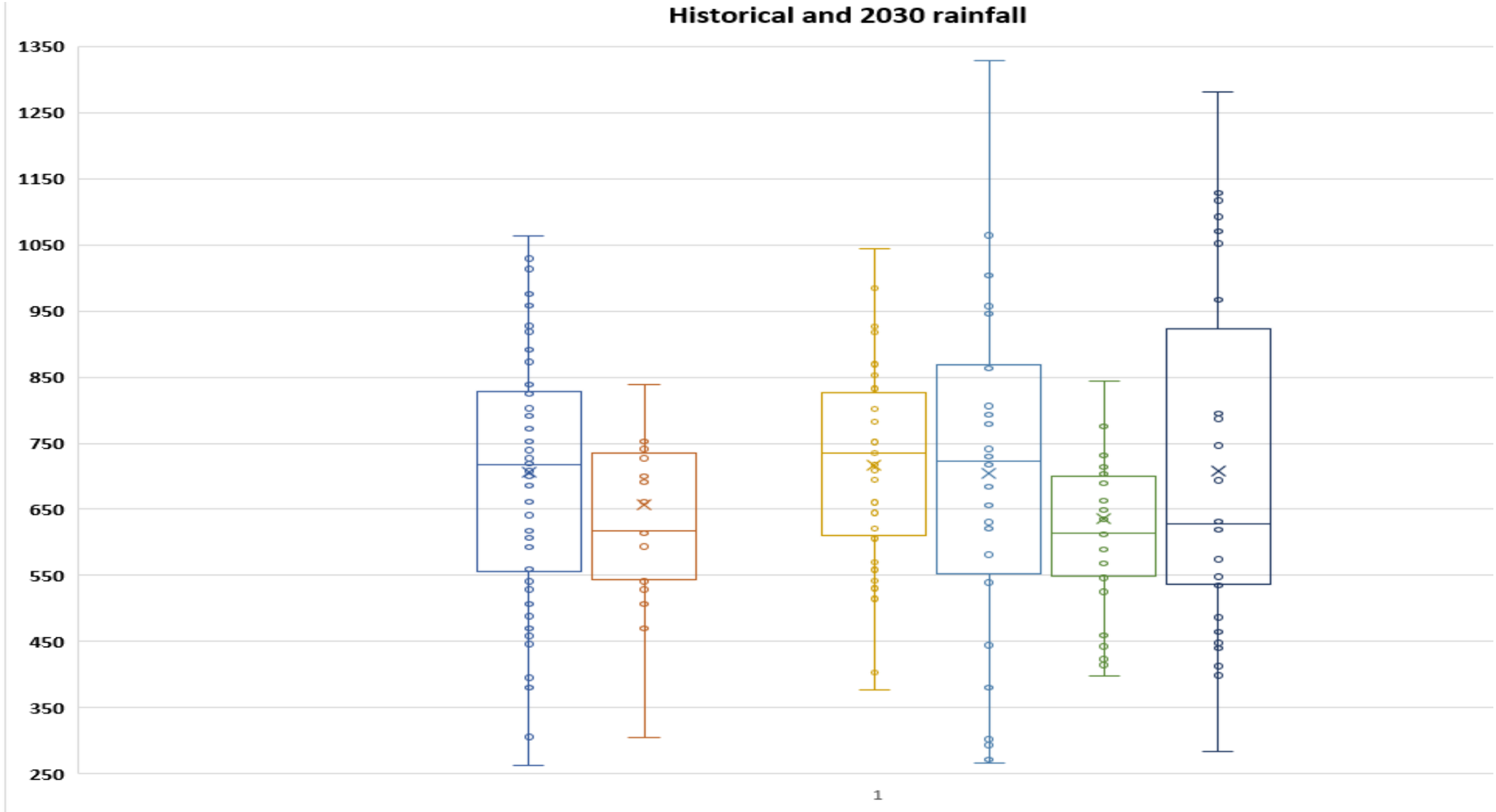
Graham Advisory

YASS


Wyangala dam from 1955 on a 10 yr moving average
850
825
800
775
750
725
700
675
650
625
600
575
550
MM
14
13.8
13.6
13.4
13.2
13
12.8
12.6
Deg C
R² = 0.6912
R² = 0.2171
Rainfall
Mean temp
Linear (Rainfall)
Linear (Mean temp)


Mean temperature and rainfall on a 10 yr moving average
MM
850
825
800
775
750
725
700
675
650
625
600
575
550
525
500
Deg C
14.5
14.3
14.1
13.9
13.7
13.5
13.3
13.1
12.9
12.7
12.5
Rainfall
Mean temp
Linear (Rainfall)
Linear (Mean temp)

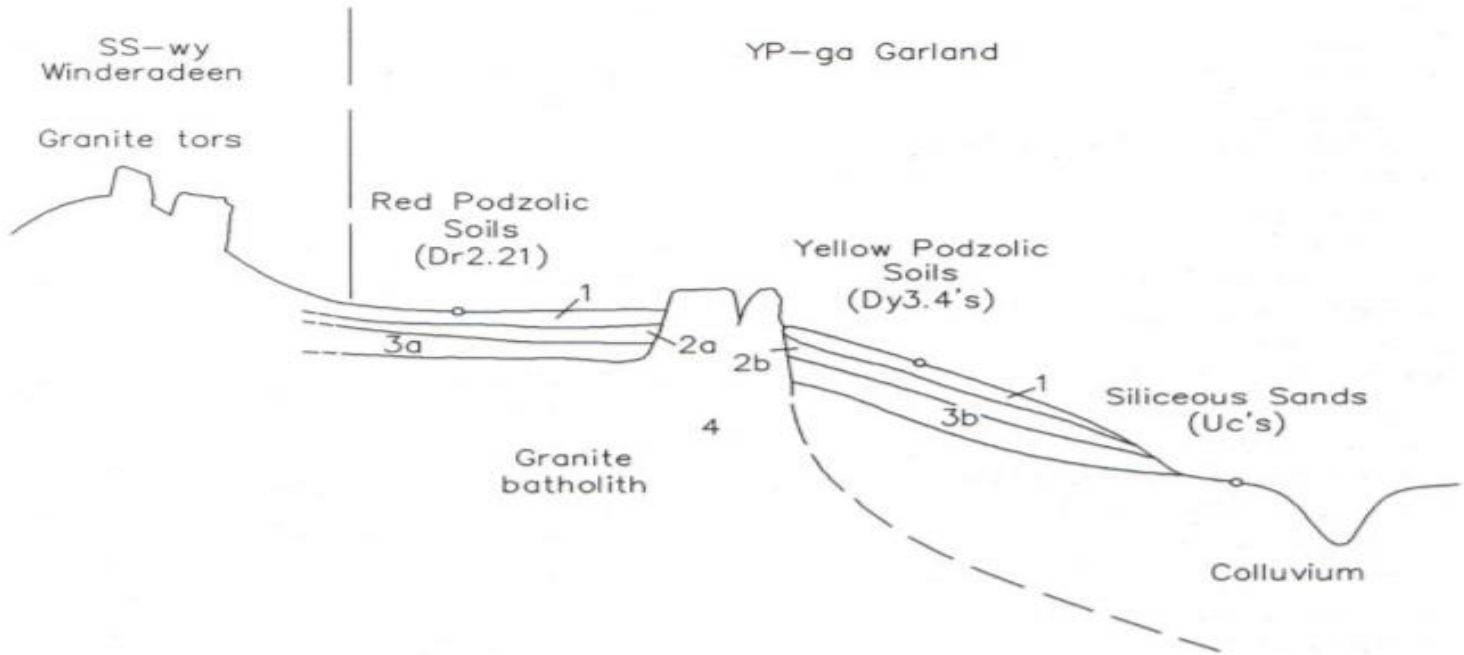

Annual mean temperature degrees C
16.5
16
15.5
15
14.5
14
13.5
13
12.5
12
1955 to 2018
2000 to 2018
2030


Historical and 2030 rainfall
1350
1250
1150
1050
950
850
750
650
550
450
350
250
1
MM
1955 to 2018
2000 to2018
2030

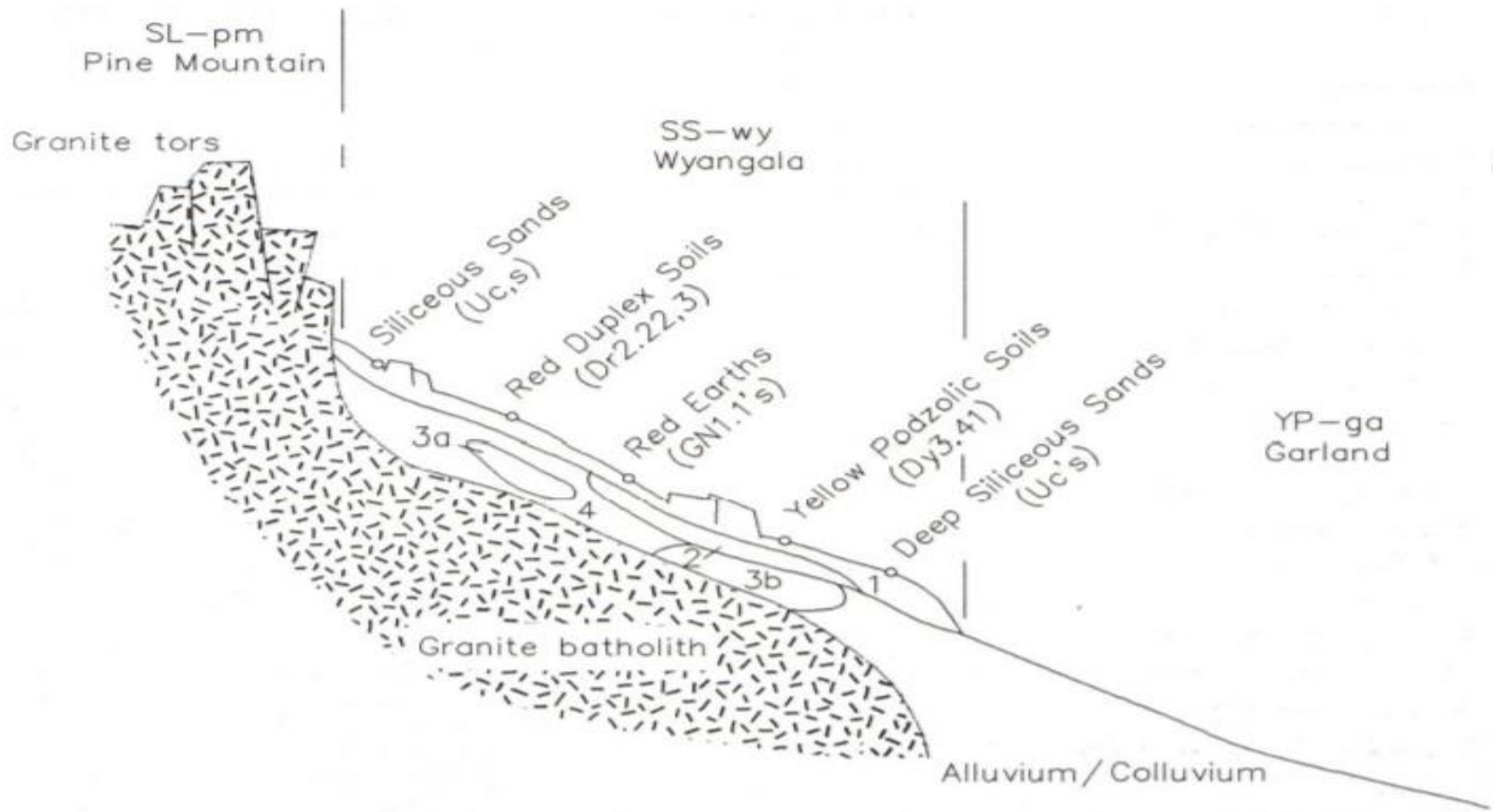
CLIMATIC ZONE: 3C, 3D, 10A and 10B.

Annual average rainfall generally exceeds 650 mm. May be summer or winter dominant. Summers are hot and winters mild to cold.

YP – ga GARLAND SOIL LANDSCAPE

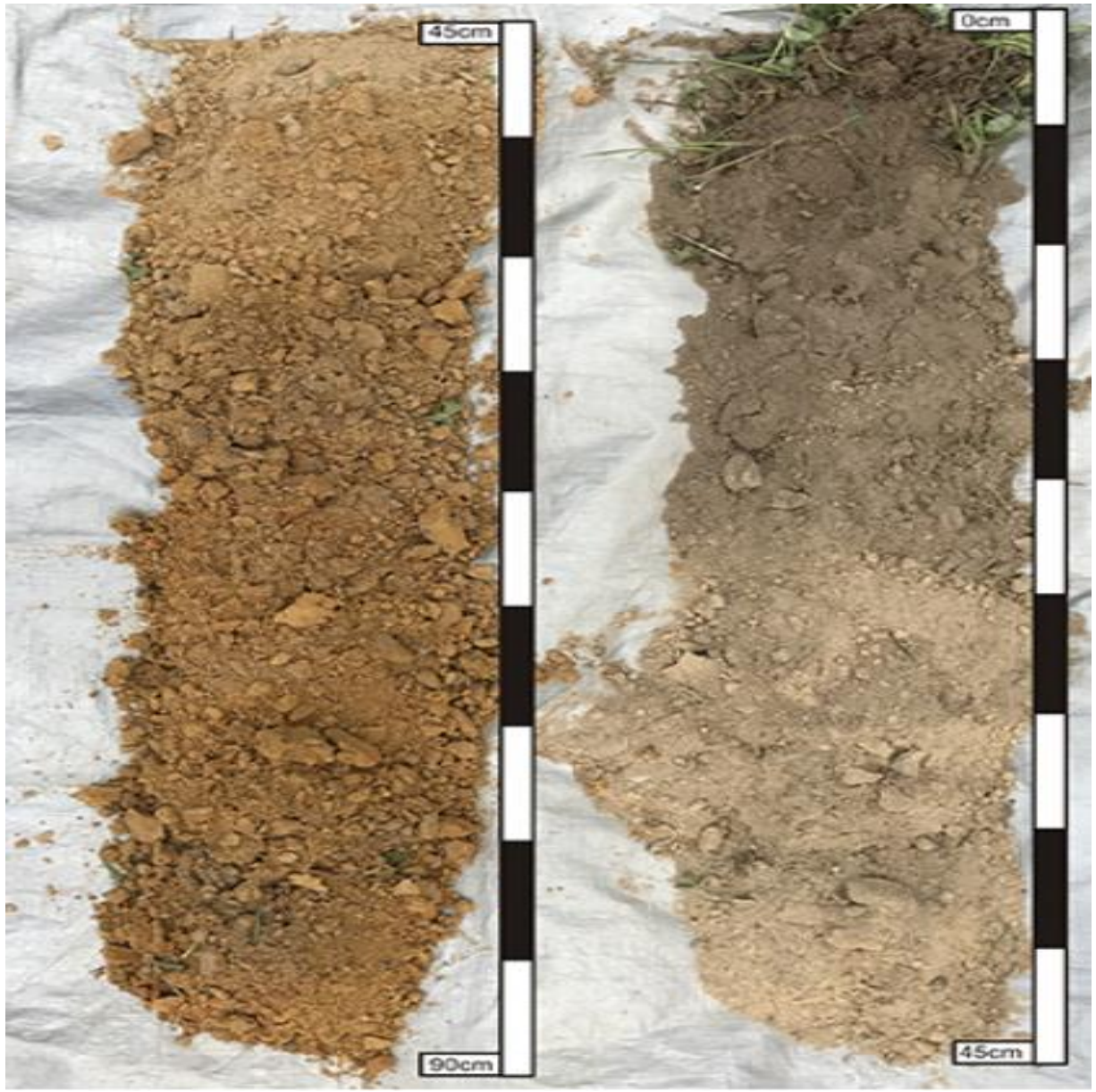


SS – wy WYANGALA SOIL LANDSCAPE

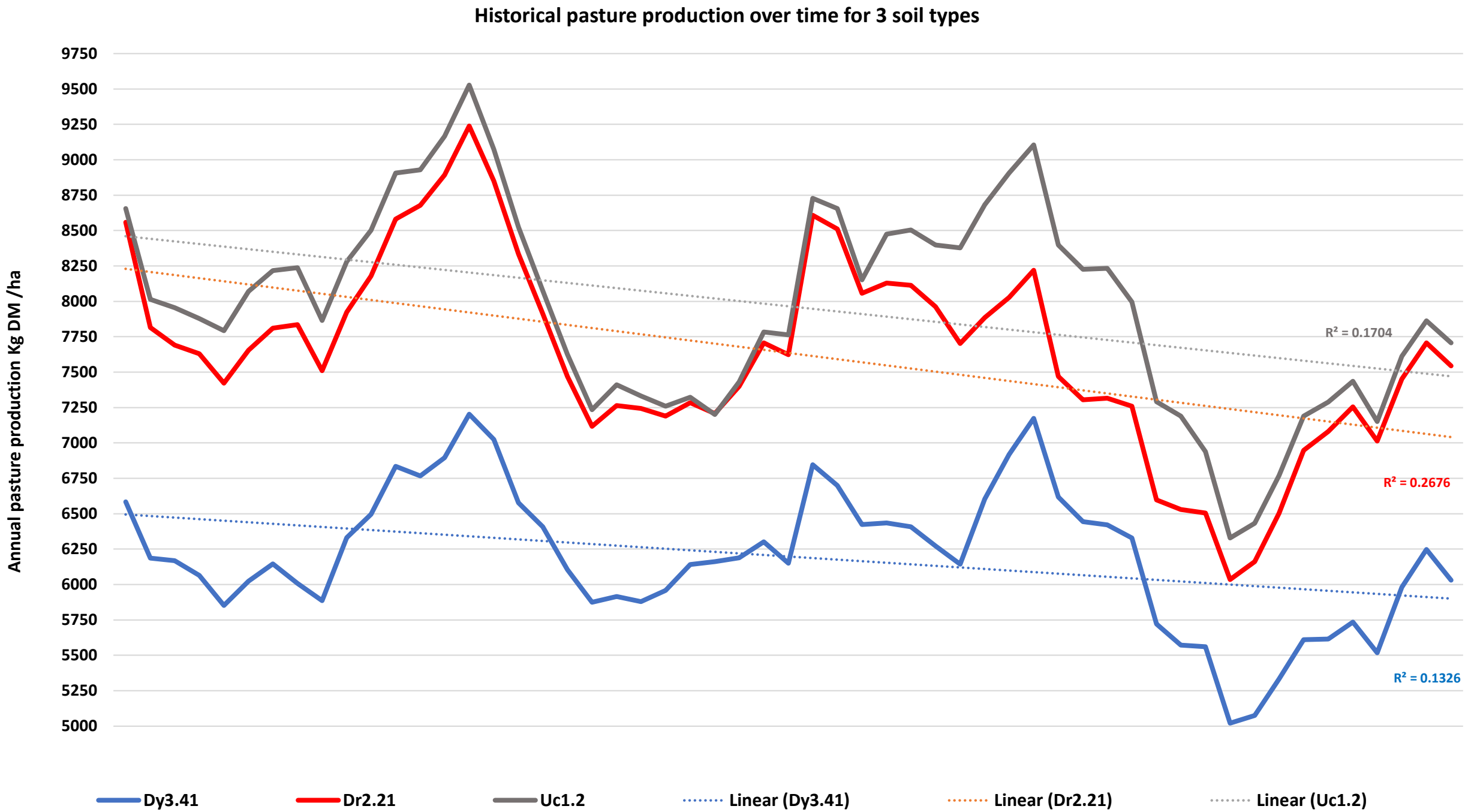


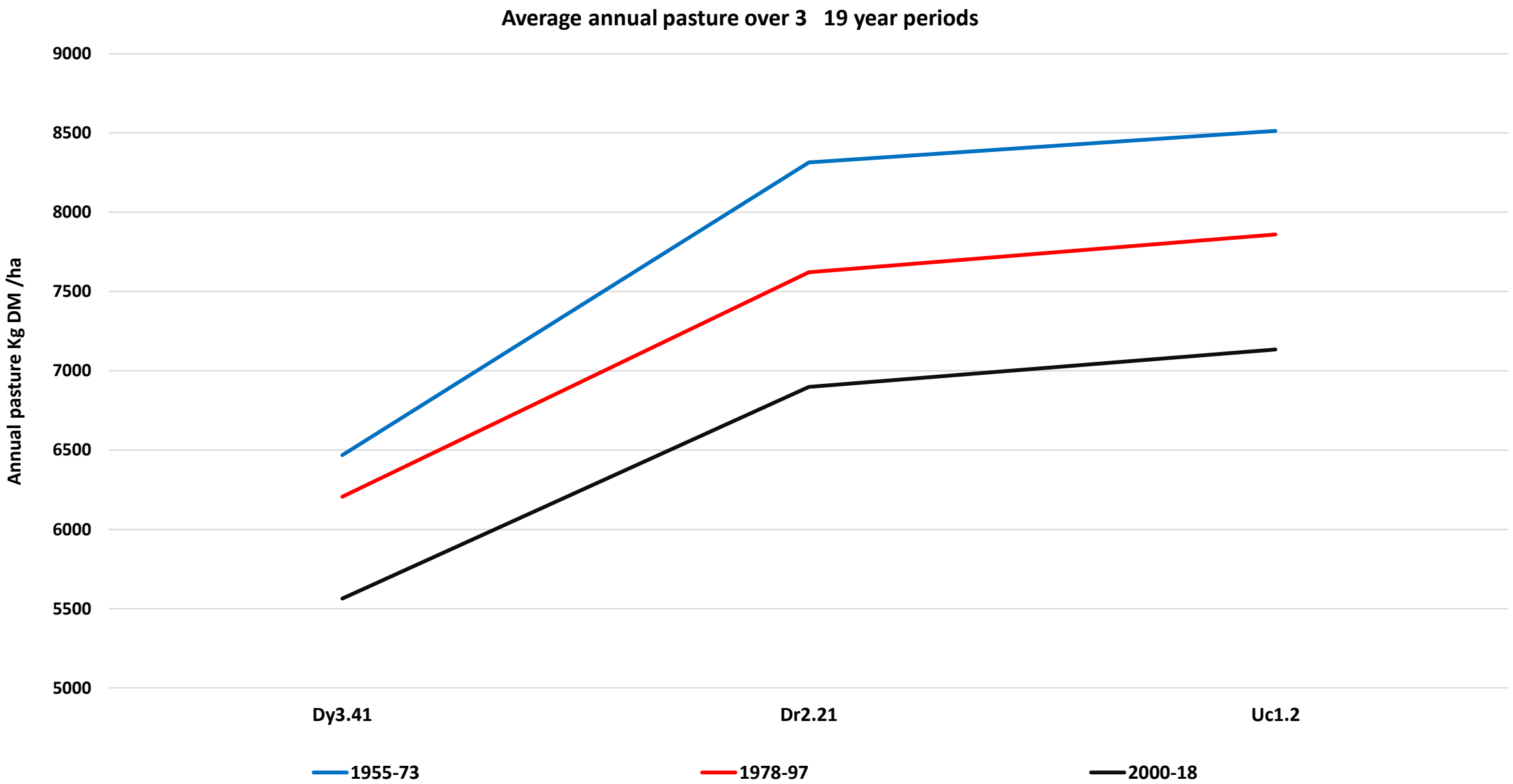
1. Loamy sand
2. Bleached clayey sand
3a. Red structured sandy clay
3b. Yellow–grey mottled clay

Dy



Dr


Historical pasture production over time for 3 soil types
Annual pasture production Kg DM /ha
9750
9500
9250
9000
8750
8500
8250
8000
7750
7500
7250
7000
6750
6500
6250
6000
5750
5500
5250
5000
R² = 0.1704
R² = 0.2676
R² = 0.1326
Dy3.41
Dr2.21
Uc1.2
Linear (Dy3.41)
Linear (Dr2.21)
Linear (Uc1.2)


Average annual pasture over 3 19 year periods
Annual pasture Kg DM /ha
9000
8500
8000
7500
7000
6500
6000
5500
5000
Dy3.41
Dr2.21
Uc1.2
1955-73
1978-97
2000-18

Native grass
Sub clover
Annual grass

pasture climate

1955 to 2018
30 yrs at 2030

GrassGro

3 soils

soil

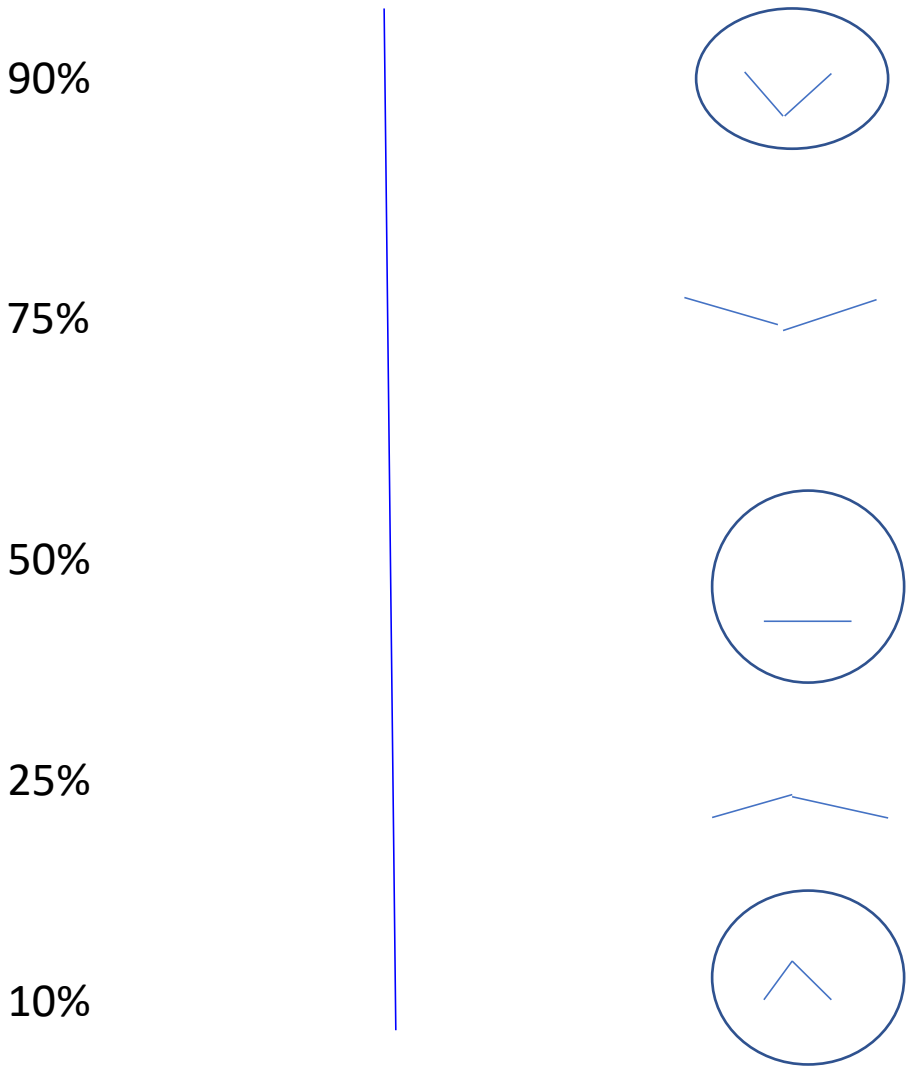
livestock

Merino

CO_2 fertilisation

- The model takes CO_2 fertilisation into account in working out pasture production.
- Levels used 380 ppm for history and 440 ppm for 2030, currently 415 ppm.
- With higher levels of CO_2 the stomates under the leaf do not have to open as much to capture CO_2 therefore there is a lower loss of water from the leaf.
- This does have a noticeable impact on pasture production and stocking rate. It only benefits C3 plants not the C4 summer growing species.

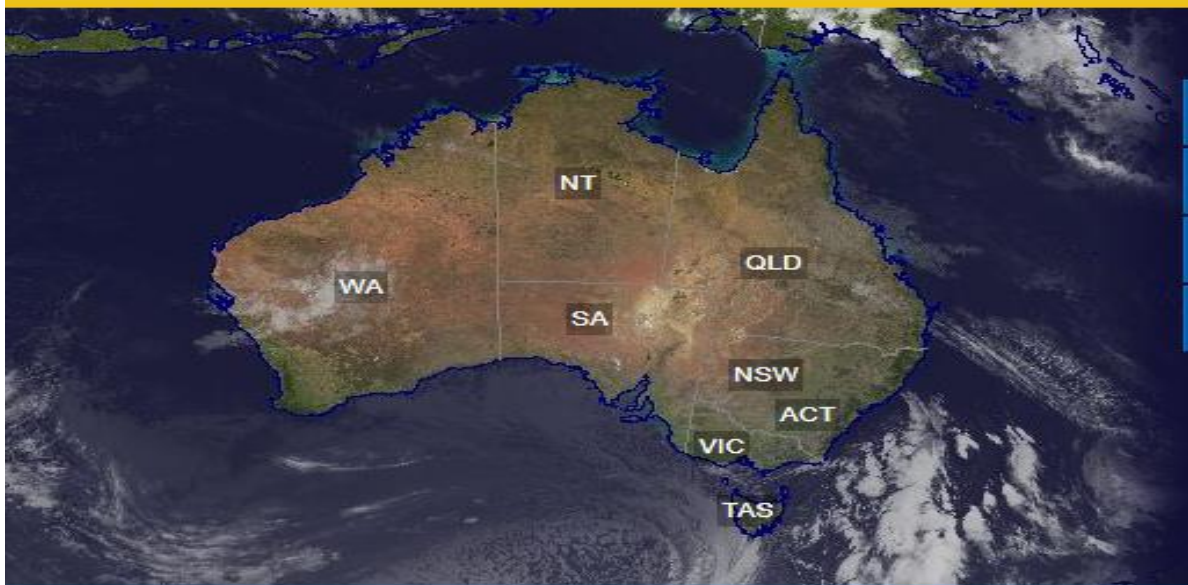
What do the % mean?



Warnings current

NSW | VIC | QLD | WA | SA | TAS | ACT | NT

Warning services



- Rain radars
- Satellite images
- Weather maps
- MetEye

Forecast for Tuesday 28 May

City observations

Sydney	Melbourne	Brisbane	Perth	Adelaide	Hobart	Canberra	Darwin
Now	Now	Now	Now	Now	Now	Now	Now
12.3°	10.3°	22.4°	18.6°	12.6°	9.0°	5.9°	27.2°
WNW 26km/h	W 7km/h	W 13km/h	E 7km/h	WSW 11km/h	WSW 15km/h	WNW 33km/h	N 7km/h
9° 19°	9° 16°	10° 22°	10° 24°	11° 17°	6° 11°	3° 10°	21° 32°
Sunny.	Few showers developing.	Sunny.	Sunny.	Showers.	Showers.	Shower or two developing. Windy.	Sunny.
0.0mm rain since 9am in Sydney.	0.2mm rain since 9am in Melbourne.	0.0mm rain since 9am in Brisbane.	0.0mm rain since 9am in Perth.	0.0mm rain since 9am in Adelaide.	0.0mm rain since 9am in Hobart.	0.4mm rain since 9am in Canberra.	0.0mm rain since 9am in Darwin.

e environment™

FAQ | MetEye Disclaimer | Metadata

TEXT VIEWS

Australia

Holbrook, NSW | Locate | Find me | Time zone AEST

Monday, 27 May 2019 | Tue | Wed | Thu | Fri | Sat | Sun | Mon

Forecast for Holbrook

See text views for location

Save location

	Mon. 27 May	Tue. 28 May	Wed. 29 May	Thu. 30 May	Fri. 31 May	Sat. 1 Jun	Sun. 2 Jun
Max (°C)	11	12	11	13	16	17	17
Min (°C)	–	2	6	1	1	1	2
Chance of rain (%)	–	95	95	5	5	0	10
Rainfall range (mm)	–	6 to 10	5 to 10	0	0	0	0
Issued 27 May 2019	Detail	Detail	Detail	Detail	Detail	Detail	Detail

Holbrook Weather (beta)

MAP VIEW
MetEye

View the current warnings for New South Wales

Change location | Start typing, then select from list (town, city, postcode or lat/lon) | Locate | Find Me

9.1 °C

Lowest	Highest
9.1 °C	11 °C
7:20 pm	3:27 pm

0 mm
of rain since 9 am

Latest weather at 7:20pm

WNW	Wind Direction
1014.1	Pressure (hPa)
19 km/h *10 knots*	Wind Speed
54 km/h *29 knots*	Highest Gust (12:55pm)

WEATHER STATION

Albury
Approx. 54.1 km away

ID: 95896

ALL WEATHER STATIONS

Forecast

issued at 5:44 pm AEST on Monday 27 May 2019.

Rest of Monday — 11 °C

When will it rain?

	Possible rainfall	Chance of any rain
7:00 pm - 10:00 pm	0 mm	0%
10:00 pm - 1:00 am	0 mm	0%
1:00 am - 4:00 am	0 mm	0%
4:00 am - 7:00 am	0 mm	10%
7:00 am - 10:00 am	0 - 0.4 mm	30%
10:00 am - 1:00 pm	0.2 - 1 mm	50%

Tue 28 May — 2 °C — 12 °C
Possible rainfall: 6 to 10 mm — Chance of any rain: 95%

Wed 29 May — 6 °C — 11 °C
Possible rainfall: 5 to 10 mm — Chance of any rain: 95%

Thu 30 May — 1 °C — 13 °C

WEATHER OVERVIEW
DETAILED 3-HOURLY FORECAST
EXTENDED FORECAST (7-DAY)
CURRENT AND PAST WEATHER

RADAR

Tuesday 28 May

Rainfall

From	1:00 AM	4:00 AM	7:00 AM	10:00 AM	1:00 PM	4:00 PM	7:00 PM	10:00 PM
50% chance of more than (mm)	0	0	0	0.2	0	0.2	0.4	0.6
25% chance of more than (mm)	0	0	0.4	1	0.6	2	2	2
10% chance of more than (mm)	0	0.4	2	3	2	4	5	5
Chance of any rain	0%	10%	30%	50%	40%	60%	60%	70%

Temperatures

At	1:00 AM	4:00 AM	7:00 AM	10:00 AM	1:00 PM	4:00 PM	7:00 PM	10:00 PM
Air temperature (°C)	4	2	3	8	10	12	9	9
Feels like (°C)	0	-1	-1	3	5	5	3	3
Dew point temperature (°C)	3	2	3	5	7	7	7	8

UV

At	1:00 AM	4:00 AM	7:00 AM	10:00 AM	1:00 PM	4:00 PM	7:00 PM	10:00 PM
UV Index	0	0	0	1	2	1	0	0

Significant Weather

From	1:00 AM	4:00 AM	7:00 AM	10:00 AM	1:00 PM	4:00 PM	7:00 PM	10:00 PM
Thunderstorms	○	○	○	○	○	○	○	○
Snow	○	○	○	○	○	○	○	○
Rain	○	●	●	●	●	●	●	●
Fog	○	○	○	○	○	○	○	○
Frost	○	○	○	○	○	○	○	○

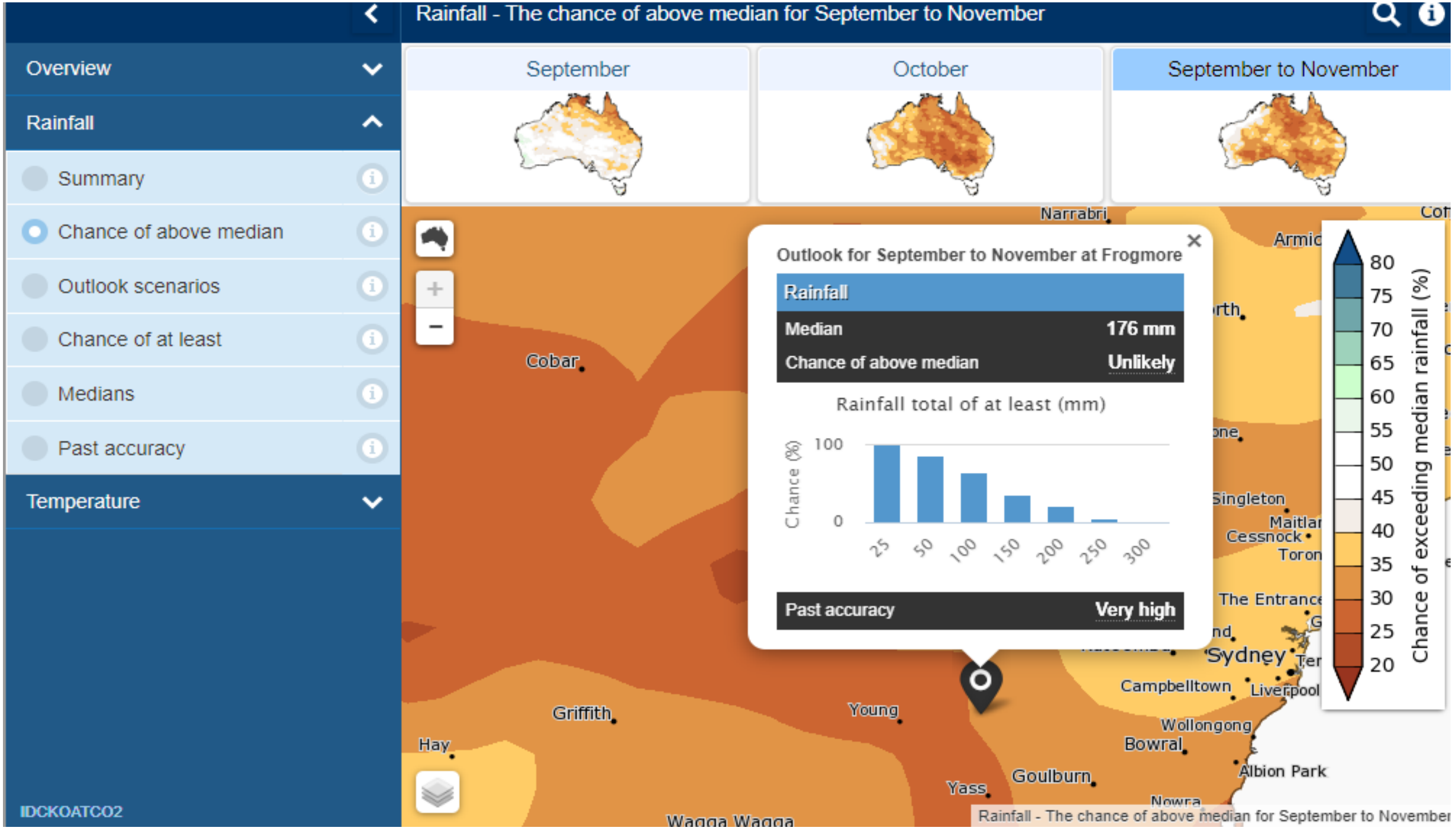
Humidity & Wind

At	1:00 AM	4:00 AM	7:00 AM	10:00 AM	1:00 PM	4:00 PM	7:00 PM	10:00 PM
Wind speed km/h *knots*	11 *6*	7 *4*	9 *5*	17 *9*	22 *12*	30 *16*	28 *15*	28 *15*
Wind direction	W	NNW	NNW	NNW	NW	NW	NW	NW
Relative humidity (%)	93	100	100	82	78	74	93	89
Forest fuel dryness factor	4.2	4.2	4.2	7.3	7.3	7.3	7.3	7.3
Mixing height (m)	300	300	307	1025	1264	1446	365	697

Wednesday 29 May

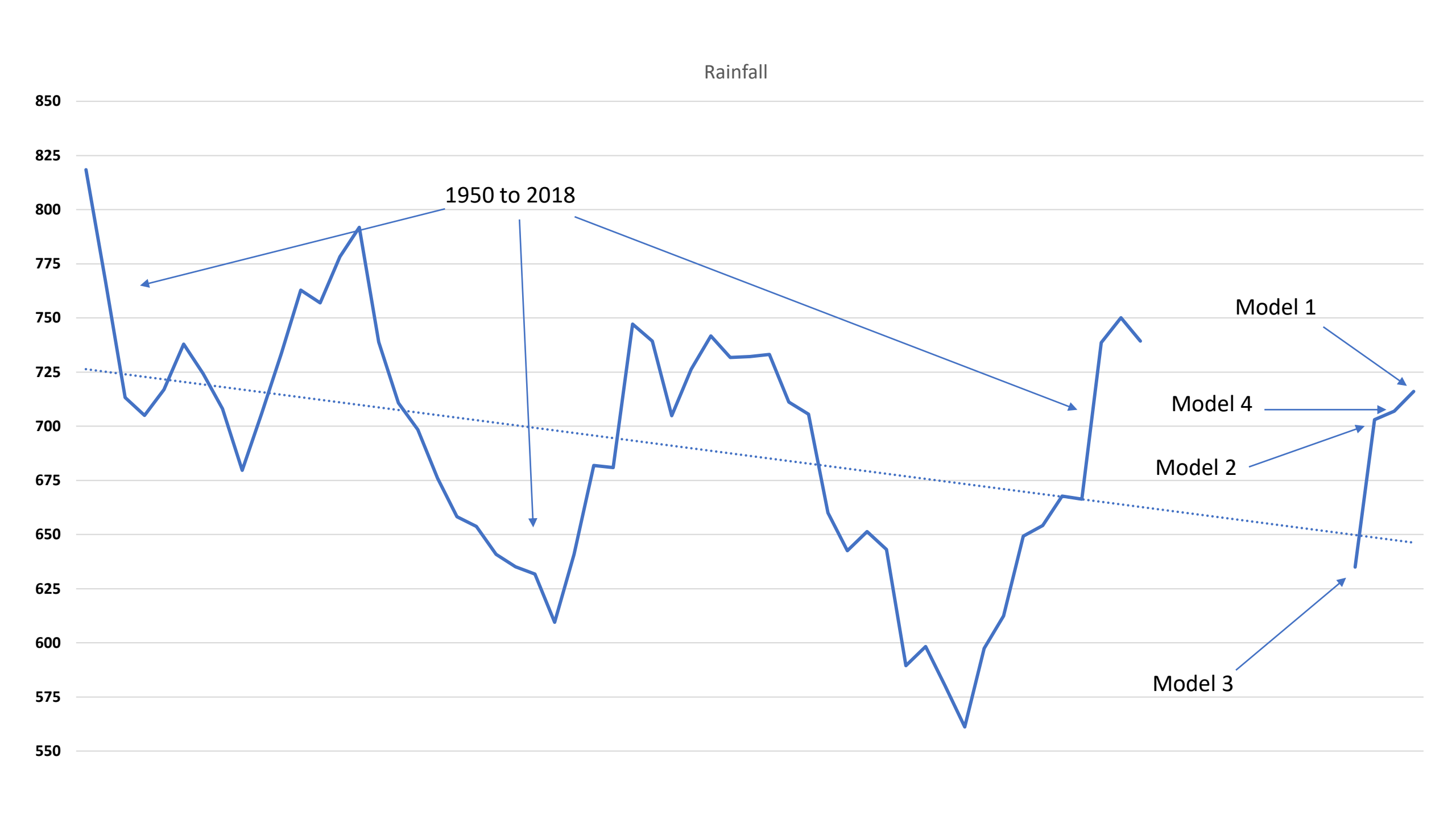
Thursday 30 May

Friday 31 May


Rainfall - The chance of above median for September to November
Overview
Rainfall
Summary
Chance of above median
Outlook scenarios
Chance of at least
Medians
Past accuracy
Temperature
IDCKOATCO2
September
October
September to November
Outlook for September to November at Frogmore
Rainfall
Median 176 mm
Chance of above median Unlikely
Rainfall total of at least (mm)
Chance (%)
100
0
25
50
100
150
200
250
300
Past accuracy Very high
Chance of exceeding median rainfall (%)
80
75
70
65
60
55
50
45
40
35
30
25
20
Narrabri
Cobar
Griffith
Young
Hay
Wagga Wagga
Singleton
Cessnock
The Entrance
Sydney
Campbelltown
Liverpool
Wollongong
Bowral
Albion Park
Goulburn
Yass
Nowra
Rainfall - The chance of above median for September to November

Comparison of rainfall and mean temperature history vs 2030

	Annual rainfall MM	Mean temperature deg C
base		
1955 to 2018	**706**	**13.31**
1989 to 2018	**674**	**13.57**
2030 – 1	**716**	**14.38**
2030 – 2	**703**	**14.47**
2030 – 3	**635**	**14.69**
2030 - 4	**707**	**14.37**


Rainfall
850
825
800
775
750
725
700
675
650
625
600
575
550
1950 to 2018
Model 1
Model 4
Model 2
Model 3

Do changes in temperature and rainfall tell us the whole story?

	Annual rainfall MM	Mean temperature deg C	Annual pasture Production kg dm/ha	Annual dse /ha at the same GC rule
2030 – 1	**716**	**14.38**	**8157**	**13.5**
2030 – 2	**703**	**14.47**	**8291**	**11.3**
2030 – 3	**635**	**14.69**	**6823**	**10.3**
2030 - 4	**707**	**14.37**	**8267**	**12.2**

Dy 3.14 – yellow podzolic

	Profit $/ha	Annual pasture kg dm/ha	DSE/ha
Base	**57**	**6204**	**5.9**
Model 1	133	6322	7.1
Model 2	59	6494	6.3
Model 3	**41**	**5533**	**5.4**
Model 4	120	6679	7.2

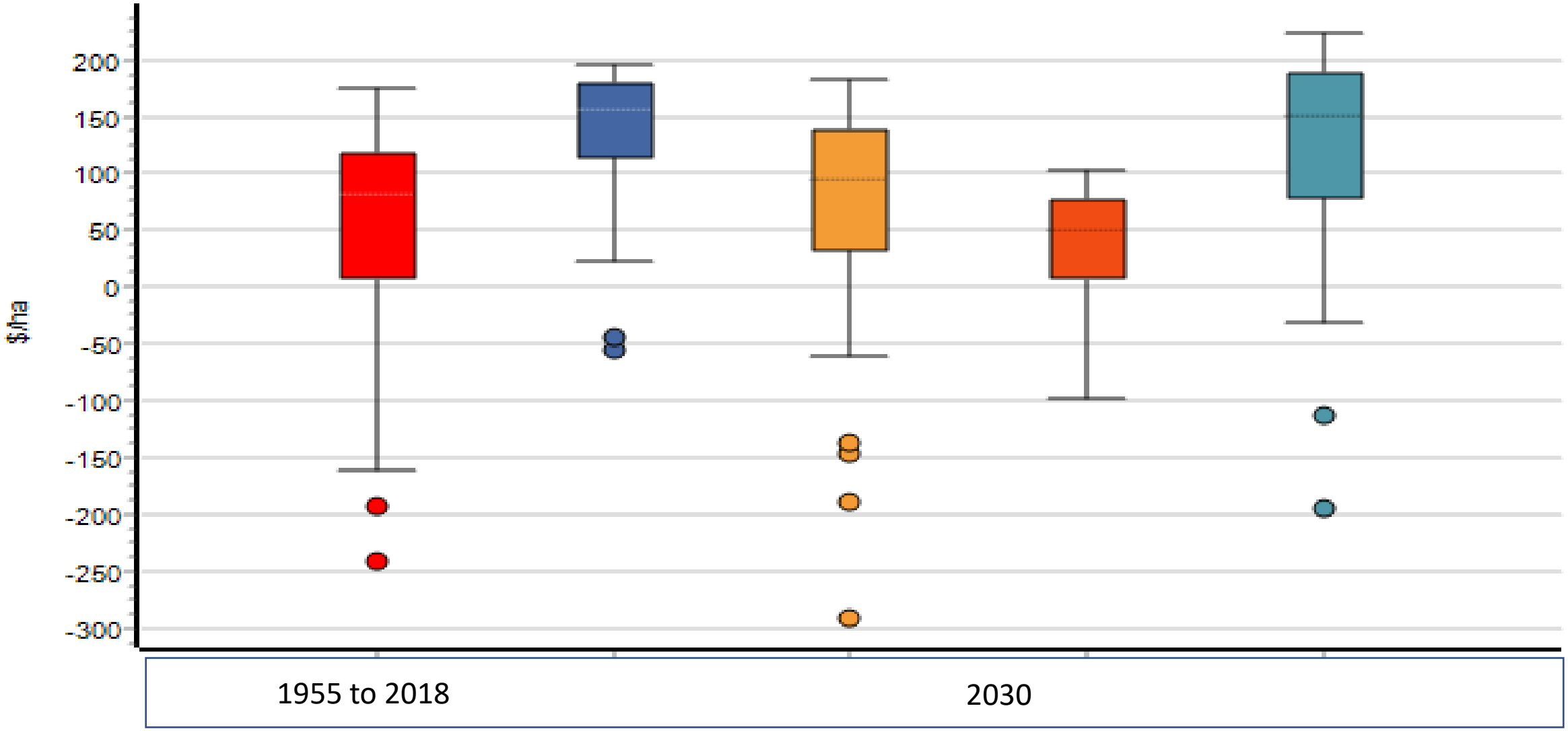
Dr 2.12 – red podzolic

	Profit $/ha	Annual pasture kg dm/ha	DSE/ha
Base	**305**	**7684**	**11.1**
Model 1	430	8157	13.5
Model 2	**279**	8291	11.3
Model 3	**270**	**6823**	**10.3**
Model 4	350	8267	12.2

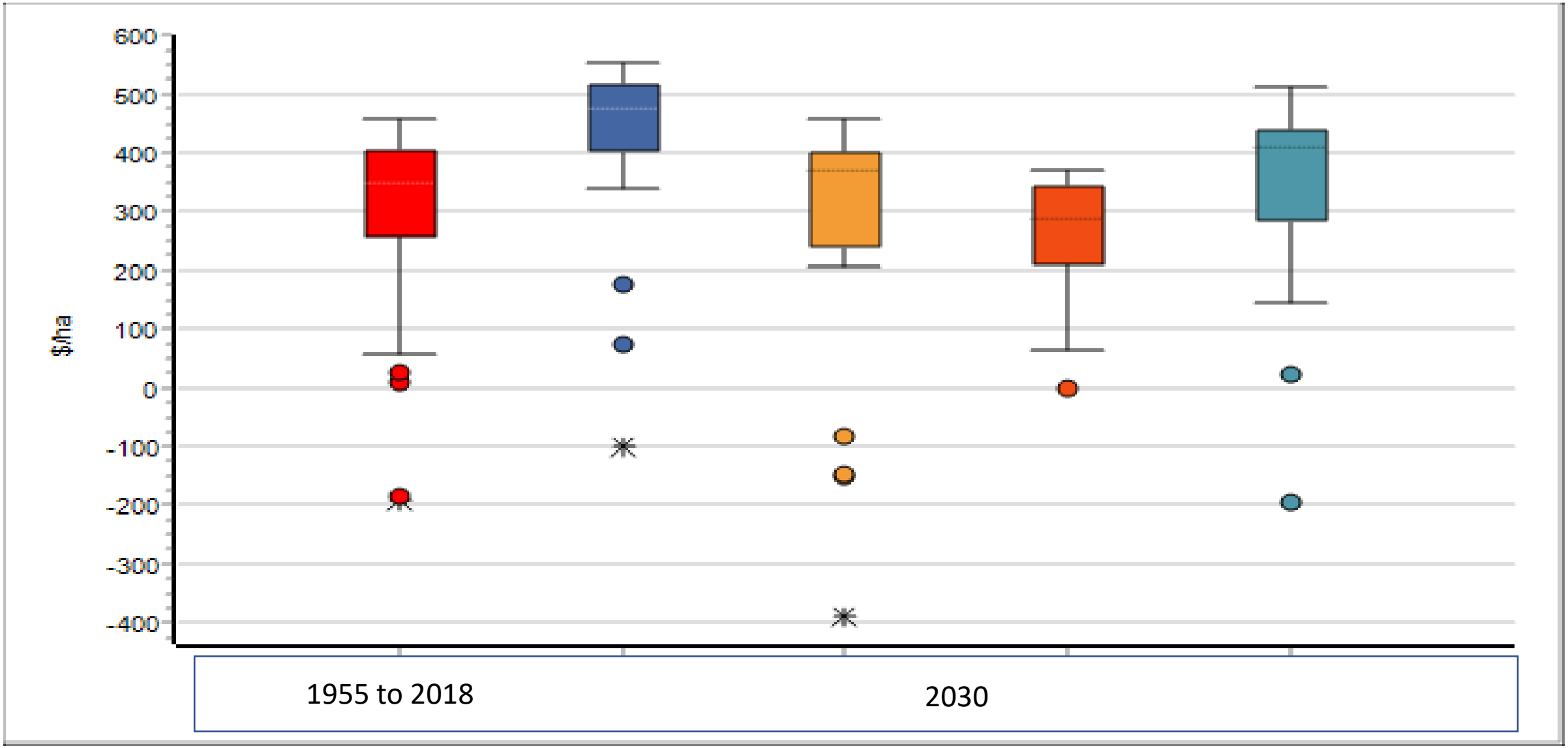
Uc 1.2 –uniform course textured sands

	Profit $/ha	Annual pasture kg dm/ha	DSE/ha
Base	**330**	**7971**	**11.6**
Model 1	426	8519	13.2
Model 2	**311**	8509	11.9
Model 3	**284**	**7023**	**10.5**
Model 4	376	8416	12.8

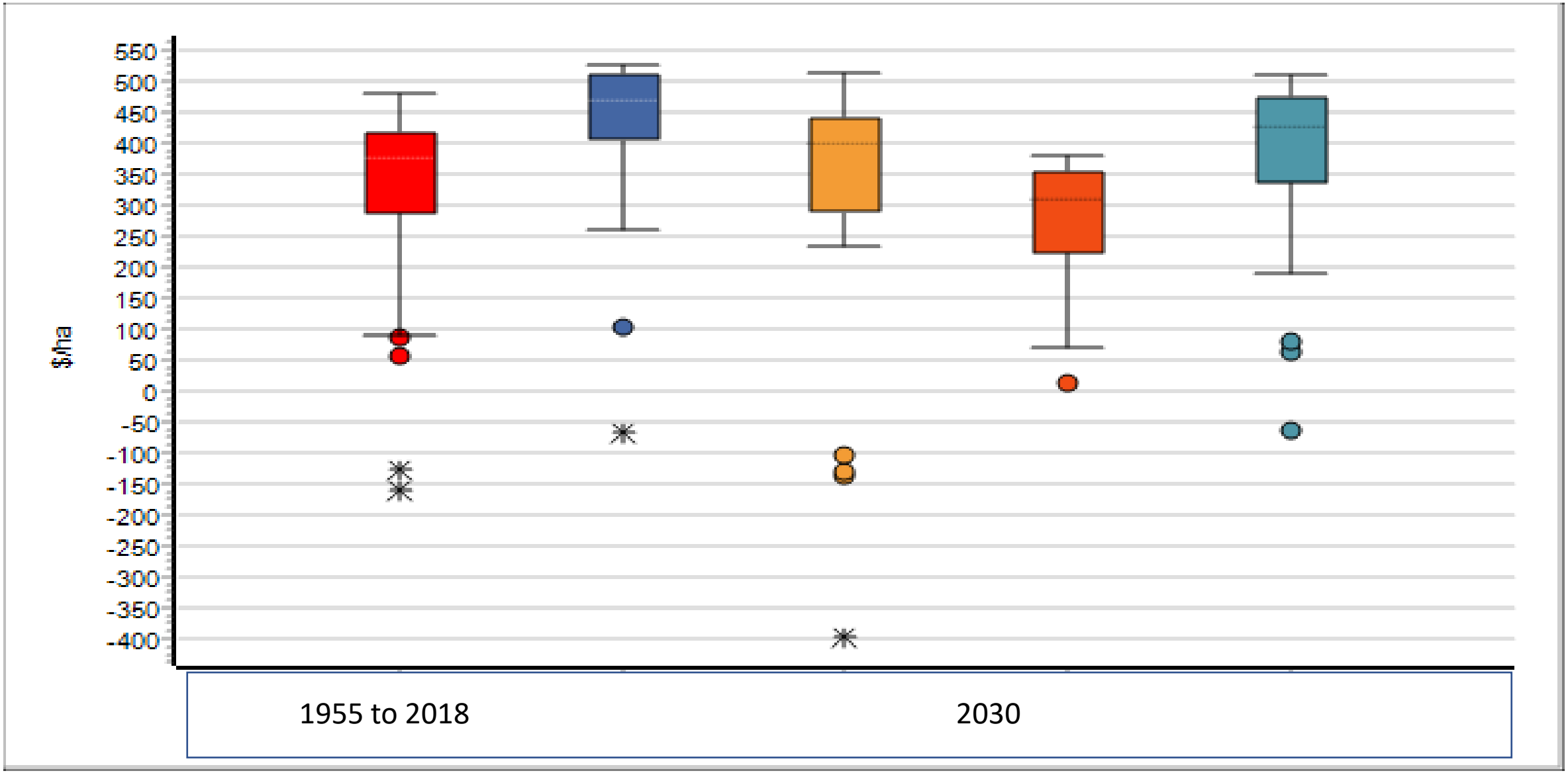
Dy 3.41 –profit $/ha



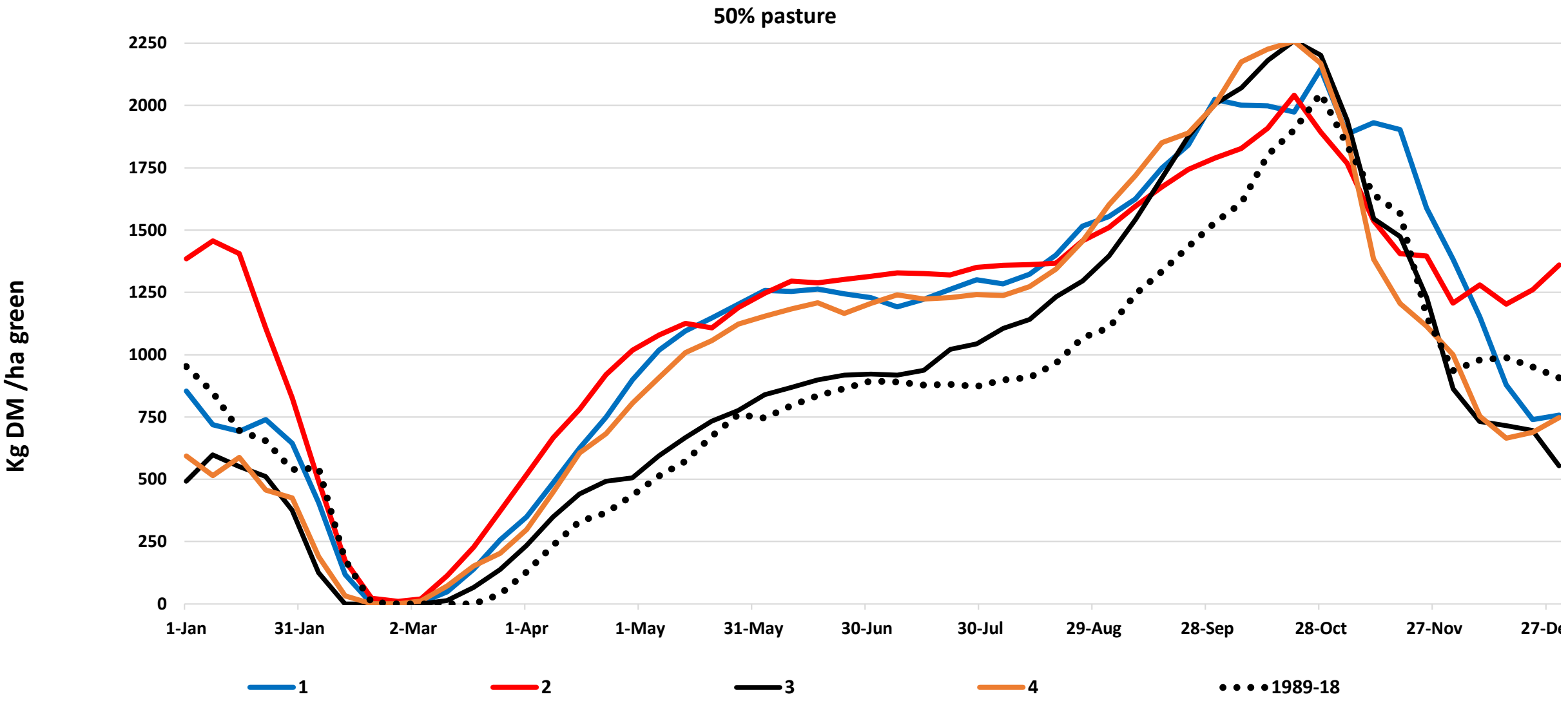
Dr 2.21 – profit $/ha



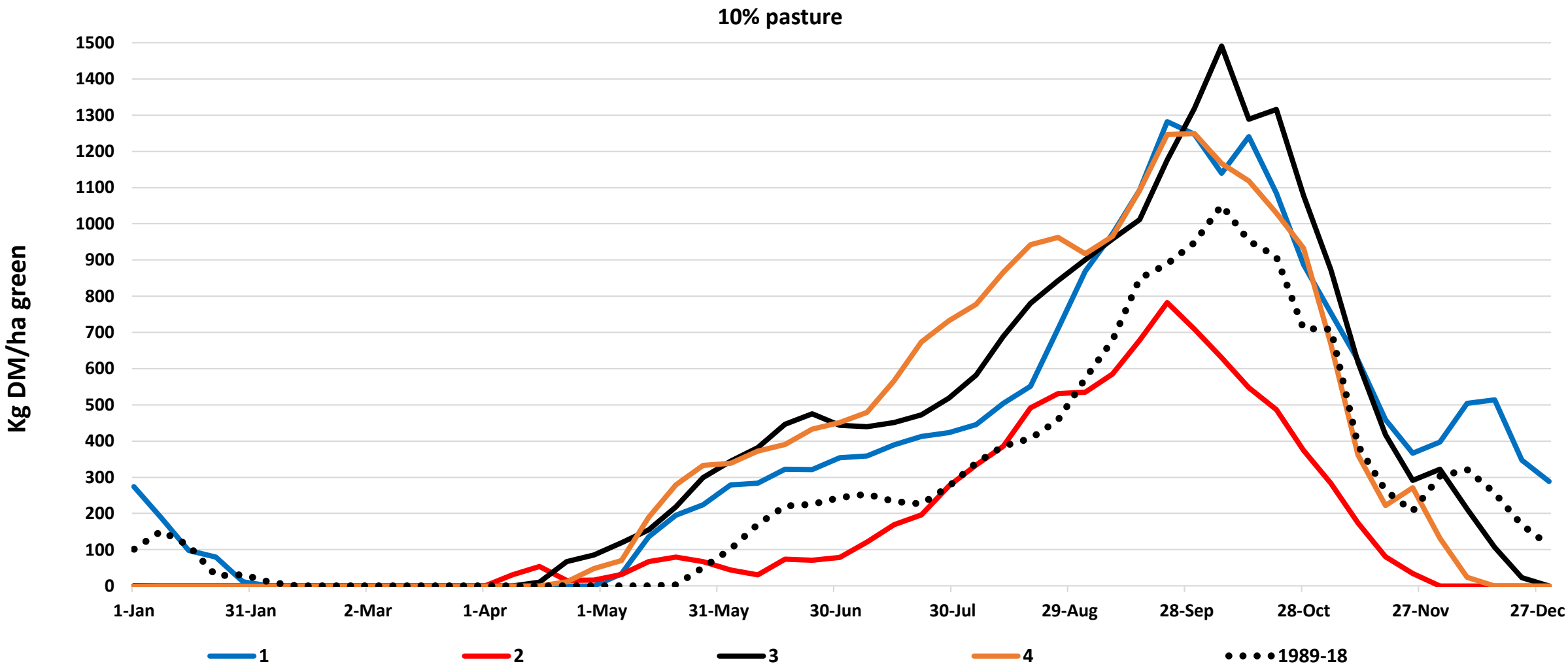
Uc 1.2 – profit $/ha

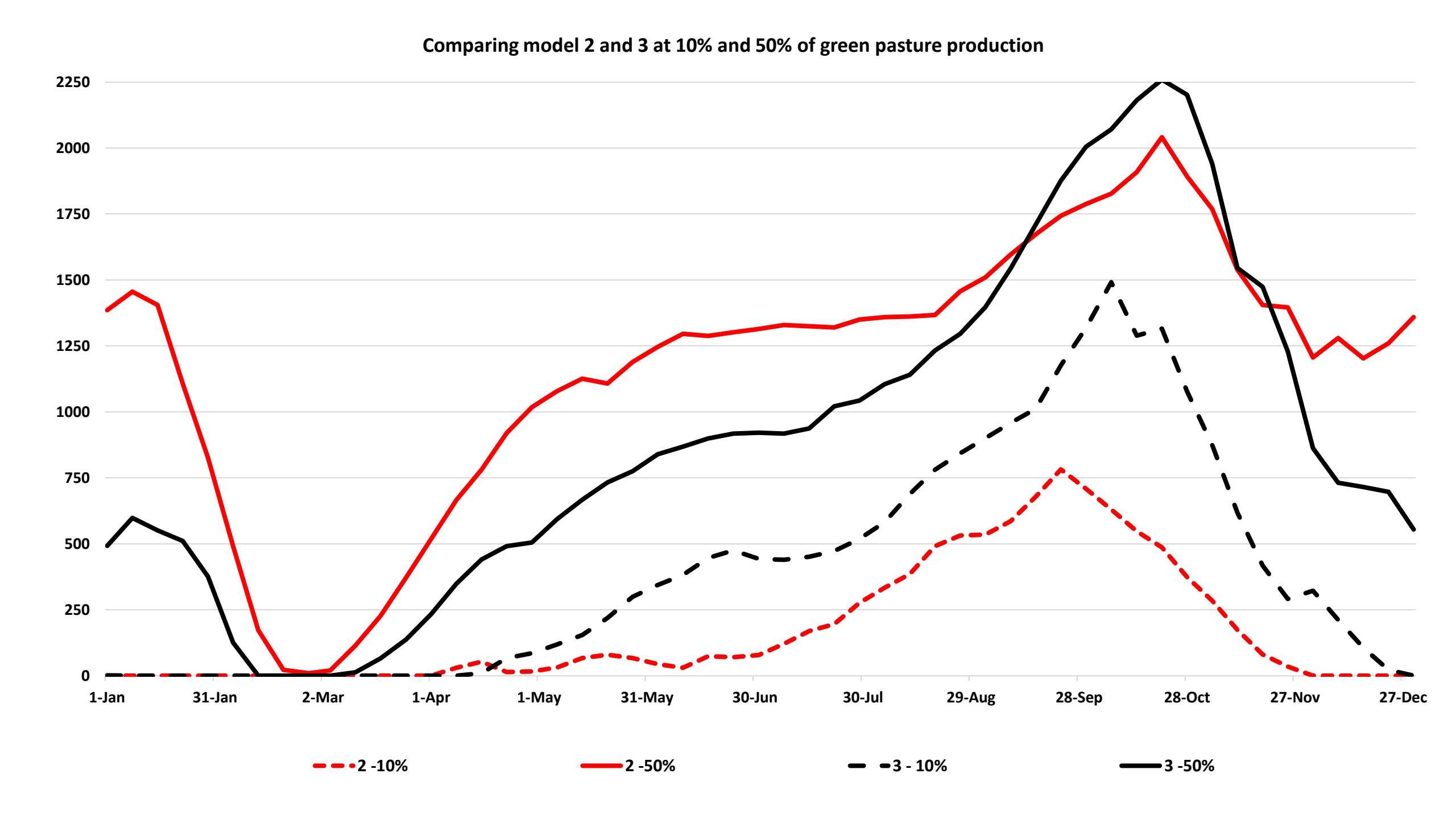


Green pasture – 2030 vs 1989-18 - at 50% level



Green pasture – 2030 vs 1989-18 - at 10% level




Comparing model 2 and 3 at 10% and 50% of green pasture production
2250
2000
1750
1500
1250
1000
750
500
250
0
1-Jan
31-Jan
2-Mar
1-Apr
1-May
31-May
30-Jun
30-Jul
29-Aug
28-Sep
28-Oct
27-Nov
27-Dec
2 -10%
2 -50%
3 - 10%
3 -50%

Uc 1.2 –uniform course textured sands

	Profit $/ha	Annual pasture kg dm/ha	DSE/ha
Base	**330**	**7971**	**11.6**
Model 1	426	8519	13.2
Model 2	**311**	8509	11.9
Model 3	**284**	**7023**	**10.5**
Model 4	376	8416	12.8

What does this work not cover?

- **Stock water** – in my view this is the greatest short term problem that the tablelands grazing industries have. The higher evaporation rates are rendering a lot of dams as unreliable.
- Need fewer deeper dams OR need to cover good dams. The cost to the business of destocking due to lack of stock water is substantial and would be greater then taking measures to improve water reliability.

What can I be doing?

- Protecting pastures and soils in dry events is critical. This can be achieved via containment areas or destocking. Each strategy has a different impact on the business which needs to be considered. It is the time of the impact that is the biggest difference.
- Build flexibility into your livestock system, so you can react to good or bad seasons.
- As the national herd and flock is getting smaller retaining a useful breeding structure will be important. As more producers want to trade a smaller pie the downside risks of trading will increase.

Summary

- The impact of 2030 climate on the livestock system is not as severe as most people expect. This is due to the small change in rainfall predicted.
- Note the impact of the driest model, 12% decrease in rainfall but app 50% reduction in profit. Small changes can have big impacts.
- These results are similar to other work done in the region – the tablelands.
- A key issue will be the way that major dry events are managed and the ability of the business to capture extra profits from the good years.
- Do not extend this outcome to other regions.

What information do we need?

- Producers and advisors need to be kept up to date with the potential path of the climate. The 4 models show different paths, what action we should take depends on which path is the future. I'm not seeing this work being done.
- A difference of 50 to 70 mm in long term rainfall could be substantial.
- All this data is based on work done around 2010.
- The number of locations that are recording weather data is dropping. Yass has stopped recording in August 2018, started rainfall in 1889. This is creating extra "noise" we can do without.