



Assessment of climate change projections for WA – new tools for adaptation

Ian Foster 25 February 2013



Overview

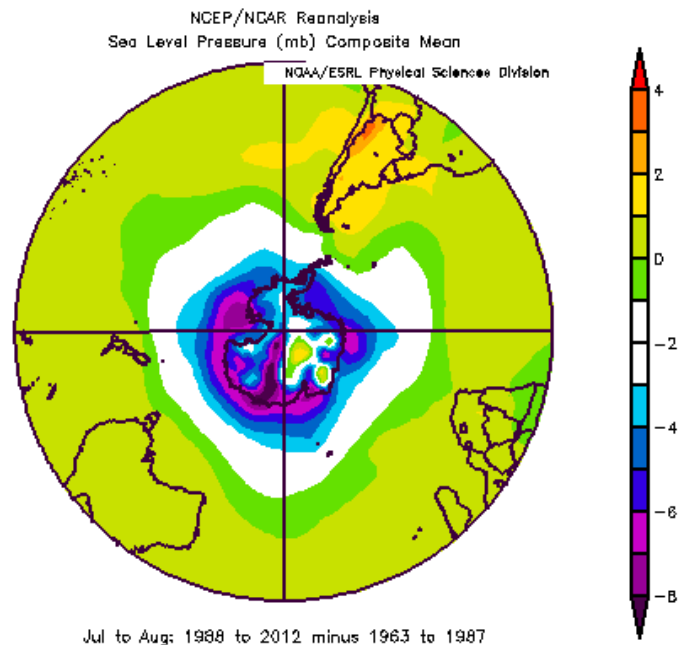
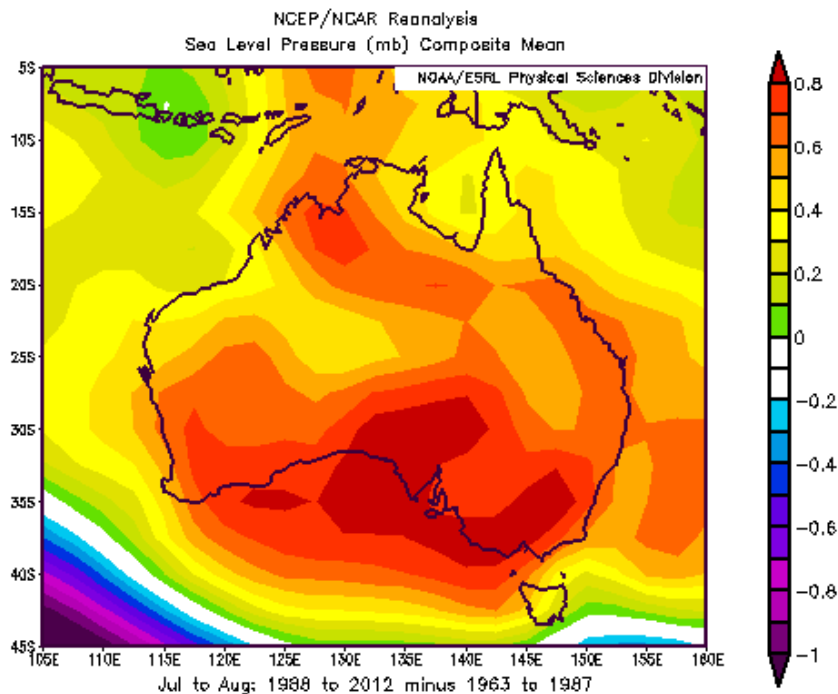
- Climate change projections for WA issued at Greenhouse 88 Conference in Perth.
- Assess the accuracy of those early projections by comparing them with the observed climate since then.
- New DAFWA weather stations to assist adaptation.

Greenhouse 88 Climate Projections

- Most likely scenario at 2040:
- Southward shift in winter rainfall systems
- Decreased winter (JJA) rain between 10% and 20%
- Increased summer rain (up to 40%).
- Winter temperature rise by 1.8 to 2.1 °C
- Summer up by 1.2 – 1.5 °C



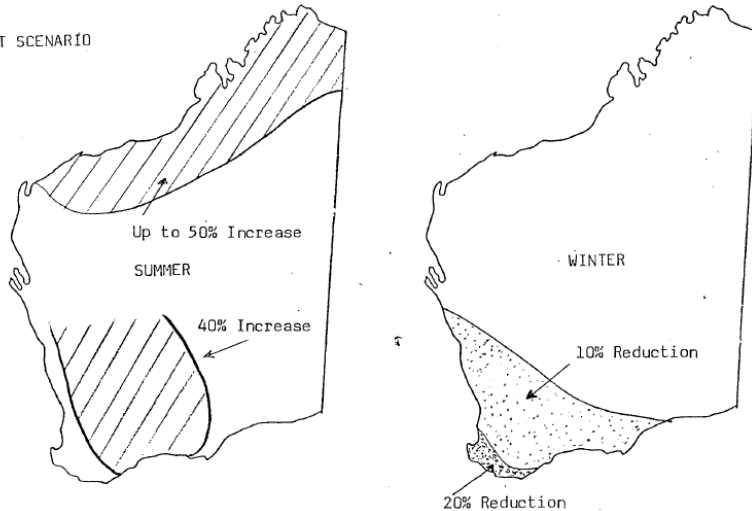
Pressure changes JJA



BoM Rain Projections at 2040

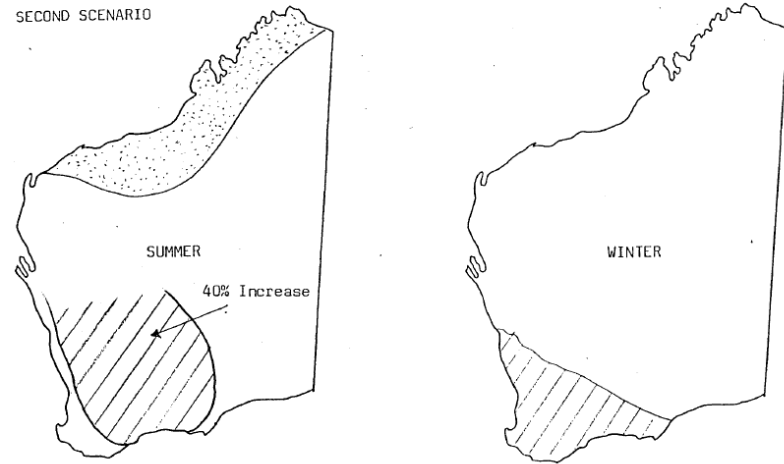
PRECIPITATION CHANGES IN WA FOR TWO GREENHOUSE SCENARIOS

FIRST SCENARIO



Increased Rainfall
Decreased Rainfall

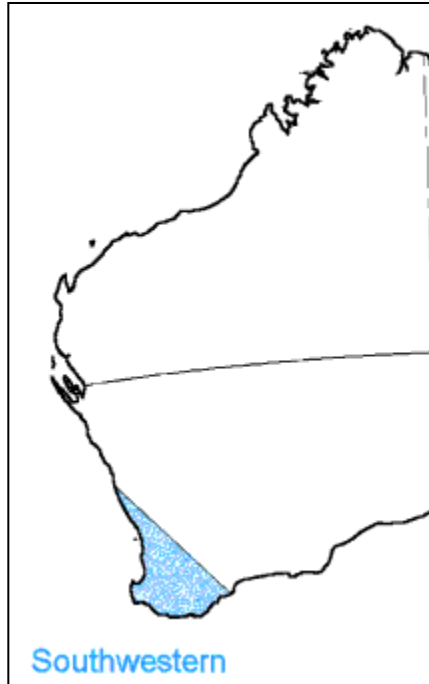
SECOND SCENARIO



Increased Rainfall
Decreased Rainfall

FIGURE 1

Study Area



Seasonal rainfall and temperatures were averaged over this region for the years 1988 to 2012.

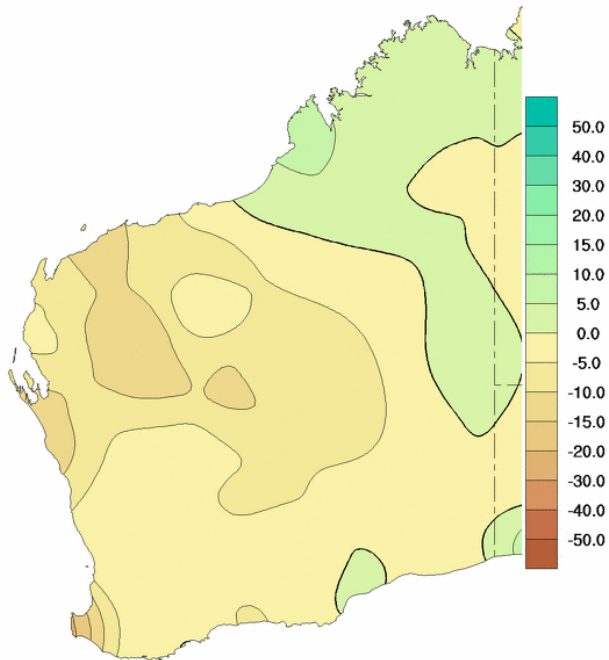
Source: BoM

Compare rainfall and temperatures as projected for that period with those observed.

Rainfall Changes 1970-2012

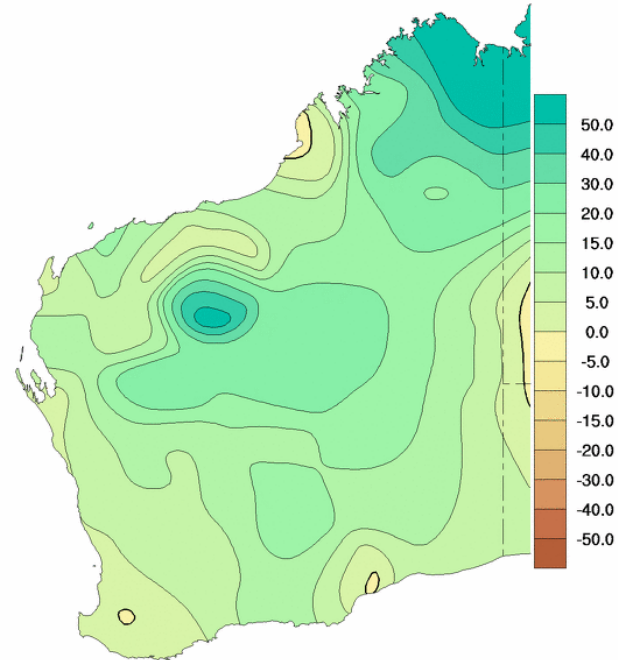
Trend in Winter Total Rainfall

1970-2012 (mm/10yr)

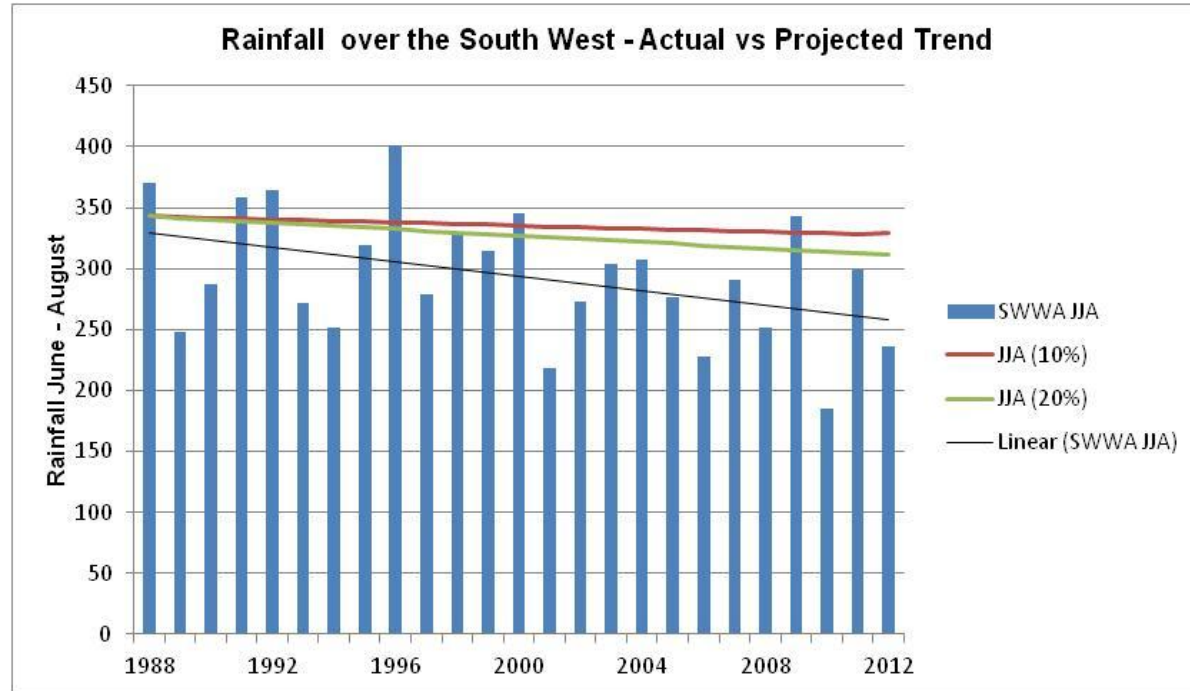


Trend in Summer Total Rainfall

1970-2012 (mm/10yr)



Winter Rainfall Changes SWWA 1988-2012



Summary of Climate Changes 1988 - 2012

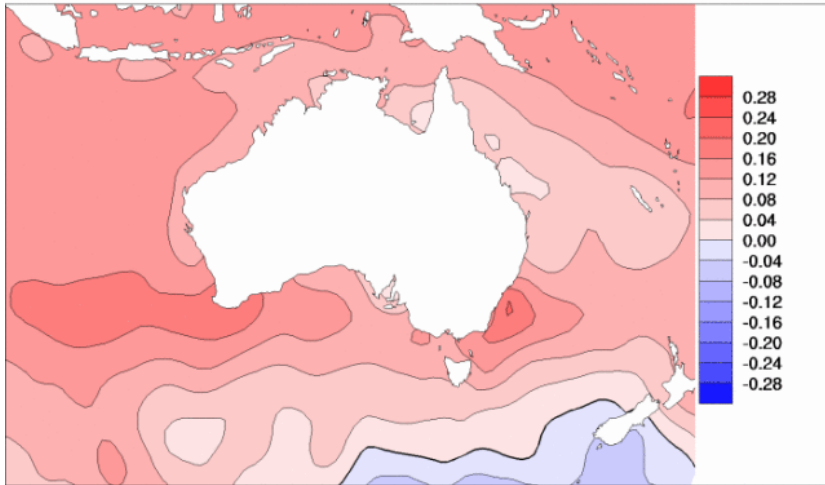
Changes at 2012	JJA	DJF
Projected rain	-6% to -9%	+19%
Actual rain	-15%	+6%
Projected temperature trend degrees/ decade	+0.3 to +0.4 deg C	+0.2 to +0.3 deg C
Actual temperature trend degrees/decade	+0.14 deg C	+0.03 deg C mixed pattern

Annual warming has been +0.18 degree/decade in that period. Difference 1988 to 2012 is +0.4 °C.

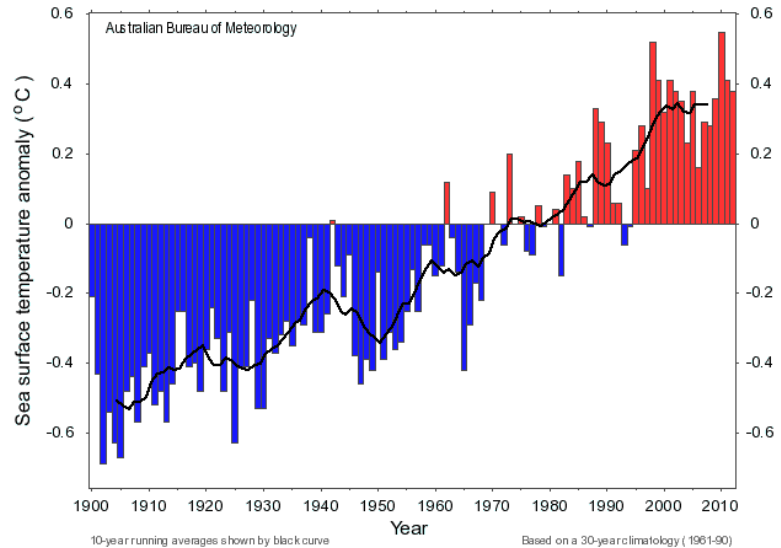


Sea Surface Temperatures

Trend in SST for the Australian Region ($^{\circ}\text{C}/10$ yrs) annual 1970-2012



Annual sea surface temperature anomaly - Australian Region (1900-2012)



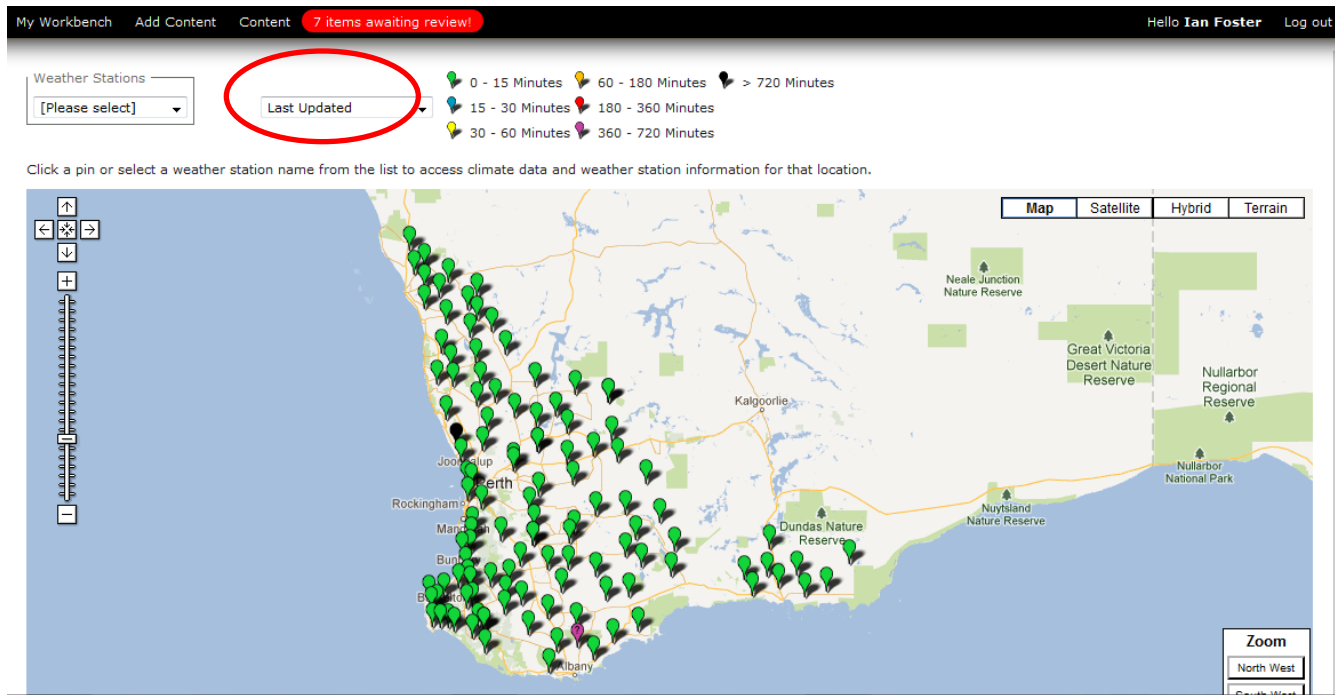
Weather Stations

- DAFWA has expanded its weather station network across the Wheatbelt and south west.
- These views are a sample from the new Oracle weather station database under development.
- The old web pages are still operating and show the new stations as well as the old stations.
- Accessible via

www.agric.wa.gov.au/weather

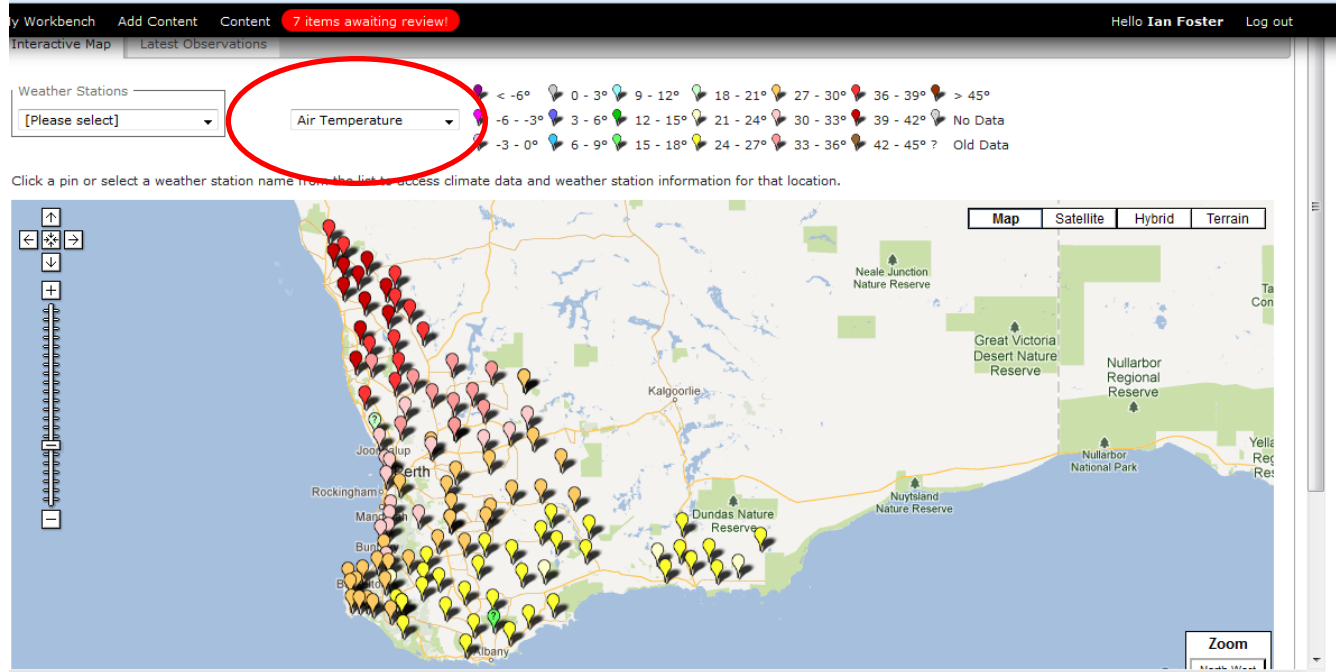


First screen – map view



First view shows how current the data is - green is good.

Map view of selected variables



Select from
temperature,
humidity,
rainfall and
wind to display
all sites.

Drill down and select individual stations

Use standard Google map zoom slider to get a local view.

Click on station balloon to show local weather conditions.

My Workbench Add Content Content 7 items awaiting review! Hello Ian Foster Log out

Weather Stations [Please select] Air Temperature

< -6° 0 - 3° 9 - 12° 18 - 21° 27 - 30° 36 - 39° > 45°
-6 - -3° 3 - 6° 12 - 15° 21 - 24° 30 - 33° 39 - 42° No Data
-3 - 0° 6 - 9° 15 - 18° 24 - 27° 33 - 36° 42 - 45° Old Data

Click a pin or select a weather station name from the list to access climate data and weather station information for that location.

Map Satellite Hybrid Terrain

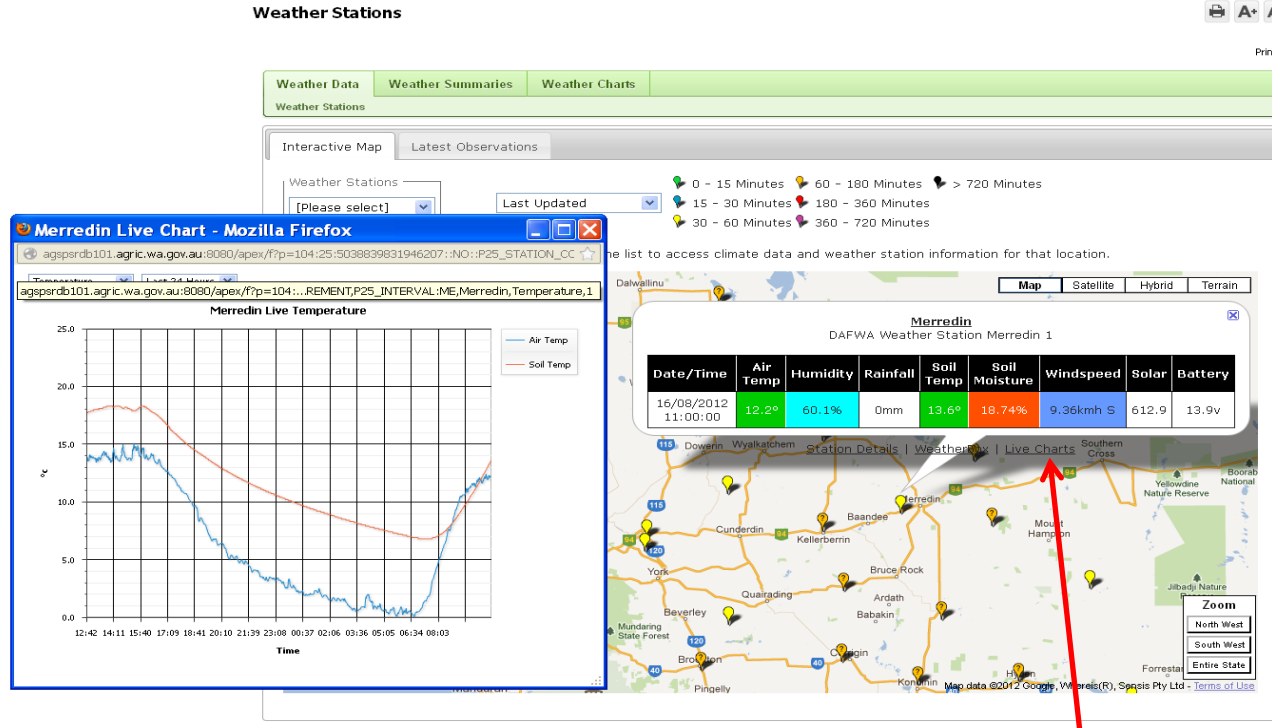
Merredin
DAFWA Weather Station Merredin 1 (data since 26/03/1985)

Date/Time	Air Temp	Feels Like	Humidity	Rainfall	Soil Temp	Soil Moisture	Wind	Solar	Battery
10/02/2013 11:54:00	31.7°	28°	23.5%	0mm	36.2°	8.62%	16.92kmh ESE	1154.9W/m²	14v

[Station Details](#) | [WeatherBox](#) | [Live Charts](#)

Zoom
North West
South West

Charts can be done



View with chart of local temperatures for the past 24 hours.



Data summary at each site

[Home](#) [My Workbench](#) [Add Content](#) [Content](#) 7 items awaiting review! Hello **Ian Foster** [Log out](#)

[Weather Data](#) [Weather Summaries](#) [Weather Charts](#) [Data Extraction](#)

[Weather Stations](#) > [Merredin](#)

Station **ME - ACEWSTNME001 - Merredin**

Description **DAFWA Weather Station Merredin 1**

Start Date **26/03/1985**

[WeatherBox](#) | [Live Chart](#)

[Overview](#) [Daily Summary](#) [Monthly](#) [Yearly](#)

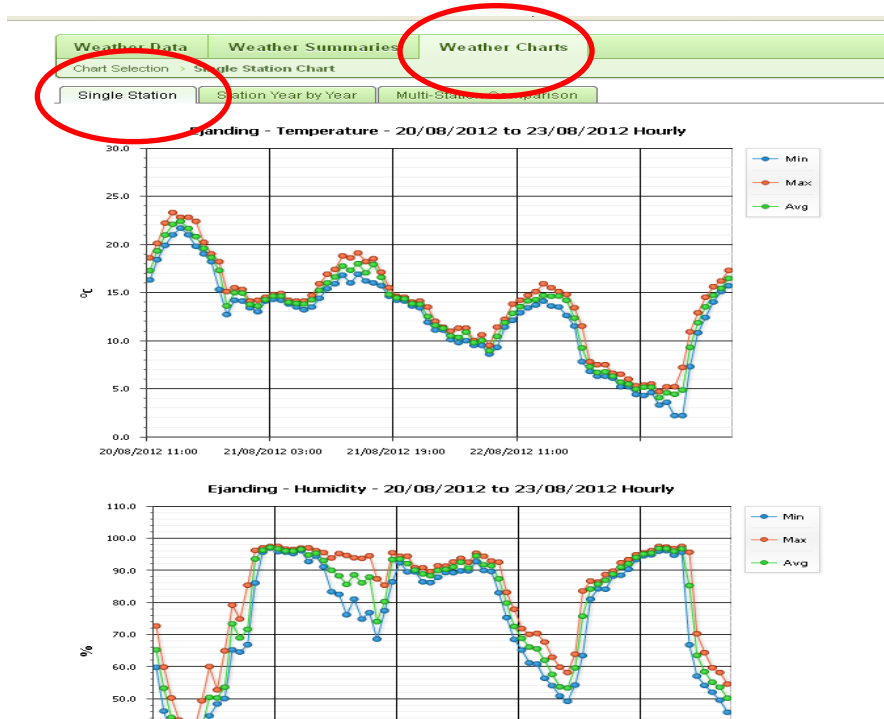
Latest	
Time	11:24:00
Air Temp°	30.6
Feels Like°	28.1
Rain mm	0
Humidity%	28
Soil Temp°	34.8
Wind Direction	E
Solar W/m²	1126.6
Windspeed km/h	13.32
Soil Moisture%	8.66
Delta T°	12
Battery V	14

Today from 9:01am	
Air Temp° min/max	24/30.7
Air Temp° avg	27.6
Humidity% min/max	27.4/45.4
Humidity% avg	34.5
Rain mm	0
Evaporation mm	3.2
Soil Temp° min/max	29.2/34.8
Soil Temp° avg	31.8
Soil Moisture% min/max	8.7/9.1
Soil Moisture% avg	8.8
Windspeed km/h max	25.2 E
Windspeed km/h avg	14.8
Solar Total kJ	10803.2
Battery V min	13.6
Hours of Data	2:24

Yesterday to 9:00am	
Air Temp° min/max	16.5/35.6
Air Temp° avg	26
Humidity% min/max	12/69.7
Humidity% avg	36.2
Rain mm	0
Evaporation mm	12.3
Soil Temp° min/max	27.3/43.3
Soil Temp° avg	34.2
Soil Moisture% min/max	8.7/9.5
Soil Moisture% avg	9.2
Windspeed km/h max	31.3 SE
Windspeed km/h avg	15.4
Solar Total kJ	33425.1
Battery V min	12.9
Hours of Data	23:57

Year to Date	
Air Temp° min/max	12.8/43
Air Temp° avg	25.7
Humidity% min/max	5.9/96.1
Humidity% avg	41.4
Rain mm	59.6
Rainy Days	6
Soil Temp° min/max	20.9/48.1
Soil Temp° avg	32.8
Soil Moisture% min/max	8.7/38.6
Soil Moisture% avg	13.5
Windspeed km/h max	63 NNW
Windspeed km/h avg	15.1
Solar Total kJ	1247139.3
Battery V min	12.8
Days Of Data	39.5

Charts for each site



Temperature and humidity at Ejanding.

Old web pages

Select
'Summary
Data' tab to
see a table of
all stations

Department of Agriculture and Food
GOVERNMENT OF WESTERN AUSTRALIA

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A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

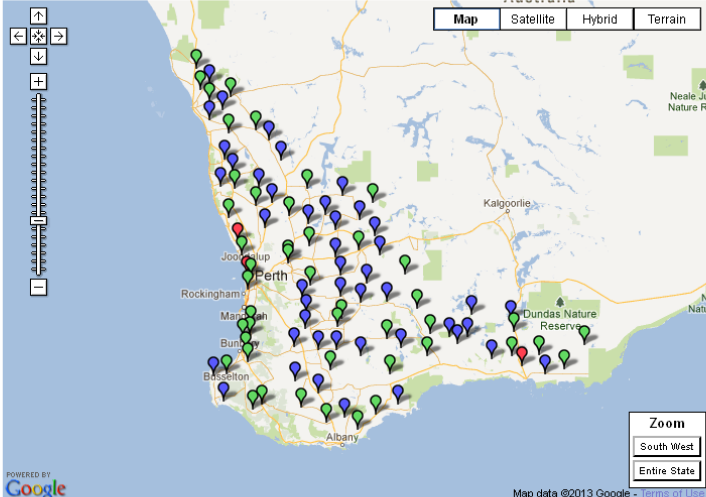
General Enquiries: +61 8 9368 3333 | PaDIS: 1800 084 881

You are: Home > Environment & Climate > Climate > Real time and historical weather data > Climate Data: Weather Stations

Climate Data: Weather Stations

Climate Home | **Summary Data** | Weather Stations | Climate Graphs

Click a pin or station name to access climate data and weather station information for that location.



Map | Satellite | Hybrid | Terrain

Zoom: South West, Entire State

POWERED BY Google

Map data ©2013 Google - Terms of Use

Green pins indicate the weather station is providing live data. Blue Pins indicate daily update sites. Red pins indicate maintenance at that site.

Live Stations

- [Badgingarra](#)
- [Binnu](#)
- [Lancelin East](#)
- [Manjimup](#)
- [Salmon Gums](#)
- [Scaddan](#)

Daily Stations

- [90 Mile Tank](#)
- [Cascades](#)
- [Mukinbudin Aero](#)
- [Trarling West](#)
- [Quelup](#)
- [Tunney](#)

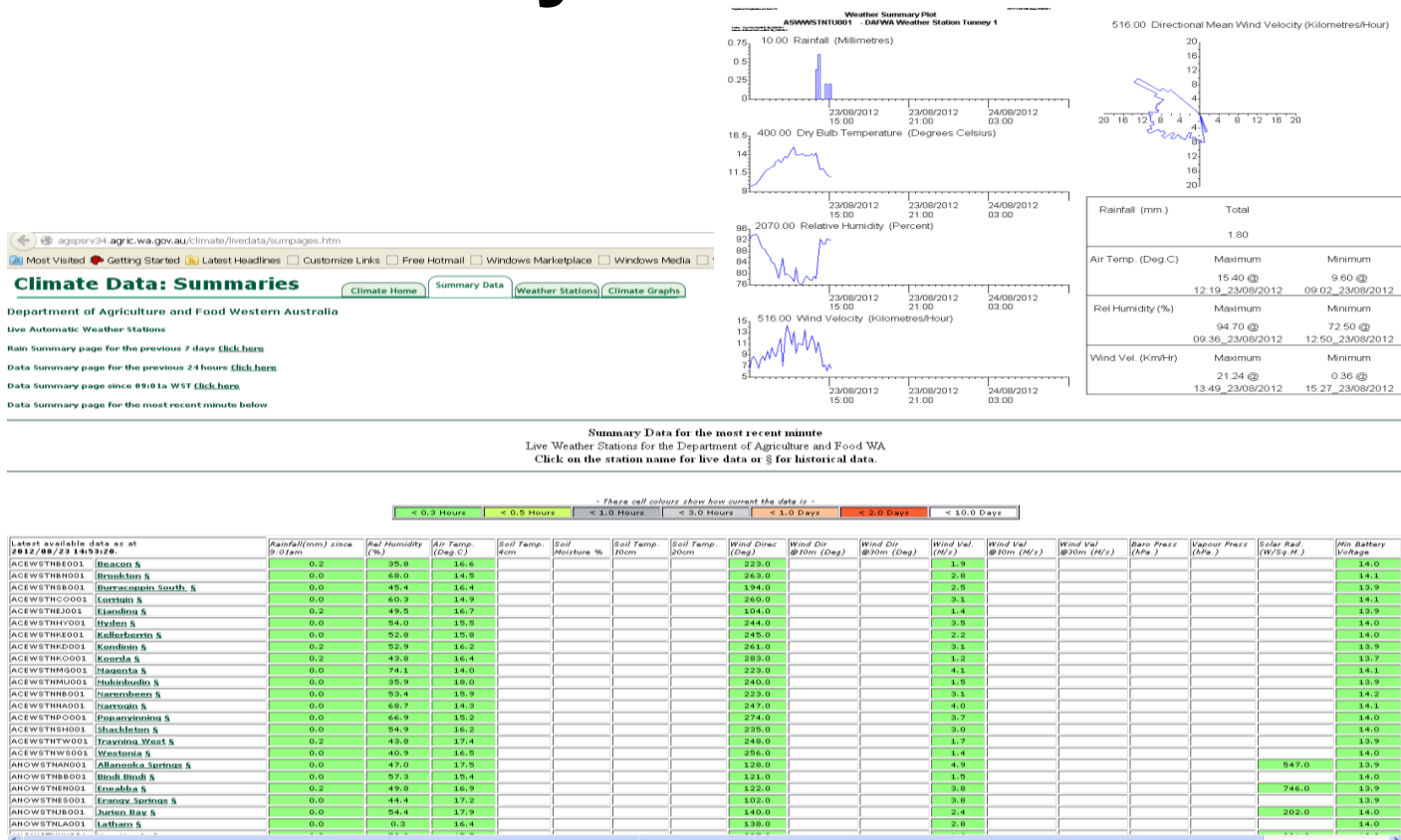


Summary Table

Top part of table shows the new stations. Green coloured cell means data is current.

Select name (eg Hyden) to see a simple plot of today's weather.

Select symbol § to see a 7-day summary of weather.



Key messages

- Projections of the WA climate made in 1988 have been confirmed by subsequent observations.
- The South West region has dried out faster than predicted.
- Expansion of DAFWA's automatic weather station network is a good development.





Department of
Agriculture and Food



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Development Corporation
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Questions?

ian.foster@agric.wa.gov.au



New stations

[Data Summary page for the most recent minute helos](#)

Summary Data for the most recent minute

Live Weather Stations for the Department of Agriculture and Food WA

Click on the station name for live data or S for historical data.

Click on the station name for any data or 3 for historical data.																
Data Past week Station	Data Past Year	Date	Day	WST Time	Air Temp	Rel Hum	Soil Temp	Solar W/m²	Rain mm	Delta T	Wind @ 3 metres lph Dirn	Wind @ 10 Metres lph Dirn	Batt vols mm	Data Past Year	Data Past week Station	
Kumumura	Kumumura	23/08/12	Thursday	14:57	35.5	16.0	32.8	571.0	0.0	17.4	9.7 N	-	13.4	Kumumura	Kumumura	
Carnarvon	Carnarvon	23/08/12	Thursday	14:59	25.4	27.1	28.3	646.1	0.0	10.6	9.7 SE	-	14.1	Carnarvon	Carnarvon	
Binu	Binu	23/08/12	Thursday	14:58	19.8	33.8	18.7	592.7	0.0	7.9	1.4 HE	16.2 E	14.3	Binu	Binu	
Chasman Valley	Chasman Valley	23/08/12	Thursday	14:57	18.9	22.9	18.1	632.8	0.0	7.8	12.0 SE	-	12.7	Chasman Valley	Chasman Valley	
Mullea	Mullea	23/08/12	Thursday	14:57	18.6	33.4	17.1	597.6	0.0	7.6	6.0 E	-	12.7	Mullea	Mullea	
Eradu	Eradu	23/08/12	Thursday	14:57	18.1	48.5	23.5	591.3	0.0	5.4	11.5 ESE	-	13.3	Eradu	Eradu	
Minagara	Minagara	23/08/12	Thursday	14:58	17.3	47.5	17.6	630.4	0.0	5.4	10.7 ESE	-	13.4	Minagara	Minagara	
Morava	Morava	23/08/12	Thursday	14:57	17.1	34.7	22.0	564.8	0.0	7.1	22.0 E	-	12.5	Morava	Morava	
Raduanaara	Raduanaara	23/08/12	Thursday	14:58	16.4	38.9	14.6	695.1	0.0	3.9	10.1 SE	-	12.5	Raduanaara	Raduanaara	
Kalanina	Kalanina	23/08/12	Thursday	14:57	16.6	36.8	18.3	586.7	0.0	6.7	3.2 NE	-	14.1	Kalanina	Kalanina	
Maura	Maura	23/08/12	Thursday	14:57	17.1	52.2	19.2	695.1	0.0	4.8	10.1 SE	12.6 SE	13.9	Maura	Maura	
Wongan Hills	Wongan Hills	23/08/12	Thursday	14:57	14.6	64.4	17.7	126.1	0.0	3.2	1.4 BSW	-	12.7	Wongan Hills	Wongan Hills	
Lancelin East	Lancelin East	23/08/12	Thursday	14:58	18.1	16.8	14.8	634.8	0.0	4.2	10.1 SE	12.6 E	14.0	Lancelin East	Lancelin East	
Ginman West	Ginman West	23/08/12	Thursday	14:58	16.8	59.2	18.8	537.0	0.0	3.9	7.2 BSW	-	14.0	Ginman West	Ginman West	
Wanneroo	Wanneroo	23/08/12	Thursday	14:56	16.9	64.9	18.8	594.2	0.0	3.3	4.0 S	-	13.8	Wanneroo	Wanneroo	
Floreat Park	Floreat Park	23/08/12	Thursday	14:58	16.7	72.6	20.2	546.0	0.0	2.5	7.9 HRW	-	14.2	Floreat Park	Floreat Park	
South Perth	South Perth	23/08/12	Thursday	14:57	17.7	65.6	18.2	591.8	0.0	3.3	8.3 SW	-	12.5	South Perth	South Perth	
Madina	Madina	23/08/12	Thursday	14:58	16.5	74.1	16.5	695.6	0.0	3.2	3.2 HRW	-	12.9	Madina	Madina	
Boronia Park	Boronia Park	23/08/12	Thursday	14:58	17.2	40.1	18.6	536.5	0.0	6.3	7.6 BSW	-	12.9	Boronia Park	Boronia Park	
Maredin	Maredin	23/08/12	Thursday	14:59	16.8	42.4	22.2	635.7	0.0	6.0	5.8 SSE	-	14.1	Maredin	Maredin	
Villem South	Villem South	23/08/12	Thursday	14:57	15.0	50.9	16.8	649.4	0.0	4.6	13.7 WSW	-	13.1	Villem South	Villem South	
Mackenna North	Mackenna North	23/08/12	Thursday	14:56	15.8	54.7	17.3	687.7	0.0	4.3	SW	-	13.0	Mackenna North	Mackenna North	
Hutcheon	Hutcheon	23/08/12	Thursday	14:57	15.1	17.5	17.4	537.4	0.0	3.8	2.8 WSW	-	13.0	Hutcheon	Hutcheon	
Murek	Murek	23/08/12	Thursday	14:56	15.2	62.0	17.2	274.0	0.0	3.4	7.9 WSW	-	13.4	Murek	Murek	
East Bayview	East Bayview	23/08/12	Thursday	14:58	15.1	64.4	13.4	291.8	0.0	3.2	9.7 WSW	-	13.4	East Bayview	East Bayview	
Warcona	Warcona	23/08/12	Thursday	14:58	15.4	76.3	13.9	205.8	0.0	2.1	9.4 H	-	13.3	Warcona	Warcona	
Hawea	Hawea	23/08/12	Thursday	14:57	16.4	18.4	18.4	630.3	0.0	4.5	9.3 E	100.3 E	13.9	Hawea	Hawea	
Dardou	Dardou	23/08/12	Thursday	14:57	16.1	65.5	13.7	209.2	0.0	3.2	10.1 WSW	-	13.6	Dardou	Dardou	
Dardou	Dardou	23/08/12	Thursday	14:58	16.1	72.0	14.3	233.2	0.0	3.2	10.1 WSW	-	13.6	Dardou	Dardou	

Old stations,
scroll down to
see more
summaries

