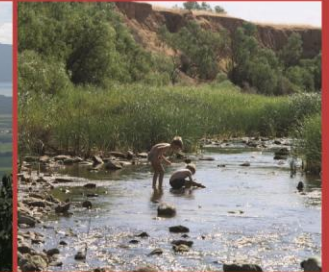




Calperum OzFlux site – Calperum-Chowilla Supersite



Defining landscape options to **better
manage our landscape resources**
now, and for the future.





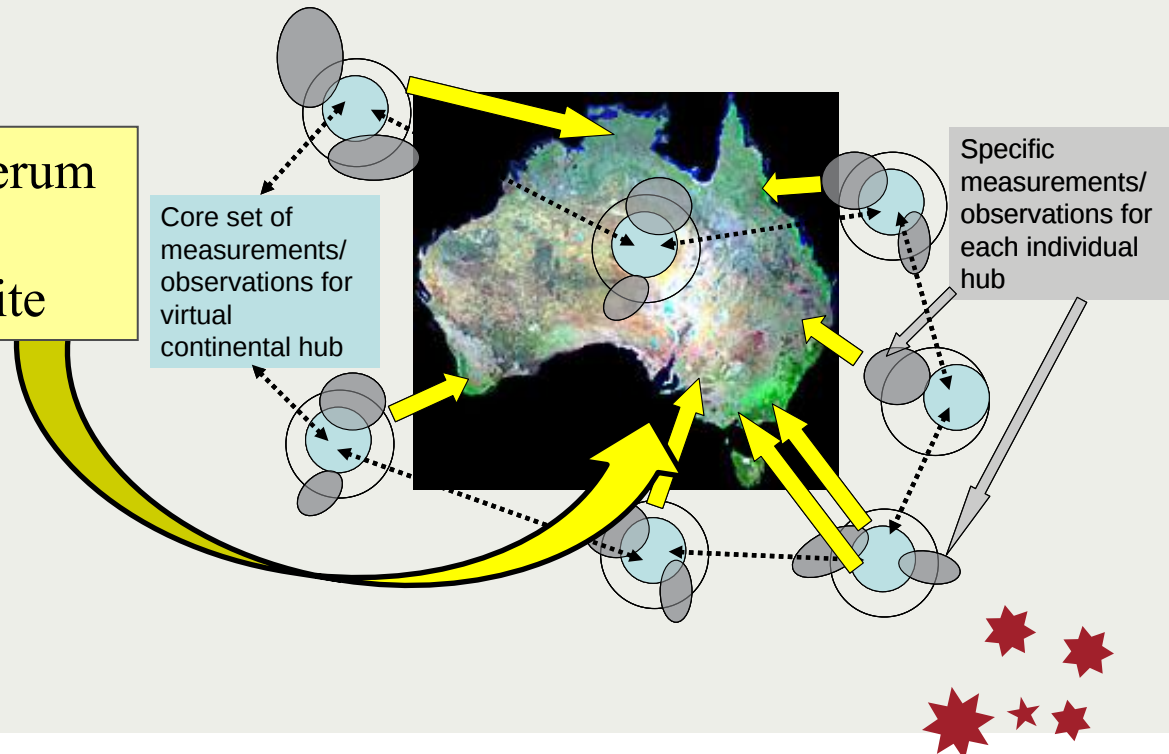
Connecting SA's ecosystem measures into the national network

Wayne Meyer

Professor, Natural Resource Science

Wayne.meyer@adelaide.edu.au

Lower Murray Calperum
Chowilla region
measurement supersite





Why Calperum - Chowilla?

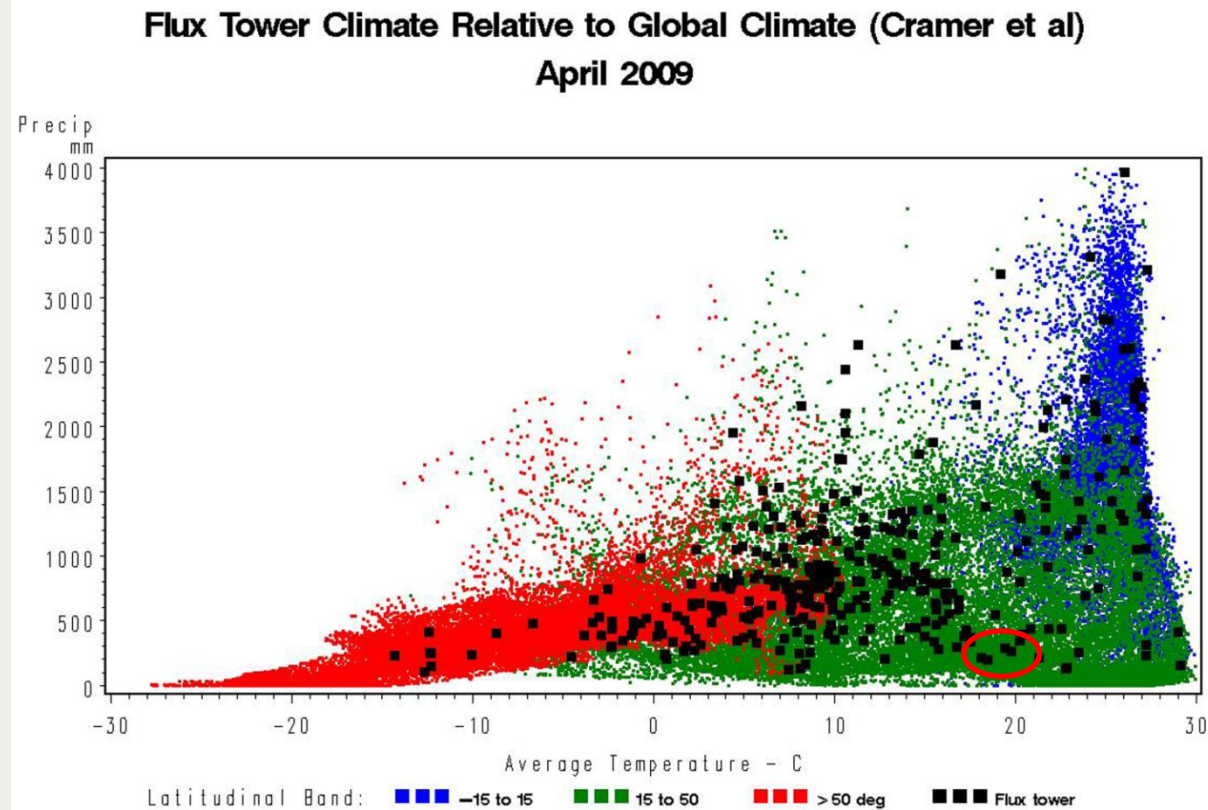
- Typical southern Australian Eucalypt vegetation association on sandy calcareous soils
- Has value as stand alone site to complement national coverage of quantifying terrestrial fluxes
- Increased value as co-investment makes linkage into the MDB icon site of Chowilla floodplains
- Research questions:
 - Quantification of energy, carbon, water and nutrient fluxes?
 - Size and value of interdependence and exchange between rain dependant, floodplain and river ecosystems?
 - Rate and size of ecosystem response to management – fire, grazing, revegetation, flooding, flow regimes ?





Why Calperum?

- Under represented in global modelling (ecological and regional climate)
- Maximise FluxNet global coverage





People

- Wayne Meyer (UA)
- David Chittleborough (UA)
- ~~Tim Lubcke, Josh Phillips...~~ Georgia Koeber
- Peter Cale and Grant Whiteman (Aust. Landscape Trust)
- Regional NRM Board (Hugo Hopton)
- SA Govt. agencies (DENR and DfW)





SA

NSW

Floodplain

Mallee

River

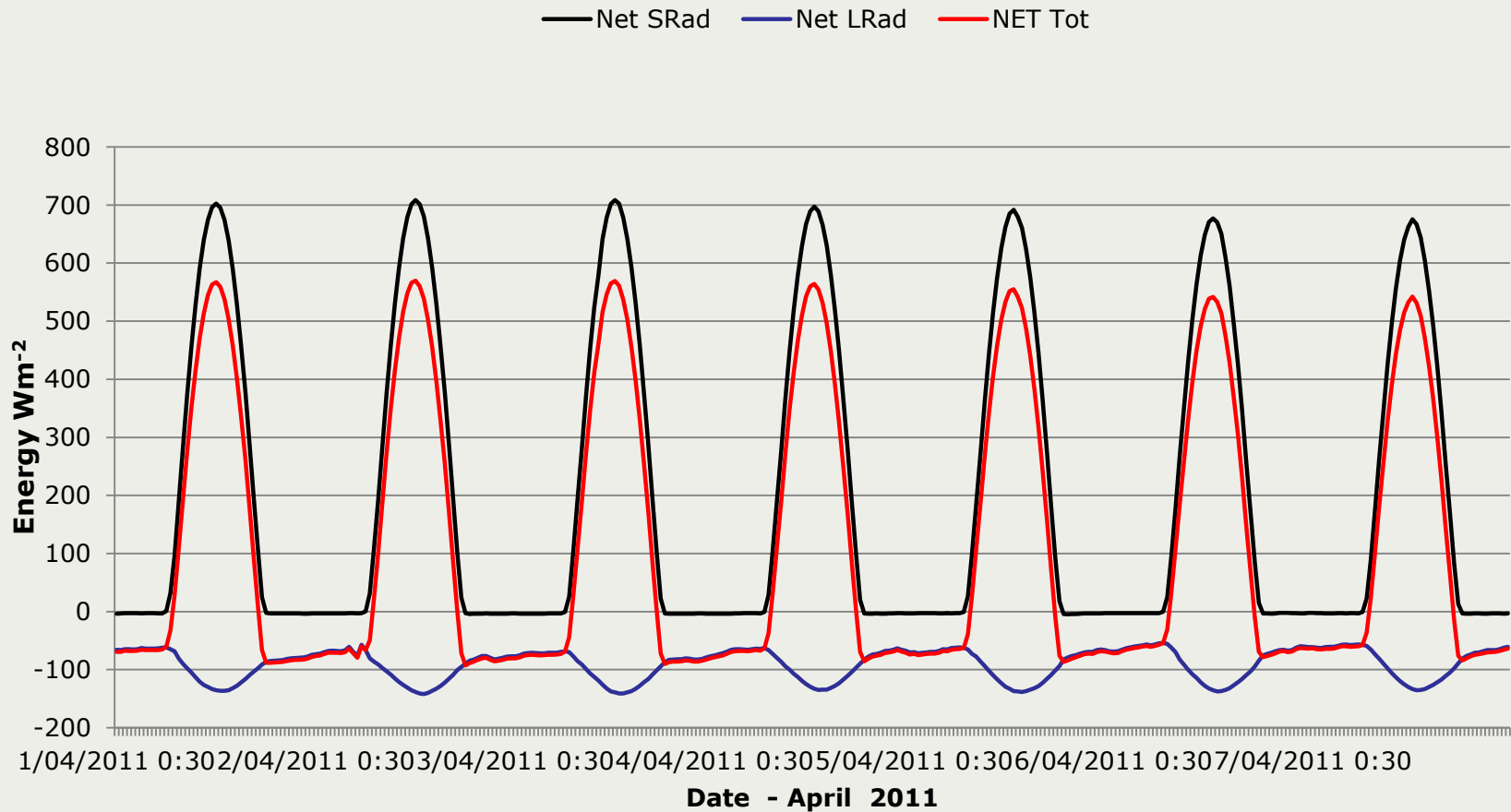
Renmark

Vic



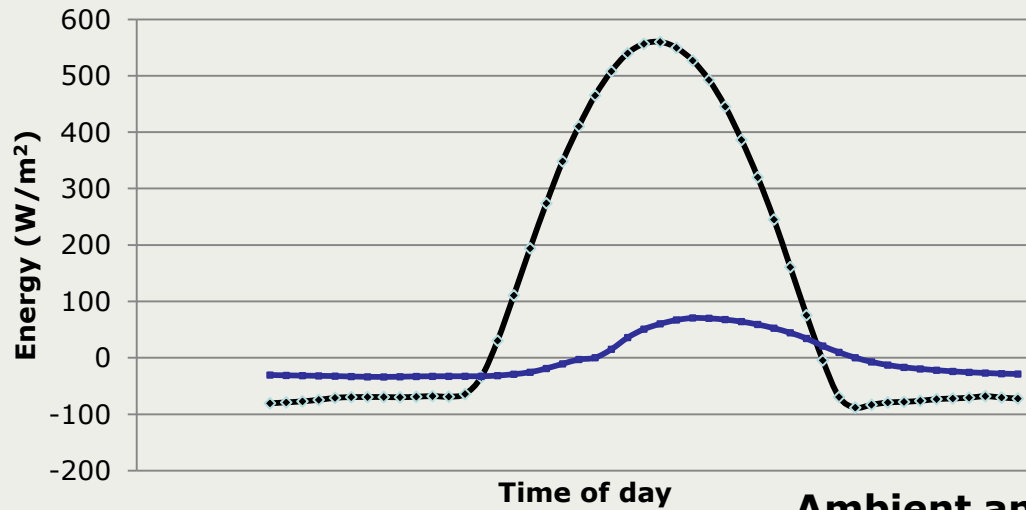




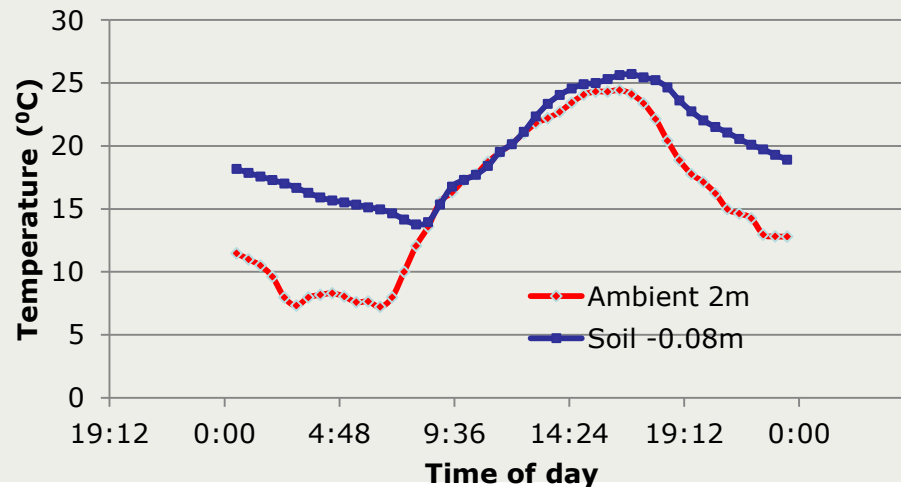




Net radiant energy and ground heat flux 4 April 2011



Ambient and soil temperature 4 April 2011



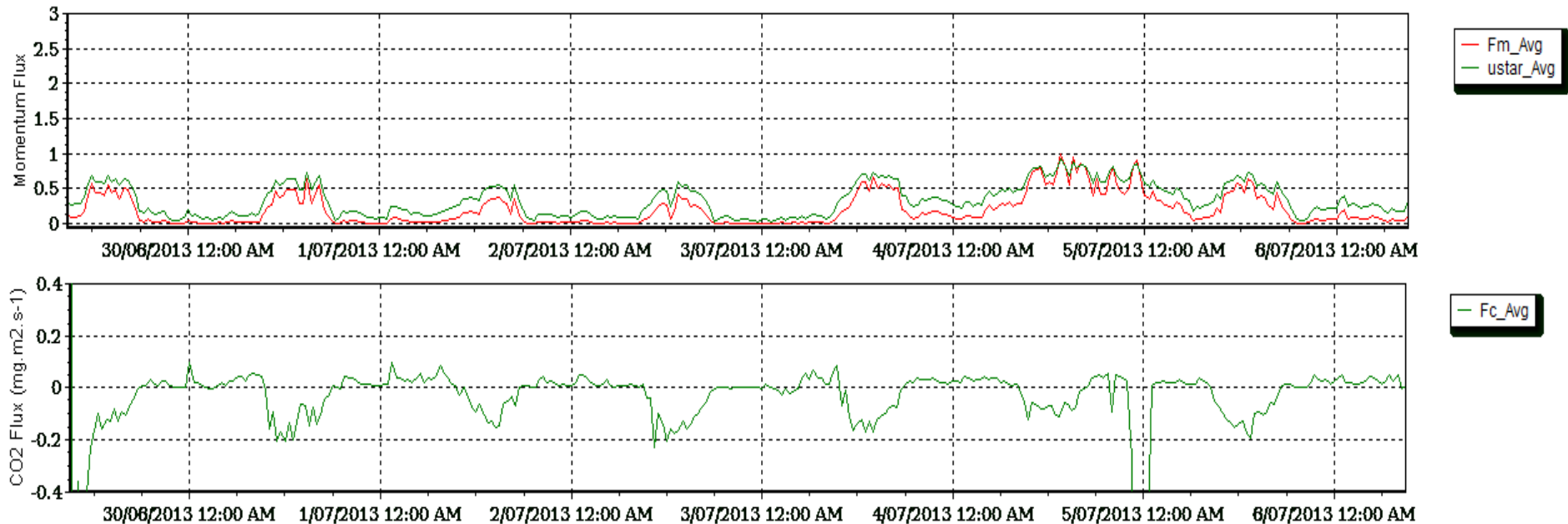


<http://calperumchowilla.wordpress.com/site-data/>

Calperum-Chowilla Ozflux Tower

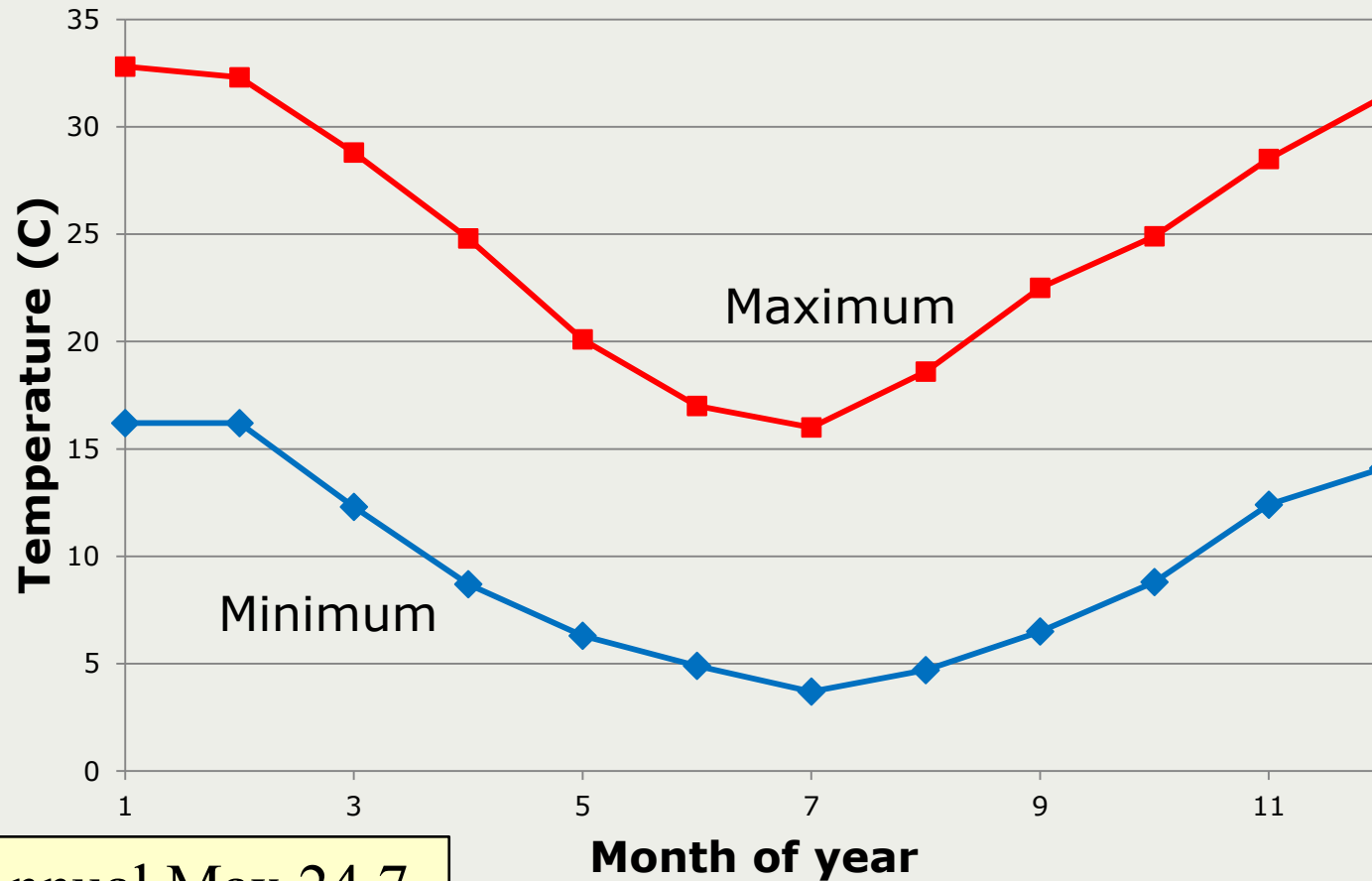
(Raw data only)

Fluxes





Renmark median temperatures



Annual Max 24.7
Min 9.7
Mean 17.2





Rainfall

Renmark Irrigation (02400)

Year

Total (mm)

2004

213

2005

291

2006

158

2007

238

2008

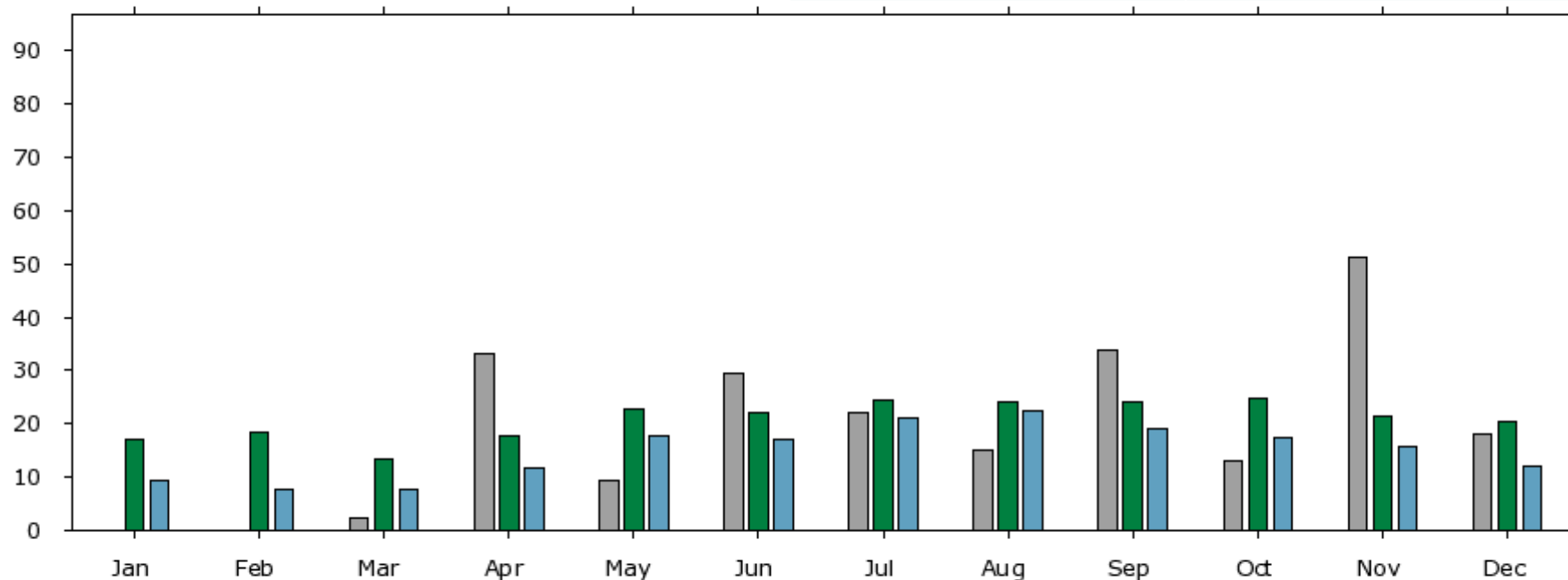
217

2009

228

Median

240



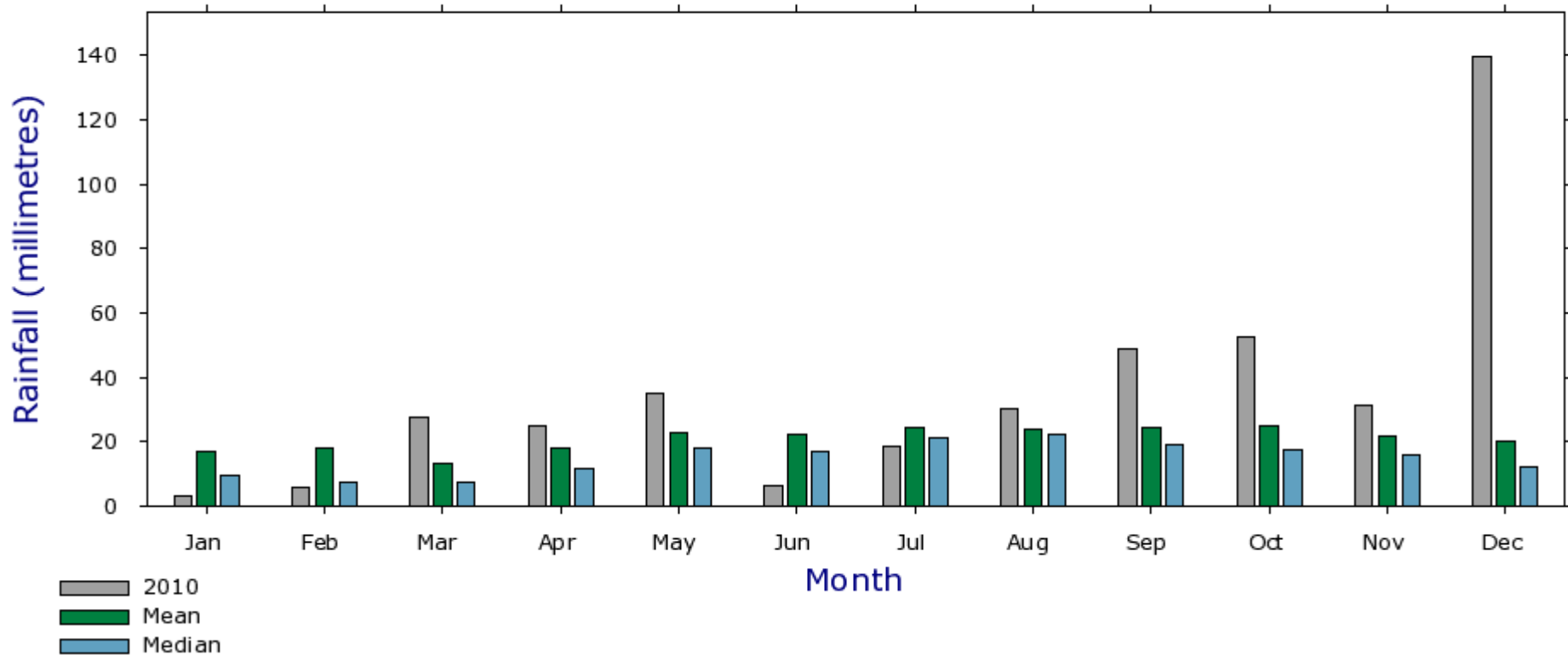
2009
Mean
Median

Month



Rainfall at recording station ~ 20 km from tower site
(expect tower site to have less – annual median ~ 225mm)

Renmark Irrigation (024003) 2010 Rainfall (millimetres)



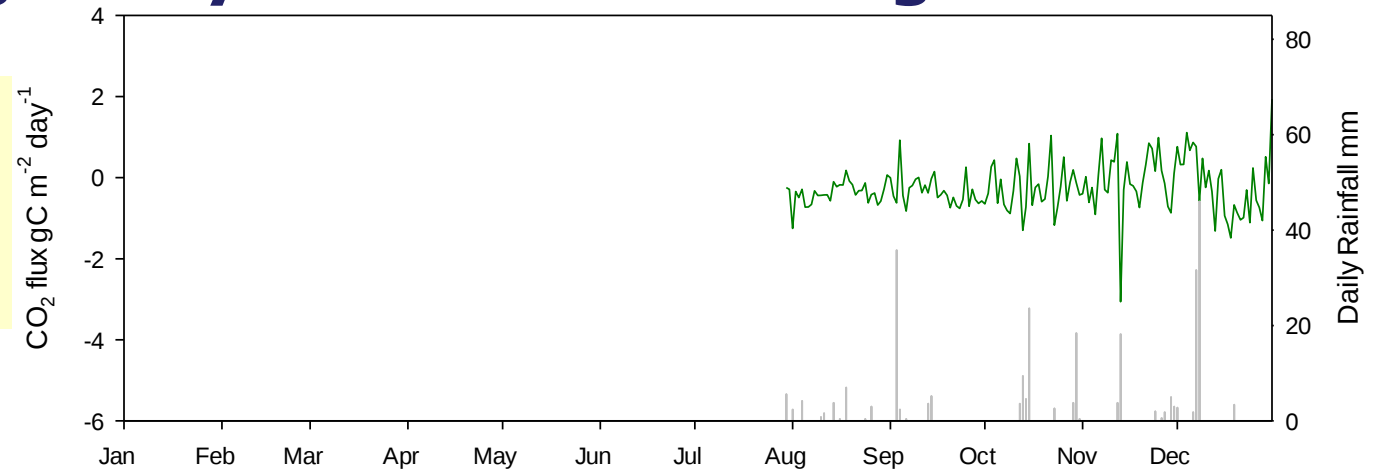
Annual median = 240 mm

2010 total = 424mm



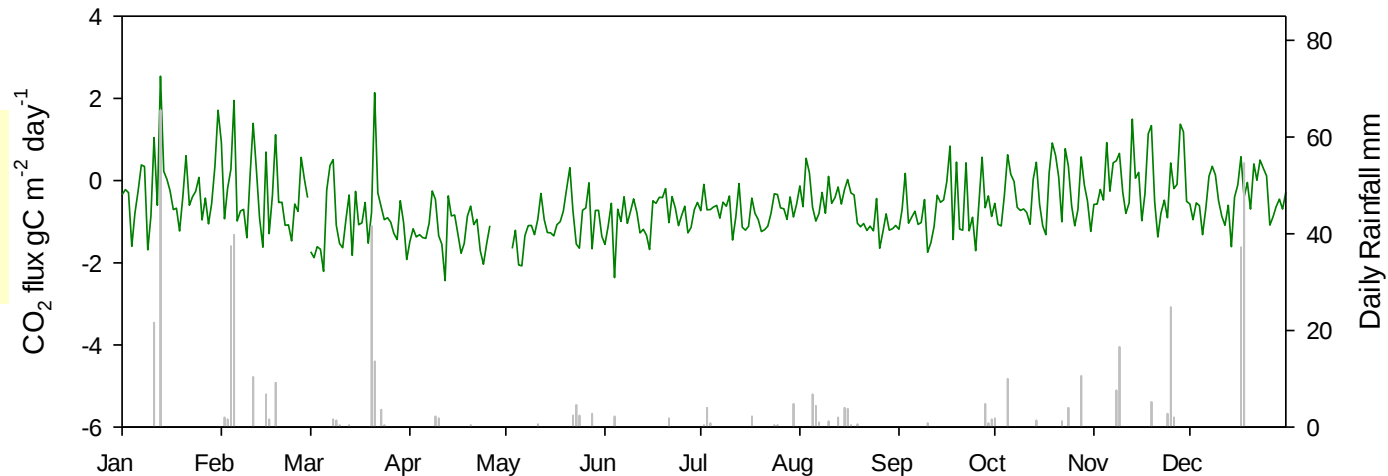
Flux of CO₂ – Aug to Dec 2010 - prolonged dry then above average rainfall

2010 Jul-Dec
Renmark: 311 mm
Site: 265 mm
Ann. median: 240



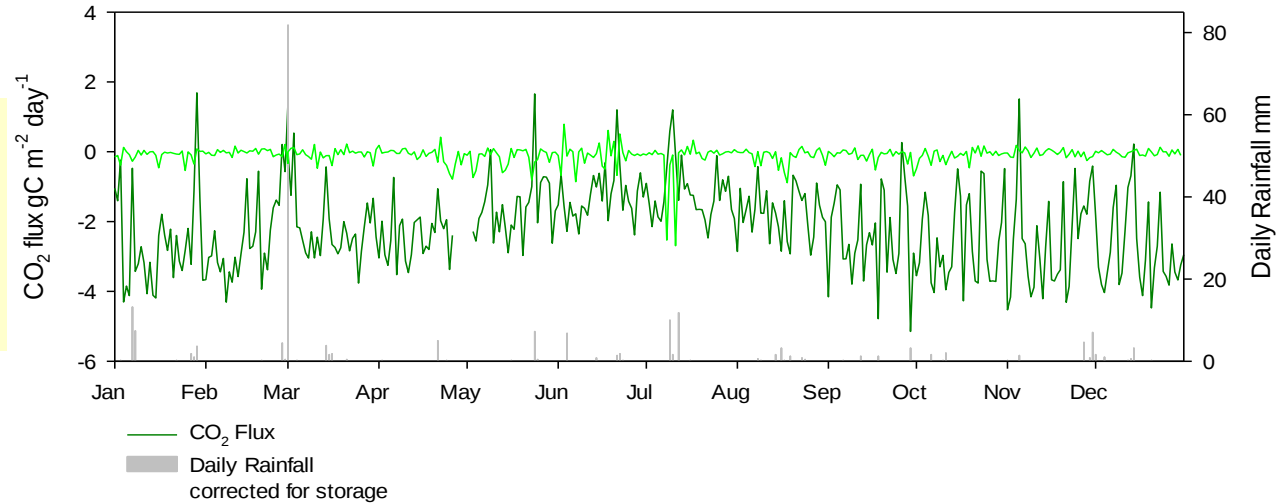
Flux of CO₂ – Jan to Dec 2011 – above average rainfall

2011
Renmark: 457 mm
Site: 510 mm



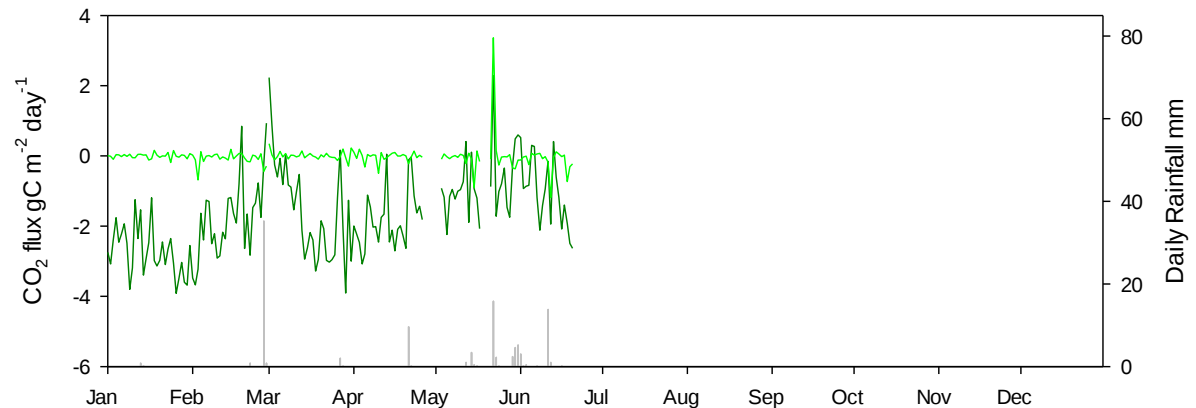
Flux of CO₂ in 2012 – average rainfall

2012
Renmark: 244 mm
Site: 210 mm



Flux of CO₂ in 2013 – average rainfall (Jan to Jun)

2013
Jan - Jun
Renmark: 111 mm
Site: 107 mm



Annual flux of carbon and water

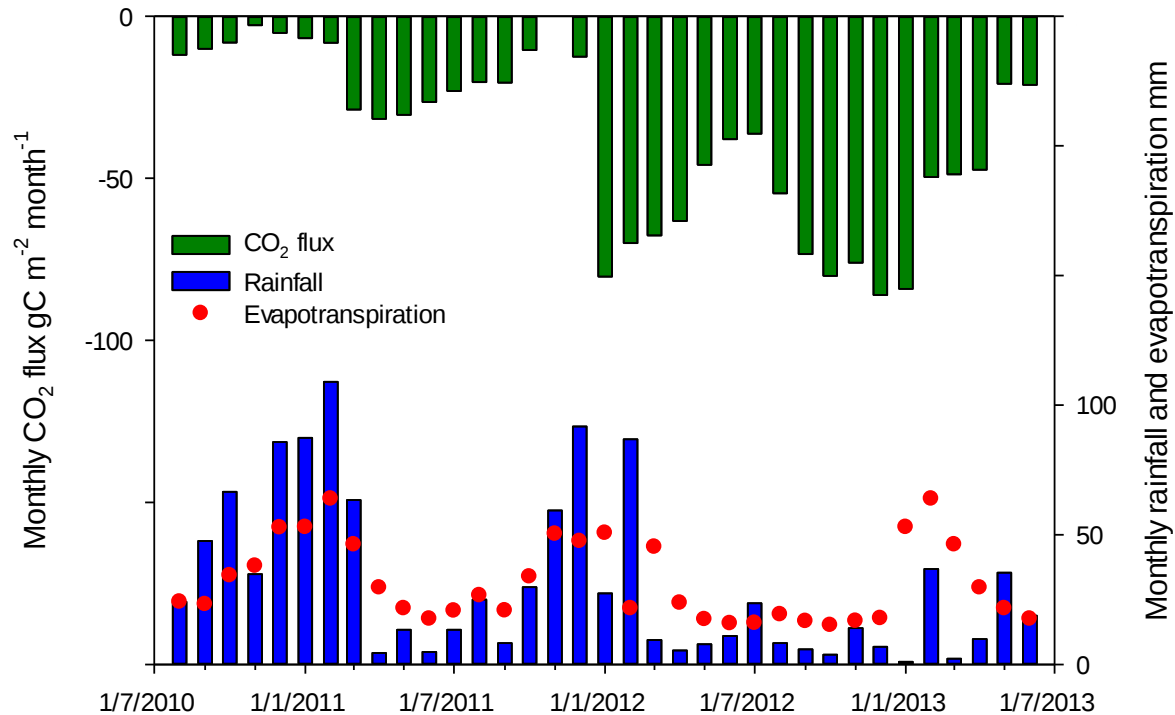
	Fc (tC ha⁻¹ year⁻¹)	Fc (tC ha⁻¹ year⁻¹) [corrected for storage]	ET mm	Renmark rain (mm)	Site rain (mm)
2010	-0.912	+ve	176Aug-Dec	302Aug-Dec	264Aug-Dec
2011	-2.196	+ve	431J-D	457 J-D	510 J-D
2012	-7.718	-0.335	275J-D	244 J-D	210 J-D
2013	-5.790	-0.083	180Jan-Jun	115Jan-Jun	107Jan-Jun

By the time we correct 2010 and 2011 for storage:

2010 and 2011 may have annual fluxes losing carbon to the atmosphere when wet.

2012 and 2013 may have annual fluxes acquiring carbon or at least in equilibrium with the atmosphere carbon when dry.

Annual flux of carbon and annual rainfall



In the wet years of 2010 and 2011 loss of carbon from the soil smooths atmospheric flux of CO₂? Or less radiation causes less photosynthesis?

In the dry years not as much carbon is lost from the soil to temper the atmospheric flux of CO₂? Or more radiation causes more photosynthesis?

Data checks

F_c $\mu\text{mol m}^{-2} \text{s}^{-1}$ is numerically similar to $\text{gC m}^{-2} \text{day}^{-1}$ ✓

Instrumentation and calibration?

Rainfall events in summer cause respiration pulses? – Birch effect or lack of radiation?

Leaf area index (LAI) measures:

(1) photos and processed by Keith Bloomfield, Derek Eamus and Nicolas Boulain, (on ground monthly)

(2) ceptometer (on ground monthly) and

(3) plane fly over (September 2013)

LAI is also for our calculations of evapotranspiration.

Across site comparisons and implications

We want to compare affects of rainfall events on carbon dioxide flux from towers with unrestricted water.

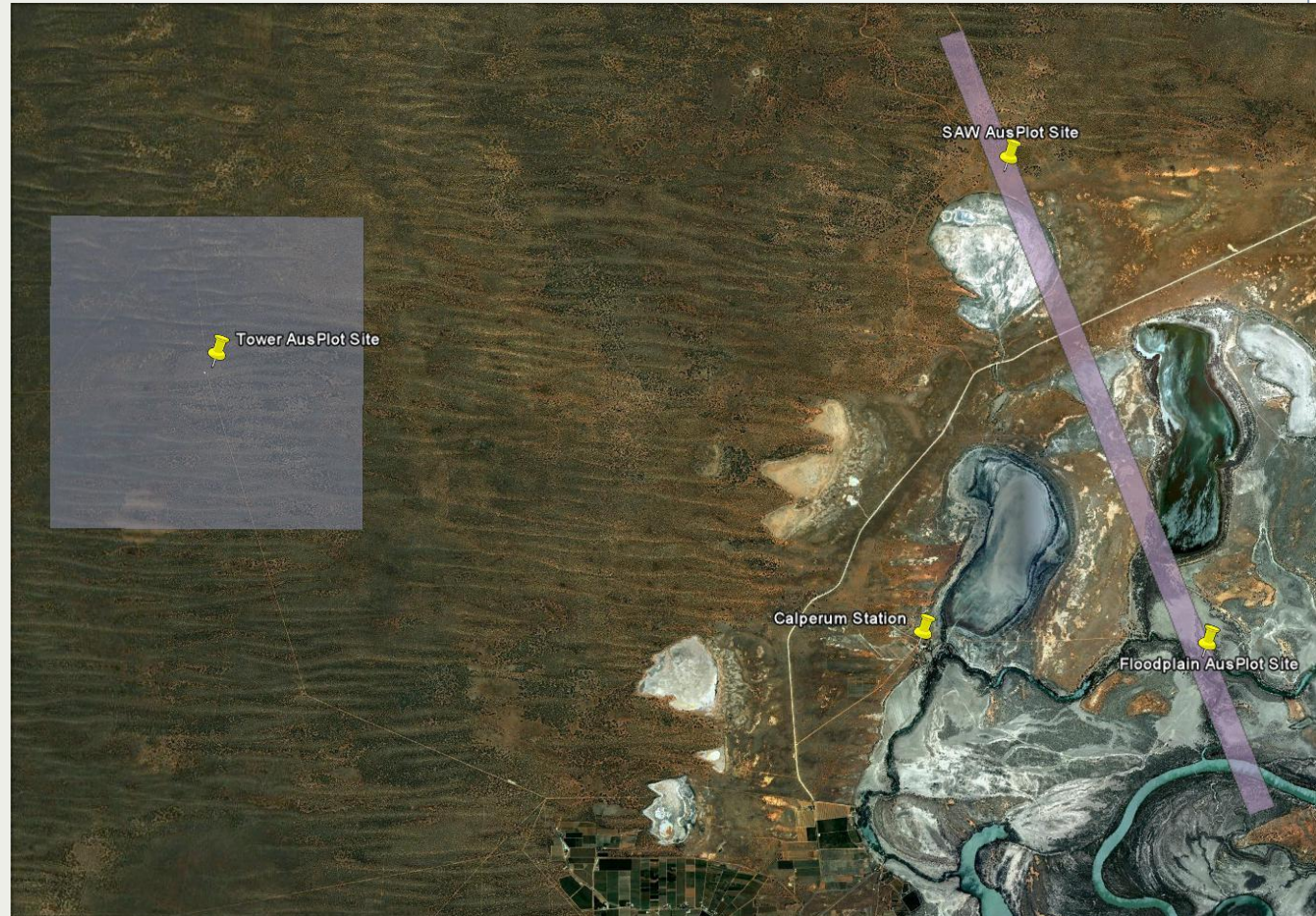
Water restricted arid ecosystems may have more to lose if rainfall events increase.



What next?

AusPlots

Three sites;



AusCover

- 5km² around tower site
- Transect covering Callitris & floodplain Ausplot sites



Questions?

