

Submission to Senate Committee

The integrity of the water market in the Murray Darling basin

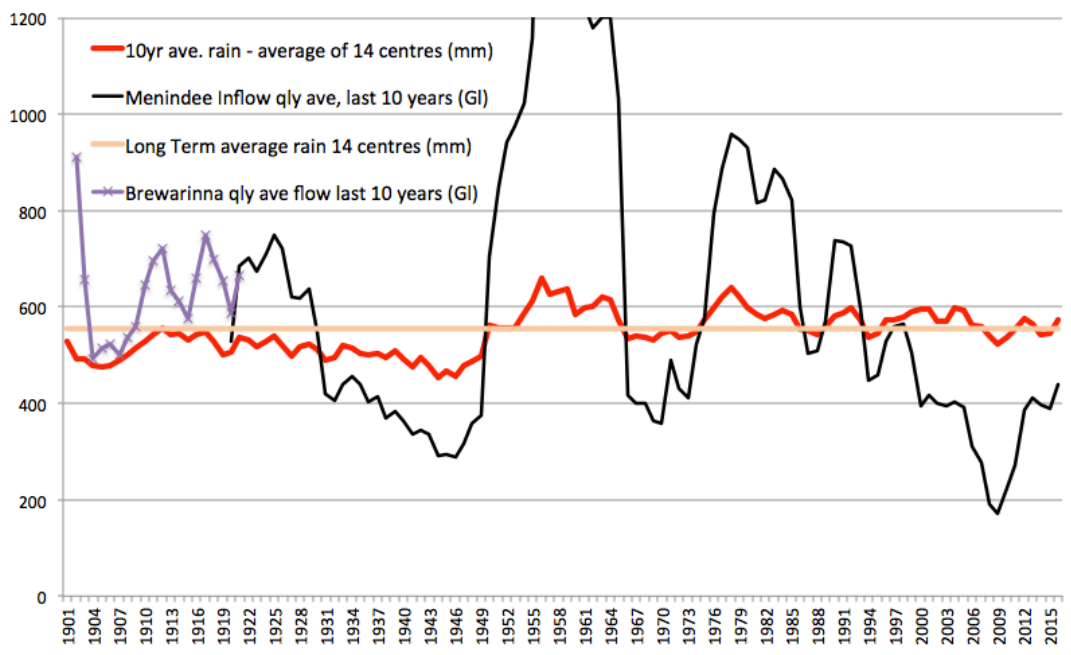
(Corroberating ABC 'Four corners' on over extraction from the Barwon Darling)

I am a retired statistician/publc servant (with experience in complex modeling) with a keen interest in the health of the Murray Darling basin. I was among the many stunned by the ABC 'Four Corners' program which triggered this enquiry. In particular, some **concerns expressed on 'Four corners' seemed consistent with my results** – details of which follow.

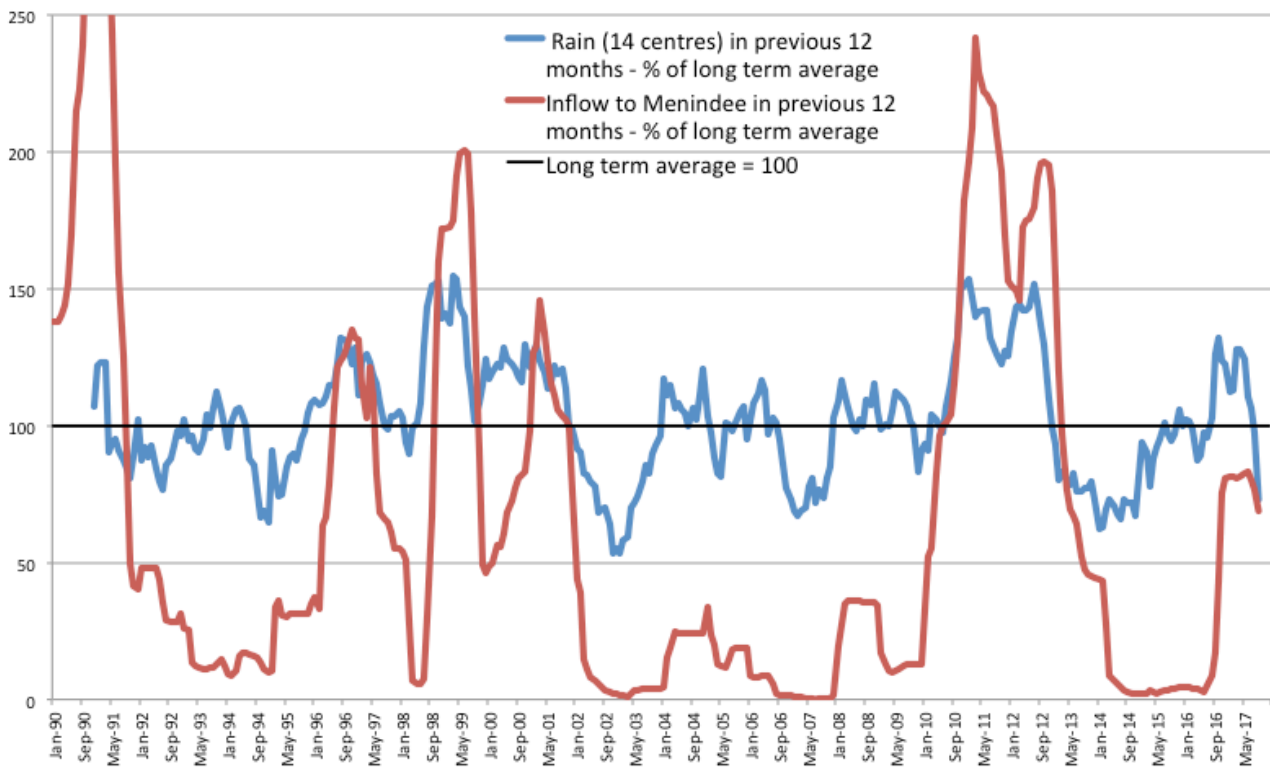
In 2015, I became very puzzled why the lower Darling should be running dry for the third time in a dozen years, compared with a handful of times in the previous century. This prompted me to conduct my own detailed study of rainfall data and river flows (to Wilcannia/Menindee) for the 125 years I could obtain data.

Despite the huge area over which Darling flows can emanate, and the variability of rainfall across it, I found I could get reasonably strong correlations of river flows and rainfall using average of rainfall for less than a dozen centres – on both an annual and monthly basis. However, I extended my coverage to 14 centres (plus nearby "alternates" to cover missing rainfall observations) to get a more complete coverage of the Barwon Darling and its major tributaries – preferably at least one in the upper catchment and one on the plains for each. To overcome 'seasonal' issues with rainfall and river flows, monthly data was aggregated to '12 month ended' moving totals for both river flow and rainfall. Rainfall is highly correlated with flows past Wilcannia a couple of months later. However, it must be remembered that river flows fluctuate more widely than rainfall because, once catchments are wet, a higher proportion of rainfall ends up in rivers – and vice versa.

The main results of my on-going study are shown in the following 2 graphs. The long term graph of annual plots (for average of the previous 10 years) shows how much the relationship between 'average rain' and 'average river flows' has changed over the last century – especially in recent decades. The most obvious (but not only) reason for the change is higher extraction from the rivers for irrigation etc. Prior to the 1950s (and major growth of irrigation in the Darling basin) even 'below average' rainfall still produced reasonable flows past Wilcannia – while more recently it seems to have required 'above average' rainfall to get significant flows.



The second graph shows monthly data (last 12 months) for about the last 25 years to September 2017. It shows more clearly how it now takes periods of 'above average' rainfall to get significant flows as far as Wilcannia/Menindee. Of particular interest in the current context, is the last period of negligible flows to the lower Darling that began in mid 2013. This was associated with a period of below average rainfall from around the end of 2012 and lasting for around 2 years. Rainfall returned to 'around average' throughout 2015 – but significant flows to Wilcannia did not occur till the second half of 2016 - after the record breaking rains in mid-west NSW in mid 2016. Until then, the NSW water authorities continued to blame 'drought' for continuing low flows in the lower Darling.



### ABC Four Corners Allegations

Although references to precise timing are few, it seems that many of the allegations of non-compliance occurred around 2015 – and could be part of the explanation why significant flows to the lower Darling took so long to recover from their 3 years of lows. It doesn't mean other factors (like above average temperatures) did not also contribute - and once a river runs dry, refilling it takes considerably more water to restart flows than what is required to keep a river flowing.

Thus I must emphasize that although my results seem consistent with unauthorized over extraction of water from the Barwon Darling (perhaps over a long period) they should not be interpreted as constituting proof.

Significant unauthorised extraction of water from slow flowing rivers should be traceable. There are many NSW govt (automatic) river level and flow monitoring stations along the Barwon Darling. The NSW 'waterinfo' website shows daily data for at least half a dozen recording stations in the Walgett to Bourke region. Given that many claims of 'over extraction' were over a comparatively small area (between Walgett and Bourke?), it seems inconceivable that 'major over-extraction' could occur without being apparent from close analysis of river levels/flows at the relevant nearby monitoring stations – even well after the alleged events.

For long periods, flows in the Barwon Darling are only hundreds of megalitres a day – yet the private dams on major cotton farms hold many gigalitres – ie would take some weeks to fill at a few hundred megalitres a day. It maybe time consuming to assemble and analyse the relevant data – but it should be possible to work out how much and where water ‘disappeared’ between flow monitoring stations.

Some of the claims in the ABC program are less concerning. Choosing to sell ones current entitlement when prices are high can be sensible – and part of the process how scarce water is directed to where it is most needed. It should not mean any more water being taken from the river – provided that compliance is properly monitored and ‘allocations’ are properly managed (including allocations reduced along the whole river when water is scarce). Similarly, trading water up and down a river is not intrinsically bad – unless there are flaws in the system that allows it.

Naturally, I would be prepared to provide any further detail or explanation of my work that the committee may require.

I hope this committee can assist the process of ensuring that administration of rules relating to extraction of water from rivers can be significantly improved from what seems to have been the case.

Rob Foster  
25 September 2017