Salinity Inquiry
Submission No. 41

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The Committee Secretary
House of Representatives Standing Committee on Science and Innovation
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To Whom It May Concern:

INQUIRY INTO COORDINATION OF THE SCIENCE TO COMBAT THE NATION'S SALINITY PROBLEM

Thank you for the opportunity to make a submission to your inquiry on the important subject of salinity. Accurate comprehensive research must be the building block for sound public policy in natural resource management. However, key Australian research institutions seem to be preoccupied with maintaining their funding base and capacity to control the research agenda, rather than with the provision of objective and relevant information. Salinity is an issue where, there appears to be a particular inability to acknowledge improvement. Indeed key research institutions appear committed to portraying a continued and growing salinity problem notwithstanding evidence to the contrary

1. PROVISION OF RELEVANT INFORMATION

Your committee has drawn extensively on the writings of CSIRO Land & Water in the provision of background information for the inquiry. The first paragraph of your information paper[1] begins with the quote, 'Dryland salinity is undoubtedly the greatest and most intractable threat to the health and utility of Australia's rivers, soil and vegetation.' However, basic data is not provided to back up this and other claims. The second reference is to the National Land & Water Resources Audit *Australian Dryland Salinity Assessment 2000*[2]. While this 129 page document would appears to provide detailed statistics on the extent and magnitude of our salinity problem, on careful analysis it is evident that the document does not distinguish between current and predicted salinity problems. The document is concerned with 'hazard' and 'high risk' without giving us an indication of the current situation.

The National Land and Water Resources Audit *Australian Water Resources Assessment 2000* also purports to provide salinity information. It appears like a big report card - a catchment-by-catchment assessment of water quality concluding that we have lots of 'major (water quality) issues' – in other words, D grades for water quality. However, trying to understand what contributes to the bad marks is not so easy. Incredibly, this national report does not use

the nationally recognized ANZECC water quality guidelines. Instead, median, average and 90th percentile values for different localities have been variously combined and it is unclear for which periods (last decade or last year) and flow conditions (floods or droughts). Without presenting a single trend line for any water quality indicator, the report states, '*The Australian Water Resources Assessment 2000* provides the first overview of Australia's declining surface water quality with salinity, nutrients and turbidity issues revealed across most of the intensively used basins'. This document like so many recent Australian government publications in the environment area is a misrepresentation of the available information.

The Australian Bureau of Statistics *Land Management and Salinity Survey 2002* indicates that two million hectares of agricultural land were reported by farmers as showing signs of salinity with 70 percent of the affected area in Western Australia. This represents approximately 0.2 percent of farmland (Table 1). This is a significantly smaller area than the five and a half million hectares 'at risk or already affected' and the 17 million hectares claimed to be at risk in 50 years in your inquiry's backgrounder[3]. Which are the correct figures in terms of area currently affected by dryland salinity? Where is the trend line showing how the current situation is worsening such that we could expect a large increase in area affected by dryland salinity over the next few decades?

Table 1. Land Showing Signs of Salinity, Summary by State

State	Farms with land showing signs of salinity	Proportion of total farms in State (a)	Land showing signs of salinity	Proportion of total farm area in State (b)	Salinised land unable to be used for production	Proportion of land showing signs of salinity (c)	Proportion of total farm area in State (d)
	number	%	'000 ha	%	'000 ha	%	%
NSW/ACT	3108	7.4		0.2	44	35.6	0.1
Vic.	4834	13.7	139	1.1	60	43.5	0.5
Qld	993	3.4	107	0.1	40	37.4	-
SA	3328	21.6	*350	0.6	105	30.1	0.2
WA	6918	51.3	1241	1.1	567	45.7	0.5
Tas.	390	9.1	6	0.3	2	27.2	0.1
NT	8	2.0	2	-	2	97.3	-
Total Australia	19579	13.9	1969	0.4	821	41.7	0.2

(a) Farms with land showing signs of salinity as a proportion of total farms in the State/Territory/Australia. Source for the denominator is data from the ABS 2001 Agricultural Census.
(b) Land showing signs of salinity as a proportion of total farm land in the State/Territory/Australia. Source for the denominator is data from the ABS 2001 Agricultural Census.
(c) Salinised land unable to be used for production as a proportion of land showing signs of salinity.
(d) Salinised land unable to be used for production as a proportion of total farm land in the State/Territory/Australia. Source for the denominator is data from the ABS 2001 Agricultural Census.
* Subject to sampling variability between 25-50%

Source: Australian Bureau of Statistics 2002. Reproduced from Moran 2003[4]

When we are told water quality is deteriorating and dry land salinity is a worsening problem we should be provided with basic trend lines that give us a clear indication of the current and

recent past situation. Indeed it is imperative that we have an indication of current trends. How else are we to understand whether or not our investment in salinity mitigation works over the last two decades has been effective? Furthermore factual information needs to be based on measured statistics rather than computer generated predictions from simulation or decision support models. Information from models is useful, but must complement rather than replace measured statistics.

2. Burying Good News to Maintain the Illusion of a Crisis

River salinity in the Murray Darling Basin has long been considered a major issue for Australian agriculture. According to the Wentworth Group[5], *The Economist* magazine[6], and everyone in Ticky Fullerton's book *Watershed*, including Ticky Fullerton[7], a major problem is deteriorating water quality in particular a worsening salinity problem.

The CSIRO website until September this year includes the statement, "...look at Australia's largest and most developed river system, the Murray-Darling Basin, shows the nature of the problem we face. Salt levels are rising in almost all of the Basin's rivers and now exceed WHO guidelines for drinking water in many areas. Business as usual is not an option. If we do nothing, the salinity of the Lower River Murray – where Adelaide pumps out its drinking water – will eventually rise to exceed WHO guidelines."

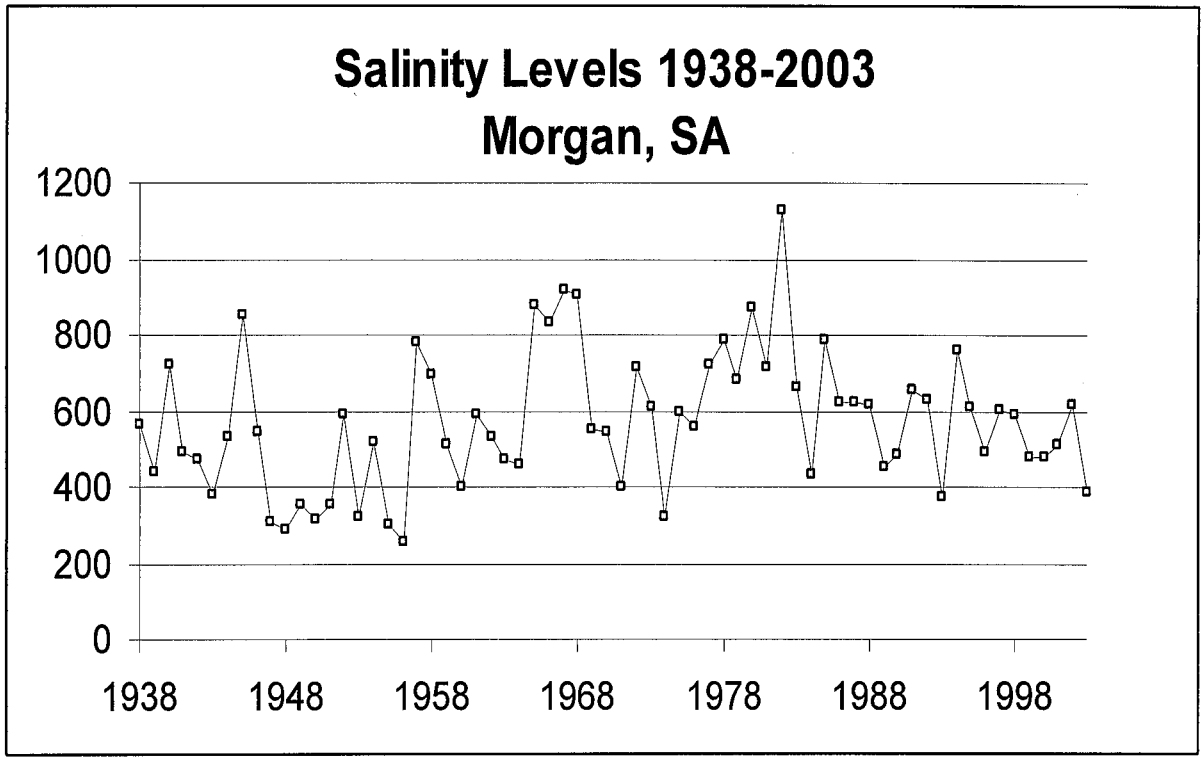
But the evidence does not support these claims of deteriorating water quality and in particular deteriorating river salinity. While Ticky Fullerton's 354 page book laments deteriorating water quality, no water quality data is provided. There was no data to accompany the very powerful statement on the CSIRO website.

Daily readings for salinity from 1938 are available on request from the Murray Darling Basin Commission for Morgan, South Australia. Morgan is the key indicator locality for water quality in the Murray Darling Basin. Morgan is just upstream of the pipeline off-takes for Adelaide's water supply. Its use as an indicator site emphasizes the relative importance of river salinity impacts on all water users in the system[8]. The yearly averages for salinity measured in EC units for Morgan are plotted in Figure 1. Current salinity levels at Morgan are equivalent to pre World War 2 levels.

A plot of yearly average salinity levels for the last 20 years suggests salinity levels are dropping at this key indicator site, Figure 2. Water quality is improving. Upstream at Swan Hill and Yarrawonga salinity levels are stable, Figure 2. Contrary to information that was posted on the CSIRO website, salinity levels were <u>not</u> increasing at key sites in NSW and Victoria.

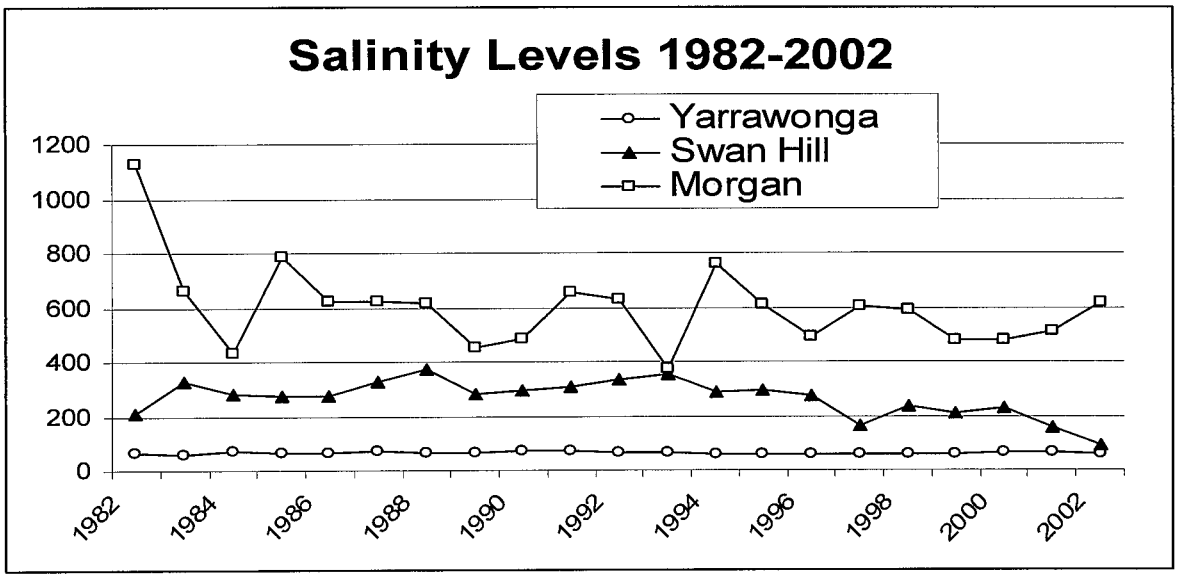
This information was first presented at a Forum in Canberra on 25th July 2003 in a presentation titled *Received Evidence for Deteriorating Water Quality in the River Murray* and subsequently published on the Institute of Public Affairs' website (http://www.ipa.org.au) and by On Line Opinion (http://onlineopinion.com.au).

Figure 1. Salinity at Morgan



Data Source: Murray Darling Basin Commission, June 2003

Figure 2. Salinity at Morgan, Swan Hill and Yarrawonga



Data Source: Murray Darling Basin Commission, July 2003

The Murray Darling Basin Commission (MDBC) concurs with the findings in my paper and has stated that, 'average salinity in the River Murray has in effect improved during the last decade.' The MDBC estimates that due to the salt interception schemes and improved land management practices average salinity has improved by approximately 200 EC units. The MDBC has suggested that a 5 year moving average gives a better indication of the improvement in river salinity concentrations rather than plotting yearly averages. Such a trend is shown in Figure 3. Notwithstanding the MDBC preference for this means of portraying this information as a five year trend, it is not readily available on the MDBC website in this form and the Commission's most recent publication continues to infer an ongoing deterioration in salinity levels[9].

CSIRO Land and Water recently revised the text on its website and replaced the reference to rising salinity with, 'Land and water resource managers in Australia are under increasing pressure to meet stringent environmental guidelines, and the health of river and estuaries is a key factor in the sustainable management of Australia's natural resources.' The organisation fails to acknowledge the improvements in average salinity in the River Murray and instead calls for land managers to 'meet stringent environmental guidelines'.

CSIRO Land and Water appears to have overlooked the improved measured salinity trend. This is evident in a recent summary publication featured on the CSIRO Land and Water website titled, *Is the River Murray Water Quality Deteriorating? A Salinity Perspective*[10] in which it is claimed that:

1. 'There are increasing trends in stream salinity from upland catchments, particularly in NSW' and,
2. 'Over the next 50-100 years, long-term groundwater rises as already seen in the Mallee and the non-irrigated areas of the Riverine Plains will override the benefits gained through the existing measures'.

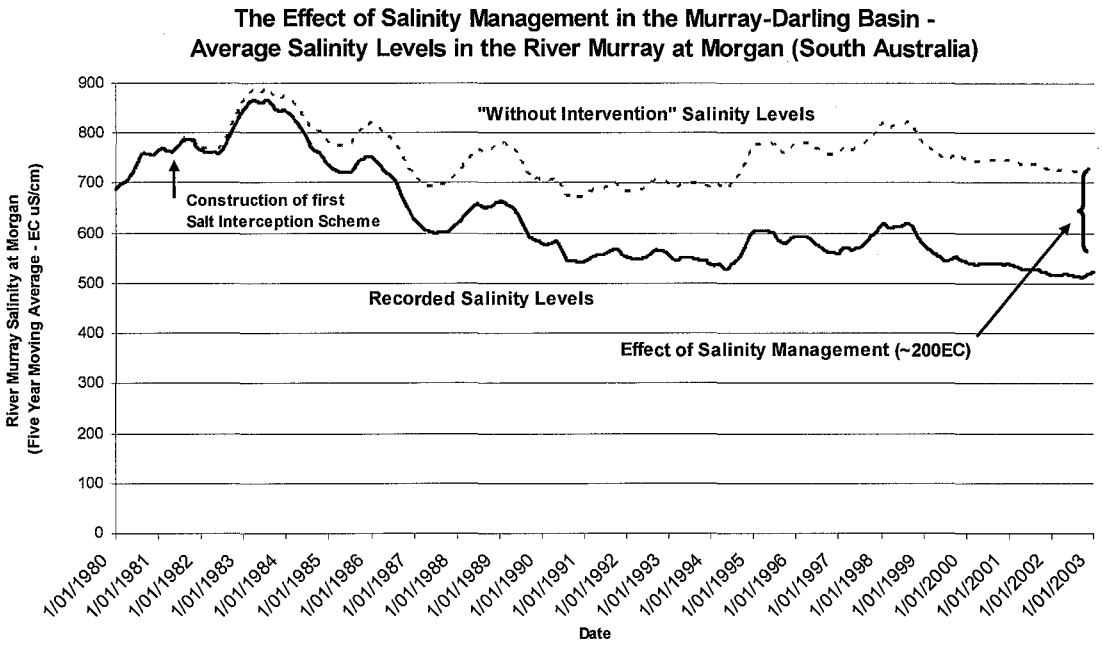
However, these two conclusions in this summary document are not support in the detailed technical papers, also by CSIRO Land and Water, which are cited as providing the supporting information.

The first assertion that there are increasing trends in stream salinity from upland catchments is purported to be based on the *Assessment of Historical Data for the Murray-Darling Basin Ministerial Council's End-of-Valley Target Stations*[11]. This comprehensive study does not use the term 'upland catchment'. If the term is intended to denote catchments in the upper section of the Basin, for example draining into the Darling River, then this conflicts with the data reproduced in Table 2, which shows only 2 of 8 rivers with increasing stream salinity,.

The CSIRO's historical assessment concludes that there was sufficient data to establish stream salinity trends at 16 of 32 'End-of-Valley' target stations. Yet a careful examination of the data at these stations (the data for which is reproduced in Table 2) shows the river salinity trend was not statistically significant at 7 stations, indicated statistically significant rising

salinity at 5 stations and statistically significant falling salinity concentrations at 4 stations,. Interestingly the study suggested that the 'good quality data at Morgan' showed that climatic variability affected EC exceedence curves more than land use or management change.

Figure 3. Salinity at Morgan, Five Year Moving Average



The reference to long-term groundwater rises in the Mallee cites a detailed CSIRO Land & Water technical paper, *Groundwater recharge in the Mallee Region, and salinity implications for the Murray River – A Review*[12]. Findings in this technical paper include, 'The time for the increase in deep drainage to reach the water table is related to the deep drainage rate, the initial watertable depth, and the soil water content within the unsaturated zone. Throughout most of the area, watertables are more than 20m below the land surface, and this time delay is of the order of tens of years. Because much of the Mallee region was cleared between 50 and 100 years ago, watertables should now be rising over much of the region.', however, 'in NSW and Victoria watertable trends have not been determined for most of the Mallee region, in part due to scarcity of data. In South Australia, there is a scarcity of data in crucial areas within 20km of the river.' No data is presented to support a trend of rising groundwater in the Mallee.

Table 41. Table B. Mean (1985-2000) salt output to salt input (SO/SI) of the MDB E-O-V target stations as a ratio and a category, defined by Low, Medium and High (Low < 2, Medium < 4 and > 2 and High > 4). Overall stream EC trend (1975-2000) of the MDB E-O-V target stations and status denoted as "significantly" rising or falling, or if the trend is "not significant" statistically, denoted by (-).

Sites	SO/SI		Trend	
	Ratio	Category	Value (µS/cm/yr)	Status
410130 - Murrumbidgee @ Balranald	0.07	Low	0.3 ± 2.0	-
412045 - Lachlan @ Corrong	N/A	N/A	N/A	N/A
421023 - Bogan @ Gongolgong	0.94	Low	5.5 ± 3.1	Rising
421012 - Macquarie @ Carinda	0.99	Low	2.4 ± 1.9	Rising
420020 - Castlereagh @ Gungalman Bridge	N/A	N/A	N/A	N/A
419026 - Namoi @ Goangra	1.59	Low	-3.7 ± 2.8	Falling
418058 - Mehi @ Bronte	0.19	Low	0.8 ± 5.5	-
416001 - Barwon @ Mungindi	7.69	High	0.0 ± 1.1	-
425008 - Darling @ Wilcannia Mn Ch	0.23	Low	-2.0 ± 2.5	-
421004 - Lachlan River @ Forbes	3.43	Medium	8.7 ± 1.8	Rising
423005 - Cuttuburra Ch @ Turra	N/A	N/A	N/A	N/A
423004 - Warrego River @ Barringun No. 2	N/A	N/A	N/A	N/A
422015 - Culgoa River @ Brenda	0.28	Low	-4.9 ± 2.4	Falling
422012 - Narran River @ New Angledool	0.13	Low	-6.1 ± 3.6	Falling
417204a - Moonie River @ Fenton	N/A	N/A	N/A	N/A
422211a - Ballandool River @ Woolergilla-Hebel Rd	N/A	N/A	N/A	N/A
422209a - Bohkara River @ Hebel	N/A	N/A	N/A	N/A
Briarie Creek @ Woolergilla-Hebel Rd	N/A	N/A	N/A	N/A
424201a - Paroo river @ Caiwarro	N/A	N/A	N/A	N/A
415200 - Wimmera river @ Horsham Weir	N/A	N/A	N/A	N/A

Table continued next page

Table 2. Continued

406203 - Avoca @ Quambatook	N/A	N/A	N/A	N/A
407203 - Loddon @ Laanecoorie	4.51	High	5.1 ±9.7	-
406202 - Campaspe @ Pumps	2.99	Medium	0.4 ± 0.3	Rising
405253 - Goulburn @ Goulburn Weir	N/A	N/A	N/A	N/A
404217 - Broken @ Casey's Weir	N/A	N/A	N/A	N/A
403241 - Ovens @ Peechelba-East	0.98	Low	0.4 ± 0.3	Rising
402205 - Kiewa @ Bandiana	2.34	Medium	0.0 ± 0.2	-
409204 - Murray @ Swan Hill	1.9	Low	-1.8 ± 2.0	-
426510 - Murray @ Lock 6	N/A	N/A	N/A	N/A
426514 - Murray @ Lock 4	N/A	N/A	N/A	N/A
426522 - Murray @ Murray Bridge	N/A	N/A	N/A	N/A
426554 - Murray @ Morgan	0.53	Low	-6.8 ± 3.6	Falling

Source: Table copied directly from Assessment of Historical Data for the Murray-Darling Basin Ministerial Council's End-of-Valley Target Stations. CSIRO Land & Water Report October 2002. pg. 177.

3. IN CONCLUSION

Research institutions and national audits are funded to provide objective and relevant information from which informed management decisions can be made. Yet basic information on the current extent and current trends with respect to dryland and river salinity is not easy to obtain from government funded institutions. Futuristic predictions based on models are useful, but must complement rather than replace measured statistics needed to give an indication of the current situation.

Currently good news stories are generally concealed while impressions of a worsening situation are promulgated. The impression is that key research institutions are preoccupied maintaining the illusion of a 'salinity crisis'.

Yours sincerely

Jennifer Marohasy
Director, Environment Unit

[1] House of Representative Standing Committee on Science and Innovation, Inquiry into coordination of the science to combat the nation's salinity problem. Inquiry Information. August 2003.
[2] House of Representative Standing Committee on Science and Innovation, Inquiry into coordination of the science to combat the nation's salinity problem. Inquiry Information. August 2003.
[3] House of Representative Standing Committee on Science and Innovation, Inquiry into coordination of the science to combat the nation's salinity problem. Inquiry Information. August 2003.
[4] Property Rights to Water – Effects on Agricultural Productivity and the Environment. A. Moran. IPA Backgrounder, June 2003, Vol. 15/3.
[5] The preamble to the Wentworth Group's seminar document a *Blueprint for a Living Continent* begins with the statement, "Salinity and deteriorating water quality are seriously affecting the sustainability of Australia's agricultural production, the conservation of biological diversity and the viability of our infrastructure and regional communities."
[6] An article in *The Economist* on 12th July 2003 began, "The depleted Murray's salt levels are rising, leaving Adelaide, one of Australia's biggest cities, facing a big problem: its water supply will be undrinkable in 20 years unless a way can be found to restore the river to health."
[7] For example, page 66 of *Watershed*: "So just how serious is the plight of the Murray-Darling? Doug Shears, arguably Australia's most powerful agri-businessman and head of Berri Ltd, says it couldn't be more so. 'If the deterioration over the next 20 years is anything like the last, the Murray will be unusable for anything let alone agriculture.' The problem is twofold. There isn't enough water in the system and what is left is rapidly getting brinier and brinier."
[8] Salinity and Drainage Strategy – Ten Years On 1999. MDBC, 1999
[9] Ecological Assessment of Environmental Flow Reference Points for the River Murray System. Interim Report. MDBC. August 2003.
[10] Is the River Murray Water Quality Deteriorating? A Salinity Perspective. C. Charters, M. Stauffacher, G. Walker, T. Hatton. http://www.clw.csiro.au/priorities/salinity/rivermurray/index.html
[11] Assessment of Historical Data for the Murray-Darling Basin Ministerial Council's End-of-Valley Target Stations. Chris Smitt, Ian Jolly, Trevor Dowling, Glen Walker. CSIRO Land and Water, Technical Report 40/02, October 2002.
[12] Groundwater Recharge in the Mallee Region, and salinity implications for the Murray River – A Review. PG. Cook, F.W. Leaney and I.D. Jolly. CSIRO Land and Water, Technical Report 45/01, November 2001.