Supplementary submission to Regional Aust Committee (Supplement to submission number 617)

This updates my original submission (especially the included "Summary Table"), to incorporate the following,

- the MDBA submission (with much additional detail on actual diversions) and evidence to the committee, the MDBA chairs 7 April speech, and, other transcripts and submissions added to the committees website since my original submission,
- show likely total inflows in financial year 2010/11 against the perspective of past financial years especially given the apparent absence of comparative historical data in the other submissions to the committee that I have read,
- a reduced version of material (and other updating) I would have submitted to the committee in person had public hearings not ended.

As the rebound in inflows, dam levels and southern basin river flows began in the second half of 2010 (and continued so strongly in early 2011), they stand out more sharply in financial years than in "calendar year" aggregates shown in my earlier submissions to MDBA and this committee. The black line in the top panel of the following graph shows that (even if no rain fell in May/June) **the "Flow to South Australia" (and to the Murray mouth) in 2010/11 will be the highest since the 1970s** (and the "summary table" shows many other aggregates recovering strongly). The blue lines show the main inflow aggregates published regularly by the MDBA – and which are so difficult to reconcile with totals shown in the "guide" (eg about 9000GL pa for "Total inflows -excluding Menindee and Snowy releases" – compared with 15900 in the Guide for 'Total inflows - excluding Darling'). The brown lines show total diversions for NSW and the total for "NSW, Vic & S.A" – and the orange line adds Queensland for the dozen years data is available. Despite year to year fluctuations, one can discern an upward trend in NSW and Victorian diversions until the late 1990s – when the recent long period of low inflows began.

The lower panel attempts to reduce the impact of short term fluctuations by reverting to 10 year averages – and a longer time period. The longer term growth in NSW and Victorian diversions shows up as the difference between the red and black, and yellow and red lines respectively. The long term downtrend in "flow to SA" is clearly due to diversions upstream. The difference between the two black lines shows how small South Aust diversions are in relation to both the total water flowing to SA – and as a proportion of basin wide diversions. The dotted purple line shows the broadest aggregate one can compile from MDBA data, ie Total inflows, including Menindee and Snowy Mountains releases from Murray 1. It is confusing for the MDBA to publish series for "System Inflows" whose average aggregate levels are smaller than some of their data on "diversions"

As the rapid growth in recent months in 2010/11 "year to date" totals was predictable from water already in the system, my conclusions have not changed. **My original submission focused heavily on apparent flaws in modeling - both economic and streamflow/salinity**. Even although it may not have been picked up by others, there should be no doubt that **modeling underlying figure 8.7 in the guide (Salt exports through the Murray mouth) is flawed** – as it seems based on an assumption that salt "exports" rise in direct proportion to river flows (and ignores salt removed by interception schemes upstream). There is abundant evidence that "on average" higher flows mean lower average salinity (top panel of "graph III" in my original submission). Thus, optimum flows to the Murray mouth could be much less than 7060 and 7745 GL pa suggested in the guides scenarios of cuts of 3000 and 4000GL.



Flows and diversions by financial years

All data in gigalitres in year to June. Inflows data as published in MDBA weekly reports. Diversions data from MDBA submission to Regional Aust committee. Data for 2010/11 assumes no new inflows after mid April, and 20,000ml per day to SA from end April.

I note many others (including bodies/people of considerable standing) have made written and oral submissions to the committee about weaknesses of modeling used in the "guide". I also note ABARES evidence to the committee supported its economic modeling (showing large cuts in water producing small reductions in basin employment) – but find it unconvincing. I acknowledge (ABARES defence) that reduced availability of water would encourage greater

use on crops yielding higher returns - but note other submissions have pointed to some such crops, eg grapes and other fruit, being prone to major price gluts from oversupply.

One could argue about the reliability of models (both economic and water flows) until the cows come home - but some will remain skeptical (often justifiably) no matter how good the models are. In these circumstances, it is unwise to rely on "model results" when there is more easily understood evidence available – as there is with the case for reducing overall diversions from (at least some) basin rivers. My graphs and "summary table" contain some examples.

I am encouraged by statements by the MDBA's new chair about a fresh start to the "guide" and that the next version will be a "starting point" for further discussions with stakeholders. Further, working through the details (including how much engineering solutions may contribute) and alignment with State Govt. water plans will take some years. I hope this committee will emphasize the desirability of a careful considered approach on the basis of the best available objective evidence. It seems to me that **working towards targets for desirable flows at various points in the basin (especially end flows of major tributaries) seems more important than setting SDLs based on long term averages.** It does not make sense to reduce diversion limits to apply in years when water is plentiful. The last decade demonstrated that the critical issues are fluctuations in inflows/availability and how to reduce diversions and/or supply the environment when water is scarce.

On the subjects of shortage and objective indicators, I return to the indicator of system health where there is long run historical data, ie salinity – the subject of the following graph. My original submission noted that excessive salinity and other degradations in the lower Murray and lakes in the decade to 2010 seemed as much due to prolonged low inflows to the system as to excessive diversions (which the SDLs proposed in the Guide would not have stopped – without further cuts in temporary allocations). It also noted that salinity in the lower Murray and Lake Alexandrina had recovered to close to longer term lows by the end of 2010 – well



## Salinity and rainfall

before the peak flows generated by the summer floods in Qld, NSW and Victoria had arrived. These floodwaters washed a lot of long term build up of salt and decayed vegetation into the river, especially in northern Victoria, and produced adverse "spikes" in water quality. However, despite record rains across northern Victoria, the spikes in salinity went to smaller peaks than in earlier years and are now receding. This is despite the proportion of flows coming from the (usually much saltier) Darling being above long term averages and still rising. Thus, salinity in the lower Murray and Lake Alexandrina seems to be in the process of returning to record lows. The graph on the preceding page shows monthly average salinity (microseimens/cm – last plot is for the first half of April) and mm of rainfall in the previous 5 months at some relevant points on the Murray and lower Darling (5 months because it suits the scale and covers the length of the average rain season).

After sharp falls in the middle months of 2010, associated with the initial recovery in flows to the lower lakes, salinity in lake Albert has fallen more slowly. To have such a slow decline (from about 8000 to 6700u/cm) in the 5 months to mid April despite over 9000GL of water flowing past Blanchetown suggests that engineering works need to be part of the solution in the lower lakes (as I believe they should be in many other parts of the basin).

I am also attaching updates of graphs in my original submission most affected by additional data (ie graphs 1, III and V) although some changes are fairly minor. I have changed the scale on the lower panel of graph III to show lake levels, and the recent reductions in salinity at Milang and Poltalock on Lake Alexandrina more clearly - at the expense of the 2007-9 extremes at Goolwa disappearing off the top of the scale. Perhaps it is also worth noting that the "average" seasonal trough in storage levels is normally in (early?) May – yet the total in storages (graph I) continued rising almost throughout 2010/11 – and is around record levels for this time of year. Surely such a strong position suggests that this committee (and the MDBA) has time to fully assess the environmental benefits of the recent rains before the MDBA releases an updated guide – which I fervently hope will contain much more objective historical data and analysis than its predecessor.

As noted previously, I want to see BOTH a healthy river system and communities within it and am happy to assist the committee however I reasonably can. Naturally, this would include traveling to Canberra to attend a meeting of the committee and provide any supporting material may seek.

Rob Foster 18 April 2011

(Copy to MDBA)

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## SUMMARY TABLE



All data in gigalitres. Plotted monthly to end Mar 2011, storage levels to mid April.



All lines with markers show salinity levels in microseimens/cm. Top panel is average in 10 years ending the year shown. Lower panel monthly - last plots are mid Apr 2011. Flow rate in lower panel is days to fill L.Alexandrina. Lake level is mm from 1m above sea level on inverted scale. From 2007 to early 2010 Goolwa levels were above 10,000 (up to 30,000) and would not fit the scale.



Graph V Goulburn and Murrumbidgee flows and storage

Monthly flows and levels in gigaliters. Diversion rate are annual diversions divided by 12. Wagga rainfall is mm in previous 5 months. Last plots for Mar 2011.

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Ш				Murray at Euston	8139	6466	5514	1934	2479	2763	2731	3211	2096	1574	1479	1948	(10700)	01	573		
22				Murray flow to S.A. Murray flow at Blanchetown	6706	6808	5903 5803	1650	1135 1135	2082	1306	2397 1065	1405 056	130	11/5 566	1023	(12500)	V F	22U 645		
2 K	- 31781	13677	5105	Basin total - outflow thru Murrav	/ mouth		2000				DOCT					C 7 O T	(nnnnt)	-		7060	7745
35																	Ca	pac-			
36	,			Water in Storages (end Jun e	sxcept 2011)												nid April i	ty end Ju	Ę		
37				Dartmouth		2122	3092	3214	1148	1858	1717	2487	486	664	804	1252	(2415) (3	1 (906)	672		
80				Hume		1107	1229	551	519	294 257	896 24F	622	385	467	316	796	(0672)	038)	607 274		
500				Victoria		400 4170	0000	292	187	007	045 000	415 090	704	503 E41	241 270	1 E 2 4	(440)	(1/0)	524 500		
41				MDBA dams INCI Menindee		4857	6711	4557	2023	2741	3288	3793	1234	1974	1589	3924	(2655) (9	352) 3	183		
42	1			% of capacity		52%	72%	49%	22%	30%	35%	41%	13%	21%	17%	42%	83%	- m	14%		
43				Burrinjuck		553	412	258	72	404	249	345	319	426	382	421	(1000) (1	026)	329		
4				Blowering		789	860	412	192	88	286	870	395	609	542	744	(1585) (1	631)	500		
45				Eildon		n.a.	1081	711	377	673	940	748	354	474	433	916	(2776) (3	1334) 1	068		
40				Major / dams (listed above) % capacity		0 2	160%	360C 2606	2662	2/CS	4433 2006	260%	140%	100%	180%	200%	313010) (13 820%	543) 4	20%		
48	<u> </u>			vo capacity change (major 7)			0.04	-1496	-2943	0/ C7	859	1056	-3266	718	N.01	-1766	(8532)	ר			
49	1							1	2	5	0			2	]	000	(2000)				
50	,			One indicator of system healt	th - Salinity (Cal	endar y	ears)														
51				at Swan Hill		252	230	131	104	97	115	79	81	71	54	102	275		106		
22				at Morgan		5/4	513	631	473	41/	360	369	510	4/2	506	787	360	- (	448		
2				at Milang (Lake Alexandrina)		1142	n.a.	1049	1159	1327	1348	1168	2003	3956	5448	4194	540	Ż	406		
55	- Notes:	Unless oth	nerwise n	oted, all flows and levels data are	e in gigalitres for t	he year (	ending Ju	ne. Salin	ity is ave	rage daily	/ microse	imens pe	r cm for .	calendar	year. All	data for 2	010/11 is up to	o mid April.			
56		Most data	on actué	I diversions (excl. interceptions) f	from MDBA submi	ssion to	Regional	Australia	committ	ee. 2010/	11 YTD f	rom MDB	A weekly	reports.	Some inc	consitenci	es between com	iponents & t	otals.		
57		Most long	term da	a on flows, storages & salinity tal	ken from an excel	"workbo	ok" supp	ied by M	DBA on 3	0 Novem	ber - in n	esponse t	co a writt	en reque:	st. This h	as been si	upplemented w	here necess	ary		
58		by data	in MDBC	A/MDBA "Murray River weekly rep	ports", annual rep	orts or "I	Drought (	pdates".	"100yea	r+" (& so	me "last	40 years'	') averag	es are ca	lendar ye	ars. Nam	oi & Macquarie	data from N:	SW water.		
59	Updated	mid Apr 1.	1 (some	data still subject to checking/revis	sion). Although ma	any river	flows are	e past the	eir peaks	"year to	date" tot	als for Bl	anchetov	n, "Flow	to S.A". 8	& Bertund	y are still rising	sharply.			

SUMMARY TABLE