Submission Number: 617.2
Date Received: 18/04/2011

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,

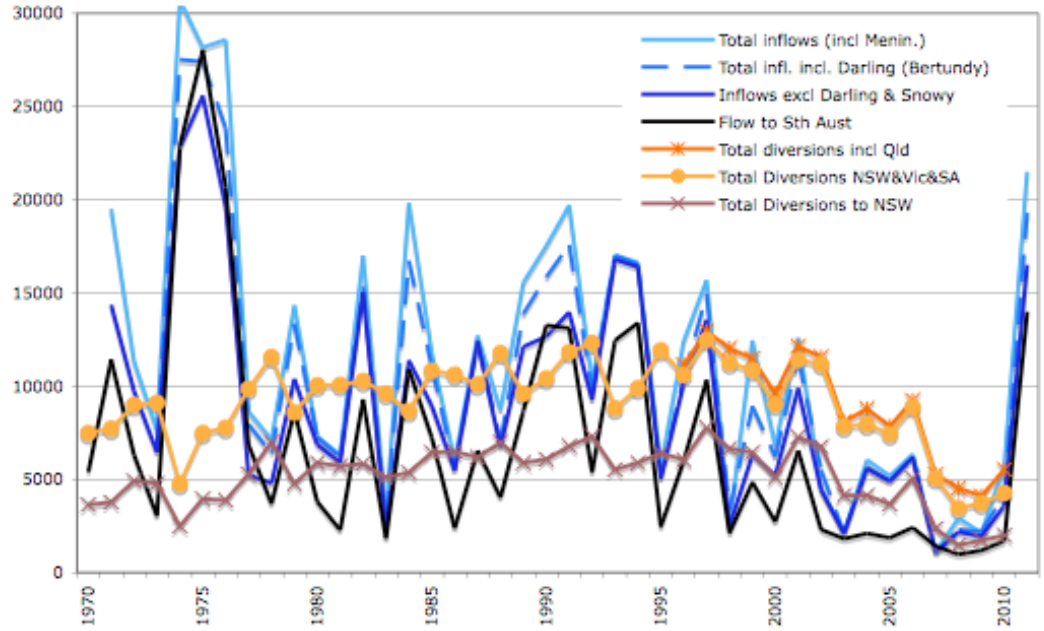
- the MDBA submission (with much additional detail on actual diversions) and evidence to the committee, the MDBA chairs 7 April speech, and, other transcripts and submissions added to the committees website since my original submission,
- show likely total inflows in financial year 2010/11 against the 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.

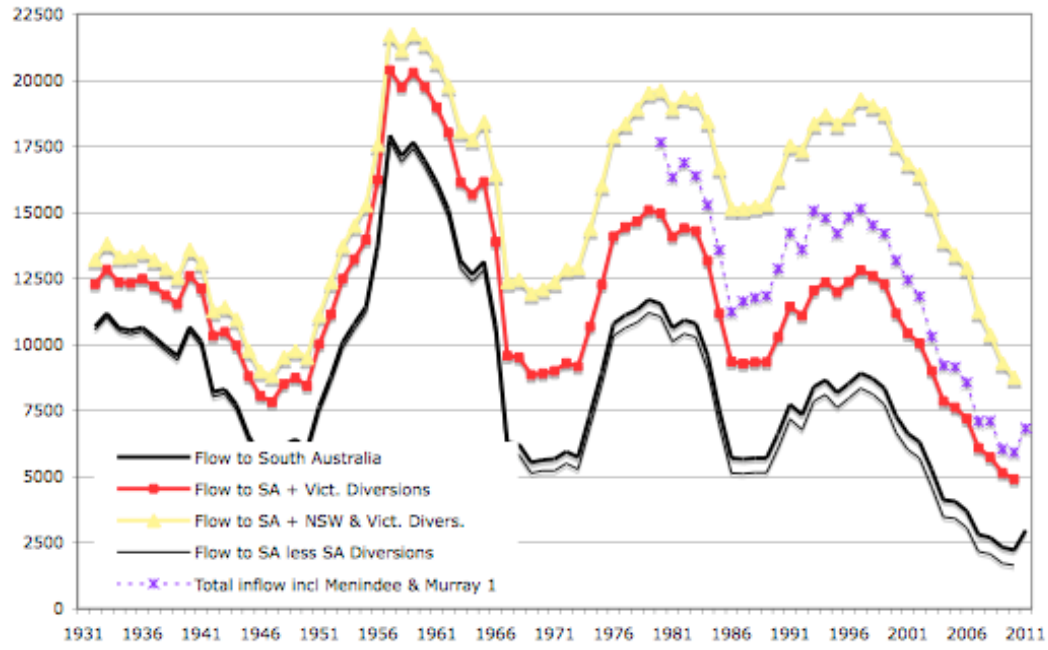
As the rebound in inflows, dam levels and southern basin river flows began in the second half of 2010 (and continued so strongly in early 2011), they stand out more sharply in financial years than in "calendar year" aggregates shown in my earlier submissions to MDBA and this committee. The black line 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.

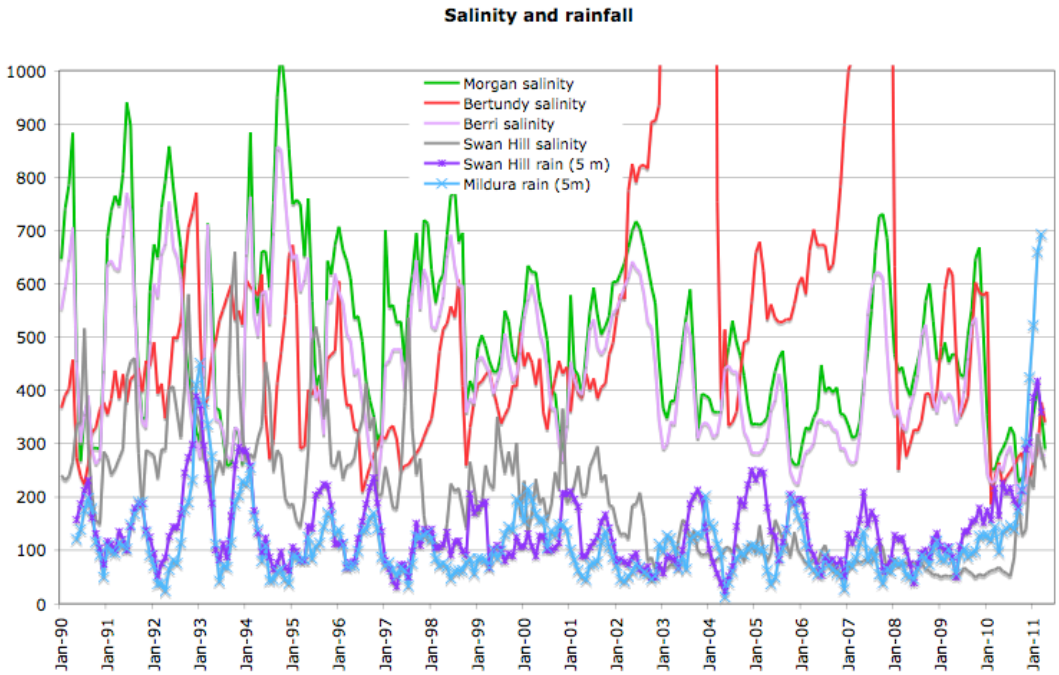
I note many others (including bodies/people of considerable standing) have made written and oral submissions to the committee about weaknesses of modeling used in the "guide". I also note ABARES evidence to the committee supported its economic modeling (showing large cuts in water producing small reductions 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 average**s. 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



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.

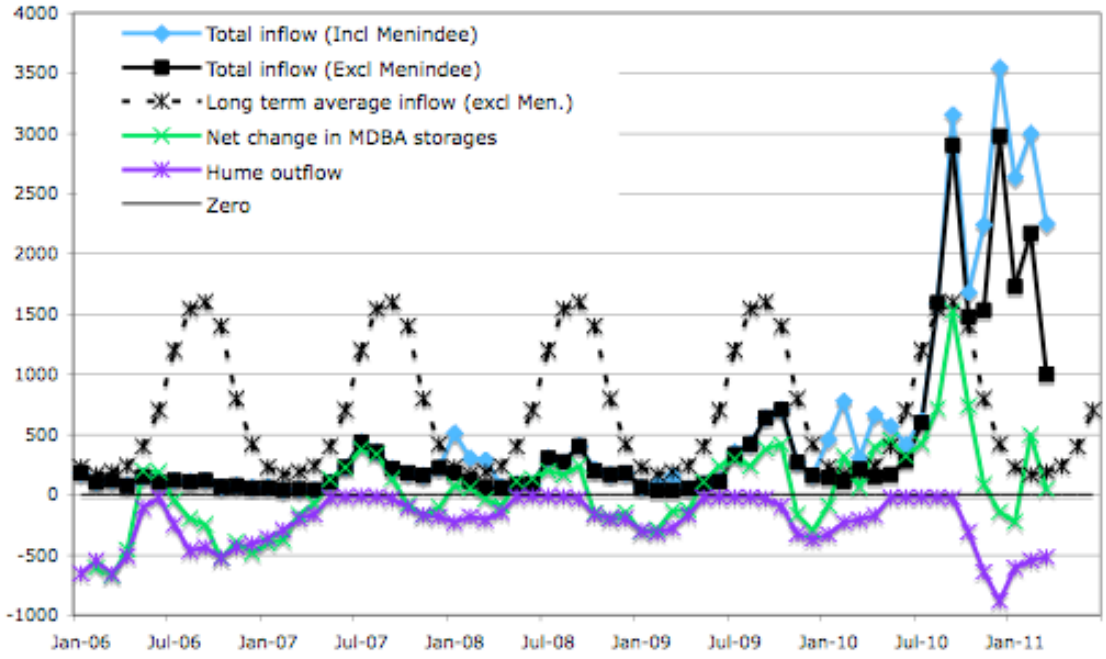
Rob Foster
18 April 2011

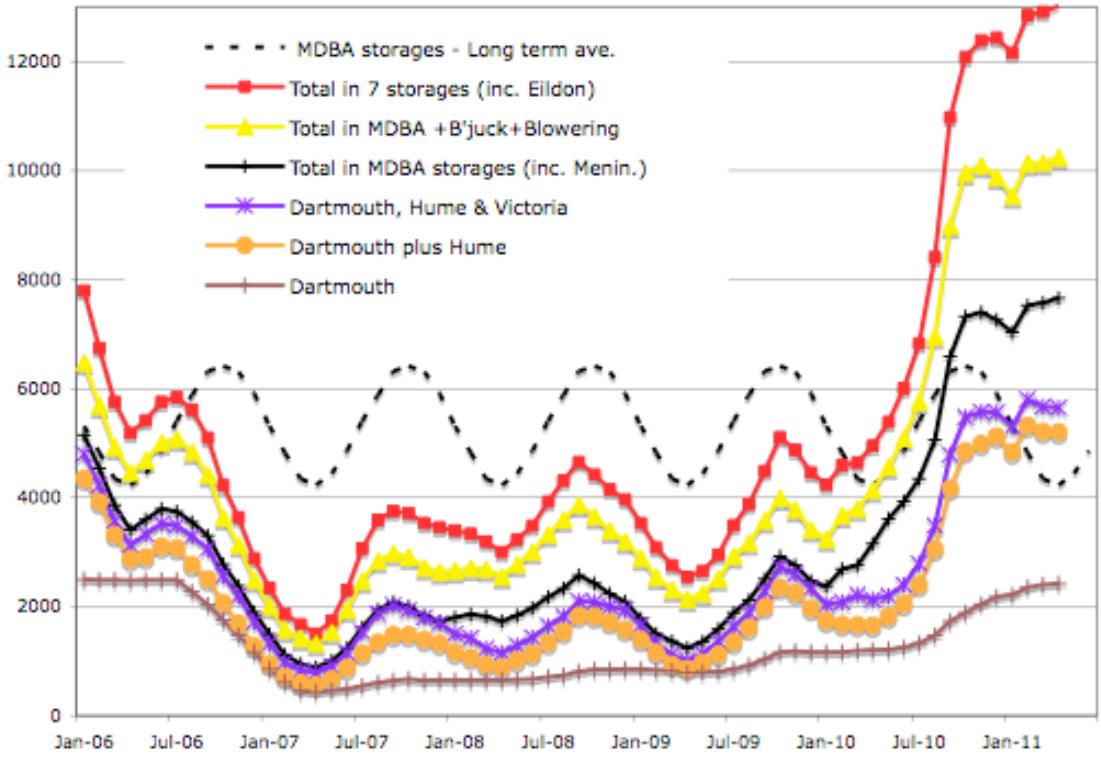
(Copy to MDBA)

SUMMARY TABLE

	A	B	C	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	As per Model used				Last	Last														As proposed for red-	
2	in guide to Plan				100+ yrs	40 yrs	.00/01	.01/02	.02/03	.03/04	.04/05	.05/06	.06/07	.07/08	.08/09	.09/10	.10/11		average	uctions in Diversions	
3	annual	Diversion	flow														YTD (mid April)		2000/10	of 3000gl	of 4000gl
4	inflow	limit	at end	**Inflows**																	
5	15959			Inflows EXcl. Menindee & Snowy.		8930	9898	4423	2085	5563	4878	6173	1067	2170	1928	3586	(16500)		4177		
6				Snowy releases from Murray 1		1234	1210	855	1309	939	1169	1215	1027	711	888	1114	(1430)		1044		
7				Inflows into Menindee		2277	2686	93	52	482	291	171	21	762	181	2180	(5000)		692		
8				Darling flow at Bourke		2830	3525	203	134	761	477	319	22	934	297	2450	(8000)		912		
9			1021	Darling end flow (Bertundy)		1256	1631	1048	23	56	36	16	17	142	267	546	(2700)		378	1276	1316
10	2128		653	to Darling from Namoi (at Walgett)		na	1700	45	32	3	410	200	7	97	116	460	(2500)		307	696	709
11				to Darling from Macquarie (Carinda)		120	na	30	na	na	2	3	2	na	2	3	(300)				
12																					
13				**Diversions in year to June**	(1920-70)																
14		1721		NSW Murray			2070	2113	879	1312	1241	1667	602	244	341	439	(850)		1091	1247	1086
15		1656		Vic Murray (including Kiewa)			1689	1890	1723	1453	1472	1553	1387	784	812	950	(550)		1371	1214	1064
16		665		SA Murray	234	561	662	621	736	607	620	590	626	423	485	480			585	492	433
17		4042		**Total Murray (includes SA)**			4421	4624	3338	3372	3333	3810	2615	1451	1638	1869			3047	2943	2583
18		2061		Murrumbidgee			2747	2348	1793	1775	1618	2200	960	515	602	910			1547	1396	1190
19		1861		Other NSW (Total NSW less Murray & Murrumb.)			2462	2284	1463	1035	807	1171	796	707	786	636			1215	1449	1286
20		5643		Total NSW (Murray, Murrumb.& other)	1592	5228	7279	6745	4135	4122	3666	5038	2358	1466	1729	1985			3852	4092	3562
21		1607		Goulburn			1569	1700	1076	1596	1553	1592	651	684	628	804			1185	1151	992
22		3583		Total Victoria (Murray, Goulburn & other	2444	3411	3461	3824	2965	3252	3136	3252	2090	1555	1503	1809			2681	2601	2281
23		1012		Total Queensland			688	341	214	815	392	316	160	1054	383	1232			560	734	647
24		10942		**Total (sum of above)**	4270	9200	12090	11531	8050	8756	7814	9196	5234	4498	4100	5506			7678	7945	6946
25																					
26				**River flows**	100+ years																
27				Outflow from Hume		4423	4888	3585	4392	3092	2979	3775	3580	1311	1737	1844	(4300)		3118		
28	1804		1708	from Ovens (Wangaratta)	1549	1591	2103	877	362	1379	1254	1465	132	521	424	864	(3400)		938	1716	1717
29	3559		1600	from Goulburn (near Murray)		1374	1109	220	171	494	411	470	146	205	131	184	(2850)		354	1785	1937
30	4791		1593	from Murrumbidgee (Balranald)	1811	1146	589	284	130	123	125	179	172	138	105	187	(2250)		203	2109	2325
31				Murray at Euston	8139	6466	5514	1934	2479	2763	2731	3211	2096	1574	1479	1948	(10700)		2573		
32				Murray flow to S.A.	9029	6808	6543	2294	1799	2082	1850	2397	1405	960	1175	1693	(12500)		2220		
33				Murray flow at Blanchetown			5802	1659	1135	1603	1306	1965	956	430	566	1023	(10800)		1645		
34	31781	13677	5105	Basin total - outflow thru Murray mouth																7060	7745
35																					
36				**Water in Storages (end Jun except 2011)**													mid April	Capac-ity	end Jun		
37				Dartmouth		2122	3092	3214	1148	1858	1717	2487	486	664	804	1252	(2415)	(3906)	1672		
38				Hume		1107	1229	551	519	294	896	622	385	467	316	796	(2790)	(3038)	607		
39				Victoria		455	360	392	287	256	345	415	284	303	241	354	(440)	(677)	324		
40				Menindee		1173	2030	400	70	332	330	269	79	541	228	1522	(2010)	(1731)	580		
41				MDBA dams (NCI Menindee		4857	6711	4557	2023	2741	3288	3793	1234	1974	1589	3924	(7655)	(9352)	3183		
42				% of capacity		52%	72%	49%	22%	30%	35%	41%	13%	21%	17%	42%	83%		34%		
43				Burrinjuck		553	412	258	72	404	249	345	319	426	382	421	(1000)	(1026)	329		
44				Blowering		789	860	412	192	88	286	870	395	609	542	744	(1585)	(1631)	500		
45				Eildon		n.a.	1081	711	377	673	940	748	354	474	433	916	(2776)	(3334)	1068		
46				Major 7 dams (listed above)			7034	5538	2595	3573	4433	5489	2223	2941	2718	4484	(13016)	(15343)	4913		
47				% capacity		n.a.	46%	36%	17%	23%	29%	36%	14%	19%	18%	29%	85%		53%		
48				change (major 7)				-1496	-2943	978	859	1056	-3266	718	-223	-1766	(8532)				
49																					
50				**One indicator of system health - Salinity (Calendar years)**																	
51				at Swan Hill		252	230	131	104	97	115	79	81	71	54	102	275		106		
52				at Morgan		574	513	631	423	417	360	369	510	472	506	282	360		448		
53				at Milang (Lake Alexandrina)		1142	n.a.	1049	1159	1327	1348	1168	2003	3956	5448	4194	540		2406		
54																					
55	**Notes:**	Unless otherwise noted, all flows and levels data are in gigalitres for the year ending June. Salinity is average daily microsiemens per cm for calendar year. All data for 2010/11 is up to mid April.																			
56		Most data on actual diversions (excl. interceptions) from MDBA submission to Regional Australia committee. 2010/11 YTD from MDBA weekly reports. Some inconsitencies between components & totals.																			
57		Most long term data on flows, storages & salinity taken from an excel "workbook" supplied by MDBA on 30 November - in response to a written request. This has been supplemented where necessary																			
58		by data in MDBCA/MDBA "Murray River weekly reports", annual reports or "Drought updates". "100year+" (& some "last 40 years") averages are calendar years. Namoi & Macquarie data from NSW water.																			
59	Updated mid Apr 11 (some data still subject to checking/revision). Although many river flows are past their peaks, "year to date" totals for Blanchetown, "Flow to S.A". & Bertundy are still rising sharply.																				

Graph I **Inflows and storage levels**

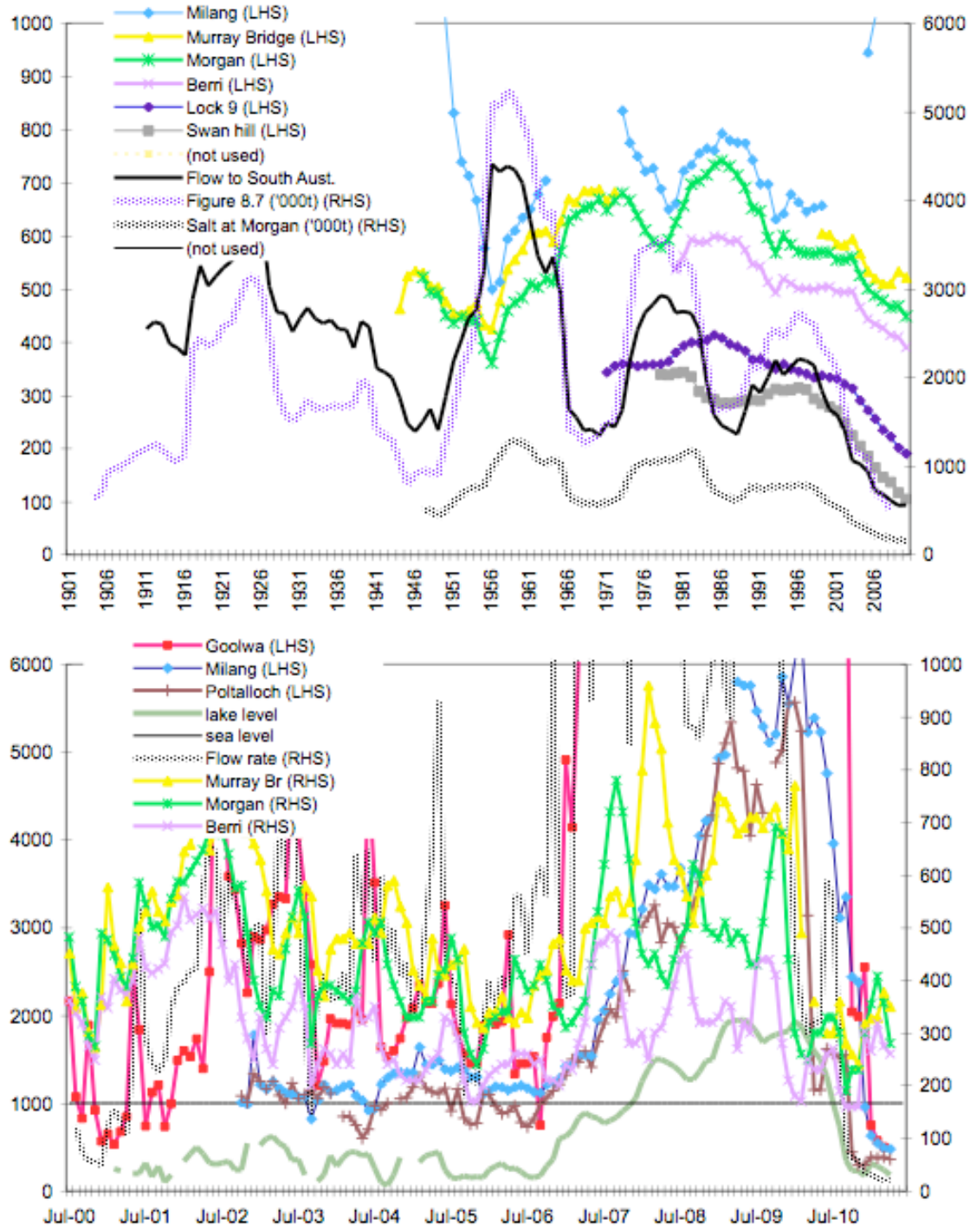




All data in gigalitres. Plotted monthly to end Mar 2011, storage levels to mid April.

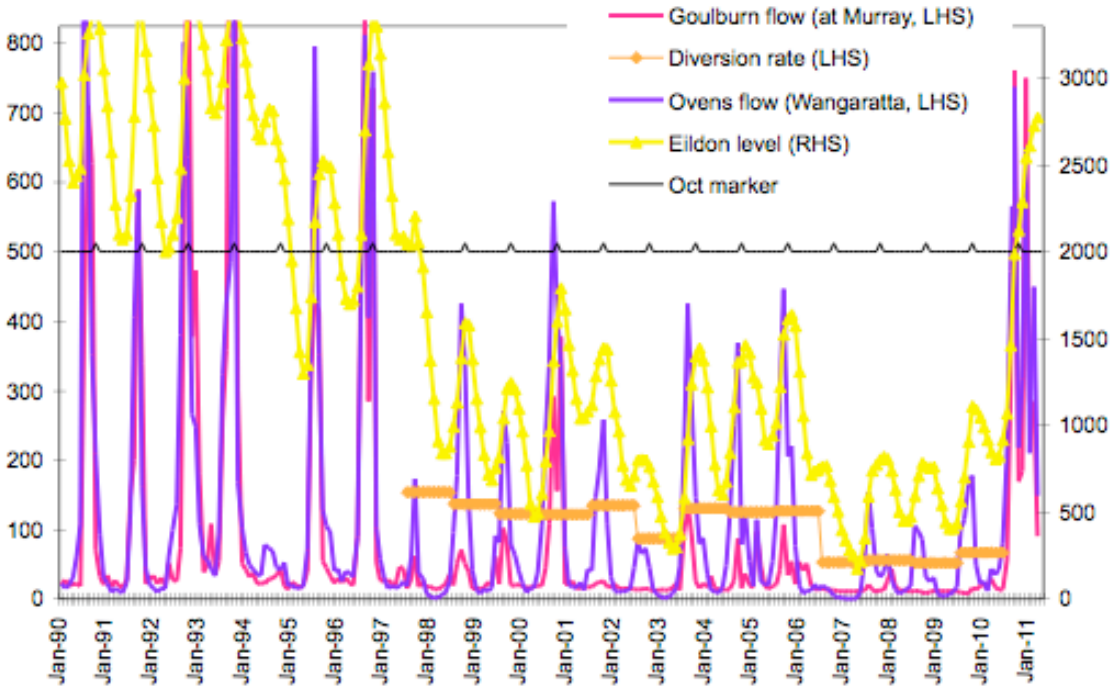
Graph III

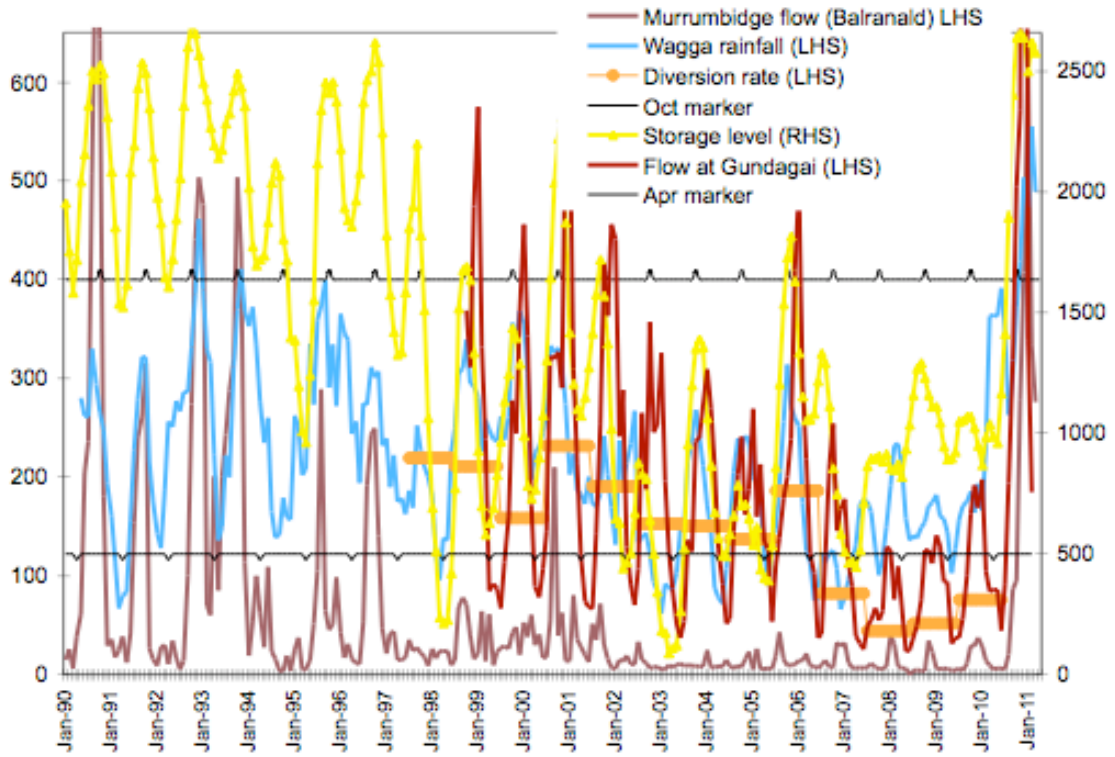
Salinity



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.

SUMMARY TABLE

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3	annual	Diversion	flow														YTD (mid April)		.2000/10	of 3000gl	of 4000gl
4	inflow	limit	at end	**Inflows**																	
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9			1021	Darling end flow (Bertundy)		1256	1631	1048	23	56	36	16	17	142	267	546	(2700)		378	1276	1316
10	2128		653	to Darling from Namoi (at Walgett)		na	1700	45	32	3	410	200	7	97	116	460	(2500)		307	696	709
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16		665		SA Murray	234	561	662	621	736	607	620	590	626	423	485	480			585	492	433
17		4042		**Total Murray (includes SA)**			4421	4624	3338	3372	3333	3810	2615	1451	1638	1869			3047	2943	2583
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23		1012		Total Queensland			688	341	214	815	392	316	160	1054	383	1232			560	734	647
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29	3559		1600	from Goulburn (near Murray)		1374	1109	220	171	494	411	470	146	205	131	184	(2850)		354	1785	1937
30	4791		1593	from Murrumbidgee (Balranald)	1811	1146	589	284	130	123	125	179	172	138	105	187	(2250)		203	2109	2325
31				Murray at Euston	8139	6466	5514	1934	2479	2763	2731	3211	2096	1574	1479	1948	(10700)		2573		
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33				Murray flow at Blanchetown			5802	1659	1135	1603	1306	1965	956	430	566	1023	(10800)		1645		
34	31781	13677	5105	Basin total - outflow thru Murray mouth																7060	7745
35																		Capac-			
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38				Hume		1107	1229	551	519	294	896	622	385	467	316	796	(2790)	(3038)	607		
39				Victoria		455	360	392	287	256	345	415	284	303	241	354	(440)	(677)	324		
40				Menindee		1173	2030	400	70	332	330	269	79	541	228	1522	(2010)	(1731)	580		
41				MDBA dams INCl Menindee		4857	6711	4557	2023	2741	3288	3793	1234	1974	1589	3924	(7655)	(9352)	3183		
42				% of capacity		52%	72%	49%	22%	30%	35%	41%	13%	21%	17%	42%	83%		34%		
43				Burrinjuck		553	412	258	72	404	249	345	319	426	382	421	(1000)	(1026)	329		
44				Blowering		789	860	412	192	88	286	870	395	609	542	744	(1585)	(1631)	500		
45				Eildon		n.a.	1081	711	377	673	940	748	354	474	433	916	(2776)	(3334)	1068		
46				Major 7 dams (listed above)			7034	5538	2595	3573	4433	5489	2223	2941	2718	4484	(13016)	(15343)	4913		
47				% capacity		n.a.	46%	36%	17%	23%	29%	36%	14%	19%	18%	29%	85%		53%		
48				change (major 7)				-1496	-2943	978	859	1056	-3266	718	-223	-1766	(8532)				
49																					
50				**One indicator of system health - Salinity (Calendar years)**																	
51				at Swan Hill		252	230	131	104	97	115	79	81	71	54	102	275		106		
52				at Morgan		574	513	631	423	417	360	369	510	472	506	282	360		448		
53				at Milang (Lake Alexandrina)		1142	n.a.	1049	1159	1327	1348	1168	2003	3956	5448	4194	540		2406		
54																					
55	**Notes:** Unless otherwise noted, all flows and levels data are in gigalitres for the year ending June. Salinity is average daily microseimens per cm for calendar year. All data for 2010/11 is up to mid April.																				
56	Most data on actual diversions (excl. interceptions) from MDBA submission to Regional Australia committee. 2010/11 YTD from MDBA weekly reports. Some inconsitencies between components & totals.																				
57	Most long term data on flows, storages & salinity taken from an excel "workbook" supplied by MDBA on 30 November - in response to a written request. This has been supplemented where necessary																				
58	by data in MDBCA/MDBA "Murray River weekly reports", annual reports or "Drought updates". "100year+" (& some "last 40 years") averages are calendar years. Namoi & Macquarie data from NSW water.																				
59	Updated mid Apr 11 (some data still subject to checking/revision). Although many river flows are past their peaks, "year to date" totals for Blanchetown, "Flow to S.A". & Bertundy are still rising sharply.																				