Kalbar Fingerboards Heavy Mineral Sand Project

Woodward family – IAC Reference Material.

Presentation Tables, Graphs & Information:

Table 7-1 *– Appendix A - Ground Water & Surface Water Impact Assessment - Conceptual Surface Water Management Strategy & Water Balance'*

Table 7-1 Comparison of climate change projections (climate scenario RCP8.5)

	DELWP (2016)[2]			CSIRO (2015)		
Parameter	**10th percentile**	**50th percentile**	**90th percentile**	**10th percentile**	**50th percentile**	**90th percentile**
Location	Mitchell River basin			Southern Slopes - Victoria East		
Baseline period	1975-2014			1986-2005		
Projection year	2040			2030		

Table 7-1 Comparison of climate change projections (climate scenario RCP8.5)

	DELWP (2016)[2]			CSIRO (2015)		
Parameter	**10th percentile**	**50th percentile**	**90th percentile**	**10th percentile**	**50th percentile**	**90th percentile**
Temperature (°C)	1	1.3	1.5	0.5	0.8	1.1
PET (%)	3.1	4.7	5.7	2.2	4.3	6.1
Rainfall (%)[1]	4.3	-2.3	-9.7	5	-1	-8
Runoff (%)[3]	10.4	-11	-26.3	Approx. 0	Approx. -10	Approx. -20

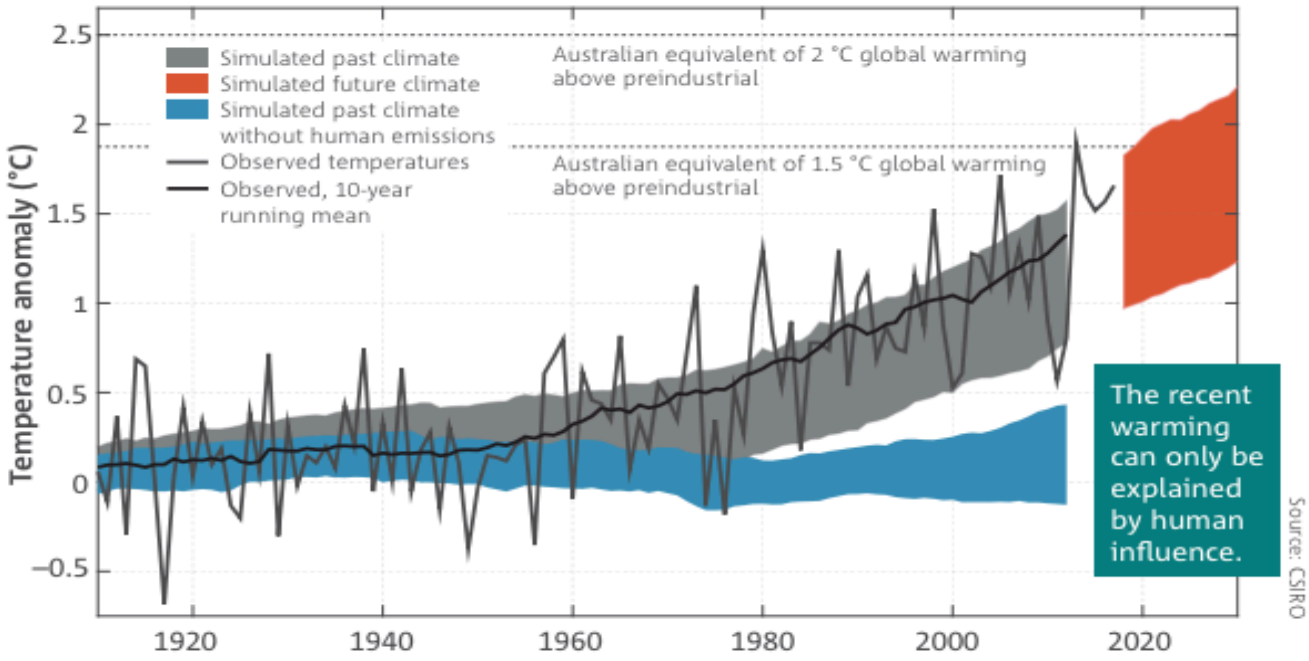
Notes:

1. DELWP (2016) presents 10th percentile rainfall projections as 'wetter' conditions, while CSIRO (2015) presents 10th percentile as 'dryer' conditions.
2. Climate change projections represent a low (10th percentile), medium (50th percentile) and high (90th percentile) impact on water availability from climate dependent sources.
3. CSIRO (2015) reports a decrease in runoff as *high confidence* but recommends that further hydrological modelling would be required to develop reliable runoff statistics

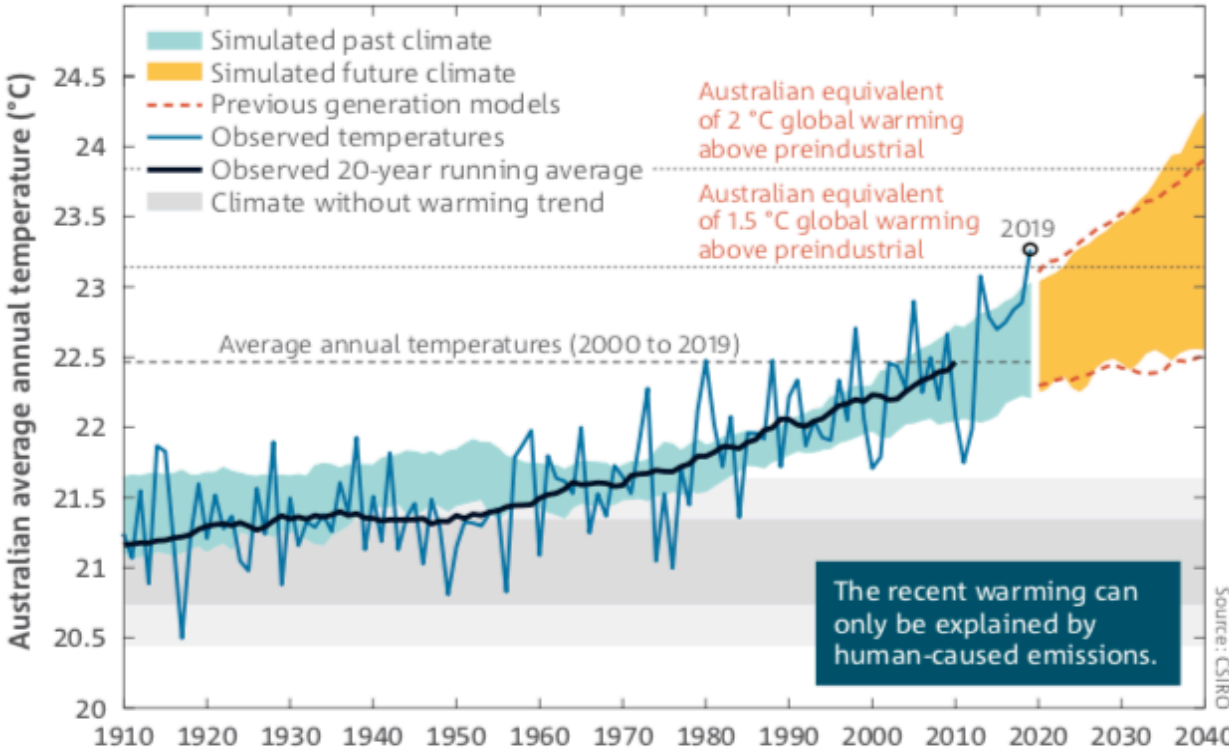
Is the mine factoring climate change properly? The DELWP data suggests that there will be a temperature increase of (1.5 degrees x 88%* = 1.32 degrees by 2037) Is the 1.32 degree temperature rise that will occur from 2016 to 2037 factored in to the EMM modelling calculations regarding water availability?

**Note - DEWLP data provided makes a projection for 2040, however the mine will wind up in 2037 – therefore you can only factor the temperature increase predicted for 22 of 25 years (2016-2037) - this is 22 of the 25 years (between 2016 & 2040) or 88%*

Graph 1 & 2 – *CSIRO State of the Climate report 2018 & 2020*

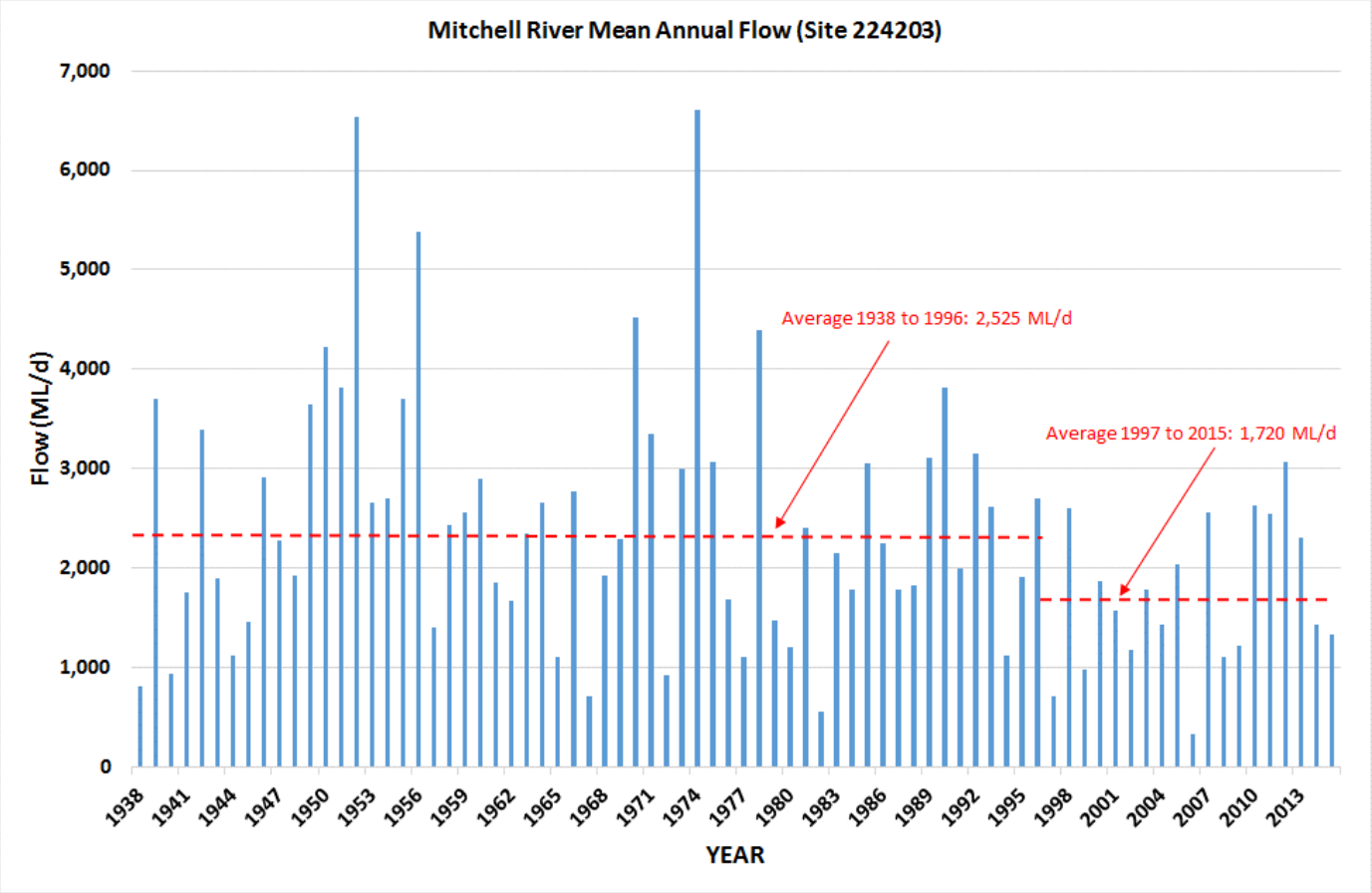


Continued rise in temperature anomaly 2020 to 2030 - shown in red



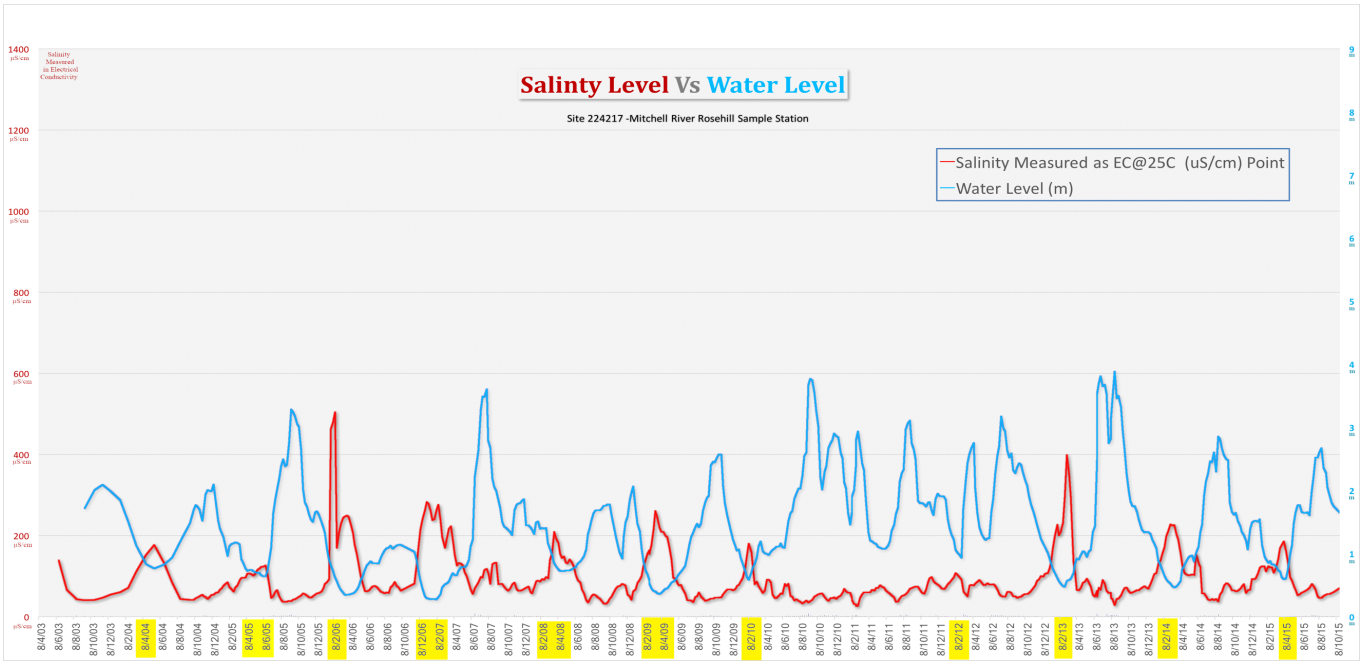
Continued rise in average temperature 2020 – 2040 shown in Yellow, Black dotted lines represent Australian equivalent of Global warming thresholds.

Table 2 - EGW - Annual Water Outlook – Dec 2016 to Nov 2017 (showing declining flow).

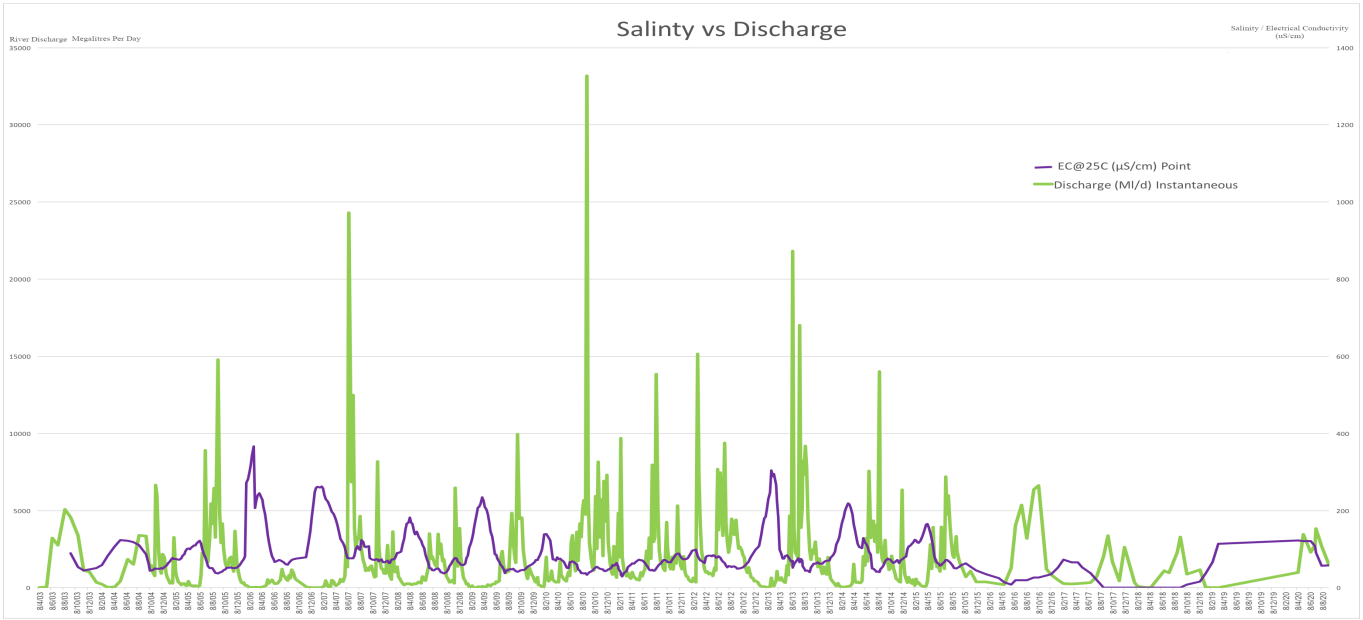


The table above shows Mitchell River 'annual flow averages' as nearly halving over a 60 + year period.

<u>Graph 3 & 4</u> – Data taken from DEWLP's (data.water.gov).
Using the closest & most consistent station to the East Gippsland Downstream enterprises – Rosehill Station 2003 - 2020

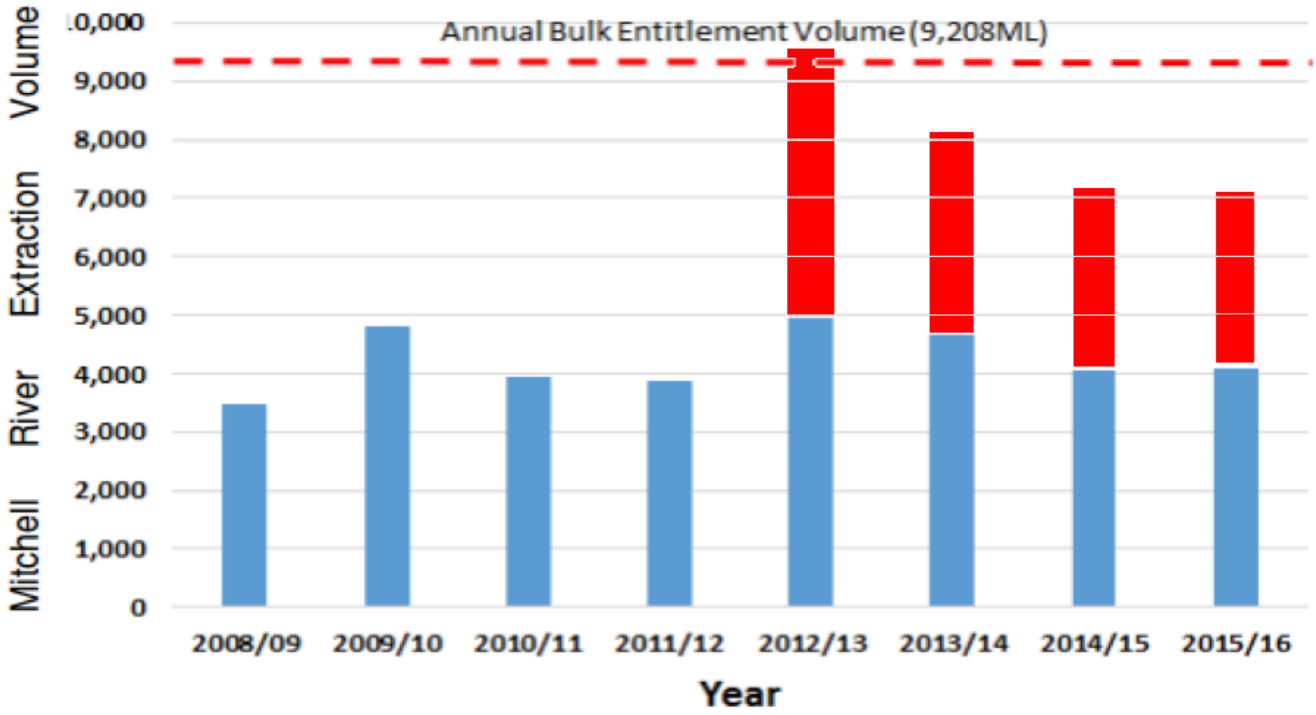


When water drops below average levels, salinity spikes! Yellow highlighted months (across bottom axis) show a pattern in dates with the Rivers Saltiest Months almost always 'December – March'. Remembering that it is the following months from April to November that also prove critical



*The same applies for Graph 2, with a direct correlation shown (water green, salinity purple).**However Data collected for these graphs are not downstream, data samples were taken above rock barrier where salinity levels <u>are not</u> as extreme as the downstream section of river**, yet we still see many months approaching WHO drinking water cut-off standards. All graphs show 13 years of data.*

Graph 5 - Kalbar EES - 35_Appendix_A006AppF_Surface water assessment regional study using EGW own Graph to show take and use comparison.



As you can see if Kalbar's start-up was initiated in 2012/13 their extractions would hypothetically place EGW's headroom for capacity, over & close to limits.

Table 3's (grouped) - Water Watches citizen science program capturing Mitchell River Salinity at the Wy-Yung bridge from 2004 - 2018

Mitchell River - Lind Bridge EG_MIT540

East Gippsland | Mitchell River | Mitchell River | Mitchell River | 24_4 Mitchell River

11 results found (Displaying 1 - 11)

Details

18-08-2018
09:00am
Approved

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
		192.4	7.64	0.08	9.5	9.6		10

Habitat data

Bank Erosion Stability	Bank Vegetation	In Stream Cover	Riffles Pools Bends	Verge Vegetation	Overall
Good [4]	Poor [4]	Fair [6]	Good [4]	Good [8]	26

21-07-2018
09:15am
Approved

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
		1642	7.57	0.09	11.8	10.2		5

21-04-2018
10:00am
Approved

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
		1450	7.54	0.1	22.5	21.8		13

Habitat data

Bank Erosion Stability	Bank Vegetation	In Stream Cover	Riffles Pools Bends	Verge Vegetation	Overall
Good [4]	Poor [4]	Fair [6]	Good [4]	Good [8]	26

27-07-2004
15:00pm
Approved

Creature data

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
		1790	7	0.015	13	8		10

05-05-2004
07:45am
Approved

Creature data

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
	7	2920	7	0.015	10	12	0.11	10

01-05-2004
10:22am
Approved

Creature data

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
	3.8	1714	6.5	0.015	10.5	12.5	0.11	15

20-04-2004
06:34am
Approved

Creature data

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
	2.3	22500	7	0.14	7.5	13	0.28	10

02-04-2004
06:40am
Approved

Creature data

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
	3.5	25340	7.5	0.08	15	18	0.14	10

14-04-2004
17:37pm
Approved

Creature data

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
	4.9	19410	7.5	0.08	20.5	20.5	0.14	10

25-10-1999
09:30am
Approved

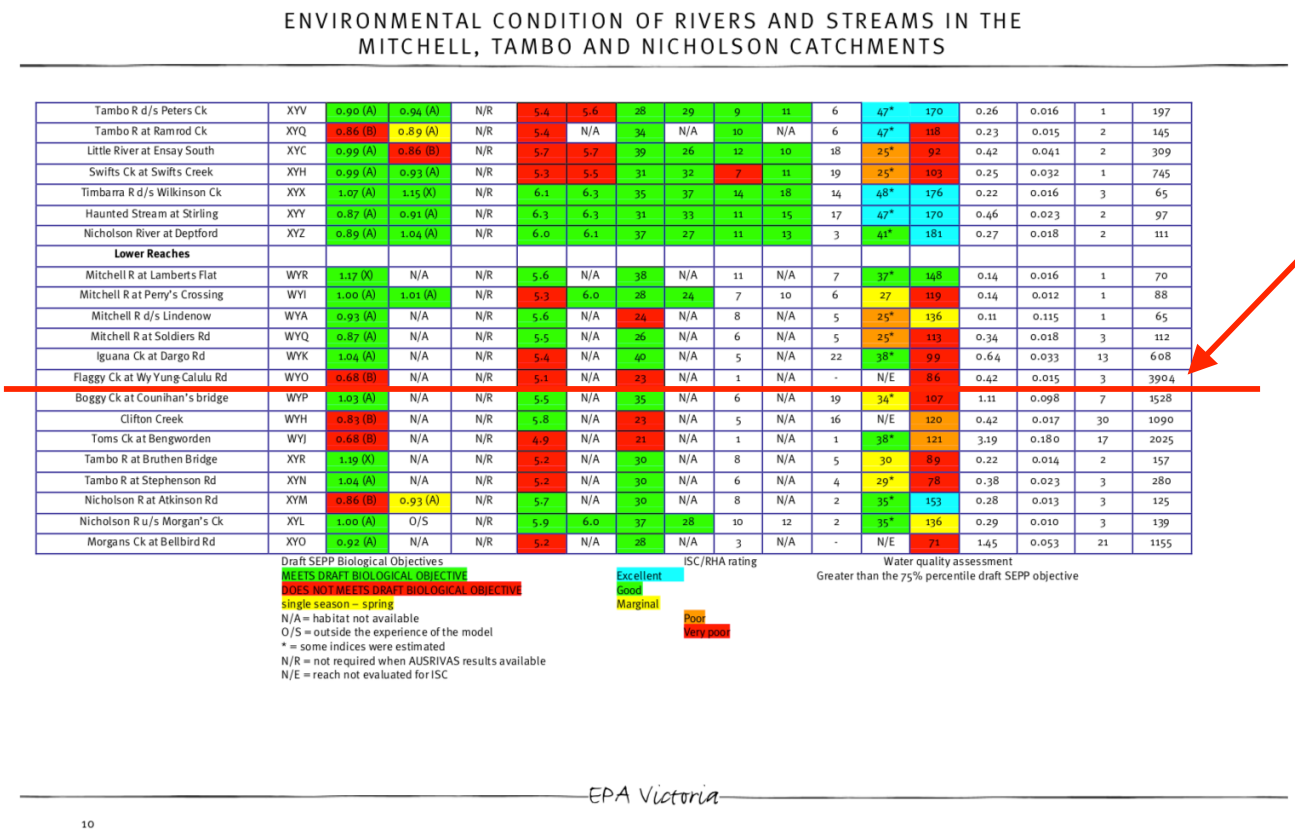
Creature data

Phys chem data

D.O. %	D.O mg/L	EC µS/cm	pH pH Units	rP mg/L P	Air ° C	Water ° C	P mg/L	Turb NTU
76	7.6	1310	6.4	0	14	15.2	0.025	10

Of 11 samples taken between 1999 & 2004 only one delivered a measurement that was drinkable (800 – 1500 microseimens). The four most saline samples were taken, (as highlighted earlier) between the problem months of December to March. (measured in EC uS/cm).

Table 5 – EPA - ENVIRONMENTAL CONDITION OF RIVERS AND STREAMS IN THE MITCHELL, TAMBO AND NICHOLSON CATCHMENTS , Publication 853



ENVIRONMENTAL CONDITION OF RIVERS AND STREAMS IN THE MITCHELL, TAMBO AND NICHOLSON CATCHMENTS

Tambo R d/s Peters Ck	XYV	0.90 (A)	0.94 (A)	N/R	5.4	5.6	28	29	9	11	6	47*	170	0.26	0.016	1	197
Tambo R at Ramrod Ck	XYQ	0.86 (B)	0.89 (A)	N/R	5.4	N/A	34	N/A	10	N/A	6	47*	118	0.23	0.015	2	145
Little River at Ensay South	XYC	0.99 (A)	0.86 (B)	N/R	5.7	5.7	39	26	12	10	18	25*	92	0.42	0.041	2	309
Swifts Ck at Swifts Creek	XYH	0.99 (A)	0.93 (A)	N/R	5.3	5.5	31	32	7	11	19	25*	103	0.25	0.032	1	745
Timbarra R d/s Wilkinson Ck	XYX	1.07 (A)	1.15 (X)	N/R	6.1	6.3	35	37	14	18	14	48*	176	0.22	0.016	3	65
Haunted Stream at Stirling	XYY	0.87 (A)	0.91 (A)	N/R	6.3	6.3	31	33	11	15	17	47*	170	0.46	0.023	2	97
Nicholson River at Deptford	XYZ	0.89 (A)	1.04 (A)	N/R	6.0	6.1	37	27	11	13	3	41*	181	0.27	0.018	2	111
Lower Reaches																	
Mitchell R at Lamberts Flat	WYR	1.17 (X)	N/A	N/R	5.6	N/A	38	N/A	11	N/A	7	37*	148	0.14	0.016	1	70
Mitchell R at Perry's Crossing	WYI	1.00 (A)	1.01 (A)	N/R	5.3	6.0	28	24	7	10	6	27	119	0.14	0.012	1	88
Mitchell R d/s Lindenow	WYA	0.93 (A)	N/A	N/R	5.6	N/A	24	N/A	8	N/A	5	25*	136	0.11	0.115	1	65
Mitchell R at Soldiers Rd	WYQ	0.87 (A)	N/A	N/R	5.5	N/A	26	N/A	6	N/A	5	25*	113	0.34	0.018	3	112
Iguana Ck at Dargo Rd	WYK	1.04 (A)	N/A	N/R	5.4	N/A	40	N/A	5	N/A	22	38*	99	0.64	0.033	13	608
Flaggy Ck at Wy Yung Calulu Rd	WYO	0.68 (B)	N/A	N/R	5.1	N/A	23	N/A	1	N/A	-	N/E	86	0.42	0.015	3	3904
Boggy Ck at Counihan's bridge	WYP	1.03 (A)	N/A	N/R	5.5	N/A	35	N/A	6	N/A	19	34*	107	1.11	0.098	7	1528
Clifton Creek	WYH	0.83 (B)	N/A	N/R	5.8	N/A	23	N/A	5	N/A	16	N/E	120	0.42	0.017	30	1090
Toms Ck at Bengworden	WYJ	0.68 (B)	N/A	N/R	4.9	N/A	21	N/A	1	N/A	1	38*	121	3.19	0.180	17	2025
Tambo R at Bruthen Bridge	XYR	1.19 (X)	N/A	N/R	5.2	N/A	30	N/A	8	N/A	5	30	89	0.22	0.014	2	157
Tambo R at Stephenson Rd	XYN	1.04 (A)	N/A	N/R	5.2	N/A	30	N/A	6	N/A	4	29*	78	0.38	0.023	3	280
Nicholson R at Atkinson Rd	XYM	0.86 (B)	0.93 (A)	N/R	5.7	N/A	30	N/A	8	N/A	2	35*	153	0.28	0.013	3	125
Nicholson R u/s Morgan's Ck	XYL	1.00 (A)	O/S	N/R	5.9	6.0	37	28	10	12	2	35*	136	0.29	0.010	3	139
Morgans Ck at Bellbird Rd	XYO	0.92 (A)	N/A	N/R	5.2	N/A	28	N/A	3	N/A	-	N/E	71	1.45	0.053	21	1155

Draft SEPP Biological Objectives
MEETS DRAFT BIOLOGICAL OBJECTIVE
DOES NOT MEETS DRAFT BIOLOGICAL OBJECTIVE
single season – spring
N/A= habitat not available
O/S = outside the experience of the model
* = some indices were estimated
N/R = not required when AUSRIVAS results available
N/E = reach not evaluated for ISC

ISC/RHA rating
Excellent
Good
Marginal
Poor
Very poor

Water quality assessment
Greater than the 75% percentile draft SEPP objective

EPA Victoria

10

In 2002 the EPA also ran salinity measurements through the way of River Condition Report. Out of the publications 45 test sites the highest reading in relation to the Mitchel was at Wy-Yung – Calulu rd creek.- the water being undrinkable.