Murray Futures – ***Lower Lakes & Coorong Recovery.***

Submission *–Securing the Future - A Long- Term Plan for the Coorong, Lower Lakes and Murray Mouth*, Draft for public comment 2009, and including comments from *Lake Alexandrina Fish Risk Assessment (LAFRA)* 2009.

Introduction:

The premise from the ***DEH*** supplied documents is based on a freshwater solution and deals only with impacts on the post-barrage environment and its biota. This is clearly defined in 'the commission' shown at the bottom of the document (***LAFRA***) page V111 of the Executive Summary.

In further evidence of the above.
Page iii of the Executive Summary says: "Emerging from this work, the key strategy for this site for the future is to return adequate supplies of fresh water. No other strategy provides a long term future which preserves to any extent the values of the site."

However, page 57 of the same document indicates that modelling was contracted out to WBM and the concept they dealt with was saltwater intrusion to raise the lake level with ASS suppression as the primary motivation.

We believe:

The WBM modelling indicates a 'raise and hold' concept with no thought of tidal exchange over time.

Where flow restrictions of the river Mouth are mentioned, **the concept of greater tidal flow over time is ignored.**

The mixing **value of tidal flow** is not considered but **seiching** does receive a mention in the paper, although it does not appear to impact on the modelling, **as it should**.

The figures of loss in fresh water flow scenarios mentioned on page 57 of the document (***LAFRA***) of 150 GL/yr at the lakes will require 696 GL/yr across the upstream border suggests some additional loss along the way, which today, remains un-accounted for. **It must therefore be accounted for!**

This suggests that the water loss from the river as a delivery mechanism still hasn't been investigated, and purchased water may well be disappearing into aquifers and coming out somewhere else such as at sea or is being pumped out as part of the salt interception scheme.

Several pages refer to native fish species and flood responses. In one example on page 76 (***LAFRA***), flood responses for Golden Perch seem to expect recruitment

from lake spawning but elsewhere, the upstream movement is recognised. The whole Golden Perch scenario does not recognise or mention upstream migration or downstream drift of pelagic fry.

Many species which are on the edge of distribution in the lakes are treated as a 'must save here' instead of considering the use of the freshwater to enhance better habitats upstream for species e.g. (Mogurnda, River Blackfish and other Riverine and backwater species). Cod do better in the river and those in the lakes now are at the 'bottom end' of where they should be, and not unlike other fish in some areas of the lakes, they also struggle with extreme salinity gradients.

To try to maintain these species in a very unstable and marginal lake environment is wasting freshwater which should maintain river habitat.

ECu gradients in Lake Alexandrina have peaked excessively on several recent occasions. For example, February 2008 near the barrages at 34000 ECu's and at similar levels in February 2009 from the same region. The Clayton and Goolwa channel areas were slightly lower for the same periods at mid 25000 ECu's which are **still extremely high** when considering the need to sustain remaining freshwater species.

The concept of making the lakes tidal does not mean that all native freshwater fish must be lost from the lakes, with the introduction of seawater.
Saltwater intrusion into the lakes initially, is likely to push species northward towards freshwater inflows. The modelling indicates a slow progression of salinity northwards into the face of freshwater inflows.

It is likely that this scenario would push freshwater fish through a well designed permanent weir at Wellington. Furthermore, it is not impossible for carp to be selected out at the weir given the researched travel behaviour differences of European carp and native fish.

The location of a weir at Wellington demonstrates the impractical mindset displayed throughout the documents. Additional to the need in permanency, it is likely that any 'temporary weir' at Pomamda Island would be left in place for a very long time given the broad range of flow figures used in modelling and elsewhere in the documents.

Modelling deals with flows of 150GL/yr, 250GL/yr and 350GL/yr, recognised as worse case scenarios. These ranges are likely and realistically close to what we will get, yet pages 39 and 40 of the *Futures Paper* say that 3,500Gl/yr is more like the required figure. Any idea's of a 'temporary weir' is therefore **optimistic to the extreme**. There is a huge gap between the science coming from the two agencies and their scientific thinking here!

A weir at Wellington needs to be permanent and well constructed to carry a lock and a fishway. It is quite possible to incorporate a carp trapping mechanism to trap this noxious species that are trapped in the lake, as they attempt to re-enter the river during times of low flow. The weir should be placed at Wellington, just downstream of the ferry where the structure needs to span less than 300 m of river width.

The reality of a weir with a lock is that the volume of freshwater needed to support freshwater in the lower lakes, to provide additional through-mouth flows and at the same time, maintain a healthy river wetlands system including billabongs and

backwaters is not available and cannot in practice become available **without severely compromising storage mechanisms throughout the MDB system.**

For the rivers health, and its wetlands, we need to conserve what water we can get from the MDB within the river itself, and exhaust the system into a **tidal managed** lake through a weir/lock at Wellington. With an estuarine lakes system, future lakeside development can accommodate any sea-level rises as a result of climate change progressively, instead of being faced with the sea being held back until catastrophic failure through further weakening of the aging lower lakes barrage system. **This possibility must be acknowledged as the barrage engineering is in poor repair.**

In consideration of tidal mixing in the lakes, if the lakes were an average 3m depth and there were a rise and fall of 30cm with each tidal change, that's **10% of the water body exchanged for each tidal period. This is significant exchange and far exceeds the exchange that would be required to prevent increasing salinity!**

Generally:

It appears that the documents have been developed as a result of a selection process of proposals and concepts from previous documents that are likely heavily biased by individuals' opinions, or perhaps even by a single opinion.

The flow chart, Step 9.2 on page 50 of '*Securing the Future*' indicates the process of a reject bin at each step with no mechanism for retrieval as either conditions change or better science/information/knowledge is sourced. **It is incomprehensible that there is no re-appraisal mechanism.**

Page 82 of the '*Securing the Future*' document clearly indicates that the concept of using tidal flow to scour silt from the mouth and channels leading to the barrages, **has not been understood**. Quoted modelling deals with the introduction of seawater through the barrages to increase lake depth and volume, **but only as a single event** and even though it considers tidal exchange, it appears to ignore wind seiche. Wind speed and direction resulting from changes in the weather in this region impact on water movement throughout both widely exposed lakes, and influences flow between the lakes as well as providing cyclic changes to tidal flows.

It is crucial to understand tidal wave pressures and flows that occur in several directions throughout both lakes and using these wind driven sea water flows daily as a major component towards clearing the system and sustaining an estuarine feature.

The writers below have discussed this with the **DEH Director** for the region during June 2009.

Page 38 of '*Securing the Future'* once again indicates and quotes modelling but repeated results provided suggest that the same static modelling has been used and referred to over and over again rather than a programmed series of models. This is purely an assumption but it is no more or no less than what modelling represents anyway.

The assumption that seawater in the lakes would not produce a healthy estuary is an end answer when the **effect of tidal flow has not been considered** in modelling. **The entire document therefore deals only with a freshwater solution in mind.** The inadequacy of this approach is deafening!

Sadly, it appears that South Australian authorities have either failed or have elected not to keep abreast with other Australian precedents with acid sulphate soils and seawater solutions. The most recent concerning a paper '*Remediation of coastal acid sulfate soils by tidal inundation' and the effectiveness and geochemical implications*.' By S Johnson, A Keene, R Bush, E Burton and L Sullivan.

The inundation work was carried out over 5 years at Trinity Bay near Cairns by *CRC Care* as a National Demonstration site. This acid crisis started in the 1970's and only now with the introduction of tidal seawater have they managed to arrest the situation. http://www.crccare.com/view/index.aspx?id=42370

The government's freshwater solution requires the exclusion of sea water by the barrages. The document does recognise that there are **sea level rises** forecast as a result of climate change. The barrages were built a long time before any thoughts of sea level rises resulting from climate change. They were not designed to withstand large level differences on either side of these structures as they do today.

The time-frame of 100 years was used recently by a decision of the Supreme Court relating to development plans in a near coastal environment. The development was refused because sea level rises within the next 100 years would threaten the development.

The barrages and the natural lay of the land could be predicted to be over-topped by sea water within the next 100 years. A sudden flooding event would be the expected outcome with catastrophic consequences for lakeside communities.

The reality is, **if the lakes were to become tidal as a management option now**, sea level rises would be a gradual process which would be dealt with progressively with development, and not make the area more vulnerable as is suggested at the bottom of page 82 of the *Murray Futures 'Securing the Future'* document.

Economics:

Currently, the average cost when purchasing water rights throughout the Murray Darling Basin is $2,400-00 per megalitre or $2.4 million dollars/GL (Advertiser Dec 19 2009).

Given it would currently need about 1000 GL to reach the Lower Lakes to fill them, that represents $ 2.4 billions worth of water and currently, there may be no water at all because much of the trading has dealt only in 'the rights' with no water until it flows.

When considering paying $2.4 billion dollars for enough water to fill the lakes, we must realise that the possible water is likely only found in the middle to upper reaches of the MD Basin and if some water does eventuate, then a significant percentage of that water will be lost along the river as it makes its way downstream. Page 57 of the document *LAFRA* recognises that.

Once in the lakes, it is subject to dispersal over a very large area resulting in an evaporation loss of 700 GL/ or more in a single year. That's 70% of our original $2.4 billion dollars worth lost to evaporation for ever.

If the $ 2.4 billion was to deliver 1,000 GL to the lakes, and we know that this can't be the case because we only bought the water rights, then the water still has to come down the river sometime in the future, and only if we actually receive any! Buying water rights without the tangible water is ridiculous to the extreme. In itself, it is destroying much of the basin today, and undermining the countries financial stability. If purchasing of water rights were to result in water being delivered to the lakes, then that would still be lost to evaporation at rates described previously.

There is an incorrect expectation of enough water to exhaust the system through the Murray Mouth via the barrages, being additional water volumes to maintaining the lakes. The amount of water likely to become available in the future cannot support a freshwater lakes solution. To suggest flow volumes sufficient to exhaust the system through the mouth is absurd.

Pages 50 and 51 of the '*Murray Futures - Securing the Future'* document indicate that any course of action has to fall within a **$200 million dollar** budget bracket.

That amount would fail abysmally and would only gain, on today's water rights figures, about 84 gigalitres which would mostly be lost to evaporation anyway, notwithstanding it would not entirely reach the lakes.

Trying to maintain a freshwater solution for the lakes etc when costs are more than ten times over the prescribed budget, and that's just for buying the water rights, without allowing for any other costs for 'interdependent and complementary items as part of the package, with an emphasis on the total site,' is ridiculous**.**

'And that's for just one year with no guarantee of water at all!

Furthermore, such a purchase for the Lower Lakes does not aid the Riverine Wetlands at all, whereas additional real water and not just 'rights' is needed for them to have any chance!

Future:

That real water can only come from a plan of action which uses fresh water in the river and **exhausts the river periodically into a tidal managed Lake System**.

Interestingly, page 82 of the '*Murray Futures –Securing the Future*' document, under sub-heading 'desalination' shows an example scenario how desalinated water lost to evaporation from the lakes would have a value in the order of $1 billion dollars.

Taking this one step further, imaginary water from purchased water rights in the same situation with the same volume would cost a good deal more than that.
Wasting freshwater in the lakes cannot and must not be sustained!

There are suggestions on pages 39 and 40 of the same document of the need for a flow rate of 3,500 GL per annum flow**. To suggest that we can achieve that target and maintain it is optimistic in the extreme when today we cannot find 10% of that volume.**

In canvassing the subject further, and referring to page 57 of the '*Fish Risk Assessment paper.* Where a target 150 GL into the lakes (worst case scenario) is suggested, would require 696 GL to reach the South Australian border, this means that the economics of buying water for filling the lower lakes becomes un-imaginably many billions of dollars.

Above all, South Australian cannot continue to pick away at the edges of our fresh water supplies. Neither can the state government continue to hide behind a false premise that our water woes can endure long enough until it rains and flows into the lower MDB region, for it will not in the foreseeable future.

Regardless, the loss of precious freshwater into the lower Murray lakes can only be stopped by adding one further barrier to the end of the river so that we can manage the very last drop of our fresh water. Only together, with an estuarine lakes system in place to gradually blend with the Coorong; to return that to a pre-barrage era when the region was recognised as a successful alternating estuarine system, will we see a return to a healthy lower river and lakes system.

We have sadly discovered that our scientists differ considerably when it comes to sound science of this region. The emotions and one-sidedness behind much of the processes of remediation has not been useful, particularly when seeking reasonable and beneficial media with this crisis. The public deserve better than that!

The success of remediation will only endure from sound, fully recognised science throughout. It won't be possible where stop-gap measures and cherry picking continues and where it is aided and abetted by those who have ulterior motives.

The authors herein make it known that the above submission is part of our wider presentation and therefore must be read holistically in conjunction with our previous submissions. Our research shows that to be relevant, DEH needs to do a whole lot more urgent analysis of the supplied subject data throughout the 'Futures' series.

South Australia must move on with this crisis!

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