

APPENDIX B (1)

SUMMARY

The Case for the Coorong South Lagoon Salinity Reduction Strategy

Urgent, important action.

Aim: habitat restoration in the Coorong South Lagoon by pumping hypersaline water out to the Southern Ocean.

1. Severely degraded environment (very high salinity, no fresh water inputs, salinity getting worse); very important component of Ramsar-listed wetland.
2. This has caused a drastic change in ecology:
 - a. salinity is well above levels tolerated by keystone species (**180 ppt** in summer, even above 200 ppt in 2007, compared to historic levels less than 100 ppt, and seawater 36 ppt) .
 - b. well-documented changes in plant, chironomid, fish, bird species; changed ecology (species now present vs formerly present).
3. Keystone species: several are now missing from the South Lagoon
 - a. plant *Ruppia tuberosa* (tolerates 100 ppt, plus needs adequate water levels , which are dropping)
 - b. chironomids (midges) (tolerate up to 120 ppt)
 - c. Small mouth hardyhead fish (tolerates up to 120 ppt)
 - d. *Note that all of these are food for birds*
4. Threatened species in decline – a prime example is the fairy tern, which is now listed as vulnerable on the IUCN red list (largely due to reduced breeding in the Coorong South Lagoon).
5. Solution
 - a. Pump hypersaline water out to sea, to “reset” the system
 - b. Target salinity levels: 100 ppt summer / 60 ppt winter
 - c. Will take up to 2 years to bring salinity to target levels, if we start in summer 2009 – 2010.
 - d. Alternatives are too costly or take too long* (immediate action needed), and are not really alternatives: the pumping program is necessary as well.
 - e. Monitoring of physical environment (salinity and water levels) and biology will be needed (keystone species and bird populations)
 - f. Re-establishment of keystone spp is expected to occur from Coorong North lagoon refuges (*Ruppia* may need a revegetation program)
 - g. Beyond the “reset” point: need to monitor (salt, water levels, ecosystem biology), and might need to restart pumping to keep salinity near target levels (would need to set a trigger salinity level for re-starting pumping)
6. Consequences of delay
 - a. Ecological consequences of delay are significant:
 - i. substantially decreased likelihood of success in habitat restoration (progressive loss of habitat restoration potential from refuges in the North Lagoon)

- ii. increased pumping time required to reach target salinity levels
 - iii. consequent increased risk of loss of threatened species
 - b. Financial consequences
 - i. Increased cost due to longer pumping time required before targets are reached
7. Supporting documents:
- a. Brookes, J.D. et al (2009) *An Ecosystem Assessment Framework to Guide Management of the Coorong*. CLLAMMecology Final report
<http://www.clw.csiro.au/publications/waterforahealthycountry/cllamm/CLLAMM-Final-Report-Ecosystem-Assessment.pdf>
 - b. Brookes, Justin D., Rogers, Daniel J., Aldridge, Kane T., Deegan, Brian, Hipsey, Matthew R., Paton, David C., Ganf, George G., Rolston, Alec, Webster, Ian and Noell, Craig. *Managing the Lower Lakes and Coorong*. Submitted to Marine and Freshwater Research.
 - c. Paton, David C., Rogers, Daniel J., Aldridge, Kane, Deegan, Brian and Brookes, Justin. (2007) *A future for the Coorong and Lower Lakes*. *Pacific Conservation Biology* 15, 7-10.

* "Alternative" ways to restore Coorong South Lagoon habitat:

freshwater flow over barrages

(very costly to purchase and availability very uncertain in the short term)

freshwater flow from Upper SE drainage (lower amounts and not available in short-term)

note that in both of these cases it will be extremely difficult to restore the South Lagoon habitat without the removal of hypersaline water, either beforehand or at the same time, i.e. the pumping program is necessary for habitat restoration to occur. This conclusion can be clearly drawn from numerous modelling scenarios run by the CLLAMMecology research team.