Salinity Inquiry
Submission No. 26

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COOPERATIVE RESEARCH CENTRE FOR
FRESHWATER ECOLOGY

17 October 2003

The Committee Secretary
House of Representatives Standing Committee
On Science and Innovation
Suite R1-116
Parliament House
Canberra ACT 2600

Dear Sir or Madam,

Inquiry into the coordination of the science to combat the nation's salinity problem

Attached please find the CRC for Freshwater Ecology's submission to the above enquiry for the Standing Committee's consideration.

If you have any further enquiries regarding this matter please contact Associate Professor Ralph Ogden on 6201 5168.

Yours sincerely,

Prof Gary Jones
Chief Executive

Encl.

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Submission to the House of Representatives Inquiry into the co-ordination of the science to combat the nation's salinity problem

prepared by Daryl Nielsen, Amanda Kotlash and Ralph Ogden

This is a submission from a freshwater R&D organisation, the Cooperative Research Centre for Freshwater Ecology (CRCFE). We limit our discussion to principles for the better use of science to inform the management of salinity impacts in our rivers and freshwater wetlands.

A) Use of salinity science base and research data

Salinity problems are best solved by applying scientific knowledge at a regional scale.

Salinity problems are best solved by applying scientific knowledge at a regional or landscape level. High salinity in soils and water may occur locally but the lateral movement of salt through surface and subsoil water flow means that local salinity problems often require a regional solution. Salinity generated in terrestrial parts of a catchment may enter waterways through lateral movements in run-off and groundwater. Once saline water enters an aquatic system it might be diluted, but salinity can also increase as water evaporates, leaving salts behind. This can increase salinity in waterways, particularly in wetlands. Knowledge about the nature of lateral salt fluxes can provide a basis for improved salinity management schemes.

Employ adaptive management practices – they contribute valuably to our knowledge base

Our present knowledge-base needs to be improved to better serve resource managers tackling a wide range of salinity-related problems. We need to observe the responses of biota and processes within aquatic ecosystems when rehabilitation actions are implemented. We strongly recommend 'adaptive management' approaches, where an effort is made to evaluate the success of specific management actions, having regard to the lags between actions and improvements that often occur with salinity. Adaptive management uses a scientifically designed monitoring program to evaluate the effects of actions.

B) Linkages between those conducting research and those implementing salinity solutions.

Support the development of dedicated knowledge exchange programs to help salinity research inform resource management.

A number of research organisations (including the CRCFE) have undertaken or are conducting salinity research. The knowledge generated by salinity researchers is initially produced as scientific papers – a format that is not readily accessible to resource managers. It is vital that this knowledge be made available in easily interpreted formats for both the scientific and the non-scientific community.

The CRCFE has developed a dedicated knowledge exchange program that links scientific research to management outcomes and community needs. Similar programs operate in some other organizations, and we recommend that this approach be more widely adopted by salinity research organizations. The aims of knowledge exchange are 1) to distil the key findings from a range of scientific research projects, 2) to deliver them to resource managers or the community in a useable format, and 3) to provide feedback to researchers about the needs of managers and community groups. In the CRCFE, knowledge exchange activities are carried out by a team of 'knowledge brokers', in conjunction with researchers.

For knowledge exchange to be successful it is necessary to know how resource managers gain knowledge from water 'experts'. We have found that resource managers obtain knowledge from the *first credible source they can access and trust* (Cullen et al. 2001). Our knowledge brokers work with stakeholders to establish the credentials of the CRCFE as an 'honest broker' of quality advice on freshwater systems, and to ensure that our advice and products are readily available.

The CRCFE has produced one review on the impacts of salinity on freshwater systems (Nielsen and Hillman 2000); a second review, on salinity management, is to be released soon.

C) Adequacy of technical and scientific support

To improve our capacity to manage salinity we need to better understand how it affects biota and processes in aquatic systems.
Focus on:

- *juveniles (animals) or early developmental stages (plants)*
- *key processes driving aquatic ecosystems*

Most of the research effort into salinity within Australia has been directed at predicting the effect of increasing salinity on agricultural systems, where the problem has been felt the most. Management of salinity in aquatic ecosystems is less well studied, but there is increasing demand for knowledge about salinity management in freshwater systems. A taskforce on salinity and biodiversity established by the Australian and New Zealand Environment and Conservation Council has predicted that by the year 2050 more than 40,000 km of waterways and associated wetlands will have significantly elevated salt levels (ANZECC 2001).

Threshold levels for salinity impacts on freshwater biota have been set, based on consumptive use or where significant impacts on the environment will occur (MDBC 1999). So far these have been based on knowledge about adult or mature forms of the biota – there is too little information on the effects of salinity on earlier developmental stages, such as eggs and juveniles, for generalisations to be made. However, the limited data available suggest these early developmental stages are at greatest risk from increased salinity. For example recent CRCFE research has shown that larvae of Murray cod are 5–10 times more sensitive to salt than adults (Chotipuntu, in review). There are also few data on how salinity interacts with processes driving aquatic ecosystems, such as carbon and nutrient cycling (Nielsen *et al.* in press). Of particular interest are the effects of increasing salinity on the overall integrity of river ecosystems – plant and animal production, nutrient dynamics and food web structure.

References

ANZECC (2001) Implications of Salinity for Biodiversity, Conservation and Management. Report prepared by a Taskforce on Salinity and Biodiversity. (Australian and New Zealand Environment and Conservation Council: Adelaide)

Chotipuntu, P. (in review). Salinity sensitivity in the early life stages of an Australian freshwater fish, Murray cod (*Maccullochella peelii peelii,* Mitchell 1838). PhD thesis submitted to the University of Canberra for review.

Cullen, P., Cottingham, P., Doolan, J., Edgar, B., Ellis, C., Fisher, M., Flett, D., Johnson, D., Sealie, L., Stocklemayer, S., Vanclay, F. & Whittington, J. (2001) Knowledge seeking strategies of natural resource professionals. *CRC for Freshwater Ecology Technical Report* 2/2001. (on http://freshwater.canberra.edu.au > Publications > Technical reports)

MDBC (1999) *The Salinity Audit.* Murray-Darling Basin Commission, Canberra.

Nielsen, D.L., Brock, M.A., Rees, G.N. & Baldwin, D.S. (in press) The effect of increasing salinity on freshwater ecosystems in Australia. *Australian Journal of Botany* (accepted 2003).

Nielsen, D.L. & Hillman, T.J. (2000) *The status of research into the effects of dryland salinity on aquatic ecosystems*. CRC for Freshwater Ecology Technical Report 4/2000. (on http://freshwater.canberra.edu.au