Desalination and Water Treatment
www.deswater.com
1944-3994 / 1944-3986 © 2009 Desalination Publications. All rights reserved.
doi: 10.5004/dwt.2009.264

2 (2009) 325–333
February

Hindcasts of the fate of desalination brine in large inverse estuaries: Spencer Gulf and Gulf St. Vincent, South Australia

Jochen Kämpf[a], Craig Brokensha[a], Toby Bolton[b]

[a]*School of Chemistry, Physics and Earth Sciences;* [b]*School of Biological Sciences, Flinders University, PO Box 2100, Adelaide, SA 5001, Australia*
Tel. +61 8 8201 2214; Fax: +61 8 8201 2905; email: jochen.kaempf@flinders.edu.au

Received 20 August 2008; Accepted 20 October 2008

ABSTRACT

Two major reverse osmosis seawater desalination plants are planned for construction in Spencer Gulf and Gulf St. Vincent, South Australia. A state-of-the-art and carefully calibrated hydrodynamic model (COHERENS) is employed to predict the fate of desalination brine in these sheltered inverse estuaries. In this study, we assume that the brine discharged has a salinity being twice that of ambient gulf water. Findings demonstrate that, owing to slow flushing, the upper reaches of these gulfs are the most unsuitable discharge locations and that, owing to particularly weak neap tides, discharge water can attain high concentrations of >10% (1/10 dilution) and a salinity excess of >5 psu within 100 m distance from the discharge location. Apart from salinity effects, the damage that desalination brine will have on the marine and benthic ecology of South Australian gulfs will crucially depend on the water quality (e.g. levels of dissolved oxygen and other chemicals) of water discharged.

Keywords: Seawater desalination; Brine discharge; Inverse estuary; Hydrodynamic modelling; Flushing time

* Corresponding author.