



SOME BIOLOGICAL EFFECTS FROM  
WARM EFFLUENT WATER DISCHARGED FROM  
THE TORRENS ISLAND POWER STATION

by

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### Summary

The Torrens Island Power Station is built on the estuary of the Port Adelaide River. It discharges, into Angas Inlet, warm effluent water which, under the present operating conditions, can be up to 10.7°C above ambient. This has produced water temperatures in excess of 35°C in the inlet.

The possible biological effects of the discharge have been investigated by a number of authors but none of these concentrated on the crustacea which inhabit the receiving waters. This study was, therefore, primarily an investigation of the effects which the effluent had on some of these animals.

A study of the distribution of the blue crab Portunus pelagicus revealed that the animal was sparsely distributed throughout the upper reaches of the estuary, including the thermally-affected regions. The temperature regimes were considered and they suggested that the pattern of distribution of the blue crab was not determined by the warm water from the Torrens Island Power Station.

An investigation into the sources of food for P. pelagicus indicated that the mussel Modiolus inconstans was an important part of the crab's diet in the study area. The distribution of the mussel itself was locally affected by the effluent. On the basis of available data, however, this did not influence the distribution of P. pelagicus.

A number of temperature-tolerance studies were conducted with P. pelagicus. They suggested that the blue crab had an ultimate upper incipient lethal temperature near 39.0°C. Together with the other thermal requirements which the experiments revealed, this indicated that under current operating conditions the Torrens Island Power Station did not raise outlet water temperatures to levels which were lethal to P. pelagicus.

The seasonal abundances of the prawn Penaeus latisulcatus and the shrimp Leander serenus were affected by the warm water. In late summer the density of P. latisulcatus became greater in the discharge zone than in any other part of the study area. Data were too scant, however, to suggest how this might affect the local population of prawns.

During 1974 L. serenus exhibited an "attraction in winter, avoidance in summer" response in relation to Angas Inlet. This did not recur in 1975 but occasional samplings during winter of 1976 and 1977 suggested that the attraction, at least, recurred at these times.

The species diversity of the intertidal community of sessile animals, as measured by the Shannon-Weiner function, was negatively correlated to surface water temperature. The correlation was significant at the 95% level of acceptance. The abundances of each of ten major species were negatively correlated to water temperature but none of these correlations were significant.

Gastropods caught in crab pots were most abundant in areas unaffected by the effluent.

The bottom of the channel in Angas Inlet is covered by a layer of silt. Its extent is dependent upon the operation of the power station. The conditions which it produces (soft substrate, poor light, anaerobic mud) may influence the distribution of sessile animals in the inlet.

It is concluded that the effluent from the Torrens Island Power Station does not have a detrimental effect on the animals studied.

DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university and, to the best of my knowledge and belief, contains no material previously published or written by another person, except when due reference is made in the text of the thesis.

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