BIOACCUMULATION OF HEAVY METALS IN THE SYDNEY ROCK OYSTER, *SACCOSTREA COMMERCIALIS* (IREDALE & ROUGHLEY)

by

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TECHNICAL NOTE

This thesis was prepared using an Apple Macintosh©. All applications were the property of the Department of Applied Biology, University of Technology. Word processing was performed using Microsoft Word©. Maps were prepared using Superpaint© and graphs using Cricket Graph©. Data processing were performed using Microsoft Excel© and all statistical analyses were carried out using SYSTAT©: The System for Statistics (Wilkinson 1989). All significance tests were calculated at the 5% level unless stated otherwise. All error values are given as the 95% confidence limits.

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ABSTRACT

The suitability of the Sydney rock oyster (*Saccostrea commercialis*) as a monitor of heavy metal contamination in estuarine and coastal waters was assessed. Case study I examined the influence of body size *(ie: soft tissue dry weight)* on the tissue concentrations of Cu, Zn, and Fe. Sampling was replicated both spatially and temporally in order to determine whether the size-metal relationship for these elements varied with geographical location *(ie: differing levels of environmental contamination)* or season. All oysters were collected from 'wild' populations in the Hawkesbury/Nepean estuary. Least-squares regression analysis indicated that Cu concentrations were independent of body size at all times. Analysis of covariance (ANCOVA) showed that this relationship did not change with either geographical location or season. Size-metal relationships for Zn indicated that concentrations for this element varied from being independent of size to being size-dependent with proportionally greater concentrations present in the larger individuals. Yet tests for homogeneity of slopes (ANCOVA) showed that no differences in regression coefficients occurred with geographical location or season. Iron concentrations were size-dependent with proportionally greater concentrations in the smaller individuals. ANCOVA revealed that homogeneity of slopes with geographical location occurred only on two of the four sampling occasions. Further examination of data revealed that the size-range of the individuals sampled may be important in determining size-metal relationship for iron.

Case Study II examined the concentrations of Cu and Zn in *S. commercialis* deployed into the Georges River/Botany Bay and the Port Stephens estuaries. The influence of tissue assimilation/loss on metal concentrations was also examined. Organisms of a homogenous genetic stock, of a similar size and age, and transplanted to a similar tidal height were utilized. As all organisms were of a similar size and age at the time of their deployment any differences in size during sampling were attributed to growth. Results indicated that tissue loss *(ie: 'degrowth')* not accompanied by a similar loss of metal resulted in an increase in metal concentrations. The assimilation of new tissue at a greater rate than metal accumulation *(ie: 'dilution')* resulted in decreased metal concentrations. From these relationships it was apparent that measures must be taken to reduce, account for, or eliminate the effects of growth in bivalve monitoring programs. Unless this problem is addressed, metal concentration values in *S. commercialis* are likely to give an inaccurate estimation of the level of environmental contamination and confound attempts to isolate pollution point sources.