

DISTRIBUTION AND FACTORS AFFECTING  
THE ABUNDANCE OF *Amphibola crenata*  
IN THE AVON-HEATHCOTE ESTUARY  
2008-2010

UNIVERSITY OF CANTERBURY  
NEW ZEALAND



**Distribution and factors affecting the abundance  
of *Amphibola crenata***

**in the Avon-Heathcote Estuary**

**2008 - 2010**

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by

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## ABSTRACT

The Avon-Heathcote Estuary is the largest semi-enclosed shallow estuary in Canterbury, New Zealand and functions as a sink for local industrial and domestic treated sewage. The endemic mudflat snail, *Amphibola crenata* is one of the conspicuous members of the estuarine benthos and it is likely to be a good indicator of changes in contaminant and nutrient conditions within the estuary.

This thesis investigated the current densities, distribution, and biomass of *A. crenata* in the Avon-Heathcote Estuary. *A. crenata* was widely distributed throughout the estuary. However, no mudsnails were found in samples collected from southern sites close to the causeway and none were present on the sandbanks in the centre of the estuary. There was a positive correlation between *A. crenata* density and biomass. As the distance from the edge of the estuary and salinity increased, the density and biomass of *A. crenata* decreased. All of the statistical models showed that mudsnails were found close to the estuary edge.

Densities of *A. crenata* were higher in summer compared to winter. Juveniles inhabited the high-tide level while medium and large *A. crenata* were common at the mid-tide and low-tide levels. There was a good correlation between the dry weight and shell length of *A. crenata* for all sites and seasons.

Over a six week period, field cage experiments found that shell growth of adult, medium and juvenile *A. crenata* varied amongst sites based on combination factors including food quality, contaminant levels and sediment conditions. The wet weight of large adults did not change significantly, however, there were differences in weight gain of medium and juveniles from the different sites. Mudsnail condition varied with body size and site. Zinc was the trace metal found in the highest concentrations in the sediment while cadmium was the lowest trace metals detected. Levels of total phosphorus, nitrogen, ammoniacal, kjeldahl nitrogen and dissolved reactive phosphorus in the water were highest at the Oxidation Pond site which was close to the main discharge point from the treatment plant into the Avon-Heathcote Estuary.

*A. crenata* populations in the present research have shown strong correlations with environmental variables and this can be used for management

and conservation. The research presented in this thesis provides a starting point in our understanding of the effects and implications of diverting treated waste water on the distribution and abundance of a key gastropod. Future research could also include other indicator species and other estuaries and bays of the New Zealand coastline.