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The Influence of Environmental Factors on Reproduction and
Recruitment of *Macomona liliانا* (Class: Bivalvia) in Manukau
Harbour, New Zealand

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Abstract

The tellinid bivalve, *Macomona liliانا*, is important to the structure and organisation of intertidal sandflat communities in Manukau Harbour. This thesis reports on features of the reproductive, larval supply and recruitment biology of *Macomona liliانا* in relation to environmental factors in the harbour.

Macomona liliانا is gonochoric. In a mid-tide population sexual maturity occurred in animals ≥ 22 mm (shell length). Spawning is asynchronous and protracted from late November to March throughout the harbour and timing of the reproductive cycle is associated with seasonal changes in environmental variables: temperature, salinity and seasonal production of phytoplankton and benthic microalgae. A visual gonad index was useful for establishing the main periods of spawning activity.

Favourable habitats are at mid-tide on the large exposed sandflats characterised by well sorted fine sands. Less favourable habitats are in sheltered bays characterised by moderate-poorly sorted sands. A delay in the onset of gametogenesis in small compared to large adults (July-August cf. May-June) indicates size and/or age dependent resource allocation to growth and reproduction. Adult size classes are evenly represented in favourable habitats whereas in less favourable habitats size classes are dominated by small adults. Favourable habitats have an equal sex ratio or are biased towards females whereas in less favourable habitats the converse is true.

Early life-history stages are described and techniques employed to facilitate their identification in plankton and sediment samples. A spatial Taylor's Power Plot (slope, $b = 1.31$) demonstrates thorough mixing of larvae in the main channels. Spatial autocorrelation models confirm that densities of larvae are higher to the south of Karore Bank than to the north.

The recruitment period is December to early March but varies between successive years. Physical transport processes, post-settlement migration and high levels of mortality in *Boccardia syrtis* tube-mats dominate recruitment patterns in the high energy environments. Larval supply and active habitat selection by settling larvae may, however, be significant determinants of population structure in sheltered bays.

Generalisations are made on the effect of habitat quality on the reproduction and recruitment biology of the Manukau Harbour metapopulation.

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