

Hazel Needham

PhD Candidate



Department: Biological Sciences
Research Project: The role of burrowing crabs as 'ecosystem engineers' for the maintenance of coastal processes.
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Research Interest

Burrowing crabs make up a significant proportion of the benthos in the coastal sediments of New Zealand. These organisms are active deposit feeders and occur in large densities across a wide range of habitats. Burrowing organisms perform a major ecosystem function in soft sediment habitats. Bioturbation increases sediment/detrital mixing as well as increasing sediment permeability and chemical exchange at the water/sediment interface. Burrowing influences nutrient flux and regeneration by increasing the surface area available for these processes to take place. Because of these factors, the impact of burrowing crabs on the benthos is thought to be substantial.

Although burrowing crabs are numerous in many locations around New Zealand's coast, little work has been undertaken to determine their impact on nutrient cycling. Benthic systems are responsible for up to half of the nutrients made available for primary production in coastal regions with benthic organisms playing a key role in the regulation of nutrients in to and out of the water column.

The overall focus of this study is to examine the effects of burrowing crabs on major ecosystem processes such as nutrient exchange. This study will focus on both local and system scale affects in two differing sedimentary habitats.

Key Research Questions

- Is crab behaviour and activity likely to affect benthic nutrient processes?
- Does crab and burrow density alter nutrient recycling?
- Do crabs alter the sediment structure and stability by creating burrows and does this change with sediment type?
- Can local scale experiments and measurements be up scaled to ecosystem level processes?

Publications:

Journal Articles:

Spicer, J.I. S. Widdicombe, **H. R. Needham** and J.A. Berge (2008). Impact of CO₂- induced seawater acidification on extracellular acid-base balance of the northern sea urchin *Strongylocentrotus dröebachiensis*: comparison with other phyla.(in prep)

Widdicombe, S. S.L Dashfield, C.L. McNeill, **H.R. Needham**, A. Beesley, A. McEvoy, S. Oexnevad, K.R. Clarke and J.A Berge (2008). Impact of CO₂ induced seawater acidification on sediment diversity and nutrient flux. Marine Ecology Progress Series (submitted).

Widdicombe, S. **Needham H. R.** (2007). Impact of CO₂ induced seawater acidification on the burrowing activity of *Nereis virens* (Sars 1835) and sediment nutrient flux. Marine Ecology-Progress Series **341**: 111-122

Clarke, K. R. Chapman, M. G. Somerfield, P. J. **Needham, H. R.** (2006). Dispersion-based weighting of species counts in assemblage analyses. Marine Ecology-Progress Series **320**: 11-27.

Widdicombe, S. Austen, M. C. Kendall, M. A. Olsford, F. Schaanning, M. T. Dashfield, S. L. **Needham, H. R.** (2004). Importance of bioturbators for biodiversity maintenance: indirect effects of fishing disturbance. Marine Ecology-Progress Series **275**: 1-10.

Published Reports:

Ecological Effects of Sea Lice Medicines on Scottish Sea Lochs - DEFRA, UK 2004 (multiple author report)

Conference presentations and workshops:

Needham H.R. Pilditch C.A, Lohrer A. M., Thrush S.F. How the mud crab *Helice crassa* affects its environment. NZMSS oral presentation NZMSS and AMS combined conference 6-10th July 2008.

Needham H.R. Pilditch C.A, Lohrer A. M., Thrush S.F. The role of burrowing crabs as ecosystem engineers for the maintenance of coastal processes. NZMSS poster presentation 29th to 31st August 2007.

Needham, H. R. Widdicombe, S. Lowe, D. Blackford, J. Turley, C. The Environmental Impacts of CO₂ Release on Marine Systems Following Carbon Sequestration. SET for Britain, House of Commons poster presentation, London, UK. 13th March 2006.

Needham, H. R. Somerfield, P. J. Gee, J M. Meiofaunal Community Response to In-Feed Treatments Associated with Salmonid Aquaculture. Twelfth International Meiofauna Conference poster presentation, Ravenna, Italy. 11th -16th July, 2004.

Needham, H. R. Somerfield, P.J. Nickell, T. A Strategy for Monitoring the Effects of In-Feed Sea Louse Treatments on Meiofauna. European Marine Biology Symposium 38. Poster presentation, Aviero, Portugal. 8th -12th September 2003.

Meiobenthic And Nematode biodiversity Unravelling Ecological and Latitudinal Aspects (MANUELA). Participant at the kick off workshop, Ghent University. 28th - 30th September 2005.



Hazel and marine technician Dudley Bell collecting water samples from flux incubation chambers.

About me

Having completed my degree in Marine Biology in Portsmouth (UK) I moved to the South West of England where I worked in the benthic ecology group at Plymouth Marine Laboratory for several years. I moved to Hamilton in October 2006 to start my PhD at Waikato. In my spare time I enjoy reading, cooking, socialising, snorkelling/swimming and exploring New Zealand's magnificent scenery.