

Matt Knox**PhD Candidate**

Department: [Biological Sciences](#)

Research Project: Biodiversity and patterns of gene flow in marine amphipods

Qualification: PhD

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Location: R.2.15

Research Interest

My study is on biodiversity and patterns of gene flow in the open ocean benthic environment, targeting amphipod crustaceans as the focus of research. Amphipods are a species-rich and abundant order of crustaceans occurring throughout the marine environment. My research aims to assess diversity by comparing species assemblages sampled from a wide geographical area. Following this, patterns of gene flow within selected widespread and abundant amphipod species will be investigated. I am particularly interested in the role of potential dispersal barriers (e.g. bathymetric features, oceanic convergences) in structuring these patterns. I have focused specifically on the Chatham Rise, Challenger Plateau and Ross Sea ecosystems. Each of these systems have vastly differing oceanographic settings and ranges of depth (200 - >2000 m), providing a gradient of dispersal barriers. Using all three systems, a comparative approach will be undertaken whereby patterns of genetic variability will be determined and interpreted on the basis of past and present dispersal barriers.

The accurate identification of species and their genetic resources is central to conservation biology. However, within some species it is often assumed that individuals randomly breed with one another in large contiguous populations. In nature, gene flow within a species is rarely panmictic and genetically distinct populations are common. For example, physical barriers can prevent genetic exchange between neighbouring populations. Over time, these populations will develop fixed genetic differences through genetic drift and local adaptation, potentially leading to speciation. Through molecular techniques, these intra-specific differences can be detected and linked to potential barriers of gene flow. Knowledge of such barriers will be important in terms of making informed decisions as to the management of marine species resources. This research has been made possible by aligning with NIWA's Oceans 2020 biodiversity project and an International Polar Year voyage to the Ross Sea.

Key Research questions.

1. What is the level of species richness and abundance within amphipod fauna at each station and study site?

2. What is the role of different physical barriers (e.g. bathymetric features, oceanic convergences) in the creation and maintenance of genetically structured amphipod populations and biodiversity?
3. Does the degree of physical heterogeneity (i.e. potential dispersal barriers) at each study site result in greater levels of genetic structuring and biodiversity?

Publications.

Knox, M. A., Pilditch, C. A., Hogg, I. D. and Lörz, A. N. (2007) Population connectivity of New Zealand shelf amphipod species using DNA sequences. In: *The 2007 Conference of the New Zealand Marine Sciences Society*. Waikato University, Hamilton.

Knox, M. A., Hogg, I. D. Duggan, I. Banks, J. Sutherland, D. L. (2006) Monitoring zooplankton diversity in ponds and lakes using mitochondrial DNA barcodes. In: *The 2006 Conference of the New Zealand Freshwater Sciences Society*. Park Heritage Hotel, Rotorua.

Knox, M. A., Hogg, I. D., Sutherland, D. L. Stevens, M. A. and Pilditch, C. A. (2005) Testing the utility of DNA barcoding for the identification of amphipod crustaceans in Tauranga Harbour. In: *The 2005 Conference of the New Zealand Marine Sciences Society, Fourth International Conference on Marine Bioinvasions and Margins*. Victoria University, Wellington.



About me

Originally from Dargaville (NZ), I came to Waikato to study in 2001. Friends, work and good timing have kept me in Hamilton ever since. In this last year I have enjoyed the experience of working onboard the RV Tangaroa but still prefer life on land. When I'm not at university or on field work I like to enjoy the great outdoors, play sports and sample the occasional frosty brew with my mates.

