

Description written by Shelley Heiss-Dunlop when asked about her pollen count work on Motuihe Island.

I took the pollen core samples in October 2003.

The core was extracted by using a vibracoring system which came from the School of Geography and Environmental Sciences Department at the University of Auckland.

I had previously done my undergraduate degree at the Auckland University in Geography and Anthropology (BA/BSc conjoint) .

I was fortunate to have Scot Nichol from the Geography Department (a geomorphologist with an interest in tsunamis in the Hauraki Gulf) assist me in taking the core samples on Moutihe and for supplying the necessary equipment. We took the equipment on a DoC boat which did regular trips out to the island at the time because there were rabbit hunters staying on the island completing the rabbit eradication.

In conjunction I was also studying seed dispersal by starlings on Motuihe (and assisting another student who was doing a similar study on Tiritiri Matangi). Back then there was a starling roost site in the macrocarpa trees up by the old water tower. The macrocarpas have since been removed. I had seed traps set up under the roost site over a 12 month period and analyzed their droppings counting a total of 10,500 seeds comprising of 64 different plant species.

Below is an abstract taken from my MSc thesis providing a brief overview of my study aims - to identify and understand the past vegetation history on Motuihe.

The vegetation analysis in my thesis is from a single core taken from Golden Bay (Takutairaroa Bay) at the eastern end of Ocean Beach. There is a photographic map attached below indicating the core site with an arrow.

"Motuihe Island reflects a long and intense history of human modification. The current coastal broadleaf forest no longer represents the diverse range of species found in a mixed conifer-coastal broadleaf forest that once existed on Motuihe. Regeneration patterns and species composition have been significantly altered due to both Maori and European occupation and the subsequent introduction of exotic pest species.

This study aims to reconstruct past vegetation patterns on Motuihe Island for the purpose of ecological restoration planning. Past species assemblages were identified from Holocene vegetation patterns, historical literature, and present day analogues of islands within the same ecological district.

A sediment core was extracted from the Golden Bay (Takutairaroa Bay) catchment for a palynological investigation.

The local vegetation history commences in a freshwater environment with a swamp forest dominated by kahikatea. A mixed conifer-hardwood forest covers the surrounding hill slopes with matai (*Prumnopitys taxifolia*), miro (*P. ferruginea*), rimu, and totara (*Podocarpus totara*) emerging from a pohutukawa (*Metrosideros excelsa*) canopy. Hutu (*Ascarina lucida*), nikau, and tree ferns (*Cyathea* and *Dicksonia*), comprised the understorey with *Griselinia*, *Hebe*, and *Myrsine* forming a fringe around the swamp margins.

Rising water levels, probably due to a blockage in the outlet, initiated the hydrosereal development of a shallow lake invaded by freshwater wetland plants. Later pukatea and maire tawake (*Syzygium maire*) invade the swamp forest. Early Polynesian deforestation is marked by an abundance of charcoal and bracken fern (*Pteridium esculentum*) spores coinciding with a decrease in forest pollen taxa, probably occurring around c. 700 yr BP. The arrival of Europeans is marked by further losses in native vegetation, and the introduction of exotic grasses (Poaceae) and trees.

Understanding the vegetational and environmental history of Motuihe Island provides a basis from which to explore a wide range of restoration options including the potential development of a swamp forest and wetland in the Golden Bay beach catchment. The findings offer an opportunity to create a range of experiences indicative of various past vegetation and environmental states".

I have taken some sections out of my thesis about the process of extracting the sediment cores.

"The reconstruction of Motuihe Island's vegetation and environmental history was derived by pollen analysis from continuous sediment subsamples from core M2, extracted from Golden Bay swamp.

A number of sites were investigated with a prodder to ascertain sediment types. In most cases a hard base layer was struck indicating the need to use a vibracorer rather than a D-section corer (S. Nichol *pers. comm.*). Potentially suitable sites were located close to coastal environments that could compromise the long-term accumulation and preservation of organic sediments. However, small lakes or wet areas fed by freshwater streams are best suited for reconstructing extra-local vegetation as they are less affected by the surrounding regional geography."

Three sediment cores were collected using a vibracoring system. Two cores were extracted from Golden Bay (M1 and M2) beach catchment and one from the base of Taraire Bush (M3) adjacent South-east Beach, in October 2003 (Plate 2.7).

The cores were extracted by boring a length of aluminum piping (76 mm x 4.2 m) into the ground driven by a small petrol motor, and then winched out and sawn at the appropriate lengths before sealing the ends for transportation to cool storage in the School of Geography and Environmental Science's laboratory, at Auckland University.

A continuous sediment core (M2) was collected in an aluminum tube to a maximum depth of 118 cm."

Golden Bay - towards the easter end of Ocean Beach - there is a swampy area with a stream running through it opening out on to the coast. From my study it can be assumed this was once a small lake in this area based on the type of trees that were identified from the pollen core.