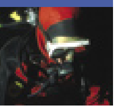
Coasts & Oceans

great science



Mangroves are fish nurseries

As many estuaries silt up, New Zealand's mangrove forests are advancing, prompting intense debate about their ecological value and how these habitats should be managed. It's often said that mangroves support and protect young fish, but until earlier this year there was no quantitative evidence for this claim.

In March and April 2005, NIWA scientists conducted extensive field work, during night and day, sampling fish in mangrove forests around northern New Zealand.

In the relatively pristine Rangaunu Harbour (Northland), mangroves supported modest numbers of juvenile snapper, which were not found in more modified estuaries. Juvenile parore were a consistent feature of most of the six east coast estuaries studied, while juvenile grey mullet were patchily abundant in the two west coast estuaries we sampled. Yellow-eyed mullet were common in all the estuaries, and we encountered invasive bridled goby at several sites in Mahurangi Harbour. We found relatively high numbers of juvenile shortfinned eels in every mangrove forest sampled, suggesting that mangroves may also play an important nursery role for this species.

How to use radar to measure gravel

How much gravel is there on a beach? Whether there's one hundred thousand or one million cubic metres of gravel does matter.

If a beach is prone to disappearing, cliffs behind it will erode faster, and low-lying areas will be at risk from storm waves and seawater flooding. Gravel on beaches either comes from rivers in big floods or from cliff erosion, so there can be years on end when waves are washing the beach away without much replenishment. By knowing how much gravel is stored on a beach, we can tell how sensitive the coast is to fluctuations in gravel supply or to dams on rivers trapping sediment which would otherwise reach the coast.

This year, NIWA worked with the University of London to see if ground-penetrating radar could give us the answer efficiently. The radar unit is swept along a line across the ground, sending out pulses of electromagnetic radiation (like regular radar) and catching the radar waves which bounce back when the type of material under the surface changes. The technology worked well and avoids the need for time-consuming and expensive mechanical excavation (or back-breaking digging).

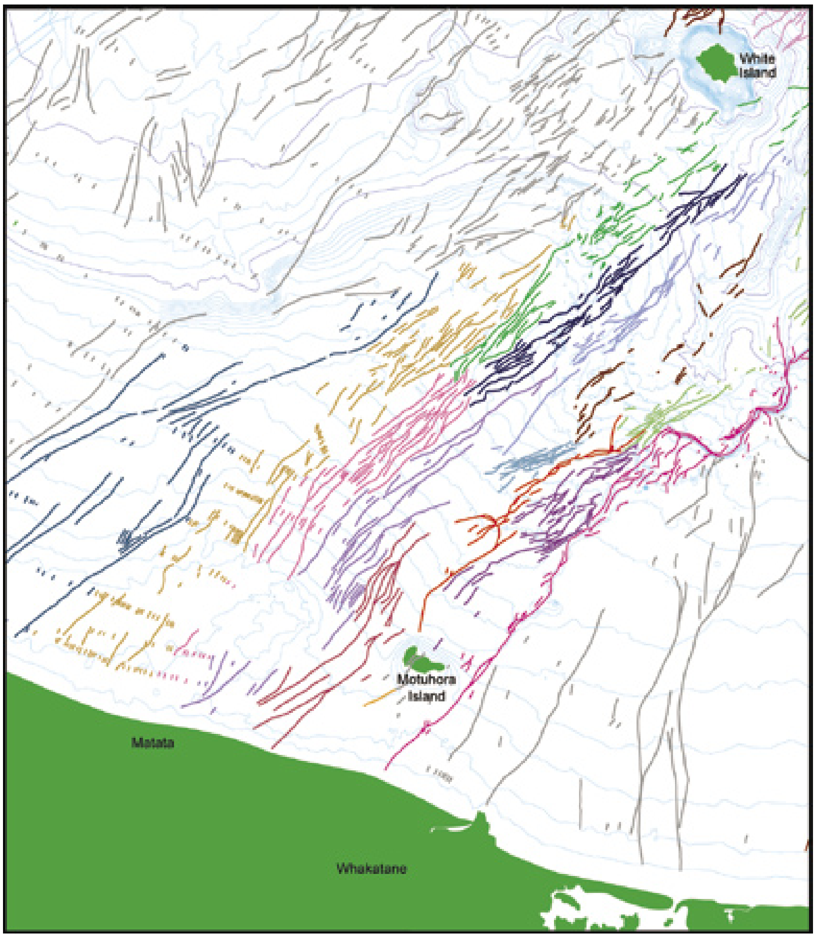
More than 150 quake sources revealed

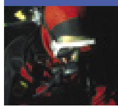
When the Bay of Plenty's earthquake risk was assessed in 2000, 14 offshore earthquake sources were taken into account. NIWA has just completed a major 5-year study of active offshore faulting in the region, and our count now stands at 166.

The work represents a major upgrade in scientific knowledge of the region's offshore structure and active 'rifting', where the earth's crust is stretched (and potentially ripped into two plates).

Our marine geologists have mapped the seafloor precisely using multibeam acoustic equipment on *Tangaroa*. They have studied some 2200 kilometres of multi-channel seismic data, which provide them with a picture of what's underneath the seafloor down to about 3 kilometres deep. They have combined this information with high resolution seismic data showing the detail of structures as little as 40 centimetres thick in the top 40 metres of the seafloor, giving us a history of fracturation going back up to 20 000 years.

This science was funded by the Foundation for Research, Science & Technology. We are now able to provide Environment Bay of Plenty with much better estimates of the maximum magnitude of earthquakes that could credibly occur on these faults, and in some cases an estimate of their return time. The regional council will use this information for hazard planning.





How much life can the water support?

Billions of tiny plants drift in the sea around New Zealand. These phytoplankton are crucial to marine life because they use energy from the sun to produce food for marine animals. NIWA uses satellite images of the colour of the ocean to determine phytoplankton abundance: the greener the ocean, the more phytoplankton there are in the water.

Unfortunately, this method does not work near the coast, where mud and sand particles suspended in the water hide the much smaller change in colour due to phytoplankton. Brown river water, which has organic matter dissolved in it, does the same.

This year, NIWA scientists measured the colours of phytoplankton, suspended sediment, and river water in the Bay of Plenty and Hauraki Gulf. The measurements will help us to work out how abundant the phytoplankton are, even when suspended sediment and land runoff are present. This will be a major step towards estimating how much life phytoplankton can support over New Zealand's continental shelf, a result eagerly anticipated by coastal managers who have to work out how land-use changes are affecting coastal life, and where aquaculture facilities should be located.