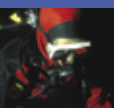
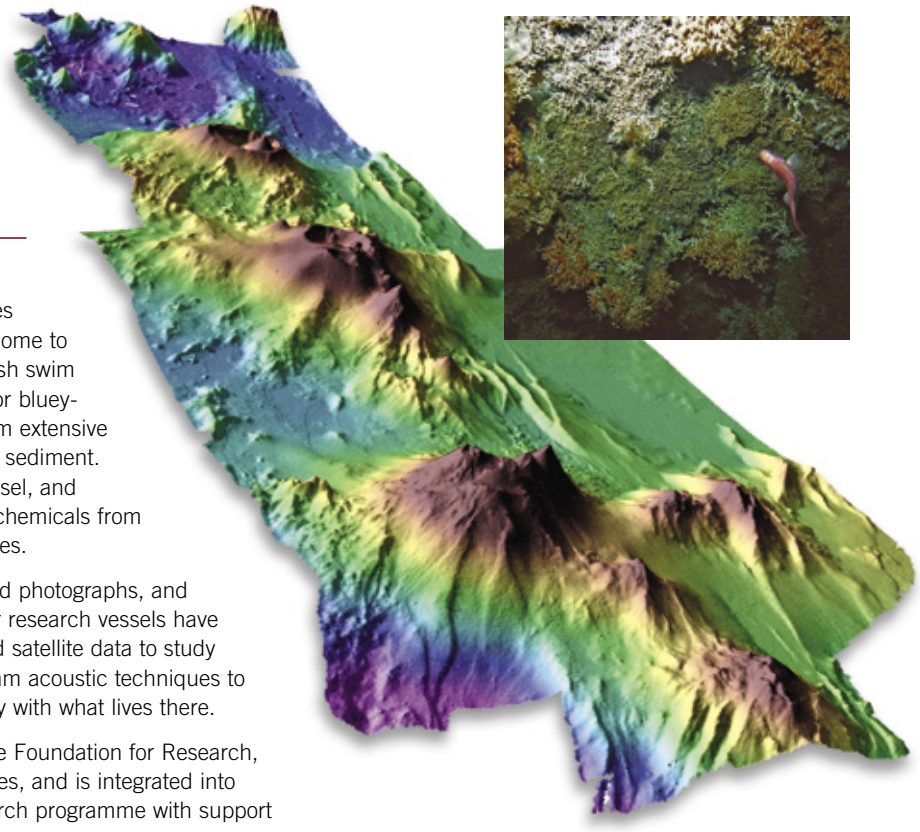
Aquatic Biodiversity & Biosecurity



Life on a seamount



There are at least 800 seamounts (undersea mountains, knolls, and hills more than 100 metres high) in waters around New Zealand. Some are home to a wide range of creatures, others to just a few. Fish swim over them in the pitch black of the deep ocean, or bluey-green twilight of shallower water. Stony corals form extensive reefs on some, while others are covered in sandy sediment. Along the Kermadec Arc, species of shrimp, mussel, and clam survive thanks to unique bacteria living on chemicals from hydrothermal venting on active undersea volcanoes.

Since 1998, NIWA has taken thousands of seabed photographs, and hundreds of direct samples from seamounts. Our research vessels have made ten seamount-specific voyages. We've used satellite data to study the water around seamounts, and used multi-beam acoustic techniques to map some seamounts and associate their geology with what lives there.

Our on-going seamount research is funded by the Foundation for Research, Science & Technology and the Ministry of Fisheries, and is integrated into the global Census of Marine Life seamount research programme with support from the Alfred P. Sloan Foundation in the USA.

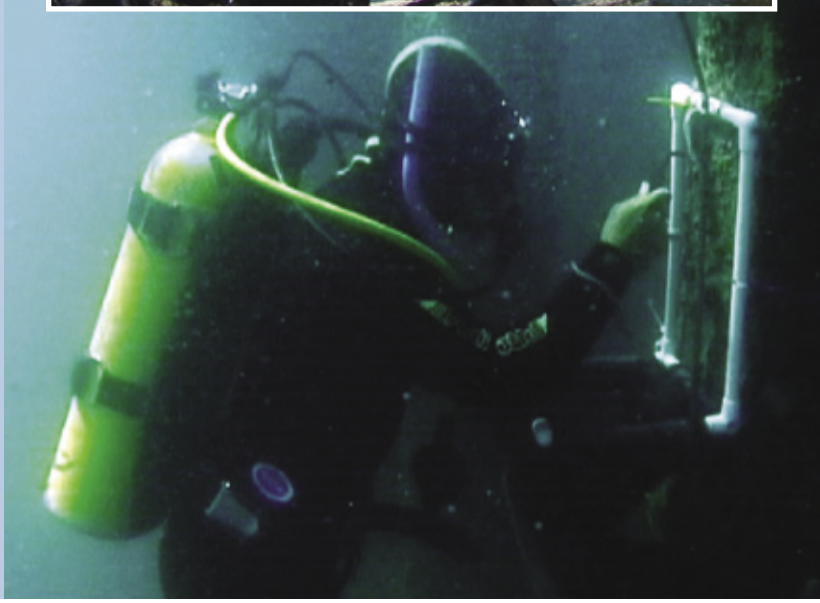
Tracing alien invaders

The spread of non-native marine species is one of the greatest threats to biodiversity in the world's oceans. This threat appears to be increasing along with the volume and speed of global shipping.

Since 2001, NIWA has been surveying the marine plants and animals in shipping ports and marinas nationwide for the Ministry of Fisheries and Biosecurity New Zealand. The surveys form a baseline for monitoring the rate of new arrivals and for communicating likely risk (or lack thereof) to our marine ecosystems or to our major trading partners. The surveys are also improving knowledge of native species living in some of New Zealand's busiest ports and harbours.

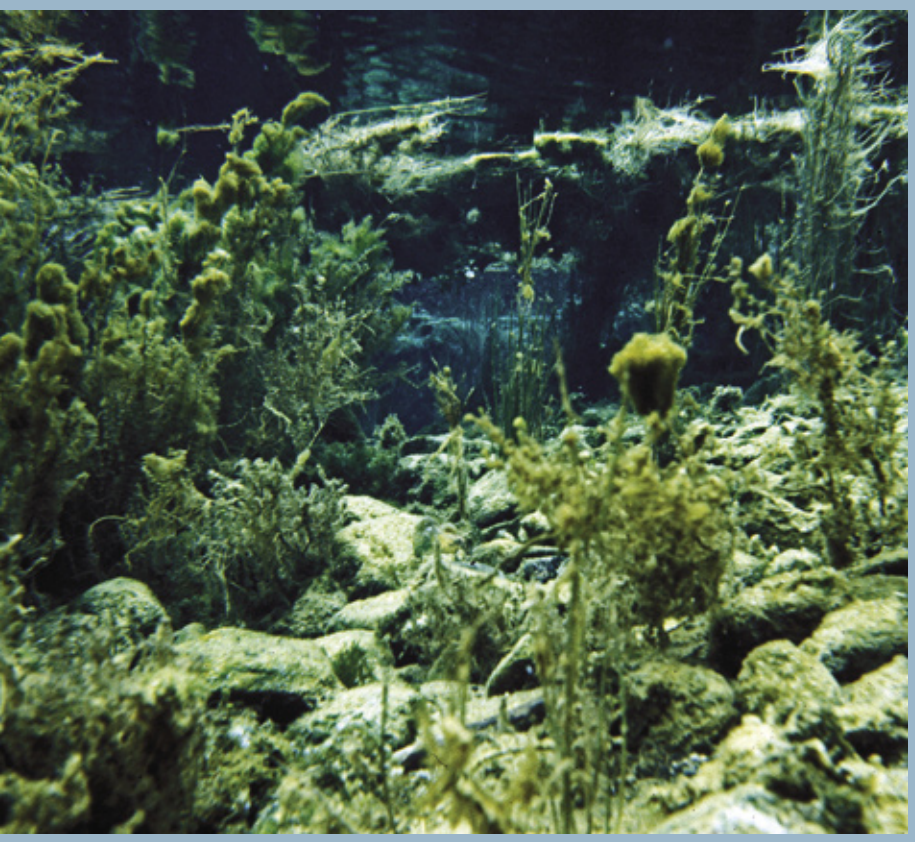
To date, we have surveyed 16 ports and marinas from Opua in the north to Bluff in the south. We repeated the surveys in about half these ports over the past summer (2004–05), and re-surveys are planned for the remainder in 2005–06.

So far, more than 1300 unique species have been identified, including 125 species that are known or suspected of being introduced to New Zealand. Nineteen of these species were recorded for the first time in New Zealand waters. Over 100 other species are potentially new to science and await more formal description.



Top: Oliver Floerl (foreground), Aleki Taumoepeau, and Nick Gust surveying in Auckland.

Bottom: Aleki samples fouling assemblages in Taranaki.



Doorways to a watery underworld

Throughout human history, springs have been valued as sources of cool, pure water. Our direct reliance on spring water has decreased in modern times, and so has our attention to them. Over the last three years, NIWA scientists have been researching springs, documenting their biodiversity, and assessing the effects of land-use practices.

The most significant human-induced threats to spring biodiversity and water quality are over-pumping or chemical contamination of groundwaters, vegetation clearance, and stock trampling. In one study we sampled 33 small springs and found they would all fail the guidelines for domestic water supply because of faecal contamination.

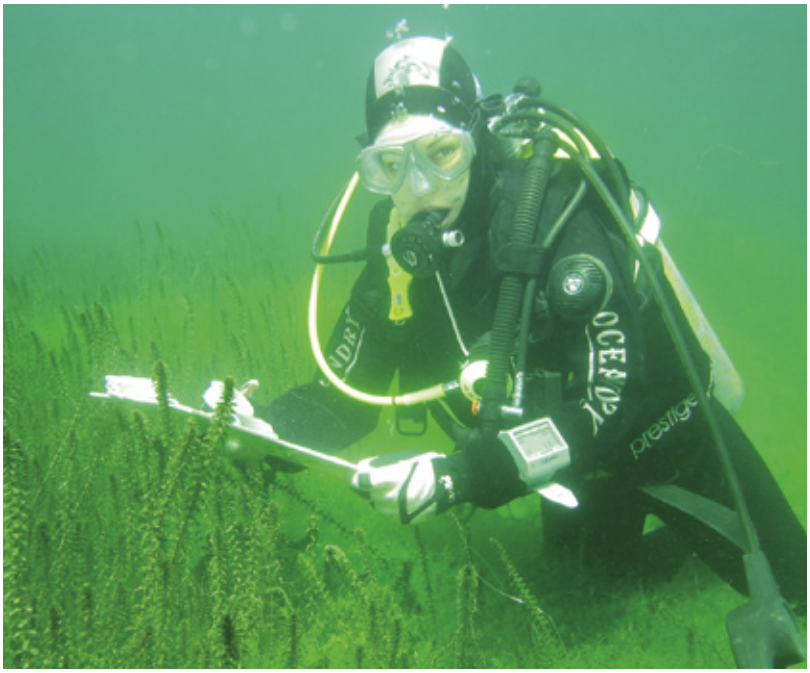
Our research has identified a number of ways to protect springs. The simplest are to exclude stock and maintain natural vegetation around spring heads. More broadly, greater emphasis needs to be placed on maintaining the quality and quantity of groundwaters that are feeding the springs.

This work has been funded by the Department of Conservation, the Foundation for Research, Science & Technology, and the dairy industry.

The state of the lakes

Few lakes in New Zealand retain their original native vegetation, and many lakes are threatened by land-use changes and alien aquatic plants. The challenge of monitoring dozens of waterbodies in a region, when aquatic weeds can be easily spread, is a daunting one. We have been working with regional councils on ways to better target their surveillance efforts. Our approach is to help lake managers identify threats and act early to prevent degradation, rather than having to clean up afterwards.

NIWA's LakeSPI (Lake Submerged Plant Indicators) tool is now available on-line (www.lakespi.niwa.co.nz) and is used by regional councils to provide an effective early warning system. We are also working with iwi and lake managers to develop other lake condition indicators using species of cultural significance (such as koura and kakahi) which quickly disappear as lakes become degraded.



Regional councils are also using LakeSPI information in combination with NIWA's Aquatic Weed Risk Assessment Method. This allows us to assess the risk that a new weed will infest lakes in a region, how bad any potential new weed would be, and what are the most likely ways weeds could get into a particular lake.

The underpinning research for our freshwater biosecurity has been funded by the Foundation for Research, Science & Technology.

Tracey Edwards surveying the vegetation in Lake Waikaremoana. The photograph illustrates the high water quality and clarity in the lake, with a predominance of desirable native vegetation and low impact from the only significant invasive plant in the lake, Elodea *(left).*