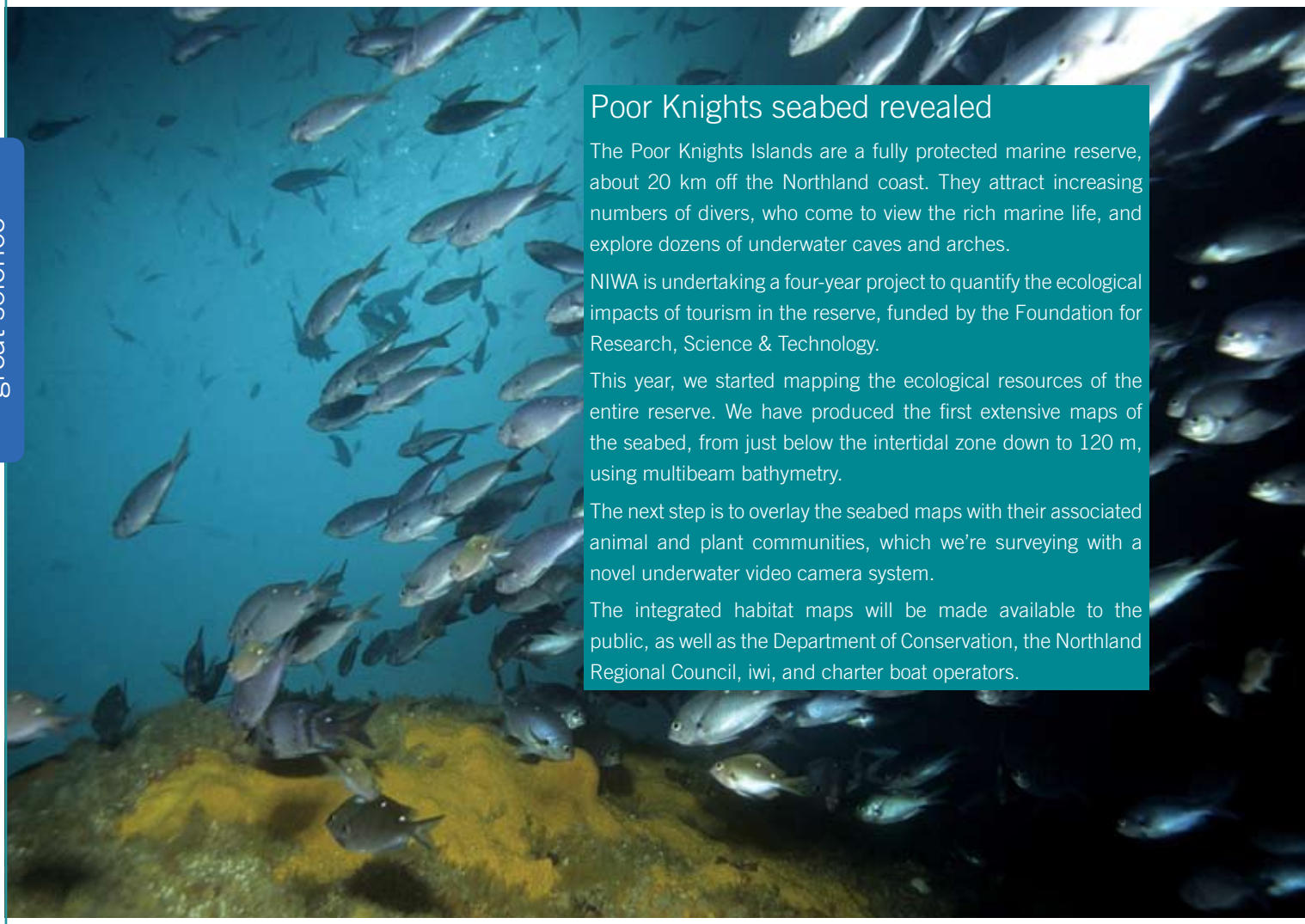
Coasts & Oceans



Poor Knights seabed revealed

The Poor Knights Islands are a fully protected marine reserve, about 20 km off the Northland coast. They attract increasing numbers of divers, who come to view the rich marine life, and explore dozens of underwater caves and arches.

NIWA is undertaking a four-year project to quantify the ecological impacts of tourism in the reserve, funded by the Foundation for Research, Science & Technology.

This year, we started mapping the ecological resources of the entire reserve. We have produced the first extensive maps of the seabed, from just below the intertidal zone down to 120 m, using multibeam bathymetry.

The next step is to overlay the seabed maps with their associated animal and plant communities, which we're surveying with a novel underwater video camera system.

The integrated habitat maps will be made available to the public, as well as the Department of Conservation, the Northland Regional Council, iwi, and charter boat operators.

Land use affects marine life

Changes in land use associated with human population growth have altered the amounts and types of sediments from land that have been deposited in coastal areas, often to the detriment of marine communities. This is a worldwide issue.

NIWA researchers have quantified the impacts of land-based sediments on marine communities in the Auckland region by following experimental deposits of sediment placed on the sea floor.

Despite tidal currents and waves that were expected to reduce the impact of these test sediments, we found that the increased sediment load had significant adverse, long-lasting effects on marine life. These ranged from killing sediment-dwelling organisms – including shellfish, snails, and marine worms – to reducing the feeding and growth rates of filter-feeders such as cockles and pipis.

This research highlights the need for policies that minimise sediment loss to the coastal zone.

The project was funded by the Auckland Regional Council and the Foundation for Research, Science & Technology.

Mud deposited on this estuary after heavy rainfall smothered seagrass and shellfish beds.

Measuring ocean nitrate from space

Nitrate is a key nutrient in the world's oceans, and has a major influence on ocean productivity.

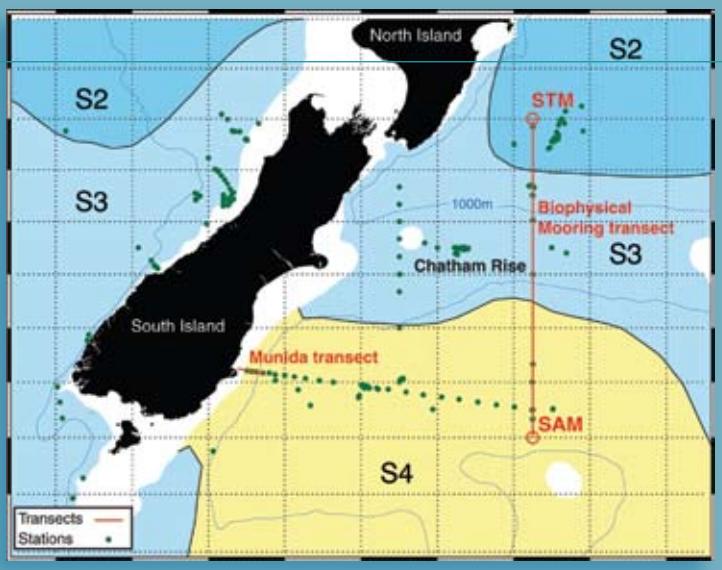
Measuring ocean nitrate levels directly is difficult and costly, because they vary greatly over time and space. This is particularly so around New Zealand, where subantarctic and subtropical water masses meet.

Scientists instead rely on satellite measurements of sea surface temperature (SST) and chlorophyll (the green pigment found in plants) to estimate surface nitrate concentrations.

NIWA scientists have tested how well these estimates match reality, using a unique set of repeat temperature and nitrate measurements taken from NIWA and Otago University vessels.

They found that, while SST alone captured much of the actual variability in nitrate levels, the inclusion of chlorophyll data improves our ability to predict nitrate concentrations.

This represents a major breakthrough in our ability to predict ocean nutrient levels from space. The study was funded by the Foundation for Research, Science & Technology.



Repeated measurements of temperature and nitrate concentrations were made on transects sailed by Tangaroa *and* Munida *in subtropical (S2) and subantarctic (S4) waters and the Subtropical Front (S3) southeast of New Zealand.*

Unlocking secrets of the seabed

Marine geologists from NIWA and France are leading a major international collaboration to explore New Zealand's seabed for clues to past climate change.

Lying at the junction between northern-tropical climate influences and those of the Southern Ocean, the New Zealand region is internationally recognised as an ideal location to investigate past 'abrupt' climate change. It is also renowned for giant submarine landslides, some of which may be triggered by sea level rise.

The researchers used the unique capabilities of French oceanographic research vessel *Marion Dufresne* to take 30–50 m long cores of seafloor sediments at key places around New Zealand.

They will analyse the nature of the sediments, and the microscopic fossils trapped within, to get a picture of past climatic and oceanic conditions. This will help shed light on interactions between climate, land, and ocean processes, and to understand the causes and timing of submarine landslides.

Marine geologists Geoffroy Lamarche (NIWA) and Jean-Nöel Proust (CNRS-Géosciences Rennes, France) study a seafloor map onboard RV Marion Dufresne.