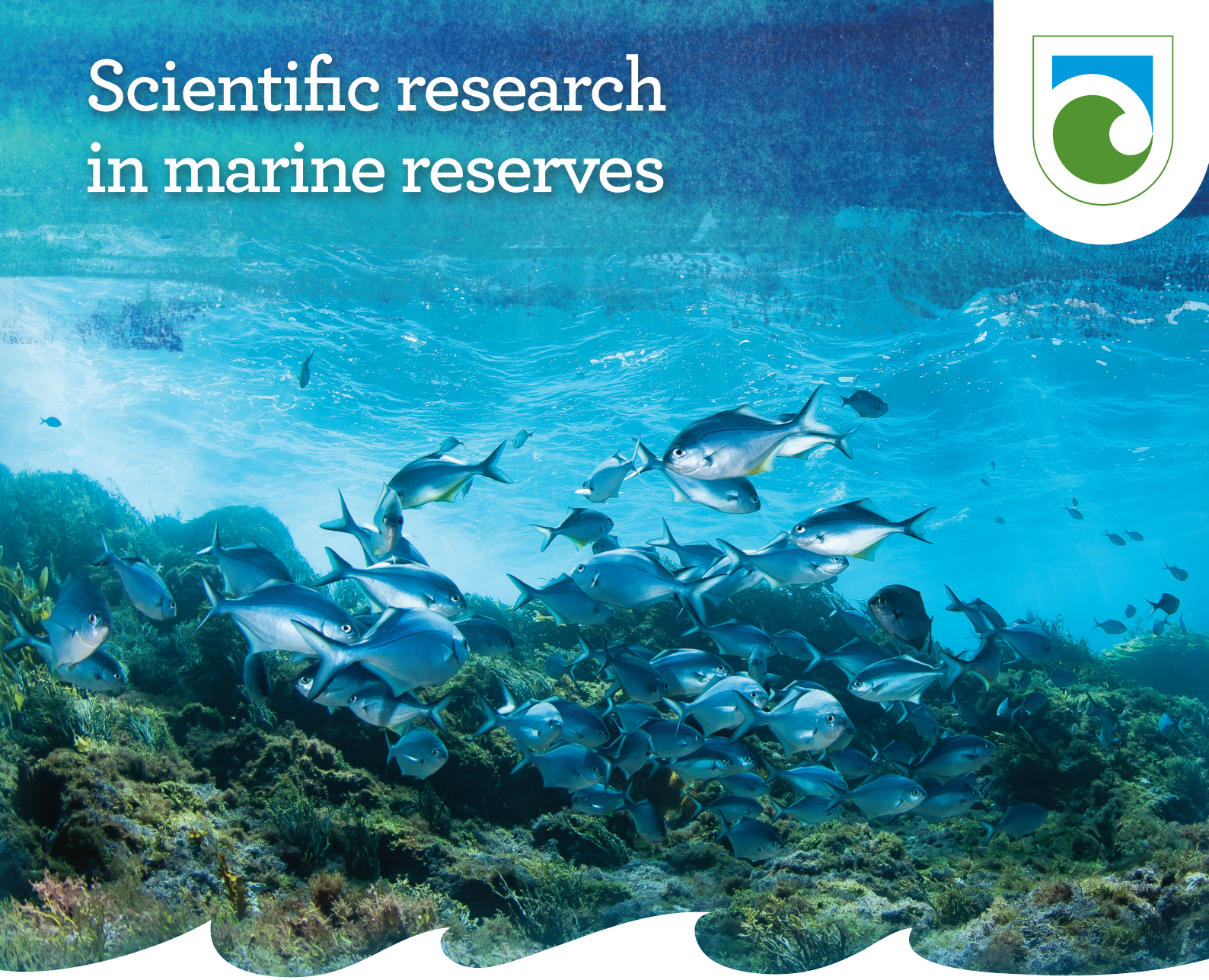
Scientific research in marine reserves



Algal blooms, rock lobster moulting, pāua reproduction, octopus habitats and the effects of fishing on snapper—these topics are a sample of the diverse research carried out in New Zealand's marine reserves.

Scientific study was an important reason for establishing marine reserves in New Zealand. DOC commissioned a review (summarised here) to quantify and describe the value of marine reserves for scientific research. It provided background information for the New Zealand government's programme to conserve marine biodiversity in a network of reserves and other marine protected areas.

From 1975 (when the country's first marine reserve was created) to 2013 (when the review was published), 167 peer-reviewed publications, 136 university theses and 170 unpublished reports (mostly baseline and monitoring studies funded by DOC) resulted from studies carried out in marine reserves.

Study sites

The oldest marine reserves (as shown) have attracted the most research to date.

Department of Conservation
Te Papa Atawhai

Protected but not perfect

Marine reserves provide an opportunity to study ecosystems that are closer to pristine by prohibiting activities such as fishing, removing sand and shellfish collecting. Studies of species that are popular targets for fishers (e.g. snapper, blue cod and rock lobster) can be more difficult outside protected areas.

Also, comparing the health and structure of ecosystems within marine reserves with those in unprotected areas can help evaluate how well management practices outside marine reserves are working.

Some human activities still affect marine reserves. Boat anchoring and careless divers can damage the seafloor. Marine reserves are also influenced by larger-scale influences such as pollution, sedimentation and climate change.

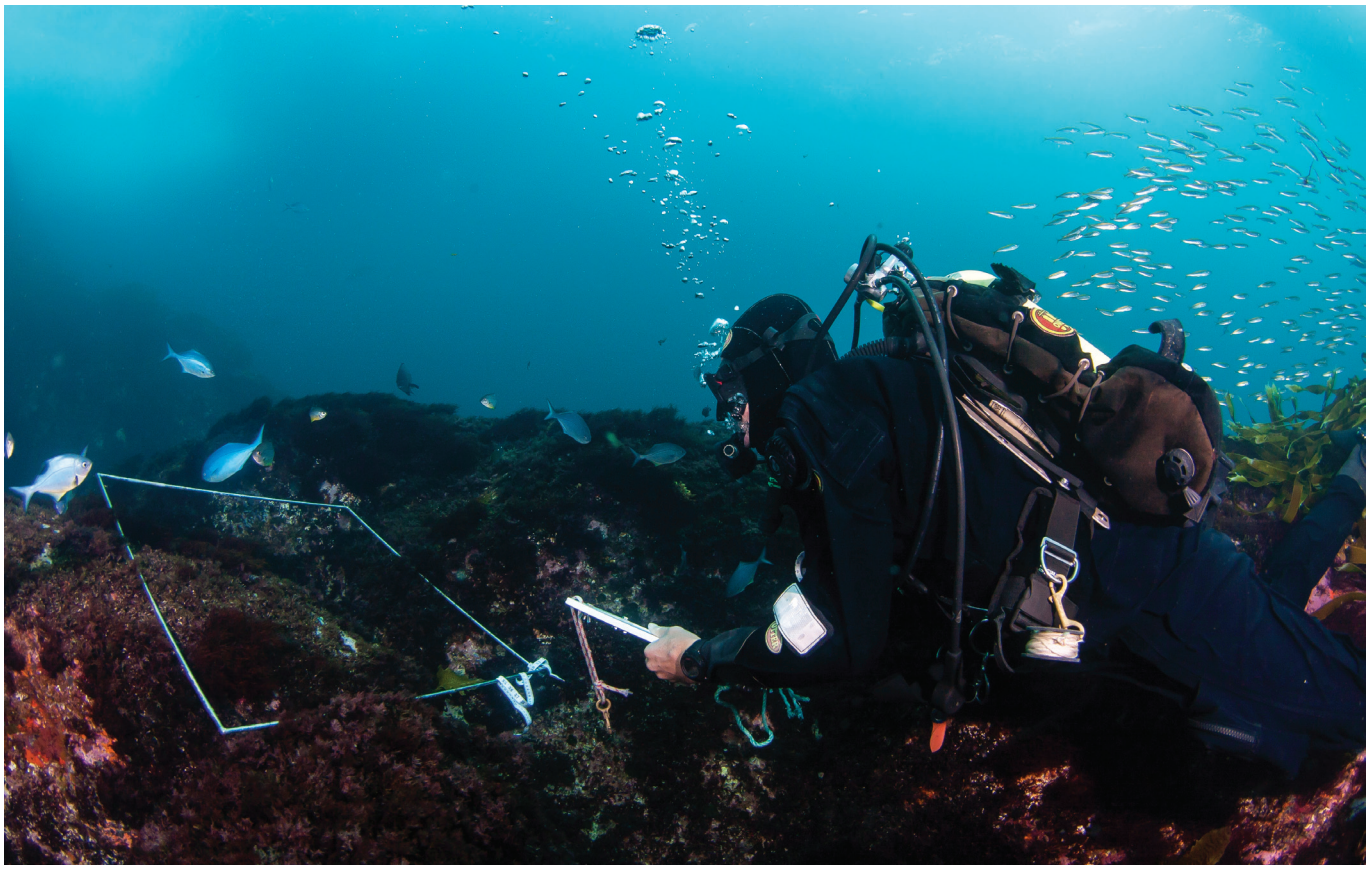
New Zealand's most studied marine reserve

Up to 2013, more research had been carried out at Cape Rodney–Okakari Point (Goat Island) Marine Reserve (established in 1975) than at all of New Zealand's other marine reserves combined. The University of Auckland's Leigh Marine Laboratory, situated next to the reserve, has facilitated the completion of 127 student theses and many other publications.

DOC has maintained a rock lobster monitoring programme in this reserve and at nearby unprotected sites since 1995.

In 1990, researchers at Leigh reported that more and larger specimens of the fish popular with fishers (such as red moki, rock lobster and blue cod) had been found in the reserve than outside. At that time, the effects of fishing were thought to be minimal and it was believed that large fish would not stay within marine reserve boundaries. The study provided early proof that fished species could recover in protected areas and helped to interest many people in marine reserve research.

Waikaranga (Seal Rocks), lies off the Taranaki coast in Tapuae Marine Reserve.



A diver measures the number of shellfish and the seaweed coverage in a 1 metre square sampling area.

Monitoring and manipulation experiments

Scientific monitoring programmes collect equivalent information from various sites over a period of time, to look for and validate ecological changes. To verify trends in marine reserves, good planning and rigor in data collection is essential. The best monitoring programmes are consistent and cover long periods of time—a 10-year study is more than twice as valuable as two 5-year studies.

Long Island - Kokomohua Marine Reserve in the Marlborough Sounds is a good example of effective ecological monitoring. DOC supported a monitoring programme in 1992, a year before the reserve was created, which has continued annually or biennially. At each designated site, usually the same two people have repeated the same procedures (catch, measure and release of fish; video and diver surveys; and measurement of rock lobster, pāua, kina etc.). This long-term study with highly consistent methods reliably documents some of the changes that have taken place in this marine reserve for more than 20 years.

Manipulation experiments are also commonly carried out in marine reserves, to gain a better understanding of ecological processes. This type of research makes a small change in one area and compares any effects with an unmodified site, e.g. sections of the seafloor may be covered with mesh to exclude large fish in order to study their impact on kina.

International impact

By global standards, New Zealand has an extensive network of coastal marine reserves and generally high levels of compliance with the no-take regulations. The review noted that this country's research has made a significant contribution to knowledge internationally.

Tourism—a blessing or a curse?

No one anticipated the popularity of marine reserves as tourist destinations. In the 1970s, one reason for creating a marine reserve near Leigh was to have an undisturbed area to carry out manipulation experiments. Now, this marine reserve attracts thousands of visitors daily in the summer months.

Visitors often become advocates for marine reserves and marine conservation. The review, however, highlighted the need to investigate the effects of tourism on popular marine reserves, to see if delicate structures are being damaged and if diving and snorkelling are changing fish behaviour.

A busy day at Cape Rodney–Okakari Point Marine Reserve, near Leigh.

A banded wrasse swims through a kelp forest in a marine reserve.

What's next?

The review recommended taking the following actions to increase the value of marine reserves for scientific research:

- coordinate research nationwide
- estimate the amount of poaching at selected reserves
- investigate the quantity of fishing and catch rates at reserve edges
- build long-term partnerships among management, researchers and funding agencies to maximise the benefits of scientific research.

Find out more

Download the full publication: Scientific and biodiversity values of marine reserves
www.doc.govt.nz/documents/science-and-technical/drds340entire.pdf (3222K)

Unidentified colonial ascidian, or sea squirt, Poor Knights Islands Marine Reserve.

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