Biodiversity

Ocean Survey 20/20

NIWA's Deep Towed Imaging System captures a butterfly perch swimming above a coral-encrusted reef at about 200 m depth on the Chatham Rise.

Putting deep seafloor biodiversity on the map

Little is known about the biodiversity of New Zealand's offshore seafloor communities, particularly at productive depths where commercial fisheries occur. One of the objectives of the Government's Ocean Survey 20/20 programme is to better understand the role these communities play in the wider marine environment and in sustaining ocean resources.

The Chatham Rise and Challenger Plateau were chosen for initial investigation because they occur at similar depths, but support very different levels of productivity and fishing activity. In the past year, scientists have undertaken three voyages on *Tangaroa* to map, photograph, and sample seafloor habitats and communities at fishing depths in these two areas.

About 42 500 still images, 170 hours of video footage, and more than 5000 biological sample lots were collected. Taxonomists analysing the specimens are likely to identify species new to science.

The project will provide significant new information about seafloor biodiversity and, ultimately, aid decisions about resource management and offshore Marine Protected Areas. The Ocean Survey 20/20 Chatham-Challenger project is led by the Ministry of Fisheries in collaboration with NIWA, Land Information New Zealand, and the Department of Conservation.

The little things that hold wetlands together

Around 90% of New Zealand's wetlands have been drained or otherwise destroyed in the last 150 years. To protect the remaining 10%, we need to understand what makes our wetlands tick and, conversely, what damages them.

Algae and invertebrates are important components of wetland food chains, and algae act as indicators of environmental stress. But little is known about these small organisms that drive our wetland ecosystems. NIWA scientists are documenting the diversity of algae and invertebrates in New Zealand wetlands to assist the Department of Conservation in prioritising wetlands and wetland habitats for conservation.

Our initial study of four near-pristine wetlands on the west coast of the South Island has shown that each has its own unique assemblage of algae and invertebrates. Within a wetland, different habitats support different algae. This means that to protect wetland biodiversity you need to protect examples of each wetland type and habitat.

Further research is investigating biodiversity variation among wetlands on a wider scale, and the impacts of human activities on these endangered natural systems.

Alastair Suren, NIWA

NIWA's Dr Brian Sorrell surveys a fen in the upper Freshwater Valley, Stewart Island.

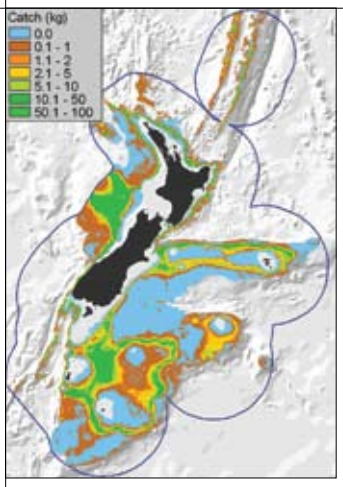
Novel approaches to marine protection

Under the New Zealand Biodiversity Strategy, the Government has set a target of protecting 10% of New Zealand's marine environments by 2010. NIWA's research is helping to design Marine Protected Areas (MPAs) that deliver the biggest conservation benefits with the least cost to fisheries, using the best available data and methods.

The team is using newly developed reserve-planning software to design and evaluate four MPA scenarios, based on the predicted distributions of 96 commonly-caught species of bottom-dwelling fish in trawlable parts of New Zealand's offshore Exclusive Economic Zone (EEZ).

Results show that MPAs selected to avoid prime fishing areas and protecting 10% of trawlable parts of the EEZ could protect an average of about 23% of each fish species' geographic range. This is nearly 2.5 times greater than the conservation benefits of proposed Benthic Protection Areas, with no extra cost in lost fishing opportunity.

This research is being undertaken with scientists from the universities of Helsinki, Melbourne, and Stanford, and the Department of Conservation (DOC), with funding from the Foundation for Research, Science & Technology, DOC, and the Ministry of Fisheries.



Predicted distribution of a typical bottom-dwelling fish species, ribaldo (Mora moro) *in trawlable depths of the EEZ (blue line). Fish distributions are predicted by statistical models relating 21 000 catch records to key environmental variables.*

Gas-fuelled ecosystems unveiled

An international team of scientists has observed, for the first time, the unusual creatures living around methane seeps off the North Island's east coast. Some of the species collected, which include tube worms and clams, are new to science.

The 21-member team onboard *Tangaroa* included scientists from NIWA, Woods Hole Oceanographic Institution, Scripps Institution of Oceanography, and the University of Hawaii as part of a larger study of marine 'chemosynthetic' ecosystems.

Chemosynthetic ecosystems are fuelled by chemicals, such as methane and sulphide, rather than sunlight. New Zealand is one of the few places where several chemosynthetic habitats occur in close proximity, allowing scientists to address key questions about their ecology.

The scientists used *Tangaroa*'s substantial mapping capabilities, our Deep Towed Imaging System, and seabed sampling equipment to characterise the geology and biota of these habitats. The team discovered an abundance of cold methane seep sites off the east coast, including one of the world's largest, dubbed 'The Builder's Pencil', covering an area of about 0.18 square kilometres.

The voyage was funded by the US National Oceanic and Atmospheric Administration and NIWA.

NIWA/NOAA

A previously unknown species of marine tube worm discovered at 'The Builder's Pencil' cold seep.

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- aquatic pests including toxic algae – detection, identification, prevention, spread, potential risks, control, eradication
- human impacts on biodiversity
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