

## Marine reserves

## The future reserved?

**The experience of New Zealand seems to suggest marine reserves as a proactive solution to the crisis in the world's oceans**

**M**arine reserves are probably the most proactive means of countering the present crisis in the world's oceans. In that part of the globe where the hemisphere is centred on New Zealand, 90 per cent is ocean and the marine ecosystems there are isolated from humans. They should, therefore, be less affected by exploitation and pollution than those of most other countries. New Zealand should thus be the ideal test case for marine reserves.

Under New Zealand's Marine Reserves Act, such reserves are set aside primarily for scientific purposes. The need for increased scientific understanding is very clear, as threats to the ocean from both natural and human sources are blatantly obvious.

As the worst El Niño since 1983 reverses the normal climatic patterns in the South Pacific, dramatic die-offs of marine mammals, penguin, fish and seabird kills, toxic algal blooms and red tides are hitting New Zealand waters with unexpected severity. Such impacts threaten fisheries, economics and equanimity. They demonstrate just how little of the complex dynamics of marine ecosystems and their living species is known.

In the sub-Antarctic Auckland Islands, more than 1300 pups of the endangered Hookers sea lions have died for reasons scientists have as yet been unable to determine. With a population of under 15,000, Hookers are the rarest and most isolated of sea lions in the world. Campaigning in recent years by conservationists, concerned that the numbers of adults drowning in the nets of the squid fishery could lead to extinction, led to the Ministry of Fisheries setting a quota on the number that could

be killed before the fishery was closed. This quota, like a stock assessment, is an estimate of the sustainable mortality derived from the biological parameters, and the numbers killed on vessels, Ministry of Fisheries observers extrapolated over the whole fleet. Last year, the figure was more than 100 females, already much greater than the agreed quota before intensive lobbying led to the Minister closing the fishery. Yet, even before this year's fishing season had begun properly, it was estimated that more than this number of breeding adults had already died at sea from this mysterious illness. The consequences of further human impact could be serious.

On the mainland, following numerous complaints of human acute respiratory irritation, there have been official warnings to keep people off two popular beaches. In another outbreak in Wellington, a university marine scientist found that all marine life in the harbour had been killed and that the city could only wait for a change of weather to disperse the toxin involved.

Around the coast, there have been numerous closures of beaches, marine farms or specified lengths of coastline for shellfish harvesting as a result of monitoring toxic blooms in the north, there have even been dramatic red tides off local beaches. This is the first time since the unprecedented crisis in 1992-93 that there have been reports of such widespread and intensive impacts. If nothing else, it raises questions about how much we know about the dynamics of the marine ecosystems.

**Unusual events**

Although so many unusual events have occurred this summer, the fact that they have occurred in many different bodies of

water separated by features such as the Southern Convergence means that the search for causal factors must be sought in features that encompass the wider area.

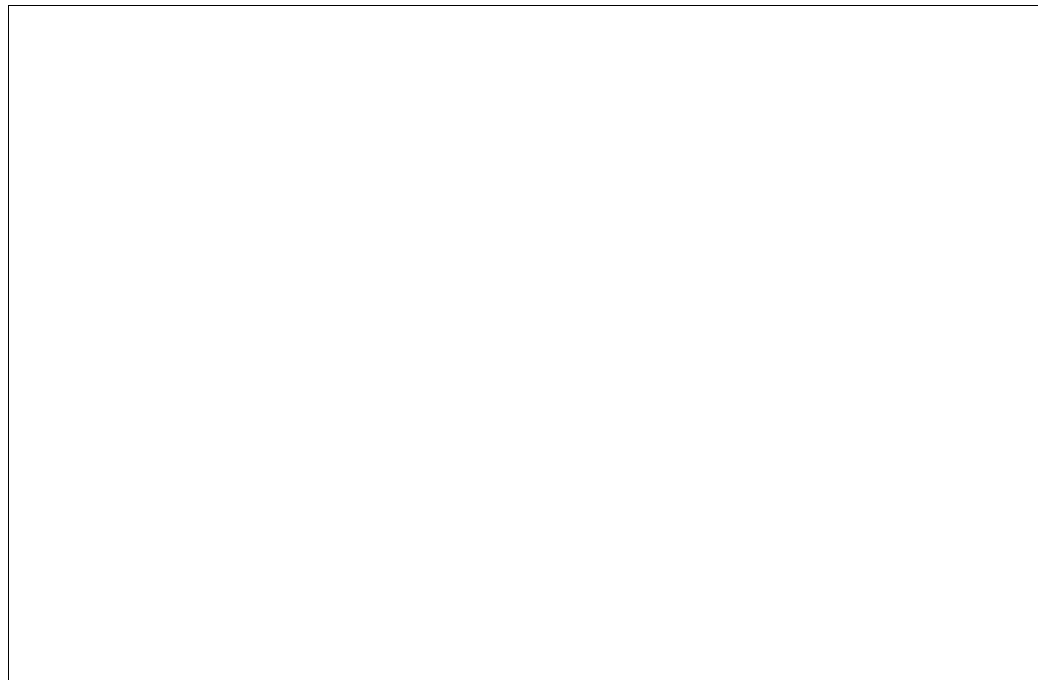
**G**enerally, threats from pollution and overexploitation of the world's oceans are increasing. If these major impacts can be removed from specific special and representative ecosystems, allowing them to regenerate to [their previous, natural state, and providing them as control groups, it could lead to better knowledge.

Such areas of marine reserve are a small but vital contribution to the protection of the seas. Marine ecosystems are complex and diverse and, with the difficulties of monitoring within a fluid medium, we know comparatively less about them than about terrestrial systems. Scientists typically use control groups in order to remove the effects of as many variables as possible and marine reserves are seen as appropriate for this purpose.

By preventing the removal of fish, seaweeds, shellfish and other living organisms, it is believed they may revert to a more natural state and, therefore, allow for both better understanding and the regeneration of fish populations. Marine reserves are of value not only for scientists but have social values and benefits for education, recreation, management baselines, conservation and

as a source of pleasure for nature enthusiasts. Indeed, in those reserves established long ago, the spectacular volume and diversity of fish that so excited the early European explorers to New Zealand can again be seen, while newer destinations are showing signs of reverting to this state. With 'spillover' and increased larval export from expanding species populations, practical benefits also flow beyond the designated areas to the environment and those who depend on it. Many species and the products of spawning do not recognize gazetted boundaries but rather, as the pots of lobster fishermen surrounding some reserves testify, become distributed widely and contribute economically to these and other stakeholders.

There are now 14 such reserves sprinkled around New Zealand: Cape Rodney-Okakari Point (the Leigh Marine Reserve and the first established), the Kermadec Islands (the largest marine reserve in the world), Poor Knight Islands, Whanganui A Hei, Tuhua (Mayor Island), Kapiti Island, Long Island, Kokomahua, Tunga Island, Piopiotahi (Milford Sound), Te Awaatu Channel (The Gut)-these latter two are both in Fiord land, following application made by the Federation of Commercial Fishermen-Westhaven (Te Tai Tapu) and, more recently, Pollen Island and Long Bay, established under the Marine Reserves Act. In addition, but under different legislation, there are two



Marine Parks, Tawharanui and Mimiwhatangata, and the Sugar Loaf Islands Marine Protected Area. Applicants have included university marine scientists, Maori groups, community groups, the Federation of Commercial Fishermen, the Department of Conservation, and conservation groups.

**T**hese are generally no-take areas for scientific purposes under the Marine Reserves Act, but their establishment was often motivated by a desire to conserve representative areas of the sea, its habitats and species-places where people can visit and see fish and marine life as they used to be. Overseas, it is recognized that "New Zealand's marine reserves provide an international model for the protection of critical marine reserves around the globe," as Groundswell reported in *A Newsletter on Marine Reserves*.

In reality, as yet, only a tiny four per cent of the territorial sea (out to 12 nautical miles) is protected and, without the Kermadec Reserve, there would be less than one per cent in marine reserves. The immediate target is an area of 10 per cent. On land, the need for conservation is well recognized and almost a third of New Zealand is protected in national parks and reserves. Even this does not seem to be enough to preserve the uniqueness of New Zealand's landscape. Marine ecosystems are even more complex and so the issue is more urgent.

New Zealanders like to fish and gather food from the sea both commercially and privately, so virtually the entire coastline is, or has, until very recently, been exploited-so setting tip reserves is controversial. Yet divers have testified to the sometimes spectacular recovery of marine life within the reserves. Some, like Leigh just north of Auckland, have become major attractions, where people can see dramatic schools of fish by just paddling into the water.

Such benefits are becoming widely recognized and scientific research has endorsed them by showing an unexpectedly large increase in fish-there are now 20 times more rock lobster, and 12 times more snapper in the reserve than

outside. If marine reserves can contribute positively toward regenerating local areas, then, in order to be effective nationally, a network of biogeographically and ecologically representative reserves is required. This should include all types, from those on exposed, hard coasts to the soft estuarine mudflats, mangroves and wetlands.

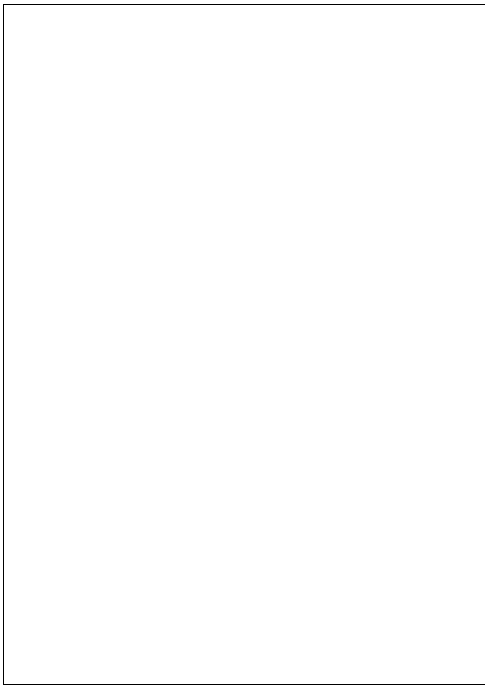
In the Hauraki Gulf, just outside Auckland and adjacent to the region of greatest population in New Zealand, efforts are under way, in terms of both theory and implementation, to define a network. Scientists have used both physical and biological criteria to define principles, so that selected areas would include both representative and unique marine ecology. To explain the principles, Professor Bill Ballantine, a marine scientist and leading proponent, uses the analogy of a trawl net, just as the meshes are largest at the mouth and reduce in size at the cod end, where the quantity of fish will be the densest, marine reserves offshore need to be greater but further apart and, inshore, where habitats and species are both denser and more diverse, the reserves should reduce to smaller size but increase in number.

More significantly, for specific stakeholders, Ballantine has shown that if one area has a higher priority for one group, then, provided a neighbouring area also meeting the principles is available, it will serve the purposes of a network just as well.

In the Hauraki Gulf, there are now around eight marine reserves or special ecological areas gazetted, with a further eight in fairly advance stage of the application process. As yet, in only two widely separated pairs are the reserves close enough for natural biological linkages to occur obviously. Nevertheless, it would need only another eight reserves before the anticipated synergistic interactions between them could reasonably be expected to provide an effective network.

#### **Deep water resources**

Not all ecological nor biogeographical types, however, are represented, particularly in offshore areas. Despite knowledge of New Zealand's deepwater fishery resources, efforts to set aside



examples of the habitats and ecology that support them have yet to advance beyond the thinking stage.

In Australia, however, scientists, and others working on orange roughy, through their research, management and conservation organizations, have ensured that at least a few of the known deep-water sea mounts and their diverse benthic (bottom-dwelling communities) remain unfished in an interim reserve.

White conservationists see reserves as a proactive means of countering the present crisis in the global fisheries, the issue is more controversial for other stakeholders. The sub-Antarctic, where pleas have been made for a 100-km exclusion zone around the Auckland Islands to protect the foraging grounds of the endangered Hookers sea lions, is one example.

Species ignored in one culture may be highly prized in another and thus offer lucrative markets. In the past, New Zealanders had no commercial interest in squid, but that is by no means the case now as industry has expanded to meet those demands or even create others. Despite management efforts, some stocks are reducing and effort is shifting to other species. As the companies fishing on the apparently dwindling stocks of orange roughy are increasingly marketing the once-despised oreo dories, so many of the same companies working the deep-water

squid fishery are askance at any suggestion of exclusion from the now lucrative Squid fishery. Even the offshore areas seem to be fully exploited.

In most coastal waters, not only is it more necessary to set aside marine reserves but it is also more difficult without encroaching on jobs and livelihoods. The fishing industry has supported marine reserves in theory, and even applied successfully for a couple, but, in practice, it has opposed most applications. Nevertheless, through consultation and negotiation, there is hope that sufficient reserves will be designated and that fishermen who will be hardest hit in the short run will be the recipients of the greater benefits from more prolific stocks in the longer term.

As the older reserves regenerate closer to their unexploited state and as the newer reserves begin the process of forming a network, our understanding of their species, dynamics and inter-relationships increases in detail. We begin to accumulate the knowledge and skills necessary to counter the many and diverse threats to the ocean,

#### Complex fisheries

Whether the same reasoning and processes that auger well for New Zealand can be applied to the even more biologically and socially complex fisheries in the tropical developing world is an issue for investigation by those who use them or know them best. As just a tentative suggestion, perhaps communities could set aside spawning and nursery areas as a tithe—certainly an immediate sacrifice, but one offering potential benefit in the longer term over a much wider area. 🍷

This article has been written by Leith Duncan, an environmental fisheries consultant based in New Zealand