



1. Introduction

1.1 Why another report on marine issues?

It has become something of a cliché to say that New Zealand's marine environment is a crucial strategic asset, to draw attention to the enormous benefits New Zealand enjoys from its seas and coastal areas, and to highlight the extraordinary opportunities offered in the development of marine resources. It has become equally commonplace to hear debate about the priorities for management of the marine environment – whether a response to a crisis for the ecological viability of an area or species, a demand for more research to fill critical information gaps, or stakeholder groups' concerns at the chronic inability of New Zealand's management systems to fulfil their expectations and requirements.

Over the last decade and longer there have been many official statements, studies, reports, conferences, and policy initiatives addressing aspects of management of the marine environment. Some key examples are summarised in Vista 1 below.

1 Examples of Marine Environmental Management Studies

- In April 1999 the Prime Minister signed the Oceans Charter on behalf of New Zealand, an initiative of the Intergovernmental Oceanographic Commission of UNESCO. Over 60 countries have signed the Charter, which is a statement of principles aimed at promoting awareness of the ocean environment and its importance to society.
- *New Zealand's Biodiversity Strategy: Our Chance to Turn the Tide* (Department of Conservation, Ministry for the Environment, 1998) includes a section on coastal and marine biodiversity. The main desired outcome for 2020 is that New Zealand's natural marine habitats and ecosystems are maintained in a healthy, functioning state. Degraded marine habitats should be recovering. A network of marine areas representative of New Zealand's indigenous marine biodiversity should be protected.
- In 1998, the International Year of the Oceans, the Seaviews Conference organised by ECO brought together a group of New Zealand's leading marine scientists, policy and resource managers to address future directions for management of human impacts on the sea.

- The preparation of the New Zealand Seafood Industry Foresight Strategy (New Zealand Seafood Industry Council, 1998). The industry recognises that research is a fundamental requirement in the seafood industry.
- The New Zealand Mussel Industry Council released its *Environmental Management System Code of Practice* in March 1999.
- In 1997 the Ministry for the Environment's *The State of New Zealand's Environment* report included some depressing statistics about the state and ongoing decline of this country's marine and coastal ecosystems. Many marine species and the habitats on which they depend are under intense pressure. For example, by 1993 the combination of disease and harvesting pressure had reduced stocks of Bluff oysters to ten per cent of their original level (Annala J H. 1993).
- In 1992 the New Zealand Conservation Authority conference on *Marine Conservation and Wildlife Protection* considered the issues of sustainability and a national strategy for marine management that encompasses marine conservation.
- As far back as 1980 the Commercial Marine Fisheries Working Party of the National Research Advisory Council (NRAC, 1980) reported that:

...the New Zealand fishery industry is based on a common property resource... management of such a resource cannot be left to market forces or ad hoc arrangements. It is imperative that the state is involved, that specific goals are set, and that a national policy is enunciated...

A simplistic view of the resource of a fishery considers it to be just those few fish species that have commercial or recreational value... This is a narrow, incomplete and misleading view of the fish stocks or the marine environment and one responsible in part for the sequential events of fisheries decline, collapse and switch to less preferred (and less valuable) species seen generally throughout the world. In fact the resource is the total marine environment of a geographic area, of which the commercial or recreationally valuable species are simply one part... changes in one part will be reflected in compensatory changes in others (National Research Advisory Council, 1980).

The ongoing debate reveals a notable consistency in its reiteration of a number of key concerns or areas for priority action:

- the sustainability of fishing;
- the operations and outcomes of New Zealand's fisheries quota management system;
- Treaty of Waitangi rights and entitlements;
- the decline and degradation of species and ecosystems;
- bycatch of non-target fish species, marine mammals and seabirds;
- biosecurity and the risks to New Zealand of alien marine organisms;
- provisions for recreational fishing;
- the lack of comprehensive scientific data for most of our marine resources and ecosystems;
- the small proportion of New Zealand's coastal seas under protective status as marine reserves;
- the lack of any deep sea protection; and
- the impacts of land-based management on marine environments.

This debate is based in widespread dissatisfaction with the provisions and efficacy of New Zealand's management regimes for the marine environment and fisheries, and the lack of a cohesive approach to complex ecosystems within which many have rights and many are involved in management. Dissatisfaction is a broad-ranging pattern across the people, groups and sectors with an interest in the marine environment, although different stakeholders may be unhappy with different aspects of the system for different reasons.

There have been considerable efforts to address this chronic discontent and improve the effectiveness of marine environmental management. New Zealand's fisheries management systems and legislation have been in a state of continual revision, updating and amendment over the last 21 years. New legislation was passed in 1983, there were further major reforms in 1986 with the introduction of the quota management system (QMS), and several amendments until the 1996 Fisheries Act was passed. The proposed amendments to the Resource Management Act 1991 and proposed review of the Marine Reserves Act 1971 are further initiatives for change. Other recent developments include the Māori customary fisheries regulations, and the initiative of the Ministers of Fisheries, Conservation and the Environment to look at developing a more coordinated approach to marine environmental policy.

However, despite the reviews and changes, the difficulties, tensions and frustrations continue, and the extent to which New Zealand's management of marine resources is sustainable is still uncertain. The most recent amendments to the Fisheries Act 1996 – in particular the devolution of significant management responsibilities, and crucial decision-making for marine environmental research, to the commercial fishing sector – have engendered an acrimonious public debate between industry representatives, the Minister, the scientific community and the environmental non-governmental organisations (NGOs).

It seems clear that what is needed is to take a few steps back and consider our relationships with the marine world from some first principles – a 'clean slate' approach. This kind of approach does not ignore the vast array of existing statutes and management systems, rights and responsibilities in the marine environment. It simply acknowledges that there are times when, in order to have clarity about we are trying to achieve, a fresh approach will be necessary.

2 AN OCEANS APPROACH BY OTHER NATIONS

Australia and Canada have both developed integrated approaches to marine management.

Canada's 1997 Oceans Act provides the Minister of Fisheries and Oceans with the authority to co-ordinate the Can\$4 billion of federal spending on oceans-related issues. The Oceans Act also paves the way for the development of a comprehensive Oceans Strategy, based on the principles of integrated management, shared stewardship, the precautionary approach and sustainable development.

Australia's release late last year of its Oceans Policy (Environment Australia, 1998)¹ was the first step in providing a framework for the nation's marine management, setting a vision, and creating a federal administrative structure for implementing the policy. One of the crucial next steps is the commitment of the Commonwealth to work with States and Territories to prepare regional marine plans. These plans are to be based on integrated and ecosystem-based principles of planning and management, and all relevant agencies will be required to abide by them. An Australian Marine Science and Technology Plan was released in June 1999 (Department of Industry Science and Resources, 1999).²



South Africa has recently (March 1999) released a draft white paper on coastal management, (<http://www.oneworld.org/saep>).

There are several other international initiatives.

The United Nations Commission for Sustainable Development, chaired by New Zealand's Minister for the Environment, has taken ocean management as its prime focus. Last year was International Year of the Oceans and was marked by the publication of the UNESCO funded, Independent World Commission on the Oceans report "The Ocean our Future" (Soares, 1998).

The sheer size and complexity of New Zealand's marine zone – quite apart from utilisation and management tensions – indicate that a systems approach is needed. In fisheries management there has been some increased focus on components of the marine ecosystem rather than just on single species. This is an important shift in realisation that **the marine world is firstly a mosaic of complex ecosystems, and secondly a home to utilisable species.**

This 'systems' focus is fundamental to the long-term sustainable management and development of

New Zealand's marine environment. The systems approach needs to extend beyond the context of the ecological system. It has to extend to the way we think about and ultimately organise our whole management of marine assets. We need to assess the merits of a 'systems thinking' approach to our legislation, to our recognition of the rights and values of tangata whenua, to our research, to our development of property rights and responsibilities, and to our policy formulation.

Currently we don't approach the three dimensional world of the marine environment from a systems perspective. In the eyes of many stakeholders interviewed during the course of this investigation, the marine world is divided into discrete territories, with highly variable linkages of communication, influence or action between them. Such compartmentalisation of a complex ecosystem with unique management challenges will not help New Zealand to realise marine opportunities cost effectively, or to ensure ecological sustainability.

Thus this study takes a whole marine systems focus. Working from a 'systems thinking' perspective has enabled a broad assessment of

New Zealand's Exclusive Economic Zone and Continental Shelf



- New Zealand's exclusive economic zone
- Potential areas for UNCLOS-III outer continental shelf claim
- Area's "for resolution" with other nations regarding New Zealand's UNCLOS-III outer continental shelf claim

Development after discussion with MFAT/LINZ and based on NIWA/LINZ mapping

strategic opportunities and risks. It has highlighted the importance of involving the many people and groups with an interest in New Zealand's seas and coastal resources, as we advance the sustainable management and development of the marine environment.

1.2 The role and strategic approach of the Parliamentary Commissioner for the Environment

The role of the Parliamentary Commissioner for the Environment (PCE) is to review the capability, performance and effectiveness of the system of environmental planning and management established by Government and to provide advice and information so that the quality of the environment is maintained and improved. The Commissioner is an Officer of Parliament, independent of the Government, reporting directly to Parliament through the Speaker of the House. This independence enables a non-partisan and wide-ranging approach to be taken in the Commissioner's investigations.

The PCE has conducted a number of investigations into marine environmental management over the past eleven years including:

- Shakespeare Bay Port Development: Review of Marlborough Harbour Board's Environmental Planning (1988);
- Maui Stage II Development Environmental Impact Audit (1988);
- Marine Fisheries Management (joint study with the Controller and Auditor-General) (1990);
- Marsden Point Terminal Proposal Technical Review Panel Report (1994);
- Sustainable Management of the Chatham Rise Orange Roughy Fishery (1992);
- Dredging Disposal in the Hauraki Gulf (1995);
- Environmental Management of Petroleum and Mineral Mining Activities Beyond the 12 Mile Limit (1996).

In 1997 the PCE developed a strategic plan³ to identify significant areas where the PCE could add most value to advancing environmental management in New Zealand. Two ecosystems were identified as priorities for attention: the urban environment and the marine environment. Given that there are many facets to environmental management of such large complex systems – one dominated by human activity and the built

environment, the other by the impacts of extractive harvesting and competing uses – it was considered necessary to begin work in each area by undertaking overview studies.

The overview investigations are designed to be just that – high level strategic examinations of the whole 'system' areas. They range widely across an extraordinary diversity of different issues, priorities and information. They recognise specific concerns and perspectives, but consider each from the broader context of sustainable management of resources and the environment. They explore the relationships and influences between the various factors, players and issues, and develop an understanding of the consequent impacts, risks and opportunities for environmental management. Following this model, an overview of urban environmental management, *The Cities and their People*, was completed in 1998.

An important objective of these overview studies is to take the longer-term view, going past the immediacies of contemporary management and systems demands to consider the critical priorities for the first half of the next century. Within the overall assessment of requirements and priorities, they identify key issues for further, more detailed attention in subsequent investigations. The urban overview study made no specific recommendations. However, this marine overview has arrived at some crucial conclusions where it is obvious that recommendations are necessary in order to advance New Zealand's progress towards achieving sustainability in our management and use of marine resources.

1.3 Terms of reference

With the objective of maintaining and improving the quality of the environment (section 16(1)(a) Environment Act 1986), the terms of reference are to identify:

- significant issues, strategic risks and opportunities that influence the management of New Zealand's marine environment; and
- critical issues, strategic risks and opportunities that require more detailed investigation.

The Commissioner will report on:

- the investigation in the annual report to Parliament for the year ending 30 June 1999; and



- the outcomes of the investigation by September 1999⁴.

The investigation will focus on key issues through four core themes, namely:

- the values and expectations of stakeholders;
- institutional frameworks and international obligations;
- the rights and responsibilities of stakeholders; and
- the adequacy of environmental information to enable integrated management and to progress sustainable development.

By focusing on these themes, the investigation has taken a holistic approach to the management of the marine environment, with particular consideration of the relationships between economic and environmental goals and policies.

1.4 Approach and methodology

Like any project or undertaking, the marine overview investigation has been approached from a particular perspective. In the interests of clarity about the nature of the investigation, and the resulting report, it is important to outline the conceptual approach and methodologies.

As noted above in section 1.1, the project has taken a systems approach in the widest sense to the concept of 'the marine environment' and what it comprises (see Vista: 3 What is meant by the marine environment?). This has been essential to avoid the dominance of sectors' priorities and of particular, predictable ways of thinking, whether scientific, bureaucratic, protectionist or commercial.

3 WHAT IS MEANT BY THE MARINE ENVIRONMENT?

To understand the sea, you need to start at the tops of the mountains, with the clouds bringing rain, and the winds curling across the flow of the land, running on down, trickling through the creeks and crannies of the mountains, curving into the wider rivers running between the hills, meandering gently across broad swampy flats and sandy coastal plains, nudging up against the incoming tide, swirling with the currents across the harbour entrance, spreading out across the shallows and the warm bays between sheltering headlands, taking a sideways sweep around rocky off-shore islands and, at last, reaching the deeper waters

where there is nothing between you and the great oceans stretching away to the horizon and far beyond.

To understand the sea, you need to look back towards the land, with the tang of salt water on your skin, keeping a balance on the waves and currents shifting back and forth beneath you, taking your rhythm from the chunking sound the water makes against the boat, taking your bearings from the old reference markers, the alignment of the hills with the cabbage tree on the point and the gap where the river comes through, working against the pull of the channel as the tide changes, watching the birds circling and swooping down to feed across the bay, watching the way the sea comes back always to solid land, to the meeting place of water and earth, the meeting place of people and the elements.

This investigation takes an inclusive and wide-ranging approach in its discussion of 'the marine environment'. Firstly, humans and their values, ideals, beliefs, and cultural and metaphysical frameworks cannot be excluded from any practical definition. The marine environment is more than just the biophysical resources, the water and fish and birds and plankton. Different people, groups, cultures and sectors within the community each bring a complex mix of personal, spiritual, traditional and aesthetic dimensions, economic imperatives and opportunities, values and ideals, assumptions and expectations to their various interactions with the biophysical environment.

An extraordinary diversity of other creatures live in and depend on the sea – fish, eels, sharks, octopuses, rays, seals, dolphins, albatross, penguins, dotterels, terns, petrels, crustaceans, shellfish, seahorses, snails, starfish, jellyfish, huge sperm whales, and invertebrates so tiny they cannot be seen with the naked eye. The marine environment also includes the natural habitats on which these species depend, the corals, seaweeds and rich plant growth that protect and feed them. These habitats range from the brackish estuarine shallows that sustain populations of pipi, cockles, flounder and sole, beyond the densely packed ecological diversity that make seamounts such an important place of shelter and sustenance for fish and small marine animals, to the depths of the trenches extending through our EEZ.

Minerals, oil and gas reserves, and chemicals such as sulphur compounds issuing from undersea vents near White Island are part of the marine environment. So also is the full range of ecological factors and influences on the global level, from El Nino and La Nina and other meteorological and climatic patterns, to the deep cold currents swelling up from the Southern Ocean into the Kaikoura Canyon, laden with nutrients,

creating a globally significant habitat for sperm whales. The tourists excitedly photographing those whales – and the tourism enterprises that provide for some the wildlife experience of a lifetime – are part of the marine environment.

In geographical terms, New Zealand's marine environment encompasses the territorial sea and the exclusive economic zone (EEZ), as well as the seabed of the continental shelf extending beyond the EEZ. The marine environment includes coastal areas, sand dunes, beaches and cliffs, and New Zealand's 158 offshore islands. It includes the vessels – freighters, trawlers, tankers, ferries, waka, yachts, launches, dinghies, kayaks and other craft – that take people out onto the water. It includes the experiences, activities and purposes that take them there.

The marine environment includes the mana of the marae sustained by kaimoana gathered locally. It includes the accumulated knowledge of generations, building up a unique understanding about each place, and the practical know-how to make sure its natural resources will still be there for future generations. It includes the distinctive character and sense of identity of each local coastal community, the familiarity of the headland seen in different weathers through the kitchen window every morning, the way the light gleams and shimmers across the bay as the tide turns. It includes the deep love of ordinary New Zealanders for the special places where they go sailing and fishing, swimming and walking – the importance of the beach where they took their children paddling for the first time.

The investigation team travelled from Whangarei to Bluff, meeting with as many people as practicable. Some people were interviewed by phone. Inevitably, the interviews ranged across all kinds of topics and information. The great diversity of people reflected the diversity of marine environmental issues and interests (a list of interviewees is given as appendix 1). Even so, there are many people and groups who could not be consulted in the time available.

Each group and sector was consulted on the current issues and concerns relating to the marine environment, as well as those issues that will be relevant in the 21st century. Innovative solutions and creative practical ideas for managing the marine environment sustainably were of particular interest.

In addition, information and discussions of various issues have been gathered from official

and published sources and from the internet. As a result this report incorporates a diversity of different kinds of data, including what might be classed as 'anecdotal information' and the personal views and experiences of some of those interviewed. Where such 'informal' information has been included, it should be taken as a report of the perspectives of those concerned, not as any expression of the views or opinions of the PCE. The intention in using such information has been to reflect more directly and accurately the positions and feelings of those who were consulted, and thus to build up a sense of the overall mosaic of views, values and concerns of the various stakeholders in the marine environment.

This report contains only a small amount of the information gathered during the course of the investigation. It should be seen as a distillation of the key points and concerns – a focusing in on the most important and the most interesting. The objective has been to advance understanding of the strategic priorities that emerge from the very complex business of marine environmental management. Although much of the detail has been omitted, some has been highlighted in the Vistas throughout this report. A reference bibliography is given at the end of the document, and in addition references are listed at the end of each chapter.

It is useful to clarify what this study is **not**, as well as what it is. It is **not** an assessment of the state of the marine environment, although information on the depletion and degradation of New Zealand's marine and coastal ecosystems and resources is included at some points, and underpins the general direction of the study. This report is **not** an analysis of every environmental impact on New Zealand's seas and coasts; in the interests of manageability a thematic approach has been taken, identifying exemplary cases or issues sufficient to indicate the broader picture. It is **not** a formal scientific study – it brings science into the wider social, cultural, policy and economic arenas. It does **not** go into detailed analysis of specific points in the fisheries legislation and the proposed statutory amendments, nor does it get caught up in the complexities of the quota management system for particular fish stocks. The report is **not** a futures visioning exercise such as the recent Foresight process coordinated by the Ministry of Science,



Research and Technology, but it is very much focused on the future and on what will be necessary to achieve sustainable management of marine and coastal environments.

1.5 The structure of the report

With a topic as wide and fluid as marine environmental management, with so many different currents and channels that might be followed through it, all of which influence each other, determining a particular structure for this report was not going to be straightforward. One way of arranging the report would be according to ecological or resource categories, working with, for example, inshore and deep sea matters, or with categories such as minerals, marine mammals, fish and seabirds. Another way to structure the assessment would be according to stakeholder groupings, dealing with each interest group and their particular concerns in turn.

To some extent the advantages of each of these approaches have been utilised at various points in this report, while following another structure again – a more thematic ‘systems’ approach as most appropriate for the strategic focus of this study.

The issues will be discussed under four principal areas:

- why the marine environment matters to New Zealanders – the different ways that people see the marine environment, the values and expectations they bring to their encounters and interactions with the sea, and the utilisation and fiscal value of marine resources;
- how the marine environment is managed – an outline of the statutes and formal systems, and an exploration of some of the points of interface between government structures and citizens;
- the various different kinds of rights, and expectations of rights, of stakeholders in the marine environment; and
- the adequacy of our information and knowledge about the marine environment.

In addition to working through the issues within this framework, there are a number of cases, stories, quotations or examples that float, each with their own distinctive buoyancy, alongside the main discussion. Often their relevance is not limited to a single issue or theme, and thus they

have not been confined to a single place in the body of the text. They are referred to in the text as vistas and are intended to illustrate and illuminate the developing discussion, and to directly share the views of some of the people consulted during the course of the investigation. References within the vistas are set out at the end of each chapter.

References for chapter 1

- ¹ Environment Australia, Ministerial Advisory Group on Oceans Policy, 1998: *Australia's Oceans Policy*. Canberra. (<http://www.environment.gov.au/marine/ocepoly/main.html>).
- ² Department of Industry, Science and Resources, 1999: *Australia's Marine Science and Technology Plan – An Overview*. Canberra (<http://www.ist.gov.au/science/marine/marineoverview>)
- ³ Parliamentary Commissioner for the Environment, 1997: *Future Directions*. Strategic focus for the Parliamentary Commissioner for the Environment 1997-2001. Wellington.
- ⁴ Due to the PCE's commitments and the dissolution of the House of Representatives in October 1999, the report was unable to be tabled until December 1999.

References for the Vistas

- Department of Conservation, Ministry for the Environment, 1998: *New Zealand's Biodiversity Strategy, Our Chance to Turn the Tide – A Draft Strategy for Public Consultation*, December 1998. The NZ Biodiversity Strategy Project, Wellington.
- New Zealand Seafood Industry Council, 1998: *New Zealand Seafood Industry Foresight Strategy*. October 1998. (<http://www.seafood.co.nz>)
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2. Influence of Values and Expectations of the Marine Environment

2.1 Introduction

When we are dealing with the management of New Zealand's marine environment and resources, we are also inevitably dealing with a diversity of different groups and individuals, iwi, hapū and whānau, public agencies and private enterprises, local community groups and broader national organisations. Each of these stakeholders has different interests in marine resources and environments, and different expectations of what their interactions with those resources and places will provide. The sea and its riches mean different things to different people. Therefore we need to look at these frameworks of value and belief *before* focusing on the institutional frameworks and the management issues.

The underpinning principle is that the marine environment delivers unique benefits to the functioning of the planet and its many inhabitants. The utilitarian and economic value of marine resources is influenced by the values and expectations of the various stakeholders. Marine systems clearly provide useful tangible products such as food, oil and gas from beneath the sea bed, and a medium for transport. There are also essential benefits that are less easy to quantify, such as habitat for a vast number of species (a significant percentage of New Zealand's biological diversity), the metaphysical and cultural values of tangata whenua and the continuity of human association with the coast and the sea, the recreational experiences of a large proportion of New Zealanders and overseas visitors, and the vital ecosystem services provided by the marine environment (eg regulation of carbon dioxide [CO₂] and oxygen [O₂], and waste dispersal).

The matrix of values and expectations changes over time. Different interests and groups will gain different levels of influence, developing different projects and programmes, demanding the satisfaction of different needs, and focusing on different priorities, all in response to changing circumstances, new opportunities and a range of external factors.

Other kinds of fundamental difference are also important; for example, the great variation in resourcing levels between various stakeholders, with some extremely well-financed sectors and others that operate with minimal or no funding and support. There are similar marked inequalities in the levels and kinds of knowledge, skills and

hands-on expertise of the various different groups and individuals – both in specifically marine or fisheries matters, and in broader areas such as the law, commercial practice, processes of consultation and negotiation, and awareness of community dynamics and concerns.

The diversity of values, attitudes and requirements can be a significant factor for the effectiveness of environmental management, particularly in situations when disjunction between the paradigms of different stakeholders is not recognised or well understood. Often such differences seem to relegate the respective parties to polarised adversarial positions. These typical confrontational patterns can obscure any shared goals or management requirements, and often constrain any potentials there might be for groups and individuals to work together for mutual benefit and better environmental results (see sections 4.4 and 4.5).

In many cases the entrenching of such differences seems to result from a lack of understanding on the part of the various stakeholders and groups – both of the frameworks and values of others, and of their own.

The following brief summaries explore some of the reasons why New Zealand's marine and coastal environments, and their resources, are important to different kinds of New Zealanders.

2.2 Marine ecosystem functions

In monetary terms we tend to think of the value of the marine environment as being derived from seafood products, hydrocarbon and mineral deposits, and tourism and recreation products. As important as these are to societal wealth (see section 2.3), by far the greatest value of New Zealand's marine environment is in the ecosystem services it provides. Most of these benefits are currently not included in the market economy. They include such factors as gas regulation (CO₂/O₂), acting as a source or sink for heat, waste treatment, nutrient cycling, and habitats.

It is these ecosystem service functions, many of which are global systems functions, that are the real wealth of the oceans. In a recent study¹ it was estimated that 63% of the value of all global ecosystem services (US\$20.9 trillion/yr) is derived from marine systems, with 50% of this being derived from coastal ecosystems. In Costanza's study 'ecosystem services' includes ecosystem goods (eg food and hydrocarbons).



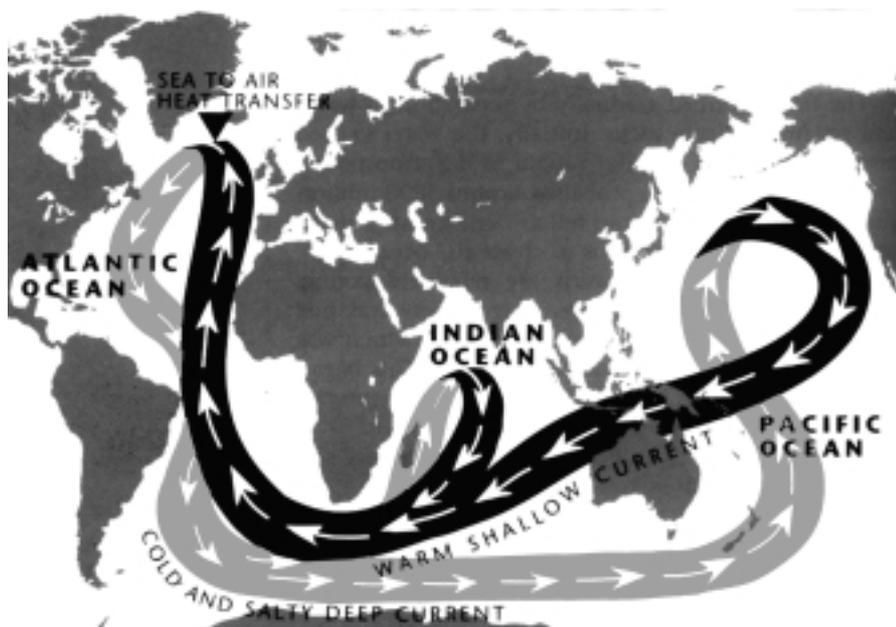
However, even with such goods being included, the majority of ecosystem service functions are still outside the market economy. In simplistic terms this can be illustrated in the New Zealand context by the fact that New Zealand's Exclusive Economic Zone (EEZ) totals 1.69% of the world's oceans, with an estimated ecosystem service value (per Costanza *et al*) of NZ\$183 billion (4.6 times the total value of ecosystem services provided by New Zealand's land base).² This can be contrasted with the value of seafood and hydrocarbon products in 1998 of approximately NZ\$2.6 billion.

Such a focus on the ecosystem services function of marine systems may seem academic and irrelevant, but it is vital for the future sustainability of the planet. New Zealand's marine systems, in common with those throughout the world, are complex and often very delicately balanced. Our utilisation of components of these systems will frequently have system level effects, and these effects will not be confined to a specific site or resource. For example, biotic components such as

phytoplankton are linked to atmospheric functioning (eg uptake of CO₂); global climates could be influenced by changes at the marine/atmosphere interface caused by the destruction of critical habitats. This interconnectedness means that in our pursuit of more exploitable resources (fish, oil etc), we must recognise the enormous importance of the non-market values of the maritime system. We need to research the impacts of utilisation of marine 'goods' on the functioning of the ecosystem as a whole in order to understand the interrelationships more clearly and to ensure that the diversity of marine values, whether currently recognised by the market or not, are sustained (see sections 5.2-5.7).

It should be noted that it is unlikely that it will be possible to identify and accurately quantify all of the services an ecosystem delivers, and "...it would be a mistake to think that if ecosystem services were perfectly understood and evaluated in monetary units according to accepted economic precepts, the problem of ecosystem evaluation would be completely solved".³

Global Current Patterns: the Great Marine "Conveyer Belt"



Source Broecker, W.S. 1991. Reproduced under written permission from Cambridge University Press.

2.3 Marine ecosystem goods

The Utilitarian Tradition

New Zealand’s marine environment and the resources within it have, since the time of earliest European contact, been viewed as a source of income. The early sealing and whaling industries were certainly not sustainable, although they earned many traders and shipowners substantial fortunes for a few decades, and provided essential materials to fuel the industrial revolution of the late 18th and early 19th centuries. The seal and whale populations in New Zealand’s waters were soon depleted in a classic boom and bust cycle:

In the early 1800s, sealing ships took cargoes of 50,000 or 60,000 skins... Whalers from America, England and other European nations operated in increasing numbers in the waters around New Zealand. In the single year 1836, the Bay of Islands saw 93 British whaling ships, 54 American and three French. In 1840 the Americans alone had over 700 ships operating in the Pacific – on average each ship took about 100 whales a year.

By 1880 the once thriving Pacific whaling industry was reduced to a few areas off the coasts of Peru and Australia... both the right and sperm whale populations of the world had been hunted to the edge of extinction.⁴

Everything was valued in terms of its productive usefulness – even penguins on the subantarctic islands were boiled down for their oil.⁵ The journals and letters of the early European settlers enthusiastically record the rich harvests of fish enjoyed by Māori communities along the coasts and harbours. For a century and a quarter, from the arrival of the New Zealand Company until the 1960s, the prevailing principle was that the natural resources of the marine environment, as well as the land, were available for human

utilisation and economic benefit. The development of today’s conservation ethic and the concept of sustainability have been relatively recent trends in New Zealand resource management, driven by an increasing awareness of the losses and degradation resulting from uncontrolled exploitation.

Economic value

Commercial stakeholders in the marine environment have a diverse range of interests in the supply to markets of goods and services provided by New Zealand’s oceans. In addition to the ecosystem services considered above (see section 2.2), the sea is also of enormous utility to human society in other ways that are similarly outside current market systems (see Vista 4 Uses and values of the marine environment).

Within the next few years, annual returns from fishing, aquaculture and hydrocarbon extraction will be in the order of \$2.6 billion per annum (see table 2.1 below). Potential returns in the foreseeable future are difficult to estimate, but on current data it is possible to define resource totals in the order of up to \$100 billion from hydrocarbons. Mineral deposits from the relatively small areas surveyed so far include: the Chatham Rise phosphoric deposit estimated in 1990 to be worth over \$10 billion; large gold, salt and silica aggregates; and manganese nodule deposits of possibly more than \$200 billion.⁶

The use of any resource is a complex transaction where a large number of factors may need to be balanced and integrated to achieve maximum returns and benefits, however those may be defined. Among the factors influencing use decisions are:

- the values, not just fiscal, attributed to the resource;

Table 2.1 Estimated value from major New Zealand industries based on extraction or servicing the marine sector

Industry	Production Value (NZ\$)
Oil and Gas (1997)	\$1,395 million
Wild fishing (1998)	\$1,050 million
Boat building industry (1998)	\$375 million
Marine farming – aquaculture (1998)	\$170 million
Total	\$2,990 million



- market demand and projected demand;
- opportunity costs;
- the range of alternatives available;
- the comparative advantage of other uses and resources;
- scarcity and perceived scarcity;
- perceived and actual risk to the operation, to the resource and associated ecosystems;
- infrastructure costs associated with utilisation;
- externalities whether quantified or open-ended; and
- the extent to which any of these factors are deemed to be beyond the control of the user or decision-maker.

Market demand will provide signals that will promote one use over another at a particular point in time, for example in the priority accorded to Golden Bay's scallop fishery over the less lucrative flounder fishery in the same area. But market demand must not take precedence over the ongoing sustainability of the system, and its ability to supply the optimum levels of services and benefits, including the wider ecosystem services. **A fundamental requirement of sustainability – both ecological and economic – is that due consideration is given to the ongoing nature of the supply and to the overall ecological resilience of the resource.** Economic sustainability (ie viability) tends to have a short- to medium-term focus while ecological sustainability necessitates a long-term focus. Therein lies a fundamental tension that must be accommodated.

If New Zealand is to promote the sustainable development of its marine assets, it must recognise the diverse range of commercial interests and factors in the marine arena, and clearly establish where and how they relate to each other. Improving our understanding of the interrelationships between commercial, environmental and other values in marine resources, and developing robust frameworks for the comparative assessment and integration of ecological and economic data, are urgent priorities (see sections 5.3-5.7).

4 USES AND VALUES OF THE MARINE ENVIRONMENT

1. Direct Use Values: Consumptive Uses

- Commercial, industrial market goods (fish, shellfish, crayfish, bioprospecting, oil, gas and minerals, etc)
- Traditional or customary uses (fish, shellfish, crayfish, kina, seaweed etc)
- Recreational benefits (fish, shellfish, crayfish etc).

2. Direct Use Values: Non Consumptive Uses

- Recreation (charter cruises, wildlife photography, diving, swimming, sailing, catch and return fishing)
- Science and education (marine studies of various kinds)
- Transport (domestic and international shipping).

3. Indirect Use Values

- Climate control (moderation of weather, generation of sea breezes etc)
- Oxygen/carbon dioxide exchange; contribution to water cycle;
- Absorption and dispersal of land-based pollution
- Habitat and protection of biodiversity and species (potential sources of medicines, source of future aquaculture).

4. Option and Existence Values

- People may value the option to use a particular resource aspect of the ocean in the future. They may value the option to retain it in its natural state. Although difficult to measure, these different values should be recognised in assessing the contributions of the ocean to human welfare.
- People may value the ocean purely for its existence without any intention to directly use the resource in the future. This includes intrinsic natural value.

Note that any of the above values can be considered at different scales, eg as applicable to a bay, a harbour, a regional coastline, the nation's EEZ, or the ocean that comprises the whole hemisphere.

Oil and gas

New Zealand meets about half of its oil and all of its gas requirements through local production both on and off-shore.⁷ (Taking the 1997 oil and gas production figures and multiplying them by the published barrel price⁸ gives an approximate production value of \$NZ 1.39 billion.) This industry has developed since the 1973 oil crisis revealed New Zealand's strategic vulnerability. The current domestic supply limits the country's exposure to potential fluctuations of the international oil supply, and possibly to fluctuations in international oil prices.

New Zealand will enter the 21st century with most of its oil and gas deposits intact and with only the Maui fields in the Taranaki Basin exploited. The Canterbury Basin has excellent prospects, but exploration is not yet commercially viable given the current low international oil price. The lack of any oil industry infrastructure outside Taranaki is a further disincentive to development, although the East Coast of the North Island is under development for gas production.

The benefits for regional economies are an important factor, and are significant in the promotion of the industry. The advantages, both actual and projected, need to be considered alongside the impacts on coastal and inland environments from industry activities and extensive infrastructure requirements. One high profile example was the impacts of the construction of the proposed outfall associated with the synthetic fuels plant on the traditional mahinga kai areas of Te Ati Awa at Motunui.⁹

Generally a number of marine environmental sustainability concerns are relevant for the future of New Zealand's oil and gas industry, including:

- greenhouse gas emissions;
- the efficient utilisation of methane;
- best future use of a product, for example, gas for the production of electricity, or for transportation, direct heating etc;
- the risk of oil spills;
- adverse effects on coastal environments and other areas where facilities are located; and
- the wider context of global concern about the exploitation of non-renewable resources – there is increasing interest in reducing hydrocarbon dependency, but very little action.

New technology is being developed at a rate that may generate new resource recovery industries, such as hydrate and heavy metal extraction. Hydrates – a frozen mix of water and methane found in substantial volumes off the North Island's East Coast between Gisborne and Cook Strait, and off Fiordland – are estimated by some scientists to hold twice the energy of all known reserves of oil, coal and natural gas. Concentrated in ocean sediments, they expand to around 160 times their seafloor volume when extracted. While there are significant engineering difficulties, a consortium of Japanese oil companies and Canada's national earth science organisation are now making the first extraction attempts.¹⁰

Shipping, transport and ports

Around 95% of New Zealand's exports by value travel by ship; by bulk, we export five times as much as we import. Deregulation of the coastal shipping industry in 1995 made New Zealand one of four countries in the world that does not have a subsidised domestic shipping fleet. In the past, New Zealand had an industry based on coastal trading vessels working out of small regional ports, but now the shipping trade largely comprises bulk volume international vessels.

Until the 1980s, New Zealand's ports were publicly owned and managed through elected harbour boards. Their successors, port companies, are subject to the Resource Management Act 1991 (RMA) and other environmental legislation in their operations. Expansions such as the extension of the Fergusson terminal in Auckland, or the new port terminal at Marsden Point at the mouth of the Whangarei Harbour, have been the subject of extensive negotiations through the resource consent processes under the RMA. The port companies are increasingly environmentally conscious; for example, Ports of Auckland has established a comprehensive environmental policy, covering auditing, water quality, biosecurity, dredgings disposal, ballast water and noise issues.

One suggested scenario for New Zealand's ports in the 21st century is that they will evolve to a rationalised situation of dominance of the three major ports: Auckland, Lyttelton and Tauranga.¹¹ In such a scenario, smaller regional ports and facilities will seek to diversify and try new developments. The port development at Marsden Point has been promoted as a forestry terminal. However, the environmental effects of such



projects can be significant. For the Marsden Point Terminal proposal, the resource consents process under the RMA identified a wide range of concerns including effects on harbour water quality, on mahinga mataitai and wāhi tapu, on harbour ecosystems, and on the operation of the adjacent oil refinery jetty.

A small number of businesses, primarily in the greater Auckland area and in harbours such as the Bay of Islands and the Hokianga, provide regular commuter ferry services, plus ferries and other vessels for tourism trips. The environment is a significant component of these enterprises, which promote the whole experience of water travel, harbour views, the unspoiled island destinations, and the opportunities to see wildlife such as dolphins or the special fauna on island sanctuaries such as Tiritiri-Matangi. The Cook Strait ferry services also promote the natural scenery of the Sounds as an experience. Even prosaic daily commuter services gather an extra dimension from the simple fact of being in a natural environment: “The [Hauraki] Gulf and its islands open a window into a lifestyle which is the envy of princes”.¹²

The fishing industry

Most commercial fishing in New Zealand is subject to the quota management system¹³ established in the early 1980s to allocate a proportion of the total allowable annual catch of each fish stock to established fishing operators. Today the New Zealand fishing industry consists of three large corporate entities (Sealord, Sanfords and Talleys) and a number of smaller organisations, the majority of which lease rather than own fishing quota. Māori are key stakeholders in the industry, with a long history of involvement in fishing; the Treaty of Waitangi Fisheries Commission, Te Ohu Kaimoana, was established in the early 1990s (see appendix 2). Māori interests now own 40% of the commercial fishing quota, and a number of iwi operate or have interests in processing facilities.¹⁴ Some fishing sectors have grouped together into cooperative organisations in order to maximise benefits through a more coordinated approach to management. Exports of New Zealand fish earn \$1.2 billion per annum.

The commercial fishing sector is just that – commercial. At the end of the day, fishing companies are there to earn a profit through the

provision of seafood products to domestic and international markets. This need not be incompatible with environmental sustainability, although many people outside the industry believe that commercial fishing will not be able to modify its activities and thus continue to cause environmental degradation. There are perceptions both within and outside the industry of a prevailing ‘cowboy’ mentality amongst commercial fishers, despite the fact that the 1980s and 1990s have seen significant developments in the management of New Zealand’s fisheries.

There have been far-reaching effects from the introduction of the quota management system. Constraints are established on the Total Allowable Catch (TAC) for quota species in an area, an annual process to set catch limits based, in some cases, on the estimated biomass and productivity of the fish stocks. The last ten years have seen a dramatic change in the fishing sector, with many fishers seeing a brighter future for their industry because they now feel that the resource is being managed more effectively. However, there is still a wide range of attitudes and values within the fishing industry. While many recognise that fishing needs to be managed sustainably, and accept that this will result in some constraints, others still question the need for regulations and environmental criteria.

A priority for many in the fishing sector is certainty over the medium and longer term for future investment. The industry has high plant, equipment and operating costs, and many people in fishing feel that development will depend on reducing uncertainty. This expectation that the vulnerability of investment will be limited is entirely consistent with the new focus on environmentally sustainable management. It is also closely compatible with the increasing focus on professionalism and quality, a conscious emphasis on improving standards, which has been central to both training and marketing initiatives in the fishing sector in recent years. There have been extensive initiatives by some of the major enterprises and the national industry training programme to build skills, refine operations and processing, and increase product quality and reliability – some ten per cent of industry personnel are undertaking some form of training each year. However, the emphasis thus far has been on the quality of the product, rather than on the quality of the sector’s interactions with the marine environment.

Marine farming

There are important distinctions between wild fisheries and marine farming. Aquaculture is well established in New Zealand with three successfully farmed species: mussels, salmon and oysters. Aquaculture is a sector conscious of its ‘newness’, with the determination and enthusiasm of an industry breaking into new territory, both commercially and geographically. In 1998 exports of mussels were in excess of \$117 million, compared with just \$2.6 million in 1981. Marine farming is currently managed under three statutes – the RMA, the Marine Farming Act 1971 and the Fisheries Act 1983. The industry considers that legislative complications and councils’ implementation have constrained its efforts to develop to the extent many see as its potential. Recently a Government moratorium on new marine farming projects in the Marlborough Sounds was lifted by the Minister of Conservation. There are currently a large number of applications before the Marlborough District Council for new marine farms and for extensions to existing farms in the Sounds.

This year the mussel industry has launched an Environmental Code of Practice, which sets operating standards by which the industry can regulate its activities and impacts. The very nature of aquaculture, dependent on the water quality in enclosed bays and harbours, forces the industry into an intimate relationship with the dynamics of coastal and upstream environments. For a set period of time after every rainfall marine farmers are unable to harvest. Stringent monitoring and conditions are maintained to ensure the aquaculture products are not adversely affected by chemicals, nutrients or sediment carried downstream from inland activities. Because of this close relationship with the surrounding ecosystem, the industry has described itself as a ‘canary in the coal mine’, the first point of awareness for other marine users of any significant fluctuations in environmental quality (see section 2.7).

Marine farming has expanded rapidly in sheltered harbours and in-shore areas not previously utilised in any overtly commercial production capacity. In many cases this has led to tensions with local residents, recreational groups and environmentalists whose objections are often based in aesthetic or scenic values and in perceptions that an industrial operation is

‘invading’ a pristine natural environment. The Department of Conservation (DOC) has also objected to some marine farming applications on ecological grounds. There are, however, positive opportunities with new technologies that allow the marine farm structures to float submerged a little way under the water, thus minimising the visual impacts on the ‘unspoiled’ character of the area.

2.4 Tangata whenua

Whakapapa: Origins

In the traditional Māori world view, all creatures including humans and all plants and natural resources are descendants of the first family, the atua born of Ranginui and Papatuanuku, the sky and the earth. Tāne is the oldest child, the creator god of forests and birds, from whom humans are descended; Tangaroa, whose realm is the oceans and waters and whose children are the fish and other sea creatures, is a younger brother. Thus human life and marine life are connected through the kinship of the atua. This entails special responsibilities and the obligations of whanaungatanga, involving respect and the duty to take good care.

The actual islands of Aotearoa are themselves originally a fish and a boat – the northern island is, for many iwi, Te Ika a Maui, the great fish hauled up from the deeps by Maui the atua-ancestor, and the southern island is the boat on which he and his brothers were out fishing. For Ngāi Tahu, the southern island is the great waka of the atua-ancestor Aoraki, overturned on a visit from the heavens to the world of Papatuanuku.

New Zealand is a nation descended from immigrants. The epic voyages of the ancestral waka from Hawaikinui, the original homelands far away in Te Moananui a Kiwa, the Pacific Ocean, are the foundation for today’s tribal and kinship structures, with iwi and hapū associations based in waka groupings. The skills of those early mariners – long-distance navigation by the stars, boatbuilding and sailmaking, sheer nautical ability in the heavy Pacific conditions – were equally useful in the coastal waters around Aotearoa.

Kai moana: Fisheries resources

Fishing and the utilisation of other marine resources have always been and continue to be fundamental to tangata whenua. As the gifts of



Tangaroa, fisheries and other resources are more than mere protein; their inherent value as taonga is inextricably based in the wider social, spiritual and cultural matrix of iwi, hapū and whānau.

Fishing methods and materials were developed for local species, including traps, pots, various nets, hooks, lines, lures and spears, as well as hand-gathering and diving... boats were designed for different fishing activities... The preservation of seafood by cooking, drying and smoking also allowed the resources to become a valuable trading commodity, particularly with inland tribes.¹⁵

Stranded whales on the beaches have always been a rich resource, providing oil, meat, and bones and teeth for making decorations and implements. The enormous value of stranded whales is reflected in the stories of disputes between the early waka groups over these animals, and in the powerful karakia offered by tohunga to attract whales in to the shore. Seals were hunted and utilised for meat and for their skins. Sharks also provide oil and teeth for implements and decoration.

Seabirds such as titi or muttonbirds were and still are an important food; others such as kuaka (godwit) have been harvested plentifully in season for centuries, although since the 1940s kuaka have been classified as a protected species. Feathers of seabirds such as toroa (albatross) are prized for personal wear and for the decoration of ceremonial waka. Kina, the spiny sea egg, is widely harvested. The various seaweed species are also valuable, such as kelp for making bags for storing titi, and karengo or sealettuce, a delicacy in some areas.

Tikanga: Management systems

Naturally for such crucially important resources, complex management systems were developed over the generations. Through a process of careful observation, testing the parameters of human interaction with the resource and its sustaining environment, learning through trial and error, good times and hard times, hapū and whānau developed finely tuned systems to manage utilisation and access, and to prevent over-exploitation. Fishing, and any other interaction with the natural environment, is carefully controlled according to tikanga – a complex framework of practical management rules, ritual and protocol, recognising the metaphysical

dimensions as well as the ecological, working to sustain the mauri of each resource as well as to sustain its physical viability. Women's involvement in fishing is restricted on the basis that their spiritual energies could have adverse effects on the mauri of marine resources. The need to protect the spiritual dimensions of coastal waters and harbours is also an aspect of the imposition of a rāhui after a drowning, "both out of respect for the dead, and to prevent the taking of food from the area for a specified period of time".¹⁶

Access to natural resources is controlled according to the seasonal cycles over the year, according to the moon's cycles and the daily ebb and flow of the tides, and in response to local changes and shifts in weather, wind and other conditions. This requires extensive knowledge of each species and their behaviours and requirements in different circumstances and seasons, and of their interrelationships with other species. Management techniques include strict controls for the best times and places to harvest each species, the appropriate methods to use, and techniques for restocking certain areas and modifying habitats in the interests of the resource:

The extensive fisheries management systems required a detailed knowledge of the fish stocks in a hapū's fishing area, their habitats and movements. These included not only knowing the identification, locations and the sizes of the populations of different species, but also the seasons of spawning and maturity. One crucial management practice was, and still is, that fish are not harvested while they are spawning.¹⁷

Māori traditionally took great care to sustainably manage their fisheries ecosystems. The gutting of fish, disposal of waste, excess bait, food or rubbish at sea or on the shoreline was always strictly forbidden... baskets and kits were not dragged over shellfish beds... nets were not allowed to drag along the sea-bed... people took only enough for their immediate needs.

Māori also developed techniques to actively enhance the state of their fisheries... to transplant shellfish from one location to another and seed new varieties or to assist the build-up of existing depleted stock... Fishers would target predator species in order to help the shellfish repopulate.¹⁸

Tikanga, and the social and ecological bases that sustained them, are finely tuned to the specifics of each place, resource and community. An indication of the precision and complexity of Māori systems for management of marine resources can be found in some of the evidence given in claims to the Waitangi Tribunal, in particular the Muriwhenua Fisheries and Ngāi Tahu Sea Fisheries claims.

Fisheries were not seen as an open access resource... The fisheries themselves were clearly defined areas with known rights of access. Knowledge of particular tauranga ika or fishing grounds was closely guarded by the hapū or iwi and handed down through the generations.

As fisheries were communally owned, they were subject to traditional forms of authority and management. This was usually administered under the guidance of the rangatira or chief of the hapū or iwi, who was responsible for the sustainability of the resource... In the exercise of rangatiratanga, prohibitions and enforcements such as tapu, rāhui and muru were applied by the rangatira or kaitiaki to fisheries areas where a regulation of use or access was appropriate.¹⁹

The 20th century has brought far-reaching changes to traditional social and community structures, and to local natural environments and resources and their management, but the importance of kaimoana to hapū and whānau has never diminished. In many areas, both in rural communities and in the major urban centres, the traditional resources of the sea are a basic part of the diet of many families. Seafood is an essential feature on the tables at hui, celebrations and other events. The ability to provide these delicacies is a reflection of the mana of the marae:

Mataitai (sea food) is very valuable, more valuable than meat – without that our table is nothing.²⁰

Marine and coastal environments also include locations where other natural resources have always been and still are gathered. These resources are part of the customary fabric of culture – rongoa or medicinal plants and other healing materials, flaxes, pingao and other weaving materials, or special muds or waters. Their gathering and use are important aspects of sustaining the identity and intergenerational community links of hapū and whānau.

Hapū and whānau continue to maintain detailed and extensive knowledge of local coastal and fisheries resources. However, in many places there have been significant losses, both of species and their habitats, and of the practical knowledge and the traditional cultural and spiritual frameworks within which environmental management was sustained. These losses have been seen as an inevitable consequence of the loss of tangata whenua ownership and control over places and resources.

Nga Reinga Pūmau: Values

A range of other values beyond fishing and the utilisation of marine resources give particular meaning to the marine and coastal environment for tangata whenua. Marine places and features are central reference points in whakapapa, the ancestral connections with particular landforms or sites, where iwi, hapū and whānau are descended from rivers, islands, rocks or mountains.

The coast and in-shore waters are always landscapes of great meaning for tangata whenua. Boundary points such as a headland, island, rock or rivermouth will determine the traditional takiwā or territory of an iwi, hapū or whānau. Coastal areas are dense with historical significance, including special points or features named and associated with the atua and ancestors – islands and headlands, bays and beaches, or specific reefs and rocks. Particular ancestors and their travels and exploits are inherent in particular places. For example, at the entrance to Te Whanganui-a-Tara (Wellington Harbour) is Te Tangihanga a Kupe, a rock feature also known as Barrett's Reef. The islands of Tikapa Moana, or the Hauraki Gulf, are the floats of the great fishing net of Taramainuku. Te Rauparaha and Te Rangihaeata, the powerful Ngāti Toa warrior lords, were based on Kapiti Island in the early 19th century and will always be associated with the island, now a sanctuary for endangered native birds.

Many of the harbours and bays around the coastline of Aotearoa were originally created by taniwha, ancient water creatures with awesome powers. Te Whanganui-a-Tara was inhabited by two taniwha, Whataitai and Ngake, who broke through the land and opened the channel to Raukawa Moana (Cook Strait). "Hokianga Harbour was made by a female taniwha named Araiteuru and her eleven children, each of whom formed an inlet."²¹



There is profound importance for tangata whenua in the large number of wāhi tapu on the coasts and islands, and in the many harbours of Aotearoa. Wāhi tapu include battle sites and burial places, and tauranga waka, the landing-places of the ancestral voyagers. Habitation sites, especially strategic coastal pa sites, are vital reference points of identity for iwi, hapū and whānau communities.

As well as the places and their significance, the marine environment has unique value in the meaningfulness of particular wildlife and kaitiaki species – fish, seabirds, sharks, octopus and whales – traditionally associated with an iwi, hapū or whānau. The identity and whakapapa of the people can be inextricably linked with such creatures. This is often seen in the wharenuī, with sea creatures, wave patterns and waka featuring in the carvings, kōwhaiwhai and tukutuku panels in the house.

Knowledge about each fish, marine mammal and bird species and their particular characteristics is encapsulated in the whakataukī, the richly metaphorical sayings that enliven oratory, debate and normal conversation:

Something that was caught fast and could not be shifted was *e kia, me te wheke e pupuru ana*, “holding on like an octopus”, a man or a tribe threatening to attack was *me he waha kahawai*, “like a kahawai’s mouth”... the (shag’s) tenacity was proverbial: *E kore te kawau e neke i tona tumu tu*, “the shag will not move from its stump”.²²

Waiata also utilised an enormous repertoire of stories, images and lyrical descriptions, of birds and whales, storms and heroic navigators, epic voyages and the lamenting for departures by sea.

2.5 Recreation

The sea is a vital element to New Zealanders’ recreation. The majority of the population lives in the larger cities with access to harbours and beaches; none of us lives more than 140 km from a coast. The marine environment has become a fundamental part of New Zealand life – holidaying at the bach or crib at the beach every summer, the kids starting on a P-class (yacht) and dreaming of crewing on keelers, the hundreds of thousands of Kiwis who get away as many weekends as they can for the fishing, or the tens of thousands of scuba divers going over the side

to experience the magic of underwater ecosystems and species.

The extent of New Zealanders’ love affair with the sea should not be underestimated. One in every four Auckland households has a boat of some kind.²³ New Zealand’s top fishing magazines have a circulation of 20,000 copies each month. There is enormous public support for New Zealand crews in the Americas Cup, the Whitbread Round the World race, the Admiral’s Cup, and the Sydney-Hobart race.

Recreational interactions with the marine environment are significant for New Zealand identity and for the enjoyment, health and wellbeing of millions of people. It should also be noted that there are important commercial and economic dimensions to the recreational values of the marine environment, even though it can often be difficult to determine the particular connections, eg the causative links of upstream activities with downstream impacts.

The marine recreation industry in New Zealand is extensive and widely diverse, including:

- boat design and construction, with much of the New Zealand industry being at the leading edge globally of both design and technical sophistication;
- subsidiary services such as sailmaking and marine engineering, and general requirements such as fuel for boats;
- the development, construction and operation of facilities such as marinas;
- recreational fishing supplies, including rods and other gear, bait and accessories;
- magazines for fishing, yachting and powerboat sailing;
- guided fishing trips, particularly for big-game sportfish such as marlin and yellowfin tuna;
- handy-hints practical advice for fishers and recreational boaters, with a wide range of videos, and popular television series such as “Gone Fishing”;
- diving equipment and accessories, and diving training; and
- other tourism services for both New Zealanders and overseas visitors, including scenic voyages, whalewatching, swimming with dolphins, and wildlife centres such as Auckland’s Kelly Tarlton’s Underwater World or Napier’s Marineland.

For recreational fishers, as well as for yachties, divers, swimmers, surfers, people walking on the

beach and other recreational users of marine environments, there is a broad base of values and motivations. From tag-and-release big game fishers to kids catching spotties on the wharf, actually catching a fish is often only a small part of the reason for going out there. The experience of simply being in the natural environment is a fundamental motivation. The investigation team was advised that many recreational users value the spiritual dimensions of their time in the marine environment, but that these aspects are rarely if ever discussed. Psychological or therapeutic aspects can be important too – the sense of freedom in ‘getting away from it all’, taking time out from the pressures and hassles of modern life, and the bonding between family members going out on the water together, passing on family traditions and skills.

Recreational uses of the marine environment have changed over time. Many divers who started in the 1950s or 60s as spear fishers now only take photographs. About half of all billfish now caught are tagged and released again. A strong consciousness of environmental degradation, losses and decline of underwater ecosystems and of recreational fishing opportunities, runs through many people’s appreciation of marine recreation. Some divers suggest an ongoing process of diminishing expectations for the recreational experience. Where years ago divers would commonly experience schools of thousands of fish of diverse kinds, now environments have become such that divers are excited to see a small school of fish. For example, in the waters around Three Kings Islands in 1966 a common sight was a school of trevally 500 metres across; in 1980, schools of trevally 100 metres across were seen; in 1994 a group of scuba divers saw a school of trevally 20 metres across and were thrilled at the sight. This awareness of the decline in what might be expected – a trend paralleled in the increasing ratio of effort and distance to catch for many recreational fishers – contributes to the growing commitment of many marine recreationalists to more sustainable environmental and fisheries management.

2.6 Tourism

High amongst New Zealand’s appeal for overseas tourists are its remoteness from the world of crowds and pollution, and its perceived pristine character. At the fundamental geographical level,

our oceans are our separateness from the rest of the world.

Tourism is a strong component of the New Zealand economy. In the year ending March 1999, international tourism brought \$3,595 million in foreign exchange (excluding airfares).²⁴ It has been estimated that tourism is directly and indirectly responsible for more than \$1 billion of tax revenue per annum.²⁵

The interface between land and sea is an essential element of the tourist experience. Specific landscape icons such as the Bay of Islands, Cape Reinga and Ninety-Mile Beach, Cape Kidnappers, the Marlborough Sounds, and Abel Tasman and Fiordland National Parks are heavily promoted components in New Zealand tourism. Generic coastal landscapes are also vital to tourism’s marketing and branding of the New Zealand identity – the bush-fringed sandy beach, the dramatic rocky headland, the sparkling setting for a regatta or a fishing trip.

Tourism depends upon ongoing access to such scenic natural environments, although some of the more popular locations have a limited capacity, both ecologically and socially, to handle large numbers of visitors.²⁶ The tourist industry also benefits significantly from the continued existence of charismatic marine wildlife for tourists to view and, as with dolphins in the Bay of Islands, to swim with. Although the tourist industry tends to focus on a few of the more dramatic icon species, particularly Kaikoura’s whales, there is an increasingly strong educational dimension to the service they provide their customers, with information and conservation messages included in the tourist experience and in some marketing (see Vista 5 Whale Watch Kaikoura).

**Table 2.2 The popularity of marine tourist activities²⁷**

Tourist Activity	International Tourists Partaking (% of total visitors)	Number (to nearest 1000)
Scenic boat cruise	30	384,000
Milford Sound	29	372,000
Dolphin watching	14	179,000
Whale watching	8	102,000
Sailing	6	76,000
Sea fishing	6	76,000

5 WHALE WATCH KAIKOURA

One of New Zealand's most successful tourism ventures, Whale Watch Kaikoura offers visitors "a unique marine and cultural experience in one of the world's last unspoiled natural wildernesses." Since its relatively small beginnings in 1987, Whale Watch Kaikoura has developed with strong involvement of the local community. Hundreds of thousands of visitors are now attracted to Kaikoura each year, bringing some \$30 million income; the enormous success of tourism has helped to consolidate Kaikoura's awareness and concern for the extraordinary natural resources of their coast and offshore waters.

Whale Watch Kaikoura is mandated and owned by Ngāi Tahu and Te Runanga o Kaikoura, and a fundamental kaupapa of kaitiakitanga underpins the whole enterprise. The ethic is to value and understand the whales, seals and other marine creatures, and the natural environment on which they depend. The Kaikoura coastline is unique in the world, with powerful deep sea currents bringing rich nutrients from the Antarctic ocean close in to the shore. Research – in association with prestigious agencies such as the Smithsonian Institute and National Geographic – is an ongoing priority. Monitoring is part of every voyage, and detailed records are kept of the individual whales, location and behaviour, and environmental conditions. There is much to learn about the dynamics amongst communities of whales, and their seasonal movements between inshore, mid-water and outer zones. Whale Watch Kaikoura has won a string of national and international awards for environmental tourism, and is involved in international forums on marine mammal issues – for example, the concepts presently being developed for a Pacific Ocean whale sanctuary.

2.7 Upstream users

A wide range of land uses and environmental management processes act upon the marine environment from a distance. The links between such 'remote users' and the marine environment may not be immediately obvious – there may be considerable geographical separation, or the infrastructure of contemporary urban developments may obscure the direct connection.

The impacts of upstream users can be most intensive on inshore coastal environments. These ecosystems are particularly productive and valued for the ecosystem service function they provide (see section 2.2). Inshore marine areas, in particular harbours, estuaries and sheltered bays, as well as rocky shorelines and islands, are environments of immense richness and biological diversity. They are also the areas most commonly used for recreational purposes, and the marine zone of particular significance to tangata whenua.

Land uses and processes affecting the marine environment include:

- discharges from industrial facilities released, often after some processing to minimise toxicity, into rivers and waterways which flow eventually to the sea;
- sewage discharges into coastal waters, rivers and waterways (most are treated to some degree);
- runoff from dairy farms into rivers and waterways, which releases nutrients (mainly nitrogen and phosphorus);
- other agricultural and horticultural discharges including pesticides and fertilisers;
- the disposal of dredging materials from harbours, and of other waste matter, further out at sea;

- stormwater runoff from the mixing of rainfall and pollutants such as organic matter, sediment, and road surface accumulations, carrying large amounts of persistent and bio-accumulative contaminants including zinc, copper, PCBs, organochlorines and hydrocarbons;
- sedimentation and soil carried downstream from such disruptive land-uses as roading developments, subdivisions, or forestry clearance; and
- dams for hydroelectricity that change the rates and timing of freshwater flows into the nearshore environments.

It can often be very difficult to trace specific linkages and determine the particular cause of a remote environmental effect. Thus attributing responsibility for environmental damage, making a realistic assessment of the actual costs involved, or working to minimise or mitigate such effects, can be a complex matter. Further research is needed to fully understand the extent of the impacts of urban and agricultural systems on downstream receiving environments in New Zealand (see sections 5.2-5.7). There is a risk that some of these impacts may be irreversible; and many are as yet unknown.

Some initiatives are being taken to increase awareness amongst upstream users, and to develop more integrated management approaches:

- promotion of riparian management by regional councils;
- improvements in quality of discharge from sewage treatment plants;
- higher standards placed on resource consents, and improved industry standards for wastewater discharges;
- Marlborough District Council has identified the extent of their Sounds catchment and the Wairau and Awatere catchments, and have developed their district plans around each of these distinctive watersheds;
- Te Ao Marama, the resource management group of the four Murihiku runanga of Ngāi Tahu, follows a kaupapa of working from the coast and estuaries back up the rivers to identify sources of pollution such as leaching, farm runoff, and industry, and encourages councils and resource users to understand the connections and linkages in the natural environment.

6 WHAT DOES UPSTREAM POLLUTION COST?

The assumption is made that coastal and marine environments are available to be used as receiving and dispersal systems for upstream activities. An indication can be drawn for the scale and intensity of such activities by looking at the costs involved in alternative processes for treatment or disposal of the various materials.

One example is the proposal for the discharge of stormwater from 180 hectares of the Auckland Central Business District into the Waitemata Harbour at a new outlet at Captain Cook Wharf. The construction of a settling tank to minimise the sediment and contaminant load before the stormwater is released into the marine environment has been costed at \$7 million. There was consideration given to discharging stormwater with all of its contaminants directly into the harbour, which would have been addressed by dredging every few years. However, a recent Australian study suggests that dredging would not be effective in removing all of the heavy metals and contaminants (Dept. of Civil Engineering, Monash University 1999).

2.8 Researching the marine world

New Zealand's oceans provide exciting research opportunities. Nationally and internationally scientists have strong motivations to undertake work in a challenging and diverse arena of research. The thrust of research is dependent on a range of motivations and incentives. Given the contribution of New Zealand's marine environment to regional and global ecosystem services, it would be reasonable to conclude that our research priorities should be on establishing what is there, and how marine physical processes and ecosystems function and interact. Given the enormous actual and potential value of marine resources to our economy, it should not be surprising that in recent years the major emphasis has increasingly been on research needed to manage aspects of the resources that are currently utilised. Two areas of primary interest are the most profitable target fish stocks and the definition of New Zealand's continental shelf boundary in regard to our claim for sovereign rights to seabed resources including minerals.

This research focus has some parallels with soil research in New Zealand. Over recent decades much of our soil science effort has been devoted



to dealing with various problems that have arisen from trying to grow crops (eg kiwi fruit) on soils about which there was insufficient knowledge before the crop was planted. The message from the failures of much land-based management research is: the more that is known about a resource and its surrounding habitat and environmental conditions before use, the lower the risk in utilisation and protection. While this seems rather obvious, it appears a similar trend is occurring in marine sciences, with a strong trend (reinforced by quota owners associations) towards sharpening the focus onto specifically management-oriented research. There is a serious risk that New Zealand's capacity to manage wider ecosystem level matters, or to study impacts on species with little or no commercial value, will be constrained. In the long term, these risks may be highly significant in terms of the maintenance of specific research capacities.

2.9 Public interest and conservation

For the deeper ocean environments, public awareness and a conservation ethic have strong ties to science, as most New Zealanders cannot experience these environments in person. Coastal areas, and some marine mammals and birds, are more accessible; through inshore environments people can gather first hand information and a personal sense of the marine world's intrinsic natural values. These opportunities for direct involvement are strong motivating factors in many New Zealanders' interest in marine reserves, fringing coasts and islands, in our efforts to integrate coastal management through the RMA, including pollution control, and in our statutory protection of 'charismatic megafauna'.

New Zealand has undertaken a number of innovative marine conservation initiatives, such as new methods for the protection of marine mammals and sea birds, developed to reduce the number caught accidentally by fishing. New Zealand is also the only country that collects a levy from commercial fishers (the conservation services levy) for conservation work related to fishing impacts on protected species.

There is an active conservation community in New Zealand, with strong memberships of various groups (see section 3.6). The public is keenly involved in hands-on conservation activities such as tree planting, clean-ups and

restoration projects at coastal sites and islands, organised by the Department of Conservation (DOC) and other agencies. Lobbying by representatives of the major NGOs has been effective in advancing conservation objectives on a number of issues including raising the profile of the Patagonian toothfish. DOC and the Ministry of Foreign Affairs and Trade (MFAT) work together on issues related to the protection and conservation of whales, most notably the establishment of a Southern Oceans whale sanctuary in 1994 and the current proposal to establish a South Pacific whale sanctuary to be considered by the International Whaling Commission. New Zealand is well connected with international conservation networks, and specific campaigns such as Project Jonah.

However, conservation advocates and NGOs regularly emphasise their concerns about the small number of New Zealand's marine reserves, confined to small coastal areas (see Vista 7 Marine reserves and marine protected areas), about the state of our estuaries and harbours, and the impacts of fishing. Coastal conservation issues also encompass landscape character, land use and development, particularly in harbour-oriented urban environments such as Auckland.

7 MARINE RESERVES AND OTHER MARINE PROTECTED AREAS

New Zealand's marine reserves, created under the Marine Reserves Act 1971, are totally protected 'no-take' areas (Department of Conservation, 1994 and 1995). The boundaries of a marine reserve cannot extend inland beyond the foreshore. As at November 1999 there are 16 marine reserves (see appendix 3) in New Zealand, with a combined area of 762,839 hectares (4.77% of the area of the territorial sea) or, excluding the Kermadecs, 14,839 hectares (0.093% of the territorial sea).

In December 1998 the Australian and New Zealand Environment and Conservation Council (ANZECC) Task Force on Marine Protected Areas published guidelines for establishing a national representative system of marine protected areas, including principles, identification and selection criteria, and the outcomes to be achieved (ANZECC1998).

The Department of Conservation's strategic business plan for 1998/2002 sets a goal of achieving marine heritage protection by:

- establishing a representative network of protected marine areas;
- effectively managing all marine protected areas;
- providing the greatest practicable protection to migratory cetacean species; and
- reducing fisheries bycatch of seabirds and marine mammals.

The Department is also working on a review of the Marine Reserves Act. Problems often raised about the current Act include:

- its inapplicability to areas outside the territorial sea;
- the application and public consultation processes;
- the lack of any reference to the Treaty of Waitangi; and
- the desirability of a wider range of purposes for the establishment of marine reserves than solely the scientific study of marine life.

Some marine scientists and the Royal Forest and Bird Protection Society advocate that 10% by area of all marine habitats should be protected by 2002. Four guiding principles have been proposed to fast-track the creation of a network of no-take marine reserves throughout New Zealand:

- representation, with reserves in each marine biogeographic region representing all obviously-different habitats;
- replication, with several of each type of reserve as insurance against accidents;
- the concept of developing a network of reserves, taking a strategic approach to the wider marine and coastal environment, rather than focusing on single isolated patches; and
- sustainability – the total area of the whole system must be big enough (Ballantine W J, 1991 and 1996).

Internationally some marine scientists recommend that a minimum of 20% of the area of a country's EEZ be zoned as no-take areas (Bohnsack & Ault 1996). Some NGOs, citing an emerging international literature (Holland & Brazee 1996 and other papers), are suggesting that 50% of marine areas should be protected from fishing to ensure that species and ecological assemblages will not be lost.

Marine reserves are protected from direct human impacts like fishing, and it is also an offence to pollute a marine reserve or disturb marine life. Prohibiting direct human impacts means that marine reserves are preserved in a near 'natural' state so that biological community interactions can function undisturbed.

However, natural events such as sediment pollution, disease, localised die-back of habitat forming species (eg kelp), or local invasions of introduced species can also remove species and change habitats. In some cases a small reserve, by favouring some species over others, could become less diverse than it was initially.

Other limitations of the marine reserve model have also been noted. For example, small coastal marine reserves are not as effective for migratory species or creatures dependant on a range of different habitats, as they can be for more localised species such as small reef fish. A fixed marine reserve will not necessarily follow or fit with the natural flux and seasonal shifts of the ecosystem or the particular species for which protection is required. One suggestion put forward by a tangata whenua representative to overcome this inflexibility is for a system of rotating temporary protective coverage, where different sections of the marine area are closed or restricted for a season or for a few years as appropriate, then the protection is moved to another part – a concept more akin to the rāhui imposed by tangata whenua than the statutory reserve model.

Many iwi and hapū are fundamentally opposed to the current marine reserve model on the principle that, under the no-take system, prohibiting access of tangata whenua to the sites and natural resources within their rohe moana is contrary to the Treaty of Waitangi. Some iwi and hapū insist that a marine reserve will not be supported in their area unless a mataitai or taiapure proposal is integrated with it, to ensure that tangata whenua have continued access as appropriate to traditional sites and resources. However in other places, iwi or hapū have been closely involved with marine reserve proposals – such as the joint application from Ngāti Konohi of Ngāti Porou and DOC, for Te Tapuwae o Rongokako marine reserve between Pouawa and Waiomoko Rivers on the East Coast. The boundaries of this proposed marine reserve have been drawn to exclude tauranga ika or traditional fishing grounds and the management board planned for the proposed reserve will have strong Ngāti Porou representation.



8 BIRD AND MARINE MAMMAL BYCATCH

Many of the seabirds and mammals caught accidentally during commercial fishing operations in the EEZ are endemic to New Zealand. However, unlike our endemic land species, New Zealand's endemic albatrosses, petrels, dolphins, fur seals and sea lions can spend a large proportion of their lives outside the EEZ. Satellite tagging and bird banding information shows New Zealand-breeding albatrosses and petrels travelling to South America. Recovery of tagged New Zealand fur seals shows that pre-breeding juveniles travel large distances from their breeding rookeries on the West Coast, some reaching Tasmania (Department of Conservation, 1999). As a consequence, the nature and magnitude of "non-fish" bycatch during commercial fishing operations is both a national and international issue.

In New Zealand there has been particular public concern about the levels of seabird bycatch (particularly albatross species) in the tuna longline fishery (DOC, 1999). Experimental methods trialled to reduce seabird mortality include using weights to sink longlines more rapidly, and improved on-board processing to avoid discarding fish offal which attracts birds.

Fur seals and sea lions get caught in the huge trawl nets used to catch hoki and squid. Hector's dolphin bycatch has been an issue for the small inshore fisheries off the Canterbury coast. However, set net fishers harvesting from Kaikoura to Oamaru have recently agreed to use "pingers", acoustic devices to warn dolphins away from their nets. This is expected to reduce dolphin bycatch by more than 75%.

Within the New Zealand EEZ there is a legal obligation to report marine mammal and seabird bycatch to the Ministry of Fisheries. Data from the Scientific Observer Programme (MFish and DOC) reports are compiled annually and reviewed by the MFish Aquatic Environment Working Group. These data are also considered by DOC's conservation services levy marine mammal and seabird working groups.

Direct reports from fishing vessels, although legally required, may not always be provided. This under-reporting can be established by comparing vessel reports to estimated levels of non-fish bycatch from Observer Programme data.

Since 1994 the Conservation Services Levy funds about 20% of the Ministry of Fisheries observer programme, organises the return to New Zealand of dead animals for research, and investigates ways of reducing the likelihood of animals being caught.

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3 Agencies and Systems for Management of the Marine Environment

3.1 Introduction

The system for the management of the marine environment comprises the institutional structure of legislation, policy and processes established by the Government together with the many agencies and stakeholder groups. Chapter 2 of this overview has outlined the diversity of stakeholders and their values and expectations of the management of the marine environment. This chapter seeks to outline the more formal systems of agencies and processes through which management of the marine environment is effected. There is an international dimension to management of the marine environment that makes the system more complex than that for managing New Zealand's land mass.

New Zealand's legislation for the marine environment has developed over many years. However, the concepts of integrated management and of sustainability of the marine environment have only recently been recognised in the system of statutes, policies and processes. The following diagram outlines operational aspects of the marine environment.

There are many statutes with application in the marine environment of New Zealand and, consequently, a number of different public authorities with responsibilities in this area. Some of the statutes apply only within the territorial sea; others apply in the Exclusive Economic Zone (EEZ) and some to the continental shelf beyond the EEZ. For domestic legislation to apply in the EEZ and beyond, it must be authorised by or consistent with international law.

A list of the main statutes applying to management of the marine environment is given in appendix 4. A list of agencies with marine environmental management responsibilities is given in appendix 5. An overlay of these systems on the spatial extent of the marine environment is shown pictorially in the diagram on the following page.

3.2 The implications of international obligations

The New Zealand Government operates in the context of its international obligations, of which there are many relevant to the marine environment. A list of some of the international agreements relating to the marine environment to which New Zealand is a party is given in appendix 6. Increasingly, governments, including

New Zealand's, have bound themselves to act in accordance with international agreements, but they must often make changes to their national legal regimes before they are in a position to ratify these international agreements.

Chief among the international obligations to which New Zealand has acceded in the context of the marine environment is the United Nations Convention on the Law of the Sea 1982 (UNCLOS). UNCLOS is a comprehensive convention that provides for the regimes applicable to the territorial sea, exclusive economic zone (EEZ) continental shelf and high seas, as well as for many other marine issues. It sanctions the declaration of 200 nautical mile EEZs enabling a significant part of the world's oceans to be brought within the jurisdiction of states.

Under the umbrella of UNCLOS a number of other agreements and conventions have been entered into, clarifying aspects of UNCLOS such as the agreement on the conservation and management of straddling and highly migratory fish stocks (known as the Fish Stocks Agreement, see appendix 6). The recently enacted Fisheries Act 1996 Amendment Act (No 2) 1999 will enable New Zealand to ratify this agreement.

UNCLOS includes a number of articles with major implications for New Zealand. These include:

- article 61, which imposes an obligation on member states to ensure that the living resources in their EEZs are not endangered by over-exploitation;
- article 62, which requires states to promote optimum utilisation of the living resources of their EEZs;
- article 192, which imposes a general obligation on states to protect and preserve the marine environment from pollution; and
- article 193, which sets out the right of states to exploit their natural resources pursuant to their environmental policies and in accordance with the duty of protection and preservation.

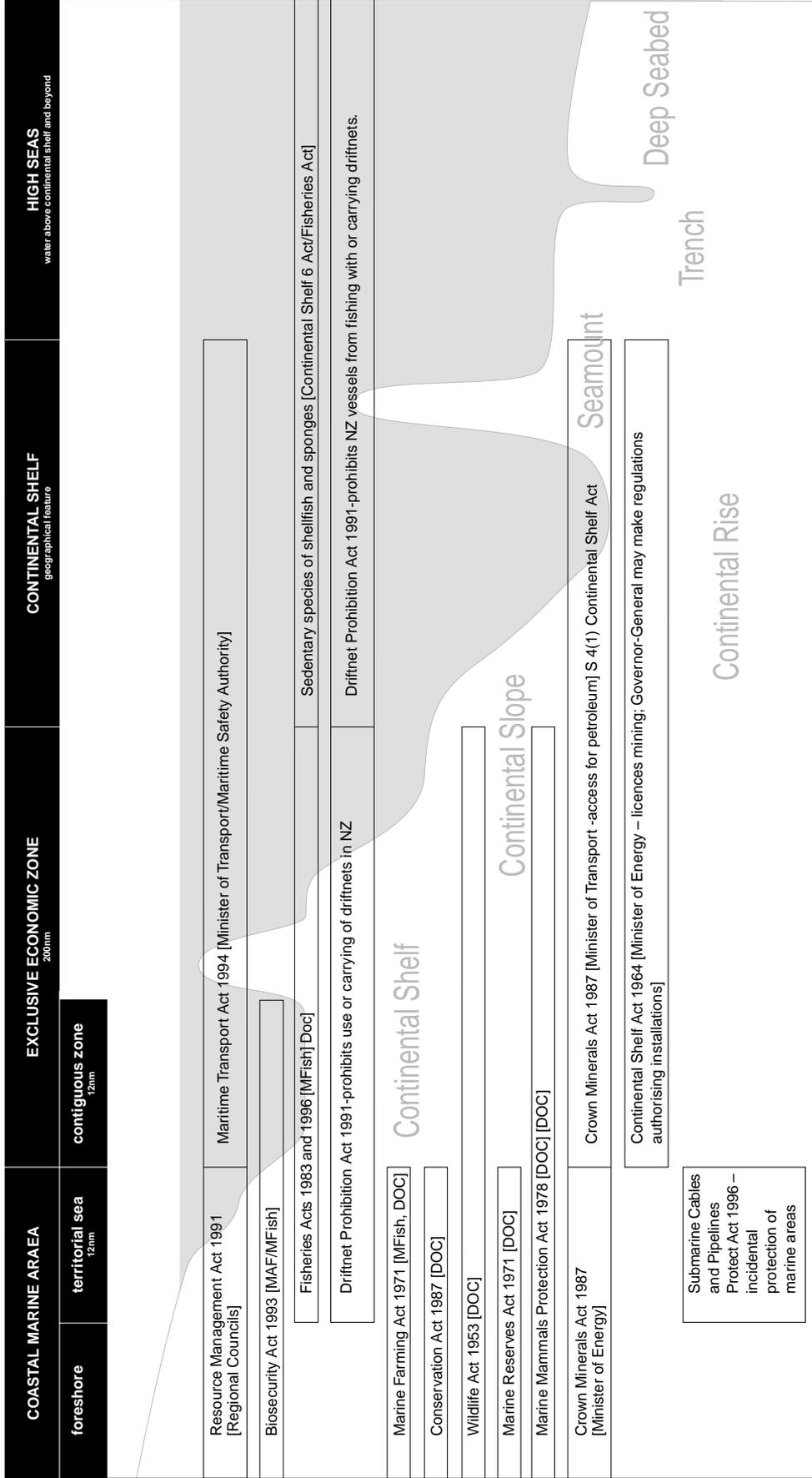
The marine environment presents opportunities for New Zealand but these come with definite obligations and responsibilities.

UNCLOS requires coastal states to determine the allowable catch of the living resources in their EEZs. It then imposes an obligation on coastal states to ensure that "the maintenance of the

Jurisdictions, Operations and Agencies in the New Zealand Marine Environment: A Complex Picture

JURISDICTION	OPERATION	AGENCY
Health and Safety	Navigation systems (lighthouses etc) Search and Rescue Health standards Environmental response Hydrographic Charts	Maritime Safety Authority (<i>shipping</i>) NZ Police (<i>statutory</i>), NZ Coastguard, Maritime Safety Authority, Civil Aviation Authority Ministry of Health Maritime Safety Authority (<i>oil spill</i>), Department of Conservation (<i>environmental protection</i>) Land Information New Zealand
Natural Resource Management	Fish Stock Management Monitoring and Compliance Quota Management System administration	Ministry of Fisheries, Department of Conservation, Fish and Game Council (<i>freshwater sportsfish eg salmon bycatch monitoring</i>) Ministry of Fisheries, Department of Conservation, Royal NZ Navy, Royal NZ Airforce Ministry of Fisheries
Habitat/ ecosystem management	Conservation / biodiversity Marine reserves Environmental science Atmosphere and climate Discharges from land and other sources	Department of Conservation, Regional Councils Department of Conservation Ministry of Fisheries, National Institute of Water and Atmospheric Research National Institute of Water and Atmospheric Research, Ministry for the Environment Regional Councils, Maritime Safety Authority
Energy Sector	Access to, or occupation of, seabed Oil and gas Minerals and Metals	Department of Conservation, Ministry of Transport, Regional Councils Ministry of Commerce, Minister of Energy Ministry of Commerce, Ministry of Transport
International	Biosecurity Southern Ocean and Antarctica Sovereignty Trade	Ministry of Fisheries, NZ Customs Service, Ministry of Transport, Regional Councils, Department of Conservation Ministry of Foreign Affairs & Trade, Department of Conservation, Ministry of Fisheries Ministry of Foreign Affairs & Trade, Royal NZ Navy, Royal NZ Airforce TradeNZ, Ministry of Foreign Affairs & Trade
Treaty of Waitangi	Rangatiratanga - policy, decisionmaking Kaitiakitanga, tikanga - management Mauri, whakapapa - integrity Wahi Tapu - significance Tauranga ika, kai moana - sustainable utilisation Claims to the Waitangi Tribunal	<div style="display: flex; align-items: center; justify-content: center;"> <div style="font-size: 2em; margin-right: 10px;">}</div> <div style="text-align: center;"> <p>Kaitiaki - iwi, hapu, whanau</p> </div> <div style="font-size: 2em; margin-left: 10px;">}</div> </div> <div style="margin-top: 20px; text-align: center;"> <p>Ministry of Fisheries, Department of Conservation, Ministry for the Environment, Te Ohu Kai Moana, Waitangi Tribunal, and Regional Councils</p> </div>

Application of New Zealand legislation to the marine environment



living resources in the EEZ is not endangered by over-exploitation". To this end, it requires states to use "proper conservation and management measures", which are to be designed to move populations of harvested species to levels at which they can produce maximum sustainable yield (MSY), as qualified by relevant environmental and economic factors (Article 61). Parts II and III of the Fisheries Act 1996 closely reflect the obligations imposed by UNCLOS and the Biodiversity Convention.

In addition to UNCLOS, New Zealand has more specific obligations in respect of the protection of the marine environment from pollution. New Zealand has recently enacted legislation enabling it to ratify the London Dumping Convention.¹ It has also implemented its obligations under MARPOL.²

The objective of the Convention on Biological Diversity adopted at the Earth Summit in Rio de Janeiro in 1992 is the "conservation of biological diversity and sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources". The Convention requires the signatory states to develop national biodiversity strategies, plans or programmes for the conservation and sustainable use of biodiversity. New Zealand has prepared a draft biodiversity strategy for public consultation, which includes a chapter on coastal and marine biodiversity.

9 SOUTHERN BLUEFIN TUNA IN CRISIS

Off the Australian and New Zealand coasts, two extraordinary migratory animals are under threat as a result of millions of baited hooks stretched across their migratory pathways. Southern bluefin tuna is the highly prized target, while seabirds (several species of albatross and petrels) are the accidental bycatch. Their populations are plummeting at alarming rates. Estimates show that bluefin has been reduced to 5% of its 1960 population levels. Australian scientists predict that there is over a 50% chance that under the present catch regime, the population will fall to zero by 2020 (Klaer et al, 1996). The world conservation union (IUCN) recently listed southern bluefin tuna as 'critically endangered'.

Both the bluefin and the seabirds are long-lived and slow to reproduce. Bluefin live 20 to 25 years, grow to over two metres long and can weigh up to 200 kilograms. They swim at speeds of up to 70 kilometres/

hour and are a highly migratory species, spawning south of Indonesia and migrating either west to the southern Atlantic or east to the Tasman Sea and Pacific Ocean. They are one of the world's most highly valuable fish, selling for as much as US\$20,000 each in Japan.

In August 1999, the New Zealand and Australian Governments brought their concerns over Japan's "experimental" fishing of bluefin tuna to the International Tribunal on the Law of the Sea. New Zealand, Australia and Japan are parties to the Convention on the Conservation of Southern Bluefin Tuna. The Tribunal has upheld New Zealand and Australia's case which means that Japan will no longer be able to act unilaterally in setting up an "experimental" fishing programme as a means of securing significant extra tonnage of tuna. The decision is an interim one pending a decision by the Arbitral Tribunal on the dispute.

3.3 The role of Government

The Government elected by the people of New Zealand has the right to govern, including the functions of developing policy, proposing laws to Parliament for enactment, and enforcing the law. Parliament enacts, or chooses not to enact, legislation proposed by the Government or by individual members of Parliament.

Parliament is not legally constrained in the making of legislation. There is no overriding legal obligation to make laws to protect the public interest. However, there are non-legal constraints on Parliament's law making power, namely moral and societal restraints on members of Parliament³ including the desire to be re-elected.

Statutes often authorise the making of subordinate legislation, namely regulations and rules that do not go through the parliamentary process. They address the level of law making that is considered too detailed for Parliament. Plans and regulations made under the Resource Management Act 1991 are examples.

In geographical and practical terms, New Zealand's laws apply in New Zealand territory, that is the islands that comprise New Zealand, including the Ross Dependency, and its territorial sea. UNCLOS authorises coastal states to claim an EEZ and to make laws for their EEZs for certain purposes set out in the convention.

Under the law, the New Zealand Government's roles and responsibilities in respect of the marine



environment are to:

- ensure environmental sustainability and safeguard New Zealand's biodiversity;
- maintain a fair and equitable system to benefit the nation and its citizens;
- fulfil the Crown's responsibilities and obligations under the Treaty of Waitangi;
- fulfil New Zealand's international obligations;
- protect the public interest and provide for public consultation and participation;
- ensure information is being provided to stakeholders; and
- establish reliability through standards, auditing and law enforcement services.

3.4 Fisheries management

Prior to 1986 New Zealand fisheries were managed principally on an input-controlled open access basis, subject to the requirement to hold a fishing permit and with regulations designed to restrict the activity of fishing by constraining effort.

Fisheries are currently managed under the Fisheries Acts 1983 and 1996. The purpose of the 1996 Act is to provide for the utilisation of fisheries resources, while ensuring sustainability (see Vista 25 What is the status of our fish stocks?). All persons who make decisions under the Fisheries Acts are required to take into account the environmental principles and the information principles set out in the 1996 Act. The latter set of principles constitutes a formulation of the precautionary principle.

Under the current system of fisheries management the responsible Minister is required to set a cap on the amount of the catch of each fish stock in each quota management area. This is the total allowable catch (TAC). The TAC applies each fishing year unless varied. The TAC takes account of recreational fishing, customary Māori fishing, illegal take and other fishing-related mortality, and commercial fishing. The purpose of the TAC is to ensure that all fishing occurs within the limits of what is sustainable.

The Fisheries Act 1996 has a focus on ecosystems and provides for a range of sustainability measures, one of which is the TAC. TACs are not set on an ecosystem basis but on a species by species basis, with some recognition of the interdependence of species and associated and dependent species. However, when the Minister is considering the setting of a TAC, he or she also considers whether

or not to impose other sustainability measures in the interests of the ecosystem.

The setting of sustainability measures, including TAC, is the crucial point in the process. The imposition of a combination of sustainability measures is intended to promote the sustainability of the system. The setting of a TAC means that there is a cap on the extraction of commercially or otherwise desirable sea life.

The fisheries management system must be seen in the context of the system for marine management with which it co-exists. The Quota Management System (QMS) was grafted onto New Zealand's existing marine management system, which included legislation providing for marine reserves (for scientific purposes), marine mammal protection and sanctuaries, seabird protection and the various fisheries controls with limited entry and input controls of other types.

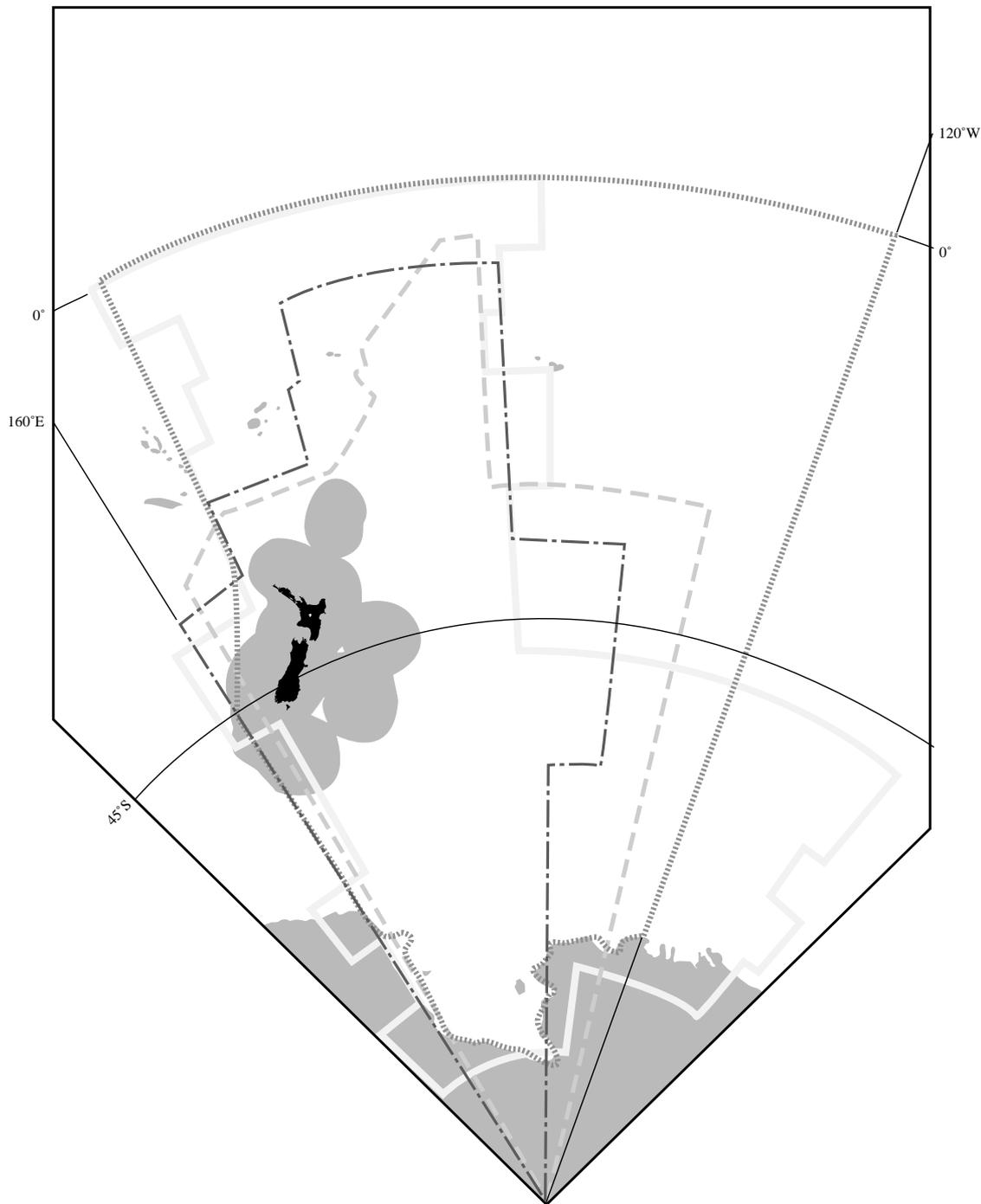
The Fisheries Act 1996 Amendment Act 1999 addresses issues identified in the Ministry of Fisheries' fisheries reform process, but leaves three areas for further consultation and development. The areas covered by the Amendment Act include: fisheries plans, devolution of fisheries services to the industry, direct purchasing of research, cost recovery, a balancing regime, alternative TACs and offences and penalties.⁴ The issues deferred for later consideration are: aquaculture, recreational fishing and co-management. A paper on marine farming is to be released for public discussion.

3.4.1 Commercial fishing

New Zealand's QMS has only a few parallels in other parts of the world. Since its introduction in 1986, a number of teams of fisheries managers from other nations have visited New Zealand to look at this system. Although other countries including Iceland have experimented with property rights-based management to varying degrees, no other country has yet adopted quite the same kind of system that operates in New Zealand.

The QMS applies to the commercial fishing of most fish stocks. It is Government policy to eventually bring all commercial species within that framework. The commercial component of the TAC – the total allowable commercial catch (TACC) – is divided into Individual Transferable Quota (ITQ) allocated to New Zealand

Boundaries of New Zealand Maritime Responsibilities as at June 1999



- · — publishing maritime charts and weekly chart corrections in 'Notices to Mariners'
- data for the General Bathymetric Chart of the Oceans
- promulgating radio navigation warnings
- · — search and rescue

Based on a LINZ map (p.5) in "N.Z Hydrographic and Bathymetric Information Strategy"-August 1997"



commercial fishers. The holding of ITQ entitles fishers to catch a specific proportion of the TACC rather than a set tonnage of fish. ITQ may be held only by persons who hold a commercial fishing permit for the species subject to the QMS.

The QMS is widely promoted by political and industry spokespersons as a system for achieving sustainable utilisation of fisheries resources:

The New Zealand fisheries Quota Management System has won a worldwide reputation as a role model for sustainable fish harvesting.⁵

There is wide agreement – even from stakeholders critical of various aspects of the operation and effectiveness of the QMS – that it is a major improvement on the pre-1986 fisheries management systems in terms of both environmental criteria and the economic dynamics of the industry:

The QMS has been credited with improving the management of stocks, reducing redundant fishing capacity, alleviating conflicts over allocation of catches, substantially improving the economic returns from fishing to both the industry and the Government, and reducing pressures on fisheries managers.⁶

The commercial fishing of non-QMS stocks is managed either through permits and regulations as to areas, species, quantities, methods, types of fishing gear and time limits, or through controlled fisheries. Pending the transfer of commercial fish stocks to the QMS, a moratorium on new fishing permits has been imposed.⁷

3.4.2 Māori customary fisheries

Following the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992, recognition and provision for the special relationship of Māori as tangata whenua with places of importance for customary food gathering was made and a distinction drawn between this and commercial fishing.

Non-commercial fishing for Māori is governed primarily by regulations which “aim to formalise the customary management practices of individual whānau, hapū and iwi”.⁸ It should be noted that many whānau, hapū and iwi have been for decades conducting their own monitoring and management systems for their local communities and traditional seafood resources. Often a rāhui will be imposed by kaumātua to protect stocks of

fish and shellfish, particularly during summer seasons when pressure becomes more intense. These kinds of systems, based in tikanga, kaitiakitanga and the authority of kaumātua, are of a different nature to the systems now developed by the Ministry of Fisheries under the legislative frameworks.

Two sets of regulations have been developed,⁹ essentially providing for:

- the declaration of mataitai reserves; and
- the appointment by the responsible Minister of tangata kaitiaki/tiaki (individuals or groups who authorise non-commercial fishing within their rohe moana).

The powers and responsibilities of tangata kaitiaki/tiaki are set out in detail in the regulations. Customary fishing authorisations are to be made on a standard form prescribed by regulations, and must specify a number of conditions including the purpose, quantity and size of the fish to be caught, and the dates, location and methods of fishing. An authorisation may also include requirements to satisfy tikanga and local custom.

Tangata kaitiaki/tiaki must keep records and provide quarterly reports to the Ministry of authorisations, catches and locations. They may also have a role in Ministry management processes, including providing comment on the activities of commercial and recreational fishers, which might affect Māori customary fishing. They may develop management plans for tangata whenua for the fisheries in their rohe moana.

Ngāi Tahu and recently Ngāti Kahungunu have entered into further arrangements with the Ministry of Fisheries to contract iwi people to work as regional customary fishing co-ordinators. The five southern Kai Arahi co-ordinators provide a contact point between local tangata whenua and the Ministry, and have a critical role in education.

10 NGĀTI WAI AND THE POOR KNIGHTS MARINE RESERVE

Ngāti Wai are kaitiaki of the Poor Knights Islands, off Tutukaka – islands where their ancestors lived and fought, and where fishing always sustained the people. In the 1800s the islands were vacated as a result of warfare and declared tapu. But Ngāti Wai retain customary fishing rights in the waters around the islands.

The Poor Knights are also a highly popular recreational diving area, and in 1981 a marine reserve was established extending 800 metres around the islands and associated stacks and rocks. Under New Zealand's marine reserves legislation the fundamental principle is that reserves are to be closed to fishing, but with the Poor Knights, an amendment was made to the legislation to allow for ongoing controlled recreational fishing within that reserve. By the mid-1990s, there was concern at the pressure of fishing on the reserve area, and the Minister of Conservation determined that all fishing should be banned, with an 18-month phased transition period.

The Ngāti Wai Trust Board sought judicial review of the Minister's decision. The issues at stake were not merely the state of the marine resources at the Poor Knights, but the argument of Ngāti Wai that there was a legitimate expectation that the Minister should have taken their unique relationship with the islands into account, and should have preserved their customary fishing rights. The new Māori customary fishing regulations (see section 3.4.2) do not apply to marine reserves. Ngāti Wai supported a ban on recreational and commercial fishing in the area, but, consistently over an extensive period of official consideration of these issues, upheld the distinction between these kinds of fishing and the customary rights of tangata whenua. Ngāti Wai note that customary rights and kaitiakitanga – which include matters of mana, history, tikanga and wairua, and appropriate management of the islands as wāhi tapu, as well as the practical business of fishing – are for tangata whenua to determine, and to defend. Ngāti Wai also have concerns about current management issues within the marine reserve, including the impacts of moorings and anchorages, the damage caused to corals and sponges by inexperienced divers, and the lack of any co-ordination of the various data from scientific studies of the area to establish a good information base.

In the Auckland High Court just before Christmas 1998 Justice Smellie ruled that the decision to ban all fishing at Poor Knights was unlawful to the extent that it related to customary fishing, and directed the Minister

to reconsider his decision as it related to customary fishing rights.* The Department of Conservation is now to undertake further dialogue with Ngāti Wai.

* *Ngātiwai Trust Board & Haddon v Minister of Conservation*, CP No 39/98, 22 December 1998

The Fisheries Act also provides for temporary closure of a fishing area, or for restriction or prohibition of particular fishing methods, to be declared under sections 186A and 186B. These closures, restrictions or prohibitions may be imposed to recognise and make provision for the use and management practices of tangata whenua in the exercise of non-commercial fishing rights, to improve the availability or size (or both) of fish, aquatic life or seaweed resources, and to recognise customary fishing practice in a particular area. A restriction or prohibition on a particular fishing method may be imposed only if that method is having an adverse effect on the use and management practices of tangata whenua in the exercise of non-commercial fishing rights. Consultation with interested stakeholders, including tangata whenua, environmental, commercial, recreational, and local community interests, must be undertaken before a closure, restriction or prohibition may be imposed.

Mataitai

Mataitai reserves are traditional fishing areas of special significance to tangata whenua, who are authorised to manage non-commercial fishing in that area. Management aims must be consistent with sustainable use of the fisheries resources, and fish stocks within the mataitai may be enhanced. Management controls apply to both Māori and non-Māori fishers and are enforced by Ministry of Fisheries compliance staff and Honorary Fisheries Officers. Bylaws can cover such matters as the species that may be taken, the methods that may be used, quantities and size limits.

The process of establishing a mataitai can be lengthy and includes consultation with the local community and written submissions from commercial quota owners and recreational fishers. Once a mataitai is established, commercial fishing is excluded from that area. Before approving the establishment of a mataitai, the Minister must be satisfied that it will not unreasonably affect the exercise of commercial and recreational fishing rights. However, a mataitai proposal will not be declined simply



because the area is also used by commercial and recreational fishers. If those other users may still fish successfully in other areas, the mataitai may be approved. A general principle is that commercial fishing is to be prohibited within mataitai, although tangata tiaki/kaitiaki may propose to the Minister that commercial harvest should be allowed under certain conditions. Mataitai may not be established in a marine reserve, although they may be established within a taiapure.

New Zealand's first and (to date) only mataitai was established at Rapaki Bay in Lyttelton Harbour, at the initiative of Te Hapū o Ngāti Wheke Rapaki of Ngāi Tahu. A number of other mataitai proposals are being developed. Ngāti Toa Rangatira are developing a mataitai proposal for Pukerua Bay, and Te Ati Awa are considering mataitai for several sites on the southern coast from Makara to Turakirae Head. Ngāti Toa are concerned at the ongoing poaching and harvesting of undersize paua around the Raukawa coast – areas where paua have always been abundant in the past, yet due to intensive pressure from expanding urban settlements, little kaimoana now remains. There is considerable interest in mataitai as a constructive means of addressing such problems while still ensuring tangata whenua access for customary gathering.

Ngāti Kuri are also considering a mataitai proposal for Spirits Bay and Tom Bowling Bay in the North, in response to the ecological damage caused by intensive commercial and recreational fishing (see Vista: 12 Piwhane – Spirits Bay: a unique ecosystem). The intention of Ngāti Kuri is for community management of natural resources; the iwi are working to determine the most appropriate management methods and constraints to allow these complex ecosystems to recover and then to ensure their ongoing viability into the future.

Taiapure

Part IX of the Fisheries Act 1996 provides for the declaration of taiapure local fisheries by Order in Council. Taiapure may be established in estuarine and coastal waters that have customarily been of special significance to any iwi or hapū as a source of food or for spiritual or cultural reasons. Some Māori note, however, that taiapure is not a Māori management construct (the name 'taiapure' is a newly-coined mix of Māori words for 'coast' and 'procedure'). Currently there are three taiapure established.¹⁰

A taiapure proposal from a local community must go through a complex process before the Minister of Fisheries may approve the establishment of the taiapure and appoint the management committee. This committee makes recommendations to the Minister for regulations for the conservation and management of the fish, aquatic life or seaweed in the taiapure. Regulations apply equally to tangata whenua, to Māori from other areas, and to non-Māori, for the control of fishing in the area. Commercial fishing may be allowed within a taiapure, but only if the management committee recommends this as part of the regulations.

11 MAKETU – THE ESTABLISHMENT OF A TAIAPURE

One of New Zealand's first taiapure was established at Maketu in the Bay of Plenty. Maketu is a place of profound importance for tangata whenua, as the final landing-place of the Te Arawa waka, and the point where the Kaituna River brought the waters of Lake Rotorua and Lake Rotoiti out to sea (until it was diverted in the 1950s for a land drainage programme). The Maketu headland, a strong strategic feature located between two rich wide estuaries, has always been an important site:

Historical sources highlight the abundance of kaimoana... marine and freshwater fish, mussels and kai mataitai such as pipi, cockle, eel, kahawai and whitebait... In recent years (there has been) a decline in the abundance of marine life in the area. The numbers of fish species, including flounder, grey and yellow eyed mullet, kahawai, snapper, trevalli and whitebait have drastically declined... For other species, a change in habitat characteristics has made the Maketu estuary a less hospitable site (Ririnui & Memon, 1997).

A group of Maketu residents got together in the early 1990s to work on a taiapure proposal. There was strong support from the whole community, but getting through to the actual establishment of the taiapure was a frustratingly long and slow process. Extensive initial consultation was required with local recreational and commercial fishers, conservation groups and the general public. When the proposal was lodged, legal and procedural complications took years to resolve. The complex requirements of the process have been noted by other iwi and hapū as significant disincentives for taking up taiapure opportunities in their own areas.

The Maketu taiapure currently comprises only the first

phase of the community's vision; subsequent stages are intended to extend the taiapure area to cover a further offshore area and islands. The taiapure committee has prepared a detailed strategic plan based on rangatiratanga, kaitiakitanga and manaakitanga. The plan sets out comprehensive policies for protecting mauri and waahi tapu, monitoring, compliance, education and promotion, environmental restoration, employment and training, and finance and planning. A permit system has been established to gather information, and recreational fishers' representatives have been co-opted to work with the committee. A rāhui was put in place over the 1998/99 Christmas period. The committee has had scientific support from Environment Waikato, and local school children are going to help with ecological surveys.

The Maketu committee endeavours to make progress with management, public awareness and restoration, but receives no funding from the Government for projects or travel costs, and no payment for members' time and expertise. Data has to be stored in cardboard boxes stacked up beside the coordinator's dining table. At a practical level, the committee needs such basics as a computer and filing cabinet, photocopying and stationery, signs, fuel for the boat to go out and check the mussel rocks, and perhaps a small shop-front office space in the local centre to give a point of contact for the community. The costs would be minimal; the environmental gains for Maketu would be enormous.

12 PIWHANE – SPIRITS BAY: A UNIQUE ECOSYSTEM

Piwhane, or Spirits Bay, on the northernmost shore of the North Cape, is a place of profound importance for tangata whenua as Te Rerenga Wairua, the place from which the souls of the dead make their departure for Hawaikinui, the ancestral and spiritual place of origin. It is a remote and beautiful area, regarded by Ngāti Kuri as a unique and fragile taonga. It is also an area that has been intensively fished for scallops, snapper, tarakihi and trevally.

Commercial fishing for scallops, using bottom-trawling methods, has been undertaken since the early 1990s. The TACC for the east Northland area for 1996 and 1997 was set at 189 tonnes meatweight, which was brought down to 106 tonnes in 1998. Harvests were 56.3 tonnes in the 1995/96 season, 66.6 tonnes in 1996/97, 78.1 tonnes in 1997/98, (McGregor, 1998) but only 10.1 tonnes in 1998/99. By early 1999, a survey

found that scallops have almost completely disappeared from the area, even from places previously very rich in scallops; there is also a disturbing absence of scallop spat, despite the survey being undertaken at the most likely time for spat settlement (Cryer et al 1999).

An earlier scallop assessment survey in May 1996 (O'Shea, 1996) had also discovered, as bycatch, a rich diversity of rare and unusual species, many of which were suspected to be new to science. This extraordinary biodiversity – especially rich at the boundary between tropical and temperate waters – included 218 sponge species, 170 bryozoans, corals, gorgonians, sea squirts, hydroids, crustaceans, and a barnacle whose nearest relative is thought to have become extinct 300 million years ago (ECO, 1999).

NIWA reported that these unique species were highly vulnerable to damage by bottom trawling methods of catching scallops. The first report on the scallop fishery and the rare and unusual "bycatch" was released in April 1997. A further survey to examine the benthic communities in Spirits Bay and Tom Bowling Bay was conducted in January 1999, and reinforced the results of the earlier work. All the scallops caught in the 1999 survey bore evidence of probable previous interactions with scallop dredges, suggesting that scallop fishing was more widespread than previously assumed.

There has been intense concern and considerable publicity about the risks posed to the ecosystems of Spirits and Tom Bowling Bays, and some initiatives have been undertaken:

- in 1997 the commercial fishers (through the Northland Scallop Enhancement Company) instituted a voluntary closed area of 1059 sq. km to protect the hydroid beds. Later operators of trawl vessels agreed to restrict their trawling to three "trawl corridors";
- Ngāti Kuri proposed in March 1999 that a mataitai reserve be established to protect the area. Their proposals are currently being considered in the context of ongoing discussions with the Minister of Fisheries;
- the environmental NGOs have conducted a vigorous campaign in the media to focus public attention on the ecological diversity at stake, and have proposed interim dredge and trawl method restrictions over a larger area than the voluntary restrictions;
- in June 1999, MFish proposed three options to close part of Spirits Bay and Tom Bowling Bay to commercial scallop fishing and bottom dredging as a sustainability measure;



- regulations came into force on 11 November 1999 which prohibited trawling and Danish seining in Spirits Bay and Tom Bowling Bay and prohibited commercial fishers from taking scallops from those waters (Fisheries Regulations 1999).

In the meantime, the scallop fishery is in a state where “confidence is such that only about ten vessels were prepared to give it a go when the season was scheduled to start during mid to late July... Leasing quota is not an option due to the state of the fishery and the spectre of closures, and... the prospect of selling outright is equally remote.” (Stevens, 1999). However it may already be too late. Spirits and Tom Bowling Bays’ unique underwater taonga, and the ecosystems that supported them, have already been devastated.

3.4.3 Recreational fishing

Identifying just who is a ‘recreational fisher’ can be a complex task in itself, but it is known that over 500,000 – 600,000 New Zealanders go marine recreational fishing at least once a year¹², and many consider it a birthright. Whereas the allocation of quota to commercial fishers enables them to co-operate in the management of commercial fisheries and regulations set up a structure for tangata whenua to manage customary fisheries, the system for recreational fishers does not enable recreational fishers to manage recreational fishing. Until this right is provided for, the primary agency responsible for recreational fisheries is the Ministry of Fisheries. In the absence of a formally constituted management organisation, the New Zealand Recreational Fishing Council (Inc) represents marine recreational fishing interests in management decision making processes carried out by the Ministry. The Council is made up of appointed delegates from affiliated national councils and regional associations with fishing interests.

Recreational fishing is managed under regulations. The regulations cover recreational, but also subsistence fishers, all of whom must comply with limits on the amount of fish of particular species that they may take each day as well as method and gear restrictions.¹³ Some areas are also closed to recreational fishing.¹⁴ These regulations are in place for the purposes of ensuring sustainability, and for allocation of an appropriate proportion of the TAC to and amongst recreational users.

Since 1990 the Ministry has carried out three national marine recreational fishing surveys. Information was collected on where people fish, what they use, where they go and how much they catch. This information is used to assist the Ministry in management initiatives, such as setting the TAC. The TAC incorporates recreational take by, where possible, estimating its size. This, along with other non-commercial takes, are then subtracted from the TAC to get the TACC.

A working group comprising representatives from the Ministry and recreational fishers is discussing a framework for managing marine recreational fishing at present. A recent paper from the working group outlines options for self management by the recreational fishing sector, allowing it to manage harvesting of the recreational allocation and also to represent the interests of recreational fishers in wider management decisions (see Vista 13).

13 CHOOSING A MODEL FOR MANAGING THE RECREATIONAL FISHING SECTOR

There are a number of alternative models and operating principles that might be applied to the complex task of managing and fostering a large, diverse recreational sector. Whilst representative bodies do exist, there has been a recent call for a more formal recognition of the recreational sector in the management of fisheries, and a greater degree of self management. An important consideration in the appointment of a management structure for recreational fishers is obtaining a mandate to represent local fishers, to enable acceptable levels of compliance. Possible options include elections and appointment by the Minister to ensure appropriate representation.

A representative body could take the form of a trust, company or incorporated society. Funding sources for management include central government, local government, sponsorship, licensing, tagging (pre-purchase tags for fish), membership, and levies (Recreational Fishers Conference 1999).¹⁵ It is important that whichever options are chosen, the philosophies underpinning recreational fishing should be recognised.

Key tasks for management of the recreational sector are the development of fishing plans with commercial and customary fishers to manage inshore fisheries and to set the rules by which recreational fishers will operate and monitor recreational fishing impacts.

One model already operating is that demonstrated by the national and regional Fish and Game Councils which are responsible for the protection, management and enhancement of introduced game birds and freshwater fish and their habitats. Whilst they do not manage a resource that is shared with other groups such as commercial fishermen or tangata whenua there are some similarities to the marine recreational fishing sector. Fish and Game Councils are required to prepare and work to management plans that have regard to sustainability, to impacts on other natural resources and other users of the habitat, and to maximising recreational opportunities for hunters and anglers. A process of public consultation is required for the development of these plans.

New Zealand's freshwater recreational fishers and hunters have a strong tradition of independence and self-regulation. The system is self-funding, resourcing all its work through annual licence fees (an overall income of approximately \$5.6 million p.a.).

Determination to manage their own affairs has been protected in legislation since the beginnings of their formal organisation, with the formation of the early acclimatisation societies in the 1860s. The statutory frameworks include an oversight and approval role for the Minister of Conservation, but within that they provide for anglers and hunters to:

- determine their own objectives and priorities for management of the target resources and their habitat environments;
- make their own regulations and set bag limits;
- base decisions in their own members' expertise and knowledge of the resource;
- undertake compliance and enforcement; and
- set licence fees and receive and manage all licence revenues.

3.5 Environmental management

3.5.1 Exclusive occupation of the coastal marine area

Under the Resource Management Act, regional councils are responsible for the sustainable management of the coastal marine area, ie the foreshore and seabed of the territorial sea. Persons wishing to occupy coastal space to the exclusion of others are required to comply with the regional coastal plan prepared by the relevant regional council and may be required to obtain a resource consent from the council. The purpose of the regional coastal plan and of resource consents is to ensure that the environmental effects of

activities that take place in the coastal marine area are avoided, remedied or mitigated. If the activity for which consent is sought is classified as a restricted coastal activity by the regional coastal plan, the Minister of Conservation is the consent authority. Activities that may involve exclusive occupation of coastal space include mining (extraction of oil, gas, sand), port activities, marine farming, moorings, wharves and jetties.

In addition to the resource consent that may be required for an activity, some activities require additional permits from other public authorities. Mining activities require a permit under the Crown Minerals Act 1991 and marine farming activities may also require a fisheries permit under the Fisheries Act 1983.

Marine farming is currently covered by three enactments: the Marine Farming Act 1971, the Fisheries Act 1983 and the Resource Management Act 1991. As at October 1999 the Government intends to conduct a review of the aquaculture regime, it intends to repeal the Marine Farming Act and provide for the RMA and the Fisheries Act 1983 to apply to existing marine farming leases, licences and permits as an interim measure.¹⁶

Beyond the territorial sea, there is no requirement for activities to obtain resource consents for occupation of the seabed. The Continental Shelf Act 1964 authorises the Governor-General to make regulations authorising or prohibiting the construction or use of installations on the continental shelf outside the territorial sea. No such regulations have been made. However, mining activities beyond the territorial sea will still have to be authorised by a mining permit granted by the Minister of Transport (for petroleum) or the Minister of Energy (other minerals) under the Crown Minerals Act 1991.

Under international law, other states are entitled to lay cables and pipelines on New Zealand's continental shelf beyond the territorial sea.¹⁷ New Zealand's international telecommunication links run from Auckland east to the Pacific and Hawaii, and west to Australia via Norfolk Island. Within New Zealand waters, the Cook Strait cables carry both power and telecommunications. The Submarine Cables and Pipelines Protection Act 1996¹⁸ allows for the creation of 'protected areas' where, unless specifically exempted, fishing or anchoring is not permitted. By excluding fishing and anchoring, such submarine cable corridors



are regarded by some as de facto 'marine protected areas'. The total area of these no-fishing zones is 164,215 hectares,¹⁹ or over 11 times the total area of New Zealand's marine reserves (excluding the Kermadecs).

Not all cables and pipelines are protected by designated exclusion zones, but are marked on navigation charts and by shoreline notices warning of the dangers of anchoring and/or fishing in the vicinity of cables.

There are also exclusionary provisions for military requirements, including 15 Military Operational Areas around the New Zealand coast used for firing exercises. These areas are not legally closed, but three (Kaipara Harbour, White Island, and an area off the Himatangi coast) are deemed to be in permanent use, and are therefore effectively closed areas. Other military activity that has limited the use of the territorial sea is the dumping of ammunition. Before 1955 dumping was carried out indiscriminately, in theory at depths below 200 metres; however, live ammunition has been reported in shallower waters, especially in the Hauraki Gulf and the waters around the Hen and Chicken Islands. Since 1955 five ammunition dumping areas have been designated, each of ten nautical miles in diameter.²⁰ However these have not been in use by the New Zealand Defence Force for at least the last 30 or more years.²¹

3.5.2 Non-exclusive occupation of coastal space

Many uses of the marine environment do not require exclusive occupation of the foreshore or seabed. Yachts or other boats, ships, windsurfers, and surfies and swimmers all pass over the seabed, but their use does not exclude others. However, such uses may be excluded from some areas where people have exclusive occupation rights (see section 3.5.1) or from areas that are set aside for conservation or research purposes. Some uses of marine areas may also have adverse effects on the environmental values and qualities of importance to tangata whenua.

Ships of other nations have a right of innocent passage through the territorial sea.²² Passage of a vessel is not innocent where it commits any act of wilful and serious pollution contrary to international law or undertakes unauthorised fishing activities in the territorial sea.²³

The Maritime Safety Authority (MSA) regulates shipping, whilst smaller recreational vessels are not formally required to be licensed, although clubs can impose rules for racing. The Coastguard provides competency courses, which incorporate some training in environmental matters. Regional councils and the MSA develop regulations to maintain safety and environmental standards.

Some commercial uses that do not require exclusive occupation of the coastal marine area do require permits. Regional councils in conjunction with the Minister of Conservation have responsibility under the RMA within the coastal marine area to control commercial activities in relation to the surface of the water, and discharge of contaminants into water. In the tourism sector, marine mammal watching, charter boat operations and related activities have become popular. Nature tourism in the marine environment is a growing market. There has been a recent proposal by Submarine Adventures, based in Dunedin, to operate a tourist submarine in Milford Sound.²⁴

The Marine Mammals Protection Regulations 1992 prohibit commercial marine mammal operations except with a permit issued by the Director-General of Conservation, and stipulate the sort of behaviour that is or is not permissible around marine mammals. The purpose of the regulations is to protect marine mammals from harm or interference.

3.5.3 Exclusion of marine areas for conservation and research purposes

The Department of Conservation administers a number of statutes that provide for the setting aside of areas of the territorial sea for various purposes related to conservation and research. The Marine Reserves Act 1971 authorises the creation of marine reserves for the purpose of preserving areas of sea and foreshore in their natural state as the habitat of marine life for scientific study.

The Department is responsible for the management of marine mammals within New Zealand's territorial sea and EEZ, and the Minister of Conservation may declare a place within the territorial sea to be a marine mammal sanctuary. The Minister may specify the activities that may or may not be engaged in within the

sanctuary. Sanctuaries under the Marine Mammals Act 1978 do not necessarily exclude other uses such as fishing, but such uses may be subject to restrictions as to method in the interests of protecting marine mammals from harm.

Marine reserves, marine mammal sanctuaries and wildlife sanctuaries may be established only within the territorial sea. However, the Fisheries Act 1996 provides for sustainability measures to be taken throughout the EEZ, which may include closing areas to fishing. This is in keeping with the provisions of UNCLOS which grants coastal states jurisdiction in their EEZs largely for fishing and other exploitative purposes, and with concomitant responsibilities to protect living resources from over-exploitation and the marine environment from pollution.

Potentially, wildlife sanctuaries, refuges and management reserves may be established within the territorial sea under the Wildlife Act 1953. However, those that have been established so far do not generally cover any areas of the sea. The exception appears to be the wildlife management reserve at Whanganui Inlet in Tasman District, which specifically allows shellfish gathering and fishing.²⁵

An area of the seabed around the Sugar Loaf Islands is protected for the purpose of maintaining that area in its natural state as the habitat of marine life and to provide for the enhancement of recreational activities. This was achieved by passing special legislation, namely the Sugar Loaf Islands Marine Protected Area Act 1991. Mining is prohibited but fishing is allowed, although only recreational users may anchor.

Under the Fisheries Act 1983 and the various fishing regulations, restrictions on fishing have been imposed in a number of areas.²⁶

3.5.4 Pollution of the marine environment

New Zealand has committed itself internationally to protect its marine environment from pollution. Regional councils are responsible for the control of discharges, dumping or incineration in the coastal marine area (the territorial sea) and the Maritime Safety Authority is responsible for the control of those activities in the EEZ and in the sea above the continental shelf. The MSA is responsible for oil spill management and response and standards for ships and equipment both within the territorial sea and beyond. A major

source of pollution for the coastal marine area is the discharge of contaminants and sediment from land, whereas the EEZ and beyond is primarily at risk from pollution discharges by vessels.

Some scientists consulted as part of this study feel that one of the biggest issues facing our marine environment is the inability to manage sediment run-off from the land, especially from non-point sources (refer to section 2.7). The effects on aquaculture and the marine environment from the discharge of sediment into marine waters, in relation to the productivity and biodiversity of estuaries and shallow coastal waters, are largely unknown.

The Resource Management Act 1991 authorises regional councils to prepare regional coastal plans, which are not to be inconsistent with the New Zealand Coastal Policy Statement (see section 3.7). Without a permit from the regional council or authorisation by regulations, no person may, in the coastal marine area:

- discharge contaminants into or onto land, air or water;
- dump or incinerate any waste or other matter;
- dump ships, aircraft, and offshore installations; or
- discharge harmful substances from ships or offshore installations.

No person may dump any radioactive waste or matter from any ship, aircraft, or offshore installation.

Another sort of ‘pollution’ of the marine environment results from the introduction of unwanted marine organisms. The Ministry of Fisheries is responsible for marine biosecurity and, in particular, is concerned with the introduction of unwanted marine organisms from the exchange of ballast water and from the hulls of vessels. The Ministry has issued an import health standard under s 22 of the Biosecurity Act 1993 which applies to ballast water loaded within the territorial waters of another country and to be discharged in New Zealand waters. The standard does not affect the emergency discharge of ballast waters.

The fouling on hulls is regarded as ‘risk goods’ for the purposes of s 33 of the Biosecurity Act 1993. Where there are risk goods on board a vessel that has entered New Zealand waters, an inspector may direct the master to:

- deal with the goods in a specified way; or
- move the vessel outside New Zealand waters;



or

- destroy the goods in a place and manner approved by the inspector.

The Ministry of Fisheries has recently let a contract for the development of a national pest management strategy proposal under the Biosecurity Act 1993 for *Undaria pinnatifida* (an invasive seaweed recently established in New Zealand) (see Vista 14 Risk to New Zealand – marine biosecurity).

14 RISK TO NEW ZEALAND – MARINE BIOSECURITY

Over the last 100 years, an average of 1.4 new marine species per year are known to have established themselves in New Zealand. These alien invaders are most obvious in shallow coastal waters and harbours. The impacts of their presence are wide ranging:

- the poisoning effects of microscopic dinoflagellates;
- the voracious carnivorous appetites of seastars;
- replacement of dominant native seaweeds by introduced species;
- the smothering mat-forming action of an introduced Asian mussel; or
- the impact of *Undaria* (a Japanese seaweed) on paua.

The Ministry of Fisheries has not undertaken an overall risk assessment for the introduction of alien species, but estimated risks for individual species are high. For example, the estimated cost to the fishing and aquaculture industries of the accidental introduction of the north Pacific seastar (*Asterias amurensis*) – not yet present in New Zealand waters – is \$200 million per year in lost production and \$10 million per year in control costs (Mountfort, 1998). According to the Otago Daily Times (5 August 1999), DOC has needed to spend more than \$2 million over five years to eradicate *Undaria* from Patersons Inlet and Bluff Harbour. There is a long list of similarly potentially harmful species. The overall risk, being the sum of all individual species risks, is highly significant for New Zealand's biodiversity.

There is no way of knowing how these marine invaders get to New Zealand. Most probably they arrive in ballast water or attached to ships' hulls. As part of a growing international response to the problem, the Ministry of Fisheries has placed controls on the discharge of ballast water. It has also worked with others to establish protocols for the collection and

disposal of debris from the defouling of ship hulls, and has commissioned work to design tests for compliance with these protocols.

3.6 Non-Government groups

The environmental NGOs in New Zealand have made, and are continuing to make, a significant contribution to improving processes and systems for marine environmental management. Environmental NGOs, through their memberships, represent the concerns and interests of a strong sector of the New Zealand public in the development and refinement of marine management policy.

- ECO has participated actively in all aspects of the fishery management processes for a number of years. Representatives take part in consultations ranging from the setting of TACCs to cost recovery and setting bycatch limits for fisheries, such as the squid fishery around the Auckland Islands.

ECO seeks to unite environmental NGOs and local groups around a platform for marine management reform and to empower them to get involved. ECO serves as a clearing house for information about the marine environment, and the policies and decisions that affect it. Fisheries and marine environmental issues feature regularly in the ECO newsletter and other information releases. It was ECO's initiative to organise the national SeaViews Conference in 1998.²⁷

- Historically, Greenpeace has waged campaigns against driftnet fishing, commercial whaling, the impacts of land-based pollution on coastal environments, and the disposal of harbour dredgings in coastal waters. More recently, there has been a focus on the threat that unsustainable fishing practices pose to the long-term viability of the ocean environment. Internationally, the organisation is working towards the adoption of its principles and guidelines for ecologically responsible fishing by governments, industry and other interests. Greenpeace is at the forefront of international concern about the unsustainable fishing of Southern bluefin tuna and Patagonian toothfish in the southern oceans, and has helped focus political, public and media attention on these issues.

- The Royal Forest and Bird Protection Society has been vigorously lobbying for the establishment of marine reserves. Applications were recently lodged for two additional reserves, one on Waiheke and another in Nelson.

Forest and Bird has also been a consistent voice calling for the protection of New Zealand's unique biological diversity; the organisation has taken a major role in the development of New Zealand's draft Biodiversity Strategy (see section 3.7). Forest and Bird participates in and contributes to all aspects and phases of the fishery management process.

- World Wide Fund for Nature's (WWF-NZ) mission is to conserve nature and ecological processes. Its marine programme is centred around the concept of 'endangered seas', campaigning to bring an end to destructive fishing practices, to remove government subsidies, to decommission excess fleet capacity, and to develop social and economic incentives for sustainable management, such as the formation of the Marine Stewardship Council.²⁸ WWF also campaigns to create no-fishing areas as insurance against the impacts of unsustainable fishing.

Proposal for a Ministry of Marine Impacts Management

This concept was suggested by the environmental NGOs at the SeaViews Conference in 1998 with the objective of setting commercial fishing within effective environmental and social constraints and within an ecosystem approach to marine management. The idea has arisen from the frustration experienced by environmental NGOs at the fragmentation of the present legal and administrative framework. (The model used in constructing the Department of Conservation by bringing together all the 'green bits' for land was a starting point for this concept.) The environmental NGOs are concerned that the marine environment is unlikely to be properly administered to meet either New Zealand's international obligations or the public's aspirations for good stewardship without major reform.

The Coastguard

The Royal New Zealand Coastguard provides a nationwide marine safety service, standards and

support services, and education to the boating public. The education programmes reach approximately 8,000 people each year through various courses including Day Skipper, Boatmaster and VHF Marine Radio courses. There are positive opportunities for educating, monitoring and increasing awareness about marine environmental issues. The Coastguard has a strong volunteer ethic and few paid staff; lack of certainty and continuity of funding for the service is a significant constraint.

Community groups

Many local community groups are active in marine issues, particularly coastal environmental monitoring, restoration or education. Examples include:

- Cheltenham Beach Caretakers – in the early 1990s a group of local residents on Auckland's North Shore began a sampling programme of shellfish on Cheltenham Beach. The group's findings led to the call for a ban on the taking of all inter-tidal organisms in order to restore the area's shoreline ecology and biological diversity. The idea subsequently received support from tangata whenua, the local council, Devonport Community Council, and the Ministry of Agriculture and Fisheries, resulting in the establishment of a comprehensive protection regime for the area. The caretakers maintain an ongoing monitoring programme in association with marine scientists from Leigh. Awareness is high, with hundreds of local volunteers turning out to help with the surveys counting cockles.
- Save Piha Shellfish is a community group formed to protect Piha's shoreline ecology. The group has worked from a basis of strong community support for a regulatory closure of shellfish harvesting on this beach on Auckland's west coast. Locals are intensely concerned about the state of the coastal environment, and are encouraging a whole-catchment approach; their data indicates an entire system at crisis point, from mussels and kelp to the little blue penguins. The group includes two honorary fisheries officers, a network of 'watch houses', and a team of volunteers on the beach to educate locals and visitors about the voluntary community closure and the status and importance of Piha's shoreline ecology. The group is



working with environmental consultants and the University of Auckland on surveys, but efforts to secure official recognition and support from the Ministry of Fisheries have been frustrating. A contribution from the regional council helped with signs. The group has undertaken formal monitoring, including photographic surveys and the collection of baseline data, since 1997; an ethic of responsibility and guardianship is encouraged, as is the concept that Piha's shellfish are not merely a resource, but an asset to be valued and cared for properly.

- Whaingaroa Environment, a community-based catchment management group, was in 1998 involved in developing submissions from the Raglan community to the Ministry of Fisheries concerning fishing regulations for Raglan Harbour. A meeting of residents, local commercial quota holders, recreational fishers and tangata whenua representatives identified significant common ground in their goals for fishing in the harbour, and produced a ten-point plan to change the fishing regulations in the Raglan area. The plan included measures such as no dredging for shellfish within the harbour, restricting the setting of recreational nets to one tide, and developing a coastal no take area. The Ministry did not advance the community plan, citing issues including formal procedural matters, the extent to which the Raglan community was represented in the development of the proposal, and the need for comprehensive tangata whenua endorsement.
- The Adopt-a-Beach programme, organised through the Ministry of Fisheries Auckland office, began as a sponsored programme for children, and now has some two dozen member schemes. The programme provides basic information and advice for community and school groups to conduct surveys and research on local shellfish resources. The programme receives no formal funding from the Ministry.
- Coastcare groups have been established in a number of places throughout New Zealand. One group at Mount Maunganui has been active in planting indigenous vegetation and creating formal tracks to the beach to minimise sand dune damage. Many groups are supported in some way by regional councils.

The NGOs and representatives of local community groups face a number of difficulties in actively participating in marine environmental management. In some official processes, including many of those established by the Fisheries Act 1996, only a select number of groups are formally recognised and given the opportunity to participate. Community groups, NGOs and recreational representatives are often excluded from critical decision-making processes, eg the recent 'fast track' working group on cost recovery in the fishing industry.²⁹ Some consultation processes run by regional councils and the Department of Conservation have been more inclusive.

Accessibility to information is often linked to whether or not a group is a recognised participant in the process. While information is a key to effective participation, environmental NGOs and community groups can find it difficult to obtain the information they require. The difficulties with information flow also constrain effectiveness in the other direction; often the formal established management processes do not give equal credibility or weighting to non-economic values and qualitative information. Valuable data gathered by local communities may be dismissed, or expensively duplicated by official researchers. Some community groups feel that their commitment and their work are not given credibility by official agencies, and that formal processes are being used to exclude local people and local level concerns rather than to recognise and reflect them.

An enormous commitment of time and resources is required of community group members, NGO campaigners, and recreational stakeholders to participate in some marine management processes and contribute what they can for the quality of the local environment and the future sustainability of natural resources. The pressure on personal lives, families, and other professional and community commitments can be fiercely intense. There is little government support to facilitate participation (see section 3.8.10).

3.7 Government initiatives and strategies

Over recent years, a number of strategies, programmes and ad hoc responses have been initiated to address aspects of marine management. Some of the major ones are listed

below; other more issue-specific examples are listed at appendix 7.

New Zealand Coastal Policy Statement 1994 (NZCPS)³⁰

The NZCPS is to date the only national policy statement prepared under the Resource Management Act 1991. Its purpose is to establish policies in order to achieve the sustainable management of natural and physical resources in relation to the coastal environment in New Zealand. Regional coastal plans developed by regional councils must not be inconsistent with the NZCPS. The Minister of Conservation is responsible for developing, monitoring and reviewing the NZCPS.

The draft New Zealand Biodiversity Strategy 1998³¹

The draft strategy includes a coastal and marine biodiversity chapter and includes the concept of managing the marine environment to sustain biodiversity. An action plan is proposed with objectives such as improving our knowledge of coastal and marine ecosystems, sustainable coastal management, co-ordinated marine management, and sustainable marine harvest practices. The Department of Conservation and the Ministry for the Environment have jointly developed the draft strategy while a range of agencies have been identified to implement the strategy.

Environmental Sector Foresight 1998: Strategy for the Marine Subsector

The objective of the Foresight process, initiated by the Ministry for Research, Science and Technology, is to identify the outcomes for research, science and technology for New Zealand's future. The Environmental Sector Foresight Strategy (October 1998)³² included goals for the marine subsector. These included: definition of resources in the marine estate, understanding of the functioning of marine systems, ecologically sustainable use and protection of the marine environment, economic development through efficient use of marine resources, and meeting community aspirations.

Environment 2010 Strategy³³

Environment 2010 was developed by the Ministry for the Environment and published in September

1995 as a statement of the Government's strategy on the environment. Although *Environment 2010* has no section on the marine environment as a whole, it includes a section that identifies the most significant risks to sustainable utilisation of fisheries as:

- depletion due to persistent over-fishing, leading to a collapse in a commercial fishery or a recreational fishery, and attendant social and economic dislocation;
- contamination of fisheries by natural events (eg algal bloom or disease) or human activities (eg oil pollution or sedimentation);
- introduction of new harmful species and diseases, eg through the discharge of ballast water from ships;
- potential long-term damage to habitat caused by fishing;
- damage to threatened and endangered species and habitat from fishing activities;
- risks to recreational fishing from inappropriate levels and location of commercial fishing;
- risks to Māori customary fisheries; and
- high levels of non-compliance with fisheries laws.

It is noted in *Environment 2010* that uncertainty is a significant problem in managing these risks.

In January 1999 a stocktake of *Environment 2010* undertaken by the Ministry for the Environment identified the following remaining and new risks for sustainable fisheries:

- uncertainty in the assessment of many fish stocks and insufficient information to assess the status of others, which may result in some fisheries being threatened by over-fishing;
- incomplete information on non-compliance, which may result in over-fishing;
- ballast water and hull scrapings, which may introduce exotic pest species; and
- the limited understanding of effects of fishing activities on habitat and non-targeted fish species.

Interdepartmental initiative 1999 – Marine Environmental Stocktake³⁴

Since the PCE commenced this overview investigation, a group of officials from three government departments have been instructed by the Ministers for the Environment, Conservation and Fisheries to explore the idea of developing integrating mechanisms for marine management. This initiative was an effort to respond to the



critical need for integration and for consideration of an ecosystem approach to the marine environment.

ANZECC

The Australian and New Zealand Environment and Conservation Council (ANZECC) is a non-statutory Ministerial Council consisting of the Australian Commonwealth, State, and Territory Ministers, and New Zealand and Papua New Guinea Ministers responsible for the environment and conservation. It was established in July 1991 to provide a forum for member governments to exchange information and experience and develop co-ordinated policies in relation to national and international environment and conservation issues.

In the marine area, there have been two recent initiatives. The first was aimed at reducing impacts from shipping³⁵ and the second on establishing marine protected areas.³⁶

Another ANZECC initiative, arising from Australia's recent launch of its Oceans Policy, is the development of a Trans-Tasman Understanding on Oceans Policy to develop policies that will result in complementary approaches to the protection and development of marine resources. Other projects include a Regional Marine Plan for the south-eastern region of Australia's EEZ, an area of joint interest where the EEZs of Australia and New Zealand adjoin.³⁷

Reviews of legislation

There are a number of legislation reviews either under way or proposed by Government that will affect the management of the marine environment. These include:

- A review of the **Resource Management Act 1991**, which is intended to reduce duplication, uncertainty and costs of compliance, and to improve practice and the procedures of the Act. One change is the proposed amendment to the definition of the 'environment' to remove reference to social and economic considerations. The amendment bill was introduced into the House of Representatives in mid-July 1999.
- A review of the **Marine Reserves Act 1971** is proposed and terms of reference for the review have been drafted for Ministerial consideration.

- The **Hauraki Gulf Marine Park Bill** has been reported back by the Transport and Environment Committee. It seeks to establish a framework for managing the many aspects of the Hauraki Gulf (see Vista 15 Proposed Hauraki Gulf Marine Park).
- The **Resource Management (Marine Farming and Heritage Provisions) Amendment Bill** has been reported back to the House of Representatives and is awaiting its third reading. The select committee has recommended that the enactment of these provisions not wait for the full review of the aquaculture industry. The bill will repeal the Marine Farming Act. Existing marine farming leases and licences will become coastal permits under the RMA and marine farming permits and spat catching permits under the Fisheries Act 1983.

Review of implementation of legislation

Under the Public Finance Act 1977, the Controller and Auditor-General has the authority to examine whether resources have been applied effectively and efficiently and in a manner consistent with Government policy. Under this authority, the Auditor-General has looked at the work carried out by the Ministry of Fisheries under the Fisheries Act 1996, and the extent to which its activities in the eight major fisheries it manages are carried out within a sustainable utilisation framework. The Auditor General's investigation will be presented separately to Parliament.

15 PROPOSED HAURAKI GULF MARINE PARK

A new kind of park has been proposed for the Hauraki Gulf, including the Firth of Thames and the east coast of the Coromandel peninsula, and some 33,000 hectares of island and coastal reserves. The park concept has evolved through a lengthy process of deliberations since 1991 when the Government set up a working party. The final proposal was introduced as a bill by the Minister of Conservation in November 1998.

The bill advances an integrated approach to the management of this extensive area and its natural resources. The Minister described the proposal as:

quite unlike a national park or marine reserve... more in the concept of multi-use parks around the world that allow commercial activity like shipping and fishing while ensuring that conservation and

recreational values are maintained... The philosophy driving this Bill is integration... a more holistic and ecosystem approach is needed (Hon Dr Nick Smith, 26 November 1998).

The integration is intended to be effected by the formal establishment of the Hauraki Gulf Forum, a local authority initiative that evolved out of earlier efforts at an integrated management approach. Currently regulatory and planning functions for the Gulf are exercised by two regional councils, nine district councils and at least three government departments, under a range of statutes including the RMA, the Conservation Act and fisheries legislation. The proposed Forum would include representatives of each of these official agencies, with the objectives of co-operation, better communication and promotion of conservation and sustainable management. The powers and functions of the Forum, however, would be primarily advisory and advocacy – the Forum is not intended to be a management agency for the proposed Gulf Park, and the existing management and statutory roles of the respective agencies would remain unchanged.

The Forum also proposes iwi representation, to “recognise the historical, traditional, cultural and spiritual relationship of the tangata whenua with the Hauraki Gulf, its islands, and, where appropriate, its catchments.”(Hauraki Gulf Marine Park Bill, No 244-1, Explanatory Note, piii).

It is proposed that the Forum will be required to have regard to the principles of the Treaty of Waitangi; a system of Deeds of Recognition is proposed to acknowledge the relationships of tangata whenua with specified places within the proposed park.

A number of iwi and hapū are tangata whenua in the area, many with interlinking and overlapping histories and connections with these rich coasts and landscapes. A number of Waitangi Tribunal claims – including the Hauraki claim currently being heard by the Tribunal (see section 4.3.2), which includes rangatiratanga over Tikapa Moana (the Gulf) and ownership of the foreshore and seabed – apply to the lands and waters to be included in the proposed park. The bill includes a clause which ensures that claims to the Tribunal or in any Court relating to the foreshore, seabed, or other land or natural resources of the Gulf would not be limited or affected by the park. Tangata whenua have expressed strong opposition to the park proposal, objecting to:

- the lack of an adequate Treaty-consistent management framework;
- the lack of adequate representation on the proposed Forum;

- the use of the name “Hauraki Gulf” for Tikapa Moana;
- the need for matters under claim to the Tribunal to be determined before the proposal becomes a fait accompli;
- issues of management and decision-making authority; and
- the inadequacies of Crown and local government consultation over the proposal.

Other opponents of the proposal have criticised the park concept as “a Clayton’s park”, only adding another layer of bureaucracy, unnecessarily duplicating RMA processes, and increasing costs. Fishers and marine farming interests have objected on the basis that the viability of their businesses will be adversely affected. Other stakeholder groups feel that an emphasis on commercial activities will dominate over recreational and conservation values. There is strong resistance to the promotion of the area as “a playground for Auckland.”

The park proposal is undoubtedly a brave effort to bring together management agencies, tangata whenua, a diverse range of interest groups, and the symbolic national significance of one of New Zealand’s most intensively used marine and coastal environments – a seascape moreover that is the venue for the America’s Cup races, and thus a feature of media coverage around the world. The park proponents have been driven by no little idealism as well as by the promotional opportunities offered by the Cup and other events. However, the difficulties encountered in developing the proposal, the scepticism of many tangata whenua and stakeholder groups, and the uncertain outcomes, are salient factors that offer important lessons for any such initiatives in the future.

In August 1999 the Transport and Environment Committee recommended that the bill be passed with amendments to provide for: giving clear recognition to tangata whenua; acknowledging more clearly the role of commercial fishing; and inserting a new definition of “economic activity”.

3.8 Issues affecting development of systems to manage the marine environment

A number of issues emerge through this summary of the current systems and statutory provisions for management of New Zealand’s marine and coastal environments. Strategic and tactical patterns have emerged at a more thematic level – characteristic assumptions about management and



its objectives, about how to approach the issues, and how to determine directions and make decisions. These patterns and expectations have major implications for the future sustainability of the marine environment.

3.8.1 The dominance of fishing

Throughout this investigation, there was a strong tendency for the discussion of marine environmental management issues to focus, almost obsessively, on fishing. Although the majority of stakeholders, across a wide range of sectors and groups, are aware that there is a much wider spectrum of human impacts and interactions with the marine environment, almost every interview ended up being about fishing. This predominance of one – admittedly major – aspect of marine environmental management is symptomatic of the ways current systems and structures make a genuinely integrated approach increasingly difficult.

3.8.2 Compartmentalisation

The tendency when dealing with something as dauntingly enormous and diverse as the marine environment is a retreat to the manageability of

compartmentalisation. Ecological, social, economic, cultural and metaphysical dimensions are divided off from each other into separate disciplines or areas of expertise.

The various activities and resources (food, minerals, conservation, whalewatching, recreation, transport) are administered under different management regimes; each priority harvest species is managed within quota management areas. Different biophysical and geographical areas are allocated to separate agencies which operate through separate statutes and structures (ministries, regional councils, iwi and hapū representatives in the customary fishing system, management committees such as those established for marine reserves or taiapure reserves, industry interest groups, or semi-privatised research institutions).

To a certain extent this is understandable given the requirements of scale, the invariable tensions between the costs of some environmental management requirements and the funds available, and the tendency of contemporary management systems to equate purposefulness and discipline with a tight focus on a few key objectives. However, when addressing the realities of the marine environment, the



'Who's your manager?'—Marine species don't 'play' according to sectoral or Jurisdictional rules.

compartmentalised *modus operandi* soon reveals severe limitations. **These failures of vision and integration are a major strategic risk for New Zealand’s marine environment and for our future sustainable use and development of marine resources.**

The inability to operate beyond the boundaries of one’s own particular system or frame of reference may be a constraint formally and specifically spelled out in statutory or policy determinations of that system or framework. For example, the Environmental Risk Management Authority is precluded from considering the wider contexts of the introduction of new organisms into New Zealand, and may assess each application only on its own merits. The Department of Conservation concentrates its efforts primarily on those coastal lands, marine reserves and wildlife it has responsibility for administering under the conservation statutes. Whether the constraint is externally imposed, or whether it is the result of inherent or assumed paradigms of particular professional, social or cultural groups, the consequences are the same:

- a narrowing of focus and an emphasis on administrative efficiency and convenience;
- a tendency towards impatience with and intolerance of other priorities and perspectives;
- a tendency to define objectives and achievement within the carefully delineated boundaries of ‘the possible’; and
- the repeated inability to even begin to address the wider ecological and various human-derived contexts with any coherence and effectiveness, at any level beyond the reassuringly rhetorical.

When you only take seriously a manageably small piece of the overall picture, there’s a high risk you’ll miss a few giant icebergs.

16 NATURAL MARINE BOUNDARIES

In the marine environment itself, there are few borders or boundaries. Those that there are derive from fundamental biophysical conditions – depth and pressure, temperature, salinity, currents and tidal fluctuations, nutrient loadings, the effects of geophysical features such as headlands or trenches on currents, the upwellings of chemicals and minerals from undersea vents, or the extent of the fans of sediments and other deposits spreading out from the

major rivermouths. These kinds of boundaries are not necessarily fixed in space and time, but will shift and change and evolve and merge into one another and even disappear altogether.

When planners draw a line on a map, it may assist in the management of their operations, or in the definition of an area of jurisdiction or responsibility of a particular agency. However, such lines may be quite meaningless in the marine environment.

Māori have long advocated a holistic approach to management for both land and sea environments. They consider that the present compartmentalised systems have no basis in the practical realities of nature or in the processes and flux of the sea and the seasons.

3.8.3 Nga Whakahaere Ara Ake: Tangata whenua concerns

There is an especially complex history to the developing phases of the legal and statutory dimensions of the Treaty and Māori fisheries. The last two decades of the 20th century have been a time of dramatic change in fisheries management, change which has resulted in both tangata whenua and the Crown seeking greater certainty through more precise, comprehensive statutory and official recognition of the Treaty principles. The reports of the Waitangi Tribunal on the Muriwhenua and Ngāi Tahu fisheries claims³⁸ were important catalysts in a climate of increasing pressure for review and reform.

The stated purpose of Part IX of the Fisheries Act 1996 is to make “better provision for the recognition of rangatiratanga and of the right secured in relation to fisheries by Article II of the Treaty of Waitangi”. The Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 preserves Treaty rights in respect of customary non-commercial fishing.

However, tangata whenua have raised concerns about the administrative systems and provisions for Treaty rights in fisheries and marine environmental management, and the extent to which they provide appropriate management frameworks to ensure the expression of kaitiakitanga and the ongoing viability of marine taonga. The following matters have all been identified as factors constraining the effective implementation of kaitiakitanga in fishery and environmental management:

- the retention of Ministerial powers in appointing taiapure committees and approving



- taiapure regulations and mataitai bylaws;
- the restriction of committees to an advisory role;
- the lack of funding or other practical provisions to support the operation of taiapure committees and tangata tiaki/kaitiaki; and
- the limitation of the geographical scope of taiapure and mataitai.

The processes by which these systems have been developed have left an often difficult legacy that may be significant for the achievement or otherwise of good environmental outcomes. The controversial process to develop the new regulations for Māori customary fishing was one such case. Crown consultation was initially undertaken with Paepae Taumata Māori, a body of representatives of whānau, hapū and iwi from throughout the country, but an impasse was reached due to the seemingly intractable differences between the expectations and claims of tangata whenua and the position of the Crown. Out of such kōrero a number of concerns have been identified by tangata whenua:

- the extent to which the Crown retains authority and control of management processes and decision-making;
- the extent to which kaitiakitanga may be confined in its practical applications – for example, the expectations of tangata whenua that kaitiaki should, where necessary, have the ability to make bylaws throughout the hapū's takutai moana, not just in the small localised area of a mataitai reserve;
- recognition and provision for the priority of the Māori customary fishing take ahead of the entitlements of commercial and recreational fishers;
- the consultation and negotiation processes followed by the Crown in the development of statutes, regulations and policies; and
- resourcing and capacity requirements for tangata whenua to carry out their business as kaitiaki, including funding, training, equipment, and administrative necessities.

There are also concerns regarding the difficulties of integration between the various mechanisms for protective management of coastal and marine areas (see section 3.8.2). Taiapure, mataitai and marine reserves are each developed and set up under separate statutory systems. Many iwi and hapū noted that, while marine reserves could not be supported as foreclosing rangatiratanga and

customary access and rights, there would be positive support for a combination approach, where marine reserve protection is established for particular areas, and a mataitai or taiapure placed in the same area recognises kaitiakitanga and provides for the local community's needs. A combination of methods would allow greater flexibility and specificity to develop specific requirements as appropriate for each distinct coastal and marine area. However, tangata whenua are concerned that the current official provisions do not facilitate such an approach.

The integration of different management frameworks is also relevant in regard to the Māori interest in New Zealand's commercial fisheries. As major stakeholders in the fishing industry, the priorities of Māori in recent years through the work of the Treaty of Waitangi Fisheries Commission have been in building the value of Māori assets, in training and employment, and in the development of an allocation mechanism for fisheries assets (see appendix 2). Environmental considerations, or the ethic of sustainability, have not to date been given any particularly emphatic profile as part of the Māori involvement in the fishing industry. On the other hand, the systems for customary non-commercial Māori fishing are based firmly within the traditional ethic of kaitiakitanga, where sustainability and protection of the natural resources themselves are fundamental priorities alongside ongoing local level utilisation. There would seem to be very strong opportunities for Māori commercial fishing to develop a sense of distinctiveness from other industry players through a purposeful re-integration of traditional and contemporary imperatives. This could become a powerful dimension of the branding and marketing of those enterprises owned and controlled by Māori – the kaupapa and responsibilities of kaitiaki, based in close interconnectedness with the natural environment and concern for the sustainability of marine resources, intelligently intertwined with the requirements of modern business. Such an integrated approach could be strategically promoted both within New Zealand and to overseas markets.

3.8.4 Management and independence

One of the issues that came through most persistently in this investigation is the question of devolution of management responsibility to the

users of the marine environment. The major stakeholder groups are seeking greater independence and autonomous control over their own activities. Much of the debate has focused around the implications of the recent amendments to the Fisheries Act 1996 for certain responsibilities for planning, research and management to be assigned to the commercial sector, but others too are calling for autonomy in their interactions with the marine environment. Tangata whenua uphold the Treaty guarantee of rangatiratanga, and the authority of local kaitiaki for customary harvests, the environmental management of fisheries and other resources, and the cultural and metaphysical dimensions of coastal and marine environments. Recreational fishers, coming from the experience of 'getting away from it all', are fiercely resistant to centralised structures or organisational systems that would impinge on the spontaneity of their fishing. Some conservationists, on the other hand, argue for government control of environmental management, basing this position in the principle that a strong government role is the only way to ensure security for ecosystems at risk, and to ensure that the public and concerned groups are consulted and involved in the process.

Diverse scenarios are typically associated with the respective management approaches. Different stakeholder groups in the marine area work to particular expectations about the relative effectiveness of different scenarios for management. For example, there is a considerable body of economic theory, largely terrestrial-based, that suggests the principle of private ownership of a resource will result in better and more efficient management. This model fails to acknowledge the difficulties of application to a marine "commons". The concept is that those with a direct economic interest, or the ability to take profit from the resource, will have the greatest incentive to care for it, and will manage it so as to ensure its ongoing viability into the future. Under this paradigm the role of government is to establish the broadest level of policy frameworks and then give private interests maximum operational independence to get on with the business of management. Some industry stakeholders display an automatic distrust of government intervention and the constraints that might be imposed to balance private interests with protecting the public good. There is a

common expectation that a stronger government role will result only in inefficiencies, cumbersome bureaucratic procedures and unnecessary costs and complications. No less strongly held and determinedly argued is the contrary body of opinion that public control is essential for sound management, for standards to be maintained, for transparency and accountability, and for the ongoing sustainability of the resources on behalf of all present and future users of the marine environment. The principle here is that a private management paradigm and the devolution of management responsibilities will encourage exploitation and a short-term focus, will inevitably result in the modification of natural ecosystems to maximise profitability, and will not be able to integrate or provide for other kinds of value. These arguments insist upon strong government control, and on mechanisms for input from the wider public to temper the particular interests of powerful stakeholders. These two fundamental approaches to managing a natural resource have tended to dominate the debates about fisheries management in New Zealand. They can be seen as opposite points on a spectrum – from full central Government control, through to private ownership and management of the resource where individuals, local communities or private agencies have responsibility for its ongoing sustainability. The debate between these basic frameworks for marine environmental management has thus far been largely a matter of perception and ideology. More work is needed on the actual effectiveness of different management approaches, and the actual environmental outcomes that have been achieved, in order to assess more clearly and reliably their benefits and limitations. More importantly, more attention is needed to alternative approaches that recognise the complexities of managing resources, for which some property rights are held, within a complex ecosystem "commons". The various stakeholders in the marine environment have many goals, constraints and priorities in common. However, the current adversarial positions taken by some of those stakeholders are both obscuring a clearer understanding of what those constraints and priorities are, and foreclosing on potential for working through the issues constructively. **The lack of a cohesive strategy for the management of the whole marine sector in New Zealand is a major constraint to advancing sustainable management.** It is not possible for a single



marine sector group (ie the fishing industry) to ultimately develop a management system that is ecologically sustainable. There will always be too many components of the whole system beyond the scope of their management capabilities and capacity to invest in any required research.

3.8.5 Local and national

There is also a continuum of approaches to management responsibility and decision-making in the geopolitical sense. This ranges from the small scale, local level (communities, residents' groups, hapū or whānau) through to the broader regional, national and international levels. It will be important to maintain a careful balance between the need for local level distinctiveness – the autonomy to accommodate the unique local character and requirements of each place and resource – and the need for appropriate degrees of consistency, equity and assurance of standards in environmental management throughout the country. Another factor that will be significant is the extent to which local or sector-group management systems will require support and guidance from government. There will often be issues of capacity, skills requirements and practical resourcing which may need to be constructively addressed in order for locally based management systems to function as envisaged and achieve their objectives. A salutary example here is the experience in New Zealand's schools, where ten years ago governance and policy responsibilities were devolved from central government to the school boards of trustees.

A recent Education Review Office assessment looking at ongoing problems with the system identified:

- the inflexibility of a 'one size fits all' model, which has stifled local identity and constrained the development of a range of management models; and
- the need for adequate support such as an advisory service for local boards as they grapple with the complexities of their role and responsibilities.³⁹

3.8.6 Accountability

At the heart of these debates are the crucial issues of accountability and reliability. **Regardless of which kind of management regime is being followed, and which group, agency or sector is undertaking it, there must be confidence that the system will do what it is intended to do.**

Accountability is an often delicate mix of a number of factors, including demonstrated effectiveness, communication, transparency of processes and systems, and openness to the concerns and priorities of other stakeholders and the wider public interest. A critical requirement is reliable, accessible, neutral information. This has often been lacking in the debates over fisheries management. The conventional means of establishing such basic evidence is an independent audit process. This should ideally be undertaken by an agency or individual with no vested interest in the management system or the outcomes of the process. Issues of the neutrality of research and data management have been an area of intense criticism in the discussions surrounding the Fisheries Act 1996 Amendment Act 1999.

The ability to demonstrate accountability has direct relevance for the debates over independence in management. A fundamental principle is that the burden of proof in regard to the effectiveness and reliability of a management system should lie with the operator or beneficiary of that system. It is argued that environmental sustainability can not be achieved:

...until the burden of proof is placed on exploiters of public marine resources to prove that they do not cause damage rather than simply assuming this to be the case until demonstrated otherwise. Similar commercial use of land resources requires extensive environmental impact studies and is carefully regulated. Continued monitoring is required, and all data are readily accessible to the public... In other contexts, particularly those involving human health and safety, we routinely place the burden of proof that the intervention will not cause damage on those hoping to exploit public resources... this legal burden of proof must be applied to our marine resources so that those hoping to exploit them must demonstrate no ecologically significant long-term changes.⁴⁰

There are practical opportunities to develop incentive systems where management independence is predicated upon the independent demonstration of environmentally sustainable practices, methods and planning. Such incentive systems, with clear management objectives, would need to be carefully developed through an open process of debate and consensus involving all the respective stakeholder groups in the

marine environment. Standards would need to be established both for environmental criteria and for evidence. In order to assure neutrality, auditing and monitoring mechanisms would need to be transparent and provided separately.

3.8.7 Monitoring and compliance

In the interviews conducted for this investigation, the issues of monitoring and compliance were raised in discussions with many interviewees across all groups and sectors. For many there was little to say, except – often with a shrug of the shoulders – that effective monitoring and compliance are virtually impossible for New Zealand’s marine and fisheries resources. It was widely felt among industry spokespersons, tangata whenua, government officials and the Navy that these fundamental aspects of management are beyond New Zealand’s current capacities. A number of factors were acknowledged, including:

- the sheer distances and vast geographical areas involved;
- weather and climate conditions, which can often be arduous;
- the lack of a clear lead responsibility amongst the various government agencies including regional government;
- the lack of appropriate vessel capacities and trained personnel to help monitor compliance; and
- logistics, costs and practical requirements.

There was also wide acceptance of the principle that the Government has the responsibility, whatever marine, coastal or fisheries management systems may be in place, to ensure that necessary monitoring and auditing requirements are met. This is a fundamental starting point for the Government to:

- work constructively for sustainable management;
- be able to protect the public interest in natural resources;
- ensure accountability in the expenditure of public funds on marine and fisheries management; and
- satisfy its obligations under the Treaty to tangata whenua as kaitiaki of natural taonga and places and resources of significance.

Monitoring and compliance with regard to non-fisheries marine environmental matters within the

territorial sea are primarily the responsibilities of regional councils. Land-based impacts, particularly on sensitive coastal and estuarine environments, require continual vigilance. Regional councils are addressing problems such as coastal sedimentation. For example, Environment Waikato monitors river sediment levels, soil erosion and the rates of harbour infilling, and is addressing the vulnerability of large estuarine bays to upstream land uses. A case study on sedimentation in the Whangamata Estuary on the Coromandel identified such issues as loss of open water, decreasing water depth, and increasing muddiness of sediments.⁴¹

At present, apart from exploratory drilling, the Maui A and B platforms are the only permanent offshore installations. Both are outside the territorial sea, and therefore environmental monitoring is the responsibility of the Maritime Safety Authority (MSA), (although the two associated pipelines to shore are within Regional Council jurisdiction). Annual site inspections are done by MSA, and in addition the Chief Petroleum Inspector (Department of Labour, Occupational Safety and Health) completes an environmental compliance checklist as part of his on-site safety inspection, carried out every two months. The security of the pipeline and the monitoring of the exclusion zone around the platforms is carried out by the owners, Shell BP Todd.

The Cook Strait cables have been surrounded by an exclusion zone (no fishing or anchoring) since 1906, but legal protection was increased for all cables and pipelines in 1996 by the passage of the Submarine Cables and Pipelines Protection Act. In recent years this has led to an increase in the number of prosecutions, particularly in the Cook Strait cable protection zone⁴².

For New Zealand’s fish and shellfish resources, the Ministry of Fisheries allocates approximately one-third of its total budget, its largest single budget item (over \$17 million for 1999/2000), to compliance work. This includes monitoring, detection of offences and illegal fishing activities, and education. A further budget of \$2.5 million is allocated for the prosecution of offences.

The Ministry of Health is responsible for the New Zealand Marine Biotxin Monitoring programme, regularly sampling and analysing shellfish, both commercial and non-commercial, for food safety.



Reviews of the monitoring and control of toxic shellfish poisoning have been commissioned. The Ministry allocates a budget of approximately \$1.5 million per annum for the programme.

It is important to acknowledge that there will be differences between requirements for monitoring and compliance in nearshore coastal environments, (where there are a range of fisher groups and interests, and a range of other activities that may be impacting on ecosystems), and in deepsea situations, (where there are few users of the environment other than commercial operators). Different monitoring and compliance frameworks will obviously be appropriate for commercial as opposed to non-commercial fishing activities.

3.8.8 Fisheries monitoring

For non-commercial in-shore fishing, a national network of honorary fisheries officers, working with Ministry of Fisheries staff, is primarily responsible for education, monitoring and enforcement. They ensure compliance with such requirements as closed areas, seasonal limitations, and bag limits. The honorary fisheries officer system, like the tangata kaitiaki systems recently formalised under the Māori customary fishing regulations (see section 3.4.2), involves members of the local community in the ongoing work of managing fishing. Honorary fisheries officers have extensive powers including powers of entry, questioning, arrest and seizure of property such as vessels and gear used in unlawful fishing.

Monitoring of deepsea fishing is currently undertaken using a combination of methods. Satellite technologies allow the continuous tracking of the positions and movements of fishing vessels, using transceivers feeding back data to the Ministry of Fisheries base in Wellington. Inspections of vessels and on-shore fish processing facilities are undertaken.

The Ministry also has a team of trained scientific observers (The Ministry of Fisheries Observer Programme) who are placed on board some fishing vessels to monitor activities and record information for some selected fisheries. The necessity for these independent and dedicated (ie not employed to do other jobs on the vessel) fisheries observers is illustrated in the following two examples.

In April 1996 there was a debate between the

fishing industry and DOC about whether “company observer” and “MFish observer” data on the number of New Zealand sealions killed in the southern squid fishery (off the Auckland Islands) could be amalgamated. Fishers argued that the amalgamation of data would give increased vessel coverage and therefore a better estimate of the number of sea lions killed. However, for the 1996 southern squid fishery, MFish observers were reporting a higher rate of sea lion kills (about three times more) than company staff. A statistician commissioned by DOC showed that: there was a 3 in 100 chance that the company and MFish data came from the same “population”.⁴³

The second example is the bycatch of Hector’s Dolphins off the Canterbury coast in July 1998. The Department of Conservation, working with fishing industry representatives and MFish, and employing independent fisheries observers, recorded six dolphins killed during 89 observed days of fishing. None were self-reported by fishers for the other fishing days for that year.⁴⁴

Under the QMS a complex monitoring system has been established for commercial fisheries based on record keeping returns and paper trails. Previous dockside monitoring systems were considered to be too costly and impractical; fisheries stations formerly located in small regional centres were closed; sea-based enforcement capability was cut back. The current system relies on honesty and focuses on auditing the detailed reports in fishers’ catch landing returns. This information is cross-checked with quota data and the returns of licensed fish receivers and processors. It has been argued that this record-based monitoring approach has been more effective than the previous systems, improving detection of illegal fishing activity by removing the need for a fisheries officer to be physically present when the offence is committed, whether out at sea or at the landing point. However, the emphasis on record keeping has meant far more intensive paperwork requirements both for the fishing industry and for the Ministry. Concerns have been expressed about the unwieldy complexity of the whole process:

...an independent review of the New Zealand QMS commissioned by the Canadian government concluded that the system appears to have been captured by the enormity

of the data entry required and the day to day operational requirements of the quota registry system, and, in fact, little actual monitoring [is done] of the quality and implications of the data received and processed.⁴⁵

Out at sea, New Zealand's long-range maritime patrol force of six Orion aircraft conducts surveillance over the EEZs of most of the South Pacific and some central Pacific states. The Navy also conducts sea patrols in the South Pacific, such as the voyage of the frigate Te Kaha in early 1999, intended as a deterrent to unsustainable fishing of Patagonian toothfish. The Navy noted the importance of direct observation of fishing activities, whether from an Orion or from a vessel, relative to remote monitoring by satellite tracking systems. It was felt that a physical presence is essential both for deterrent value and to provide adequate evidence for any prosecution that may follow.

The Navy has described itself as 'the front line of sovereignty', and as having a 'constabulary' role for New Zealand's ocean territories. There has been some reference to the potential for the Navy and the Air Force (with its Orions) – as agents of government regularly deployed in and across New Zealand's vast marine areas – to develop a stronger role in environmental and fisheries surveillance alongside their other defence and safety responsibilities. The 1998 Quigley Report to the Foreign Affairs, Defence and Trade Select Committee noted that:⁴⁶

Risk assessment places... illegal exploitation of, or threats to, New Zealand's offshore resources, ... marine pollution, ... and biosecurity alert ahead of war...

New Zealand is surrounded by an extensive area of sea and rich fishery resources which are envied by fishers from other countries. Poaching is an ever-present threat, and one that can grow. There can be little doubt that there will always be a need for the protection of our exclusive economic zone.

..the naval combat force is seldom used for fisheries patrol, is over equipped for that role, but is under-equipped for serious warfare. None of the navy's ships is ice strengthened, weakening New Zealand's capacity to protect interests to the south. These include not only the fishery in the Southern Ocean, but also the stewardship obligations in respect of the.... Antarctic Treaty.

Given such general acknowledgement of the importance of marine monitoring, and the Government's ongoing investment in maintaining a defence presence in New Zealand's EEZ (\$100 million per annum for the Orions alone), it could be useful for more detailed work to be undertaken to assess the practical opportunities for more fully utilising the operational capacities and expertise of the defence forces to support environmental management. It will be important also to identify fundamental constraints, as well as the efficiencies that might be gained.

3.8.9 Compliance

As has been noted elsewhere in this report, issues of trust between the various agencies and stakeholders in the marine environment are fundamental to the development of more effective management systems. To establish compliance with the legislation and regulations, transparency and reliability of reporting is crucial.

Not surprisingly, specific information about discrepancies in reporting and dishonest activities is often not easily available, unless such evidence has been gathered for the prosecution of fisheries offences. There have been a number of large scale quota fraud cases, such as the notorious Operation Roundup case that uncovered a complex conspiracy over several years to misdeclare nearly a million dollars' worth of illegally taken orange roughy (or not declare it at all). Such major fraud cases are evidence of the ease with which fishing operators and processors might "co-operate in falsifying documents in a consistent manner to circumvent the checks and balances in such a document intensive system".⁴⁷

Although understandably there is circumspection about the details of unlawful fishing activity, there is relatively open informal acknowledgement of discrepancies of various kinds. For example, at a recent fishing industry conference, there was mention of such matters as multiple record keeping. Stories are told of crayfishers officially reporting 100 craypots for the Ministry audit, but in actual fact keeping as many as 140 pots. Other stories tell of fishers keeping more than one fishing logbook and strategically 'compiling' their statistical returns. Large discrepancies are found between the data gathered at sea by official fisheries observers and the returns lodged by fishing company staff; such differences have been particularly significant in



the data provided on bycatch of marine mammals such as sea lions and Hector's dolphins.⁴⁸ (See Vista 8 Bird and marine mammal by catch).

There is a high degree of error in the data returns received by the Ministry. 'Data grooming' can be an extensive process, sifting through the records and removing obvious errors before the dataset can be analysed.

The complexities of the administrative and recording procedures established under the QMS, and the various amendments and exceptions to these processes, only increase the general opacity of the system and the difficulties of monitoring. The Byzantine levels of complexity in the fisheries regime (with over 4000 regulations and new ones being established regularly) have proliferated with the best intentions – to refine and tighten processes to deal with problems such as bycatch or target fish taken in excess of quota. However, the complexities of the system can further obscure the situation and can provide opportunities for discrepancies (whether deliberate or not) to slip through. Such procedural obfuscations include:

- the deemed value payments system for fish caught without quota;
- quota balancing systems to accommodate 'overs and unders';
- issues with the management, recording and fishing rights for non-QMS species;
- the restructuring of government agencies in the mid-1990s, particularly the separation of the Ministry of Fisheries from the former Ministry of Agriculture and Fisheries; and
- the systemic developments within the industry, including quota trading and leasing, and vertical integration of fishing and processing companies.

It is imperative to find ways of addressing the issues of trust so crucial to the advancement of sustainable management. Questions of adequate and transparent systems for monitoring and compliance will need to be given due attention in order to overcome the critically damaging perceptions of the fishing industry as 'cowboys on boats'. The effectiveness of current systems will need to be carefully assessed.

The principal effect of the various administrative systems, and now statutory amendments to the Act, has been to allow fishermen to avoid the ultimate point of a QMS, namely to limit the quantity of fish taken to the quantity of quota held.⁴⁹

17 COMPLIANCE AND COMMUNITIES

A common perception expressed by many people interviewed for this investigation was that intensive pressures on recreational fishing resources, particularly around Auckland, were being caused by the harvesting undertaken by immigrant communities. There were widespread assumptions that such groups have little understanding of the ecology of New Zealand coastal environments, of the need for sustainability in harvesting, or of the provisions of the fishery regulations.

The Ministry of Fisheries and its predecessor department MAF Fisheries have attempted to address these issues proactively with consultation and education programmes with Chinese, Vietnamese, Laotian, Cambodian and Pacific Island communities in the greater Auckland area, in order to develop mutual understanding. The principle is that the support of the communities is essential for any compliance regime to be enforceable. Initiatives include meetings with Asian and Pacific Island clubs and leaders, articles in the communities' newsletters, campaigns on Pacific Island radio stations, and using bilingual compliance staff to patrol the popular beaches and explain bag limits.

3.8.10 Participation and communication

An essential factor in improving management and building more environmentally reliable systems is the participation of all stakeholders. Consultation and involvement of interested and affected parties must be meaningful, appropriate, and adequate. There are particular aspects with the participation of tangata whenua in management and policy processes for the natural taonga for which they have kaitiaki responsibilities.⁵⁰ At present there is not good participation and communication amongst the various groups and interests in marine and fisheries management. While some fishing industry groups and collective quota holder organisations are beginning to develop co-operative management approaches, the wider marine environmental arena is characterised by sharp divisions between the different sectors, entrenched positions, profound distrust and cynicism, and a typically adversarial, combative approach towards other interest groups. The debates surrounding fisheries and marine management issues often become heated. The process itself – the details of bureaucratic procedures, committees, access to information, inclusion or exclusion from decision-making – often dominates. People become caught up in

process matters, and lose sight of the bigger picture and the overall environmental outcomes. Much of the debate is developed from the absolute positions established by the respective parties, standpoints of principle from where there may be little or no prospect of negotiation or compromise. These ‘high grounds’ can be both refuge and handicap for the contending stakeholder groups. However, the range of options becomes severely limited. Locked into positions that must be defended, little attention can be given to developing innovative approaches to advance both economic and environmental sustainability. The two dominant stakeholders in marine environmental management to date have been the fishing industry and the Government. In the annual processes for determining TACs and TACCs, commercial sector representatives invariably outnumber other stakeholder groups’ representatives, such as conservation advocates or researchers.

develop more trust and communication across all sectors and stakeholders in the marine environment. A number of factors will be critical:

- breaking down the assumptions commonly made by each group about each other;
- establishing a neutral, risk-free territory where different groups can engage in debate, challenge assumptions, and improve understanding of each other’s perspectives and priorities;
- distinguishing between perceptions and realities;
- recognising shared needs and common goals in marine environmental management, and exploring mechanisms for combined initiatives to address them;
- establishing appropriately neutral auditing processes and independent monitoring systems;
- improving the accessibility of necessary information; and
- addressing issues of resourcing and equity.

Table 3.1 Participation of stakeholders in Fisheries Act processes.

Affiliation	Parties to annual cost recovery consultation process % of the 33 approved parties	Attendance at stock assessment meetings % of the 94 attendees. ⁵¹
Ministry of Fisheries	Not an approved party	12
NIWA	Not an approved party	39
Commercial fishers	61	38
Māori	15	7
Recreational	12	3
Environmental	12	1

Resourcing issues are unavoidable. Commercial sector representatives and government officials are funded to participate in what can often be extended sessions. Travel to meetings and other costs are met. Participation is not necessarily an easy matter for representatives of tangata whenua, the recreational sector and conservation groups. There can also be capacity issues in terms of the expertise required in scientific, technological, economics and legal areas, and in regard to the range of values and rights of various stakeholders. Inequities between different participants are perhaps not easy to address, but can often contribute to difficulties in communication and understanding. Many of those interviewed for this investigation believed that it is essential to

18 COMMUNITY-BASED APPROACHES TO MANAGEMENT

Community-based management (also known as co-operative management or co-management) is a generic term describing formal or informal arrangements, between groups or communities of fishers and other stakeholders and the various levels of government responsible for the management and protection of fisheries and the marine environment. (Ostrom 1990, White et al 1994).

Community-based management is grounded in a belief that management will be more effective and become sustainable if all individuals and groups that have an interest in the resource or ecosystem participate in the development and implementation of



policy. This management approach is not the same as a property rights regime such as the QMS. Fundamental differences in ideological terms and theoretical foundations exist. To ignore these distinctions is to discount the potential of community-based management to redress some of the problems plaguing conventional systems of fisheries management.

A broadly participatory management model allows those who have a stake in the resource or natural system to incorporate their knowledge, experience and visions into the policy development process, as may be appropriate and agreed. Local or traditional ecological knowledge can assist in science-based decision making where data are scarce or incomplete. This information also provides rapid feedback regarding the ecological effects of management decisions and allows an iterative management approach to develop. Equitable and legitimate participation in the process ensures individual commitment and belief in the system. The incentive shifts from maximising individual gains, to maximising communal returns. Time scales for returns lengthen to allow greater recognition of the links between economic systems and ecological systems.

The structure of the regime, and the nature and degree to which management responsibilities are evenly shared between players, are contextual. The dynamics and characteristics of an effective community-based system necessarily reflect the ecological, social, political, cultural and economic conditions within which it is based. The role and experience of tangata whenua as kaitiaki for marine and coastal taonga will be fundamental to the development of effective systems.

There are numerous operative examples of community-based management worldwide. There is strong potential with this model to: "promote conservation and enhancement of fish stocks, improve the quality of data and data analysis, reduce excessive investment by fishermen in competitive gear, make allocation of fishing opportunities more equitable, promote community economic development, and reduce the conflict between government, fishermen and fishermen's groups" (Pinkerton & Weinstein 1995). Nevertheless, community-based management is not necessarily a panacea. It cannot be applied in the same way in all situations or under all conditions. Nor can it be romanticised; some community-based initiatives can be and have been environmentally damaging. The nature, limitations and preconditions of community-based management must be recognised and accommodated as such systems are developed.

The myriad problems facing fisheries, and marine management in general, require innovation and creativity. Community-based management offers a practical way to overcome entrenched positions and deadlocks and to move towards sustainability in a collaborative, cooperative fashion.

19 CHAOS AT SEA – The possible application of Chaos theory to Fisheries management

The challenge: can single-species management ensure sustainability?

The majority of the world's oceans have reached or surpassed what are believed to be sustainable yields. Nearly 70% of the world's fish species are overfished, fully-exploited or depleted (FAO 1999). Global catch is only being sustained by increased fishing at lower and lower trophic levels (Pauly et al. 1998) and at a higher cost per unit of catch.

It has long been understood that sustaining fisheries and reversing declines will require the development and implementation of paradigms that regard fish populations as fundamental elements of an ecosystem. In 1871, the Chairman of the U.S. Commission of Fish and Fisheries (created to reverse the decline of New England's fisheries) recognised that our knowledge of fish:

"...would not be complete without a thorough knowledge of their associates in the sea, especially of such as prey upon them or constitute their food..." (Baird, S. as cited in NMFS 1999).

Currently, the foundation of fisheries science is analysis of the stock-recruit relationship and the stock-assessment model. The model's objective is determination of the maximum sustained yield (MSY) a fishery can support while allowing surplus production to be captured. Central questions revolve around acceptable levels of fishing effort and the number of fish that can be removed. While the single-species approach is undoubtedly valuable, there is a growing recognition that it may not be enough to ensure sustainability in a broader sense (NMFS 1999).

There is an evolving standpoint that views the nature of fisheries and marine ecosystems as diverse, complex and dynamic. Contextual factors, feedback loops and system parameters it is argued, should play a central role in management and research paradigms. According to some scientists, failure to do so is a risk to fish stocks and the ecological and economic systems that depend on them.

Evolving ways of thinking and doing

Internationally these concerns coupled with a growing awareness that “overfishing is the most commonly observed result of fishery development” (NMFS 1999) have given rise to debate about the existing paradigms that guide marine management and fisheries science. The belief that present approaches to science and management need refinement, development, and/or evolution stems from a growing recognition that knowledge of marine ecosystems is limited and is characterised by high levels of scientific uncertainty.

“The biological processes underlying the size of fish populations and associated species are often highly variable both spatially and temporally. This contributes to the uncertainty of stock assessments and increases the risk both to fish stocks and to the fisheries stakeholders. Fisheries science must often deal with many uncertainties and variabilities” (NIWA 1996).

According to the United States National Marine Fisheries Service (1999), stock-assessment uncertainty is just one of several areas of imprecision that should concern the fisheries manager. Uncertainty regarding the effects of fishing on the ecosystem is high and generally not characterised, as is uncertainty regarding ecological relationships and ecosystem structure and function.

To some degree this uncertainty is quantified in existing models and regimes via the incorporation of stochastic variables (i.e. random variability) and setting of precautionary fish quotas. Nevertheless, there are some who say this is not enough.

“We all know that the traditional single-species approach to fisheries management is tractable, but we also know that it may not be sufficient” (NMFS 1999).

“We must discover the factors behind the rhythms of the sea. We need to learn the broader truths about predator-prey interactions, about environmental shifts, meteorological phenomena, food competition in the ecosystem” O’Malley (1998).

“This raises the important question of how deep and how wide researchers must cast their nets” (Van Ginkel 1998).

The interest in new, multidisciplinary approaches to marine management is growing (Sherman 1995 as cited in NIWA 1996). Emerging sciences such as chaos, complexity or ecosystem modelling investigate the behaviour of entire systems rather than individual parts in isolation. Of relevance to this discussion, chaos theorists argue that the limitations of existing

models and systems must be made explicit.

Sustainability requires that managers commit to developing and implementing research programmes, monitoring regimes, and models that will fill these critical gaps.

The application of chaos theory to fisheries management: linear vs. non-linear views of the natural world

Natural systems can be seen as either driven by a set of linear relationships or as driven by a set of non-linear, interconnected patterns. The linear view defines population dynamics and ecosystems as balanced, exhibiting periodic order and being in a dynamic equilibrium. Populations are seen to stay relatively constant or to vary with some measure of predictability around an established equilibrium point.

By contrast, chaos theory (i.e. the non-linear view) suggests that natural systems do not tend towards equilibrium states. Populations and ecosystems are believed to vary erratically yet within limits, that is within the parameters of a natural system. Change is difficult to distinguish from randomness and is unpredictable. Chaotic systems are highly susceptible to incipient conditions and “no input or output can be pre-judged to be ‘irrelevant’ or ‘trivial’...” (Smith, M.E 1990). As perturbations move through a system, their significance grow, as does their ability to significantly alter events or the characteristic of the system.

Whether one views natural systems as the sum of their parts or whether they are viewed as synergistic, the whole greater than the sum of the parts, is fundamental. Dr. George Sugihara, a scientist at Scripps Institute of Oceanography at the University of California-San Diego summarises the elemental tension well, “Someone with a standard view would say that all the stuff I can’t explain is noise. The non-linear view is, maybe I can get something out of that. Noise is not an objective thing it’s a statement of our own ignorance” (Cited in Schleifstein, M. 1997).

Modern Management Systems and Chaos

Mismanagement of fisheries is often traced to a lack of effective controls, and the power of politics and economics to override scientific advice about species and long-term sustainability. Chaos theory suggests that collapse and mismanagement may also be a function of the incompatibility between existing management paradigms and the fundamental nature of marine ecosystems. Linear analysis tends to suggest that one can isolate significant system components, identify appropriate inputs and therefore predict outputs (Smith, M.E. 1996). As a result of this focus, policies are



inherently numerical and may not necessarily reflect or accommodate the chaotic nature and parameters of natural systems. While existing management systems strive to control or limit fishing mortality to 'acceptable' ecological bounds, chaos theory argues that sustainability would be better served if managers and scientists considered a wider systems context when developing policy (Wilson et al, 1994).

Chaos in Context

A chaotic approach to research and management is iterative, addressing the broad parameters that define and influence a given system. Take for example a study carried out by Dr. Sugihara from Scripps Institute investigating spawning behaviour of the damselfish off the Great Barrier Reef. The study showed that successive shifts in the population of new fish were caused in part by a single environmental factor: wind speed. Preliminary analysis of the model illustrated that wind speed accounted for 64% of the fluctuations; the analytical methodology used in most fish stock assessments was able to account for only 5% (Reported in Schleifstein, M. 1997).

In another example, scientists at the University of Maine's Chaos Project developed a model that would allow them to study fish stocks in the Gulf of Maine based on chaos theory. The work carried out between 1989-1991 supported the view that fish stocks fluctuate chaotically but within the ecological parameters delineated by the model (Wilson et al 1991a, 199b).

Fisheries Thrive in the Wake of Chaos — Managing for Chaos

Chaos theory contends that the unpredictable variation that drives chaotic systems occurs within boundaries determined by the parameters of the system.

A different way of managing fisheries is proposed for examination. Rather than focussing on acceptable abundance levels for individual species, management should focus on the qualitatively predictable behaviour of chaotic systems – the fact that they tend to vary within bounds and exhibit typical patterns. It is maintained that order is found in the relative stability of the system parameters (Wilson et al. 1994).

Parameters that require consideration include the following:

- factors governing life cycles;
- determinants of individual growth rates;
- interrelationships between species;
- critical habitat;
- influence of abiotic elements.

Policies would focus on regulating the how, where,

when and what to fish, while ensuring that biological processes, and ecosystem structure and function are preserved (Wilson et al. 1994). Chaos theory suggests that if critical parameters are left undisturbed, a natural system is likely to remain within a normal range of variation. The information required to achieve this end is on a much broader spatial and temporal scale: ranging from the very large (i.e. size distribution of a species), to the very fine (i.e. spawning area). It is likely that sources of this information will span the continuum from quantitative (scientific surveys) to qualitative (local/traditional ecological knowledge).

Conclusion

New Zealand's approaches to marine management have been described as innovative; our fisheries some of the 'best managed in the world'. Living up to these claims requires that New Zealand's system of fisheries management remains cutting edge. Consideration of alternative theories and models will help ensure that New Zealand decision makers continue to ask the right questions, make informed assumptions, collect appropriate information and develop effective management systems. In achieving goals for sustainability, there is scope for us in New Zealand to learn, to adapt, and to refine existing science and management paradigms.

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- ¹⁴ Refer to Commentary to the Resource Management (Marine Farming and Heritage Provisions) Amendment Bill as reported to the House of Representatives from the Transport and Environment Committee.
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4 Rights and Responsibilities

4.1 Introduction

The wide diversity of people and groups with interests in the marine environment has resulted in often intensive debate about rights. People argue for and about rights to harvest marine resources, rights guaranteed to tangata whenua under the Treaty of Waitangi, citizens' rights to participate meaningfully in decision-making that affects the marine environment and to make decisions affecting their own lives, the rights of future generations, and the intrinsic rights of the environment and its components.

There are significant fundamental differences between various kinds of rights and their ethical, social, cultural, historical and statutory basis. Some rights are established in law; others have moral force. In some cases, people assert rights that are not specifically recognised in law; the assertions reflect what some believe should be their rights.¹ This chapter will explore some of these issues and their implications for sustainable management of the marine environment.

4.1.1 The nature of rights

Rights exist in various forms, from formal to informal, and strong to weak. They may provide for access, withdrawal of resources, management, and exclusion. The way rights are characterised determines the rights holders' ability to pursue their own objectives within that right. The principal concerns of rights holders include issues of exclusivity, transferability, enforceability and flexibility. However, in an ocean commons, exclusivity and enforcement of some rights may be extremely difficult to achieve.

At one end of the spectrum of rights are property rights – strong rights since they have the protection of the law and are therefore enforceable in the Courts. At the other end of the spectrum are the broader expectations of people of their rights as citizens and of what is due to them under the generally accepted frameworks of human rights at the end of the 20th century – for example, the expectations of all New Zealanders that they have the right to a clean and healthy marine environment. These broader concepts of rights may not have specific statutory recognition, and thus can be difficult to enforce.

Inherent in owning property are the rights to control it, have exclusive possession and enjoyment of it in perpetuity, to transfer it and to

use it. However, the right to use property has long been subject to the caveat that that use must not injure others or the property of others.²

In the marine context, many people have or assert rights of some sort. Whilst there are many types of right, the most pressing issues for sustainability derive from the allocation of particular rights to certain users to extract resources – principally fish – from the marine environment.

4.1.2 Issuing rights within a commons

As a common property resource within which there are various wild creatures and materials that private interests have rights to harvest or exploit, the marine environment is inevitably a site for tension between the interests of all New Zealanders in the commons and the exercising of the private interest. The implications for marine environmental sustainability need to be addressed within the wider context of debate over private interests and the public good:

Fisheries within the EEZ are seen as a 'common property' resource, which means the Government has an important role balancing the competing demands of various user groups while ensuring stocks are not over-fished.³

The principle established by Hardin's concept of the 'tragedy of the commons' is that, given limited common resources and a number of parties with interests in those resources, it is only in each user's best interests to exploit their opportunities to profit from the resource as ruthlessly and rapidly as possible, since restraint only gives an advantage to their competitors.

The perception that common property regimes give rise to a range of social, economic and ecological problems has been embodied in Western culture for over two thousand years. In the words of Aristotle, "that which is common to the greatest number has the least care bestowed upon it".⁴ From the late 18th century enclosures of the British common lands that had supported local communities since the Middle Ages, to the implementation of the New Zealand QMS in the late 20th century, this theory of the commons has had a significant influence on debates over resource use and has guided the evolution of management theories and models:

The rational herdsman concludes that the only sensible course for him to pursue is to add another animal to the herd. And another, and



another.... but this is the conclusion reached by every rational herdsman sharing the commons. Therein lies the tragedy. Each man is locked into a system that compels him to increase his herd without limit... Freedom in the commons brings ruin for all.⁵

Fisheries economists have applied Hardin's ideas to fish stocks and the marine environment. They have refined the concept, arguing that there are limits even to the tragedy of the commons. Fisheries are believed to contain an equilibrium point where "the individual's marginal gain in adding one more animal to the herd is no longer greater than the marginal costs".⁶ Unfortunately, this equilibrium point can often be well beyond the point of the maximum sustainable yield (MSY).

At international law, New Zealand has a right to make laws applying in its territorial sea; however, such a right is to be exercised subject to the United Nations Convention on the Law of the Sea 1982 and other rules of international law (see section 3.2 and appendix 6). Beyond the territorial sea to the outer limit of the EEZ, New Zealand has economic rights in respect of the fishing and non-living resources of the zone, and jurisdiction to protect the marine environment from pollution. The sea within New Zealand's territorial sea and EEZ is the part of the ocean commons over which New Zealand may establish management regimes and grant rights of access to resources.

The international community agreed to the extension of coastal state jurisdiction to 200 nautical miles to address the problems of open access inherent in common property resources.⁷ Lack of co-operation at the international level had meant that high seas fisheries resources had been over-exploited. Extension of the EEZ brought those parts of the high seas with the richest living resources within the jurisdiction of coastal states.⁸

The Government allocates permits authorising the extraction of minerals from the seabed within its jurisdiction. It also allocates permits authorising fishing and quotas, which entitle the holders to fish commercially and to take particular species up to the amount of the quota.

4.1.3 Rights and sustainability

There are a number of assumptions inherent in the assignment of resource property rights to an

individual or business entity. The underlying paradigms have had marked influence on the evolution of fisheries management systems in New Zealand. They include the belief that clearly defined property rights will lead to sustainability, based in the assumption that having a property right will lead to a long-term interest. Another assumption is that, within such property rights frameworks, sustainability can be achieved by focusing on a few target species and thus working with the system on a species-by-species basis. There is also often the expectation that defining property rights will lead to effective collaboration between rights holders for different species and resources. Another common assumption is the political belief that clearer property rights regimes will reduce the costs and risks to the state arising from the utilisation of the resource. In short, if you have a right over it, you will cherish it and will accept responsibility for sustaining it and for paying or at least contributing to costs of managing for that sustainability.

Although the lack of clear rights in resources may lead to some difficulties in setting up systems and structures for their sustainable management, there is ample evidence from land and forest management experience world wide that the existence of property rights to natural resources does not guarantee that they will be managed in a way that ensures the resources are sustained in the long term. Over the last 50 years New Zealand, in common with many countries, has focused increasingly on the sustainability of land uses. The initial emphasis was on soil erosion, and much progress was made through a range of legislative and intervention measures. Yet, despite major effort and investment, the sustainability of land use has remained a major concern. The urgency is evidenced by the establishment in 1995/96 of the National Science Strategy for Sustainable Land Management and the Sustainable Management Fund to facilitate action to improve land management and thus the ecological health of agricultural and forestry ecosystems.

Despite such initiatives, despite the science, despite the improvements in land use management practices, and despite clear property rights systems, New Zealand's land resources are still under threat. Why? One fundamental reason is that most land-based products do not yield prices in world markets that reflect their true cost of production. Many of the environmental costs

(eg soil loss) are simply not integrated into the production costs in the overall prices established for the goods. The market determination of product price recognises only a limited range of inputs, and allocates any scarce resources for maximum return over the shorter term, not the long term. The broader environmental, social and cultural effects, including cumulative effects and future effects, are beyond most market responses. Furthermore, there are a plethora of other factors apart from product prices that affect the profitability of commercial fishing (capital, infrastructure, processing, labour, research, etc). Many of these are governed by values and systems that do not accommodate ecological realities. As Paul Hawken notes, “the continuity of the human experiment depends on more than the short term, and efficiently allocating scarce resources does not embrace everything people need or want to do. The right spouse is a scarce resource, but is rarely to be found by auction”.⁹

For the current debate about property rights in the marine environment, there are powerful and sobering lessons in the experiences of New Zealand’s land management. Even within a regime of clear property rights, in a mature sector with long-established legislative and knowledge bases, an arena that has for many decades had extensive central and local government investment in monitoring and researching the health of land resources and the impacts of use, land owners and users often cannot develop or maintain a business that ensures they can sustain the resource on which they depend – the land itself.

Rights holders such as fishers are under similar pressures to land users – fish product prices do not truly reflect ecological cost and value. In addition fishers are extracting resources from ecosystems that are poorly understood compared with terrestrial systems, from environments in which there are relatively low levels of research and monitoring by the Government.

A commercial property rights framework and the sustainable utilisation of resources such as fisheries are not fundamentally incompatible. However, the ownership of rights of access to a resource is clearly only one part of a much bigger and more complex equation. Sustainability will depend on the integration of a wide range of factors:

- the value of returns;
- the full costs of production;
- ensuring all rights holders are constructively

- aligned in the objective of sustainability; and
- ensuring that appropriate resources are applied to the necessary tasks.

4.2 Fishing rights

4.2.1 Commercial

For this investigation, a number of people consulted from management and policy areas in fishing based their approach to their business firmly in a property rights framework. Given the reliance of the fishing industry on extensive access to a public resource, an acute consciousness of rights is perhaps not unexpected. Nor should it be surprising that the industry characteristically focuses on one particular kind of right – individual property rights deriving from the objective of commercial utilisation of the resource.

The QMS provides fishing industry stakeholders with an ongoing right of access to the marine environment, a right to extract from the resource, which is not the same as an ownership right to the resource itself. In practice however such distinctions often become blurred. Often the assumptions, planning and activities of quota holders can seem to other stakeholders to be predicated upon a concept of ownership of the resource itself, a pattern which is perhaps encouraged and entrenched by the permanence of the quota right allocated “in perpetuity”.

Individual transferable quota is clothed, as it were, with the attributes of property by s27 of the 1996 Fisheries Act. The statutorily defined “characteristics” of individual transferable quota are, amongst other things, that it... “perpetually generates a right to receive an annual catch entitlement for that stock”, and that it may be traded, secured, and caveated in any manner permitted by the Act. Compared to the very limited rights of tradability permitted, say, for water permits under the Resource Management Act 1991, fisheries quotas are fairly freely tradable. The legislation goes out of its way not only to ensure that quota undoubtedly is “property”... but also to equate such property rights with registrable interests in real property.

...At common law there is no property in ocean fish – fish are unowned until caught. In fact it is... the act of catching a fish or whale which creates the property right.¹⁰



Private interests in wild pelagic species are currently different from most interests on land. A fisher provides no services or input to production, such as contributing to the growth or enhancement of a fish population, but simply has a constraint imposed on the harvest of the wild population (the TACC). (The exception to this is of course scallops and other shellfish, where harvesters through catching and redistributing spat are able to enhance future stocks.) The output constraint of the TACC is only one of many inputs to commercial decisions by parties with an interest, and only addresses one aspect of a hugely complex ecosystem in constant flux.

There are critical elements of uncertainty inherent in a quota right – it establishes the right to catch fish, which is not the same as owning fish. The difference in value between quota and actual fish caught is a reflection of that uncertainty, and derives from a complex mix of factors including:

- the ability to catch, which may be dependent on equipment, operational efficiency, weather or other practical factors,
- the activities and impacts of other extractors (whether rights holders or not),
- the condition of the target species populations, and
- the condition of the marine environment within which the target species exists and on which it depends.

One viewpoint on these issues is that the more permanent a private property right, the more likely are fishers to invest in equipment that maximises the quality of the species extracted. Permanence would also allow the rights holder to enhance the fishery.¹¹ There is demonstrable evidence of this behaviour within two well-known examples, the rock lobster and Nelson scallop fisheries. However, such behaviour has not occurred to the same extent in other fisheries, such as the Foveaux Strait oyster fishery, or the paua fisheries.

20 BYCATCH AND DISCARDS

Bycatch, which can be defined as unintentional or incidental catch incurred during fishing activities, is due to the fact that most fishing gear and practices are not perfectly selective for target species. Bycatch is also a consequence of overlap in the range and distribution of target fish species and seabirds, seals, sea lions, invertebrates or other fish species, some of

which may be targeted in another fishery. Fishing operations may either retain and process non-target fish species or may discard them for economic or legal reasons.

Target species may be considered unmarketable, thus discards, if they are damaged by fishing gear (for example, blood spots), or are the wrong size, sex (for example a male fish in a roe fishery) or part of the animal (for example the body of a shark in fin fisheries). Unmarketable bycatch generally is discarded except where regulations prohibit it or it is processed for meal and oil.

Discards can be defined as the portion of the targeted catch that is caught but not retained. Discards can occur for a number of different reasons. These include:

- economic discards—the portion of the catch that is not of economic value and therefore not “rational” to retain;
- regulatory discards—the portion of the catch that regulation prohibits retaining;
- high-grade discards—the portion of the catch that is discarded because it is of lower value than the rest of the catch and total catch limits exist. High-grading can be viewed as a form of market-induced regulatory discard.

The issue of bycatch and discards has been one of ecological, economic and social concern for some time. The practice has been criticised for its wastefulness as what is thrown overboard or converted to fishmeal may in fact represent the loss of potentially significant sources of protein or food for direct human consumption. Bycatch and discards may also put non-fish populations at risk (for example, albatross bycatch) and may threaten the viability of commercially-valuable fish species (for example, removal of undersized juveniles) or segments of the marine ecosystem (for example, irreversible loss of biodiversity or links in the food web).

Mortality related to bycatch and discards can result in significant population decline and may result in ecological changes in community structure and ecosystem dynamics (Alverson et al. 1994 as cited in NMFS 1999). Bycatch and discard levels can be reduced by modifying fishing gear or techniques to increase selectivity, improving the targeting of single species, and/or establishing no-take zones in areas that have high levels of bycatch.

The FAO global estimate of bycatch and discards (Alverson et al. 1994) ranges from 17.9 million to 39.5 million tonnes. A recent revision of this figure suggests that bycatch and discards are roughly equivalent to 25% of the reported global marine catch (FAO 1999).

Generally speaking, accurate measures of total bycatch and discards in New Zealand fisheries are lacking. In the absence of figures, one arguably can assume similar percentages.

A recent estimate of discards in select New Zealand fisheries was published by Clark et al., (1998). This study focussed on hoki, southern blue whiting, oreo and orange roughy, species that collectively account for some 60% of New Zealand's total commercial catch. The discard levels reported for these fisheries (0.8% to 6.5%) are relatively low compared to the estimated world average. Scientists attribute these lower rates to the fact that the fisheries involved largely target aggregations of fish.

By way of contrast, in a recent Ministry of Fisheries report (Ministry of Fisheries, 1999) trawlers in Spirits Bay recorded more bycatch than the snapper and trevally they were fishing for. Bycatch and discards of trevally varied between 41% and 510% of the total trevally catch, i.e. in some years bycatch and discards were up to five times more than what was landed. Non-target species bycatch, including both commercial and non-commercial species, varied between 356% and 145% by weight of the landed catch. In the case of trawling or dredging, none of these estimates includes damage or mortality that results when smaller individuals or species are forced through the meshes of nets or dredges, or crushed between the fishing gear and the seabed during fishing.

In conclusion, management of the effects of total removals is central to maintaining viable ecosystems and sustainable fisheries. In order to meet these objectives, determinations of bycatch and discard levels for all commercially targeted species, as well as for the hundreds of non-commercial species of fish, crustaceans, squid, echinoderms, sponges, corals, that are caught but about which virtually nothing is known, will be required (NIWA 1996). The time series

measurements of population sizes of key species will also be critical. Where bycatch and discard data already exist, they should be integrated into assessments of affected stocks.

21 THE BLUFF OYSTER STORY – WHERE DID WE GO WRONG?

The Bluff oyster is a glorious New Zealand tradition. It is one of our oldest commercial fisheries, but despite technological advancements and intensive management, the industry is now struggling to survive. Over the decades, the incentive for maximising harvest has come from the need for fishers to earn a living and also from competition between boats for a limited, and lately, a declining resource.

From the late 1880's to 1962 the fishery was managed by limiting the number of vessels licensed to fish. Vessel numbers ranged between 5 and 12 and annual catches ranged between 20,000 and 100,000 sacks with a generally upward trend through this period.

In 1962 the fishery was delicensed and an annual catch limit set of 170,000 sacks. The number of vessels increased from a previous maximum of 12 in 1962 to around 20 by 1969. In 1968 the catch limit was reduced and in 1969 the fishery was relicensed for 23 vessels. The catch limit remained at 115,000 sacks between 1979 and 1986 but increased sack sizes used by the industry from 1979 onwards may have reduced the effectiveness of a static oyster catch limit.

Fishers responded to the declining catch rate in the late 1960's by developing a heavier and more efficient dredge in 1968. The whole fleet had adopted this dredge by 1974. Catch rates rose to a peak in 1978 and then began declining again. In 1986 the fishery was closed early as the oyster population was discovered to be infected by the parasite *Bonamia*.

Table 4.1 Spirits Bay trawl fisheries bycatch and discard statistics

	1995-96 catch (tonnes)	1996-97 catch (tonnes)	1997-98 catch (tonnes)	Total (tonnes)
Snapper	131.4	51.5	26.2	209.1
Trevally	3.9	10.4	49.0	63.3
Target species total	135.3	61.9	75.2	272.4
Bycatch and discards associated with snapper fishing	199.7	111.7	93.6	405.0
Bycatch and discards associated with trevally fishing	33.8	50.6	109.0	183.4
Bycatch total	233.5	162.3	192.6	588.4



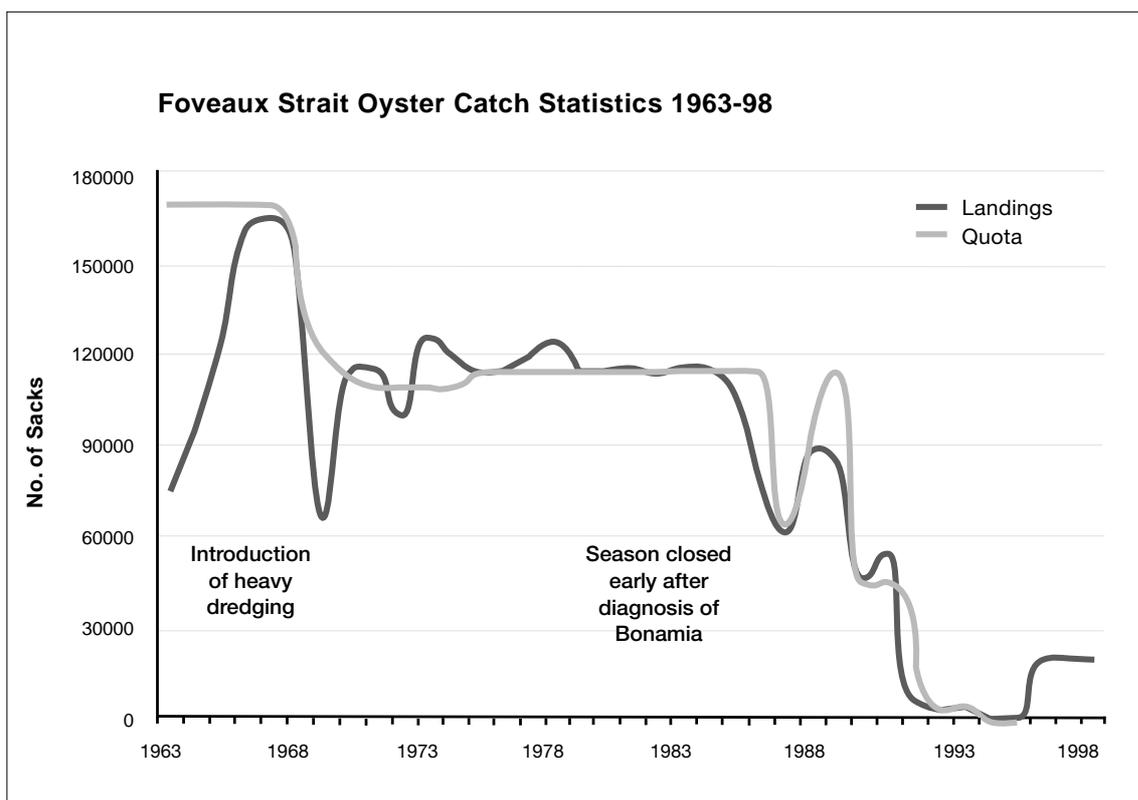
Subsequent mortality was reflected in the catch rate which continued to plummet until the fishery was closed in 1993. It has been suggested that population crash in 1963 could also have been caused by Bonamia, although this is unconfirmed (Hine, 1995). From 1986 the catch limit was progressively reduced (though not without attempts to raise it again in 1989), until in 1992 it was set at 18,400 sacks, of which only 5,820 sacks were caught. There was no commercial harvest in 1993-95 and in the years since, the catch limit has been set at around 19,000 sacks, and the industry has established an enhancement programme to assist in population recovery in the worst affected areas (Street & Stead, 1998).

Nobody can predict the onset of disease, but habitat destruction from heavy dredging, the catch limit and quota allocation systems did not provide this industry with the means to respond to ecosystem changes. With accelerated modification of oyster habitat, disease mortality has become more important (Cranfield et al 1999). Management of the resource under a quota system did not result in the development of a thorough understanding of the ecosystem and habitat on which the oysters depend. The poor state of the fishery meant quota owners have been more concerned with their own survival, with little capacity for understanding what effect their collective efforts were having on the condition of the oyster beds.

4.2.2 Recreational

The rights of recreational fishers are different from those of commercial quota holders, and have not as yet been as well defined. Compared to the QMS and ITQ, and the recently established regulations for Māori customary fishing, the recreational sector has no equivalent frameworks for precisely determining rights in the marine resource. For many New Zealanders however, the freedom to go fishing is considered a birthright. Thus the call for redefinition of recreational fishing rights has particular implications for all New Zealanders.

It is important to acknowledge that with the right to fish recreationally, should come the responsibility to manage that recreational fishing for the sake of sustainability for future generations. The lack of an infrastructure to administer the rights of recreational fishers may result in less effective management of fish stocks and may increase the risk that stocks will deteriorate. Such decline could happen for any number of reasons. However, for decline to occur due to a lack of understanding of the impacts of recreational fishing, or due to the lack of positive management between and within each stakeholder group, would truly be a tragedy of the commons.



The 1989 Policy for Marine Recreational Fisheries gives preference to recreational fishers when there is insufficient fish stock for both a commercial and non-commercial take. This policy is not formalised in legislation. The Fisheries Act 1996 does, however, oblige the Minister to make specific allowances for recreational take¹² before setting the total allowable commercial catch.

The TAC is the current point at which all fishers' rights are brought together. The commercial right, the share of quota within the TACC, is managed under a property rights framework. Recreational fishers have the option of clarifying their rights under this framework, with various options available – from a property rights framework to a right with less emphasis on tradability and more emphasis on an egalitarian principle.

There are two major difficulties in establishing an appropriate infrastructure to administer recreational rights. Firstly there are fundamental issues in identifying just who is a recreational fisher, and what are their rights. Secondly, and this can only be considered after the first difficulty is solved, there is the question of determining appropriate resourcing to support such an infrastructure. Efforts to clarify such matters are seen by many fishers as bureaucratic interference and limitation of their rights.

These kinds of issues underpin the work of the Recreational Fishing Rights Joint Working Group, involving recreational fishers and the Ministry of Fisheries. A discussion paper is being finalised for a process of public consultation in 2000 (see Vista 3).

4.3 Treaty of Waitangi

The Treaty of Waitangi 1840 is the founding document of New Zealand as a nation. It is part of the law of New Zealand to the extent that it is incorporated into statute. A number of statutes relating to the marine environment incorporate reference to the principles of the Treaty and to the values and traditional relationships of Māori with natural places and resources (see Vista: 22 The Treaty in legislation for the marine environment).

By the Treaty, Māori ceded the right to govern to the Crown and in return the Crown confirmed the rangatiratanga of the tangata whenua. The Treaty provides the basis from which New Zealand government and laws are established, through a fundamental bargain between the Crown and

Māori. This is seen in the relationship between the provisions of Article I and those of Article II of the Treaty – the exchange of the right to govern for the obligation to protect Māori interests.

The Treaty did not convey any special rights to tangata whenua – by the Treaty, the Crown confirmed and guaranteed their existing rights to land and resources, including rights in respect of intangible taonga. The Treaty has affinities with the Common Law doctrine of aboriginal title.

In 1992 the PCE's *Proposed Guidelines for Local Authority Consultation with Tangata Whenua* elaborated on the status of tangata whenua under the Treaty in regard to management of the natural environment and the formal provisions for recognition of their rights:

A common misunderstanding exists in the general community that Māori demanding their rights under the Treaty are somehow seeking special privileges... The distinction must be made between *individual* Māori, who have guaranteed to them under Article III *equal rights* as citizens, regardless of race; and Māori *tribes*, which have guaranteed to them under Article II the right to retain (and have restored to them if taken without consent) tribal resources and taonga, and the right to manage them according to their cultural preferences.¹⁴

The Waitangi Tribunal

The Treaty of Waitangi Act 1975 established the Waitangi Tribunal to inquire into and make recommendations in respect of claims relating to the principles of the Treaty. In its reports, the Tribunal has interpreted the Treaty and its practical implications for contemporary management of natural taonga and particular places. The Tribunal has recognised some principles in addition to those recognised by the Courts. The interpretations of the Waitangi Tribunal are influential in the Courts but not binding upon them.¹⁵

The Tribunal has commented on the Crown's obligations under Article II, noting in regard to the management of natural resources, that these obligations cannot be avoided or modified by delegation of the Crown's powers to another agency such as a regional authority:

If the Crown chooses so to delegate, it must do so in terms which ensure that its Treaty



duty of protection [of rangatiratanga] is fulfilled.¹⁶

The Crown is not legally answerable for breaches of its Treaty duties, as the Treaty is not directly enforceable in the Courts. If the Crown, in delegating its powers fails to ensure that its Treaty obligations are fulfilled, it is answerable only to the extent that the Waitangi Tribunal may inquire into its actions and make an unfavourable recommendation.¹⁷

4.3.1 The principles of the Treaty

The statutes refer to the principles of the Treaty, although many iwi and hapū refer to the Treaty itself, and to the Māori language document, rather than to broader 'principles' or concepts more recently developed.

It is generally accepted that our understanding of the principles of the Treaty and their applications is continually evolving. There are the findings of the Courts on a wide range of cases, the findings and recommendations of the Waitangi Tribunal in the context of claims under the Treaty of Waitangi Act 1975, and the general formulation of public policy.¹⁸ There are also statements of tangata whenua and resolutions from various hui,¹⁹ together with a lively local industry of studies, reports and academic investigations.²⁰

Principles with particular relevance to the management of the marine environment are:

- The principle of partnership, incorporating the obligation on the Crown and tangata whenua to act in utmost good faith and to accord each other reasonable co-operation on major issues of common concern. Associated with this principle is the duty on the Crown to consult, to ensure early and appropriate involvement of tangata whenua in order that decisions are based on adequate information.²¹
- The principle of active protection of the Māori interest, which involves more than passive recognition or consultation: "...the duty of the Crown is not merely passive but extends to active protection of Māori people in the use of their lands and waters to the fullest extent practicable".²²

It has been suggested that the principle of active protection also applies in regard to the natural resources and environment themselves:

New Zealand has a heritage of indigenous

species, in forests and wetlands, sea coasts and fisheries, held to be guaranteed as taonga by the Treaty of Waitangi. To remain taonga their prime requirement must be to exist... extinction is irreversible.²³

A right to a share in the [natural taonga] is of little benefit if the [resource] has been depleted by pollution and bad management of the past... it can be maintained that Crown policies which have led to environmental degradation... are in themselves breaches of the Treaty.²⁴

Principles identified by the Waitangi Tribunal include:

- The right to manage resources, places and other taonga according to tikanga and cultural and traditional values and methods.²⁵

We consider that the Māori text of the Treaty would have conveyed to Māori people that amongst other things they were to be protected not only in the possession of their fishing grounds, but in the mana to control them in accordance with their own customs and having regard to their own cultural preferences.²⁶

- Recognition that taonga include tangible and intangible dimensions and values:

From our own knowledge and research on the Māori comprehension of rivers, we see the river, like other taonga, as a manifestation of the Māori physical and spiritual conceptions of life and life's forces. It contains economic benefits, but it is also a giver of personal identity, tribal cohesion, social stability, empathy with ancestors, and emotional and spiritual strength.²⁷

The mauri is the force that ensures... that all species it accommodates will have continual life. The mauri cannot be intercepted or desecrated... When the mauri is harmed, so too is the spirit of the tangata whenua.²⁸

22 THE TREATY IN LEGISLATION FOR THE MARINE ENVIRONMENT

Section 4 of the Conservation Act 1987 provides that it “shall so be interpreted and administered as to give effect to the principles of the Treaty of Waitangi”.

The 1995 Kaikoura whalewatching case in the Court of Appeal (*Ngāi Tahu Māori Trust Board v Director-General of Conservation* [1995] 3 NZLR 553) determined that these provisions extend into the interpretation and administration of other statutes associated with the Conservation Act in its First Schedule, such as the Marine Mammals Protection Act 1978, at least to the extent that the provisions of those other Acts are not clearly inconsistent with the Treaty principles.

Section 8 of the Resource Management Act 1991 requires that decision-makers and managers “take into account the principles of the Treaty of Waitangi”.

Section 6(e) RMA requires that decision-makers under that Act recognise and provide for “the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taonga”, and section 7(a) requires that they have particular regard to kaitiakitanga.

The 1994 New Zealand Coastal Policy Statement (NZCPS) prepared under the RMA recognises that “tangata whenua are the kaitiaki of the coastal environment”. The NZCPS determines that it is a national priority to protect characteristics of the coastal environment “of special spiritual, historical or cultural significance to Māori identified in accordance with tikanga Māori”. It includes policies for:

- identification and protection of characteristics of the coastal environment of special value to tangata whenua, including wāhi tapu, tauranga waka, mahinga mataitai, and taonga raranga;
- their management according to tikanga Māori;
- protection of habitats of species important for traditional or cultural purposes;
- access of Māori people to sites of cultural value to them;
- taking into account the principles of the Treaty of Waitangi;
- meaningful consultation and involvement of tangata whenua in planning and policy processes for the coastal marine area; and
- appropriate incorporation of Māori customary knowledge about the coastal environment.

The Fisheries Act is to be interpreted in manner consistent with the provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 (section 5,

Fisheries Act 1996). Section 12 of the Fisheries Act provides for consultation in regard to the setting of sustainability measures for fish stocks or areas, and requires provision to be made for the input and participation of tangata whenua having a non-commercial interest in the stock concerned, or an interest in the effects of fishing on the aquatic environment in the area concerned. This section also requires that particular regard is had to kaitiakitanga. Part IX of the Fisheries Act provides for taiapure and customary fishing. The objective of providing for taiapure is to recognise rangatiratanga and the right secured in relation to fisheries by Article II of the Treaty of Waitangi.

4.3.2 Nga Wero: Challenges

There is ongoing concern amongst some tangata whenua about the statutory separation of Māori commercial development rights to fisheries from Māori rights to customary or subsistence use of fisheries resources, a crucial distinction made by the Crown since the 1880s in various statutes,²⁹ and confirmed in law in the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. A group from eighteen iwi have taken their objections to the United Nations Human Rights Committee in Geneva, arguing that the 1992 Act is in breach of the International Covenant on Civil and Political Rights, to which New Zealand is a signatory. The group are currently involved in proceedings in the Privy Council about whether they are entitled to legal aid in respect of their objection to the Human Rights Committee.³⁰

The present Government systems for marine environmental management are facing major challenges under the Treaty. A fundamental challenge is the WAI 262 claim to the Waitangi Tribunal for indigenous flora and fauna, a wide-ranging claim from six iwi in regard to the management, use, commercialisation, export and patenting of native plants and animals, of the genetic resources inherent within those taonga, and the whakapapa, intellectual property and traditional knowledge associated with them. This claim could have enormous implications for the future management of all indigenous species and habitats, and for the development of the potentials of natural resources (see Vista 23 New opportunities – bioprospecting).

Other Waitangi Tribunal claims in non-marine areas also may have relevance. For example, the recent Tribunal report on the Whanganui River



claim includes acknowledgement of “fundamental tenets of established law” in regard to the property rights of tangata whenua in natural resources, the nature of those rights as “the common property of a people” as opposed to “the private property of individuals”, and the relationship of those rights to the public interest, including recreational purposes.³¹

Another area of challenge is with the claims and court actions taken by a number of iwi regarding the foreshore and seabed. These also could have major implications for future management of the marine environment. They include:

- Hauraki iwi have lodged an application to the Māori Land Court for recognition of customary title to the foreshore and seabed of Tikapa Moana (the Hauraki Gulf). The Hauraki Māori Trust Board claim to the Waitangi Tribunal also seeks recognition of the customary rights of Hauraki iwi to the foreshore and seabed of Tikapa Moana, on the basis that Māori customary title to the foreshore and seabed has neither been relinquished nor extinguished (see Vista 15 Proposed Hauraki Gulf Marine Park).
- Te Tau Ihu a Maui lodged an application with the Māori Land Court seeking a determination that the customary rights of tangata whenua to the foreshore and seabed of the Marlborough Sounds have not been extinguished. Judge Hingston found that, in principle, where Māori were separated from the land adjacent to the foreshore by purchase, customary rights to the foreshore not included in the sales, or not having been expressly extinguished by law, remain.³² However, the Court did not address whether or not this is the situation for the Marlborough Sounds. On appeal by the Crown, the Māori Appellate Court remitted the matter back to the Māori Land Court to determine what land, if any, is customary land within the meaning of s 129 Te Ture Whenua Māori /Māori Land Act 1993 and then to refer that evidence back to the Appellate Court.
- Te Tau Ihu iwi challenged the action of the Minister of Conservation, Hon Dr Nick Smith, in lifting the moratorium on applications for new marine farms to be established in the Marlborough Sounds. The Government had imposed and subsequently extended the moratorium while issues of coastal tendering were addressed. The iwi claimed the

moratorium should have remained in place until the issues of Māori customary rights to the foreshore and seabed are resolved. However, their claim was dismissed by Justice McGechan in the High Court on the basis that the original Order in Council which imposed the moratorium was ultra vires and therefore of no effect.³³ It has been suggested that marine farming need not preclude resolution of outstanding claims.

23 NEW OPPORTUNITIES – BIOPROSPECTING

There is increasingly keen interest in the potential for utilising previously untapped marine environmental resources. Research teams from the National Institute of Water and Atmospheric Research Ltd and industry partners are working to identify natural compounds from marine organisms that may have very significant commercial importance.

Sponges, in particular, are proving to be useful sources of compounds with exciting potential use for fighting a number of diseases affecting humans, including cancers. Currently six new chemicals derived from New Zealand sponges are undergoing pre-clinical trials in the United States and Europe for their potential as anti-cancer drugs; two compounds are about to enter the clinical trial stage. The limited natural supply of sponges is a major barrier to fulfilling these potentials. Wild harvest is unlikely to be a sustainable option, and so New Zealand is undertaking world-leading work into aquaculture techniques to develop commercial scale sponge farming.

The recent claims about the potentials of green-lipped mussels from the Marlborough Sounds in treating cancer led to renewed interest in aquaculture (see section 4.3.2). The company which processes the mussel extract has made applications for an additional 560 hectares of mussel farm areas in the Sounds.

Experiments are also under way exploring the natural characteristics of other marine resources which may lead to specialist industries in the future – for new herbicides, pesticides or anti-fouling products. There have been proposals to farm sea horses in New Zealand, in response to strong Asian demand for these tiny creatures for their medicinal values.

Many people are enthused about the attractive possibilities in bioprospecting and in the artificial culture of a range of marine species – paua pearls are another developing industry. But the economic

opportunities and the other benefits, including the strong medicinal potential, will need to be balanced with realistic assessments of the environmental impacts and risks of the new industries' operations.

There are also significant issues to be worked through in regards to the intellectual, cultural and genetic property rights in indigenous plants and animal species. The outcomes of the WAI 262 claim currently being heard by the Waitangi Tribunal (see section 4.3.2) could have an influence on the use and transmission of the knowledge of New Zealand's indigenous flora and fauna and the genetic resource contained therein.

The 1993 indigenous peoples' Mataatua Declaration (see section 5.2.3) includes a statement of fundamental principles for the use and protection of natural species and the intellectual, cultural and genetic property inherent in them.

4.4 Implications of rights for marine environmental management

There is considerable feeling amongst the commercial fishing sector that the current fisheries management regime is not providing the industry with the conditions and incentives it needs. There has been increasing pressure from quota holders, the aquaculture industry, and government policy-makers for redefinition and strengthening of various rights in marine resources:

Fisheries managers should be enhancing rights-based management by empowering fishers to take greater responsibility for fisheries decision-making, implementation and enforcement.³⁴

Many countries have experimented with property rights-based management, but New Zealand and Iceland³⁵ have developed the furthest. However, in Iceland, recent controversial Supreme Court findings have challenged assumptions (in a constitutional sense) about the allocation of permanent quota rights, private ownership and the public commons.³⁶

This report does not challenge the establishment of property rights in the marine commons, or a commons management framework. The property rights regime for fisheries was put forward as an attempt to manage the resource sustainably, and as an allocation mechanism, it outperforms its predecessor (see section 3.4.1). **The current fisheries management mechanism, however, is**

neither economically efficient,³⁷ nor ecologically effective. The mechanism does not provide a basis for pricing all rights, and there is virtually no assessment of currently non-commercial costs and benefits.

Examples of potential limitations to environmental goals that could occur under a management framework of private interests in a public commons could be:

- failure to action environmental objectives through an inability to meet demands for compensation for a restriction of private interest (eg catch limit);
- a loss of accountability through limitations to agency responsibilities, or inability to establish liability of a user for breaching environmental standards; or
- a lack of effective legislation available to facilitate sound marine environmental management, for example inadequate provision of information to all stakeholders, or lack of public ability to constrain the actions of a particular stakeholder, should they be proven to be operating in an environmentally unsound manner.

Many economic theories assert that competition is good for markets, by fostering efficiency, innovation, improved quality of service, and demand-side management (customer trends). However, when dealing with natural resources, the primary constraints are often in supply-side management (source trends). A co-operative approach to supply-side management would seem to be the most effective means of achieving the maximum benefit from a resource for the maximum number of participants.

A co-operative approach to rights and resource management would also have significant advantages for increasing knowledge and understanding about the resource and its supporting environment. One reason that the rock lobster and Nelson scallop fisheries have been so successful is the high levels of co-operation between quota holders. Data between fishers can be combined and compared, rather than, as under a classically competitive regime, closely guarded as a matter of commercial advantage.

There is also an increasingly urgent need for clarification of issues of responsibility and accountability for maintaining environmental quality within the marine commons – an area that has received less assiduous attention from policy-



makers and sector advocates. The difficulties in determining specific responsibility are similar for fisheries sustainability as for the impacts of upstream users. In a situation where the natural resources and environmental quality of a local community are adversely affected by the exercising of commercial property rights in regard to that resource – a resource that is part of the commons of all New Zealanders – it may be virtually impossible to establish cause and effect links. The processes by which legal action might be taken to prevent the activity, collect damages or require restoration are complex and expensive and their outcome uncertain. The resolution of such questions of liability will require consideration of a range of legal, constitutional and ethical principles as well as practical matters of monitoring and evidence.

4.5 Other kinds of rights

A range of other kinds of rights might be given appropriate recognition in the management of New Zealand's marine environment and resources. Some of these rights are exercised and asserted actively by particular groups; others are more inherent in the philosophical and institutional frameworks that have been established for marine management.

The various rights asserted in relation to the marine environment, and concepts of rights that have relevance for marine sustainability, may have different status and enforceability under current New Zealand statutes and international law, as discussed above. They include:

- the democratic rights of all New Zealand citizens to a share of the natural resources of their country. This right of personal access is based in the strong egalitarian principles underpinning our colonial heritage as a reaction to the aristocratic exclusivity of much 19th century European management of lands and wildlife;
- the democratic rights of the various stakeholder groups, users and local residents in coastal areas to be involved in policy-setting, decision-making and management of marine resources and environments, to be given the necessary information to participate in these processes in meaningful ways, and to have their views, values and priorities heeded;
- the fundamental human rights of all people to sufficient food resources for survival – a

principle underpinning the regular utilisation of marine resources by rural subsistence communities and some immigrant communities;

- the expectations of future generations, as reasonably foreseeable from this point in time, to enjoy in whatever ways they may determine to be appropriate the natural resources that are their heritage – the principle of intergenerational justice. The responsibility of present generations is to ensure that the options of future generations are not unreasonably diminished due to degradation or extinction of species and habitats. International constitutional developments show the links between environmental sustainability and rights of future generations. One example is the Philippines Constitution which confirms these rights:

The State shall protect in advance the right of the people to a balanced and healthy ecology in accordance with the rhythm and harmony of nature.³⁸

These issues have also been addressed by the Chief Justice in relation to the Indian Constitution, where the Chief Justice has commented:

The provision [in the Constitution] which provides for guaranteed life (a right to life) doesn't just guarantee protection from being arbitrarily arrested or put to death, it also guarantees a healthy ecology, because that is the ultimate right to life provision.³⁹

- the rights and expectations of present generations to continue as much as possible as history has allowed, to maintain the patterns of use, value and significance of marine resources and places that have become fundamental to culture, tradition and society; and
- the intrinsic or inherent rights of the wild creatures and marine vegetation and ecosystems themselves, the 'deep Green' principles that recognise the rights of the planet's biodiversity to exist and to have the necessary conditions and requirements for continued existence.

24 INVERTEBRATE BYCATCH

As dredges (eg scallop and oysters) and bottom trawls (eg orange roughy, scampi) are dragged across the seafloor, non-target shellfish, corals and other benthic fauna are caught. There is an extensive international literature on the environmental impacts of dredging (Jones, 1992). The effects of dredging in New Zealand have to date focused on the shallow water dredging for scallops (*NZ Herald*, 21 January 1998).

Little is known about the impact of deep sea fisheries on bottom fauna (Probert 1996), in particular, the impact of deep water trawling for orange roughy and oreos on seamounts. These features, known to fishers simply as “hills”, were first fished extensively following the opening up of the Chatham Rise orange roughy fishery in the early 1980s – orange roughy are found in dense spawning aggregations at depths of 700 – 1000m near pinnacles or canyons during mid-winter. Fishers from other countries have in the past avoided fishing such areas because of the high risks associated with hooking the trawl gear on the bottom. However, New Zealand fishers took the risk and became adept at towing trawl nets down the slope from the tops of the “hills”.

The seabed in these areas is typically uneven, steep and rocky. Little is known about exactly what the pristine bottom looked like, but scientists suspect that from the pieces of coral recovered from trawl nets, dredge gear and photographs of the seafloor, that corals up to 5m high probably cover the seabed like a forest in some areas. Many of the corals and associated fauna are new to science (O’Shea et al, 1999) and very slow growing. Dragging a trawl net, particularly trawls with heavy steel “bobbers”, through fragile forests of coral, is likely to leave the seabed bare. Fishing particular hills usually follows a pattern of repeating trawls over a relatively consistent track, so that some areas of each feature may remain un-trawled, but there is no information to show whether this approach offers a practical way of limiting seafloor damage.

Research at NIWA, mainly desk top studies, concludes that New Zealand should follow the lead taken by Australia and the USA in creating reserve areas to protect some seamounts. (Clark, 1999 and Clark et al, 1998b).

The MFish observers’ reports give a firsthand account of the impacts of trawling eg:

On virgin seamounts in newer fishing areas... I have seen up to 5 tonnes of various underwater flora and fauna coming up in some tows. In particular the first tow of a new line/path on a feature can contain large amounts of destroyed bottom material. Current fishing technology allows

tow line/paths to be repeated with a high degree of accuracy. Eventually on repeated trawl lines/paths the amount of coral taken will decline to the extent that very little will be present in the nets. As it is only in the initial stages of exploration that coral is witnessed in nets, opportunities for observers to record and report large amounts have been and still are extremely rare.

In known and developed fishing areas few unfished areas exist. Anecdotal information from older fishermen and scientists who experienced the initial exploration and development of these grounds indicates that the hills (seamounts) have gone from producing large bycatches of corals, sponges etc to just bare rock. They believe that the bottom “make up” has changed drastically in the past few years.

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- report (1985) and *Motunui report* (1983).
- ¹⁷ Richard Boast. Letter to the PCE 6 September 1999.
- ¹⁸ For example, the 1989 *Principles for Crown Action on the Treaty of Waitangi*, or the recent statements of the Hon Doug Graham, Minister in Charge of Treaty Settlements, regarding issues of Māori rights in rivers.
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5 Adequacy of Environmental Information

5.1 Introduction

Management or development of any resource, business or service is dependent upon having sufficient knowledge about systems, technologies and ecosystems in order to achieve the desired objectives. Knowledge enables informed decisions. This might seem fairly obvious but when it comes to managing natural resources and environmental qualities, clear objectives and recognition of the quantity and quality of knowledge required to manage New Zealand's marine environment sustainably often seems to be lacking.

This chapter briefly discusses the information required to achieve the goal of sustainability for the marine environment, the gaps in knowledge, who can contribute knowledge, and who invests in gathering information, providing education, and generating public awareness of the marine environment.

5.2 Different kinds of information

There are many stakeholders with interests in the marine environment (see chapter 2) and each has useful data and information which can increase knowledge and understanding of the marine environment.

There are important differences between data, information and knowledge. Data can be described as observations, experiments and measurements of variables over time or within an area; information as the interpretation and analysis of the data; and knowledge as the use of information in a context for decision-making.

There are also significant differences between formal and informal information. It may not always be easy to integrate formal and informal information for marine management purposes, and neither may various kinds of informal information be given due consideration by decision-makers. However, in an information-scarce environment like the marine environment, informal information will often be a resource that marine managers cannot afford to neglect or ignore.

5.2.1 Formal information

Formal data can originate from systematic research where variables are controlled, as much as possible, and other people can repeat the work.

Data gained from observations can be analysed and converted into formal information by using procedures that set out how the data must be collected and recorded. Formal information can also be obtained from people who have observed certain phenomena and who can often link causes and possible effects of environmental change.

5.2.2 Informal information

Despite the practical difficulties of looking beneath the waves, informal information about the sea has long been available from the accumulated experience and observations of coastal dwellers, mariners and fishers.

Informal information can be an important element of understanding some aspects of ecosystems. Although often qualitative, and usually difficult to repeat or to audit, informal information is an underused source of information. Informal information is by its nature experiential and integrative; it makes linkages, acknowledges uncertainty, and is responsive to change and seasonal cycles. It is broad-based and originates from people who live, work and undertake various activities within particular places and environments.

An example of how informal information is gathered is the establishment of NERDS, the National Environmental Recreational Diver Survey, started in 1997. It is supported by the NZ Underwater Association and the Professional Association of Diving Instructors. Its aim is to get divers and local dive clubs, which already have an association with their local marine area, involved with marine monitoring and survey projects. The organisers are currently refining and testing their monitoring survey kit at Tiritiri Matangi in the Hauraki Gulf, and intend publishing NERDS results on a website.

Other examples of groups collecting useful informal information are the ongoing survey work undertaken by the Cheltenham Beach Caretakers group (see section 3.6) and such projects as the Te Puru school students' shellfish monitoring programme (see Vista 31 Schools' initiatives: a sample).

5.2.3 Mātauranga Māori

A wide variety of information is held by tangata whenua of each area as kaitiaki for the taonga within their rohe. This can include information on



natural resources and the interrelationships between species, on the habitats and food requirements of particular species, on behaviours and seasonal patterns, on trends over time, and on practical management techniques for fish, shellfish, other species such as kina or seabirds, and for coastal and estuarine habitats. This knowledge can span back across centuries of close interrelationships between hapū and whānau and the places and resources that have sustained them for generations (see section 2.4).

While it is positive that there is increasing recognition amongst fisheries and environmental managers of the value of traditional Māori knowledge, there must also be an appreciation of the sensitivity of much information. There will often be considerable caution about making some information available beyond the iwi, hapū or whānau itself – for example, details about particular fishing resources and practices, or about the medicinal values of certain resources. Information about the historical and spiritual significance of marine and coastal taonga and particular sites may also need to be protected as confidential to the kaitiaki concerned.

Such matters are increasingly significant in the current context that includes:

- the claim to the Waitangi Tribunal for indigenous flora and fauna (see section 4.3); the statements of the rights of indigenous peoples to their traditional knowledge and intellectual and cultural property in the Convention on Biological Diversity (Article 8(j)) and other international agreements;
- the 1993 Mataatua Declaration by indigenous peoples' representatives addressed to the United Nations, States and others which seeks to establish principles for the protection and use of indigenous peoples' knowledge and intellectual and cultural property; and
- the increasing pressure on marine resources from bioprospecting for commercial and pharmaceutical exploitation (see Vista 23 New opportunities – bioprospecting).

5.3 What is known about the marine environment?

Information about New Zealand's marine environment is diverse and comprises both formal and informal information, originating from systematic studies, commercial activity, academic

and applied research, observations of users of the marine environment, and from traditional knowledge. Compiling this part of the overview was difficult, as information generated and held by different stakeholders is often not generally accessible to other stakeholders. This may be for cultural reasons, as discussed above, for reasons of commercial sensitivity and advantage, or as a consequence of the complexity of official management and reporting systems.

There is an extraordinary diversity of information collected about various aspects of the marine environment, including:

- information about coastal processes collected by regional councils, some local residents, and universities;
- information on off-shore exploration prospects collected by the oil and gas industry and central Government;
- marine mammal information collected by the Department of Conservation and by observers on commercial fishing vessels;
- information on coastal oil spills that occur around New Zealand's coast collected by the MSA;
- marine fauna and flora information collected by research institutions, marine education centres and tangata whenua;
- data collection and analysis of the functioning of major physical and biological oceanographic processes carried out by NIWA;
- information on fish catches, on the effectiveness of particular harvesting methods and technologies, and on incidental bycatch collected by the seafood industry;
- three national surveys about recreational fishing which have produced information on where people fish, what they use, what they catch and how much they catch;
- two national research projects currently taking place into the economics of recreational fishing and the motivations of fishers; and
- data collection and analysis and predictions of the changes of marine populations in response to harvesting carried out by NIWA.

However, there are big information gaps in knowledge of marine systems. Some of these gaps were identified during the consultations conducted for this review.

The gaps in New Zealand's knowledge are illustrated in the draft *New Zealand Biodiversity*

Strategy an objective of which is to improve knowledge of the marine and coastal ecosystems. *The State of New Zealand's Environment* report also describes some of these gaps.

25 WHAT IS THE STATUS OF OUR FISH STOCKS?

The results of the 1998 assessment of fish stock* status is shown below:

This table illustrates that for fish stocks managed under the QMS system:

- there is insufficient information to be able to assess the effects of harvesting on 58 percent of all fish stocks;
- eight percent of all stocks are known to be depleted below the maximum sustainable yield; and
- among those depleted fish stocks are two important commercial fish stocks – snapper and all but one of the orange roughy stocks.

The maximum sustainable yield (MSY) forms the cornerstone of fisheries management in New Zealand and is defined as "...the greatest yield that can be achieved over time while maintaining the stock's productive capacity..." (Fisheries Act 1996 s 2). Determining the MSY allows managers to establish the level of fishing that will allow surplus production to be captured without compromising the long-term yield of the fishery (Hilborn & Walters 1992 cited in NMFS 1999).

When an ecosystem approach to fisheries management is considered, the concept of surplus production needs revisiting:

"Marine ecosystems are effective at capturing energy, cycling nutrients and producing biomass. Very little, if any, of this biomass is truly "surplus" to an ecosystem: before the advent of fisheries, it was recycled within the ecosystem" (NMFS 1999).

Note that the 1999 amendments to the Fisheries Act

1996 have amended the 'bottom line' in respect to the MSY. Section 8 inserts new sections (14A-14C) into the Act that enable some by-catch species to be fished below the B_{msy} (level of biomass that will support the MSY). This change will be economically advantageous to the fisher, as it will prevent the TAC of "minor bycatch species" from capping the catch of target species and thereby shutting the fishery down early.

(From: Fisheries Amendment Bill as Reported from the Primary Production Committee. *Commentary*)

* A fish stock is defined in the Fisheries Act 1996 as any fish of one or more species that is treated as a unit for the purposes of fisheries management. Fish includes all species of finfish (defined as classes Agnatha, Chondrichthyes and Osteichthyes) and shellfish (defined as all species of the phyla Echinodermata, Mollusca and the class Crustacea) at any stage of their life history, whether living or dead. Fish stocks are in effect groups of fish that are defined by their location in a distinct geographical area, and by their separateness from other stocks.

There are enormous gaps in our knowledge of global systems. For example, the influence of global ocean currents on the atmosphere (and vice versa), and the impacts of El Nino and La Nina weather patterns on the nature and intensity of ecological changes, are not well understood in New Zealand.

Information gaps occur in the following systems areas:

- basic biodiversity information – the fish, plants, mammals, birds and invertebrates that live in the marine environment and especially in the deep oceans;
- the functioning of biophysical processes of the marine ecosystems and the linkages between species and populations;
- the extent of impacts of urban and agricultural systems on coastal and estuarine environments;
- the impacts of human activities on different marine environments; and
- frameworks for comparative assessment and

Assessment	1998
Total stocks	149 (excludes the 30 stocks in QMA 10)
Stocks status unknown	87 (58 % of total stocks)
Stocks status known	62 (42 % of total stocks)
Total number of stocks known to be below B_{msy}	12 (19 % of known stock status) stocks known to be
Stocks below B_{msy}	5 orange roughy, 2 snapper, 2 rock lobster, 2 gemfish, 1 oreo

Source: MFish, July 1999

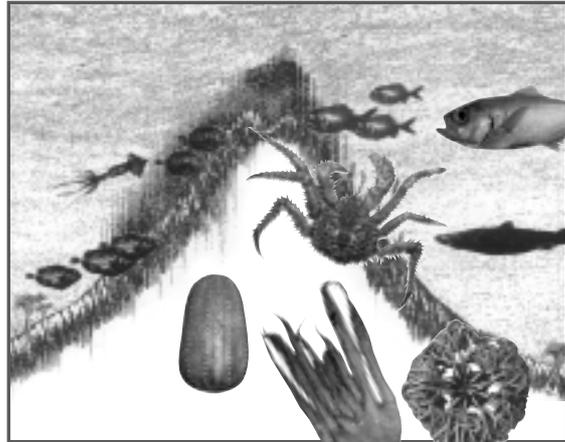


The Seamount Story

SEAMOUNTS

Some characteristics of New Zealand seamounts are:

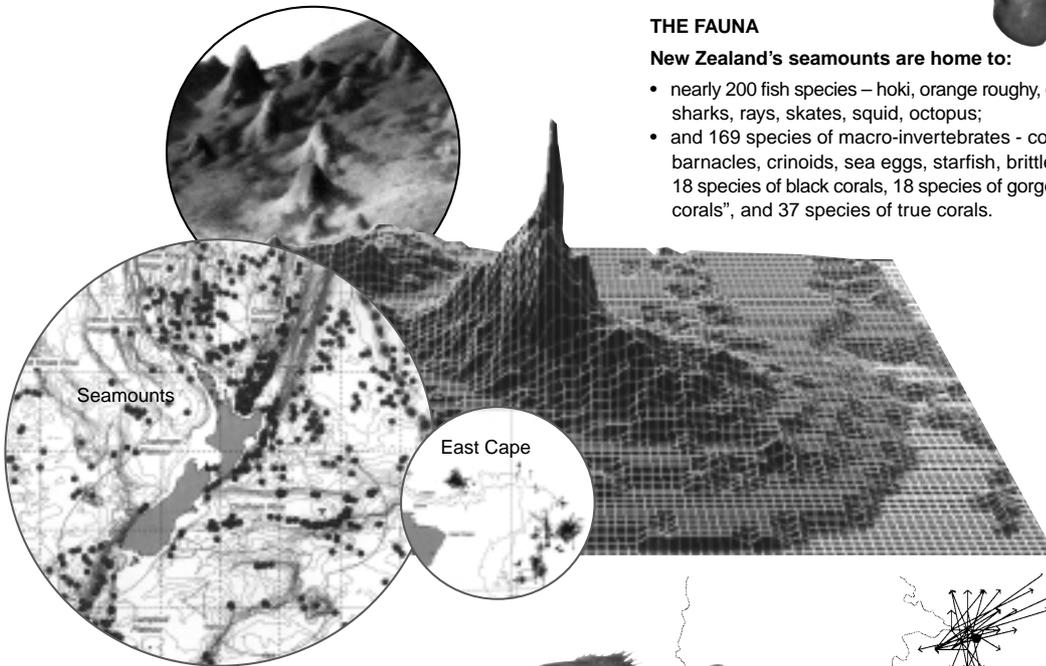
- submerged islands found in NZ's marine sub-continent;
- there are at least 785 of them in the NZ "region";
- they are prominent, many are larger and higher than Mt Tongariro or Mt Cook;
- the largest are outside the NZ EEZ on the Louisville Ridge;
- a few are over 4 000m high, and 13 reach within 250m of the ocean's surface;
- the average seamount lies in 3-4km of water, and is the size and height of Banks Peninsula;
- Bollons seamount is 200km across and over 3 000m high;
- they are usually volcanic, with a varied rugged terrain, and high biodiversity.



THE FAUNA

New Zealand's seamounts are home to:

- nearly 200 fish species – hoki, orange roughy, oreo, eels, dogfish, sharks, rays, skates, squid, octopus;
- and 169 species of macro-invertebrates - corals, crustaceans, barnacles, crinoids, sea eggs, starfish, brittle stars, including 18 species of black corals, 18 species of gorgonian "fan/bamboo corals", and 37 species of true corals.



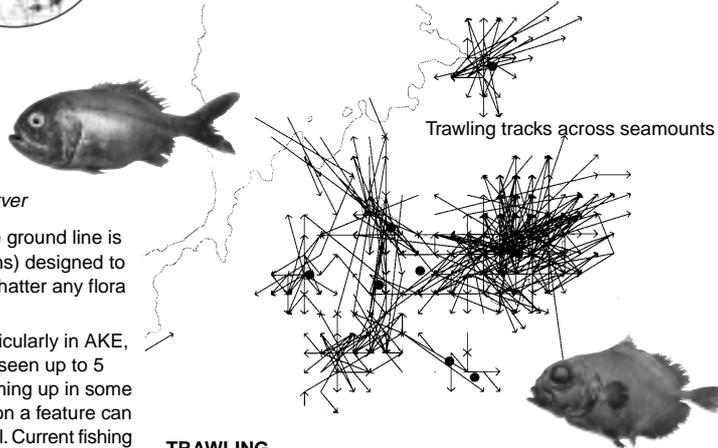
TRAWLING SEAMOUNTS

Eyewitness report from an MFish scientific observer

"Typically on these types of net, the design of the ground line is a 15m - 115m link of steel or rubber balls (bobbin) designed to roll over the seafloor. These in effect crush and shatter any flora or fauna in the towpath.

On virgin seamounts in newer fishing areas, particularly in AKE, SUB [fishing areas] and outside the EEZ, I have seen up to 5 tonnes of various underwater flora and fauna coming up in some tows. In particular the 1st tow of a new line/path on a feature can contain large amounts of destroyed bottom material. Current fishing technology allows tow line/paths to be repeated with a high degree of accuracy. Eventually on repeated trawl lines/paths the amount of coral taken will decline to the extent that very little will be present in the nets.

In known and developed fishing areas few unfished areas exist. Anecdotal information from older fishermen who experienced the initial exploration and development of these grounds indicates that the hills (seamounts) have gone from producing large bycatches of corals, sponges etc to just bare rock. They believe that the bottom "make up" has changed drastically in the past few years."



TRAWLING

- Example of trawl paths across seamounts for the fishing year 1996/97.
 - Seamounts are trawled for orange roughy and oreos.
- ❖ Diagrams and illustrations provided by National Institute of Water & Atmospheric Research Ltd (NIWA), from a report to the Department of Conservation "New Zealand Region Seamounts", August 1999. Submarine pinnacle graphic provided by RN Navy, Hydrographic Office.

integration of ecological and economic data.

Some of the more specific information gaps include:

- the impacts of the establishment of introduced marine species in New Zealand’s coastal and inshore waters, accidentally or otherwise;
- a national assessment of estuarine water quality;
- whether coastal sediments containing concentrations of lead, zinc and copper are affecting animal diversity, particularly shellfish and crustaceans, and are causing changes in growth and behaviour;
- time series observations for many fish populations – in order to manage the impacts of harvesting, fluctuations in abundance over time need to be measured;
- information on the scale or effects of the incidental mortality of non-target species that are captured, damaged or killed as a result of commercial fishing activities – when some research is carried out, it reveals that many of the non-target species are unknown;
- information on current biomass and the biomass to support the MSY, currently only known for 42 per cent of the QMS stocks;
- the effects of recreational fishing on target species and the marine environment; and
- the effectiveness of marine reserves and other mechanisms in enhancing biodiversity.

26 THE SHELVES OF GHOSTS – CLASSIFYING THE UNKNOWN

In NIWA’s biodiversity research unit at Greta Point there are, preserved in bottles, samples of fish and invertebrates (corals, seastars etc) from New Zealand’s marine ecosystems. A map on the wall shows that the last comprehensive seabed survey took place in 1974. Fishers who accidentally catch interesting or unusual specimens in their nets sometimes bring them in to NIWA.

It has been a long time since many of these species have been observed in the marine environment. There is a huge backlog of specimens waiting to be identified. Expertise for identifying new species is limited in New Zealand to a few specialists in NIWA and Te Papa; the capacity base of New Zealand taxonomists is diminishing due to lack of opportunity for practical application of their expertise and retirement of senior experts. There is the sense that some of the information held in these bottles may now be palaeontological rather than ecological.

5.4 Who invests in information?

In the context of this review it has been very difficult to ascertain the levels of investment in knowledge of the marine environment by the various stakeholders. This has partly been because information on marine management is not generally separated out from other information by Government agencies or other stakeholders. Information that is publicly available has had to be combined and integrated from a wide variety of disparate sources.

5.4.1 Government agencies

Ministry of Fisheries

The Ministry of Fisheries carries out fisheries research and monitoring to meet the Minister’s management needs (setting sustainability measures such as TACs and regulations). There is little emphasis to date on research into ecosystem functioning, even though the Fisheries Act 1996 has environmental principles outlining what is needed for sustainability.

Ministry for the Environment

The Ministry for the Environment is developing indicators to measure and report on the state of the marine environment (see section 3.8.7). A set of proposed indicators has been developed for:

- marine ecosystems including physical/chemical indicators, habitats and communities indicators and species indicators; and
- human use and values including human health, fish stocks and fishing impacts.

The proposed indicators are for national ‘state of the environment’ reporting. They will provide useful information about trends in the extent and condition of some aspects of the marine environment.

Department of Conservation

The department undertakes operational research on marine environments and protected species (marine mammals, seabirds). Research is funded either by the department or by the seafood industry through cost recovery.

Public good science agencies

The Ministry of Research, Science and Technology (MoRST) has developed the framework for the Government’s investment in



public good science. The Foundation for Research Science and Technology (FoRST) administers the Public Good Science Fund (PGSF) and other smaller funds. Science activity of most relevance to marine management within the PGSF is in output classes 6 and 16 (output 6 – fishing and aquaculture industries and output 16 – marine environments, climate and atmosphere).

The seafood industry in their Foresight Strategy¹ compared the level of the Government's PGSF investment in their industry with the investment relative to export earnings in other primary industries. PGSF funding for the seafood industry was 0.6% of total fish exports in 1996/97. This compared with 6.2% for fruit, 1% for dairy, meat and wool and 1.5% for forestry.

27 EXAMPLES OF NEW ZEALAND'S CONTRIBUTIONS TO MARINE SCIENCE

A NIWA-led multinational research team achieved a breakthrough last summer with their findings about the role of the Southern Ocean in climate change. Although nutrient rich, the Southern Ocean has relatively low numbers of phytoplankton. Scientists from Europe, Australia, and the USA with the NIWA team experimentally fertilised a 50 square kilometre patch of ocean with iron, and tracked the patch for two weeks measuring the impact of the iron. Numbers of marine phytoplankton increased, and the rate of absorption of atmospheric carbon dioxide was much higher inside the fertilised patch than in the surrounding ocean.

The Institute of Nuclear and Geological Sciences (IGNS) has been involved with mapping undersea volcanoes, frozen seafloor energy deposits ('ice that burns'), and exploring the ocean plateau off the east coast of Northland.

Undersea volcanoes or 'black smokers' are deep ocean vents in the seafloor. A joint New Zealand/USA expedition in March 1999 took the NIWA research vessel Tangaroa east of White Island to 'sniff out' the large volumes of mineral-rich hydrothermal water. There are about 25 places world wide with 'black smokers', but the New Zealand ones are unusual because they contain gold and some occur at relatively shallow depths. Most are found in mid-ocean ridges at depths of 2-3 km.

Ice that burns is a natural ice-like material made up of methane and water found in ocean sediments world-wide. These gas hydrates may become an important new energy source for the 21st century, and even

conservative estimates expect them to hold twice the known world reserves of oil, coal and natural gas. Ignored in the past as a nuisance for drillers, gas hydrates are now being evaluated by government researchers, including a Wellington team of geophysicists from IGNS.

French and New Zealand scientists spent ten days in March 1999 aboard the Tangaroa studying the geology of the Northland Plateau, the last piece of the Pacific 'tectonic jigsaw puzzle'. Only 300km north of Auckland, this area with its chain of seamounts, or extinct volcanoes, may be a former tectonic plate boundary, but little is known about its geological composition or history. Such in-depth knowledge of the seafloor is crucial to New Zealand's continental shelf claim under UNCLOS, which must be completed by 2006. This area is adjacent to the Three Kings Ridge, where claims by Australia and Pacific island states will overlap with New Zealand's claim.

Land Information New Zealand (LINZ)

LINZ is responsible on behalf of the Government for purchasing seabed mapping information. As well, LINZ maintains hydrographic and bathymetric (nautical charts and seabed depths) information which is used to produce maps and charts. LINZ will spend up to \$44 million over the next eight years to determine the extent of New Zealand's continental shelf.

Maritime Safety Authority (MSA)

The MSA is responsible for collection of information on maritime safety and environmental issues related to vessel-based discharge, hull fouling, large oil spills and addressing international marine pollution treaties. The MSA maintains a database of all the coastal oil spills around the New Zealand coast. It allocates \$30,000 per annum to the collection of this information (the MSA and regional councils spend about \$3.8 million per annum on preparedness for oil spills).

The New Zealand Defence Force

The Navy and Air Force work cooperatively with other government agencies (for example, MFish, DOC, MFAT, MSA), collecting and transferring marine surveillance information, or carrying out particular surveillance operations. However, it is difficult to separate out this investment from the investment in defence purposes.

Table 5.1 Crown marine information investment² 1998/99
(\$ M, GST inclusive)³

Land Information New Zealand – hydrographic services	\$21.4 ⁴
The New Zealand Navy – hydrographic support [Vote:Defence Forces D6]	\$11.8
Ministry of Fisheries – crown funding, fisheries research	\$ 3.7 ⁵
PGSF – output class 6 [fishing and aquaculture industries]	\$ 7.9
PGSF – output class 16 [marine environments, climate and atmosphere]	\$24.4
FRST – technology for business growth [fishing related projects]	\$ 0.8
FRST – Marsden fund [marine projects]	\$ 0.713 ⁶
FRST – non-specific output funding [NIWA, IGNS]	\$ 2.981 ⁷
Vote Research, Science and Technology – other marine components	? ⁸
Vote Biosecurity – MAF border inspection at ports	? ⁹
Vote Biosecurity – ship ballast water MFish/DOC	\$ 1.2 ¹⁰
Ministry of Health – marine biotoxin programme, aquaculture guidelines and other policy work	\$ 1.5 ¹¹
New Zealand Customs Service – marine border control	\$ 2.3 ¹²
Ministry of Commerce – Crown Minerals Office	? ¹³
Maritime Safety Authority [funded via Ministry of Transport]	\$ 3.6 ¹⁴
Ministry of Foreign Affairs and Trade	\$ 2.6 ¹⁵
New Zealand Official Development Assistance Programme	\$ 3.88 ¹⁶
Department of Conservation – crown funded research and operations	\$ 6.67 ¹⁷
Ministry for the Environment – marine indicators, bathing guidelines, pollution regulation, sustainable management fund, and other policy work	\$ 0.46 ¹⁸
Total	\$95.904

Summary of Crown investment

In summary, the Crown investment in marine information is of the order of \$96 million. Of this \$96 million, 35 per cent is hydrographic mapping, 34 per cent PGSF research, 4 per cent is the Crown contribution to the Ministry of Fisheries research with other Government agencies responsible for the remaining 27 per cent.

Even though the numbers in the following table have been carefully qualified, the verification of the numbers has been a protracted and frustratingly incomplete exercise.

5.4.2 Other stakeholders

The Seafood Industry

The seafood industry, under current Government policy, is required to invest in some of the research and marine management required for fisheries management purposes. In the 1999/2000 year, the industry is expected to contribute \$38.7 million to research (\$10M) and marine management (\$28.7M) as well as \$1.1 million (the conservation services levy) to the Department of Conservation.



28 THE ROCK LOBSTER INDUSTRY

The New Zealand Rock Lobster Industry Council (NZ RLIC) comprises representatives from each of the nine quota management zones; its aim is to ensure that the views of the rock lobster industry are given due consideration in the evolving legislative environment. A crucial expectation of NZ RLIC's regional representatives is to move towards greater autonomy and self-determination.

Since it was established in September 1996, the NZ RLIC has become an Approved Party for cost recovery consultation, and has been the contracted stock assessment research science provider for the past three years. The science contracts are run in collaboration with NIWA and the Seafood Industry Council Science Group. In addition NZ RLIC employs field technicians to undertake a range of data collection and the fishermen themselves supply essential information to the annual stock assessment process. NZ RLIC have also instigated industry funded research and development into the fisheries and into compliance strategies. The industry believes this is working well, although there are apparently varying levels of participation around the country.

The oil and gas industry

Environmental monitoring of the ocean currents and the seabed surrounding an offshore rig are carried out by the companies involved in offshore exploration.

Education and training

All six universities and some of the polytechnics have some role in marine research and teaching. The Universities of Auckland, Victoria, Canterbury and Otago all have marine laboratories (Leigh, Wellington, Kaikoura and Portobello respectively). Their investment in marine science is in terms of staff, facilities for research, and teaching.

Aoraki Polytechnic (Timaru), Otago, Nelson, Hutt Valley, Bay of Plenty, Tairāwhiti (Gisborne) Polytechnics, and Manukau Institute of Technology all offer maritime training programmes, as do many private training establishments. Courses range from seafood processing to aquaculture and seafarer qualifications. The Seafood Industry Training Organisation sets skill standards, develops qualifications registered on the national

qualifications framework and promotes training amongst people in the industry

Regional councils

Regional councils have a statutory requirement to produce a regional coastal plan under the RMA. To do so requires information on the resource management issues of most significance to each region, e.g. coastal erosion or accretion, sand mining in coastal waters, and water quality of in-shore waters. Sometimes information is collected through joint studies with other regional and district councils or through networks of Coastcare groups. Their investment in marine information varies from region to region and the extent of monitoring and research programmes required for management purposes (see section 3.8.7).

Other groups

Environmental NGOs, recreational fishers, divers, boaties, and the organisations that represent them, such as the New Zealand Recreational Fishing Council, Yachting New Zealand, the Royal New Zealand Coastguard Federation, are all sources of information on many aspects of the marine environment including the coastal environment.

29 PROGRESS SINCE THE 1990 PCE/OAG REPORT

In 1990 the PCE and the Controller and Auditor-General¹⁹ undertook a joint study on marine fisheries management. Reasons for selecting marine fisheries management for review were:

- the importance of the fisheries as a renewable food source;
- the economic significance of the fisheries, in terms of employment and export;
- the recent introduction of a new quota management system;
- public concern about unsustainable harvesting of the fishery resource; and
- the extensive use of the fisheries for recreational purposes.

"The findings in this report indicate a system struggling to provide the necessary information for management decisions which can control fishing at sustainable levels and ensure sustainability of the fishery resource.

This is reflected in:

- a lack of sufficient information about the fish;

- difficulties in reducing catches and quota;
- insufficient constraint on individual fishing activity; and
- problems ensuring compliance.

Because of the lack of information, there is greater risk and greater personal judgement in making decisions. So far, this decision process is not sufficiently open to identify the basis of decisions or the accountability of the participants.”

Nine years on from that report, this review, although not examining these issues in detail, has noted that:

- there is still insufficient information on the fish stocks managed under the QMS (see Vista 25 What is the status of our fish stocks?);
- there are still difficulties in reducing catches and quota (see Vista 30 Management of orange roughy – ineffective use of information);
- there are still problems in ensuring compliance (see section 3.8.9).

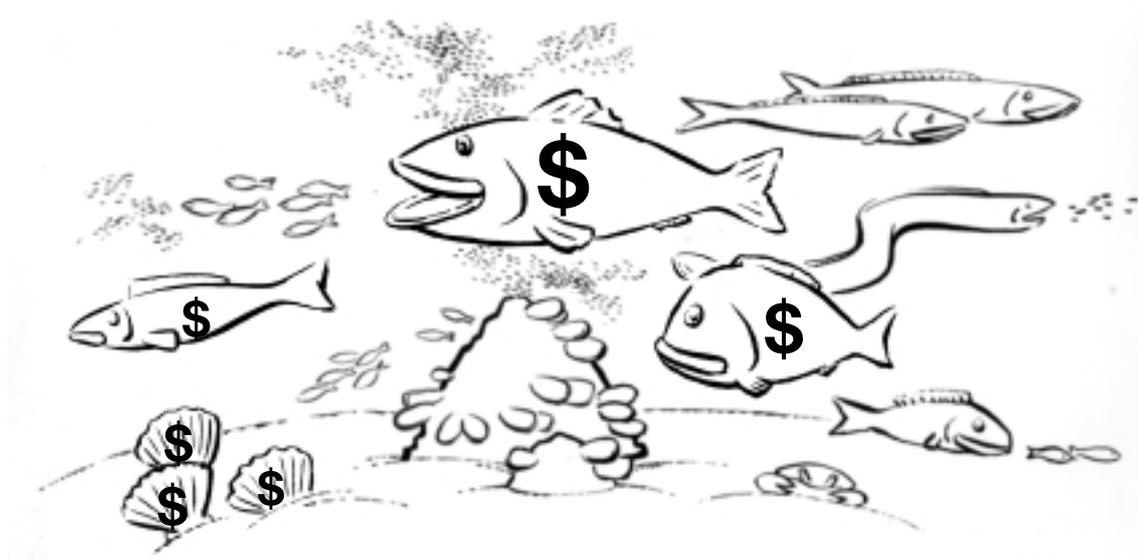
5.5 Issues for effective use of information

Managing the marine environment clearly requires in-depth knowledge by stakeholders on many aspects of the marine environment. Given the size and complexity of the marine environment, it is essential that efficient use be made of all data from all sources – which means efficient transformation of data into information and knowledge for decision-making.

Integration of information

There are strong opportunities for the integration of information generated by different Crown and other agencies (eg the Ministry of Commerce, the Ministry of Fisheries and regional councils) for strategic purposes. However, with each agency responsible only for a particular aspect or area of the marine environment, there are few incentives or effective structures for integration of information to occur. Although some stakeholders, such as the offshore oil and gas industry, have a statutory obligation to lodge information with the Government, this information is not always integrated effectively with other marine information, or utilised for environmental management purposes.

It must be acknowledged that there can be interesting challenges in deciding why and how best to integrate different kinds of information. Information may have been gathered within different frameworks – a geographical area, a particular activity (eg fishing) or infrastructure (eg a new port development), or a particular species or ecosystem. Informal information may be available in various forms, and may need to be carefully and imaginatively managed to gain most usefulness in relation to other data – for example, integrating photographic information with chemical, physical and biological monitoring of particular marine habitats.



Sustainability will mean looking beyond the economic Value of single-species to the values of whole marine ecosystems.



Standards for data collection

Appropriate standards and specifications are required for data collection so that data may be useful beyond the primary purposes for which it was collected. For example, the concept of a 'metadatabase' has been floated by LINZ for all marine survey data. Another example is the MFE Environmental Performance Indicators Programme, which is intended to produce a set of nationally consistent marine environment indicators for future use by a range of stakeholders. Procedures for gathering data so that it will be compatible with data from other regions are being addressed by MFE and regional councils.

Increase in information

The volume of information that will become available, particularly electronic 'ocean mapping', will increase exponentially in the future. The increase in information generated may occur with fisheries, oceanographic, climate and remote sensing data. How this information will be analysed, made available and used for decision-making are matters that need to be addressed within a broader strategic approach to sustainable marine management.

Responsibilities of Government

The responsibilities of the Government to manage the 'commons' have significant implications for marine environmental management. Without sound ecological information as the foundation for understanding the marine environment, sustainability of this environment may not be achieved. With the recent shift of responsibility for collecting fisheries information from the Government to the industry, there have been different expectations of what information is required from whom. Environmental NGOs and some marine scientists have grave concerns about the differences between the collection of sufficient management information to run a commercial fishing enterprise, and the level of research about ecosystem functions necessary to assess the wider issue of whether the marine environment is being sustainably managed for all stakeholders. **These concerns are valid.**

The Government's apparent policy of reducing its funding for marine research, and the introduction of cost recovery for the seafood industry, has caused the Ministry of Fisheries' research focus to

narrow and reduce investment in ecosystems and wider environmental research. This is notwithstanding the sustainability imperatives contained in the 1996 Fisheries Act.

Ownership of data

Critical issues have arisen over the ownership of data, and the information generated from that data. The Crown's funding of research through the PGSF is one example where there have been tensions between the public interest and private concerns. Information should, in theory, be available to other Government agencies for public good purposes, but in practice some science providers are reluctant or refuse to release information that they have gathered because of intellectual property considerations. Commercial advantage and sensitivities may also be given as reasons for withholding information. These issues have arisen partly as a consequence of the Government establishing a regime where science providers are in competition with each other.

Other issues

There appear to be other impediments to currently available information being used in more efficient ways to improve environmental marine management. They include:

- the policy/provider split in terms of fisheries information where the researchers and the policy makers are in separate organisations and where policy analysts may not seek appropriate information;
- the time taken to collect, collate and distribute information to stakeholders within central Government agencies; and
- the lack of consistent frameworks for compiling trend information.

5.6 Application to management

Information is the key to good decision-making. Without it, marine sustainability or 'asset management' or enhancement can be misdirected; investment decisions may be handicapped; there may be inadequate awareness of the returns to be gained from particular management approaches. Without sufficient ecological information as the foundation for understanding and managing the marine environment, sustainability may not be achieved and other benefits may not be realised.

The ability of ecosystems to thrive and evolve and to retain their biodiversity is poorly

understood in the context of the marine environment. However, there are always going to be gaps in knowledge of the functioning of ecosystems. It would be extremely difficult and expensive to fill all the gaps. Nevertheless, where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. Where major changes in marine populations have occurred, there is no guarantee that the change can be reversed or that a more stable ecosystem will develop in place of the original ecosystem. Change to ecosystems may be sudden, subtle or cumulative, and in the complex marine environment may be unexpected. There is clearly a need for a risk-based approach to changes in the marine environment brought about by human activity due to the uncertainties in the data gathering phases and in recognition that fully comprehensive information for management purposes may never be accumulated (see Vista 19 Chaos at sea – the application of chaos theory to fisheries management).

There are a number of strategic issues within the ambit of information requirements for sustainable marine management that have not yet had sufficient debate as to their advantages and disadvantages:

- the need for an integrated strategic marine/oceans focus and what this means for research and information needs;
- identification of the gaps in information and knowledge to ensure that marine environmental impacts can be more effectively managed;
- who should be investing in information to assist managing the marine 'commons';
- who owns information and who has access to it for what purposes;
- how to integrate formal and informal knowledge for sustainable management purposes;
- how to effectively use information that is currently available and that which will be generated in the future;
- there are instances where information generated is not passed on to the stakeholders in a timely manner; and
- there is a difficulty in disseminating research information to stakeholders who are not organised into effective groups and who have few resources.

Need for an information strategy

Before identifying information needs, an information strategy with clear objectives for marine management should be developed and agreed among the stakeholders. Without such a strategy, data collection and information use may not be focused on the critical information needs and gaps.

In general an information strategy should address:

- the need for baseline information, particularly where information on status and trends of marine populations is required;
- the reliability of data, and the development of standards and procedures for gathering data; and
- the commercial confidentiality of some information and how to use some of this data for defined purposes.

30 MANAGEMENT OF ORANGE ROUGHY – INEFFECTIVE USE OF INFORMATION

The following quotes have been used in successive reports on Fisheries Stock Assessments and Yield Estimates (Ministry of Fisheries 1997, 1998 and 1999) in May 1997 (see p 226), May 98 (see p 236), and May 99 (see p 248):

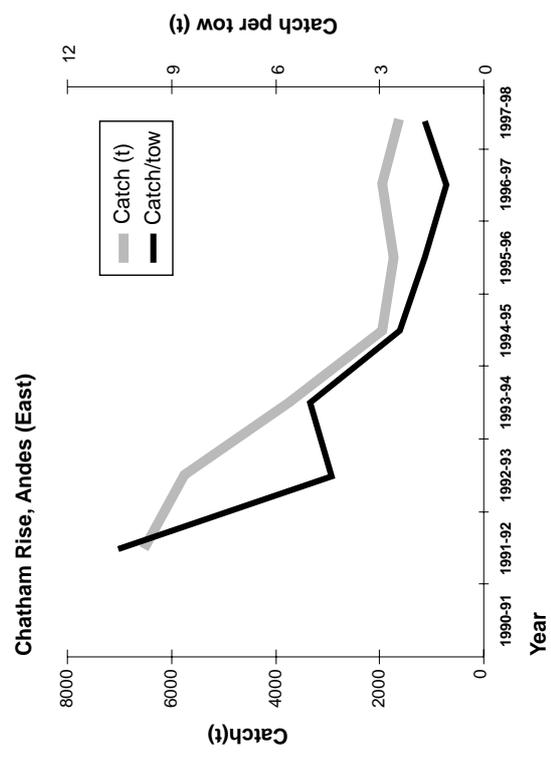
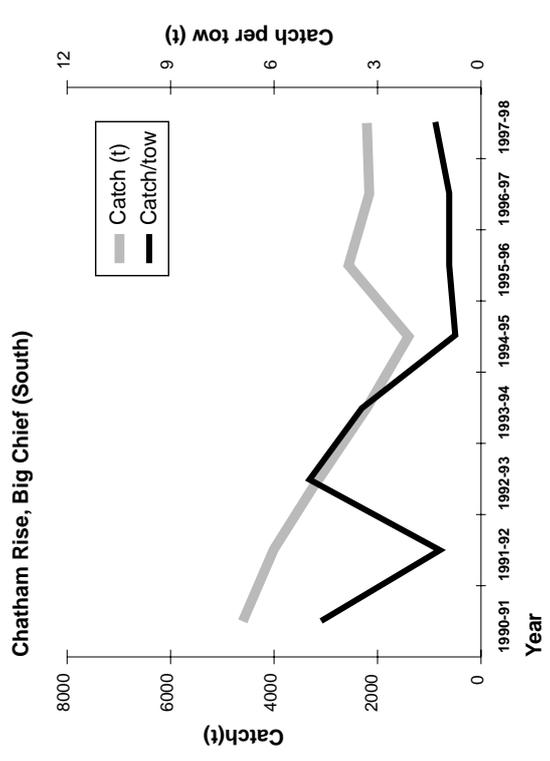
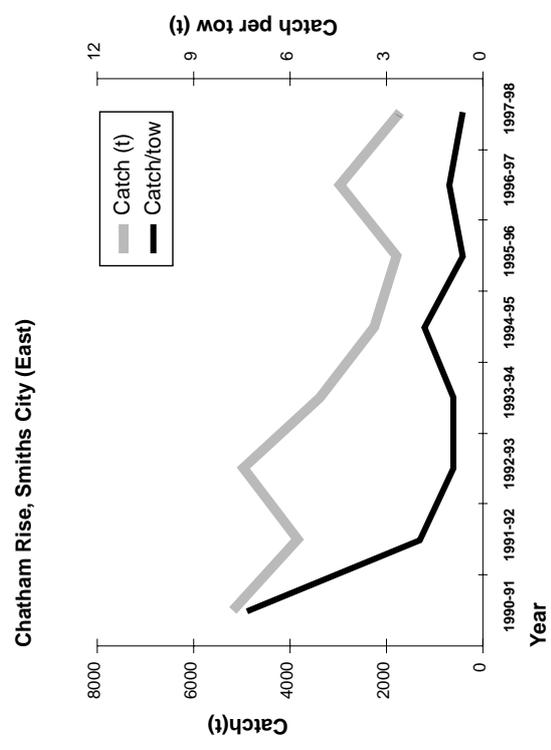
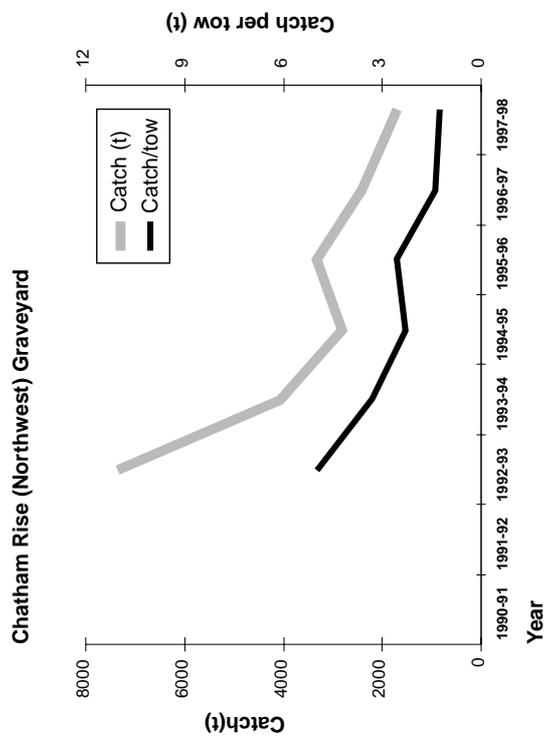
“On the Chatham Rise, the overall catch rate (for target tows) fluctuated around 8.1 t/tow from 1979-80 to 1986-87, dropped to around 6.1 t/tow for the next six years, and has dropped further to around 3.1 t/tow for the last three years.”

“Several major hills on the South Rise that were important in the late 1980s do not support their previous levels of catch. High catch rates can still occur, but these are sporadic, and it seems the hills need to be ‘rested’ between fishing episodes. Since 1992-93, more than 50% of the Chatham Rise catch has come from 4 hill complexes, all of which have shown substantial declines in catch rate.”

In 1992 the previous PCE, Helen Hughes, carried out an investigation of the long-term management of the Orange Roughy Fishery in quota management area ORH 3B (PCE, 1992). She concluded that “successive Ministers have failed to respond appropriately as new scientific information on the state of the fishery has emerged”.

The following graph shows what has happened on the four important hill complexes on the Rise up to and since 1992.

The Orange Roughy Fishery on the Chatham Rise: Catch and catch per tow statistics on four seamounts 1990–1996/97



A recent NIWA study (Clark, 1999) of commercial catch and effort data showed strong declines in catch rates over time, and a pattern of serial depletion of seamounts along the Chatham Rise, as the fishery moved progressively eastwards to unfished seamounts along the southern margins of the Rise.

5.7 Public awareness and education

Information is critical in improving wider public awareness as well as for the specific requirements of marine and fisheries management and policy-making. An informed community is essential, whether at the local level, where hapū, whānau, residents groups and individuals have a focus on a particular place or resource, or at the national level across the broader spectrum of the New Zealand public.

Some interested groups have a strong knowledge base, and various initiatives have been undertaken to raise awareness and disseminate information. However public understanding of marine and fisheries matters, and of the environmental issues at stake, is highly variable. A number of factors have contributed to the low profile and limited understanding of marine issues.

The media and public awareness

News media attention to marine issues usually centres on the more dramatic stories where conflict, crisis or controversy provide a point of focus. The overfishing of Patagonian toothfish in the southern oceans, and the dispatch of one of New Zealand's new frigates on a deterrence mission in February 1999, made exciting stories. Concern about unsustainable fishing practices closer to home generated media attention around the protests about Spirits Bay (see Vista 12 Piwhane – Spirits Bay: a unique ecosystem). Stories about poachers and their hauls, usually of crayfish or paua, appear relatively regularly – these stories invariably emphasise the large quantities taken. Northland fisherman John Hikuwai's illegal harvesting of 4.5 tonnes of snapper and the subsequent controversies received extensive coverage. Items on coastal pollution and summer season reports of beach coliform statistics draw attention to local environmental degradation. Local papers pick up on site-specific issues, such as the objections of tangata whenua to sand mining at Mangawhai Heads and at Parengarenga Harbour, and the rāhui imposed by iwi and hapū for the protection of coastal resources.

Features on marine policy and statutory provisions tend to centre on conflicts and disagreements between different stakeholder groups. Examples include the ongoing difficulties of determining an allocation system for fisheries assets for tangata whenua, and the response of fishers of non-QMS stocks to the Minister's recent announcement that compensation would not be provided for the proportion of these fisheries that would be allocated to Māori when these fisheries come under the quota system. Media coverage of marine reserve proposals usually focuses on the tensions amongst different community groups. A visit by international conservationist David Bellamy and Prime Minister Jenny Shipley to Wellington's Island Bay, where a south coast marine reserve is proposed, generated a story headlined "Marine reserve battle predicted", highlighting the opposition of local commercial fishers to the reserve.

There are also relatively frequent 'good news' stories and interest pieces, notable for their lack of depth and their isolation from the wider context of environmental concerns. These media items include pieces on the more adventurous, high-tech scientific projects, such as the deep-sea submersible explorations and the quest for the giant squid off Kaikoura. There are also the photo opportunities organised for public relations purposes or to enhance political profile.

The nature of the news media in the late 20th century must be acknowledged. The media will utilise the kinds of information and follow the kinds of directions that make a good story. This is not necessarily the same as providing comprehensive information, educating the public, or encouraging broader understanding of obscure and complex issues. Some feature writers in the larger papers and magazines develop more detailed studies, but often the matters that environmental and policy managers are grappling with are just not considered newsworthy.

Radio New Zealand runs two regular science programmes, "Eureka" and the "Discovery" series on National Radio. Television in New Zealand offers few programmes on marine environmental issues; those that do screen here are usually from overseas, such as the popular Discovery Channel, rare documentaries or entertainment series. New Zealand on Air production priorities are for 'people stories' with local content. No New Zealand environmental science programmes have been funded since the



mid-1980s, although recently a general science series for junior school children was produced. Fishing programmes however screen fairly regularly, with advice and hints for recreational fishers, and scenic footage of some of New Zealand's best fishing locations, the most recent one being "Gone Fishing".

The Cousteau Society, now headed by New Zealand yachtsman Sir Peter Blake, has a well-established global educational and media profile based on the pioneering work of the late Jacques Cousteau. Sir Peter is enthusiastic about the opportunities in film, television and the internet. The visual magic of underwater creatures and their environments is an extremely powerful tool, not only for children but also for adults, to increase awareness of the beauty and complexity of marine biodiversity, and thus build public commitment to more environmentally friendly behaviours.

The Oceans Society, established in New Zealand in 1975, coordinates an annual photographic competition for underwater photography. In 1998 over 1100 images were entered by photographers from around the world. Other marine advocacy undertaken by the Oceans Society includes sponsoring work with Hector's dolphins and promoting the ethic of taking photographs rather than taking fish.

The magazines and campaigns of conservation NGOs often feature articles and images of marine species and underwater and coastal environments.

Educational programmes

Environmental education does not have a strong profile in many New Zealand schools, nor is there any purposeful focus on marine and coastal concerns. At the policy level there have been initiatives to encourage the development of programmes for environmental matters generally, but there has been no purposeful focus on education on marine issues.

The Ministry for the Environment has prepared a national strategy for environmental education, and compiled a directory of environmental education resources that does include a section on "Coasts". The Ministry of Education has recently produced *Guidelines for Environmental Education in New Zealand Schools*, to assist teachers to incorporate environmental education across the seven learning areas of the school

curriculum. The extent and focus of environmental programmes in any school is determined locally by each school and its Board of Trustees, which has the power to implement (and fund as it can) educational development initiatives (EDI) in curriculum areas. Popular study topics on marine themes, such as "The Rocky Shore", are undertaken by many primary schools.

The Department of Conservation is no longer directly involved in conservation education work with schools. The department's Conservation Week programmes each spring have not given any priority to marine issues, although in 1993 the Conservation Week theme of *Living Places: Whaitua Oranga* included materials on coastal and estuarine habitats.

Seaweek is held in March each year, and is coordinated by MESA, the Marine Education Society of Aotearoa, a voluntary collective of educationalists and scientists working in the marine environment. MESA's vision is to "create an awareness and knowledge of the marine environment so that all New Zealanders take personal responsibility for their interactions with it". The society organises conferences, teacher workshops and snorkelling trips, and produces and distributes educational materials through its two resource libraries. MESA's efforts however have been constrained by lack of funding; time is spent trying to secure resources and sponsorships, rather than being able to concentrate on educational activities. Networks amongst teachers are strong, but liaison with official agencies has been frustratingly ineffectual in terms of advancing MESA's goals for marine education.

Similar difficulties face individual schools' initiatives. The enthusiasm and commitment of particular teachers is vital to get projects under way.

31 SCHOOLS' INITIATIVES: A SAMPLE

Kamo High School has been involved with the marine environment throughout the 1990s, with each year's seventh-form students participating in an ongoing project studying the wildlife and ecosystems of Whangarei Harbour. The school has developed a proposal for three marine reserve areas: mangrove forests at Waikaraka, tidal mudflats around Motumatakohe or Limestone Island, and the rich diversity of underwater life at Motukaroro at the mouth of the harbour. The project has incorporated different curriculum areas including geography, science and mathematics; the creative aspects include written articles and an illustrated children's book, *The Adventures of Captain Crab*. The students undertook surveys and advocacy within the school and the wider community. Tangata whenua, Ngāti Wai, have been involved and given encouragement. There has been advice from scientists from the Leigh Marine Laboratory. However, the project has been undertaken on the proverbial shoestring and has depended heavily on the personal commitment of staff and students.

Marlborough Boys' College has begun a project to study fish habitat in Kenepuru and Queen Charlotte Sounds. Groups of sixth- and seventh-formers take weekly water samples from key points in the Sounds for analysis. Samples taken through the summer spawning period give baseline data on snapper and other species' eggs, small larvae and plankton; students also test the temperature, clarity of the water, salinity and pH levels, information that will help to establish the impacts of land-based activities on the marine environment. The project has had support from the local recreational fishers and advice from NIWA, but resources are a problem. Funds are scarce for practical requirements such as travel costs or good quality microscopes to analyse the samples. Again staff impetus has been crucial in developing the project.

At Te Puru Primary School on the Thames coast, marine studies are a key part of the school's wider outdoor environmental education programme. Every child in the school has been involved, surveying shellfish, monitoring water quality and beach debris and plastics, and learning about global climate change through tracking the direct effects of coastal erosion on the foreshore in front of their classrooms. Nine and ten-year-olds collect samples on measured transects off the seawall, and carefully record the sizes and numbers of the species found.

The project has received encouragement and support from the Ministry of Fisheries Adopt-a-Beach scheme,

from the regional council, and from local iwi, who have established a rāhui over the area. However the project is hampered by a lack of resources. The Ministry of Education advised the school that such discretionary initiatives must be funded from within their operational budget. Te Puru staff feel strongly that this policy stifles innovation and the pursuit of locally relevant priorities. They need such basics as sieves to sift the sample material, nets and microscopes, and wetsuits for winter surveying; maintaining the school's kayaks is an ongoing cost. The logistics of running the project have also not been easy – in particular freeing staff from the classroom to organise and supervise the outdoor work. Nevertheless the children's enthusiasm is strong, and Te Puru's long-term goal is for a wider programme bringing together other schools in the district and developing a comprehensive marine education centre.

Other agencies and private organisations also undertake marine educational work:

- Kelly Tarlton's Underwater World at Orakei in Auckland runs a range of educational programmes for schools from all over the North Island. Most programmes involve parents as well as students; overnight sleepovers at the aquarium are very popular. The educational programmes are carefully targeted to suit the levels and interests of each school group. Older students tend to work more at the ecosystem level, while younger children focus on particular animals – favourites include sharks, penguins, crabs, seahorses, piranha, and moray eels. Kelly Tarlton's integrates conservation messages with information about sustainable use of marine resources. Information packs and educational resources have been developed for schools and the general public. The wider public awareness opportunities are significant, with large numbers of tourists and Aucklanders visiting the aquarium each year.
- Whalewatch Kaikoura developed education kits and a video on whales for Form 1 and 2 students in all New Zealand schools. Information sheets and activities are available on topics such as sonar, whale communication, feeding and habitat, and a website allows children to ask questions about whales and other marine wildlife.
- Seafriends is a private marine educational centre based at Leigh near the marine reserve.



Offering guided trips and snorkelling expeditions, educational programmes and an aquarium, Seafriends provides marine experiences and information to 3000 school children and 1000 senior citizens each year. There is a strong emphasis on the wider environmental interrelationships between land and sea, exploring the impacts of land-use, waste management practices and climate change on marine and coastal environments. The Seafriends website offers information and articles on marine and wider environmental issues.

- The Portobello Marine Laboratory on the Otago peninsula, a unit of the Otago University Marine Sciences Department, runs educational programmes for children and students from pre-school through to post-graduate levels, for the general public and senior citizen groups. "Touch tanks" give the opportunity for hands-on contact with smaller creatures including anemones, sea snails and slugs (the instruction is "stroke, don't poke"). The centre offers aquariums, shark tanks, art programmes and a range of guided shore walks and outdoor activities. A new feature, developed in conjunction with Otakou marae nearby, is Te Aka o Matamata, a beachfront interactive display of traditional Māori fishing tools and techniques. A wide selection of publications and materials has been developed.
- The Island Bay Marine Education Centre on Wellington's south coast also offers live displays, hands-on activities, tours and educational programmes. Since 1996 some 20,000 school children and more than 20,000 preschoolers and adults have experienced the Centre programmes; regular Open Weekends attract between 500 and 1,000 visitors. A sense of guardianship for Wellington's unique southern coast and harbour environment is encouraged, as well as a sense of the extraordinary diversity and fascinating weirdness of the region's marine life. The long-term vision is for the development of a purpose-built marine conservation centre on the Wellington coast, to include a habitat-based aquarium, and a small aquaculture research and training facility.
- An educational programme on marine environmental issues was developed by NIWA

and the Royal Society of New Zealand, based on the 1998 research voyage of the Tangaroa. A daily diary of the expedition was posted on the Ocean Voyage website for schools to follow the work of the marine scientists on board the ship; an information pack covered topics such as: plankton and the food chain, the ocean floor, hydrothermal vents, undersea sediment flows, fish physiology, fisheries management and sustainability, marine reserves, tidal and wave action, currents and climate;

- Each year NIWA, together with corporate sponsors, provides ship time on the Kaharoa, for 6th and 7th form students. Called the Sea and Learn programme, it provides a unique opportunity for New Zealand high school students and teachers to experience "real-life" marine science, and to observe NIWA's scientists at work.
- The Royal Society Alpha series of science and technology resources provides information for students and teachers on topics including "New Zealand Hoki" on the fishing industry and the QMS, "Whale research", and "El Nino – La Nina".
- Regional councils also undertake educational programmes for schools and their local communities. One example is "Life's a Beach", a coastal education programme produced by Environment Bay of Plenty for secondary schools, with the objective: "to highlight the beach environment and most importantly the sand dunes and the role they play in protecting our beaches". A video and teacher's folder encourages appreciation of the complex natural character of coastal and dune environments.

These brief outlines of marine environmental education and awareness initiatives give some indication of the eager market both amongst schools and the general public for such information. The popularity of marine wildlife programmes, booked solid months in advance, is evidence that many New Zealanders want to learn more and to enjoy a different kind of natural experience.

The range of different programmes currently available reflects the diversity of marine ecosystems and the equal diversity of human interests. The flexibility to target specific issues or topics, and to develop programmes that reflect

and satisfy local or regional community priorities, is critically important for the relevance, and thus the effectiveness, of marine education and awareness programmes.

However, the ad hoc nature of New Zealand's initiatives in educating students and the general public about the marine environment is a major strategic weakness. The various activities lack any integrating framework and, despite the efforts of groups such as MESA, there is little coordination or efficient collaboration. Marine education and awareness work in New Zealand needs greater coherence and official support – in funding, in training and guidance for teachers and facilitators, in practical matters such as the administrative logistics for outdoor educational programmes, and in wider political recognition and endorsement.

The current limitations may be obscured by the efforts of individuals, volunteers and agencies who have made progress with particular educational initiatives. But the constraints on environmental education and communication, and the consequent limitations of public awareness of marine issues, are a serious risk for the future management of New Zealand's natural resources. Achieving environmental sustainability will require a public that understands the nature of the resources, the reasons why they are important, and the environmental implications of certain actions and practices.

References for chapter 5

- ¹ New Zealand Seafood Industry Council, 1998: *New Zealand Seafood Industry Foresight Strategy*. October 1998. Wellington.
- ² Marine information investment is defined as information collected or generated to assist in statutory and other responsibilities of Government.
- ³ Financial data all GST inclusive and taken (unless otherwise stated) from the "Estimates of Appropriations" for the year ending 30 June 1999.
- ⁴ Vote:Lands D6 topographic and hydrographic services – total \$24.9M, \$18M (excl. GST) is spent on hydrographic contracts, with about \$6M allocated to the RNZN. About \$1M is allocated from D3 provision of the survey system, and D4 land title services.
- ⁵ These figures exclude the commercial fishing industry's cost recovery contribution – \$11.8M for management research, and \$27.3M for other fisheries management operations. (Based on Tables A, B, page 14 MFish *Proposed nature and extent of fisheries services*, February 1999). GST has been added to the figures.
- ⁶ Marine projects only. Information from Royal Society of New Zealand, August 1999.
- ⁷ Output 6, \$ 1.42M, Output 16, \$ 1.55M ie 80% of Output 16 NSOF is spent on marine projects. Source: MoRST,

August 1999.

- ⁸ Vote: Research, Science and Technology D1 & O8 policy advice, D2 & O1 contract management, O5 international science links, O9 science promotion, O12 publications.
- ⁹ Vote:Biosecurity D5 – MAF, marine portion of total \$29.9m is unknown.
- ¹⁰ Vote:Biosecurity D12 to DOC – eradication, and Vote:Biosecurity D13 to MFish.
- ¹¹ Part of Vote:Health in 1998/99 to fund 17 contracts for the monitoring of biotoxin levels in non-commercial shellfish beds to determine risk to public health.
- ¹² Estimated marine activity portions of surveillance and search [Vote: Customs D12, \$24.6M] and check and clear [Vote: Customs D10, \$11.0 M].
- ¹³ Vote:Energy D2 – A total of \$5.6M for management of the Crown Mineral estate but a marine portion for petroleum licences is unknown. Over \$1 million is allocated for storage and maintaining the repository of commercial exploration data provided as a statutory requirement by licence holders.
- ¹⁴ In addition, MSA uses oil pollution and marine safety charge levies which were \$2.3M and \$11.3M respectively in 1998/99.
- ¹⁵ Estimated 13 FTE staff (NZ and overseas) working on marine-related issues.
- ¹⁶ This figure is for marine projects in the South Pacific area only, administered by MFAT.
- ¹⁷ Estimated value \$5.81M provided by DOC, June 1999. Excludes the conservation services levy but includes a \$199,000 MoRST grant for seabird research.
- ¹⁸ Estimated value for indicators programme taken from MFE's *Marine environmental management stocktake – Summary* June 1999. Other information from MFE.
- ¹⁹ Controller and Auditor General and the Parliamentary Commissioner for the Environment, 1990: *Marine Fisheries Management*. The Audit Office and the Office of the Parliamentary Commissioner for the Environment, Wellington.

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FUTURE VISION – It's 2043: The Heat Is On

It is the year 2043. Despite valiant international efforts to halt global warming, the “fossil” policies of some nations have resulted in accelerated rates of global warming. A 3.5°C rise in global temperatures has led to worse than expected impacts on land, in the coastal zone, and at sea. The words of the global warming sceptics have been drowned out by large-scale inundation of low-lying coastal areas, the precipitous loss of biological diversity, devastating changes in the composition of commercially valuable species, and a massive loss of prime agricultural land.

All aspects of New Zealand's social, economic and ecological realms have been affected. Let us take a look at how the goals and objectives of various interests reacted to the climate crisis and how these in turn were reflected in policy and regulation.

FISHING INDUSTRY

In 2010 Government placed a “green incentive” on the commercial fishing sector. This scheme was based on the belief that competitive marketplaces would only work if industry paid the full cost of production. Negative environmental and social externalities incurred should be reflected in the price of the product. It became quite clear that integrating cost into pricing was a critical pathway to innovation and sustainable industries. Innovation and resilience had been identified early on as key factors in coping effectively with the added societal stresses associated with climate change.

In 2014 the FAO announced that global overfishing was now affecting 92% of all fish stocks. This statistic, coupled with the “green incentive” and growing consumer pressure for “green” fish, led the fishing industry to voluntarily adopt “Standards for Sustainability”. Tangata whenua, as a major force in New Zealand fisheries since late last century, took an early lead in developing the Standards, bringing together other industry groups, recreational fishers, and environmentalists for critically important conceptual discussions at the Kaitiaki Kaimoana series of hui and meetings in 2016 and 17. The Standards were so successful at meeting the goal of “sustainable marine ecosystems” that they were embodied in law in the Marine Ecosystems Act 2021.

The Standards made it mandatory to:

- Manage interactions between target fish and predators, competitors and prey species, interactions between fish and the ecosystem, the effect of fishing on the environment, and effects of climate on marine ecology.
- Shift the burden of proof so that fishing is allowed only after it is shown that healthy and diverse fish populations and marine ecosystems will not be negatively impacted.
- Rehabilitate the destructive impacts of former fishing practices on fragile marine habitats and ecosystems.
- Reduce bycatch and discards to levels approaching zero.
- Develop and maintain indicators of marine ecosystem health at the genetic, species, population and ecosystem level.
- Buy “Marine Insurance” requiring:
 - (a) fish populations to be maintained at a high percentage of the unfished biomass,
 - (b) fishing not to endanger fish species or prevent recovery.
 - (c) the application of the Precautionary Principle to all fisheries.
- Apply sustainability principles to the entire production cycle. For example, packaging reduces, re-uses, and recycles raw materials; energy consumption is strictly monitored and reduced to minimum levels; and CFCs, HCFCs, HFCs and other chemicals that are ozone depleting or contribute to global warming have been minimised and/or eliminated in all phases of production.

In 2032 New Zealand received a United Nations award for marine environmental management. The New Zealand “model” is now being applied in all the world's oceans.

In the 20s tangata whenua within the industry built a strong international branding and marketing strategy around the kaitiaki ethic, which had especially powerful appeal in the United States and Europe. As a result, over the last ten years the export value of New Zealand's distinct “green” fish products has grown consistently, at a rate of 10% per annum. Our seafood exports are enjoyed by millions worldwide and are vastly more profitable than lamb or butter ever were.

COMMUNITIES AND NON-GOVERNMENTAL ORGANISATIONS

Having won the corporate-sponsored competition, “Coping with Climate Change”, the New Zealand Association for Environmental Education and the New Zealand Marine Sciences Society utilised their combined winnings of \$6.5 million to develop marine environmental education and research centres in all of New Zealand’s major coastal cities. Their initial priorities – to identify and integrate the diverse range of issues, information and stakeholders in the marine environment – were paralleled by the government’s recognition that the embarrassing information gaps and communication failures of the last century were putting New Zealand’s marine environment, and the communities and businesses that depend on it, at risk. The strong representation of tangata whenua, NGOs and local communities in the 2006-7 revision of New Zealand’s marine legislation was crucial to the viability and public acceptance of the new laws. The review also allocated \$10 million for research, education and network building, which went into the expansion of the NZAEE and NZMSS projects.

The quality and innovation of the science carried out by this network of laboratories is now world-renowned. Each year there is keen competition for places in the visiting scholar and post-graduate research programmes. Environmental education is an integral part of the curriculum for all New Zealand children, on par with sciences, language and geography in terms of academic importance. Research labs have been developed on the larger coastal marae, schools and wananga. Hands-on involvement of local people is a key principle, from pre-schoolers doing their first cockle surveys through to groups like the Grey Blues, the senior citizens’ coastal monitoring network. The immediacy of marine information-sharing, giving community groups instant connections into national and international systems, has allowed them to develop innovative and locally-relevant solutions to resource management questions.

The Pacific Bioregional Marine Conservation Area (PBMCA) used its 25th Anniversary celebrations to recognise the economic, ecological and cultural benefits that resulted from incorporating well over half of the New Zealand

EEZ in a system of functional management zones. Ecologically-derived boundaries were developed to regulate use on an area by area basis. Decision-making was grounded in key ecological principles aimed at maintaining biodiversity and ecosystem health. From the outset, the results were closely monitored via a complex set of environmental indicators. Twenty-five years later the result is clear — high levels of biodiversity, vibrant coastal waters rich in kaimoana, sound local economies, robust and comprehensive information and research systems, and communities all over New Zealand calling on the PBMCA community management team to assist in setting up bioregional reserves in their area.

SCIENCE AND INFORMATION

The predicted impacts of global warming threatened to alter the structure, function and species composition of New Zealand’s marine environment. Back at the turn of the millennium, New Zealand scientists recognised that knowledge, resilience, and creative adaptation would be vital to maintaining healthy ecosystems in the face of climate change.

The radical work of scientists at NIWA and at the New Zealand Institute of Computer Science led to the development of the EnviroInfo System, now the basis for the World Court’s Ecosystem Management Programme. This system was the first of its kind, allowing for the integration of quantitative and qualitative data, bringing together the new developments in technology with the rich information resources from community programmes. Tangata whenua were at the forefront from the early stages, working to maximise the benefits from 21st-century applications of traditional matauranga Māori. The widespread utilisation of EnviroInfo through schools, universities, marae and local community centres has built in New Zealanders a keen understanding of the complexity and connectivity of the marine environment, as well as its associations with geological, hydrological, climatic and other biological systems.

The science of ecosystem modelling and managing under multiple uncertainties (including climatic events, chaotic systems, and, in the early years, lack of information) was soon perfected in the New Zealand system. Gone are the days when scientists had to prescribe management measures



based on a single-species approach. By the 20s, management plans for an individual fish stock were replaced with management plans for entire ecosystems.

The Fishery Ecosystem Plan (FEP) was one of the first tools developed for research and management. The Plans, which are based on a model developed by the US Congressional Ecosystem Advisory Panel, contain information on ecosystem structure and function as well as species composition, so that the ecosystem effects of individual management decisions can be evaluated. The FEPs include the following elements:

- Delineation of the geographic extent of ecosystems;
- Development of food webs models;
- Quantification of habitat required (at all life history stages) by species that function as “keystones” in the food web;
- Calculation of total removals, including bycatch and discards, and a quantification of how these removals relate to overall biomass, ecosystem production, optimum yields, natural mortality and trophic structure;
- Assessment of the amount and types of scientific uncertainty, which are then used to develop ‘buffers’ for integration into conservation and management plans;
- Establishment of indices of ecosystem health that serve as targets for management.

The FEPs have proven to be critical in preventing the loss of biological diversity and the erosion of ecosystem function. The model has been adopted globally.

COASTAL ZONE MANAGEMENT

The big storms of 2025-26 are still remembered for wreaking staggering ecological and economic losses along New Zealand's coasts. Over 200 homes were swept out to sea. Vast areas of sensitive estuarine habitat were permanently flooded leading to a critical loss of prime bird breeding habitat. As a result of these tragedies, the sensitivity and vulnerability of coastal areas was reflected in policy development.

Commercial and residential developments on dunes and in other vulnerable near-shore areas are now strictly regulated. New coastal complexes have been designed along ecological principles taking into account the 80 centimetres rise in sea level and the increased frequency of storm surges.

The importance of the links between coastal and upstream environments, and of protecting critical inland habitat for coastal species, was recognised as a key recommendation from the 2005 Waterways Symposium. Several initiatives emerged from the Symposium, which opened the first 25 of the elver hatcheries that since then have been established on most New Zealand rivers. The establishment, by 2009, of environmental plans for forests and farms endorsing ‘zero-waste’ principles has enhanced rural practice and led to huge reductions in soil erosion, sediment load and fertiliser/pesticide run-off.

The resolution of Māori claims to the Waitangi Tribunal for coastal and foreshore areas gave a solid basis for a management kaupapa where iwi and hapū work closely with local communities and official agencies on the improvement, protection and appropriate utilisation of resources and the coastal environments that sustain them. River management partnerships have been forged between many iwi, hapū, community groups, farmers and businesses, integrating riparian restoration and water-quality programmes with the work of coastal marae in maitaitai and mahinga kai management. Throughout the 20s and 30s, many dams, culverts and causeways were removed and the natural character of streams, rivers and estuaries has been restored with a concomitant increase in overall biological diversity.

Threats of ballast water and sewage to coastal and off-shore biodiversity are now a thing of the past. Government regulations made on-board “pest” processing facilities mandatory on all vessels and implemented world standards for on-shore waste handling facilities.

AQUACULTURE AND MARINE FARMING

Rising sea levels and the boom-bust cycles experienced early in the century, resulted in the creation of new regulations in 2012 which ensured that aquaculture development proceeded with caution. Improved knowledge of the ecological risks guided the placement and total numbers of “farms”. Since 2012 projects have been concentrated in designated “aquaculture areas”. Sites have been chosen in consultation with tangata whenua and other community interests, and planning is guided by strict ecological and economic criteria. Coastal uses associated with the aquaculture industry have been integrated with New Zealand's coastal

network of taiapure, maitaitai, and marine reserves.

These criteria ensured that the needs of the environment were protected while creating a context of stability for the extraordinary development and consolidation of local and regional business enterprises in the 20s, and the subsequent drop in New Zealand's unemployment. As a direct result, export markets have expanded significantly, as has local demand.

PUBLIC AWARENESS AND EDUCATION

In 2009, the successful eco-tourism ventures in Kaikoura and Fiordland were expanded to include submersible tours in Cook Strait, Dusky Sound, the Kaikoura canyon and several spectacular seamounts in the New Zealand EEZ. A landmark was reached in 2034 when in the 25 years since their inception, over 10 million people had visited these new attractions. The two major eco-tourism companies shared the Global Green Business Award in 2040. For decades now, the tourism industry has been New Zealand's greatest contributor to Gross National Product. Our eco-tourism model is imitated throughout the world, in particular the integration of tourism with environmental monitoring and restoration which was pioneered in the second phase of the submersible programme.

New Zealand video and educational programmes are steady earners of overseas income through global net links. The immense world-wide popularity of the New Zealand drama series "Torora Bay" in the early teens encouraged interest amongst US and European audiences for marine imagery and information on our Southern oceans. This early block-buster was the starting point for the Southern Film Renaissance, which has utilised the scenic beauty and natural state of New Zealand's marine and coastal environment, and launched the careers of the New Zealand stars and film crews who went on to dominate world film and video in the 20s and 30s.

AIR FORCE, COAST GUARD, MARITIME SAFETY AUTHORITY, AND NAVY

The "Hoki Wars" in the first decade of the century resulted in the establishment of the Blue Force, a combined strategic integration of Air Force, Coast Guard, and Navy operations which allowed for the intensification of marine border patrols in

New Zealand's vast EEZ. Increased surveillance was necessary in order to protect our rich waters from the 'empty sea' poachers—vessels from areas that are now devoid of marine life as a result of rising sea temperatures and overexploitation—and to protect underwater communication cables.

Patrols were upgraded again in 2028 with the discovery of the immensely valuable properties of the yellow stickle-squirt, the invertebrate found only in New Zealand waters, that has since the early 30s made cancer a thing of the past. Patrols were also intensified in response to a biosecurity Blue Alert following the black sponge infestations in New Zealand harbours in 2032.

GOVERNMENT

An Oceans Resources Strategy of 2010 was a key platform for the development of the Marine Ecosystems Act of 2021

The Principles of this Act underpin all marine and coastal management, basing New Zealand systems firmly in the fundamental framework of:

- ecological information regarding basic biodiversity, and the function and structure of ecosystems,
- the value and significance of natural resources and environments to people and communities, and
- the effects of economic developments, urban centres and primary industries on coastal and estuarine environments.

Conservation and sustainability matters are assumed to consist of scientific, economic and social/cultural aspects. Although emphasis will vary, all three aspects must be considered and included in policy development. Assessment of possible ecological and socio-economic effects of resource use should precede proposed use, as well as the expansion or restriction of an existing use.

A critical aspect of the Principles are their development and recognition of a role for government – both central and local – that enables the maximum possible involvement of ordinary New Zealanders in marine and coastal management. The fishing industry, iwi and hapu, recreational users, local residents groups, academics and environmentalists have all been active in the projects that have been supported under the Principles, and in the ongoing monitoring that has been so critical to

maintaining credibility both within NZ and globally. As a result of closer participation and greater public acceptance and understanding of marine management requirements, the high value of major monitoring systems that constantly enable the health of marine ecosystems to be determined has been widely accepted by all parties.

6 CONCLUSIONS AND RECOMMENDATIONS

This wide-ranging study of the management of New Zealand's marine world has outlined a picture that is full of opportunity, yet deeply disturbing in its limited effectiveness and capacities to date.

The “bright side” reveals great concern and many constructive initiatives in local communities, Māori and Pakeha, aimed at improving the ecological health of inter-tidal or in-shore fisheries. The establishment of the QMS for fisheries management, and New Zealand's signing of international conventions such as UNCLOS, are important steps towards more sustainable management of the marine world.

But offsetting the “bright side” are a number of conclusions about essential requirements for advancing marine environmental management. To put it bluntly, the areas requiring action are daunting; the ecological and economic values at risk are substantial. In many cases the needs and priorities are increasingly urgent. Even more daunting is going to be the task of building consensus and understanding of the many values, interests and rights at risk. Piecemeal fiddling with current systems will not be sufficient to address these risks. New ways of managing and investing in the marine world are needed.

Without a substantial refocus on our marine environment over the next decade, there can be no guarantee that ecological qualities will be sustained, that the viability of businesses, dependent on such ecosystem health will be maintained, or that the customary, recreational and cultural relationships of New Zealanders with their seas, beaches and harbours will be guaranteed into the future.

6.1 Conclusions

There have been some constructive initiatives by Government and by communities to work towards sustainable marine practices.

Initiatives have arisen from concerns over the lack of sustainable practices or the recognition that restoration of ecological health of a marine ecosystem is required. They include: the establishment of the QMS in 1986, the establishment of taiapure and mataitai, and the conservation services levy in fisheries management.

Community “care” groups in coastal areas have been established, in some cases with the

assistance of regional councils. Other community groups have organised programmes to monitor environmental change, to prevent destruction of local shellfish resources and to educate other beach users.

Educational initiatives are introducing New Zealanders, young and old, to the marine environment with the aim of increasing understanding of this environment.

There is a lack of communication and a grave lack of trust among stakeholders. This is severely inhibiting the advancement of sustainable management of the marine environment.

Stakeholders have a diverse range of values, attitudes and requirements and these can be a significant factor for the effectiveness of environmental management. There are situations, outlined in this report, where failure to recognise different ways of valuing the marine environment has resulted in adversarial processes and in some stakeholders being excluded from participation. A lack of trust underlies lost opportunities for practical initiatives for better environmental results – for example, the lack of official recognition and support from the Ministry of Fisheries for the efforts of the community group campaigning to protect Piha's shoreline ecology (section 3.6).

Tangata whenua are strategic partners in the sustainable management of the marine environment, as ancestral kaitiaki, as iwi, hapū and whānau with customary rights to utilise marine resources, and as major commercial quota holders.

While all New Zealanders have a stewardship interest in the marine environment, tangata whenua are kaitiaki for the marine environment and resources, responsible to past and future generations for sustaining and protecting these taonga.

Traditional and contemporary management practices of tangata whenua are based in tikanga and the accumulated knowledge of many generations, yet are continually evolving. Developments include the systems for customary fishing and mataitai, and the work of iwi and hapū resource management units.

Tangata whenua, with extensive quota holdings and major investment in the fishing industry, are strongly positioned to advance the environmental



sustainability of New Zealand's fisheries. There are both challenges and unique opportunities for the integration of commercial fisheries management with traditional values and kaupapa.

The eventual outcomes of claims by tangata whenua to the Waitangi Tribunal, particularly the claims for foreshore and seabed, and for indigenous flora and fauna, may have significant implications for the future management of New Zealand's marine environment.

Lack of knowledge about marine species and their significant role in maintaining the integrity and resilience of marine ecosystems is a serious risk for New Zealand.

This report identifies strategic gaps in knowledge resulting from lack of, or poor use of, data on critical aspects of marine ecosystems. The lack of basic information on the status of commercial fish stocks is a glaring example. For over half of the fish stocks managed under the QMS, too little is known to be able to assess whether harvesting is maintaining stocks at or about the level that will produce the maximum sustainable yield.

Adequate quality ecological information is an essential foundation for understanding and hence managing the marine environment. Without the effective utilisation of information of different kinds and from a range of sources, the assets, in economic and ecological terms, will not be managed sustainably to the detriment of community and stakeholders alike.

Willingness on the part of the Government to adequately invest in knowledge gathering to support sustainable management approaches to the marine environment is crucial.

Current investment, particularly in ecosystem research, is totally inadequate given that the Government is New Zealand's guardian of the marine commons. The Government's responsibility for the marine environment brings with it the need for ecosystem information and other strategic information to ensure that the health of the whole system is maintained.

The Government's investment in research on ecosystem impacts (as distinct from other marine research) has decreased markedly over the last six to seven years. The marine knowledge generation partnership between the Government, quota holders and other marine stakeholders is poorly developed. The current devolution to the industry

of research and management functions is a high-risk strategy for a unique, very vulnerable system.

The fisheries management rights regime is immature and poorly integrated with other rights. It therefore cannot ensure sustainable management of resources.

A commercial property rights framework and the sustainable utilisation of fisheries resources are not fundamentally incompatible. However, the current rights regime has only operated for thirteen years and, although there is no doubt it is an improvement on the previous open access regime, there is little evidence yet that it is delivering sustainable management of the fish stocks or the marine ecosystems they inhabit. Evaluation of the ability of a rights regime to deliver sustainable management over the longer term is required. The regime appears to be most effective in delivering sustainable outcomes where a co-operative approach to management, either among the quota holders or with other stakeholders, has occurred.

The Government system for managing the marine environment has overlaid a property rights framework for fisheries management onto a very diverse "public good" management framework. The two frameworks do not mesh well. For example, protection of areas of the coast constrains access to quota, and without compensation, can result in conflict, wasted resources and expensive litigation.

The dominance of the private property rights approach has, to differing extents, excluded the values and priorities of tangata whenua, recreational users, local residents groups and other concerned groups from policy and decision-making processes. Provision has been made for the customary fishing rights of tangata whenua, yet no direct funding has been provided. While recreational users are acknowledged in the fisheries legislation as stakeholders, their contributions depend on their own resourcing. This cannot continue if ecologically sustainable management of the marine environment is the goal.

Whilst there has been development of some rights in the marine environment, there has been less attention and practical effort given to the responsibilities of rights holders to use resources sustainably, beyond the specific effects-based management provisions of the RMA and the Fisheries Act.

Marine management systems must recognise the complex, variable nature of the marine environment.

There is a range of management systems that can, or have been, applied to the marine environment ranging from a property rights approach to community-based systems. Each management system has strengths and weaknesses, and is more appropriate in some situations than others. Management of the coastal environment has different pressures from management of the deep-sea environment.

The complexities of, and interconnections within, the ecological, cultural and economic systems being managed are not reflected in current management structures. These structures are narrowly compartmentalised and focused on outputs rather than outcomes. This has resulted in an inability to deal with the marine environment as a whole and to address the relationships and interdependence between the various constituent species, their habitats, and wider marine ecosystems and processes.

Responsive management techniques need to be incorporated into the different management regimes to allow prompt adjustment when anticipated or unanticipated changes occur in the marine environment. This necessitates good knowledge generation systems and indicators to quickly and effectively evaluate the success of an approach in working towards more ecologically sustainable marine environments.

There is no overarching framework or strategy to guide the many stakeholders towards sustainable management of the marine environment.

The various pieces of legislation affecting the marine environment have different objectives, for example between marine reserves legislation and the use of marine areas for oil and gas prospecting. There is no framework within which such objectives can be assessed as to their contribution to overall marine management goals. Where legislation seems to have incompatible goals there is no effective mechanism to resolve the issues raised.

6.2 Where to from here?

The present management regimes, structures and processes for marine environmental management do not allow for all New Zealanders to participate within an integrated framework. They please very few people! There is a lack of understanding of the full range of rights and responsibilities, and an inability to generate a more strategic management approach.

Clearly this situation cannot continue if New Zealand is to honour its international obligations, specifically UNCLOS. Ensuring the on-going ecological sustainability of marine ecosystems will continue to be a challenge requiring strategic and innovative solutions.

6.3 Recommendations

The recommendations are in two parts: those focused on areas requiring urgent action and one, a task force, aimed at putting in place a long-term strategy for the sustainable management of New Zealand's marine environment. Some people may feel that a task force has the risk of becoming another talk shop, simply a continuation of the many earlier exercises, and that its recommendations, like those of previous processes, may not be actioned.

In contrast the PCE has concluded that while there are some matters that require urgent action by Government, and has recommended accordingly, the major need is for a complete reappraisal of the institutional, legal and knowledge bases with which we manage the marine environment. Fundamental changes are needed in the way we see the sea and ultimately value its resources. It is unlikely that the necessary progress can be made by continuous iteration of the complex and disjointed systems we have evolved to date. The strength of the task force model is that it can take an inclusive, consultative approach and build consensus for needed action, while increasing understanding of what is at risk.

The review revealed a strong desire from all stakeholders for a greater role in the decision-making processes that shape the way New Zealand's marine environment is managed. A task force is a robust way for Government to help consolidate that commitment and at the same time build up trust within and between stakeholders. It is, in simplest terms, a vehicle for a wider debate,



preventing sector capture and focusing on the needed environmental management outcomes. In addition, it is a mechanism for avoiding the New Zealand tendency to create new institutional arrangements before the outcomes they are to deliver have been adequately defined and agreed to by key stakeholders. New marine agencies (for example a Ministry of Oceans), as proposed by some stakeholders, should only be created when marine management needs have been clearly identified and when adequate assessment has been made of the capacity of existing institutional arrangements, or new proposals.

To the Ministers of Environment, Conservation and Fisheries:

Urgently review the adequacies of the Resource Management Act, the New Zealand Coastal Policy Statement, the Marine Farming Act and the Fisheries Act to ensure the sustainable management of coastal and marine ecosystems occurs in a more integrated manner.

To the Minister of Conservation:

Give high priority to the review of the Marine Reserves Act 1971 to widen the purposes for which protection of marine areas may be established.

To the Ministers of Conservation and Fisheries:

Give high priority to the identification, and protection, of a representative selection of seamounts where these are not yet affected by fishing pressures. In order to fill critical gaps in the ecological information needed for management investment in ecosystem level research should be increased.

To the Minister of Research, Science and Technology:

To better reflect New Zealand's national and international public good obligations, increase the Crown investment in marine and coastal ecosystem sciences be increased.

To the Prime Minister:

Establish a Coastal and Oceans Task Force for the purpose of developing a strategy comprising firstly, goals and principles, and secondly, actions and policies for the future sustainable management of New Zealand's marine environment.

The Task Force should:

- be administered by an agency independent of any particular government, ministry or department;
- be adequately resourced (both funds and expertise) and have the powers and authority to examine the many complex issues thoroughly and be able to recommend clear courses of action;
- be representative of all key stakeholders, selected through a cross-party process;
- have a limited life-span (for example two years) to achieve its work, and
- be required to report to the Prime Minister.

In carrying out its brief the Task Force should recognise that:

- there is a diversity of values and expectations held by stakeholders in the marine environment;
- there is a diversity across the full range of rights in the marine environment, including the Treaty of Waitangi. Adequate and appropriate recognition of the full range of rights is a fundamental pre-requisite for sustainable management of the marine environment;
- principles of sustainability for the marine environment are required, which could include currently developed principles and concepts as well as innovative approaches;
- a systems approach to the marine environment is necessary;
- effect should be given to the spirit of New Zealand's international obligations;

As receiver of the Task Force recommendations, Government should report to Parliament, via the appropriate select committee, at six monthly intervals for a minimum of two years on progress with their adoption and implementation. Where recommendations are not to be implemented, rationale for the decisions should be provided.

The Task Force brief should ensure that an examination of the critical issues affecting the marine environment is carried out and that the following matters, with recommendations, are included:

1. A strategic framework focus

- Development of a long-term strategy for the marine environment – looking out to the pressures, opportunities and potential state of the marine environment to at least 2043. This could be achieved through a marine environment foresight exercise extending the efforts of the 1998 MORST Foresight Project.
- Agreement from the wider community on overarching goals and objectives for sustainable management of the marine environment.

2. Knowledge of the marine environment

- The current state of knowledge of marine ecosystems, and identification of major gaps from a management perspective;
- The state of research and investment capacity;
- The level of investment in knowledge generation needed to fill strategic gaps;
- The effective use of information and data from a range of sources that is currently available;
- Issues of ownership and access to information for management purposes, and
- Improvement in public awareness and understanding of the marine environment and issues of sustainable management.

3. The continuum of rights

- The identification of practical mechanisms for the rights held by all New Zealanders to be taken into account in a range of management regimes;
- Identification of the responsibilities that go with any enhancement of rights to one group beyond others, including governance roles and responsibilities;
- An assessment of the effectiveness of a property rights approach for sustainable management of the marine environment, including biodiversity protection; and
- An assessment of the utility of the current rights frameworks for sustainability and biodiversity protection purposes.

4. Legislation and policy

- An assessment of the adequacy of the current legislation and policies to achieve overarching sustainability and biodiversity objectives;
- Identification of the different, and sometimes conflicting objectives of the various pieces of

legislation and ways these could be more appropriately integrated;

- Identification of the obstacles to effectively implement legislation that is based on sustainability principles, and
- An assessment of the place of non-statutory approaches such as community-based management to achieve sustainability objectives, recognising that there can be no “one size fits all” management approach in the marine environment due to the complexity, scale and variable nature of the environment.

5. Agencies

- An assessment of the present structures and the ability to co-operatively achieve overarching goals for the marine environment;
- Identification and assessment of the role of what are considered ‘non-core’ agencies, such as the Navy, to assist in marine management, and
- Development of a strategic framework for the evolution of functions from Government agencies to non-government agencies and groups together with appropriate effective and achievable accountabilities.



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Glossary of Terms

ANZECC	Australian and New Zealand Environment and Conservation Council	knowledge	the use of information in a context for decision-making
Aotearoa	islands of New Zealand	korero	discussion, debate
atua	god, supernatural being	kowhaiwhai	patterns on the rafters in the whareniui
biodiversity	biological diversity, or ‘biodiversity’ for short, describes the variety of all biological life – plants, animals, fungi and microorganisms – the genes they contain and the ecosystems on land or in water where they live. It is the diversity of life on earth the living mass of an animal or plant population	LINZ	Land Information New Zealand
biomass	the living mass of an animal or plant population	MAF	Ministry of Agriculture and Forestry (formerly Ministry of Agriculture (1995-1998), Ministry of Agriculture and Fisheries (pre-1995))
biosecurity	the exclusion, eradication and effective management of pests and unwanted organisms into New Zealand	mahinga kai	places where food and other resources are traditionally gathered
bycatch	the incidental catch during commercial fishing operations of unwanted species - fish, marine mammals, seabirds and invertebrates	mahinga	places where food is obtained from the sea or seashore
chaos theory	in relation to population and ecosystem dynamics – their non-randomness, lack of predictability, and lack of movement towards equilibrium	mataitai	respect, dignity, status, influence, power
CITES	International Convention on Trade in Endangered Species	mana	respectfulness, supportiveness
data	observations, experiments and measurements of variables over time or within an area	manaakitanga	local Maori community and its meeting-places and buildings
DOC	Department of Conservation	marae	places and buildings
DPMC	Department of the Prime Minister and Cabinet	marine environment	broadly the oceans and the atmosphere above them; the human dimension as well as the biophysical; biological but also oil and mineral resources; mountains to the territorial sea, EEZ and continental shelf; islands, coastal areas, estuaries, sand dunes, beaches and cliffs.
ECO	Environmental and Conservation Organisations of New Zealand Inc.	MARPOL	International Convention on the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978
ecosystem service functions	ecosystem functions that contribute to human survival and wellbeing derived from the normal functioning of a healthy ecosystem.	mauri	essential life force, the spiritual power and distinctiveness that enables each thing to exist as itself
ecosystem	a biological system comprising a community of living organisms (including humans) and its associated non-living environment, interacting as an ecological unit.	MESA	Marine Education Society of Aotearoa
EEZ	Exclusive Economic Zone	MFAT	Ministry of Foreign Affairs and Trade
hapū	Maori family groups, communities	MFE	Ministry for the Environment
hydrates	combined with water - in relation to gas hydrates, methane gas is trapped inside a lattice of water ice in porous rock strata beneath the seafloor	MFish	Ministry of Fisheries
information	information as the interpretation and analysis of data	MHWS	Mean High Water Spring
ITQ	Individual Transferable Quota – a property right within the Quota Management System giving the holder the perpetual right, which can be traded and transferred, to fish for a particular species	moana	sea, ocean
IUCN	International Union for the Conservation of Nature and Natural Resources now known as The World Conservation Union	MOC	Minister of Conservation
iwi	Maori tribal groups	MORST	Ministry of Research Science and Technology
kaimoana	food from the sea	MOT	Ministry of Transport
kaitiaki	iwi, hapū or whānau group with the responsibilities of kaitiakitanga	MSA	Maritime Safety Authority
kaitiakitanga	the responsibilities and kaupapa, passed down from the ancestors, for tangata whenua to take care of the places, natural resources and other taonga in their rohe, and the mauri of those places, resources and taonga	MSY	maximum sustainable yield
karakia	prayer, incantation, expression of respect	murū	confiscation
kaumātua	elders, decision-makers for the iwi or hapū	NERDS	National Environmental Recreational Diver Survey
kaupapa	plan, strategy, tactics, methods, fundamental principles	nga	plural
		Ngati	people of (iwi or hapu name)
		NGO	non-government organisation
		NIWA	National Institute for Water and Atmospheric Research Ltd
		NRAC	National Research Advisory Council (dis-established 1986)
		NZCA	New Zealand Conservation Authority
		NZCPS	New Zealand Coastal Policy Statement
		PCE	Parliamentary Commissioner for the Environment
		PGSF	Public Good Science Fund
		precautionary principle	taking a cautious approach to development and environmental management decisions when information is uncertain, unreliable, or inadequate
		property rights	permissible use, change and transfer of resources, goods and services. The right is not unfettered as restrictions may be applied by contract or law
		QMS	Quota Management System – a system based on individual transferable property rights and used to manage New Zealand commercial fisheries.



<i>quota</i>	a tradable property right to harvest the particular species for which quota is held by the fisher
<i>rāhui</i>	protection of a place or resources by forbidding access or harvest
<i>rangatira</i>	chief, leader
<i>rangatiratanga</i>	rights of autonomous self-regulation, the authority of the iwi or hapū to make decisions and control their own resources
<i>RMA</i>	Resource Management Act 1991, and amendments.
<i>rohe</i>	geographical territory customarily occupied by an iwi or hapū
<i>rohe moana</i>	coastal and marine area customarily occupied and utilised by an iwi or hapū
<i>runanga</i>	committee of senior decision-makers of an iwi or hapū
<i>SeaFIC</i>	New Zealand Seafood Industry Council Ltd.
<i>SITO</i>	New Zealand Seafood Industry Training Organisation
<i>sustainability</i>	the ability to continue an activity for a long period of time while maintaining diverse, healthy and productive ecosystems, and, meeting the needs of the present without compromising the ability of future generations to meet their own needs
<i>systems</i>	looking at the whole – ie. the connected, three
<i>approach</i>	dimensional, undivided, complex nature of marine management – see Chapter 1.1
<i>TAC</i>	Total Allowable Catch. The amount of fish that the Minister of Fisheries allows to be taken in any one year.
<i>TACC</i>	Total Allowable Commercial Catch. The amount of the TAC which may be taken in any one year by the commercial fisheries sector.
<i>taiapure</i>	local fishery declared under Part IX or Part IIIA of the Fisheries Act 1983
<i>takiwa</i>	place or territory used by or associated with an iwi, hapū or whānau
<i>tangata whenua</i>	people of the land, Māori people
<i>taniwha</i>	supernatural water-creature
<i>taonga raranga</i>	weaving materials
<i>taonga</i>	valued resources, assets, prized possessions both material and non-material
<i>tapu</i>	sacredness, spiritual power or protective force
<i>tauranga waka</i>	landing-place
<i>tikanga</i>	customary correct ways of doing things, traditions
<i>tohunga</i>	expert, person with special knowledge and powers
<i>tukutuku</i>	woven panels inside the whareniui
<i>UNCLOS</i>	United Nations Convention on the Law of the Sea 1982
<i>wāhi tapu</i>	special and sacred places
<i>waiata</i>	songs, chants
<i>waka</i>	canoe
<i>wero</i>	challenge
<i>whakapapa</i>	genealogy, ancestry, identity with place, hapū and iwi
<i>whakatauki</i>	sayings, proverbs
<i>whānau</i>	family groups
<i>whanaungatanga</i>	relationship, kinship, bonds
<i>whareniui</i>	meeting house on the marae
<i>WWF</i>	World Wide Fund for Nature

Appendix 1: Organisations and individuals consulted in the preparation of this report

- Ackroyd Walshe (Kim Walshe)
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Maui Solomon
Ministry for the Environment (Owen Cox, Bob Zuur, David Brash)
Ministry of Commerce, Crown Minerals Office (Evelyn Cole, Lyn Ellis)
Minister of Conservation office (Graeme Campbell)
Ministry of Fisheries (MFish) Head Office (Stan Crothers, Carolyn Risk, Kevin Sullivan, Mark Edwards, John Annala, Neville Smith, Fay Taylor, Lee Robertson, Chris O'Brien, Terry Lynch, Matthew Hooper, Bea Stewart, Brian Ashton, Lindie Nelson), Observer Programme (Andrew France, Jim Wills), Northern (Auckland) Regional Office (Arthur Hoare, Bob Drey, Ian Bright,
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New Zealand Association of Shipping Agents (Bruce Heather)
New Zealand Defence Force, Defence Scientific Establishment (John Buckingham, Lindsay Hall, Garry Armstrong, Devonport Naval Base, Auckland)
New Zealand Fisherman's Magazine (John Eichelsheim)
New Zealand Navy Defence Force HQ NZ (Rear Admiral Fred Wilson, Commander Mike Louisson)
New Zealand Recreational Fishers Council Inc (Bob Burstall)
New Zealand Seafood Industry Council (John Valentine, Richard Cade, John Pfahlert, Jonathan Peacey, Michael Harte, Tina Nixon, Darryl Sykes)
New Zealand Shipping Federation (Paul Nicholas)
New Zealand Underwater Association (Maria Uhle)
Nga Kaiwhakamarama I Nga Ture (Maori Legal Service) (Taki Anaru)
Ngāi Tahu (Edward Ellison, Trevor Howse, Miranda Cassidy, Piiiripi Grimshaw)
Ngāti Kahu (Margaret Mutu)
Ngāti Kuri (Andrew Christie)
Ngāti Toa Rangitira (Linda Hall-Thorpe)
Ngāti Wai (Hori Parata)
- Oceans Society (Gillian Torckler, Darrell Torckler, Roger Grace, Dave Moran)
Office of the Controller and Auditor General (David Macdonald, Colleen Pilgrim, Pat Hoy, Stephen Blair)
- Peter Rocco
Piha Beach Protection Group (Rob Astley)
Ports of Auckland (Ben Chrystall, Karen Beanland)
- Royal Forest and Bird Protection Society of New Zealand (Forest and Bird) (Barry Weeber)
Royal New Zealand Air Force (Group Captain Ian Brunton)
Royal New Zealand Coastguard Federation (Kevin Rangitira)
Royal New Zealand Navy, Devonport Naval Base, Auckland (Commander Kevin Corles, Captain David Ledson, David Wright, Commander Larry Robbins and hydrographic staff)
- Sanford Fisheries Ltd (Tom Birdsall, Martin de Beer, Auckland; Don Mitchell, Havelock)
Seafood Industry Training Organisation (SITO) (Martin Eadie)
Seafriends (Leigh) (Flor Anthoni)
Sealord (Sir Tipene O'Regan, Phil Lough, Steve Bishop)
Sea-Right Investments Ltd (Roger Beattie, Peter Ackroyd)
Smithsonian Institution, National Museum of Natural History (Clyde Roper - Quest for Giant Squid Expedition)



Tasman District Council (Dennis Bush-King, Neil Jackson,
Steve Markham)
Team NZ, Cousteau Society (Sir Peter Blake)
Te Ao Marama, Ngai Tahu Murihiku Runanga (Paddy Gilroy,
George Ryan, Michael Skerritt)
Te Hao o Ngati Whatua (William Kapea)
Telecom New Zealand (Ian Gavin)
Te Puru Primary School (Paul Hamlin, Jim Andrews)
The Treasury (Alan Bollard, Gareth Chaplin, Dominic
Milicich, Megan Taylor)
Treaty of Waitangi Fisheries Commission (Sir Tipene
O'Regan, Tom McClurg, Tom Norris, Shaun Kerins)

University of Auckland (John Craig, School of Environmental
and Marine Sciences; Bill Ballentine, Russ Babcock,
Leigh Marine Laboratory; Chris Batstone, Economics
Department)
University of Delaware (Nigel Bradley)
University of Otago, (Richard de Hamel, Portobello Marine
Laboratory; Ali Memon, Department of Geography; Phil
Mladenov, Liz Slooten, Department of Marine Science;
Michael Hall, Centre for Tourism)
University of Waikato (Hamish Rennie)

Whalewatch, Kaikoura (Wally Stone)
World Wide Fund for Nature – New Zealand (WWF-NZ)
(Simon Towle)

Yachting NZ (Adrienne Greenwood, Jim Lott)

Appendix 2: The Treaty of Waitangi Fisheries Commission: Te Ohu Kaimoana

Contemporary mechanisms for Māori interests in fishing and marine resources are based in structures that evolved from the controversial Sealord Deal in the late 1980s. The Government funded Māori into a joint venture with Brierley Investments to buy New Zealand's largest seafood company, Sealord Products. The settlement gave Māori over one-third of New Zealand's commercial fisheries, in addition to 20% of the quota for any new species brought in to the quota management system. In return, all other claims of iwi and hapu to commercial fishing rights were extinguished. Despite considerable controversy, the settlement was concluded and given effect by the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. The Act also made provision for Māori customary fishing rights through amendment to the Fisheries Act 1983 (see section 3.4.2), and established Te Ohu Kaimoana, the Treaty of Waitangi Fisheries Commission.

The functions of Te Ohu Kaimoana include:

- assisting Māori to get into and develop the business and activity of fishing;
- developing a method for the allocation to Māori of fisheries assets, including shares in the Moana Pacific fishing company, a cash fund, and more than 60,000 tonnes of fishing quota;
- making fishing quota available to iwi through an annual leasing process, at a discounted rate in order to encourage Māori into fishing - over 77,000 tonnes of fisheries access was provided through these leases in the 1998-99 year (Te Reo o Te Tini a Tangaroa, Te Ohu Kaimoana newsletter, April 1999);
- ensuring iwi representation into the legislative process, particularly the development of amendments to fisheries legislation and regulations;
- providing input into fisheries policy and management issues;
- operating a mandating process by which iwi organisations establish their authority to deal with the Commission over assets allocation; and
- developing Māori skills in fisheries management - over 200 students received training and study scholarships in the 1998-99 year (ibid).

The allocation of fisheries assets has been a difficult process, with challenges from urban Māori groups claiming recognition alongside iwi and a direct sharing in the assets, and with disagreement amongst iwi and hapu over the Commission's proposed allocation model. Tensions over whether to divide the assets in proportion to the coastline of each iwi takiwa or according to iwi population, resulted in March 1999 in a High Court injunction brought by a number of dissenting iwi, hapu and urban Māori groups, to prevent the Commission from advancing its proposed allocation model to the Minister of Fisheries. The Commission recorded litigation costs of \$2.1 million for the 1998-99 year.

In July 1999 the Minister of Māori Affairs, Hon Tau Henare, called for nominations for new members to be appointed to the Commission.

Appendix 3: New Zealand's Marine Reserves, and other Marine Protected Areas (including their size and year of gazettal)

Total Marine Reserves (16)	762,839 hectares
Cape Rodney to Okakari Point, North Auckland (1975)	518
Poor Knights Islands, Northland (1981)	1,890
Kermadec Islands (1990)	748,265
Wanganui-a-Hei (Cathedral Cove), Coromandel (1992)	840
Tuhua (Mayor Island), Bay of Plenty (1992)	1,060
Kapiti, Waikanae (1992)	2,167
Long Island – Kokomohua, Marlborough Sounds (1993)	619
Tonga Island, Abel Tasman National Park (1993)	1,835
Te Awaatu Channel - The Gut, Doubtful Sound (1993)	93
Piopiotaahi, Milford Sound (1993)	690
Westhaven (Te Tai Tapu), Karamea - West Coast (1994)	536
Long Bay – Okura, Auckland (1995)	980
Motu Manawa – Pollen Island, Auckland (1995)	500
Te Angiangi, Hawkes Bay (1998)	446
Pohatu Marine Reserve, Banks Peninsula (1999)	215
Te Tapuwae o Rongokako, East Cape (1999)	2,450
Other Marine Protected Areas (3)	3,150 hectares
Tawharanui Peninsula Marine Park, North Auckland (1981)	350
Mimiwhangata Peninsula Marine Park, Northland (1983)	2,000
Sugar Loaf Islands Marine Protected Area, New Plymouth (1991)	800
Total Marine Mammal Sanctuaries (2)	335,111 hectares
Banks Peninsula, Canterbury (1988)	113,560
Auckland Islands (1993)	221,551
Total Marine Reserves and other Marine Protected Areas (21)	1,101,100 hectares

Appendix 4: Statutory framework for marine environmental management

The many statutes related to the marine environment either control activities in this environment or set a framework for managing and utilising resources as diverse as unwanted micro-organisms through to whales. The main statutes address the following aspects:

- Establishment of the 12 nautical mile territorial sea and the 200 nautical mile EEZ (Territorial Sea, Contiguous Zone and Exclusive Economic Zone Act 1977);
- Management of residual areas of the foreshore and territorial seabed so as to protect their natural and historic resources (Foreshore and Seabed Endowment Revesting Act 1991);
- Provision for mineral exploration of the continental shelf (Continental Shelf Act 1964);
- Establishment of mineral programmes for the allocation of Crown-owned minerals and petroleum beyond the 12 mile limit together with a framework for access to those minerals (Crown Minerals Act 1991);
- Management of environmental effects within the territorial sea (Resource Management Act 1991);
- Prevention of pollution from ships, marine oil spill planning and response, and granting of marine dumping permits. Most of the marine pollution provisions apply beyond the territorial sea (Marine Transport Act 1994);
- Protection of seabirds and three marine 'species' together with provisions to manage sea bird deaths caused by fishing (Wildlife Act 1953);
- Protection of all marine mammals within the EEZ, control of marine mammal watching, and provision for the establishment of marine mammal sanctuaries (Marine Mammals Protection Act 1978);
- Recognition of Maori fishing rights secured by the Treaty of Waitangi (Maori Fisheries Act 1989);
- Allocation of fisheries resources, non-commercial traditional and customary rights and interests to tangata whenua (Treaty of Waitangi (Fisheries Claims) Settlement Act 1992, Fisheries Act 1996);
- Management of unwanted organisms within the territorial sea (Biosecurity Act 1993);
- Sustainable utilisation of fisheries resources within the EEZ (Fisheries Acts 1983 and 1996);
- Management of recreational fishing (Fisheries (Amateur Fishing) Regulations 1986/221);
- Establishment and development of marine farming in New Zealand waters (Marine Farming Act 1971, the Resource Management Act 1991 and the Fisheries Act 1983);
- Conservation of marine ecosystems within the 12 mile limit for scientific purposes (Marine Reserves Act 1971);
- Protection of land or foreshore held for conservation purposes (Conservation Act 1987);
- Prohibition on the taking of any marine living resources in the area subject to the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) without a permit issued by New Zealand or another party to the convention (Antarctic Marine Living Resources Act 1981);
- Prohibition of mineral resource activities on Antarctica (including islands) or its continental shelf, and recognition of comprehensive protection of the Antarctic environment and recognition of areas designated as specially protected by the Consultative Parties to the Antarctic Treaty and implementation of the Protocol on Environmental Protection to the Antarctic Treaty 1991 (Antarctica (Environmental Protection) Act 1994).



Appendix 5: Agencies responsible for managing the marine environment

- Department of Conservation (DOC): responsible for the development of the New Zealand Coastal Policy Statement (NZCPS) under the RMA; marine reserves inside territorial waters; marine mammal and other protected wildlife out to the edge of the EEZ, and is jointly responsible for the management of the coastal area out to the 12 mile limit.
- Regional councils: jointly responsible for coastal management through the development of mandatory regional coastal plans to assist in the integrated management of a coastal marine area in association with DOC.
- Ministry of Fisheries (MFish): manages fisheries from the coast to the outer limit of the EEZ.
- Ministry of Transport (MOT): advises Government on marine transport policy and looks after the Crown's interest in the seabed in the EEZ.
- Maritime Safety Authority (MSA): has responsibility for the control of maritime safety and for the protection of the marine environment beyond the 12 mile limit.
- Ministry of Commerce (MOC): responsible for the allocation of mineral rights over the marine environment, for cable laying and other such uses.
- Land Information New Zealand (LINZ): stewardship of government seabed mapping and hydrographic information.
- Ministry of Agriculture and Forestry (MAF): 'front line services' for managing unwanted organisms within territorial waters.
- Ministry for the Environment (MfE): administration of the RMA (which includes drafting marine pollution regulations).
- Ministry of Foreign Affairs and Trade (MFAT): responsibilities for ensuring New Zealand complies with New Zealand's international obligations.
- Department of Prime Minister and Cabinet (DPMC): coordinates policy proposals relating to many mainly non-environmental marine activities among government departments.
- New Zealand Tourism Board ensures New Zealand is developed and marketed as a competitive tourism destination to maximise the long-term benefits to New Zealand. (All details downloaded from website (www.nztb.govt.nz), 27 April 1999.)
- RNZ Navy responsible for issues of sovereignty and defence, diplomatic visits to other countries and for some surveillance of activities within the EEZ.
- RNZ Air Force has a long-range maritime patrol force of six Orion aircraft with which to conduct surveillance of the EEZs of most South Pacific states. The Orions are sometimes used for search and rescue purposes.

Appendix 6: International conventions and agreements

New Zealand is party to a number of international conventions and protocols related to the marine environment for which various rules and legislative provisions are in place. These include:

- **United Nations Convention on the Law of the Sea 1982 (UNCLOS)**

This convention covers the full range of issues of international significance in relation to the marine environment. It is supplemented by more focused conventions and by regional agreements.

The convention covers:

- Ø definition of the territorial sea, contiguous zone, exclusive economic zone, continental shelf and high seas;
- Ø defines the rights and obligations of coastal and other States in relation to the various maritime zones;
- Ø specifies rules applicable to ships such as the right of innocent passage, including rules for merchant ships, warships and other Government ships;
- Ø provides for the conservation of the living resources of the EEZ and the high seas, and the protection and preservation of the marine environment;
- Ø provides for exploitation of minerals of the continental shelf;
- Ø provides for delimitation of the continental shelf between States with opposite or adjacent coastlines;
- Ø establishes a special regime for the Area (the seabed, ocean floor and subsoil thereof beyond national jurisdiction) as the common heritage of mankind under the auspices of the International Seabed Authority.

- **The Convention on the Conservation of Antarctic Marine Living Resources 1980 (CCAMLR)** establishes a specific regime for the conservation of Antarctic marine living resources and the management of Antarctic fisheries.

- **The Agreement for the Implementation of the Provisions of UNCLOS III Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks 1995 (the Fish Stocks Agreement)** is aimed at achieving compatibility of national fisheries management regimes applicable in EEZs and the regime for the adjacent high seas areas in relation to stocks that straddle EEZ/high seas boundaries and to highly migratory stocks. It imposes a duty on coastal States and States fishing on the high seas to co-operate in order to achieve compatible conservation and management measures.

- **The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the London Convention)**. This convention prohibits the dumping of certain highly hazardous wastes and other matter from ships, aircraft and offshore installations; allows the dumping of some other wastes and matter with a special permit; and allows the dumping of all other wastes with a general permit. It prohibits the incineration at sea of all wastes or other matter.

- **Convention of the International Hydrography Organisation 1967**

This convention established the IHO with the object, among others, of bringing about coordination of the activities of national hydrography offices and the greatest possible uniformity in nautical charts and documents, as well as the adoption of reliable and efficient methods of carrying out and exploiting hydrographic surveys.

- **The Convention on Biological Diversity** The Convention outlines principles and obligations for the conservation of biological diversity and the sustainable use and the fair and equitable sharing of the benefits from the use of other species. It notes the fundamental

requirement for maintaining biological diversity is the in situ conservation of ecosystems and natural habitats, and the maintenance and recovery of viable populations of species in their natural surroundings. It requires member countries to develop national biodiversity strategies and to integrate these with other forms of planning. New Zealand has a draft strategy that is the subject of wide consultation.

- **The Convention on the Prohibition of Fishing with Long Drift Nets in the South Pacific (Wellington)** is a regional agreement of most members of the South Pacific Forum.

- **The International Convention on Maritime Search and Rescue 1979** provides for the coordination of search and rescue efforts among the parties to the convention.

- **The International Convention for the Safety of Life at Sea 1974**, (Chapter V reg 15) requires members to undertake to ensure that any necessary arrangements are made for coast watching and for the rescue of persons in distress at sea round their coasts. This obligation is reflected in s 199 **Maritime Transport Act 1994** and s 72B(2A) **Civil Aviation Act 1990**.

- **The Convention on International Trade in Endangered Species of Wild Flora and Fauna 1973 (CITES)**. The purpose of this convention is to protect endangered species, including some marine species. It also includes provision for the sustainable use of wildlife.

- **The International Convention for the Regulation of Whaling**. In the mid-1980s a moratorium was established on all whaling in all the world's oceans, with only a few exceptions. Whaling is allowed for scientific research although there is controversy about the number of whales taken for research. The Convention also allows whaling for aboriginal subsistence use. A Southern Ocean Whale Sanctuary has been established.

- **The International Convention for the Prevention of the Pollution from Ships 1973/78 (MARPOL)** regulates specific ship-based activities that have direct consequences on the marine environment. The discharge of sewage from ships and platforms is also controlled under MARPOL.



Appendix 7: Government initiatives and strategies

The following is a short list of some of the Government strategies and coordinating committees for the management of the marine environment.

- **Ballast Water and Ship's Hull De-fouling : A Government Strategy. 1998.** The desired outcome of implementing this strategy is that New Zealand's territorial seas are kept free, to the maximum practical extent, from new harmful species and disease. The Ministry of Fisheries is the lead agency for these issues.
- **New Zealand Marine Oil Spill Response Strategy 1996.** The aim of this strategy is to efficiently and effectively minimise the impact of oil pollution on the marine environment from ships and oil transfer sites. The Maritime Safety Authority is the lead agency for this strategy.
- **New Zealand Hydrographic and Bathymetric Information Strategy 1997.** The strategy establishes a framework for the purchase of core Crown bathymetric needs and the context for the proposed New Zealand Marine Survey Information System. LINZ is the lead agency for the strategy implementation.
- **The Officials' Hydrographic Advisory Group (LINZ)** was set up as part of the New Zealand hydrographic and bathymetric information strategy (August 1997). The group comprises representatives of Antarctica New Zealand, Maritime Safety Authority, NZ Defence Force, Ministry of Defence, Department of Prime Minister and Cabinet, Royal New Zealand Navy, Naval Staff Defence HQ, Ministry of Foreign Affairs and Trade, Ministry of Research Science and Technology and Department of Conservation. Their task is to advise LINZ on key hydrographic issues and developments.
- **RS&T: 2010 The Government's Strategy for Research, Science and Technology in New Zealand to the year 2010. 1996.** This strategy proposed goals for research, science and technology. The strategy recognises that untapped marine resources are an opportunity for science and technology-led development. Another identified opportunity is exploring the marine resources of New Zealand's EEZ. The agency that allocates PGSF funds to proposed projects is FORST.
- **Research Vessel Committee (MORST).** This committee was established by Cabinet in 1994 following a review of research vessel needs (the Porritt Report) (Marine Research Vessel Needs Review Committee, 1993: *Our Oceans: A Wealth of Opportunities, Research Vessel Needs for the 21st Century*. Ministry of Research, Science and Technology, Wellington) as a consequence of the restructuring of DSIR and the loss of their research vessel *Rapuhia*. It was set up to give independent advice to the Minister of Research Science and Technology on the strategic, efficient and effective use of Crown-owned research vessels.
The identification of strategic matters relating to EEZ management within the committee's terms of reference has led to more strategic matters than just research vessel needs. This was considered necessary because the Committee felt unable to do its job of predicting vessel needs without having some sense of future directions. However in doing this they were not attempting to set future strategic directions but to interpret existing policies and trends and to extrapolate them for the purpose of identifying future research vessel needs. In particular, the Committee has been considering issues relating to the development of the EEZ.

In addition to Government strategies, some government departments have published strategies or business plans that have some influence on marine management. For example DOC's *Restoring the Dawn Chorus*, the Department's strategic business plan 1998-2002 has, as one of its key issues, developing New Zealand's biodiversity strategy.