

Social impacts of marine reserves in New Zealand

SCIENCE FOR CONSERVATION 217

Nick Taylor and Brigid Buckenham

Published by
Department of Conservation
PO Box 10-420
Wellington, New Zealand

Science for Conservation is a scientific monograph series presenting research funded by New Zealand Department of Conservation (DOC). Manuscripts are internally and externally peer-reviewed; resulting publications are considered part of the formal international scientific literature.

Titles are listed in the DOC Science Publishing catalogue on the departmental website <http://www.doc.govt.nz> and printed copies can be purchased from science.publications@doc.govt.nz

© Copyright February 2003, New Zealand Department of Conservation

ISSN 1173-2946

ISBN 0-478-22376-5

In the interest of forest conservation, DOC Science Publishing supports paperless electronic publishing. When printing, recycled paper is used wherever possible.

This report was prepared for publication by DOC Science Publishing, Science & Research Unit; editing and layout by Jaap Jasperse. Publication was approved by the Manager, Science & Research Unit, Science Technology and Information Services, Department of Conservation, Wellington.

CONTENTS

Abstract	5
<hr/>	
1. Introduction	6
<hr/>	
1.1 Rationale and objectives	6
1.1.1 Rationale	6
1.1.2 Objectives	7
1.2 Research programme and methodology	7
1.2.1 Literature review	7
1.2.2 Case studies	8
1.2.3 Focus groups and national workshop	9
2. Development of marine reserves	10
<hr/>	
2.1 Establishment of marine reserves—international overview	10
2.1.1 Marine sanctuaries in the United States	10
2.1.2 Absence of impact studies	11
2.1.3 Economic impacts and diving behaviour in Australian marine protected areas	13
2.2 Legislative and institutional history of marine reserves in New Zealand	13
3. Three case studies	17
<hr/>	
3.1 Cape Rodney–Okakari Point Marine Reserve	17
3.1.1 Description and history	17
3.1.2 Establishment and management issues	17
3.1.3 Community interactions and attitude changes	18
3.1.4 Key impacts	19
3.2 Tonga Island Marine Reserve	19
3.2.1 Description and history	19
3.2.2 Establishment issues	20
3.2.3 Management issues	20
3.2.4 Community interactions and attitude changes	21
3.2.5 Key impacts	22
3.3 Pohatu Marine Reserve	22
3.3.1 Description and history	22
3.3.2 Establishment issues	23
3.3.3 Management issues	23
3.3.4 Community interactions and attitude changes	24
3.3.5 Key impacts	24
4. Social impacts of marine reserves	26
<hr/>	
4.1 Recreational and tourism impacts	26
4.1.1 Recreation	26
4.1.2 Tourism	27
4.1.3 Diving	29
4.2 Impacts on education and research	29
4.3 Impacts on commercial and recreational fishing	30

5.	Issues for establishment and management of marine reserves	32
5.1	Attitudes to marine reserves	32
5.1.1	Rights and expectations	32
5.1.2	The NIMBY syndrome	32
5.1.3	Experience at Hahei	33
5.1.4	Experience at Tonga Island and Pohatu Marine Reserves	34
5.1.5	Commercial and recreational fishers	34
5.1.6	Overseas experiences	35
5.2	Public consultation	36
5.2.1	Local committees for liaison and management	37
5.3	Maori perspectives	37
5.3.1	Traditional values and management systems	37
5.3.2	Mataitai and taiapure	38
5.3.3	Maori attitudes to marine reserves	39
5.4	Legislative and organisational issues	40
5.4.1	The overall process	40
5.4.2	Total ban or partial restrictions?	41
5.4.3	Who determines the site of a proposed marine reserve?	41
5.5	Management issues	42
5.5.1	Resource management	42
5.5.2	Enforcement	42
5.5.3	Concessions and permits	43
5.5.4	Signage and information	43
5.5.5	Funding	43
5.5.6	Public education and research	44
5.6	Social impacts and monitoring	44
6.	Conclusions and recommendations	46
6.1	Marine reserves as part of marine conservation	46
6.2	Management issues and strategies	47
6.2.1	Signage and enforcement	47
6.2.2	Visitor monitoring	48
6.2.3	Planning and review	48
6.3	Consultation	48
6.4	Improved impact assessment	49
7.	Acknowledgements	49
8.	References	50
	Appendices	53

Social impacts of marine reserves in New Zealand

Nick Taylor and Brigid Buckenham

Taylor Baines & Associates, Christchurch

ABSTRACT

Marine reserves are part of a comprehensive approach to managing the marine environment. In 2000, New Zealand had 16 marine reserves totalling 763 349 ha of territorial sea. Other reserves are under investigation and there is intense public interest in the establishment of more reserves. Through a literature review and three case studies of existing reserves, our research examines social impacts of reserves. (The cut-off point for the literature review was November 2000, when the contract report was first submitted.) Our research shows that there can be an initial, negative impact on commercial and recreational fishing. Impacts over time relate primarily to increases in visitor numbers. Some reserves have experienced a marked increase in visitors, who, in turn, increase levels of recreation activity such as swimming and diving. They create demands for infrastructure including roads, parking and waste facilities in the vicinity of the reserve, as well as for tourism businesses. Our research considers changes in attitudes towards marine protected areas and found there is evidence of greater knowledge and acceptance of marine reserves amongst local communities and the wider public. Issues for the establishment and management of marine reserves include the need to work with Maori communities to develop a range of marine protected areas, and to undertake wide community consultation and liaison. Social impact monitoring, including visitor studies, is required.

© February 2003, Department of Conservation. This paper may be cited as:
Taylor, N; Buckenham, B. 2003: Social impacts of marine reserves in New Zealand. *Science for Conservation* 217. 58 p.

1. Introduction

1.1 RATIONALE AND OBJECTIVES

1.1.1 Rationale

The Interparliamentary Conference on the Global Environment held in Washington in 1990 concluded that Nations should join together to protect marine biodiversity and productivity.¹ In New Zealand, the Parliamentary Commissioner for the Environment (1999: 96) noted:

‘Without 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 customary, recreational and cultural relationships of New Zealanders with their seas, beaches and harbours will be guaranteed into the future’.

In its report, the Parliamentary Commissioner for the Environment has charted a path through a maze of interests, legislation, institutional arrangements, studies and research towards a more sustainable future for New Zealand’s marine environment. The major conclusion is that there should be a reappraisal of the way New Zealand manages the marine environment towards a more ‘integrated’ approach. Marine reserves are part of that reappraisal, along with other types of marine protection such as Maori customary protection, marine parks and marine mammal sanctuaries.

The Department of Conservation (1994: 5) defines a marine reserve as ‘a specified area of the territorial sea, seabed and foreshore which is set up and managed for the purpose of preserving it in a natural state as the habitat for marine life for scientific study’. Since the Marine Reserves Act (1991), 16 reserves totalling 763 349 ha, or less than five percent of the territorial sea, have been created (Parliamentary Commissioner for the Environment 1999: 21; Department of Conservation 2000: 48). A list of the reserves, the dates they were established and their areas is provided in Appendix 1.

A number of surveys and research projects have been carried out for the Department of Conservation (DOC) which look at the relationship between the wider community and the establishment of these marine reserves. It is timely to synthesize the findings of the various pieces of work, update the understanding of community attitudes towards the development of marine reserves, and assess the impact of established reserves on local communities.

Research into the social aspects of marine reserves as defined in the New Zealand legislation is timely in that:

- There is considerable public interest in the establishment of further reserves.
- The establishment of marine reserves continues to engender a range of issues both locally and in the wider community, and it is useful to have information

¹ Crosby, M.P. n.d.: A proposed approach for studying ecological and socio-economic impacts of alternative access management for marine park areas. Ocean and Coastal Resource Management. NOAA internet site <http://www.noaa.gov>

on the longer-term social and economic impacts of reserves to assist the planning of new reserves.

- The fishing industry continues to have an intensive interest in the establishment of reserves with both negative and positive reactions evident.
- There are marine reserves identified at various stages of development and planning, i.e. those already gazetted, those subject to formal application, and those currently under investigation, as well as a range of years established.
- Social research will assist in developing and managing the broad network of marine protection areas.

1.1.2 Objectives

The specific objectives of this research were to:

- Establish the socio-economic impacts of marine reserves
- Examine attitudes, and changes in attitudes, to marine reserves amongst local and wider communities
- Provide insights from a social perspective into the process for establishment of further marine reserves.

1.2 RESEARCH PROGRAMME AND METHODOLOGY

The research was broken into two phases, each one year in duration. The first phase took place in 1997/98 and the second in 1999/2000.

Phase 1, Literature Review (1997/98) was a scoping study based on a review of existing research material and literature. It was a desk study, which provided the basis for planning research activities, particularly case studies, in the second phase.

Phase 2, Case Studies (1999/2000) focussed on three reserves, an investigation of wider attitudes, and the communication and discussion of research findings in a range of settings.

The split into two, non-consecutive years and the limited amount of funding influenced the research methods, as detailed below.

1.2.1 Literature review

The focus of the literature review was on the development and impact of marine reserves, and in particular how they affect communities. The focus was on:

- A review of New Zealand research looking in particular for:
 - Evidence of changes in attitudes towards marine reserves and marine conservation in general
 - The perceived and actual social and economic impacts of marine reserves
- A review of international literature and related studies on the development of marine reserves and public attitudes towards them.

Sources of bibliographic information and documents included:

- DOC library material and files

- New Zealand library data bases and references accessed through Canterbury and Lincoln University Libraries
- Enquiries on the International Association for Impact Assessment social impacts internet discussion group
- General internet searches using relevant keywords (e.g. marine, maritime, reserve, sanctuary, social, economic, community)
- Newspaper clippings at the Christchurch Environment Centre and Christchurch Public Library
- Individuals with expertise in the area (refer Acknowledgments).

Most of the material obtained related to New Zealand. Some contacts were established and material received from Australia, Indonesia, United States, the Caribbean and the United Kingdom. It proved difficult to find written material documenting the social and economic impacts of marine reserves on local communities. Indeed, much of the material traced through computer searches turned out to be focussed on the effects of reserves on ecological rather than human communities! The exception was material obtained from the Reef CRC (Cooperative Research Centre for Ecologically Sustainable Development of the Great Barrier Reef²) in Australia. Certainly New Zealand appears to be similar to other countries in this respect. Furthermore, other than the work of the Reef CRC, longitudinal (long-term) studies that would assist in identifying changes in public attitudes and social-economic impacts over time were not identified.

1.2.2 Case studies

Case studies provided insights into the establishment process, impacts and management issues relating to specific reserves. Three marine reserves were selected and studied: the Cape Rodney-Okakari Point Marine Reserve (often called Leigh marine reserve after the nearby township) located North of Auckland; Tonga Island Marine Reserve in the Abel Tasman National Park near Nelson; and Pohatu Marine Reserve (often referred to as Flea Bay marine reserve) near Akaroa, south-east of Christchurch.

The following criteria were used for choosing the case studies:

- Proximity to (and, conversely, isolation from) a major population centre
- Maori involvement
- Presence of a local tourist industry
- Length of existence of the reserve
- The current management regime and any changes to it
- Land use on the coast, including proximity of nearby, land-based conservation areas
- Level of existing social research (and possibility that a reserve might become over-researched).

The case study reserves had common characteristics. Each reserve had residents living in or owning holiday homes in close proximity to the reserve. A number of businesses and/or tourist operators worked in the vicinity of the reserves.

² See for example their annual reports or website <http://www.gbrmpa.gov.au/~crcreef>

Some of these businesses were based away from the reserve, the operator either visiting the reserve or planning to do so in the future. There were also recreational and commercial fishers operating on the boundaries of the reserves or within each reserve before it was created; however, the scale and nature of the commercial fishing varied. There were Maori interests in each reserve.

For each of the three reserves interviews were carried out with residents, business operators and commercial fishers. A one-page questionnaire (Appendix 2) was developed for business operators. Questions included how long they had been involved in the area, and their views about the impacts the reserve has had, both positive and negative.

Key informant interviews were conducted with local DOC field officers and technical support officers, as well as with DOC staff within the main centres associated with the three reserves: Auckland, Nelson and Christchurch. Other interviews covered local Maori people with interests in the reserve and people representing wider conservation interests, such as Forest & Bird. The key informant interviews were conducted with a semi-structured format using 26 key words used as prompts and a basis for computerised content analysis (Appendix 3). These keywords were developed from the background information gained in Phase 1 of the project and from initial case study interviews.

Total interviews completed were: Leigh area—6 businesses and 10 key informants; Abel Tasman area—8 businesses and 12 key informants; Akaroa area—5 businesses and 11 key informants.

There were no resources to conduct a wider public survey of attitudes to, or use of, marine reserves.

1.2.3 Focus groups and national workshop

The findings of the research were presented to two small meetings, in Nelson and Christchurch. (It was not practical to hold a similar meeting in Auckland.) The purpose of these meetings was to discuss the findings with local people who have practical involvement with one of the case studies, or other reserves.

The findings of the research were also presented to a half-day workshop in Wellington, convened by DOC in September 2000. In addition to staff of the Department at the workshop, there were representatives of government agencies, environmental organisations, recreational fishing organisations, the fishing industry and groups involved in current proposals in the Wellington region. Discussion at the workshop focussed on strategies and guidelines for the future development of marine reserves in light of the findings, and the outcomes of the workshop have been included in the conclusions and recommendations to this report.

2. Development of marine reserves

2.1 ESTABLISHMENT OF MARINE RESERVES — INTERNATIONAL OVERVIEW

Compared with land-based ecosystems, marine ecosystems are poorly studied and understood. Management of marine areas is complicated by a lack of clear property rights and control of marine resources is often partitioned among a variety of agencies and jurisdictions.

Furthermore, marine conservation initiatives such as marine reserves lag behind those for land. In the United States, for example, Yellowstone National Park was created in 1872 but it was another 100 years before a law was passed to protect some of the nation's waters. The 1972 Marine Protection, Research and Sanctuaries Act was passed as a result of concern about the impact of offshore development. Although there are a number of marine laboratories on the Maine Coast there are no marine reserves³. Despite 10 years of policy work on marine reserves, there are no national conservation areas for marine life in Atlantic Canada. Parks Canada has designated 20 miles of coastal bays in Kouchibouquac National Park in New Brunswick as a special marine protected area, and a small underwater portion of Prince Edward Island National Park.

There are 10 categories of Marine Park Areas in Australia, covering a total of 39.6 million ha. The categories are: conservation areas, aquatic reserves, fish habitat reserves, fish sanctuaries, historic shipwreck protected zones, marine and coastal parks, marine parks, marine reserves, national nature reserves and wetland reserves. These protected areas are relevant for conservation, preservation, recreational and scientific research purposes. They also have commercial implications. Tasmania is still in the process of establishing a system of marine reserves along its coast. However, the six areas proposed comprise a very small part of the total coastline. The smallness in total area of allocated marine reserves in comparison with the area of land-based national parks is a feature of several countries, including New Zealand.

As a result of an increased interest in marine conservation and sustainable use, there are numerous marine protected areas in the Caribbean (OAS/NPS 1988). Yet, efforts at marine protection have met with varying degrees of success resulting in a large number of 'paper parks'. Bunce (1997) notes that of 154 marine/coastal protected areas, two-thirds are not achieving full management capacity.

2.1.1 Marine sanctuaries in the United States

The concept of marine reserves, or sanctuaries as they are called in the United States, differs from that in New Zealand. Marine sanctuaries in the United States

³ Tyler, H. 1998: Marine areas conservation: A North Atlantic perspective.
http://www.erin.gov.au/portfolio/anca/mpa/h_tyler.html

are multiple-use areas where a variety of human activities are permitted. As a rule, dredging, mining, waste dumping or removing of artifacts are not permitted, whilst shipping is restricted to certain lanes in order to minimize the possibility of oil spills or sea wrecks. However, commercial fishing, diving for edible species and the setting of traps for lobsters and crabs are generally permitted. Sportfishing, spearfishing, boating and other types of recreational activity are also acceptable within some reserves. The office of Ocean and Coastal Resource Management within the National Oceanic and Atmospheric Administration (NOAA) oversees the National Marine Sanctuary Program and 13 designated sanctuaries⁴. With limited funding the sanctuaries are heavily dependent on volunteer staffing (Chadwick 1998).

There is concern amongst sanctuary staff and conservationists about the varieties and levels of human activity still allowed in marine sanctuaries. For example, despite the obvious decline in numbers of red sea urchins within the Channel Island Sanctuary, diving to catch them is still permitted. A burgeoning squid industry in this same sanctuary, with no regulations in force, is also of concern for its overall effect on the food chain, as squid are the staple diet of Risso's dolphins. Not only are there inadequate regulations but there is no research being carried out to investigate possible outcomes of ongoing human use (Chadwick 1998).

Alongside concern about damage to and loss of coral reef systems worldwide, there is concern about inadequate protection for coral reefs in United States sanctuaries. Flower Garden Banks Sanctuary with its extensive coral reef system still allows set net trawling. Trawl nets and boats using hydraulic equipment can disturb the ocean floor and sediments and sedentary marine life (Chadwick 1998). The Florida Keys National Marine Sanctuary was designated in November 1990 and encompasses 2,600 square nautical miles. It contains the only coral reef formations in the United States mainland and hosts a wide variety of water-based activities, including diving and snorkelling (Suman & Shivlani 1997). In addition to human activities in and around coral reefs, this ecosystem is threatened by increasing human populations nearby, with deteriorating water quality due to inadequate sewage systems. The presence of noxious chemicals and nutrients in the ocean damages the coral, and the rapid growth of algae deters its growth (Chadwick 1998).

2.1.2 Absence of impact studies

Correspondence between the research team and NOAA reveals that there have been no assessments of the social and economic impacts of marine sanctuaries in the US. Their scientific monitoring has focussed on biophysical dimensions (e.g. species health and diversity, water quality, etc.) and not on socio-economic, behavioural or attitudinal changes. However, NOAA noted that funding was requested for fiscal year 2000 to conduct an economic valuation study of the National Marine Sanctuaries Program. They also indicated that the Environmental Defence Fund is planning a study on public perceptions of the National Marine Sanctuaries.

⁴ Information on the United States Marine Sanctuary system is available on the website <http://www.sanctuaries.nos.noaa.gov/>

A socio-economic study of a proposed marine reserve in the United States Virgin Islands was commissioned by the Caribbean Fishery Management Council in response to intense negativism amongst the commercial fishermen in the area of St John (Downs & Petterson 1997). Thirty-eight fishers were identified as potential users of the St John Marine Reserve. Ninety-five percent of these were of French descent as opposed to West Indian or from the Virgin Islands. Their concerns were heightened by the fact that the area they traditionally fished was particularly productive for lobsters as well as several species of fish. The impact of closing the available fishing area was seen to contribute to increasing pressure on resources elsewhere, resulting in lower catches and therefore less income. According to one fisher 'it is too much to expect other areas to absorb the fishers and gear currently in use'. They were concerned that fishing in areas adjacent to the reserve would increase and there was no indication of what species of fish were being targeted for protection within the proposed reserve. Another concern raised was that the ban in the St John Reserve may be the first step towards closure of other areas. Whilst some fishers saw the merits of rotating areas of sea for closure, they would not state this publicly as they would be unpopular amongst the others. Some of the fishers interviewed preferred to see limits placed on the type or size of boat that can be used for fishing or the type of gear used, rather than a total ban. A decision as to what type of fishing should be banned in the reserve was under discussion and, depending on what types are permitted, some fishers may not be affected (Downs & Petterson 1997).

Despite the importance of considering socio-economics issues when developing marine management programs, the specific impacts of marine protection strategies on socio-economic conditions have not been well documented in the Caribbean according to Bunce (1997). Yet there is a widespread belief internationally that marine protection can benefit tourism, protect marine species and habitats, provide opportunities for research and education and result in higher fishing yields. In Sabah, for instance, the government believed the economic benefits of tourism based on diving in a new marine park would outweigh the loss of fishing to the few fishers who used the area. Another example of marine protection as a tourism development strategy is the development of the Curaçao Underwater Park, which was created in part to attract North American tourists to its pristine waters (Knausenberger & Fleming 1986).

The Great Barrier Reef in Australia comprises the largest and healthiest collection of coral reefs and related ecosystems in the world and is listed as a World Heritage area. It is the world's largest (350 000 km²) system of multiple-use, protected marine areas, with uses encompassing commercial and recreational fisheries, tourism and shipping as well as conservation. The Great Barrier Reef Marine Park Authority⁵ is the lead agency for management of the Great Barrier Reef. In addition, the Reef Research CRC⁶ based in Townsville was established in 1993 as part of the Australian Government's Cooperative Research Centres Program. The Centre provides strategic scientific information, education and training to enhance reef-based industry and

⁵ See <http://www.gbrmpa.gov.au>

⁶ See <http://www.reef.crc.org.au>

management of the Great Barrier Reef World Heritage Area. It has undertaken a comprehensive series of social, economic and tourism studies, including studies of visitor experiences and public perceptions (Shafer et al. 1998). The Centre has also produced social impact assessment guidelines for the Great Barrier Reef Marine Park Authority. It advocates that given the complex uses of this marine area, social assessments (including recreation planning/management) be carried out in both planning and management, including the assessment of permit applications (Broome & Valentine 1995).

2.1.3 Economic impacts and diving behaviour in Australian marine protected areas

Diving provides an intensive use of marine protected areas, often with interactions between the visitors and the marine environment. Rouphael & Inglis (1995) found through direct observations of 214 scuba divers in the Great Barrier Reef Marine Park near Cairns that a very small number (4%) of divers were responsible for more than 70% of damage observed. The research indicated that damage could be related to underwater photography and also to the type of corals. Strategies proposed for minimising damage caused by divers included limiting diver contact through the selection of dive sites, and promoting more environmentally friendly behaviour through education and information directed at divers and operators.

Information about the economic value of marine protection allows managers to make informed decisions about the funding that should be made available to support management activities. A review of the impacts of recreational scuba diving written by Australian Parks and Management and cited by Davis et al. (1995) highlights the positive economic impacts of Julian Rocks Aquatic Reserve. It also examines the potential negative, environmental impacts caused by concentrations of divers. The 80 hectare reserve was established in 1982. As a result of its diverse attractions, proximity to the tourist centre of Byron Bay, and relatively easy access, the reserve is a popular and intensively used dive site. Commercial dive operators and private boat operators use the site. Many people take dive holidays in Byron Bay. The total annual expenditure of divers in the area was estimated at \$2.8 million a year, including accommodation, food, fuel and fares, according to a travel-cost survey in 1993 and 1994 (Davis et al. 1995). Source of income for management of a reserve can include a levy on divers and concessions for tourist operators.

2.2 LEGISLATIVE AND INSTITUTIONAL HISTORY OF MARINE RESERVES IN NEW ZEALAND

The Marine Reserve Act (1971) established the statutory framework for marine reserves and was administered initially by the Marine Department and then the Ministry of Agriculture and Fisheries. Since 1987 it has been administered by the Department of Conservation. During the first 15 years only two marine reserves were created, namely Cape Rodney-Okari Point in 1975 and Poor Knights Islands in 1981.

The purpose of the Marine Reserve Act is to provide for the setting up and management of areas of the marine environment as reserves to preserve them in their 'natural' state, as the habitat of marine life and for scientific study. The boundaries of a marine reserve do not extend inland beyond the foreshore. The reserves are protected from human impacts such as fishing and it is an offence to disturb marine life or pollute the water. While these human activities are prohibited, preservation of part of the marine environment in a 'natural' state cannot exclude natural events and change, such as disease or invasions by a new species (Parliamentary Commissioner for the Environment 1999: 21–22).

A process has been developed for proposals and making a formal application for a new marine reserve. There is an initial, non-statutory, stage for developing a proposal, including site investigations and initial consultation with interest and user groups. The formal, statutory, stage of the process includes public notification and a call for objections. The Department of Conservation (2000) provides a full outline of the process. It also has guidelines for developing a management plan for a reserve.

There is a history of modification and amendment to the marine-reserve legislation. The Government is, at present, reviewing the Marine Reserves Act to ensure it is relevant to the management of the New Zealand marine environment, including the protection of marine biodiversity (Department of Conservation 2000).

A 1977 amendment to the Marine Reserves Act (1971) allowed the Minister of Conservation to authorise recreational fishing within marine reserves. This amendment facilitated establishment of the Poor Knights Islands Marine Reserve because of public pressure to allow some recreational fishing to continue in that area. It 'represented a compromise solution designed to satisfy both recreational fishing and conservation interests' (Department of Conservation 1995: 2). Only some species could be taken (Gabites Porter 1996: 5).

The Poor Knights Islands Marine Reserve was established in 1981. The islands lie 24 km off the coast of Northland, and are eroded volcanic remnants. Being relatively isolated from the mainland and therefore undisturbed, the islands are an important nature reserve with a unique ecosystem. Landing on the islands is by permit only, to reduce the risk of introducing predators such as rats and cats. The scenery above the water is spectacular, with sheer cliffs and abundant pohutukawa. The surrounding waters, fed by subtropical currents, are well known for their clarity and marine life. There are spectacular underwater cliffs, caverns and arches and they rate as one of the top diving locations in the world. The surrounding ocean is also the source of some of the best big game fishing in New Zealand. The area is serviced for fishing and diving mostly from Ngunguru and Tutukaka townships. A number of charter boats operate out of Tutukaka, 30 km east of Whangarei. The Poor Knights Islands Marine Reserve included all water 800 m from the Islands, Pinnacles and Sugar Loaf Rocks. No commercial fishing was allowed within one nautical mile (1.85 km) of the Islands and only longlining was permitted within three nautical miles (5.56 km). Small areas around Aorangi Island had full protection.

Recreational fishing continued around the Poor Knights until December 1994. Although not obliged to, as an earlier notice served to indicate full protection

was intended, the Minister of Conservation then initiated a period of consultation and review. The consultation with public, iwi and interest groups included a survey questionnaire. By far the strongest support for continued fishing came from the local, Tutukaka area (two-thirds of submissions from the area cf. 27% overall). The Department nonetheless recommended that recreational fishing should stop. The decision was questioned, leading to High Court action, and a further review and consultation period was agreed to. This led to a discussion document (Department of Conservation 1995) and analysis of public submissions (Gabites Porter 1996), which included analysis of cross submissions. In this round of public input, 57% opposed a new fishing notice although, as pointed out by Gabites Porter (1996), this number should be treated carefully as there were a large number of 'form' submissions, as well as submissions from organisations representing a large number of members. Local and Northland submissions were heavily in favour of continued, limited fishing. Gabites Porter (1996) highlight the confusion that can arise because of the strong support for recreational fishing by commercial operators who make a living out of 'amateur' activity. Throughout this process there was no social and economic impact assessment of the proposed changes in the status of the reserve. The changes have now been implemented.

Specific concerns raised about the Marine Reserves Act include the lack of reference to the Treaty of Waitangi, the application and public consultation processes, the restriction to territorial waters, and concern that the reasons for the establishment of marine reserves are really broader than just the scientific study of marine life as decreed in the Act (Parliamentary Commissioner for the Environment 1999: 22). There is concern that the concept of marine reserves should be broadened to include whole ecological systems. Furthermore, marine reserves have limitations in marine conservation. For instance, small coastal reserves may not be effective for migratory species or those that are dependent on a variety of habitats. Neither will a marine reserve necessarily be appropriate for the seasonal patterns of the ecosystem or for a specific species that requires protection (Parliamentary Commissioner for the Environment 1999: 22).

The Department of Conservation (2000) raises a number of issues for discussion in relation to the existing legislation. Marine reserves are not the only mechanism for protecting the marine environment, with the Fisheries Act, Marine Mammal Protection Act, Resource Management Act and various shipping regulations all playing a part as well. A key issue is whether marine reserves should have flexibility to allow recreational fishing. Others include protection for deep sea areas outside territorial waters, application of the principles of the Treaty of Waitangi, and sorting out management jurisdictions with territorial local authorities, especially regional councils with their responsibilities for coastal management. The process for establishing marine reserves is seen as requiring improvement, with better consultation and ways of building support from local communities and Maori.

Many iwi and hapu have opposed the marine reserve model on the grounds that it prohibits the access of local Maori to the natural resources and sites within their rohe moana (for a glossary of Maori terms, refer p. 38). They consider such a prohibition is contrary to the Treaty of Waitangi. In some cases iwi and hapu have indicated that they will not support a marine reserve in their area unless they are guaranteed continued access to their traditional sites and resources. In

other cases, however, iwi and hapu have been closely associated with proposals for marine reserves (Parliamentary Commissioner for the Environment 1999: 22).

At the time of writing there were well over 10 investigations or applications underway for new marine reserves. Commentary by the conservation advocacy group Forest & Bird in various issues of their publications over the 1990s, points to strong ongoing interest in the establishment of new marine reserves. The Minister of Conservation notes that efforts to establish marine reserves to date 'do not, in my view, reflect the public's general desire to see our marine environment well protected ...' (Department of Conservation 2000, Foreword).

3. Three case studies

Here we present information on case studies of Cape Rodney–Okakari Point, Tonga Island and Pohatu marine reserves. There is background information on the history, establishment, management issues, community interactions and attitudes for each reserve, and local impacts. Later we draw more broadly on the case studies to consider social and economic impacts (Chapter 4), and the establishment and management of marine reserves (Chapter 5). Unless identified otherwise the information from the case studies came from interviews, as discussed in Chapter 1.

3.1 CAPE RODNEY–OKAKARI POINT MARINE RESERVE

3.1.1 Description and history

The Cape Rodney–Okakari Point Marine Reserve (also known as Goat Island or Leigh marine reserve) was the first marine reserve to be established in New Zealand, in 1975. It has an area of 518 hectares and its seaward boundary extends 800 metres out from the uneven contour of its 5-km long shoreline. The nearest settlement to the reserve (approx. 3 km away) is the village of Leigh, with a population of 546 in 1996 (Leigh and Matheson Bay). The usually resident population of Leigh grew markedly (31%) between 1986 and 1996.

The reserve has a variety of habitats including rocky shores, reefs, underwater cliffs and sand flats with kelp forests and sponge gardens. The University of Auckland has a marine laboratory that overlooks 9-ha Goat Island within the reserve. The Cape Rodney–Okakari Point Reserve offers some of the best opportunities for snorkelling and scuba diving close to Auckland (1.5 hours drive), with easy viewing of fish such as blue maomao (*Scorpiis violaceus*) and snapper (*Pagrus auratus*). There are high numbers of visitors to the reserve during the summer months, weekends and public holidays. The small, 100-m long beach at the road end is sometimes crowded with up to 2000 people.

3.1.2 Establishment and management issues

Impetus for establishment of the reserve came from the University of Auckland marine laboratory sited on the shoreline. The initial boundary included parts of the rocky foreshore where several local Maori families collected kina.

There are a number of management issues associated with the Cape Rodney–Okakari Point Marine Reserve, the ‘jewel in the crown’ of marine reserves in New Zealand. Some of these issues stem from the Reserve’s status and popularity and associated visitor pressure and include:

- At the time the reserve was established it was not recognised that substantial funds would be required from DOC’s operational budget, especially as the numbers of visitors rose and created extra demands of management.
- There are insufficient ongoing funds for adequate monitoring and research as well as general management of the reserve.

- The distance of the local DOC office (at Warkworth) from the reserve makes it difficult for staff to monitor activities within the area.
Reliance on wardens, honorary rangers⁷ and users of the reserve to report illegal activities (e.g. poaching) within the reserve.
- The authority of DOC staff and honorary rangers to enforce prohibitions on harvesting in the reserve is not recognised by some poachers, who blatantly offend knowing only police have the power to arrest.
- Kina and crayfish are favourite species taken by poachers.
- Intensive uses on the boundary of the reserve, requiring a possible ‘buffer zone’.
- There is overcrowding and lack of formal controls and patrols at the beach.
- Maintenance of public toilets, grass areas, and litter collection by contractors from outside the district is ‘inadequate’.
- The conservation zone area outside the land boundary of the reserve controls run-off by restricting land owners from subdividing their properties.

3.1.3 Community interactions and attitude changes

The people of Leigh are very ‘protective’ of the reserve, and demonstrate a strong sense of community ownership. They report poachers to DOC staff or honorary rangers. Commercial fishers have actively protected the reserve from poaching trawlers, while people within the community also keep watch on the activities of divers and ‘boaties’ from outside the district. One respondent commented, ‘Members of the community take the marine reserve seriously now as they can see the positives and because we live in an era with more awareness of the environment’.

Attitudes to the reserve have changed since its establishment 25 years ago. Several stakeholder groups that formerly were opposed to it (i.e. local Maori, commercial and recreational fishers) now support the reserve, while some business people who took a neutral stance also support the concept. Kramer (1999: 62) notes that while impacts on them have varied, local businesses are now ‘highly supportive’ of the reserve.

TABLE 1. VISITOR NUMBERS IN CAPE RODNEY-OKAKARI POINT MARINE RESERVE 1974-99 (SOURCE: KRAMER 1999: 23).

YEAR	VEHICLES	VISITORS
1974/75	5 200	13 000
1983/84	16 800	42 000
1991/92	35 500	89 000
1998/99	70 000	210 000

Greater public awareness of the Cape Rodney-Okakari Point Marine Reserve has heightened its attractiveness as a visitor destination. In particular, improvement of the main access road from gravel to tar-sealed road has made it more accessible. There are many school trips to the reserve, some of which include overnight stays on the local marae as part of the educational experience. Large numbers of organised groups of retired people also visit the reserve. Observers noted that weather patterns and the state of Auckland’s economy influence visitor numbers to the reserve. The overall increase in public knowledge of the reserve, and interest in visiting it, are demonstrated by the dramatic increase in visitor numbers (people and vehicles) since 1974 (Table 1). This increased interest also reflects a wider support for the marine reserve concept (Kramer 1999: 62).

⁷ Honorary rangers have the same powers as DOC staff when they hold a warrant of authority. Wardens are often seasonal staff, usually hold no warrant and may be involved in monitoring work.

3.1.4 Key impacts

High visitor numbers are the main cause of environmental impacts. The impacts of visitors on the biological integrity of the reserve were noted by conservation interest groups (Enderby & Enderby 2000), who report that the reserve is 'suffering from its own success'.

The key social and economic impacts of the Cape Rodney–Okakari Point Marine Reserve are:

- Litter dropped by day visitors
- Changes in the behaviour of many fish species due to interaction with people (e.g. feeding bread and peas to the blue maomao)
- High demand by visitors for parking in the car park and along the Goat Island road
- Safety issues associated with the high volumes of traffic, including buses, generated by visitors
- Poaching (mainly at night)
- Local people stay away from the local beach because of overcrowding, and 'feel pushed out' when visitor numbers are high
- Food vendors and snorkel hirers operating from the roadside or private properties reduce the turnover of local shops
- Tourist charter boats operating from Leigh often visit the reserve
- Increase in accommodation facilities, and the number of restaurants and cafes at Leigh
- Development of expensive subdivisions at Leigh
- Increased occupancy rates at Warkworth motels
- Dive shops from Auckland bringing divers to the reserve
- Risks to large numbers of snorkellers and inexperienced swimmers in an area with no formal beach patrol
- Educational benefits of large numbers of school pupils visiting the reserve
- Large numbers of visiting school pupils have a major effect on the relatively small community of Leigh.

3.2 TONGA ISLAND MARINE RESERVE

3.2.1 Description and history

Tonga Island Marine Reserve has an area of 1835 hectares. Created in 1993, it is adjacent to Abel Tasman National Park. The offshore boundary of the reserve is 1852 m from Tonga Island and the mainland between Awaroa Head and the headland which separates Mosquito and Bark Bays. The nearest towns are Takaka to the north and Motueka to the south. Totaranui is a popular camp ground to the immediate north of the reserve and Awaroa, near the northern headland of the reserve, is a small settlement of holiday homes, with a small holiday resort and cafe. There are several huts and camping areas along the coastal walking track in the Park. The usually resident population of Abel Tasman National Park, i.e. the areas around Marehau to the south and Awaroa to

the north) was 171 in 1996, a marked growth of 51% from 1986 (NZ Census—Abel Tasman National Park is made up of mesh blocks 2346800 and 2366500).

Geographical features of the Tonga Island Marine Reserve include sandy beaches, boulder headlands and reefs, small estuaries and a sand-mud sea floor. It is part of Tasman Bay which is renowned for large tracts of granite above and below the water, for fish species such as tarakihi (*Nemadactylus macropterus*) and blue cod (*Parapercis colias*), and for crayfish (rock lobster—*Jasus edwardsii*). There is a colony of fur seals (*Arctocephalus forsteri*) on the island and increasing numbers of fur seals are reported in the area.

3.2.2 Establishment issues

Establishment of the reserve was a contentious process. The Department of Conservation suggested the Tonga Island Marine Reserve after considering a number of areas adjacent to the Abel Tasman National Park. Although most people agreed there was a need for a marine reserve, there were conflicting views about where the boundary should lie as residents, holiday makers, recreational and commercial fishermen were concerned about its impacts on their activities. The commercial fisher with crayfish quota who fished the area was not in favour of having his ‘patch’⁸ being turned into a marine reserve and pointed out he was not awarded any compensation. The Awaroa Headland was a favourite recreational fishing spot for locals. A major issue with the boundary was that recreational fishers saw they would be excluded at the northern, Awaroa end.

The boundaries finally gazetted differed from those suggested during the process of consultation. As a result some locals considered DOC was ‘sneaking more area into the reserve’. The Department explained that the reason for the extension at the Awaroa Headland end was to allow for a better line-up of the boundary from the sea. This change resulted in a much smaller area of reserve.

3.2.3 Management issues

The management issues associated with the Tonga Island Marine Reserve include:

- Ongoing concern about the limited extent of the reserve (e.g. the non-inclusion of the Awaroa Inlet, the possible extension of the reserve further into Tasman Bay, and the remoteness of the reserve compared with areas further south)
- Desire of Awaroa residents for consultation with DOC over management issues
- The foreshore of the Awaroa Inlet is managed by the Tasman District Council
- The large increase of visitors to the reserve area (including adjacent Abel Tasman National Park) is managed by DOC with limited resources
- Concern about providing adequate toilet facilities for the growing number of visitors

⁸ While fishers recognise traditional fishing ‘patches’ they are not part of the quota management system.

- The need for speed restrictions on recreational boats to minimise their impacts on the reserve
- Adequate signage for people entering the reserve from the beaches and the Abel Tasman Track
- Adequate signage for commercial fishers to determine the boundaries of the reserve at night
- Poaching in the reserve is difficult to control (prosecutions are few) because of its isolation and the lack of an efficient communications system between DOC and the water taxis
- The difficulty for DOC boats based at Marahau to regularly patrol the reserve, especially the northern end, and the need for DOC staff to divide their time between land and sea
- Possible appointment of water taxi drivers as honorary rangers
- The need to monitor crayfish on a regular basis using divers and local knowledge
- The feeding habits and breeding patterns of the seal population on Tonga Island need to be monitored
- Ongoing funding of research and dissemination of information about the reserve
- Not all tourist operators indicate the location of the reserve on the maps in their brochures or inform visitors of appropriate ways to act in the reserve
- Sediment run-off discolours water in the reserve and limits the interest from dive schools
- Promotion of the Tonga Island Marine Reserve by DOC appears not as vigorously as of the Long Island Marine Reserve
- It is necessary to plan ahead for growing numbers of visitors to the reserve, along with visitors to the Abel Tasman National Park.

3.2.4 Community interactions and attitude changes

Since gazettement the Tonga Island Marine Reserve there has been a notable change in local attitudes, with most locals now in favour of the reserve. Whilst the majority of Awaroa residents originally were against the reserve, the community is now very supportive. Indeed, some interviewed residents and tourist operators maintained that the reserve is too small and should include the Awaroa estuary. There is now much support for the reserve from the water taxi operators who were originally not in favour. Their support extends to voluntarily patrolling the marine reserve and actively promoting it to their customers. They can now see the commercial benefits to them as their businesses expand. The numerous kayak companies in the area inform their clients about the reserve and indicate its position on their maps. Some of the companies tell their clients about the rules associated with the reserve. Tourist operators increasingly are seeing the reserve as an additional attraction that complements the national park.

However, some people still have reservations about the Tonga Island seal colony being included in the reserve, as they consider fish in the reserve cannot flourish if the seals are increasing in numbers. Recreational fishers are now more supportive of the reserve and some actively protect it from poachers.

3.2.5 Key impacts

The key impacts of the Tonga Island Marine Reserve identified in interviews are:

- Its contribution to growth in tourism enterprises in the area (e.g. several new accommodation places and a proposed 160-bed hotel at Marahau)
- Increasing visitor numbers to the national park, most attracted to the coastal areas
- Originally there were two kayak companies operating in and around the reserve, now there are at least 13
- Increased demand for, and also competition between, growing numbers of water taxi operators
- Kayakers taking shellfish and crabs from the reserve
- Increase in the populations of fish (i.e. blue cod, tarakihi), crayfish (research has been carried out but not released to date) and paddle crabs
- Disposal of rubbish at the Awaroa Lodge due to the carry in, carry out policy.

3.3 POHATU MARINE RESERVE

3.3.1 Description and history

Pohatu Marine Reserve is an area of 215 hectares on the eastern side of the outer bays of Banks Peninsula in Canterbury. The Reserve is 15 km via a steep road, and 11 nautical miles, from Akaroa. It extends southwest of Redcliffe Point to Ounu-hau Point to include an inlet known as Flea Bay, and Dyke Head. The reserve is a typical example of a Banks Peninsula bay. Its geographical features include a reef and underwater caves, and it provides habitat and important breeding area for white-flipped penguins (*Eudyptula albosignata*). It is frequented by Hector's dolphins (*Cephalorhynchus hectori*), which are also protected by the larger Banks Peninsula Marine Mammal Sanctuary.

Onuku marae belongs to the Papatipu Runaka of the Kai Tahu people (for a glossary of Maori terms, refer p. 38). It is the main marae in the Akaroa Harbour area and the closest marae to the Pohatu reserve. The marae has provided leadership in terms of consultation with interest groups in Akaroa, including neighbouring Papatipu Runaka, namely Wairewa and Koukourarata, as they shared the mahika kai and fishing interests in these waters. The Marae has supported the Pohatu Marine reserve. Local runaka also intend to establish a Taiapure into the Akaroa Harbour with potential overlap issues with the Pohatu Reserve. The Ministers of Conservation and Fisheries are looking to the stakeholders of the marine reserve, further reserve proposals and taiapure to resolve overlap issues locally.

Flea Bay is one of the bays on the Banks Peninsula Track, a four-day tramp organised by several farming families. The Track is accessed through the town of Akaroa and is one of the many attractions that draw visitors to Akaroa, where tourism is an increasing part of the local economy. Akaroa is just 80 km from Christchurch by road, making an easy day trip, and has many visitors, both domestic and international. The commercial fishing industry has declined in importance, from 35 vessels in 1984 to just 7 in 1997 (Baines 1999) and traditional farming has struggled on the Peninsula. The usually resident

population of Akaroa was 642 in 1996, having grown 17% from 1986 (Census data).

Pohatu is one of six marine reserves in New Zealand that has a stakeholder committee. The committee represents a range of interest groups including recreational and commercial fishers, the local iwi, residents, DOC, and Forest & Bird, and the applicant group for a reserve inside the harbour, at Dan Rogers (see below).

3.3.2 Establishment issues

The process to establish the Pohatu Marine Reserve was very contentious (Ryan 1995). The application was one of a series for a marine reserve within the Akaroa area of Banks Peninsula. The Akaroa Harbour Marine Protection Society applied for a marine reserve known as Dan Rogers, an area of 530 hectares south of Onuku Marae within Akaroa Harbour. This site was fervently contested by recreational fishers, commercial fishers, recreational fishers and local Maori. It is a natural seafood collecting place for the marae as stocks are good, and the sheltered position of the cove makes it safe for fishing. Fishers counteracted the proposal for Dan Rogers by applying for the smaller, Pohatu Marine Reserve, which is located outside Akaroa Harbour. In effect, the Pohatu reserve was nominated because it was a less contentious site.

Several key informants commented that the former Minister of Conservation was very keen to have Pohatu gazetted as a marine reserve before the 1999 election. He gave a lot of personal attention to the application, chairing all the meetings and ensuring that negotiations were constructive. DOC also purchased land from a neighbouring farmer to establish a land reserve. This land reserve was described as a 'consolation prize to Forest & Bird' who supported the applications for reserves within and outside the harbour.

3.3.3 Management issues

Management issues identified for the Pohatu Marine Reserve include:

- No honorary rangers have been appointed, though sea and weather conditions make it difficult for the local DOC officer, based near Akaroa, to adequately patrol the reserve.
- A number of poaching incidents have occurred within the reserve, but there have been no prosecutions so far.
- Some Maori families are still taking marine life from the reserve as they believe it is a traditional fishing area.
- There was an 8-month delay between the opening of the reserve and the inaugural meeting of the reserve committee.
- Access by land is restricted by a steep, winding, unsealed road, suitable for 4WD vehicles, that deters visitors.
- Access by sea is sometimes hindered by weather conditions.
- The boundary proposed by the applicant was eventually extended by the Minister of Conservation at the northern end, and includes a good habitat for crayfish.
- There was no baseline research conducted prior to the opening of the reserve.

- Funding and personnel for managing and patrolling the reserve, and for ongoing monitoring and research are lacking.
- The signs on the headlands are not visible at night, and there are no posts or buoys marking the sea boundaries.
- The pamphlet produced by DOC about the reserve incorrectly marked the private driveway of a neighbour as part of the public road into Flea Bay.

3.3.4 Community interactions and attitude changes

The reserve is new and community interactions have yet to be fully established, with the committee playing a key role. Although few tourism ventures use the reserve yet, some are ready to include the reserve in their operations once there is something to 'show' tourists. A neighbouring farmer, who originally was not in favour of the reserve being established in the area, not only supports the reserve now, but has also developed an ecotourism venture based on the penguin colony. Another farmer, who described his initial reaction to a marine reserve as 'negative' due to the inclusion of 'one or two favourite fishing spots', accepts its existence and now goes elsewhere to fish. Furthermore, the commercial fisherman who held quota and fished the area, was against the reserve's establishment at the outset but now supports the concept and is keen to be an honorary ranger. The reserve is not yet being used for educational purposes.

Local iwi are generally concerned about marine reserves as they do not support restrictions that prevent their traditional right to take from the sea. While the local iwi were not in favour of a marine reserve within the harbour at Dan Rogers, they were supportive of the reserve at Pohatu. Kai Tahu are currently applying for a taiapure for the whole of Akaroa Harbour extending around to the boundary of Pohatu. Both residents and local Maori are pushing for the reserve within Akaroa Harbour as well as a taiapure, which could extend out of the harbour and around to Pohatu. This taiapure would be managed by a local committee under the auspices of the Ministry of Fisheries. It would ensure that any area of sea that is depleted of fish stock could be closed off as a 'conservation for sustainable take' area for as long as the committee determined. This may mean that at times the Pohatu Marine Reserve would in effect be increased in size should the waters beyond its boundary be declared a 'no take' area.

3.3.5 Key impacts

It is too early to assess fully the impacts of the Pohatu Marine Reserve as it was only established in 1999. The initial impacts of the Pohatu indicated during interviews are as follows:

- The employment generated by the reserve is minimal.
- A local farmer hires kayaks and guides visitors to the penguin colony in particular.
- The Reserve adds to the attractions of the Banks Peninsula walking track.
- The number of direct visitors is small.
- It is too early to tell if there are changes in fish populations.

People interviewed indicated several potential impacts that may occur as the reserve becomes better known:

- Educational visits to the reserve by school pupils and other visitors, including marae-based programmes, leading to more visits to the reserve, increased visitor spending in the Akaroa area, and increased knowledge of the reserve.
- Increased visitor volumes as the penguins and dolphins in and around the reserve become part of the product marketed by local tourism operators.
- Greater use of Akaroa Harbour by larger and more powerful recreational boats that is likely to extend around to the reserve.
- Increased visitor numbers by land and water, including jet skis, have negative effects on the penguin colony.
- Numbers of vehicles on the steep and narrow access road increased.

4. Social impacts of marine reserves

Both positive and negative impacts are evident for marine reserves in New Zealand. This section draws on the three case studies, plus other research and literature as documented, to provide a general description of social impacts.

Initial focus on the impacts of a marine reserve tends to be on the fishers who previously fished the waters of the reserve. Commercial fishermen consider that the prohibition of fishing from an area of local waters costs them time and money to obtain their quota elsewhere. Recreational and customary fishers also lose access to the reserve area. Nevertheless, some fishers believe the increased number and size of fish in reserves gives rise to a spill-over effect that benefits the commercial or recreational activities beyond the boundaries of a reserve. Emerging research provides empirical evidence of the biological benefits of marine reserves (Kelly et al. 2000). Those in favour of marine reserves believe they provide beneficial, long-term effects for protection of New Zealand's marine heritage and help sustain marine resources. Marine reserves also offer a variety of recreational opportunities and marine life for educational study. So a major impact of marine reserves is that they attract visitors to the area for recreation and education, with flow-on benefits for the local economy.

However, these impacts fall differentially on sections of the community, raising issues for reserve location and boundaries, for on-going management, and for evaluating the longer-term outcomes of the decision to establish a reserve. Issues around the establishment and management of marine reserves are discussed in Chapter 5.

4.1 RECREATIONAL AND TOURISM IMPACTS

4.1.1 Recreation

Recreational activities include those that are land- and-water based. The main water-based activities are diving, snorkelling, swimming and viewing from boats. Shore studies, walking and passive enjoyment of an attractive place where marine life can be viewed in its natural state, are common land-based recreational activities around marine reserves.

Several existing and proposed marine reserves are close to popular holiday spots, for instance, Cape Rodney–Okakari Point (established 1975), Te Whanganui a Hei (established 1992), Tonga Island (established 1993), Kaikoura (proposed 1992) and Pohatu (established 1999). Studies undertaken to determine the effect of a marine reserve on recreation and tourism (including the case studies described above) reveal some interesting results.

The long-established Cape Rodney–Okakari Point Reserve near Leigh provides an opportunity to gather information that spans a reasonable length of time

(Kramer 1999). This reserve has the best time-series of data on visitor use, as summarised in Table 1 on p. 18. An early survey indicated the reserve had become a popular underwater attraction for visitors, especially during the summer months (Bell 1984). These visitors are aware (before they decide to visit) that it is a reserve with no extraction permitted. On route they pass several coastal areas where extraction is allowed and yet they choose to visit the Cape Rodney-Okakari Point Reserve for recreational purposes. Studies show increasing numbers of people have visited since the reserve was gazetted, despite the fact that activities such as angling, spearfishing, baitcollecting, souvenir gathering and shellfish collecting were banned (Bell 1984; Kramer 1999).

The case study interviews show that the small beach at the road end at Cape Rodney-Okakari Point Marine Reserve is overcrowded with visitors at weekends, public holidays, and during the summer months. Comments indicated that locals choose to stay away from the beach nowadays as they 'feel pushed out' or that it 'does not feel like our beach anymore'. The high number of visitors at these peak periods also puts pressure on parking capacity and traffic volumes near the reserve. Parking is difficult to find at the car park or along the road on the way in, while high traffic volumes and speeding vehicles have made the only road in and out of Leigh more hazardous. Another concern for DOC staff and locals is the amount of litter that is dropped by visitors around the reserve.

In contrast, the majority of respondents in a 1997 survey of the Te Whanganui a Hei Reserve (Craw & Cocklin 1997) stated that the reserve has had no effect on the community or on themselves. In fact the reserve has had a relatively low profile and minimal impact on the number of visitors to the area.

Both the Tonga Island and Pohatu Marine Reserves have low profiles in their local areas. Thus far litter has not been a concern at the Pohatu Marine Reserve itself. The Tonga Island Marine Reserve borders the Abel Tasman Park and a key issue there is rubbish left in the adjoining Park. No rubbish bins are provided due to the 'what you carry in you must carry out' policy. There are toilets at Tonga Beach. While DOC staff consider that waste disposal is well managed at present, the owner of the nearby private lodge at Awanui reported visitors trying to offload their rubbish there. Solid waste disposal is a major job for them as all rubbish has to be barged out and then driven to Takaka. It is difficult to distinguish visitors to the Park from visitors to the Reserve, particularly with many crossing the Reserve by kayak and boat. Either way, further increases in visitors to either the Park or the Reserve could exacerbate waste management problems.

4.1.2 Tourism

Proponents of marine reserves often cite tourism and the creation of new tourism opportunities as a major beneficial impact. Tourism opportunities are linked with the number of visitors to a place.

The case studies found the clearest economic impacts through tourism at Leigh. Although it is difficult to determine if the Cape Rodney-Okakari Point Marine Reserve has had a fundamental impact on local economic development, opinion amongst locals is that they would be worse off without it. All of the Leigh

business operators interviewed during the case study agreed that the reserve has had an impact on the local economy, although the extent of this impact varies between businesses. A substantial proportion of their trade is with visitors to the reserve, primarily in the summer months. Generally, businesses believe that the reserve has helped to maintain their viability. So the case study and other research found that whilst the setting up of the reserve has constrained the economic activities of commercial and recreational fishing over a small area, it has contributed to the economy in the form of tourism (Cocklin & Flood 1992; Kramer 1999). Interviews during the case study showed there have been increases in the number of accommodation facilities, restaurants and cafes at Leigh. Local shops do not always benefit from the custom generated by the reserve, however, as many visitors bring their own food. A number of fast food and snorkel hire roadside vendors have applied for licences to operate alongside the main road into the reserve. Some locals view these vendors as 'opportunists' who spoil the image of the area as well as reduce the turnover of local shops. Firms in Auckland and other places outside the Leigh district, such as diving schools, bus companies and tour operators, also benefit from the demand for services by visitors.

As the Cape Rodney-Okakari Point Marine Reserve and the community of Leigh have become more widely known throughout the Auckland region, several expensive subdivisions have been developed on the outskirts of the town. The upmarket holiday homes reflect 'Auckland coming to Leigh' according to a local informant, although this trend is not necessarily attributable to the reserve. Residents are concerned at the prospect of a rate increase as they upgrade from septic tanks to a new sewage system.

Clearly it takes time for the tourism impacts of a reserve to build up. A study of local businesses at Hahei, the town closest to the Te Whanganui a Hei Reserve, revealed that only one diving business believed its custom had increased due to the reserve (Cocklin & Flood 1992). A local tour boat operator believed his business would increase with an established increase in marine life leading to an associated demand for underwater activities from visitors. There is debate over the extent to which local charter boats servicing the area around the Poor Knights Islands Reserve for recreational (big game) fishing will be affected by the total ban on fishing in the reserve. Local dive-boat operators servicing the Reserve consider they benefit directly from it. (Interviews were conducted with DOC staff in Whangarei and a dive operator in Tutukaka.)

Since the Tonga Island Marine Reserve was established in 1993 there has been a substantial increase in the number of tourism ventures operating in the area, for which the marine reserve is part of the attraction of the coastal environment. For example, there was only one water taxi operator 18 years ago; now there are many operators including one who owns eight boats and has eight full-time employees. Kayaking is also a popular activity ('going berserk' according to one informant) with 13 firms operating compared with one a few years ago. There is also a venture conducting tours swimming with seals off Tonga Island. New accommodation and camping facilities plus a proposed 160-bed hotel at Marahau reflect ongoing tourism development in the area. Many of these developments, however, can be most directly attributed to the increased popularity of the Abel Tasman National Park in general and the additional effect of the Tonga Island reserve itself is probably only minor.

At Pohatu Marine Reserve little economic activity has been generated during the short period of its existence and it has yet to become a tourism attraction in its own right. Tour vessels do call at the reserve. One farm has developed an ecotourism venture hiring kayaks and providing guided trips to a penguin colony. The Reserve has become an integral part of the popular Banks Peninsula walking track. Recognising the ecotourism potential of the area, adjoining landowners, whose land is part of the walking track, have recently bought coastal property adjoining the reserve (*The Press*, Christchurch, 20 July 2000, p. 28).

4.1.3 Diving

Recreational scuba diving is a fast-growing sport. Scuba diving is a feature of visitor use at some New Zealand reserves, particularly the Poor Knights Islands reserve. Diving is also a popular activity at the Cape Rodney-Okakari Point reserve. Many diving schools based in Auckland take trainees there to teach them the use of equipment. Some operators are regarded with suspicion by local people who believe that they do not educate their clients about not taking from the reserve, or a proper respect for water safety. Diving is not a significant recreational activity at the Tonga Island and Pohatu marine reserves.

Overseas research confirms the importance of managing the impacts of scuba diving in marine reserves, although most damage is done by a small proportion of divers as discussed in Section 2.1 (Rouphael & Inglis 1995).

4.2 IMPACTS ON EDUCATION AND RESEARCH

Marine reserves provide opportunities for people to study the marine environment, for pleasure or for scientific purposes. The existence of a marine laboratory alongside a marine reserve, as with the Auckland University Laboratory at Cape Rodney-Okakari Point Marine Reserve, is beneficial for research purposes, for monitoring impacts on the marine environment and to assist with enforcement. Two other proposed marine reserves, at Kaikoura and on the Wellington South Coast, will also be adjacent to university marine laboratories. The biggest advantage of marine reserves for study purposes is the minimal disturbance of natural habitat. Also, marine research is costly and time consuming, so assurance that equipment and marine life is not likely to be disturbed should not be underestimated.

Marine reserves have been described as large-scale social experiments (Ballantine 1991). The establishment of a marine reserve may initially create disruption and even social conflict in a local community. It affects the institutional and human use characteristics of an area by excluding extractive activities while allowing non-extractive activities to continue as long as they do not harm the environment. Whilst social disruption can be avoided by trying to site marine reserves in isolated places where fewer people are likely to be impacted, the obvious benefits of study and recreational use, in addition to the protection of species diversity and habitat, would be lessened (Maturin 1992).

Of the three case study reserves, so far only the Cape Rodney-Okakari Point Reserve has become an important destination for school groups. Both the

marine laboratory and local marae host school groups. Some groups combine their study of the reserve with an overnight stay at the marae. These groups have both negative and positive impacts on the area. While educational trips may make children more aware of the marine environment and generate income for the local economy, they also add to the high volume of visitors with potential impacts on the bio-physical environment and amenity values.

There is an important link between tourism and education. Visitors to reserves can develop increased knowledge and understanding, but this potential is not always realised. A study of the Great Barrier Reef (Burns & Murphy 1998) found that seeing wildlife and learning about the reef were important reasons people gave for making a trip. But they also found that promotional material made little use of the opportunity to provide educational and ecological messages. As discussed below, opportunities to provide information about marine reserves and to educate the public about their conservation values, especially those people who are visiting a marine reserve or the vicinity of a reserve, are often lost in New Zealand as well.

4.3 IMPACTS ON COMMERCIAL AND RECREATIONAL FISHING

To protect the ocean environment, a marine reserve must prohibit the removal of flora and fauna from within its boundaries. Opposition to marine reserves therefore comes largely from commercial and recreational fishers who perceive that they will have their activities adversely affected by the establishment of a reserve. For those who depend on fishing for a livelihood, increased time and travel costs caused by having to fish elsewhere is a concern they believe is under-rated by promoters of reserves.

Previous research and the three case studies indicate that the views of a majority of commercial fishers can change in favour of reserves. Joyce (1989) found the majority of commercial fishers in favour of the Cape Rodney-Okakari Point Marine Reserve and marine reserves in general. After over two decades of operation, the Cape Rodney-Okakari Point Marine Reserve has very solid, indeed almost total, support amongst local fishers. This support has been demonstrated in two surveys. Local fishers (78%) said they were in favour of more reserves, and 78% said they would actively prevent poaching (Craw & Cocklin 1997).

Case study interviews indicated that the numbers of commercial fishers operating in the area around Cape Rodney-Okakari Point Marine Reserve have increased over the last 20 years. Fishers support the marine reserve and help protect it against poachers, as noted by Ballantine (1991). A resident of Leigh described the fishers' sense of ownership as being that it is 'their reserve and if anyone should fish in the reserve it should be them and if they cannot they will protect it from others'. Recreational fishers resident at Leigh who were formerly against the reserve now also give it their support; one is a keen photographer who has contributed to educational material about the reserve.

The majority of respondents who participated in a 1997 survey at Hahei (near the Whanganui-a-Hei Marine Reserve) stated that the reserve has had no effect

upon them. Two-thirds of the respondents who used to fish in the reserve area are still in the habit of fishing for the same amount of time, although they have to travel further afield to fish. Only a few of the respondents fish less often due to the move away from 'safe' water (Craw & Cocklin 1997).

As noted in Section 2.2, the Poor Knights Marine Reserve initially allowed for a certain amount of extraction, and this strategy was supported by the game fishing industry in particular. After legal challenges and two phases of public consultation, this anomaly was challenged. Local iwi and other members of the public believed there was confusion amongst the public about these fishing rights. There was an increasing desire for change to the fishing rights within the Poor Knights Islands Marine Reserve, due to the ecological impacts of recreational fishing (Department of Conservation 1995).

The case studies found that commercial fishers at Tonga Island and Pohatu actively support these two reserves. The commercial fisher who regularly fished the Tonga Island area was not in favour of having his 'patch' turned into a reserve. Just after the establishment of the reserve, some commercial fishers were caught trawling within its boundaries. Fines then were low (i.e. \$1000 per vessel). Nowadays, commercial fishers do not poach within the reserve, perhaps because a conviction may result in the loss of a vessel and a more substantial fine. The commercial fisher who regularly fished the area of the Pohatu Marine Reserve was also against its establishment but is now in favour. Understandably, given the short time since establishment, local fishers have so far observed no changes in the fish population just outside the reserve boundary.

It is very difficult to establish the extent that fish numbers increase in and around a reserve after it has been established. Cape Rodney-Okakari Point is the oldest established marine reserve in New Zealand, and the only place where any thorough scientific study has been carried out over time. The potential benefit for fishing is the spillover effect that enhances local fisheries by emigration of adults and large juveniles from the higher densities of favoured species in a reserve (Rowley 1992). Forty percent of local fishers at Leigh considered catches were higher now outside the reserve (Ballantine 1991). Observers noted that the boundaries of the reserve are the most heavily fished and speculate this is due to an increase in the size and abundance of these fish.

Willis & Babcock (1998) report the effects of marine reserves on exploited reef-associated fishes in Northern New Zealand. This research was based on a multi-reserve comparison using underwater video. Key findings were:

- The relative abundance and size of snapper increased in marine reserves, and the longest established and best policed reserve had the greatest abundance.
- Numbers of fish were greatest at the reserve centres, and decreased going outwards to the boundaries.
- Pressure of fishing on the edges of a reserve, and levels of poaching, have major impacts on fish numbers in a reserve.
- Fish numbers are highly influenced by seasonality.
- Base-line data on new reserves is essential, but generally not available, although some longer-term data on established reserves are becoming available.

5. Issues for establishment and management of marine reserves

The three case studies, plus other New Zealand research and wider literature as indicated, provide general information on the issues around establishment and management of marine reserves. These issues are described in this chapter.

5.1 ATTITUDES TO MARINE RESERVES

5.1.1 Rights and expectations

New Zealanders believe they have an inherent right to fish from the sea, whether it be for a living or for recreation. Traditionally New Zealanders have been brought up with the belief that it is their right to take from the sea for sustenance. Any suggestion that this right be curtailed requires education and consultation to allow for a change in thinking.

It is therefore difficult to bring about a change to attitudes that sanction limits to extraction and areas of water use. A general belief that a New Zealander's inherent 'fishing rights' will be eroded has contributed to a slow acceptance of marine reserves. There are instances of this attitude changing, as shown by the three case studies and other research cited. However, the dilemma is still present whereby conservationists claim that access to the resources of the sea is a privilege and recreationists believe it is their right to extract (Ryan 1995).

In exploring changing attitudes to marine reserves, it is helpful to acknowledge the diversity of stakeholder groups, each with a distinct perspective. The stakeholder groups for marine reserves identified from the literature and case studies include:

- Local residents and ratepayers
- Business interests, especially tourism-related businesses
- Commercial fishers
- Recreational fishers
- Visitors and tourists
- Conservationists
- Scientists and educators

Views of Maori, as Treaty partner and customary fishers, are crucial and should be considered at the higher level of governance, although local interests might sometimes be considered specifically as 'stakeholders'.

5.1.2 The NIMBY syndrome

Some researchers refer to attitudes of opposition as the NIMBY (not in my back yard) syndrome (Ryan 1995). Opponents of marine reserves do not necessarily object to the concept of marine reserves, they simply do not want one in their coastal area. An example of NIMBY attitudes towards a marine reserve was

evident at Wainui, Banks Peninsula (Ryan 1995); none of the residents or ratepayers questioned stated that they were against a marine reserve, but they were opposed to one in their area. They did not want their recreational fishing interfered with and were against the suggested boundary (which would include the penguin colony) as it would close off too large an area for fishing. Views of conservationists and recreational fishers became more and more disparate, and at times openly antagonistic during the process of application (Ryan 1995).

Unless steps are taken to deal proactively with NIMBY attitudes to marine reserves, then these sentiments may continue to erode public support for particular reserves, and reserves in general. One of the ways to resolve public negativity towards new marine reserves is to involve interested and affected parties from the outset in the proposal and planning stages, as understanding the objectives for a marine reserve will increase the chances of support. Involving the community at the outset before boundaries are finalised will encourage wider participation in the formation of a reserve and its future management (Department of Conservation 1994). It is important to investigate alternative sites for a reserve within a particular area. Stakeholders can then become involved in discussing the positives and negatives of each particular site. Feedback from the proponent group to the host community and other stakeholders is vital. If a rapport is not established then a sense of mistrust is created. It is also important to allow people time to respond. Where agreements are reached, such as over a reserve area and its boundaries, these should be adhered to in the final designation.

5.1.3 Experience at Hahei

A noticeable change in attitudes has occurred at Hahei where the majority of residents and ratepayers were initially against the Whanganui-a-Hei Marine Reserve. Nearly all of them now accept the reserve, according to a survey conducted in 1997 (Craw & Cocklin 1997). Opinion has changed because local people have experienced the reserve and realise it has had no adverse effects on their community or on their personal lives. Initial opposition from the residents of Hahei was based upon suspicion of change and concern about the size and the boundaries of the reserve. Over 90% of those surveyed, including business people, supported the establishment of further marine reserves in New Zealand. Conservation and increased fish stocks were the two main reasons given for acceptance. The survey also questioned visitors to Hahei. It found that 90% of the visitors were in favour of the reserve although only a few were attracted to the place because it was a reserve. The majority sought to holiday there because they knew its reputation as an attractive spot on the popular Coromandel Peninsula (Craw & Cocklin 1997).

Location and boundaries are clearly of major concern to the public when a reserve is proposed. Changes to the initial boundaries of Whanganui-a-Hei Marine Reserve increased public support there (Melrose 1991). Local people have very definite ideas as to what would be acceptable to them. Issues to consider include the need for safe waters for recreational boats, including for recreational fishers outside the reserve. It is necessary to note the need for boat ramps and ease of access for boaties and their vehicles. If traditional boat ramps and access points are to be removed as a result of establishing a reserve, then boaties need to be consulted about alternative arrangements.

5.1.4 Experience at Tonga Island and Pohatu Marine Reserves

Boundary selection was also an issue for residents, bach owners and holiday makers when a reserve was proposed adjacent to Abel Tasman National Park. Although the idea of a marine reserve adjacent to a national park was generally supported, the actual location met with opposition. Discussion focussed on six potential sites. The eventual decision was based on a boundary that represented the least impact on recreational fishing (Taylor 1992). There was, however, wide division of opinion between the various interest groups as to where the boundaries should be drawn. DOC's relationships with these interest groups were not helped when the reserve was gazetted with a boundary change that was made after the consultation process had been completed.

There was also considerable opposition to the establishment of the Pohatu Marine Reserve. There was considerable debate about siting reserves inside and outside Akaroa Harbour (Ryan 1995). The Pohatu reserve that was finally settled on resulted from the opposition of commercial fishers and local iwi to an application for a site inside Akaroa Harbour. Opponents of that site proposed Pohatu as an alternative.

5.1.5 Commercial and recreational fishers

The case studies and literature show that opposition to marine reserves in New Zealand has often come from commercial and recreational fishers. However, this opposition is usually to specific proposals rather than against the idea of marine reserves and need for marine conservation, indicating the difficulty of putting policies for marine conservation into practice. Recreational fishers dislike being excluded from sites that they have traditionally fished (Shields 1992).

Opposition to marine reserves in New Zealand is largely from existing users. As noted in Section 4.3, attitudes do change. Some commercial fishers who were initially against reserves now respect them. Their opposition turned to support as the benefits of the increased fishing yields became apparent.

There also appears to be an element of peer regulation and enforcement. At Cape Rodney-Okakari Point Marine Reserve commercial fishers are very protective of what they have come to regard as an important asset. An earlier study found they did not appear tempted to poach and placed their pots on the outside of the boundary in the knowledge that crayfish are prolific within the boundaries (Joyce 1989).

A Wellington South Coast dive shop owner maintains there has been a change in attitude amongst divers who are now less against the idea of a marine reserve in the area and are keen to dive for the experience 'to see what is down there' instead of always expecting to 'hunt and collect' (Camp 1997).

Recreational fishing from the Poor Knights Islands Marine Reserve provides a further interesting case to illustrate how attitudes can change. Allowing fishing there may have facilitated the creation of the reserve in the first place; however, this policy was difficult to manage. A number of charter boat operators who originally supported extraction later favoured a total ban. 'It becomes increasingly tedious for charter boat operators, dive club leaders and tourist couriers to explain the reasons for the presence of fishers in the reserve' (Ballantine 1991).

5.1.6 Overseas experiences

There have been a variety of responses overseas in reaction to the establishment of marine reserves. As in New Zealand, there has been opposition from local communities and some interest groups. It evidently takes time to build local and wider public support. Countries with coastal environments are making progress, however, in establishing marine protected areas (Kramer 1999).

There is still much to be accomplished to protect marine areas in the United States. Chadwick (1998) found that while people may accept the need for conservation of marine resources in general, it is more difficult to obtain agreement for a particular site as too much is at stake. It is difficult to build support where the public consider protection is being thrust upon them. Opposition includes local fishermen, boaties and waterfront communities. Public attitudes can depend on who is in charge of planning and whether there is community input. Reserve officials are beginning to question how many human activities may be safely allowed, and at what level, before they undercut the purpose of an area for marine conservation.

A recent evaluation of the Sapelo Island National Estuarine Research Reserve in Georgia⁹ indicated significant improvements over the previous three years, raising the visibility of coastal resources and educating state residents on how to preserve them. The evaluation found that the reserve programme had built considerable community support. Achievements included the construction and staffing of a new visitor centre, active strengthening of relationships between local government and the local university, participation in interpretative programmes, over 100 residents acting as volunteers, and local high school students involved with monitoring water quality.

Under the existing legislation there have been significant problems in the United Kingdom with developing statutory marine nature reserves. In some cases vociferous public opposition has led to the abandonment of site proposals.¹⁰

The Caribbean is an important area for marine protection but experience there has been variable. Downs & Petterson (1997) found general disbelief that fishers would derive any benefit from a proposed reserve. In another reserve, in St Lucia, often held up as an example of a successful reserve in the Caribbean, there was direct conflict between user groups and reserve proponents. The reserve was negotiated with user groups and they believed that while they sustained some losses they gained other rights (e.g. fishers received priority fishing zones). Problems arose when fishers believed they were being asked to give up a portion of their income and access to traditional fishing grounds in exchange for what they saw as a tenuous benefit of possible improved productivity. There are Caribbean cases where reserves have gained support in the surrounding community over time, and examples of agreements and cooperation between local fishers, tour guides and reserve proponents.

⁹ NOAA 1997: NOAA finds significant improvement at Georgia Reserve http://www.noaa.gov/public_affairs/pr97/feb97noaa97-r405.html

¹⁰ Laffoley, D. 1994: The development of a generic management model for European Union marine natural 2000 sites. <http://www.erin.gov.au/portfolio/anacs/mpa/laffoley.html>

The overseas experience shows that if sustainable marine management is to be meaningful it needs to be supported with policies and practical measures. Even after the principles of conservation have been agreed to, it may be difficult to get different groups to accept the measures for achieving them. Much will depend on what private interests have to be relinquished, the equity of any reduced resource consumption, and the equity of any compensation.

5.2 PUBLIC CONSULTATION

The effectiveness of a marine reserve conservation programme ultimately depends on the responsiveness of the public. Failure by agencies to anticipate and interpret the public's responses accurately may lead to delays in decision making and poor public relations (Wolfenden et al. 1995). By adopting a policy that invites participation from interested and affected parties, liaison and communication are promoted, and recommendations are likely to have a high level of support.

Although the public participation process has not yet allowed a marine reserve to be established in Akaroa Harbour, this outcome should not be viewed negatively, as it has allowed for opponents to express their views. Here community representatives did not become involved until later in the establishment process, when they reacted negatively (Ryan 1995). Similarly, the case study found residents believed they were presented with a fait accompli. Those who were not approached personally resented not being consulted. Studies of the Hahei community showed the local community were concerned about inadequate consultation in the establishment process (Craw & Cocklin 1997). The South Coast Marine Reserve Coalition, who initiated an application for a reserve on Wellington's South Coast, believed the key to establishing a reserve there with the least number of impacts was to hold public meetings, conduct surveys of residents and water users, and consult with recreational and commercial fishing groups (Camp 1997).

So the key to establishing a marine reserve is through public consultation, along with social and environmental impact assessments. The way opponents of a marine reserve are permitted to participate in the process, no matter how many or how few they may be in number, will have a profound effect on establishment of the reserve as well as the eventual effectiveness of its management. The development of more effective public relations techniques and management procedures will create a significant improvement in the environmental performance of public agencies (Wolfenden et al. 1995). A consultative approach is recommended by the Department of Conservation (1994) and is now followed by most proponents applying for new marine reserves.

Determining the actual site and its boundaries should be a consultative process. Conflict arises if a community has a site thrust upon it, or if the boundaries agreed by consultation are changed later. When the boundaries of a reserve are eventually determined there will be a need to police these to ensure compliance. There is an inevitable cost in ensuring compliance through policing and prosecuting offenders. The cost can be high if a significant

proportion of the community is unsympathetic to the cause. Therefore consultation and public involvement lessen the ultimate costs of protection and management of reserves.

5.2.1 Local committees for liaison and management

There is a need to disseminate information when siting a marine reserve so that everyone involved is well informed. The sharing of information needs to be part of ongoing management.

Overseas experience points to the importance of consultation and ongoing liaison. According to management of Jervais Bay Reserve in Australia, to ignore criticisms from the public and to implement a proposal regardless of criticism would invite illegal activity. It would risk losing public goodwill and invaluable local knowledge and expertise (Sant 1996). Furthermore, management of reserves in America is heavily reliant on volunteers to the extent that 'we could hardly manage without' according to one manager (Chadwick 1998).

Co-operation of local fishers, aided by effective enforcement, was seen as the key to success for the proposed Marine Conservation District of the Virgin Islands (Downs & Petterson 1997). These local fishers found it difficult to accept 'outsiders' telling them what to do with 'their' livelihood. Antagonism was such that few local fishers attended meetings. Many Virgin Island fishers doubted their colleagues would respect enforcement: 'they would fish illegally and take their chances' commented one fisher. There was concern that if some areas were closed others would become so heavily over-fished that 'it would only be a matter of time before there would be no fish at all', as one fisher suggested. The fact that very few fishers attended meetings to discuss problems associated with creation of a reserve frustrated those that did attend. They considered their opinions were belittled because it appeared they were lone voices and other fishers didn't care.

Efforts should be made towards co-management, building responsibilities of the local community towards resource management. Co-management moves beyond consultation and liaison to community-based conservation of the marine environment, where communities are fully involved both in identification of the need for conservation and development of solutions (Luttinger 1997).

Yet of the 16 marine reserves established in New Zealand, only six have their own committee. Amongst the case study reserves, the Pohatu Marine Reserve has a committee that includes representatives of interest groups.

5.3 MAORI PERSPECTIVES

5.3.1 Traditional values and management systems

In the traditional Maori world view, human and marine life are connected through the atua Tane and Tangaroa. This relationship requires Maori to respect and care for marine life. Fisheries and other marine resources, for Maori, are more than the means to satisfy material needs. They have inherent value as

Glossary of Maori terms used:	
Atua	supreme god
hapu	sub tribe
iwi	tribe
kaitiaki	guardians
mahika kai	traditional food gathering area (South Island)
Maori	indigenous person(s)
marae	meeting ground
mataitai	fish/traditional foods from the sea
mauri	life force
rahui	prohibition on collecting fish/food
runanga	tribal council (runaka in South Island)
taiapure	local customary fishery
Tane	god of the forest
Tangaroa	god of the sea
tangata whenua	people of the land
taonga	treasure
tapu	sacred
Te Papa Atawhai	Department of Conservation
Te Puni Kokiri	Ministry of Maori Development
tikanga	customs
whanau	family/extended family
whareniui	meeting house

taonga and are inextricably linked to the social matrix of iwi, hapu and whanau (Parliamentary Commissioner for the Environment 1999: 14–15). Indeed, the cultural dimension of marine ecosystems is important throughout the South Pacific, including recognition for traditional methods of management and conservation (Lam 1998).

Over many generations, Maori have developed complex management systems for marine resources. Through the accumulation of indigenous knowledge, hapu and whanau have developed management systems to prevent resources from being over exploited. Fishing is bound into tikanga (through ritual and protocols) to sustain the mauri and physical viability of the resource. Management techniques include appropriate fishing methods, techniques for restocking areas, the most appropriate times (within the day, lunar month and season) to fish, and places to harvest a particular species (Best 1929). Although there have been substantial

changes to the traditional social structure of Maori life, and many traditional fishing grounds have been contaminated or depleted, the resources of the sea remain a basic part of the diet for many Maori families. Many hapu and whanau continue to have extensive knowledge of local marine resources. Places and features along the coast still help to define traditional boundaries and have inherent associations with tribal history and ancestors. Particular marine species—fish, sea birds, whales—are traditionally associated with an iwi, whanau or hapu, as reflected in the decorations of a whareniui (Parliamentary Commissioner for the Environment 1999: 15–17).

The Treaty of Waitangi (Fisheries Claims) Settlement Act (1992) provided for the special relationship of Maori as tangata whenua with places of customary food gathering. Customary fishing practices are governed by Customary Fishing Regulations under the Fisheries Act (1996) that require customary fishing authorisations to be made in a standard form that specifies details such as the quantity and size of the fish, the date, the location and the fishing methods. Kaitiaki must maintain records and provide reports to the Ministry of Fisheries. They may also have a role in the management regime of the Ministry (Parliamentary Commissioner for the Environment 1999: 31).

5.3.2 Mataitai and taiapure

Marine protected areas have been recognised as an important management strategy in the South Pacific. But groups with customary rights must be taken into account (Lam 1998). Maori have traditional means of marine protection through rahui and tapu. Today, under the Customary Fishing Regulations, traditional fishing grounds of special significance to tangata whenua may be protected by the establishment of a mataitai reserve. Commercial fishing is

usually excluded from a mataitai reserve, but kaitiaki may propose to the Minister of Fisheries that it be permitted under certain conditions. Management controls within a mataitai reserve apply to both Maori and non-Maori fishers. Mataitai reserves are not permitted to be established in a marine reserve. The process for establishing a mataitai reserve can be lengthy as it requires consultation with the local community, commercial and recreational fishers (Parliamentary Commissioner for the Environment 1999: 32-33).

The Fisheries Act of 1996 (Part IX) also provides for the establishment of a taiapure through an Order in Council. A taiapure may be established in coastal and estuarine waters that customarily have been of special significance to any hapu or iwi either as a source of food or for cultural and spiritual reasons. Regulations for the conservation and management of fish and other marine life in the taiapure apply equally to non-Maori, Maori from other areas, and tangata whenua. Commercial harvesting may be permitted within a taiapure should the management committee include this activity as part of the regulations it recommends to the Minister. Once again, the process for establishing a taiapure may be complex and lengthy (Parliamentary Commissioner for the Environment 1999: 33).

5.3.3 Maori attitudes to marine reserves

To date there have been no specific studies on Maori attitudes to marine reserves. Available information suggests attitudes vary amongst Maori. Of particular interest was the case¹¹ brought by Ngati Wai (kaitiaki of the Poor Knights Islands) to the Auckland High Court against the decision of the Minister of Conservation to ban all recreational fishing from the Poor Knights Islands Reserve. Ngati Wai argued that their traditional relationships and customary fishing rights should be taken into account. Further dialogue with Ngati Wai was ordered by the Court.

Rununga representing local iwi objected to all marine reserve sites suggested along the Abel Tasman National Park coast as they considered that Maori rights needed to be better researched (Taylor 1992). They expect to be able to fish waters adjacent to their land. By contrast, tangata whenua on the East Coast of the North Island were keen to have a marine reserve established as they believe it will benefit scientific and recreational users as well as provide for future generations of Maori (Shields 1992). Ngati Konohi have made a joint application for the Te Tapuwae o Rongokako Marine Reserve near Gisborne (Ngati Konohi and DOC 1998). Similarly, tangata whenua of the Marlborough Sounds have expressed interest in reserves in order to preserve marine life for future generations. In many instances, however, the resolution of Treaty claims takes precedence for iwi over the detailed planning of marine protection.

As noted in Chapter 3, establishment of the Pohatu Marine Reserve generated considerable controversy and it is now being watched closely by local Maori groups. The attitudes of these groups will depend a great deal on the success of Pohatu and the management of the reserve by DOC. Furthermore, through an overall co-management approach with local Maori there is potential to develop marine conservation over a much larger area of the marine environment in and

¹¹ Ngatiwai Trust Board and Haddon vs Minister of Conservation

around Akaroa Harbour, through a taiapure and mataitai reserve. There is also the proposal for an inner-harbour marine reserve (Dan Rogers) that is still being investigated. All these areas would link to the Banks Peninsula Marine Mammal Sanctuary. The relatively small area of Pohatu Reserve in Flea Bay (215 ha) could therefore become part of a much larger area of marine protection with close involvement of Maori.

General knowledge about marine reserves amongst Maori appears to be limited and localised to those areas where proposals for reserves have been made. Many Maori still consider that marine reserves undermine traditional, Treaty-based rights. Their focus tends to be on the need to protect customary fishing rights and areas. The marine reserve model can appear inflexible to them, and impractical in relation to tribal knowledge of species and their behaviour, such as seasonal migrations beyond reserve boundaries. Despite the positive recent experiences of tribal groups being partners in reserve proposals, other groups are poorly informed about the process for establishing marine reserves and a negative attitude has developed, particularly to the 'no take' concept.

Consultation with Maori and experience to date shows there is an opportunity to develop a coordinated, strategic approach to marine conservation with marine reserves operating alongside customary reserves and protocols. The strategy could include joint approaches to enforcement, with training of Maori fisheries officers. It would need to be backed up by a widespread education campaign involving hui around the country, with involvement and resources from key agencies, including Department of Conservation, Ministry of Fisheries and Te Puni Kokiri.

5.4 LEGISLATIVE AND ORGANISATIONAL ISSUES

5.4.1 The overall process

The push for new marine reserves often comes from non-government organisations. Joint applications for new reserves are becoming more common, reducing the involvement of DOC with the application process. Conversely, it can appear that the Department is avoiding high-risk and conflict situations and is not showing strong leadership in relation to marine reserves.

Some applications for reserves are moving slowly through the process because of the divergent views of commercial fishers, recreational fishers, Maori and other interest groups. A change of government in 1999 added uncertainty to the process. Participants become frustrated by the slow speed of the process.

Some informants commented on the legislation empowering the establishment of marine reserves (Marine Reserves Act 1971). Views varied, ranging from the Act being seen as 'woolly' and in need of rewriting, to it has 'worked fine'. A fisher suggested that scientific evidence such as base-line studies should be completed in order to support an application. Another view was that the Act should be amended by removing the requirement for scientific research as part of the process for getting a marine reserve established. One person stated that the application process is worthwhile because it ensures everyone can express an opinion, and different points of view are respected. A review of the legislation is underway, including public consultation.

5.4.2 Total ban or partial restrictions?

The question of whether it is right to impose a total ban on extraction from marine reserves has been of considerable interest in New Zealand. Some advocates of marine reserves maintain anything other than a total ban on fishing distorts the whole ecosystem (Doak 1994). As discussed in Section 2.2, the Poor Knights Islands Marine Reserve allowed for some fishing; however, an extended review led to a decision to place a total ban on fishing in the reserve. The policy against extraction from reserves is firmly in place.

Internationally, policies and management approaches vary considerably. In Tasmania, for example, each marine reserve will have specific guidelines on extraction, but generally the following activities will be allowed: boating, swimming, sailing, diving, handlining and angling. Ocean dumping, aquaculture, spearfishing, gill netting, commercial exploitation, extraction or development of non-renewable resources and any activity that threatens the continued existence of indigenous flora and fauna and historical and archaeological resources will not be permitted (Department of Environmental Planning, Tasmania, undated).

There were differences of opinion among the people interviewed during the case studies as to the purpose of a marine reserve. Some believe the purpose is to preserve life in the sea and therefore a reserve should not be open to extraction. Others consider that commercial activity, such as snorkelling and sightseeing, should not be permitted in a reserve, and that these activities should be directed to marine parks that have been created for educational and recreational activities. Another view was that different types of reserves should be established (following the pattern for land conservation) ranging from marine parks through to 'wilderness' areas at sea. Some members of conservation organisations and other individuals expressed the need for a network of marine reserves throughout New Zealand so that different ecosystems are fully represented.

5.4.3 Who determines the site of a proposed marine reserve?

The application process for new marine reserves is described by Department of Conservation (2000). The Marine reserves Act (1971) limits applications to the 'Director General of Conservation; a university; an incorporated society or body corporate engaged in or having as one of its objectives the scientific study of marine life or natural history; or Maori iwi or hapu who have tangata whenua status over the area'. The two-phase process includes a non-statutory phase to develop a proposal and a formal, statutory, application phase.

Where possible sites are examined, the following issues arise:

- Size—will the area represent the special nature of the marine life within it; is the proposal sound from an ecological perspective? A marine reserve must be big enough to ensure viability of the populations it maintains.
- Are the boundaries appropriate—do they allow for ease of access for those who approach the reserve whether by foot, or car or boat? Do they coincide with natural habitat boundaries or will artificial boundaries have to be established?

- It is important for reserve boundaries to be clearly distinguished by islands or prominent headlands and where necessary clearly lit signs and buoys. Signs need to be distinctive, particularly in isolated areas.

In determining reserve sites and boundaries it is important that the process of consultation allows all with an interest to express their views. Boundaries should consider the needs of recreational groups, tourism, education and scientific research, and the practicalities of policing. Sites should continue to include areas near major population centres as well as socially isolated areas. It may be important to suggest a number of sites in the one area so that the public have a meaningful input to the decision making process.

5.5 MANAGEMENT ISSUES

5.5.1 Resource management

The management of marine reserves involves the management of natural resources, including management of the people who use them. Management must ensure complex changes in marine life are detected, recognising people will have varying views on any changes that eventuate. For example, a marine reserve created mainly to protect paua could show a reduction in paua numbers as sea urchins have taken over (Rowley 1992). The strong recruitment of a predator to a reserve may impact on desired species. Seals around the coast of Abel Tasman National Park are an example. Taylor (1992) suggests that a marine reserve may provide a more plentiful supply of fish and therefore attract more seals, possibly negating the purpose of the reserve. A counter view is that predation is a natural process which reserves will help protect.

5.5.2 Enforcement

The three case studies and interviews covering the Poor Knights Islands Reserve¹² as well as Department of Conservation (1995) identified enforcement as a key management issue. Tougher penalties have helped deter poachers, but there is still apparently a lot of illegal activity occurring in the reserves. The case studies identified reasons why enforcement is difficult:

- Poachers tend to have larger and faster craft and good diving equipment; those patrolling reserves may lack suitable patrol boats and radio equipment.
- Departmental staff have insufficient time and resources to devote to enforcement.
- Rangers require more training and experience in enforcement techniques.
- There is a lack of resources to prosecute and it is difficult to gather sufficient evidence to obtain a conviction.

It is difficult for DOC to bring prosecutions against people discovered poaching. There have been incidences of poachers being apprehended yet the difficulty and expense of compiling evidence means very few of them have been prosecuted.

¹² Interviews were conducted with Department of Conservation staff in Whangarei and a dive operator in Tutukaka.

Most reserves in New Zealand have local people helping to patrol them. If a surveillance regime is established for a reserve, the public can help with enforcement—especially if the boundaries are clearly defined by buoys, signs or land forms. Enforcement by local people is supported by the majority of users and a willingness to warn transgressors is evident (Melrose 1991).

5.5.3 Concessions and permits

The role of permits and concessions in marine reserve management is unclear compared with terrestrial reserves. There are tourist operators visiting each of the three case-study reserves. A national concession system for marine reserves would be one tool that DOC could use to manage the activities of visitors. One informant suggested that the Department should issue ‘permits’ to people wanting to visit a marine reserve so that their impacts could be managed better.

The role of permits and concessions to enter and operate a business, research or other activity in a marine reserve could be developed further, in consultation with the tourism industry. Concession operators could have a potential role in enforcement, acting as honorary rangers, or simply as a source of information on public activity in and around reserves.

5.5.4 Signage and information

Signage and brochures with maps of reserve boundaries and rules for appropriate behaviour are necessary for the public to respect the integrity of marine reserves. All three marine reserves in the case studies had deficiencies in their signage (e.g. lights and markers on the shore and at sea, and signs at boat ramps and beaches) although DOC was in the process of upgrading signs at the time of the study. People interviewed noted that inadequate signage can make it difficult for fishers and other recreational users to identify the boundary of a reserve. There were also concerns expressed during the case studies that brochures and pamphlets were not always available, or that they did not communicate the relevant information to the public. It was not always DOC that was held responsible for this failure of communication, however. Informants reported that some tourism ventures did not accurately identify marine reserve boundaries in their brochures. Some, such as ventures around Abel Tasman National Park, did not indicate the presence of the marine reserve at all.

5.5.5 Funding

A common theme from all three case studies was that DOC had insufficient financial and human resources to properly manage, patrol, monitor, and conduct research on marine reserves. It is evident that without adequate ongoing funding the reserves will be unable to protect the particular marine habitats they were established to conserve.

Several informants expressed concern that DOC should not be promoting any further marine reserves in New Zealand until they are able to resource adequately those that presently exist. In their view a marine reserve should not be created unless funding is provided for its initial establishment and future management.

5.5.6 Public education and research

The issues surrounding marine reserves highlight the problem that nobody knows how to manage an ocean. It is a learning experience both for those directly involved and for the wider public who are expected to support the reserves. Education of the public can involve combatting misconceptions arising from an initial proposal. Opposition can be significantly reduced if full explanations are made and good information is circulated. Crucial to the success of any marine reserve proposal is how any opposition to it is handled by the applicant (Sant 1996).

A socio-economic evaluation for the St John Marine Reserve in the Virgin Islands recommended that information on the efficacy of a reserve be written up in layman's terms and distributed to existing user groups and the general public at the stage a reserve is suggested (Downs & Petterson 1997). This recommendation was echoed by a person interviewed during one of the case studies, who suggested that each [coastal] conservancy of DOC should have a marine education officer who would be responsible for producing posters and brochures to educate the public about the reserves.

However, giving certain information to the public may be counterproductive. For example, publicising an improvement in numbers of a fish species may be an open invitation for poachers to fish in a reserve.

The dilemma for public agencies and conservationists is the mix of very different goals for marine use. The goal of commercial fishers may be to go after the maximum harvest that is attainable and not necessarily consider how marine reserves can contribute to sustaining the marine ecosystem. It is difficult to persuade some people to look beyond single species with economic value. American reserves (marine sanctuaries) tend to allow for extraction and therefore this dilemma is heightened in the United States (Chadwick 1998). In most cases all sanctuary staff can do is make suggestions, and through education and disseminating information persuade others to take a long-term view. Sanctuary staff identify research as an urgent priority, as information on the ocean is lagging substantially behind knowledge of terrestrial parks.

Monitoring and research in the marine environment tends to be highly vulnerable to human interference. It is important for research to be carried out without disturbance from the public whether they be picnickers, divers or fishers, especially given the associated costs. Furthermore, monitoring and research can require long periods of time if results are to prove useful.

5.6 SOCIAL IMPACTS AND MONITORING

Study of the social impacts involved in the protection of marine ecosystems is as important as ecological monitoring. Economic monitoring that identifies any benefits to tourism is likely to increase public support (Luttinger 1997). The case studies found residents living near marine reserves in New Zealand have expressed an interest in receiving progress reports on reserves. This is an area that needs to be addressed in management plans and through community liaison. As there is limited information available in New Zealand on the impacts of marine reserves on their neighbouring communities, it is not surprising that

there is still resistance to their establishment. Yet the most basic information about public use is hard to obtain, and systems for monitoring visitor numbers need to be established, backed up by regular visitor surveys.

Overseas experience shows New Zealand will have to consider social monitoring where high visitor use develops, as well as monitoring the impacts of visitors on the reserve ecosystem. At Julian Rocks, Australia, a monitoring programme has been set up to detect changes over time (Davis et al. 1995). The cumulative effects of diver contact with the substrate and benthos is at present unknown and needs monitoring. Some data have already led to management responses and behavioural change, for example, the boats for dives are no longer permitted to anchor because of possible damage. Moorings are provided instead. However, there is a need for ongoing research to establish if banning anchors has made a difference.

There is also a need for periodic evaluation and review of management strategies, especially in light of any available biological monitoring. For instance, legislation in Tasmania requires that the management plan for each of the marine reserves is subject to a review at five-yearly intervals (Department of Environmental Planning Tasmania, undated).

6. Conclusions and recommendations

6.1 MARINE RESERVES AS PART OF MARINE CONSERVATION

As the public become more knowledgeable and supportive of marine conservation, the pressure for the establishment of more marine reserves will increase. The recent report by the Parliamentary Commissioner for the Environment (1999) represents increasing public interest in sustainable management and marine conservation, suggesting there has been a change in thinking about the seemingly limitless potential to sustain harvests and other human impacts on the sea. Further advocacy by non-government organisations on the plight of specific marine species, and the need for protection of marine ecosystems, will add to public interest in marine protected areas. There are suggestions that a much larger proportion of New Zealand's coastal waters should be protected in some form, representing a range of ecosystem types.

Maori knowledge of marine reserves tends to be limited and localised. Seafood gathering and fishing are an important part of Maori culture; however, the focus for Maori is on the resolution of Treaty claims and protection of customary fishing rights and areas. Marine reserves can appear to Maori to be an inflexible approach to marine conservation, although there are now instances where tribal groups have been actively involved in reserve proposals. There is considerable potential to develop a marine conservation strategy in partnership with Maori groups, placing mataitai and taiapure reserves alongside marine reserves.

To date, most marine reserves created around New Zealand have been relatively small (on average just over 1000 ha each if the large and distant Kermadec Islands Reserve is excluded, see Appendix 1). Our research, which included one case study reserve with very high recreational use and one with very low use, identified strong arguments for clarifying the goals of marine reserves. Roles of different protection regimes are unclear in relation to ecosystem protection, marine research, sustainable fisheries management, outdoor recreation and customary uses. The purpose and appropriate size of marine reserves require review in relation to marine mammal sanctuaries, marine parks and protected areas, and Maori customary management areas.

There is a perceived need for a range of reserves—from those that are remote with limited access, to those that are readily accessible and provide a 'public playground'. Around Banks Peninsula, a combination of different regimens of conservation management, including customary management, could be used to establish a much larger area of marine conservation than is available through marine reserves alone. The present review of the Marine Reserves Act provides an opportunity to review the achievements to date and develop a comprehensive and coordinated approach to marine conservation and protection.

Our case studies and literature research identified spectacular increases in public visitation and use of a long-established marine reserve, and anecdotal evidence of increases in visitation to other reserves. High levels of use are related to the proximity of reserves to large populations, and also to popular tourist areas. As both the general public and overseas visitors become more knowledgeable about marine reserves, and a greater number of reserves exhibit obvious changes such as plentiful and accessible fish species, then the numbers of visitors can be expected to increase across reserves in different locations.

High levels of use or the type of use (such as scuba diving, recreational boating or intense interaction with fish species) can lead to bio-physical impacts in the marine environment. These impacts can extend to adjacent land, such as vehicle parking, litter and effluent disposal, all with social implications. Social and economic impacts can include crowding and the possibility of reduced visitor satisfaction. Positive impacts can include new businesses and employment opportunities in local communities.

6.2 MANAGEMENT ISSUES AND STRATEGIES

Specific issues and management strategies were identified by our research:

6.2.1 Signage and enforcement

Success of a marine reserve in terms of increased fish stock and an enhanced ecosystem brings the potential for illegal use and the need for a management response in terms of signage and enforcement procedures. Strategies identified include:

- A preventative or educational approach can be effective in the first instance, but has to be supported by appropriate material and campaigns in schools and the media, and with specific groups such as dive clubs.
- Signage around reserves should be sufficient, and consistent between reserves.
- A marine reserve concession system could assist in managing visitor activity, with tourism operators providing information to visitors and assisting with basic enforcement.
- Increase DOC resources for patrols by staff, including staff time, boats, radios and sophisticated equipment such as surveillance cameras at high-risk locations.
- Resources are required to train and build experience amongst honorary rangers and support members of the public interested in this role.
- The level of evidence required by the courts to secure a prosecution under the Marine Reserves Act is high, which necessitates experienced rangers to attend incidents and an experienced investigator to prepare the court case.
- Prosecutions should be publicised so they act as a deterrent.
- There is need for coordination between agencies and officials including police and fisheries officers, and Maori guardians.
- A national (DOC) system for enforcement should encompass signage, concessions, policing, ranger training and prosecutions.

6.2.2 Visitor monitoring

There is a need for more information on the level and type of use of visitors to marine reserves. In the first instance basic information on numbers is necessary, using existing systems of visitor counting such as vehicle and track counters where appropriate. A methodology should be developed for counting and recording in-and-on water uses such as swimming, diving and boat movements, with a simple record form that staff or other parties (such as concessionaires, honorary rangers or research staff) can use on a regular basis. Data should be compiled into a national data base.

It is also necessary to conduct visitor surveys on a regular basis, including questions on visitor origins and transport, demographics, preferences and experiences, activities and expenditure, and attitudes. These surveys will require adequate funding.

6.2.3 Planning and review

Planning for marine reserves is needed at national, conservancy and reserve levels. Long-term and regular management planning require ongoing consultation between the Department, local communities and special interest groups. Maori should play a central part.

As DOC refines the strategy for marine reserve development and improves systems of planning, they will have to evaluate particular initiatives and review overall progress on a regular basis.

6.3 CONSULTATION

The importance of a consultative and participatory approach to the development of marine reserves is a dominant theme that arose throughout our research, both from the international literature and from the New Zealand experience. It is vital that community consultation be carried out in a full and sensitive manner. Conservation policy makers and planners should respond to the needs of the natural environment and also of the associated communities and interest groups. There is an element of NIMBY ('Not In My Back Yard') as people support marine reserves in general but are hesitant about specific proposals that could affect their interests. Negative attitudes towards a proposal change to more positive views once a reserve is established.

The establishment of a marine reserve involves stakeholders, including commercial and recreational fishers, the tourist sector, local government and other interested parties. It is essential to involve all these people and consult widely with the community. The selection of a site and boundaries through investigation of a number of alternatives appears to be the best approach. Site boundaries need to be dealt with clearly so that all interested parties can have an input into the final decision. When agreement is reached, it is important to maintain the integrity of the consultation process by adhering to the agreed parameters, even though some parties might be disappointed with the decision.

While our research indicates attitudes to a marine reserve often become more positive over time, this trend does not reduce the need for ongoing consultation

and liaison with interested and affected parties as part of the management of a reserve. It is important that local people be involved as participants in management, not just representatives of wider interest groups. As part of this public involvement it is necessary to ensure that information and publications, such as pamphlets and brochures, are available and current.

6.4 IMPROVED IMPACT ASSESSMENT

A lot of political effort and some social disruption are required to establish marine reserves (Ballantine 1991). As with any changes to complex, human-ecological systems, it is not always possible to predict the impacts of a new reserve with accuracy. Yet the substantive case required to establish a new marine reserve creates pressure to justify its existence in advance by stating what will occur. This problem of impact assessment can be approached in several ways. The first is an attempt to reduce potential disruption by siting new reserves in relatively isolated places, away from parts of the coast that have major public interest such as recreational fishing. The Pohatu Reserve falls into this category. Conversely, planners might attempt to maximise their benefits and site them where they are easily accessible and will generate considerable public use, such as the Cape Rodney-Okakari Point Reserve. Either way the result is obviously going to be that a limited range of sites is chosen for protection.

Another approach is to improve the process of site investigation and impact assessment, including baseline studies, full public consultation and the assessment of social and economic impacts. As more social impact assessments and monitoring are carried out, there will be a more substantial set of comparative cases that can be used to inform the assessment process about likely impacts. Substantive information on impacts will lead to better decision making and help to build public support.

7. Acknowledgements

This research was funded by the Science and Research Unit, Department of Conservation, Research Investigation No. 2366. We would like to acknowledge the initial encouragement of Margaret O'Brien, and the support and assistance of Ned Hardie-Boys and other Department of Conservation staff in carrying out this research. We appreciate in particular assistance from Dr Marg O'Brien, previously Head Office, DOC, Wellington; the Canterbury Conservancy librarian and Dr Ken Hughey at Lincoln University. We acknowledge the contribution of Rev. Maurice Manawaroa Gray and Mairehe Louise Tankersley (Jade Associates, Otautahi) who consulted with Maori representatives and groups regarding attitudes to marine reserves. We are also grateful for the input of Wayne McClintock and Vicki Johnson in editing and review of the original report and Lynette Clelland, Kathy Walls and two anonymous reviewers for their comments on this publication.

8. References

- Baines, J. 1999: Fisheries sector review. Resource Community Formation and Change, Working Paper 16, Taylor Baines and Associates, Christchurch.
- Ballantine, B. 1991: Marine reserves for New Zealand. *Leigh Laboratory Bulletin* 25, University of Auckland.
- Bell, C. 1984: Cape Rodney-Okakari Point Marine Reserve: a visitor survey. Department of Lands and Survey for the Cape Rodney-Okakari Point Management Committee.
- Best, E. 1929: Fishing methods and devices of the Maori. Government Printer, Wellington, Reprinted 1986.
- Broome, G.; Valentine, P. 1995: Principles of social impact assessment and its application to managing the Great Barrier Reef. *CRC Reef Research Centre Technical Report 2*, Townsville.
- Bunce, L. 1997: Integrated coastal management of common pool resources: a case study of coral reef management in Antigua, West Indies. Unpublished PhD Theses, Duke Marine Laboratory, Duke University.
- Burns, D.; Murphy, L. 1998: An analysis of the promotion of marine tourism and its markets in Far North Queensland, Australia, Chapter 22, pp. 415-430 in: Laws, E; Faulkner B.; Moscardo, G. (Eds), *Embracing and managing change in tourism: International Case Studies*. London: Routledge.
- Camp, K. 1997: Protecting sea life in the capital. *Forest and Bird* 285: 22-27 (August).
- Chadwick, D.H. 1998: Blue Refuges, U.S. National Marine Sanctuaries. *National Geographic* (March).
- Cocklin, C.; Flood, S. 1992: The socio-economic implications of establishing marine reserves. Consultancy report to Department of Conservation 1202.
- Craw, M.; Cocklin, C. 1997: Social impact assessment for Te Whanganui-A-Hei Marine Reserve. Unpublished Consultancy report to Department of Conservation.
- Davis, D; Harriott, V.; MacNamara, C.; Roberts, L.; Austin S. 1995: Conflicts in a marine protected area: scuba divers, economics, ecology and management in Julian Rocks Aquatic Reserve. *Australian Parks and Recreation* (Autumn), 29-35.
- Department of Conservation 1994: Marine reserves: a guide for prospective applicants. Wellington.
- Department of Conservation 1995: Poor Knights Islands Marine Reserve, a recreational fishing review.
- Department of Conservation 2000: Tapui Taimoana: reviewing the Marine Reserves Act 1971. Discussion document—have your say, Department of Conservation, Wellington.
- Department of Environment & Planning, Department of Primary Industry, Tasmania. n.d.: Marine reserves: what are marine reserves? Why and where have them in Tasmania? Tasmania.
- Doak, W. 1994: Poor Knights Islands: a real marine reserve at last? *Forest & Bird* 273: 18-23 (August).
- Downs, M.A.; Petterson, J.S. 1997: Rapid socioeconomic evaluation of the proposed Marine Conservation District. St John, United States Virgin Islands. Prepared by Impact Assessment Inc. for The Caribbean Fishery Management Council.
- Enderby, J.; Enderby, T. 2000: Marine reserve under pressure. *Forest and Bird* 295: 5 (February).
- Gabites Porter 1996: Poor Knights Islands Marine Reserve Recreational Fishing Review, a summary and analysis of submissions. *Northland Conservancy Miscellaneous Report Series*, Department of Conservation.
- Inglis, G.J.; Johnson, V.Y.; Ponte, F. 1999: Crowding norms in marine settings: a case study of snorkelling on the Great Barrier Reef. *Environmental Management* Vol. 24(3): 369-381.

- Joyce, R. 1989: Marine reserves: spreading the idea. *Forest and Bird* 20(4): 13-15 (November).
- Kelly, S.; Babcock, R.C.; MacDiarmid, A.B. 2000: Impact of marine reserves on spiny lobsters (*Jasus edwardsii*) and the lobster fishery. Unpublished consultancy report for Department of Conservation.
- Kramer, B.N. 1999: Lessons from Leigh: an investigation into the spread of the marine reserve concept. Unpublished manuscript, SIT-New Zealand.
- Knausenberger, W.I.; Fleming, C.B. 1986: Proceedings of the Workshop on Coastal Protected Areas in the Lesser Antilles St. Thomas, University of the Virgin Islands.
- Lam, M. 1998: Consideration of customary marine tenure system in the establishment of marine protected areas in the South Pacific. *Ocean and Coastal Management* 39: 97-104.
- Luttinger, N. 1997: Community-based coral reef conservation in the Bay of Islands, Honduras. *Ocean and Coastal management* 36(1-3): 11-22.
- Maturin, S. 1992: Paterson Inlet: a national treasure. *Forest and Bird* 265: 27-32 (August).
- Melrose, C. 1991: Cathedral Cove: what a wonderful place. *New Zealand Underwater*, Feb/Mar, 32-33.
- Ngati Konohi and Department of Conservation 1998: Te Tapuwae o Rongokako Marine Reserve Application. A joint application, Department of Conservation, Gisborne.
- Organization of American States (OAS) and National Park Service (NPS) 1988: Inventory of Caribbean marine and coastal marine protected areas. Washington, D.C.
- Parliamentary Commissioner for the Environment 1999: Setting course for a sustainable future: the management of New Zealand's marine environment. Office of the Parliamentary Commissioner for the Environment, Wellington.
- Rouphael, T.; Inglis, G. 1995: The effects of qualified recreational SCUBA divers on coral reefs. *CRC Reef Research Centre, Technical Report 4*, CRC Reef Research Centre, Townsville.
- Rowley, R. 1992: Impacts of marine reserves on fisheries. A report and review of the literature. Department of Conservation.
- Ryan, R.J. 1995: Claims making and rhetoric in the contest between conservation and recreation: the case of the Wainui marine reserve proposal. Unpublished Thesis, Masters of Parks, Recreation and Tourism Management, Lincoln University.
- Sant, M. 1996: Environmental sustainability and the public: responses to a proposed marine reserve at Jervais Bay, NSW, Australia. *Ocean and Coastal Management* 32(1).
- Shafer, S.C.; Inglis G.J.; Johnson, V.Y.; Marshall, N.A. 1998: Visitor experiences and perceived conditions on day trips to the Great Barrier Reef. *Technical Report 21*, CRC Reef Research Centre, Townsville.
- Shields, E. 1992: Reserving the Sea. *Terra Nova* 13: 22-24.
- Suman, D.O.; Shivlani, M.P. 1997: Data and results from dive operator surveys in the Keys: use and perceptions of the Florida Keys National Marine Sanctuary. Division of Marine Affairs and Policy, Rosenstiel School of Marine and Atmospheric Science, University of Miami.
- Taylor, C. M. 1992: Abel Tasman National Park, A Marine Reserve, Submissions Summary.
- Willis, T.J.; Babcock R.C. 1998: Effects of marine reserves on exploited reef-associated fishes in Northern New Zealand—a multi-reserve comparison using underwater video. Report to the Department of Conservation, Leigh Marine Laboratory, University of Auckland.
- Wolfenden, J.; Cram, F.; Kirkwood, B. 1995: Marine Reserves in New Zealand: a survey of community reactions. *Ocean and Coastal Management* 25: 31-51.

Appendix 1

MARINE RESERVES AND OTHER MARINE PROTECTED AREAS

MARINE RESERVES	DATE ESTABLISHED	AREA (HECTARES)
Cape Rodney-Okakari Point (Leigh)	1975	518
Poor Knights Islands	1981	2 400
Kermadec Islands	1990	748 000
Whanganui-a-Hei (Hahei or Cathedral Cove)	1992	840
Tuhua (Mayor Island)	1992	1 060
Kapiti Island	1992	2 167
Long Island-Kokomohua	1993	619
Tonga Island (Abel Tasman)	1993	1 835
Te Awaatu Channel (The Gut, Doubtful Sound)	1993	93
Piopiotahi (Milford Sound)	1993	690
Whanganui (Westhaven—Te Tai Tapu)	1994	536
Long Bay (Okura)	1995	980
Motu Manawa (Pollen Island)	1995	500
Te Angiangi	1997	446
Pohatu (Flea Bay)	1999	215
Te Tapuwae o Rongokako	1999	2 450
Total		763 349
OTHER MARINE PROTECTED AREAS		
Tawharanui Peninsula Marine Park	1981	350
Mimiwhangata Marine Park	1983	2 000
Sugar Loaf Islands Marine Protected Area	1991	800
Banks Peninsula Marine Mammal Sanctuary	1988	113 560
Auckland Islands Marine Mammal Sanctuary	1993	221 551
Total other marine protected areas		358 261

Appendix 2

FORM FOR SURVEY OF LOCAL BUSINESSES

We are making an assessment of the social economic impacts of marine reserves on their host communities. We would like to ask a few questions about this business, and about any impacts the xxx marine reserve has had on you.

1) Business name _____ Address _____

2) Main business activity _____

3) What proportion of your visitors are domestic i) _____ % ii) international _____ %

4) Where do the domestic visitors mostly come from? _____

5) How long has the business operated on this site (years) _____ How long has the owner/operator been on the site? _____

6) What are the peak staff numbers? Full-time _____ Part-time _____

7) Is this employment seasonal in nature? Yes No

If yes, describe _____

8) How would you describe the present business climate and activity in this area?

9) How has this changed in recent years?

10) What effects has the marine reserve had on business activity in this area?

11) What effects has the marine reserve had on your business in particular?

12) What other effects has the marine reserve had on this area?

13) What was your attitude to the marine reserve when it was being planned?

Positive Negative Neutral Wasn't sure

14) What is your attitude to the marine reserve now? Positive Negative Neutral Not sure

15) What management issues concern you?

Appendix 3

MARINE RESERVES — KEYWORDS USED FOR QUALITATIVE DATA ANALYSIS

The following keywords were used as a structure for personal interviews. Data from interviews and meetings were coded using these keywords and the content analysed by Asksam software designed for qualitative data sets.

interview [name of the person or persons interviewed]

date [date of the interview]

area [i.e. name of the case study reserve]

organisation [the name of the organisation or company that the interviewee is involved with]

contact [address and phone number/s if available]

type [tourist operation type and description]

personal [personal background and work history of the interviewee]

profile [information relating to social and economic profile of the community and surrounding region]

concessions [issues relating to the process of application and allocation, fees, management of the resource and monitoring of activity]

consultation [issues of community consultation and liaison]

council [role of local and regional government in the area, e.g. the supply of public infrastructure such as water, toilets]

doc [general role of DOC - admin. of the Act and relations with the community - see also concessions, consultation and manage]

educate [educational activity arising from or related to the reserve]

employ [employment generated by the reserve and or tourism activity]

fish [description of commercial fishing in the area and issues in relation to commercial fishing]

general [comments about marine reserves in general]

government [questions of government policy and political views]

manage [management issues for the reserve, including boundary issues]

maori [issues relating to Maori interests and use]

monitor [what information should be collected to monitor and evaluate reserves, and by who]

problem [social problems such as crime in the area]

promo [advertising and promotion of tourism and the reserve]

recreate [issues relating to recreational fishing and changes in recreational patterns]

stock [information in relation to fishing stocks, numbers, etc.]

strategy [tourism and economic development strategy for the surrounding areas]

support [level of community support for tourism and the reserve]

tourism [nature of the tourist resources, activities and trends]

visitor [nature and numbers of visitors to the business or the area]