

**MANAGING OUR IMPACTS ON NEW ZEALAND'S MARINE
ENVIRONMENT**

WORKING PAPER II - ISSUES

*A stocktake of the issues for marine environmental management
in New Zealand*

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MINISTRY FOR THE ENVIRONMENT
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This preliminary working paper has been prepared by the Ministry for the Environment, the Department of Conservation, and the Ministry of Fisheries, with input from a wide range of government departments.

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1. Introduction

1.1 Purpose

The Ministers of Conservation and of Food, Fibre, Biosecurity and Border Control, and the Minister for the Environment have directed officials to investigate current arrangements for the management of New Zealand's marine environment. Before such an investigation can commence, we must have a clear and agreed understanding of the issues facing marine management. Marine environmental management is complex, not just in New Zealand. This area represents the interface between:

- international and domestic law;
- terrestrial and marine ecological systems;
- resource development and conservation imperatives.

The marine environment is hugely complex, logistically difficult, and often poor in information.

This paper presents the results of a preliminary analysis of the risks to, and issues in, the marine environment. It is intended to initiate discussion on marine management in New Zealand.

A rating of significance is assigned to the issues at the beginning of each issue discussion. This attempts to summarise the overall current risk and pressure that the particular issue places on the marine environment. These ratings are subjective and because of the limited time frame for this exercise have been made without robust analysis or consultation with many affected parties.

In some cases the risk may be high for all of the marine area. In others it may be a predominantly near shore risk, or may even be restricted to limited areas such as in the vicinity of urban areas. A general description of the geographical extent of the risk has been provided along with the significance.

This paper should be read in conjunction with Working Paper I - Marine Environmental Context.

1.2 The state of our marine environment

The main pressures on, and the state of New Zealand's marine waters have been summarised in *The State of the New Zealand Environment*¹. In general, our coastal waters are of high quality by international standards but are under stress in some areas, particularly near the larger estuarine towns and cities and near the mouths of large rivers. The main pressures are sewage and stormwater pollution from towns and cities, and farm runoff containing animal waste, fertilisers and sediment. Waste and spills from boats can also cause pollution. There

¹ The information in this section is based on, but not restricted to, Taylor, R. and Smith, I (1997). *The State of New Zealand's Environment*. Wellington: Ministry for the Environment..

are approximately 100 small to moderate oil spills in New Zealand harbours each year. Dredging to maintain the passage of shipping also has impacts.

Total concentrations of heavy metals in some estuarine sediments (e.g. near Auckland) have exceeded international guideline values. Accelerated sedimentation can smother coastal seaweed communities, such as kelp forests, eelgrass, and fish nurseries. Elevated nutrient levels and water temperatures may fuel unwanted algal blooms in coastal waters. Increasing incidents of blooms of toxic marine algae, which are a threat to shellfish and seabirds, have been recorded along the north, east and south coasts of both islands. Several of the species were unknown here before the current decade and scientific opinion is divided over whether they are native or were introduced in the ballast water of foreign ships. The status of past, and the risk of future introductions of exotic organisms into New Zealand waters was assessed in a symposium organised by the Royal Society in 1995².

Fishing puts pressure on fish stocks, some seabirds, some marine mammals, and some benthic invertebrate communities. Many coastal fish stocks were reduced in the two decades from 1965 to 1985, following deregulation of and increased effort by the industry. Since the beginning of fisheries reforms in the mid-1980s, fishing effort has shifted to deeper waters. In addition, we are becoming more aware of the impacts of fisheries on bycatch species and ecologically associated species. Commercial fishing impacts on non-target species range from unintended capture in trawl nets or on baited longline hooks to the destruction by trawl nets and dredges of invertebrate communities on the seafloor, coastal reefs and deep water seamounts.

Recreational and customary fishing may have a significant impact on some coastal fish and shellfish stocks. Recreational fisheries are not easy to monitor. The recreational fishery catch exceeds the commercial catch for a few species in some areas. Monitoring of recreational take comes from surveys of recreational catch landed. Information is best for a small number of key recreational fisheries such as the northern snapper fisheries. Monitoring is retrospective because of the impracticalities of providing information as the fish are caught from the hundreds of thousands of people fishing in anyone year. Therefore the recreational harvest is only ascertained sometime after the finish of the year. It is estimated that 20-30% of all New Zealanders engage in marine recreational fishing at some level.

Global warming this century has raised the sea level and temperature of New Zealand waters. How much of this is natural fluctuation and how much is human-induced remains unknown. Human-induced greenhouse gas emissions play a role in climate change. Increased UV radiation through ozone depletion may also have impacts, particularly on surface dwelling organisms.

Many impacts are likely to be localised (e.g. estuarine pollution), but can have a widespread impact given the effect on breeding habitat and winter feeding. Others are more widespread (e.g. the impacts of fishing on target species, and rising sea temperatures associated with climate change). From a management point of view, local impacts can often be dealt with at regional and industry levels, while widespread impacts may need national or international measures.

² R.P. Lynch (ed) 1995. *Ballast water - A Marine Cocktail on the Move*. Proceedings of the National Symposium, June 1995. Royal Society, Wellington, Miscellaneous Series 30.

As only certain species or habitats are monitored, and much monitoring is very recent in terms of baselines, just what effects human activities are having on ecosystems is not known. For example, there are possibly no coastal areas left untouched by fishing and other human impacts which can provide us with a ‘natural’ baseline with which to compare impacted ecosystems against non-impacted ecosystems.

2. Marine environmental issues³

2.1 Fishing impacts

Issue 1 Fishing impacts⁴

Significance: High *Extent:* Territorial sea and EEZ

Relevant legislation : Fisheries Act 1996, Marine Mammals Protection Act 1978, Wildlife Act 1953, Territorial Sea and Exclusive Economic Zone Act 1977, Marine Reserves Act 1971

Responsible agencies Ministry of Fisheries, Department of Conservation (protected species bycatch impacts, protected species)

Jurisdiction The fisheries legislation applies to the entire marine environment out to the EEZ. The Wildlife Act was amended in 1996 to incorporate several marine species formerly protected under fisheries legislation and its jurisdiction was extended to the EEZ. The Marine Mammals Protection Act applies to “New Zealand fisheries waters as defined in the 1908 Fisheries Act”.

Environmental Concerns

The concerns associated with fishing fall into five broad categories:

- depletion of target species: Approximately 1 in 5 fishstocks are known to be depleted by fishing to below maximum sustainable yield.(i.e. some snapper, orange roughy, rock lobster stocks). Management measures, including reducing the allowable catch, to rebuild all such stocks are in place. All these stocks are thought by the Ministry of Fisheries (MFish) to be moving towards the level which will produce the maximum sustainable yield.
- information: Current levels of information are inadequate to determine whether harvesting is maintaining stocks at or about the level that will produce the maximum sustainable yield for over half the fish stocks managed under the QMS. As many of these are still in the fishing down phase, additional information will be important to avoid the risk of over-fishing in the future. In general less is known about non-QMS species.
- impacts on non-target species: Protected non-target species killed by fishing activities include: seabirds, sea lions, fur seals, Hector’s and common dolphins. Other species killed include many marine invertebrates.
- effects of discarded fishing gear, including “ghost fishing” by discarded nets
- habitat degradation: Damage to benthic communities by trawling, dredging and other fishing techniques. This extends from shallow coastal waters into off-shore areas. Some fisheries scientists have expressed concern that invertebrate communities on the bulk of the

³ The order of these issues does not indicate relative priority. Priorities are assessed later in this Part.

⁴ Aquaculture is addressed in a separate section.

deep water seamounts that are accessible with existing fishing gear have been disturbed by trawlers.

Together these issues are a major focus for public concerns about the effectiveness of marine management. Some concerns are sufficient to lead some to question the effectiveness of both past and current fisheries management⁵.

Existing Measures

Section 9 of the Fisheries Act 1996 requires that fisheries managers take into account three environmental principles to ensure sustainability:

- (a) Associated or dependent species should be maintained above a level that ensures their long-term viability;
- (b) Biological diversity of the aquatic environment should be maintained;
- (c) Habitat of particular significance for fisheries management should be protected.

The Ministry of Fisheries (MFish) has adopted an ecological sustainability approach to its management of fisheries⁶. However, there are no well tried methods for calculating optimal multi-stock yields. Managing the impacts of changes in one fish stock on others and on ecosystems remains a challenge.

The impacts of fishing on target species are managed through the Quota Management System (QMS) and the application of the Maximum Sustainable Yield (MSY) concept. MSY management has a single stock focus and aims to maximise the productivity of a given stock by reducing it to around one-third of its 'virgin' biomass. At present, there is no method for assessing ecological impacts of such reductions in target species biomass, or the impacts on non-target species. Nor is there any method for calculating optimal multi-stock yields. An amendment to the Fisheries Act currently before a Select Committee will allow the MSY approach to be relaxed for certain by-catch species. This may result in stocks being managed to levels below MSY, but will still require stocks to be managed at levels which do not endanger the species.

Notwithstanding the concerns above, New Zealand's target fish stocks are considered to be well managed in comparison to that of other countries. The total allowable catch (TAC) comprises the total allowable commercial catch (TACC) plus allowances for recreational and customary catch. MFish advises the Minister of Fisheries on the TAC for each fish stock. The TAC is set with reference to the population level which will produce MSY. TACs are based on research into the population and estimates of abundance and yield by the National Institute of Water and Atmosphere Research (NIWA) or other contracted science providers. A process of consultation with interested parties, including NGOs, Maori interests, recreational fishers and the fishing industry also discusses what the TACs should be and the nature and extent of research and compliance services.

⁵ Wallace, C. (1998) *Marine Management: Reform Urgent*. Marine Working Group briefing paper. Environment and Conservation Organisations, Wellington.

⁶ MFish (1997) *Changing Course -Towards Sustainable Fisheries 2010*. Ministry of Fisheries Wellington.

The Marine Mammals Protection Act (MMPA) and the Wildlife Act confer some protection on some non-target species of birds, marine mammals, marine reptiles and invertebrates that are at risk of bycatch or trawler disturbance. The MMPA covers all marine mammals. The Wildlife Act includes all seabirds but, in terms of fish and invertebrates, it protects only spotted groper and red and black corals. Department of Conservation (DoC) is responsible for both of these pieces of legislation, and commissions most of the research on bycatch of protected species, some of which is funded by the fishing industry.

Section 15(2) of the Fisheries Act is the main provision used to manage fishing impacts on protected species. It is consistent with the requirement to avoid, remedy or mitigate adverse effects of fishing on the environment contained in the purpose section of the Fisheries Act. Section 15(2) was used to implement the early closure of the squid fishery around the Auckland Islands during the 1995/96, 1996/97 and 1997/98 fishing years because of hooker sealion by-catch.

At present, MFish and DoC are developing a co-ordinated approach to dealing with these issues through inter-departmental Memoranda of Understanding (MOU). Their common philosophical base is the sustainability requirements of the Fisheries Act, which is largely consistent with that of the Resource Management Act (RMA), and the protection requirements of the Conservation and Wildlife Acts. Although inter-departmental MOU are being developed without public involvement they will improve the quality of the Departmental processes. Through these MOU's, interested NGOs and other groups will be able to be involved in the annual deliberations through working groups. The groups are convened by the MFish and the DoC, and through statutory consultation processes.

A cost recovery scheme exists to recover research, enforcement and other management costs through levies on the industry. The fishing industry is concerned about measures which impose excessive costs on it. The Fisheries Amendment Bill currently before the Select Committee proposes an amended cost recovery regime. The Bill also enables the Fisheries Minister to exempt stakeholders from cost recovery levies where they directly purchase required services to the desired standard.

Remaining issues

Evaluating the state of New Zealand's marine life is difficult due to very limited information. Consequently it is not possible to determine whether all fish stocks are being managed at the level which will generate the maximum sustainable yield.

Coastal fisheries were heavily depleted due to high levels of fishing in the two decades from 1965 to 1985 following deregulation of the industry. Since the introduction of the Quota Management System (QMS) the allowable catches for inshore fisheries have been reduced significantly and the status of some stocks have consequently improved. A stock is one species (or group of species) in a specified area (Quota Management Area - QMA).

What is the status of our fish stocks? The results for the 1998⁷ and 1996⁸ assessments of fish stock status are shown below⁹:

Table 1

Assessments	1998		1996	
Total stocks	149	Excludes fishstocks in QMA 10	131	, Excludes fishstocks in QMA 10.
Unknown status	87	58 % of total stocks	57	44% of total stocks
Known status	62	42 % of total stocks	74	56% of total stocks
Number of stocks below B_{msy}	12	19 % of stocks with known status	7	9% of stocks with known status
Stocks below B_{msy}	5 orange roughy 2 snapper 2 rock lobster 2 gemfish 1 oreo		4 orange roughy 3 snapper	

80% of QMS stocks, for which biomass and productivity data are known, are thought to be at or above the level that will generate the maximum sustainable yield. However, for over half of the fish stocks managed under the QMS, too little is known to be able to assess whether harvesting is maintaining stocks at or about the level that will produce the maximum sustainable yield. Information is best for important commercially harvested fishstocks. About 70% of the catch, in tonnage, is from fisheries where the biomass relative to the level which will give the maximum sustainable yield (B_{msy}) is known.

Some important fishery species (including snapper and orange roughy) contain some stocks which have been depleted below B_{msy} . The problems of uncertainty in the assessments of many fishstocks and insufficient information to assess the status of others are noted in the *1998 Environment 2010 (E2010) Stocktake*¹⁰ as a continuing concern. Some fisheries may be threatened by over-fishing as a result. Lower catch levels and other restrictions have been set for these fisheries which aim to rebuild stocks over time.

In 1996, the fishing industry opposed funding research on the effects of fishing on the aquatic environment (i.e. impacts on non-target species and habitats), despite these being critical to implementation of the environmental principles outlined in Part II of the Act. Under the cost recovery sections of the Act the Crown can recover the costs of fisheries services from the fishing industry. A schedule gives an initial division of costs between the Crown and industry under cost recovery. Research on the aquatic environment is included within the ambit of fish

⁷ Ministry of Fisheries - communication 19/5/99.

⁸ Taylor, R. and Smith, I (1997). *The State of New Zealand's Environment*. Wellington: Ministry for the Environment.-

⁹ *The 1998 figure includes all QMS stocks (excluding stocks in QMA 10, the Kermadecs) as well as some important non-QMS stocks (e.g. Southern Blue Whiting). The 1996 figures also include all QMS stocks (minus QMA 10)*

¹⁰ Ministry for the Environment (1999) *1998 Environment 2010 Stocktake*, Ministry for the Environment, Wellington.

services for which cost recovery could apply. This is currently a 50:50 government:industry split.

Annual MFish sponsored research expenditure has declined in recent years; from about \$22 million in 1991/92 to \$17 million in 1995-96 (no adjustment for inflation). Research approved for 1999/2000 will cost \$18 million. The industry argues that the research is now more focused than it was and the decline in spending is made up for improvements in quality. This debate is continuing and fisheries research management is under reform.

Non-compliance is a problem with any fisheries management system. Non-compliance includes dumping, high grading of fish and deliberately catching in excess of quota taken during routine fishing operations. There is also significant black market operations from those with no commercial fishing rights. A major example of black marketing is the estimated 156 tonnes of black-market paua taken in PAU2 (the North Island coast from Raglan, south through Cook Strait to East Cape and areas off this coast) compared to the legal harvest of 120 tonnes for the same area in 1995-96¹¹. A lack of information on non-compliance is a significant problem¹²

The Fisheries Act 1996 is currently being reviewed. Parts of the Act are seen as being rigid and difficult to apply in practice. A review of the Act¹³ concluded that government management of fisheries should be outcome oriented, rather than input driven, and that the roles of fisheries stakeholders in fisheries management should be clearly defined. This would include devolution of fisheries management functions to rights holder groups.

Some parts of the Act are being amended with the current Fisheries Amendment Bill. An important aspect of this Bill is the enabling provisions which will allow some services, particularly the administration of quota registers, to be devolved to fishing industry groups.

Other aspects of the proposed reforms, including co-management, are to be discussed further prior to any draft legislation being prepared. The intent of co-management is to give rights holders responsibility for managing fisheries and then holding them to account. The approach builds on the rights established by the Quota Management System.

In the future, additional investment in the enhancement of fisheries could be attractive to fishers in specific fisheries. Where this enhancement extends to measures such as seeding or deliberate habitat or food-chain modification (as opposed to the impacts associated with harvesting) new legal frameworks are needed as this may go beyond the scope of current legislation. Seeding of scallop beds around Nelson is managed under the specific sections of the Fisheries Act relating to the one fishery.

2.2 Protecting natural areas

¹¹ Ministry of Fisheries (1998) Report from the Fishery Assessment plenary, May 1998: stock assessments and yield estimates. p273 and p274

¹² Ministry for the Environment (1999) *1998 Environment 2010 Stocktake*, Ministry for the Environment, Wellington.

¹³ Hartevelt, Tony (1998) *Fishing for the Future: review of the Fisheries Act 1996*. Report of the Independent Reviewer of the Fisheries Act 1996 to the Minister of Food, Fibre, Biosecurity and Border Control.

Issue 2 Protecting natural areas

Significance: High *Extent:* EEZ

Relevant legislation: Marine Reserves Act 1991, Territorial Sea and Exclusive Economic Zone Act 1977, Wildlife Act 1953, Marine Mammals Protection Act, Fisheries Act 1996.

Responsible agencies: DoC, MFish

Jurisdiction: Territorial waters

Environmental Concerns

Marine reserves may serve a number of functions in the sustainable management of marine life: the protection of biomass and population structure in commercial species, to limit by-catch of juveniles, to protect ocean biodiversity, to protect essential life stages of commercial species, to protect and enhance productivity, to provide for marine research, to protect artisanal and community fisheries, and to enhance public education and non-destructive enjoyment of marine life. In their purest form marine reserves are no-take areas.

A statement launched in early 1998 on the Internet by 400 marine scientists claims that a fifth of the world's oceans need to be protected if many ecosystems and fish stocks are to avoid serious trouble. A recent paper suggests that establishing marine reserves can provide protection from fisheries collapses¹⁴. They suggest that with the uncertainties and biases associated with setting quotas and determining actual fishing mortality sustainable outcomes are not assured by setting quotas based on "best point estimates". In extreme cases up to 50% of the original fish population may need to be protected to marine reserves to successfully hedge against over-fishing¹⁵. A paper drawing on the New Zealand situation¹⁶ suggests that no-take marine reserves which protect some 20 to 30% of the total marine area would provide for the sustainability of ecosystems and contribute to the management of harvested species. At present, less than one quarter of one percent of the New Zealand marine environment is protected in marine reserves.

Marine ecosystems that some believe to need particular protection in New Zealand range from coastal areas around the North and South Islands to many deep water seamounts¹⁷. Seamounts host many unusual and unique species and have rich biodiversity. Work on benthic by-catch from hill or seamount areas found by-catch differs significantly from flat areas of seabed¹⁸. In flat bottomed areas by-catch was predominately sea cucumbers, sea stars and prawns while on seamounts it was different types of coral. It is likely that some species or associations are unique to one or very few seamounts. Research conducted off southern Tasmania has

¹⁴ Lauck, T., Clark, C.W., Mangel, M., and Munro, G.R. (1998). Implementing the precautionary principle in fisheries management through marine reserves. *Ecological Applications* 8(1) Supplement: S72-S78.

¹⁵ Lauck, T., Clark, C.W., Mangel, M., and Munro, G.R. (1998). Implementing the precautionary principle in fisheries management through marine reserves. *Ecological Applications* 8(1) Supplement: S72-S78. S75

¹⁶ Ballantine, W.J. (1997) Design Principles for Systems of 'No-Take' Marine Reserves *Paper for workshop on the Design and Monitoring of Marine Reserves at the University of British Columbia*. Feb 18-20 1997.

¹⁷ Submarine mountains which do not reach the ocean surface.

¹⁸ Ministry of Fisheries (1998) Review of Sustainability Measures and Other Management Controls for the 1998-99 Fishing Year. Final Advice Paper. Page 736

identified specialised assemblages of benthic communities on seamounts¹⁹. One third of the 259 species identified were new to science and 40% are thought to be unique to Australian seamounts. Seamounts also attract fish and so have become attractive sites for deep-sea fishing for species such as orange roughy and oreo. The Tasmanian research on seamounts has shown heavily trawled areas to have greatly reduced coral cover and species diversity.

There is a growing concern among marine scientists in New Zealand that seamount biodiversity is at risk from trawler operations (through both fishing and physical impacts), especially as commercially valuable fisheries are associated with seamounts. Some marine scientists at the Seaviews conference believe that very few if any seamounts in New Zealand's EEZ have escaped trawler impacts. Other experts consider that many seamounts are too deep, being below 1200 metres, for current fishing gear to access²⁰. Seamounts and the living organisms such as corals on them are by their very nature hazardous and damaging to fishing gear. The orange roughy management company which covers New Zealand's major deep water fisheries have advised the Ministry of Fisheries that it has fished less than 20% of the seamounts known to them.

The World Conservation Union (IUCN) supported a 100 kilometre marine mammal sanctuary around the Auckland Islands in 1991 designed to protect the New Zealand sea lion²¹. Greenpeace has since urged the Minister of Fisheries to implement this in the wake of the deaths of around 1500 New Zealand sea lion pups during the 1997/98 breeding season (from an as yet unknown cause) and continuing adult mortality as a result of fishing operations. Fishing mortality has been estimated up to around 120 deaths in past seasons. Since 1993/94 the Minister of Fisheries and the Minister of Conservation have set a maximum limit on the number of fishing related New Zealand sea lion deaths which can occur in the southern squid fishery around the Auckland Islands. This limit has been set with the aim of ensuring that fishing related mortality poses no threat to the New Zealand sea lion population. During the 1997/98 and 1998/99 seasons this limit was set at 63 and 67 respectively. In 1997/98 the squid season was closed early when the estimated number of sea lions caught was 62. The 1998/99 season was completed without an early closure with the final estimated mortality being 14 New Zealand sea lions.

Existing Measures

To date, the protection of marine areas has focused on shallow water ecosystems. The Marine Reserves Act 1971 applies to areas within the territorial sea and only allows the Minister of Conservation to establish reserves for scientific purposes.

New Zealand has 15 marine reserves totalling 761,000 hectares, 3 marine parks and protected areas totalling 3,150 hectares, and 2 marine mammal sanctuaries totalling 335,111 hectares. In all, these marine conservation areas cover some 1,100,000 hectares. Impressive though this looks on paper, it is somewhat misleading. Some 748,000 hectares surround the remote Kermadec Islands and a further 345,000 hectares consist of marine mammal sanctuaries

¹⁹ Ministry of Fisheries (1998) Review of Sustainability Measures and Other Management Controls for the 1998-99 Fishing Year. Final Advice Paper. Page 736

²⁰ Submissions by Ministry of Fisheries and Department of Conservation on this report

²¹ MFish states that establishing such a sanctuary would result in closure of the squid fishery in the with an export value of around \$50 million dollars per year. This figure excludes the loss of jobs in additional on-shore processing—175 people employed full-time at on-shore processing plants rely on the squid fishery.

around Banks Peninsula and the remote Auckland Islands. These marine mammal sanctuaries are not ecological reserves but are simply areas where certain forms of net fishing are restricted. That leaves less than 15,000 hectares of reserves around the New Zealand mainland and none at all in the deep waters beyond the 12 nautical mile limit. This represents less than 1% coverage in the territorial seas, and a fraction of this in the EEZ. As a consequence, it is unlikely that our reserves are a representative sample of New Zealand's different marine environments.

The Fisheries Act contains provisions which allow areas of both the territorial sea and the EEZ to be closed to fishing. The Minister can do this to (among other things) avoid, remedy or mitigate any adverse effects of fishing on the aquatic environment, maintain the viability of associated or dependent species, maintain aquatic biodiversity, and protect any habitat which has particular significance for fisheries management. The legislation also enables the Minister to impose a range of "sustainability measures" to stop environmentally harmful fishing. This could include closing areas to particular methods of fishing for short or long time periods. Closures and the restrictions introduced are reviewed regularly as part of the fisheries planning cycle. Examples of closures under the Fisheries Act include the restrictions on snapper fishing to protect snapper in parts of the Hauraki Gulf. The measures range from very small no-take areas through to prohibitions on commercial trawling and seining over large parts of the Hauraki Gulf. These measures are reviewed as part of the fisheries planning processes. The MFish is currently discussing the voluntary closure to fishing of four seamounts, representative of the estimated 1000 seamounts of varying depths and latitude in the EEZ, with the industry as well as measures to avoid or mitigate adverse impacts.

Although the Territorial Sea and Exclusive Economic Zone Act 1977 provides²² for regulations prescribing measures to protect and preserve the marine environment in the Exclusive Economic Zone, these powers have not been used. Potentially this Act could be used in the EEZ in a way that complements preservation measures under other legislation within the territorial sea.

The recent extension of the Wildlife Act to the 200 nautical mile limit enables the Minister of Conservation to prepare Population Management Plans for protected species which may be at risk of 'fishing related mortality'. Between this and the Fisheries Act, it is now possible to create *de facto* deep water reserves by protecting certain species from fishing impacts. However, these restrictions may not apply to impacts other than from fishing.

MARPOL²³ enables the declaration of particular sea areas as sensitive and/or special. Such a declaration provides stricter controls on shipping around these areas. A specially established ANZECC²⁴ working group is producing criteria to identify marine areas in New Zealand and Australia that are sensitive to shipping operations. This group is also developing a process for registering these areas with IMO²⁵ and communicating the areas to the shipping community.

Remaining issues

²² In section 27(b).

²³ The *International Convention for the Prevention of Pollution from Ships 1973/78*.

²⁴ Australia and New Zealand Environment and Conservation Council - a Ministerial Council.

²⁵ International Maritime Organisation

Except for an unused provision of the Territorial Sea and Exclusive Economic Zone Act 1977 (see above), and the Fisheries Act, there is no mechanism for long term protection of marine areas outside of the 12 nautical mile limit. The main protection mechanism within the territorial sea, the Marine Reserves Act, has rather narrowly defined objectives which aim to protect areas for scientific study rather than for protection of biodiversity *per se*. The Department of Conservation will review the Marine Reserves Act 1971 and finalise a marine reserves strategy in 1999/2000. This work will seek to address a number of anomalies and gaps in the legislation and processes involved in establishing and managing marine reserves. However, given the competing interests in the marine environment some tensions are inevitable in the establishment and management of these.

The range of measures that are put in place under the Fisheries Act often have the intent of sustaining fisheries stocks or specific by-catch species rather than protecting ecosystems from all direct impacts.

Resistance from customary, recreational and commercial fishers to setting up more reserves remains an issue. Consultation undertaken by DoC during the marine reserves work in the future may improve relationships with these particular stakeholders and identify mutual points of interest. The draft Biodiversity Strategy, once implemented, is also likely to lead to improvements in this area of marine management.

2.3 Stormwater and sewage pollution

Issue 3 Stormwater and sewage pollution

Significance: high

Extent: Urban coastal

Relevant legislation: Resource Management Act 1991, Local Government Act 1974

Responsible agencies: Regional councils and territorial authorities.

Jurisdiction: Territorial waters

Environmental Concerns

Stormwater and sewage discharge nutrients, heavy metals, pathogenic micro-organisms, and non-biodegradable litter (mostly plastic) into rivers, estuaries and the open coast. While the quality of sewage discharges has improved in recent decades, that from stormwater discharges has not - stormwater discharges have even become more extensive as urban coastal development expands.

In the Auckland region, for example, recent studies have shown there has been a steady increase in concentrations of heavy metals and hydrocarbons in some estuaries and harbours²⁶. Some of this contamination exceeds North American criteria for the protection of aquatic life. Road transport activities can be a significant source of toxic and persistent contaminants in

²⁶ Williamson, B; Morrisey, D; Swales, A (1999) The build up of contaminants in urbanised estuaries Comprehensive Stormwater & Aquatic Ecosystem 1999 - Conference Paper

urban stormwater.²⁷ There is a risk of future sewerage system failures in some cities as existing infrastructure is not maintained. Maori are generally opposed to discharges of human waste to surface waters, including coastal areas.

Existing Measures

Territorial authorities are generally responsible for the construction and maintenance of sewerage and stormwater systems under the Local Government Act, recent amendments of which require the production of asset (including sewerage and stormwater) management plans. Discharges are authorised by resource consents granted by regional councils under the RMA – regional coastal plans provide the assessment framework through which consent applications are assessed. These plans can not be inconsistent with the New Zealand Coastal Policy Statement (NZCPS) issued by the Minister of Conservation. The NZCPS places significant constraints on the discharge of sewage to the coastal environment, addressing many of the concerns identified above. The Auckland Regional Council has recently developed a strategy statement for the management of urban stormwater in the region over the next 20 years. It also hosted a conference in February 1999 titled *Comprehensive Stormwater and Aquatic Ecosystem Management* to encourage discussion and information sharing on this issue.

Green Package funding was provided to the Ministry of Transport (MoT) to investigate the effects land transport has on the environment. As part of these investigations MoT has recently started work investigating the effects that road transport has on water ecosystems.

The Ministry for the Environment (MfE) and Ministry of Health (MoH), in consultation with regional councils and representatives from health authorities, have developed the *Bacteriological Water Quality Guidelines for Marine and Fresh Water* for the management of recreational and marine shellfish gathering waters.²⁸

Remaining issues

Stormwater pollution continues to be a major problem in our urban estuaries and other sheltered coastal waters. Both technical solutions (such as developing cost-effective treatment and disposal systems) and policy solutions (few regional coastal plans have satisfactorily addressed risks posed by stormwater) are required. Improvements are also needed in some sewage treatment and disposal systems.

We have limited understanding of sediment contamination in estuaries, especially those near urban areas.

2.4 Ballast water, hull scrapings and hull-fouling

²⁷ See, for instance NIWA (1995) *Comparison of runoff quality from roads versus other urban landuses*, NIWA, Christchurch. The banning of leaded petrol will probably lead to a slow decline in lead pollution but, if trends continue, the proportion of contaminated estuarine sediments will expand from 50% to 70% in the Auckland region by 2021 - *The State of New Zealand's Environment* p7.74.

²⁸ These guidelines replace the 1992 "Provisional Microbiological Water Quality Guidelines for Recreational and Shellfish-Gathering Waters in New Zealand" published by the Department of Health.

Issue 4 Ballast water, hull scrapings and hull-fouling

Significance: med-high *Extent:* Territorial Sea

Relevant legislation: Biosecurity Act and Resource Management Act)

Responsible agencies: MFish, MAF, MfE

Jurisdiction: Territorial waters

Environmental Concerns

Hull cleanings, hull fouling and ballast water discharges from vessels are suspected of being the source of several exotic species in New Zealand coastal waters. A recent study²⁹ identified 159 adventive marine species in New Zealand. Of these, only 11 were introduced deliberately. Around 60% of these adventive species are fouling organisms, thought to have arrived attached to hulls or other structures. The rate of introduction this century is estimated in the report to average 1.4 species per annum.

A key problem indicated in the sector strategies submitted to The Ministry of Research Science and Technology (MoRST) was the lack of an effective Marine Biosecurity Strategy.

Exotic species cause environmental concerns because:

- Some of these introduced species are toxic algae, which occasionally bloom causing shellfish poisoning, fish and seabird deaths, and human illness
- Aquaculture is threatened by some exotic species
- Natural marine ecology is threatened by invasive exotic species, such as *Undaria*
- Once established, exotic organisms are extremely difficult to eradicate
- Although the impact of exotic marine organisms is thought to be potentially highly significant, both ecologically and economically, there is relatively little knowledge about the actual impacts on marine ecosystems.

Existing Measures

The Government has decided that the introduction of exotic organisms should be controlled through the Biosecurity Act, as this is its prime function. The RMA contains mechanisms for the control of ballast water discharges³⁰, but it is generally agreed that the Biosecurity Act 1993 is the more appropriate management tool.

The Minister of Fisheries published the *Ballast Water and Ship's Hull De-fouling: A Government Strategy* in January 1998. The strategy outlines what MFish intends to do to manage discharge of ballast water in New Zealand territorial waters, hull fouling, and hull cleaning.

In March 1998, MFish issued an import health standard (IHS) for ballast water from all countries under the Biosecurity Act. The IHS gives regulatory effect to the voluntary requirements put into place by the old Ministry of Agriculture and Fisheries. Due to the

²⁹ Cranfield J et al (1998) Adventive Marine Species in New Zealand, Niwa Technical Report 34.

³⁰ Particularly when the marine pollution amendments came into effect.

jurisdiction of the Biosecurity Act, the IHS applies only to ballast water discharge within the territorial sea.

Monitoring and enforcement of the IHS is difficult. MFish has a major research contract with the Cawthron Institute to develop a compliance validation methodology, which should improve both compliance monitoring and enforcement.

At the international level, the Marine Environment Protection Committee of the International Maritime Organisation (IMO) is working towards developing international measures specifically to control ballast water. The aim is to have a decision made at a Conference of the Parties in late 2000. However, it could be some time before any international controls are agreed, ratified and implemented. MFish has acted in advance of the international community, but will ensure that controls are not inconsistent with any international convention or other measures.

The Australian Quarantine and Inspection Service is putting substantial resources into the development of a comprehensive decision support system to assist ballast water management. Australia is also working on ballast control measures and guidelines³¹ but has no mandatory controls in place.

Although the focus of national and international measures has been ballast water exchange, work is being done to develop other management tools. In February 1998, the Cawthron Institute announced the success of a shipboard trial of a prototype ballast water treatment system. The trial was carried out after 18 months of research. The result was a complete kill of any organisms that were in the treated tank. Research overseas has also examined chemical, filtration, and UV treatment methods. As yet none of the treatment options have been found to be cost-effective and/or practical.

A voluntary code of practice was developed for hull fouling by the New Zealand Fishing Industry Association in December 1996. However the extent of adoption of, or compliance with, the code is not monitored. MFish released a discussion paper in January 1999 on options for controlling hull cleaning and fouling.

Remaining issues

Effectiveness of ballast water exchange: There is some uncertainty over whether mid-ocean exchange of ballast water sufficiently reduces the risk of exotic organisms arriving in our ports. MFish has a contract with the Cawthron Institute to examine the efficacy of exchange. It may be necessary to review the ballast water management approach in the light of the results of this research.

Surveillance: Monitoring for new marine organisms is relatively difficult, and there is presently no system in place that seeks to do this. A new general surveillance system relying on public and sector observation is being developed by MFish, however, more targeted surveillance will be needed.

³¹ See papers in the 1995 Royal Society Symposium.

Enforcement of controls: Presently, MFish is responsible for developing and enforcing ballast water controls. Because ballast water is an issue of ship design, safety and operation as well as an economic and environmental issue, MoT has suggested when commenting on this paper that it (through the Maritime Safety Authority (MSA)) may be better placed to lead in this area. In the light of MoT's comments, responsibility may need to be revisited.

Eradication/control of introduced organisms: Eradication of introduced organisms on land is the responsibility of MAF, MoH, or DoC depending on the nature of the risk. Responding to incursions of foreign organisms in the marine environment is now the responsibility of MFish. However, there is still limited capability and resources available for response in the marine environment. As with the terrestrial environment, funding of eradication or control remains an issue.

Health: Ballast water has led to outbreaks of infectious diseases such as cholera in other countries. Health risks of ballast water (and hull fouling organisms), such as cholera, have not been specifically addressed in New Zealand.

2.5 Protecting characteristics of special value to tangata whenua

Issue 5 Protecting characteristics of special value to tangata whenua

Significance: Medium *Extent:* Territorial sea (EEZ possibly)

Relevant legislation: Resource Management Act, 1991, Marine Reserves Act 1991, Territorial Sea and Exclusive Economic Zone Act 1977, Wildlife Act 1953, Marine Mammals Protection Act, Fisheries Act 1996

Treaty of Waitangi

Responsible agencies: DoC, MFish, MfE

Jurisdiction: Territorial waters

Environmental Concerns

Particular marine environmental issues affecting Maori include:

- giving effect to the Treaty of Waitangi (ToW) relationship between the Crown and iwi as incorporated in section 10 of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992.
- customary and commercial fishing and the relationship with recreational fishers;
- process and access problems with taiapure, mataitai, mahinga kai;
- current Treaty claims:
 - Marlborough sounds foreshore and seabed claim³²

³² The issue of customary ownership of the foreshore and seabed is currently before the Maori Appellate Court. A claim has been made by eight iwi from the Marlborough and Nelson region, who are seeking a declaration that their customary ownership of the foreshore and seabed in and around the Marlborough Sounds was not extinguished by the signing of the Treaty of Waitangi. In a decision given on 22 December 1997 the Maori Land Court found that it has jurisdiction to determine an application for customary ownership, but that evidence would

- ports and port assets
- petroleum (Taranaki)
- biodiversity (including claim Wai 262 to the Waitangi Tribunal);
- future Treaty claims out to the continental shelf (“where the Crown goes, the Treaty goes”);
- tangata whenua participation and consultation outside the territorial sea for development (e.g., prospecting, mining).

There are currently two major cases before the Maori Land Court where the applicants seek a declaration from the Courts that the foreshore and seabed is Maori customary land and not land of the Crown. The cases affect the Marlborough Sounds and the Hauraki Gulf, Firth of Thames and eastern coast of the Coromandel Peninsula. The Crown has appealed the Marlborough Sounds decision to the Maori Appellate Court and a decision on whether the case will be referred to the High Court is awaited.

Current debate also centres around customary and commercial Maori rights to fisheries and Maori involvement in the protection and enhancement of marine habitats. Customary fishing is provided for in regulations under the Fisheries Act and the Fisheries Settlement. The Minister of Fisheries, acting in accordance with the principles of the Treaty of Waitangi, is required to consult with tangata whenua and develop policies to help recognise the use and management practices of Maori in the exercise of their non-commercial fishing rights. Customary rights include provision for mataitai reserves in customary fishing areas

Maori interests in the marine environment are significant and are likely to increase. The NZCPS recognises that the Crown must recognise and actively protect rangatiratanga, land and other taonga of Maori, including their kaitiaki role.³³ The principles of the ToW are recognised in section 10 of the ToW (Fisheries Claims) Settlement Act as far as they affect fisheries.

be needed to prove existence in any given area. The Crown and number of other parties have appealed this decision.

³³ Department of Conservation (1994) *Commentary of the New Zealand Coastal Policy Statement 1994*, Department of Conservation, Wellington.

2.6 Rural land run-off

Issue 6 Rural land run-off

Significance: medium *Extent:* Coastal (especially enclosed waters)

Relevant legislation: RMA 1991

Responsible agencies: Regional councils, MAF

Jurisdiction: Territorial waters and their freshwater catchments

Environmental Concerns

Soil from eroding hillsides and fields is washed into streams and rivers by rainfall. Much of this travels to coastal estuaries and beaches where the sediment covers shellfish beds, seaweed beds and fish nursery areas. Although there is a natural base level of erosion even in forested catchments, accelerated erosion in farmed catchments is well-documented and sometimes leads to catastrophic quantities of sediment being carried by flood waters, as happened with Cyclone Bola in 1988. Intensively farmed land can also contribute to excessive nutrient and pathogen concentrations in receiving waters, especially enclosed coastal waters. Earth works and soil disturbance can result in greatly increased loss of soil.

Run-off and its impacts are of particular concern to aquaculture and intensive fisheries management. In areas, such as the Marlborough Sounds, where aquaculture is common there is heightened concern about landuse impacts on marine ecosystems.

Existing Measures

The key to managing this particular environmental issue lies in promoting, primarily by regional councils, the adoption of sustainable land management practices by landusers. National initiatives include the Government's Sustainable Land Management Strategy (co-ordinated by MfE), which aims in part to promote the adoption of 'good practice' and the principles of 'continual improvement' through effective co-ordination and information dissemination. Particular initiatives include support for the Landcare Trust, the establishment of the National Science Strategy for Sustainable Land Management, supported by Ministry of Research, Science and Technology (MoRST), and MAF's Sustainable Agriculture Facilitation Programme. Many regional plans address land-use management practices. Most of them focus on voluntary means to manage run-off, although a small number of councils use statutory mechanisms in their plans.

However, the main factors mitigating erosion appear to be economic. Low returns from sheep have led to some steepland pasture being left to revert to scrub and forest, and the high returns from forestry have led to some erosion-prone areas being planted in pine trees. Overall, though, there is no evidence to date that sedimentation rates have been significantly reduced.

The NZCPS identifies the impact of land use on the coast. Policy 3.2.7 states that policy statements and plans should identify and encourage the adoption of any practicable ways to improve the quality of water in the coastal environment by altered land management practices.

Remaining issues

Unsustainable land management practices are being addressed through the Sustainable Land Management Strategy. However, the Strategy was adopted only in 1996 and it is too early to identify its effectiveness - it is essential that its effectiveness is monitored, both on land and in the sea. Nevertheless, it will be difficult to achieve significant changes in environmental outcomes for this issue in the short term.

Communication and co-ordination between coastal and land management policy areas could be enhanced - integrated management is vital if environmental outcomes are to be improved in this area. Monitoring of the impacts of sediment and other land run-off is only done in a very few coastal areas.

A joint programme co-ordinated by the Ministries of Agriculture and Forestry, Health, and Environment, (the Freshwater Microbiology Research Programme) is investigating pathogen and indicator levels in rivers at sites impacted by different land-uses. Information generated by this programme will be used to develop stock watering guidelines, bathing and contact recreation guidelines and will improve the MoH drinking water guidelines. This programme will potentially lead to research to identify contamination pathways and environmental management solutions.

2.7 Toxic algal blooms

Issue 7 Toxic algal blooms

Significance: medium *Extent:* Coastal

Relevant legislation: Health Act

Responsible agencies: MAF, MoH

Jurisdiction: Territorial waters

Environmental Concerns

Rapid proliferation (blooming) of certain toxic species of algae is a serious and increasing problem in many parts of the Pacific³⁴. These blooms result in the intermittent closure of shellfish harvesting in various parts of the New Zealand coast, and they may have caused the death of shellfish and seabirds, such as little blue penguins. Eating affected shellfish causes seabird deaths and human illness (diarrhoea, muscular weakness and changes in skin sensitivity). Inhalation of affected water spray has caused respiratory problems, for some people in Northland and the Wairarapa. Blooms in Wellington Harbour in autumn 1998 led to the closure of the harbour to swimmers and the widespread death of bottom-dwelling organisms. The first serious incident recorded in New Zealand was in the summer of 1992 and blooms are likely to occur whenever temperatures and currents are favourable.

Existing measures

³⁴ As discussed at the APEC Marine Resources Conservation Working Group, Cairns, Australia, May 1999.

National monitoring networks are now in place to detect blooms before problems arise. One, a commercial monitoring programme for aquaculture, is managed by MFish, while the other, a public health monitoring programme, is managed by MoH. No regular monitoring of ecological impacts is undertaken.

Remaining issues

Toxic algal blooms continue to be a problem. Taxonomy and ecological requirements are poorly understood e.g. the role of global warming, nutrient enrichment, and possible introductions through ships ballast and fouled hulls.

2.8 Global warming and sea level rise

Issue 8 Global warming and sea level rise

Significance: Medium *Extent:* All (water temperature change), Coastal (sea level rise)

Relevant legislation: RMA - New Zealand Coastal Policy Statement (NZCPS)

Responsible agencies: DoC, MfE, local authorities

Jurisdiction: NZ territorial waters

Environmental Concerns

Global climate change appears to have driven a 0.7°C increase in ocean temperatures around New Zealand and a 15 cm increase in sea level in the past century or so. New Zealand sea levels are likely to rise between 7 and 17cm by the year 2025. Climate change may result in a more frequent occurrence of ‘unusual’ climate events. Coastal and low-lying land is particularly vulnerable to natural hazards resulting from climate change. Maori lands and traditional food sources may be adversely affected, particularly in the north of the North Island. The ecological effects of water temperature changes are unknown, but may result in redistribution of fish, invertebrate and marine mammal populations.

Some legal boundaries definitions are based on sea level terms (e.g. mean high water springs). The definition of these boundaries will change as sea level changes.

Existing Measures

New Zealand’s climate change policy currently aims to reduce greenhouse gas emissions and to increase removals by sinks. New Zealand must report regularly to the Secretariat of the Framework Convention on Climate Change on climate change impacts and vulnerability and response measures. Land Information New Zealand (LINZ) is responsible for sea level data relating to geodetic, topographic and hydrographic requirements, with the tidal database serving both geodetic and hydrographic requirements. Sixteen gauges are operated by ports authorities and regional councils, with some additional gauges being owned by NIWA and Civil Defence.

The NZCPS has provided a policy framework for the adaptive response to sea level rise. It requires the potential impacts of likely changes in sea level to be recognised, including the need to avoid development in areas prone to inundation or accelerated erosion; protecting human life; essential facilities and economic activities; and ensuring the integrity of natural systems and their buffers is not unduly affected. An integrated model system to address climate change impacts in coastal zone management is being developed³⁵.

The MfE Environmental Performance Indicators (EPI) Programme is developing climate change impact indicators. Although the cause of climate change impacts on the marine environment is global in nature, New Zealand needs to be aware of how global changes may impact on its own jurisdiction.

Remaining issues

New Zealand supports scientific research on the effects of warming and sea level rise on coastal land, coral and island ecological systems. One remaining issue is the establishment of a coherent approach to sea level monitoring of New Zealand as a response to global warming.

While LINZ maintains the national tidal database for hydrographic and geodetic purposes, there is no national database for sea level data for scientific purposes. Data from NIWA, Civil Defence and other agencies is not provided to LINZ. Data collected by ports authorities and regional councils is eventually forwarded to LINZ for inclusion in the national tidal database.

The responsibilities of LINZ with respect to tidal data are defined in “LINZ Role in and Needs for Sea Level Data”³⁶. The information in the national tidal database is not at the resolution required to monitor short term and detailed sea level change arising from climate change. Open sea gauge monitoring is necessary to properly monitor climate change impacts.

The lack of a strategy for sea level data collection for climate change purposes in New Zealand has been recognised by the National Science Strategy Committee for Climate Change (NSSCCC) in its annual report (1998). To follow-up, the NSSCCC plans to convene a meeting later this year inviting participation from interested parties including MfE, LINZ, NIWA and Port Authorities.

³⁵ See New Zealand’s Second National Communication to the FCCC - p89.

³⁶ Blick et al 1997.

2.9 Pollution from boats

Issue 9 Pollution from boats (other than from oil)

Significance: med-low *Extent:* All EEZ but mainly coastal

Relevant legislation: Maritime Transport Act 1994, Resource Management Act 1991, Fisheries Act 1996?

Responsible agencies: MSA, regional councils, MfE, MFish

Jurisdiction: Regional councils within territorial waters, MSA beyond territorial waters

Environmental Concerns

Pollution from vessels can arise from fuel leaks, the accidental loss of hazardous cargo, litter (e.g. plastic strapping and beer can holders, netting and nylon ropes) and the discharge of waste. Human sewage and food wastes are produced on most vessels. In addition, fishing boats generate large quantities of processing waste and other waste much of which is simply discharged overboard.

Within harbours, the concentration of vessels can mean that minor leaks and waste discharges can accumulate to cause environmental impacts, including discoloured water, unwanted algal blooms, smothering of seaweed and shellfish beds, and contamination of the water by pathogens or toxins.

Existing Measures

The MARPOL agreement on marine pollution was concluded in 1973 and amended in 1978. The legislation necessary to enable New Zealand to become party to MARPOL was passed in 1998, and MARPOL is now binding on New Zealand. Regulations and marine protection rules under the RMA and the Maritime Transport Act have recently been implemented. Under these regulations, discharges of certain wastes from boats are controlled through regulations³⁷ by regional councils within territorial waters and through the rules by the MSA outside territorial waters. Although the prescriptive nature of the regulations is out of keeping with the RMA approach, this has been necessary to ensure consistency with the Convention on both sides of the 12 nm limit.

It is not clear whether MFish has any responsibility to prevent pollution from fishing boats under the environmental sustainability clauses of the Fisheries Act 1996.

Remaining issues

One of the key remaining issues in this area is that of discharges from recreational boats and small fishing vessels. The sheer number of these boats means that monitoring and enforcing provisions for pollution control are difficult. Small oil and diesel spills are common around marinas as is the illegal disposal of garbage and sewage. The only real way of dealing with this is through education and the provision of garbage and sewage reception facilities. There tends to be a good response by boat owners to this and education programmes are ongoing.

³⁷ The regulations are drafted by MfE on behalf of the Minister for the Environment.

MfE and MSA, in association with ANZECC, are promoting the construction of reception facilities. However, in terms of MARPOL requirements no deficiencies in reception facilities provided at the major ports have been identified. A further outstanding issue relates to HSNO and the interface between that Act and the International Maritime Dangerous Goods Code (IMDG). This is a technical issue and is currently being negotiated between MSA³⁸ and the Environmental Risk Management Authority.

2.10 Dredging and aggregate mining

Issue 10 Dredging and aggregate mining

Significance: med-low *Extent:* Coastal, especially river mouths and harbours

Relevant legislation: Resource Management Act, Crown Minerals Act, Maritime Transport Act

Responsible agencies: Regional councils and Ministry of Commerce, MSA

Jurisdiction: Territorial waters

Environmental Concern

Sediment is regularly dredged from harbour entrances to facilitate the passage of vessels. Aggregate mining for gravel and sand for road construction also occurs, but is more common in river beds than on the coast. Both activities can cause sedimentation of the coastal seabed, the smothering of invertebrate and seaweed communities, and the degradation of bathing beaches. Concerns were expressed that the dredging of contaminated harbour sediments in Auckland and Wellington would lead to the mobilisation of toxic contaminants. Where no market can be found for harbour dredgings, this material must be dumped at sea and this can lead to smothering the sea bed.

An additional concern is that removing sand and gravel from harbours and river mouths predisposes some coastal areas down current of the extraction to coastal erosion.

Existing Measures

Regional councils are responsible for approving the environmental effects of such activities. Permits to dump dredged material inside the territorial sea are controlled by regulations under the RMA. Rules under the MTA control dumping of material outside the territorial sea to the outer limit of the EEZ. The MSA assesses and grants these permits. The regulations and the rules were developed in parallel and are consistent with the provisions of the London Convention.

The Ministry of Commerce (MoC) is responsible for approving the taking of sand and shingle where a permit is required under the Crown Minerals Act. This applies only where Crown-owned sand or shingle is being taken from the bed of a river or lake, or in the coastal marine

³⁸ MSA cannot enforce a domestic variation to IMDG with foreign ships. The proposed HSNO regulations are at variance with the IMDG code.

area, where “a person is seeking to prospect, explore or mine metallic or non-metallic minerals that exist as a component of the sand or shingle”³⁹.

The NZCPS makes certain levels of dredging and aggregate mining Restricted Coastal Activities. These are assessed by the Minister of Conservation.

Remaining issues

The coastal environment is generally an active place where erosion and depositional processes are common. Appropriately located and managed dredging operations may not have significant detrimental impacts, particularly if this activity is limited in extent. The consideration of the application to dredge and dispose of Auckland harbour dredgings revealed both the public misunderstanding of the nature of the material (media reports referred to “toxic sludge”) and to the limited understanding by regulatory authorities of the best way to manage contaminated sediments.

Marine pollution regulations make the dumping of dredged material, as for defined other wastes, a discretionary activity. These consents are processed by regional councils. The effects of the removal of the dredged material requires separate approval - although this may sometimes be a ‘permitted’ activity in regional coastal plans. The MSA processes applications to dump wastes and other matter outside the territorial sea. There are difficulties in assessing environmental effects of dumping dredged material in deep water. MSA and NIWA are currently addressing this through research for developing guidelines for monitoring and sampling in deep water.

2.11 Oil spills

Issue 11 Oil spills

Significance: low *Extent:* All EEZ but mostly in harbours.

Relevant legislation: Maritime Transport Act 1994, RMA for enforcement provisions in territorial waters

Responsible agencies: MSA, regional councils

Jurisdiction: All waters

Environmental Concerns

Spills of oil into our marine and coastal environment have the potential to cause serious impacts on marine ecosystems. Impacts include direct toxicity to marine creatures, indirect toxicity through preening or ingesting contaminated food, and through the smothering of benthic and littoral areas. Over 100 oil spills are reported to the MSA each year, most of them small.

³⁹ Paragraph 4.2.2 of the Minerals Programme for Minerals (1996)

Existing Measures

The MSA is charged with co-ordinating oil spill responses in territorial waters and the EEZ. The MSA is responsible for large spills and for all spills beyond territorial waters, while regional councils are responsible for dealing with small and medium spills within territorial waters. The MSA has developed an Oil Spill Response Strategy, which was reviewed in 1996 - the response involves monitoring, clean-up, wildlife rescue treatment and rehabilitation, and waste disposal.

The responsibility for planning and caring for oiled wildlife rests with the National On-Scene Commander (NOSC) who works for the Director of Maritime Safety. The NOSC is duty bound to consult and seek support, on a cost recovery basis, from DoC in carrying out these statutory duties when responding to marine oil spills.

Responsibility is based on the *capacity* to respond, rather than on geographical location. Thus, where able, the industry responsible for the spill commences the spill control and clean-up operation (Tier 1). Where this is not possible, the relevant regional council then takes responsibility (Tier 2). If the required response is beyond regional council capability, the MSA takes control (Tier 3). Cabinet has agreed that New Zealand should accede to the Oil Pollution Preparedness and Response Committee. As a consequence New Zealand will be in a position to respond to oil spills of any size.

Remaining issues

The main outstanding issue is associated with individually small, but cumulatively significant, discharges of oil.

2.12 Aquaculture impacts

Issue 12 - Marine aquaculture (marine farming) impacts

Significance: low *Extent:* Coastal (especially in enclosed waters)

Relevant legislation: RM Act 1991, Fisheries Amendment Act 1993, Marine Farming Act 1971.

Responsible agencies: Regional and district councils, MFish, DoC

Jurisdiction: Territorial waters. The Fisheries Act provisions extend to the EEZ.

Environmental concerns

A range of species are grown in marine farms around New Zealand, including: salmon, green-lipped mussels, pacific oysters and paua. Environmental effects depend on the type and scale of farming. Common potential effects include: conflicts with seabirds and marine mammals such as seals; modification of hydrological conditions (e.g., current flow leading to changes in sedimentation); the effects of biocides and growth promotants on other species; and destruction of benthic habitat through the accumulation of shell, live mussels and pseudo-faecal material under mussel and oyster farms, and faeces and uneaten food under finfish farms. These impacts may, in turn, affect species diversity locally. Other effects are human-

value related, such as compromising amenity and intrinsic values and impeding the passage of vessels.

Aquaculture which relies on plankton (e.g. mussel farms) has the potential to exceed the carrying capacity of the area, affecting other farms as well as wild fish stocks. Other environmental concerns include the occupation of coastal space preventing its use for other purposes, such as for marine reserves, conflict with iwi over occupation of the coastal space, and the loss of buoys, nets and other plastics and waste. The farming of exotic species also raises issues of indigenous biodiversity and biosecurity through the escape of farmed organisms or through the spread of adventive marine species when gear and spat are moved.

Existing measures

The Fisheries Act 1983 covers the holding and harvest of fish, shellfish and seaweed from a marine farm, and the impact of marine farming on fishing and the sustainability of fisheries resources. This includes the health of both wild and farmed fish. The Fisheries Act 1983 also covers the activity of ‘spat catching’, for example mussel spat catching involves setting out longlines with dropper lines onto which mussel spat settle, which is an additional activity to marine farming. The RMA provides a process by which coastal space may be allocated for marine farming and by which the adverse effects of marine farms (other than those on fishers and fish stocks) are either avoided, remedied or mitigated. Coastal plans set the framework for marine farms for the area from mean high water springs out to 12 nautical miles. Applicants for consents for marine farms must provide assessments of environmental effects under both the Resource Management Act and Fisheries Act 1983 processes. However, only a quarter of New Zealand’s marine farms fall under this regime - those developed after 1991. The Marine Farming Act covers pre-RMA marine farms. The environmental effects of farms are thus dealt with under two separate regimes.

A regional coastal plan may define certain activities in the coastal area as restricted coastal activities. Restricted coastal activities are described in the NZ Coastal Policy Statement, including the erection of certain structures in the coastal marine area e.g. marine farms. Applications for permits for these activities are forwarded to the Minister of Conservation by the regional council. The Minister makes the decision on whether to approve the activity.

Remaining issues

Around 600 of the 800 marine farms in New Zealand were established before 1991 and are not presently subject to the environmental controls required by the RMA. For instance, pre-1991 mussel farms are not subject to any environmental controls. This poses potential risks to the marine environment and also raises the issue of adjacent farms being managed under different jurisdictions which is inefficient and confusing.

A proposed amendment to the RMA which would bring pre-1991 marine farms under the RMA and the Fisheries Act 1983 and repeal the Marine Farming Act has been considered by a Select Committee. The Select Committee recommended in its report that the pre-1991 farms be brought into the joint RMA/Fisheries Act regime which the newer marine farms are under.

Competition among marine farms and between marine farms and other activities for access to suitable coastal space has been an issue in the Marlborough Sounds, where an Order-in-Council under the RM Act providing for a coastal tender to allocate space has been in place since July 1996. Space for suitable for tendering has not been found and the current Order will expire on 11 July 1999. Competition is also emerging as an issue in the Firth of Thames. Regional councils can only deal with applications to occupy space on the “first-in, first-served” basis. The Crown has retained with the coastal tendering provisions of the RMA the ability to allocate space independently of the coastal permit process where the level of competition warrants Crown intervention

2.13 Seafloor and subsurface mining

Issue 13 Seafloor mining

Significance: low

Extent: EEZ

Relevant legislation: Crown Minerals Act, RM Act (for consents within territorial waters), Maritime Transport Act, Continental Shelf Act

Responsible agencies: Ministry of Commerce, regional councils, MoT, MSA, MFAT

Jurisdiction: Territorial waters and EEZ

Environmental Concerns

There is currently active exploration for and development of petroleum resources in the marine environment. Petroleum exploration activities include seismic surveys and exploration drilling. Recent research by the Institute of Geological and Nuclear Sciences has revealed hydrothermal mineral deposits (including gold) in the southern Kermadec Arc which is outside the territorial sea but within our EEZ. Although the deposits are in relatively shallow water (between 120 and 1500 metres), researchers⁴⁰ believe that these resources are unlikely to be exploited in our lifetime.

Drilling and the construction of installations associated with exploration for and the exploitation of seafloor minerals can affect the marine environment in several ways:

- the seafloor and organisms living on it in the immediate vicinity of the construction site are disturbed;
- increased marine traffic enhances the potential for operational discharges, such as drilling muds and sewage; and accidental discharges, such as oil spills.
- structures may be barriers to marine mammals and fish migration, and to the passage of shipping.
- hard attachment surfaces provided by oil rigs and other fixed installations can actually lead to a profusion of sessile marine invertebrates, such as corals.

⁴⁰ For example, Cornel de Ronde, IGNS.

Existing Measures

Prospecting, exploration and mining permits are assessed by the MoC taking into account the applicant's work programme, technical expertise, and financial capability. They can only be revoked by MoC on the basis of non-compliance with the Crown Minerals Act, and regulations in force under the Act, or any of the conditions of the permit.

The policy applied is that permits under the Crown Minerals Act 1991 do not include environmental conditions, although all permit conditions contain a reference to operations being in accordance with good exploration and mining practice. This concept encompasses both resource management, health and safety and environmental management, although under the Crown Minerals Act the Minister is solely concerned with the management of minerals resources. Petroleum mining permits are also granted with a condition related to proper abandonment of production facilities. Within territorial waters, regional councils are responsible for assessing the environmental effects of mining and deciding whether to authorise these. Consents are issued within the framework provided by the appropriate regional coastal plan and the New Zealand Coastal Policy Statement.

Restricted coastal activities (RCAs) are described in the New Zealand Coastal Policy Statement, including the erection of certain structures and disturbances of the seabed. A regional coastal plan may define certain activities in the coastal area as RCAs. Applications that fall into the category of RCAs are forwarded to the Minister of Conservation who decides on whether to approve the activity.

The MSA is involved through the administration of MARPOL certificates outside of 12 nm and often suggests alternative technical options for drilling to developers where it considers that proposals may have adverse environmental impacts. This works as an informal consenting processes, and the MSA's recommendations have been sought by developers, and are consistently adhered to on a voluntary basis. The MSA and MfE consult closely when developing their respective rules and regulations to promote consistency inside and outside the territorial sea.

Crown Minerals, MoC, operates a geo-technical library where all reports on petroleum and mineral prospecting, exploration and mining are archived. This provides access to knowledge and information on the petroleum and mineral potential of New Zealand. Most of the information in the library is obtained from past exploration. Both raw and interpreted data can be accessed. Raw data obtained during New Zealand's work on delineation of the continental shelf will be archived in this library.

Remaining issues

Although there does not appear to be any likelihood that there will be significant seabed mining or development in the near future, management outside 12 nm does not appear to be well focused or co-ordinated. Environmental impacts of any development within the territorial sea are assessed through a single process and one agency (plus the Minister of Conservation in the case of restricted coastal activities). As many as three agencies may be responsible for licensing the environmental impacts of similar developments outside 12 nautical miles and no one agency is responsible for maintaining an overview of the acceptability of the development proposal as a whole.

The Parliamentary Commissioner for the Environment (PCE) found in 1996 that the procedures for environmental management of petroleum and mineral mining activities beyond the 12 nautical mile limit were not consistent with procedures inside the 12 nautical mile limit and that, even when new rules come into force, there will not be “adequate procedures for environmental effects assessment, setting and enforcement of environmental conditions and public consultation [outside the 12 nautical mile limit]”.⁴¹

However, in all recent cases where companies are conducting petroleum exploration activities they have undertaken environmental protection and enhancement procedures. These procedures have been endorsed by the Parliamentary Commissioner for the Environment (PCE). All companies also conduct environment impact reports before drilling activities begin. Further to this, the MoC advises that in making decisions concerning development, work programmes under the Crown Minerals Act the Minister must have regard to all relevant factors. This may include being satisfied that there are mechanisms for dealing with environmental issues.

With regard to sea floor mining, Article 208 of UNCLOS specifically requires coastal States to adopt laws and regulations to prevent, reduce and control pollution of the marine environment arising from or in connection with sea bed activities. This then provides NZ with the ability to place controls on these activities and their effects, which would be enforced via a specific marine protection rule or rules.

The Minister of Transport has the power to make these, and other environmental (marine protection), rules to control discharges into the waters of the EEZ and Continental Shelf. No such rules have been developed as the amount of mining activity beyond the extent of the Territorial Sea is small, and there is no perceived need for regulation now. However, under the Maritime Transport Act some mechanisms (in the form of Rules) have been provided to control and prevent discharges of oil, noxious liquid substances, hazardous substances carried in packaged form and garbage from vessels and platforms.

The Continental Shelf Act also provides a possible framework for integrating environmental impact assessment and management. Section 8 of the Act allows for regulations “for the protection of living resources of the sea and the natural resources of the continental shelf from harmful agents” in “safety zones” around any installations. MFAT currently has responsibility for creating these exclusion zones. Given that the purpose of these zones is primarily for ship safety, it may be more appropriate that the MSA establishes these zones under the Maritime Transport Act.

Another means to declare particular marine areas special and/or sensitive to shipping operations is provided by the International Maritime Organisation (IMO), via MARPOL and other mechanisms. IMO has established procedures for declaring sea areas to be sensitive and/or special. Such a declaration provides stricter controls on shipping.

⁴¹ Parliamentary Commissioner for the Environment (1996) *Environmental Management of Petroleum and Mineral Mining Activities Beyond the 12-Mile Limit*, Parliamentary Commissioner for the Environment, Wellington, page 17.

The Australian and New Zealand Environment and Conservation Council (ANZECC) has funded the project commissioned by a working group in New Zealand “Communicating with Shipping about Areas Sensitive to their Operations”⁴². The working group includes participants from central government, shipping and yachting federations and CRIs. It has used a matrix to identify areas in New Zealand which may be sensitive to certain activities. The working group has focused on communicating to the shipping community the types of activities that may impact sensitive areas. Due to restricted funding and the lengthy negotiations required to achieve agreement on which areas are sensitive, the working group decided not to register the areas identified by its matrix with the IMO. Before such areas could be registered co-ordination of all the agencies with management responsibilities in the marine environment is needed.

The Continental Shelf Act allows for “prohibiting or restricting any exploration of the continental shelf... which could result in an unjustifiable interference with... the conservation of the living resources of the sea..”

The Territorial Sea and Exclusive Economic Zone (EEZ) Act has provisions that allow for regulations for a variety of purposes including the protection and preservation the marine environment in the EEZ. However, no such regulations have been made. Due to the way the Continental Shelf Act 1964 is written, an access arrangement is not required to prospect or mine for minerals on the Continental Shelf. All that is required is a permit granted by the Minister of Energy under the Continental Shelf Act 1964.

For petroleum, the Continental Shelf Act 1964 states that the Minister of Transport is the appropriate Minister to grant access for the purposes of section 2(2) of the Crown Minerals Act 1991. However, because of the way the access provisions of the Crown Minerals Act 1991 are written, in particular definitions of “Crown land” “owner” and “occupier”, the Minister of Transport can not grant a right of access to the Continental Shelf to mine petroleum. All that is required is a prospecting, exploration or mining permit granted by the Minister of Energy under the Crown Minerals Act 1991. The Ministry of Commerce is currently formulating amendments to the Crown Minerals Act and the Continental Shelf Act to resolve this issue.

⁴² Draft report prepared for ANZECC by Tonkin & Taylor Ltd, March 1999

2.14 Ozone depletion

Issue 14 Ozone depletion

Significance: low

Extent: EEZ

Relevant legislation: Ozone Layer Protection (OLP) Act 1996

Responsible agencies: MfE and the Ministry of Commerce

Jurisdiction: territorial waters

Environmental concerns

The most important producers of stored energy from sunlight are microscopic photosynthetic plankton and their protection is an important factor in the preservation of ocean biodiversity and the health of the planet. These species are under direct threat from exposure to harmful ultraviolet light, which is enhanced by depletion of the ozone layer. Also at risk are surface dwelling fish (in the top 20 metres of the sea) which include most of our commercial fish stocks. Those especially at risk are those species in their larval phase when close to the surface. Quantities of halons in the atmosphere are increasing faster than predicted, increasing the risks of ozone depletion.

Existing measures

The Montreal Protocol provides a framework for dealing with ozone depleting substances on a global basis. MfE administers the OLP Act through responsibility for developing regulations and calling for codes of practice and accreditation schemes. The MoC manages the import system under the Act and administers and monitors 'base consumption' levels for the importation of controlled substances. New Zealand phased out imports of all ozone-depleting substances except HCFCs and methyl bromide on 1 January 1996. Regulations are in place to restrict importing HCFCs and cease importing all but essential uses by 2015. The Government agreed to a phase-out schedule of methyl bromide of 60% by 2001 and complete phase-out by 2005.

The MfE Environmental Performance Indicators programme is developing ozone layer indicators.

Remaining issues

Data on the effects of ozone depletion are limited. The use of ozone depleting substances is still increasing in many developing countries. Illegal trade in developed countries poses a major threat to the recovery of the ozone layer. The shipping industry is major user of halons, such as in fire extinguishing devices. Halons are highly effective in this function, there are few alternatives and the systems are unlikely to be changed in the short to medium term. However, ships have a life of around 20-30 years. This particular problem should solve itself in the next twenty or so years.

3. Underlying themes

3.1 Common themes among the environmental issues

The initial analysis of current marine environmental management described earlier in this report has identified several issues which require resolution. However, most of these issues do not occur in isolation and most are bound by common underlying or cross-cutting themes. A response to these issues would be more effective if it addressed these underlying themes.

These underlying themes are the need to:

1. co-ordinate policy development;
2. improve science and information;
3. enhance stakeholder involvement in decision-making; and
4. co-ordinate cross-agency service delivery.

These themes are described and analysed below. Their application to the environmental issues discussed in this report is illustrated in the table below. The ratings are subjective and, because of the limited time frame for this exercise, have been made without robust analysis or consultation with affected parties.

Notes for the table:

*: low (not a significant problem); **: medium; ***: high (more problematic).

Significance is the overall current risk and pressure that the particular issue places on the marine environment. This is based on the collective views of officials and may not reflect public perception. Note that the significance of a catastrophic event, such as a major oil spill will be high if it occurs, but the probability of occurrence, and hence the risk, of that event may be low.

Contribution of theme reflects the extent to which failures in the underlying theme contributes to the significance of the issue. It does not rank the extent to which the theme should apply. For example, policy co-ordination is desirable for the resolution of most of the issues. A score of “low” implies that either policy co-ordination is occurring satisfactorily or (more rarely) is not necessary for policy development. A score of “high” means that policy development is both not occurring and is necessary.

	Issue	Significance of issue	Contribution of Theme			
			Policy co-ordination	Information	Stakeholder participation	Cross-agency delivery
1a	Fish stock management	***	*	***	**	*
1b	Fish ecosystem management	***	***	***	**	**
1c	Fishing: marine habitat impacts	***	**	***	***	***
2	Protecting natural areas	***	***	***	**	***
3	Stormwater & sewage	***	**	**	*	***
4	Rural land runoff	***	**	**	*	***
5	Ballast water & hull fouling	**	**	**	*	**
6	Protecting Maori values	**	**	**	**	**
7	Toxic algal blooms	**	**	***	?	*
8	Ocean warming	**	?	**	?	?
9	Pollution from boats	**	*	*	*	**
10	Sand dredging	*	*	*	*	*
11	Oil spills	*	*	*	*	*
12	Aquaculture	*	**	**	*	*
13	Seafloor mining	*	**	**	**	*
14	Ozone depletion	*	*	**	?	*

3.2 Coherent and co-ordinated environmental management

Outstanding Issues

As noted in the introduction to this paper and as described in Working Paper 1 (Context), marine environmental management is complex, as this area represents the interface between:

- international and domestic law;
- terrestrial and marine ecological systems;
- resource development and conservation imperatives.

Given this complexity, the development and implementation of environmental policy will be facilitated by:

- policy leadership;
- clear policy goals and objectives;
- mechanisms to co-ordinate policy development between and within different agencies.

How does current marine management in New Zealand fare in relation to these desirable characteristics?

Policy leadership

As for land, no government agency has statutory responsibility for the overall leadership of marine environmental policy. The Minister of Conservation (and hence DoC) is responsible for the development of the NZ Coastal Policy Statement, which directs most non-fishery elements of marine management in the territorial sea. However, no Minister or agency has a similar role outside 12 nm, nor over our marine waters in general. MfE has broad functions under the Environment Act, but does not have specifically defined responsibilities to lead marine environmental policy. Note that policy leadership does not necessarily require one overall leadership agency for marine management where a common framework is established.

Clear policy goals and objectives

The RMA and, more specifically, the NZCPS articulate clear goals and objectives for most aspects of marine environmental management within the territorial sea. Many of the Acts passed during the last decade have similar purposes often related to sustainable management. Nevertheless, there is still potential for conflict between goals, even those that differ only slightly, as there is no common overarching set of policy goals and principles and no mechanism to formalise trade-offs. Some legislation, particularly that applying beyond 12 nm, is bound by international conventions and is difficult to harmonise with domestic legislation.

Policy co-ordination

Many statutes apply in New Zealand's marine environment, and a range of agencies is responsible for administering them. There are a number of examples of good collaboration between some agencies who have joint responsibility for parts of the marine environment: Examples of co-ordination include:

- MFAT and Mfish have quarterly meetings to discuss marine issues over and co-operate on matters such as the preparations to implement the UN Straddling Fish Stocks Convention;
- MfE and MSA collaborated to develop rules and regulations which ensured seamless coverage within and beyond the 12 nm limit enabling the implementation of MARPOL in New Zealand;
- DoC and Mfish have developed a Memorandum of Understanding to guide interactions between the two departments.
- There is a statutory requirement for the Minister of Conservation to seek the approval of Ministers of Fisheries and Transport when establishing marine reserves;
- Many departments co-operate in the production of the annual stocktake of progress towards the *Environment 2010 Strategy's* goals and in the development of environmental performance indicators;

- Department of Prime Minister and Cabinet has worked closely with the Research Vessel Committee and other marine committees such as those run by LINZ and MoRST.

Some officials consider that this indicates a healthy level of policy co-ordination among departments. However, other officials consider that some mechanisms do not have sufficiently wide representation of affected departments and are reliant on goodwill between the organisations and sometimes individuals. There is no formal arrangement for the co-ordination of marine environmental policy at a Ministerial or even Chief Executive level, and hence no formal mechanism for conflict resolution.

3.3 Resolving science and information difficulties

The first conclusion of the report on the State of New Zealand's Environment is that “New Zealand’s environmental information needs considerable upgrading if the state of the nation's environment is to be accurately described and trends detected”. This report identified both a paucity and an incoherence of information about marine ecosystems and human impacts on them. Particular problems include:

- deficiencies in marine taxonomy and hence our understanding of our biodiversity resources;
- limited understanding of the impacts of fishing on target species, as well as non-target species and the wider marine environment;
- water quality issues, such as contaminant concentrations in marine and estuarine sediments;
- understanding Maori environmental concerns;
- quantifying climate change impacts;
- the impacts of human activities on the environment.

New priorities for the Public Good Science Fund

The current review of the framework for public good research, through the Foresight Project, provides an opportunity for these limitations to be addressed. This Project will guide the development of a new set of priorities for the Government's investment in research, science and technology to take effect in July 2000. A number of the draft outcomes apply tangentially, rather than directly, to the marine environment.

It is important that marine stakeholders co-operate to develop appropriate science and research programmes to address the shortcomings in our understanding of the marine environment. The development of Strategic Portfolio Outlines in a co-ordinated way has the potential to greatly improve the quality and delivery of marine environment information and management. For example, MfE has approached science providers (especially CRIs) and users (such as regional councils) to develop strategic alliances. In this way, MfE could work with DoC and other agencies to promote the development of appropriate marine research portfolios.

Environmental indicators

The MfE is leading the development of national environmental performance indicators under the Environmental Performance Indicators (EPI) Programme. The purpose of the EPI Programme is to develop and use indicators to measure and report on how well we are looking

after our environment. Indicators have been developed for air; fresh water, land; waste, hazardous substances and toxics; the marine environment, terrestrial and fresh water biodiversity; and transport.

The indicators for the marine environment will be used to track key environmental issues such as the sustainability of harvest fish stocks, impacts from human activities on the coastal/marine environment, and population trends in threatened species. This set of indicators is under development. A list of confirmed indicators is due by 30 June 1999.

Co-ordinating environmental monitoring

While MfE is co-ordinating the development of marine environmental indicators, most monitoring of marine areas will continue to be the responsibility of regional councils, the MSA, DoC, and MFish. Some of the data collected by Crown Research Institutes and industry have the potential to be compiled into a monitoring system. There appears to be considerable scope to enhance the co-ordination of this monitoring.

The precautionary approach

The precautionary approach was adopted as one of the principles in the *Environment 2010 Strategy*. The precautionary principle “should be applied to resource management practice, where there is limited knowledge or understanding about the potential for adverse environmental effects or the risk of serious or irreversible environmental damage”. The principle recognises Principle 15 of the Rio Declaration (to which New Zealand has acceded). The *Strategy* goes on to state that “significant risks are particularly likely to arise where the scale of the ecosystem is large, or the ecosystem is complex... In such cases, there is a strong case for applying the Precautionary principle”.

Marine ecosystems are a prime example of *large and complex ecosystems* where there is *limited knowledge* and understanding and there are *risks of irreversibility* through habitat destruction and stock depletion. The precautionary approach does exist in some marine legislation and policy, for instance in the Fisheries Act (section 10 - information principles) and the NZCPS. The New Zealand Coastal Policy Statement states that a precautionary approach should be adopted towards activities (involving the subdivision, use or development of the coastal environment) with unknown but potentially significant adverse effects (policy 3.3).

There are several different descriptions of the principle and an appropriate definition needs to be developed for New Zealand marine environmental management. This could be articulated as one of the underlying principles in any oceans strategy. Any such definition and its application should be cognisant of its relationship to role of science⁴³.

Opportunities to improve our information

We need to recognise that the complex nature of the marine environment is such that it is unlikely that the marine environment will ever be fully understood, even with unlimited funding for research. However, opportunities exist to improve what we know about marine ecosystems and the impacts of human behaviour on these ecosystems. In addition we can

⁴³ This has been highlighted in two recent papers in *Marine Pollution Bulletin*.

improve the co-ordination of research and monitoring and the sharing of information so on-going improvements in management decisions can be made.

Some marine stakeholders have already contributed to sector strategy development for the Foresight Project. Agencies having responsibilities for marine issues need to be engaged in the next part of the process, which is the development of Strategic Portfolio Outlines. This implementation stage has the potential to improve the integration of the whole science envelope by co-ordinating the delivery of the priorities determined by operational agencies, end users and science providers. This is particularly important in the marine area where there is such a diverse range of groups involved.

3.4 Facilitating stakeholder participation

Public involvement in planning under the RMA and the Conservation Act has generated an expectation that processes under other Acts do not always meet. Many agencies, groups and individuals have legitimate interests in marine management, both in processes and outcomes. These interests have been equated with rights and parallels are often drawn to management processes within the territorial sea and on land. However, these parallels can be simplistic, as the context for management beyond 12 nm is quite different to that within:

- New Zealand's sovereignty is restricted to within the 12nm limit, and our jurisdiction outside is limited by international law which often places significant constraints on management processes;
- the impacts of human activities often decline with increasing distance from land, implying reduced need for a public overview of decision-making processes; and
- these impacts are less likely to be localised. A general principle of environmental management is decision-making by the affected community. For activities far from land, the affected community is the national, rather than local, community. Hence, processes based on local community participation will not always be appropriate away from land.

Determining appropriate levels of stakeholder participation in decision-making is a complex balance of efficiency and equity, and insufficient work has been carried out in this stocktake to be able to suggest where the balance should lie. A more fundamental issue is the wider issue of what the public wishes to see in respect of use and protection of our oceans. How stakeholders and the wider public can be effectively consulted on management of our oceans requires further thought.

3.5 Service delivery co-ordination

As with policy co-ordination, a range of statutes and management agencies cover the delivery of marine environment management services and activities. Again, there are examples of co-ordination such as the joint programme of observation of fisheries for conservation and fisheries management purposes, and co-ordination of responses to oil spills. Co-ordination is, however, selective rather than comprehensive. Mechanisms for increased co-ordination in service delivery could increase the effectiveness of marine environment management.