Marine Protected Areas

DRAFT CLASSIFICATION AND PROTECTION STANDARD

JUNE 2007

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The Marine Protected Areas Policy and Implementation Plan: Introducing the Protection Standard and Classification System

In January 2006, the Government released the Marine Protected Areas Policy (MPA) and Implementation Plan. The goal is ambitious – to engage with communities throughout New Zealand, using the best available information, to develop a network of marine protected areas that includes representatives of all our marine environments – from the common to the rare, and everything in between.

Creating this network is one of the commitments the Government made in the New Zealand Biodiversity Strategy, released in 2000. When in place, it will help ensure that examples of all marine habitats and ecosystems in our seas are protected in a way that enables them to exist in a healthy functioning state.

A key component in creating the marine protected areas (MPA) network is having a robust, consistent, science-based system to classify the many different types of marine ecosystems and habitats. We need to know what we need to protect.

Another central component is having an environmental standard that ensures that human activities are appropriate to maintain the health of the MPA.

For the MPA Policy, the standard requires that anything that happens inside a marine protected area must allow its biological diversity to be maintained, or recover, to a healthy functioning state at the habitat and ecosystem level. In practice, that means that whatever management regime is applied to each MPA – whether it's a marine reserve, a fishing restriction, or a cable exclusion zone – the consequences must meet the Protection Standard.

Used together, the classification system and Protection Standard will help us build the national network of MPAs by letting us know what we have and where, and what kind of management is needed for it to meet the Standard and remain a viable part of the network.

The Ministry of Fisheries and Department of Conservation have been working together to develop these tools. A major challenge has been the huge gaps in our understanding of marine habitats and ecosystem processes – we are continually getting more information but there is much more we need to know about the marine environment, or how our use of it affects its sustainability.

This requires that all relevant existing knowledge be used in creating the MPA network. We are committed to a precautionary approach, based on today's best science, to protect marine biodiversity sooner rather than later, and to make sure our uses of the sea are sustainable in the long term.

For this to happen, both the classification tool and the Protection Standard must be practical and achievable – able to be applied without unduly onerous data requirements. We welcome your comments to help ensure this is what they deliver.

Jim Anderton
Minister of Fisheries

Chris Carter
Minister of Conservation

The Next Steps of Consultation

This document seeks feedback from stakeholders and the community on these two papers which in final form will be pivotal to advancing the work of MPA Policy implementation. We want to ensure that the views of stakeholders and users of the marine environment are known.

Comments are particularly sought on whether these papers meet the requirements outlined in the MPA Policy and Implementation Plan. The tasks to develop these papers are referred to in paragraphs 102 and 103 of the MPA Policy.

All comments received will be carefully considered in preparing final papers for Ministerial consideration. These papers will then guide further implementation tasks under the MPA Policy.

Comments must be sent by 31 August 2007 to ensure that they are considered.

Please submit your comments by 31 August 2007 to:

MPA Consultation
PO Box 11-146
Wellington 6011
New Zealand

Comments can also be sent via email to mpa@biodiversity.govt.nz

The MPA Policy and Implementation Plan and additional .pdf copies of the consultation papers may be obtained from:

www.biodiversity.govt.nz
www.doc.govt.nz
www.fish.govt.nz

or from

Department of Conservation
PO Box 10-420
Wellington 6143 Telephone: 04 471 0726

Ministry of Fisheries
PO Box 10-20
Wellington Telephone: 04 470 2600

* Any submissions made may be subject to the Official Information Act (1982).

MARINE PROTECTED AREAS POLICY
AND
IMPLEMENTATION PLAN

COASTAL AND MARINE HABITAT AND ECOSYSTEM CLASSIFICATION

MAPPING THE MARINE ENVIRONMENT FOR IMPLEMENTATION OF THE MARINE PROTECTED AREAS POLICY

June 2007

Department of Conservation
Ministry of Fisheries

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1.0 INTRODUCTION

1.1 Purpose of this Report

1 This report presents one of the tools that will be used to put the Marine Protected Areas Policy Statement and Implementation Plan (MPA Policy) into practice.

2 It explains the two classification approaches that will be applied: one dealing with coastal marine environments, and one with deepwater marine environments in New Zealand's wider exclusive economic zone (EEZ).

3 These classification approaches will be used in conjunction with the protection standard which sets a minimum level of protection for all marine protected areas (MPAs). The protection standard is explained in a separate report.

4 In brief, this classification report:

- Describes an approach to the classification of New Zealand's coastal and marine benthic and pelagic habitats and ecosystems for both the coastal and deepwater marine environments
- Describes the scale at which coastal and deepwater marine habitats and ecosystems will be classified and mapped for the purpose of MPA planning
- Provides guidance on the extent to which other biological and physical information may be used to assist classification and MPA planning

5 How the classification approaches will be used and applied is covered in the final section of this report: '6.0 Implementing a network of nearshore MPAs'.

6 Note that this report uses universally recognised and accepted terms for its classification descriptors. They are explained in the Glossary at the end of the report.

1.2 Policy Context

7 The MPA Policy was released in January 2006. Its objective is to:

'Protect marine biodiversity by establishing a network of MPAs that is comprehensive and representative of New Zealand's marine habitats and ecosystems.'

8 One of the Policy's principles says that a consistent approach to classifying habitats and ecosystems is required to ensure that MPAs in the network are representative (Network Design Principle 2). It also says the approach may be reviewed if new information on the marine environment or classification systems comes to light, and that a transparent process will be used to do so.

9 The Policy's implementation plan describes four stages that will use the classification approaches to achieve the Policy's objectives, namely to help:

- Develop an inventory of the habitats and ecosystems that are currently represented in MPAs
- Identify any gaps in the current representation of habitats and ecosystems in MPAs
- Prioritise which habitats and ecosystems are needed to fill any gaps to ensure the MPA network is representative, and
- Identify and select appropriate new MPA sites

1.3 Why Consistent Classification is Needed to Establish an MPA Network

10 New Zealand's diverse marine environment covers an area of approximately 4.1 million square kilometres. Its characteristic features include long sand beaches and exposed cliffs, bays and estuaries of varying sizes, and deep sea habitats and ecosystems. Beneath the waves is a diverse marine biota, such as kelp forests, sponge gardens and shellfish beds. Many more species are yet to be discovered and described.

11 Knowledge of New Zealand's marine environment is expanding rapidly – new species continue to be discovered and natural features are becoming more precisely defined. Ideally, any classification should be based on detailed knowledge of the distribution and relative importance of marine biota. However, because biological information is missing, incomplete, or not at sufficient resolution for many areas, and a full inventory of habitats and ecosystems does not exist, an alternative approach is required to help identify where to place representative MPAs. The coastal and deepwater classification approaches in this report provide this alternative.

1.4 Key Points of the Classification Approach

12 While numerous approaches can be used to classify marine habitats and ecosystems, the approach presented in this report may best allow the objectives of the MPA Policy to be realised. The list below provides an overview of its fundamental features:

- MPA decision-making will be guided by best available information relating to the ecological, environmental, social, cultural and economic aspects of the marine environment. 'Best available information' is that which is available without unreasonable cost, time or effort (Planning Principle 7 in the MPA Policy)
- The marine and coastal classification system provides standard terminology for maps used to identify, plan and manage MPAs
- The marine and coastal classification system describes separate methods of classification for the nearshore and offshore marine environment
- The classification of the coastal marine environment will be based firstly on broad biogeographic regions that represent large-scale variation in physical and biological characteristics. Within each biogeographic region, variation in two key physical drivers will be used to describe habitats for the purposes of the MPA Policy – these are depth and substrate
- Any additional biological and physical information will be incorporated into the classification to more comprehensively describe the marine environment and inform decision-making
- In deepwater marine environments, the scale and nature of the information available necessitates a different approach to classification. Recent government decisions to close large areas of New Zealand's EEZ to bottom trawling and dredging have shifted the emphasis on MPA implementation to focus on the New Zealand Territorial Sea (12 nautical miles) until 2013. Until then, preparatory work to classify the deepwater marine environment will continue
- For guidance on the scale and level of detail that may be applied to deepwater marine classification, a discussion is included of how the current Marine Environment Classification (MEC) could be used
- Because of the uncertainty and variability of available information, it is expected that the classification approach will be updated as new information and approaches become available. The public and stakeholders will be kept informed of such improvements

1.5 Factors Influencing Implementation

13 A number of factors will influence how the classification approaches in this report can be used to establish an MPA network. They include:

- The quantity and quality of available information will vary greatly among biogeographic regions. It is desirable to use all the available information to establish as comprehensive marine classification as is practicable
- This variability in available information will not influence the extent to which MPAs are implemented. Rather, good quality information will provide an opportunity to represent areas of greater diversity within each MPA
- The classification described in this report will be implemented only to a defined level of detail. This level of detail will define habitats for the purpose of the MPA Policy and these habitats and ecosystems will require protection within MPAs. Additional levels of detail in the classification do not have to be represented in MPAs. However, where information is available, and agreement is reached by the planning forum, further areas may be recommended for protection
- Not all habitat and ecosystem types that can be defined by the classification will necessarily be present or mapped in each biogeographic region

2.0 AN OVERVIEW OF DIFFERENT MARINE CLASSIFICATION APPROACHES

14 Classifications divide large spatial units into smaller units that have similar biological and/or environmental character.[1] In this way, they provide spatial frameworks for systematic mapping and management.

15 While many countries have developed marine classifications schemes to underpin MPA network identification,[2] there is still no generally accepted standardised marine classification scheme at any particular spatial scale.[3] However, it has been recognised that a hierarchical approach to marine and estuarine classification (such as the biogeographic framework discussed below), is best suited to large-scale conservation planning programmes such as MPA network identification.[4]

16 A number of marine classification systems and biogeographic regionalisations have been proposed for use in New Zealand.[5] These include classifications based on distribution patterns of particular species groups, subjective criteria and expert opinion, quantitative analysis and modelling. Attempts have also been made to classify New Zealand's estuarine systems.[6]

17 Ideally, any marine classification will be based on extensive knowledge of the ecology and distribution of marine flora and fauna. Biogeographic studies also depend heavily on the state of systematic knowledge.[7] An important factor in New Zealand is the uneven state of such biological knowledge – this is concentrated in the north-east of the North Island[8] – and this frustrates attempts to apply a consistent classification system at a national level.

18 As an alternative to a biologically-driven classification, the approach to marine classification proposed here uses a mixture of biogeographical information and bio-physical properties to represent the distinctiveness between marine habitats and ecosystems. Bio-physical proxies are generally accepted as a reasonable surrogate for biological pattern, particularly at larger spatial scales, and can be used to provide a consistent description of the physical habitat types. Such classifications are assumed to reliably predict the biological communities associated with the physical properties of a site. They can provide a useful and cost effective method for identifying marine biodiversity over large geographic areas.[9]

19 Although surrogates are generally assumed to be sufficient to tell us that different areas are likely to differ in their benthic and demersal fauna, they do not reveal in detail what those fauna are, or the pelagic communities that may be associated with particular zones or their ecology (length of life, critical habitat, adult home ranges, larval dispersal distances, trophic relationships between species, etc.) There is considerable room for research to more clearly define habitats and ecosystems and describe the associated biological community, and further work is being undertaken.[10]

3.0 THE PROPOSED MPA CLASSIFICATION APPROACHES

20 The classification system is science–based and structured so that it can be used in a consistent way to inform the process of establishing an MPA network in New Zealand's marine environment.

3.1 Coastal and Deepwater Classification

21 The MPA Policy states that the process to establish New Zealand's MPA network will differ in nearshore and offshore environments. This decision was made for three main reasons: (i) because of the different composition of stakeholders for nearshore and offshore areas; (ii) the nature of the information available to guide the implementation process; and (iii) the regulatory tools available for establishing MPAs.

22 The coastal marine classification approach is described in section 4.0 of this report, and the deepwater marine classification approach is discussed in section 5.0. For the purposes of the classification the coastal marine boundary has been defined as the 200 metre depth contour (approximately the continental shelf break). The landward boundary for the coastal marine environment is Mean High Water Spring tides or tidal limits in estuaries. The deep water marine environment extends seaward from the 200m depth contour to 200 nautical miles from the coast (370 kilometres), or the limit of the Exclusive Economic Zone (EEZ). Figure 1 provides a schematic illustration of the Coastal Marine and Deepwater Marine Classification.

23 For the purpose of implementing the network of MPAs, the nearshore/offshore boundary will usually be the limit of the Territorial Sea (12 nautical miles); more detail is given in section 6.0.

3.2 Hierarchical Structure

24 The classification has been developed based on a broad hierarchical structure; this enables MPAs to be considered in a biogeographic and ecological context at regional and site scales. The classification follows a progressive scale from large spatial units in the upper levels of the hierarchy (for example, biogeographic regions and MEC Classes), to smaller units in the lower levels (for example, habitats and ecosystems).

25 The classification is three-dimensional, taking into account surface, water column and benthic features. The classification extends from tidal limits in the coastal zone to the deep oceans, and is applicable to all tidal and/or saline wetland, estuarine, coastal marine and oceanic systems.

26 Due to limitations in current knowledge, it will be rare that all habitat and ecosystem types in most areas can be immediately characterised. Mapping will be based on available information. As additional data are gathered in an area, gaps in the hierarchy will be filled and the classification will continue to grow, thus strengthening the understanding of the distribution of New Zealand's marine habitats and biodiversity.

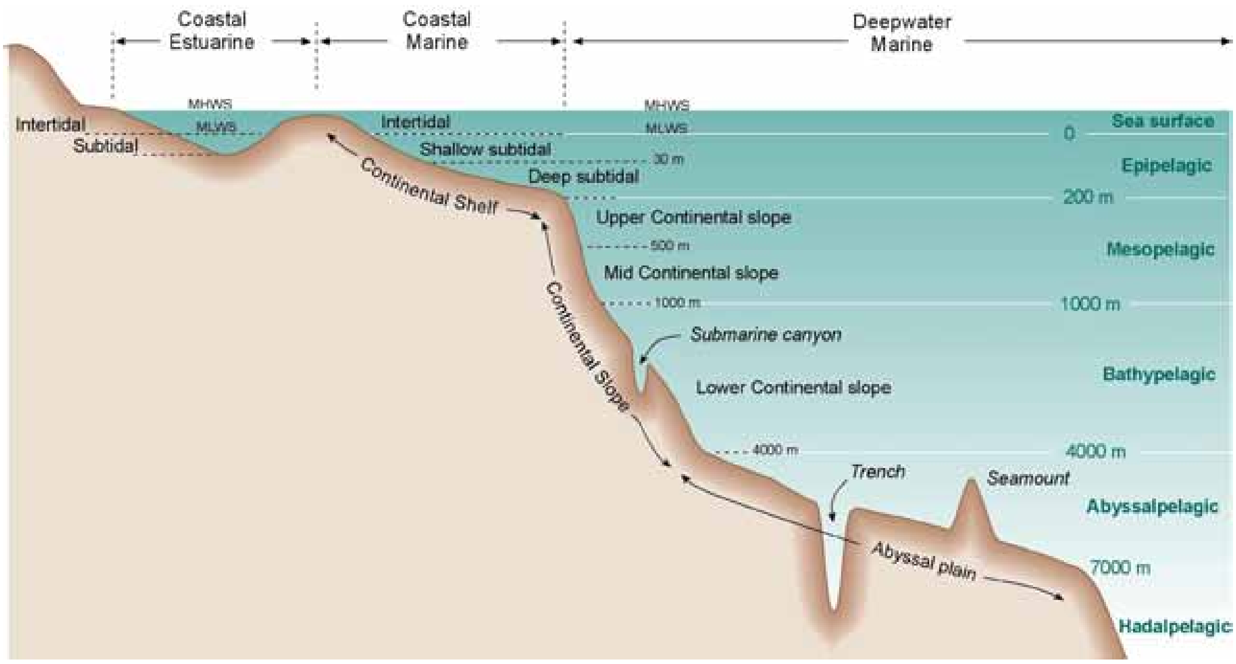

Figure 1. Schematic diagram illustrating the depth zones of the Coastal and Deepwater Classification.

4.0 COASTAL CLASSIFICATION

27 The coastal marine classification identifies and categorises the physical environment at different spatial scales in estuarine, coastal and marine systems.

28 Implementation of the classification in the coastal area will be guided by the following spatial scales:

- Biogeographic regions defined at the meso-scale (100s to 1000s of kilometres); and
- Habitats and ecosystems defined at the micro-scale (100s to 1000s of metres)

29 The first level – biogeographic regions – is overarching and inclusive of all coastal and marine ecological systems distinguished on the basis of biogeography. At the finer scales, the habitats and ecosystems have been defined based on physical or enduring features of the environment.

4.1 Coastal Biogeographic Regions

30 New Zealand has been divided into 13 coastal biogeographic regions (Figure 1). This approach is based on the premise that similar physical habitats and ecosystems, if separated by enough space (100s to 1000s of kms), will contain different biological communities due to a combination of broad-scale factors. Such factors may include oceanography, current dynamics, large-scale latitudinal gradients, climate or barriers to dispersal. Table 1 provides a description of the 13 biogeographic regions.

Table 1: Description of New Zealand's coastal biogeographic regions

	Biogeographic region	Boundary	Description
1	Kermadec Islands Coastal Biogeographic region	Kermadec Islands	This region is a unique marine environment. It comprises the submerged volcanic pinnacles of the Kermadec volcanic arc and lies between the South Fiji Basin (west) and the Kermadec Trench (east). Mainly influenced by the subtropical Tasman Front. Reef communities characterised by mix of endemic, tropical, subtropical and temperate elements. Areas of special interest include: sea caves.
2	Three Kings Islands Coastal Biogeographic region	Three Kings Islands	This region has a high level of endemism in sessile species. Three Kings Islands geology comprises hard sedimentary and volcanic rocks. Influenced by subtropical Tasman Front and localised up-welling of cooler subsurface waters during summer and autumn. Strong diurnal tidal flow around the islands. High degree of endemism (molluscs, algae, fish, and echinoderms), presence of some Australian and Southwest Pacific taxa not recorded elsewhere in New Zealand, noticeable absences of some genera common to mainland. Some taxa common to Three Kings and North Cape - molluscan records show locally restricted endemics. High diversity of sponges, bryozoans and other invertebrates offshore between Cape Reinga and North Cape. Areas of special interest include: sea caves, lava tubes.
3	Northeastern Coastal Biogeographic region	Ahipara around the tip of North Island and down to East Cape	This region is a warm temperate region influenced by the warm subtropical East Auckland Current, particularly around island groups of Cavalli, Poor Knights, Mokohinau, Rakitu (east coast Great Barrier Island), Alderman, Mayor, Volkner and White, and also some headlands, including Cape Karikari, Cape Brett and Cape Runaway. Region characterised by endemic algae, molluscs, echinoids, antipatharians; assemblages of sponges, ascidians, molluscs, fish, echinoids. Southern boundary is the confluence of the warm East Cape current that moves south and the cool Wairarapa Current that flows north. Areas of special interest include: high tidal flows areas of North Cape.
4	Eastern North Island Coastal Biogeographic region	East Cape down to Cape Turnagain	This region is influenced by mixed water masses of subtropical and subantarctic origins - warm East Cape Current and northward flowing cooler Wairarapa Coastal Current. Local effects of silt-laden river inflows into coastal areas. Northeastern and Cook Strait marine biogeographic

	Biogeographic region	Boundary	Description
			regions faunal elements exist, for example, decreasing northern reef fish species diversity. Algal and molluscan assemblages change at Cape Turnagain, and the Wairarapa Eddy moves offshore at this point. It is also the north eastern limit of "southern" seaweeds such as *Durvillaea willana*.
5	Western North Island Coastal Biogeographic region	Ahipara to Cape Egmont	This region is influenced by the northward flowing Westland Current and the southward flowing West Auckland Current, both of subtropical origin. Coastline is characterised by open, exposed sandy beaches interspersed by stretches of rocky platforms, bluffs and outcrops. Includes Hokianga, Whangape and Herekino, Kaipara, Manukau, Raglan, Aotea and Kawhia Harbours. Gravel sands and ironsands occur offshore. The fauna has affinities with both warm-temperate and cool-temperate/sub-antarctic faunas. Areas of special interest include: offshore islands – for example, Sugar Loaf Islands and Gannet Island.
6	North Cook Strait Coastal Biogeographic region	Cape Egmont on the west coast to Cape Turnagain on the east coast	This region lies in a transition area between northern and southern flora and faunas and has a high diversity of species. The tidal regimes each side of the strait are different and the water temperature is also very different. The northern side is greatly influenced by the easterly-flowing warm, saline D'Urville Current and the cooler Southland Current that travels northward through Cook Strait. This results in the presence of some sub tropical species on the west coast, compared to the east coast. Strong currents can exceed 10 knots along the eastern side of this section of the North Island. Palliser Bay is in the mixing zone of the warm D'Urville and East Cape currents and the cooler Southland Current. The Durville Current also flows up the west coast and is deflected offshore by the Mt Taranaki ringplain, resulting in very different biota further north of Cape Egmont. Includes Wellington Harbour, Plimmerton, Pauatahanui and Porirua inlets. Areas of special interest include: high tidal flows areas of Cook Strait.
7	South Cook Strait Coastal Biogeographic region	Kahurangi Point on the west coast Strait and the Marlborough Sounds to Cape Campbell on the east coast	This region lies in a transition area between northern and southern flora and faunas although the tidal regimes each side of the strait are different and the water temperature is also very different. Cold water upwelling occurs off Farewell Spit in the region from Kahurangi Point. The current influences around Kahurangi Point result in a change in species assemblages. Includes Golden and Tasman bays, Clifford Bay and the Marlbourgh Sounds, D'Urville Island. Areas of special interest include: high tidal flows areas of Cook Strait and Sounds, Kahurangi Shoals.
8	East Coast South Island Coastal Biogeographic region	Cape Campbell to Timaru	This biogeographic region is influenced by the northward extension of the cold Southland Current. There is a change in molluscan assemblages at Cape Campbell from those of Cook Strait. The gyre in the Canterbury Bight is noted as having an influence on species distribution. Includes Banks and Kaikoura Peninsula. Areas of special interest include: Banks Peninsula.
9	West Coast South Island Coastal Biogeographic region	Jackson Head north to Kahurangi Point	This region is influenced by the Westland Current and the Southland Current as water from the Tasman Sea diverges from the north-flowing Westland Current in the vicinity of Hokitika Canyon and flows south. Current patterns in this area are complex due to coastally trapped waves influencing current flow within 50–100 kilometres of the coast. High sediment and detritus loading of the water from several large rivers have a big influence on the biota to the north of Jacksons Bay.
10	Southern Coastal Biogeographic region	Timaru on the east coast around to Jackson Head on the West Coast, includes Stewart Island/ Rakiura.	This region is influenced on the western coast by the Westland and Southland currents, formed from warm Tasman-derived waters. The Southland Current flows in an anti-clockwise direction around the bottom of the South and Stewart islands, and along the Canterbury–Otago coast to Banks Peninsula, before flowing eastward along the Chatham Rise. Freshwater input from large snow-fed rivers influences biota along the east coast of this biogeographic region. Centres of marine algae diversity at Fiordland, Stewart Island and Otago. Distinctive southern South Island molluscan fauna. Also subantarctic elements in the flora and sponge and ascidian assemblages of the southern part of South Island and Stewart Island. Areas of special interest include: high tidal flows areas of Foveaux Strait
11	Chatham Islands Coastal Biogeographic region	Chatham Islands/ Rekohu	This region is a unique marine environment. Influenced by Subtropical Front. Marine algae assemblages comprise northern and southern elements of mainland species, including endemic species. Noticeable absence of some species common to the mainland (for example, *Ecklonia radiata*). Fish fauna has affinities with widespread species and central region, low species diversity compared with mainland New Zealand; mobile invertebrates have affinities with central and southern

	Biogeographic region	Boundary	Description
			regions; encrusting invertebrates (such as, sponges and ascidians) show high levels of endemism. Areas of special interest include: sea caves, overhangs.
12	Snares Coastal Biogeographic region	Snares/Tini Heke	This region contains a unique mix of remnant mainland species. Influenced and surrounded by the Subtropical Front. Molluscan and fish fauna and flora have affinities with Southern Region. The region is also the southern distributional limit for some species of algae. Areas of special interest include: sea caves.
13	Subantarctic Islands Coastal Biogeographic region	Subantarctic Islands (Auckland/Motu Maha, Bounty, Antipodes and Campbell/Motu Ihupuku Islands)	This region is a unique marine environment and each island has distinctive assemblages of flora and fauna. Islands lie atop Campbell Plateau and Bounty Plateau. Influenced by Subtropical Front and colder Subantarctic Front. Fish, ascidians, sponges and flora have affinities with southern New Zealand; diverse range of endemic bryozoan species, limited molluscan fauna, low diversity of fish species. Areas of special interest include: sea caves, overhangs, inlets and harbours, rock stacks.

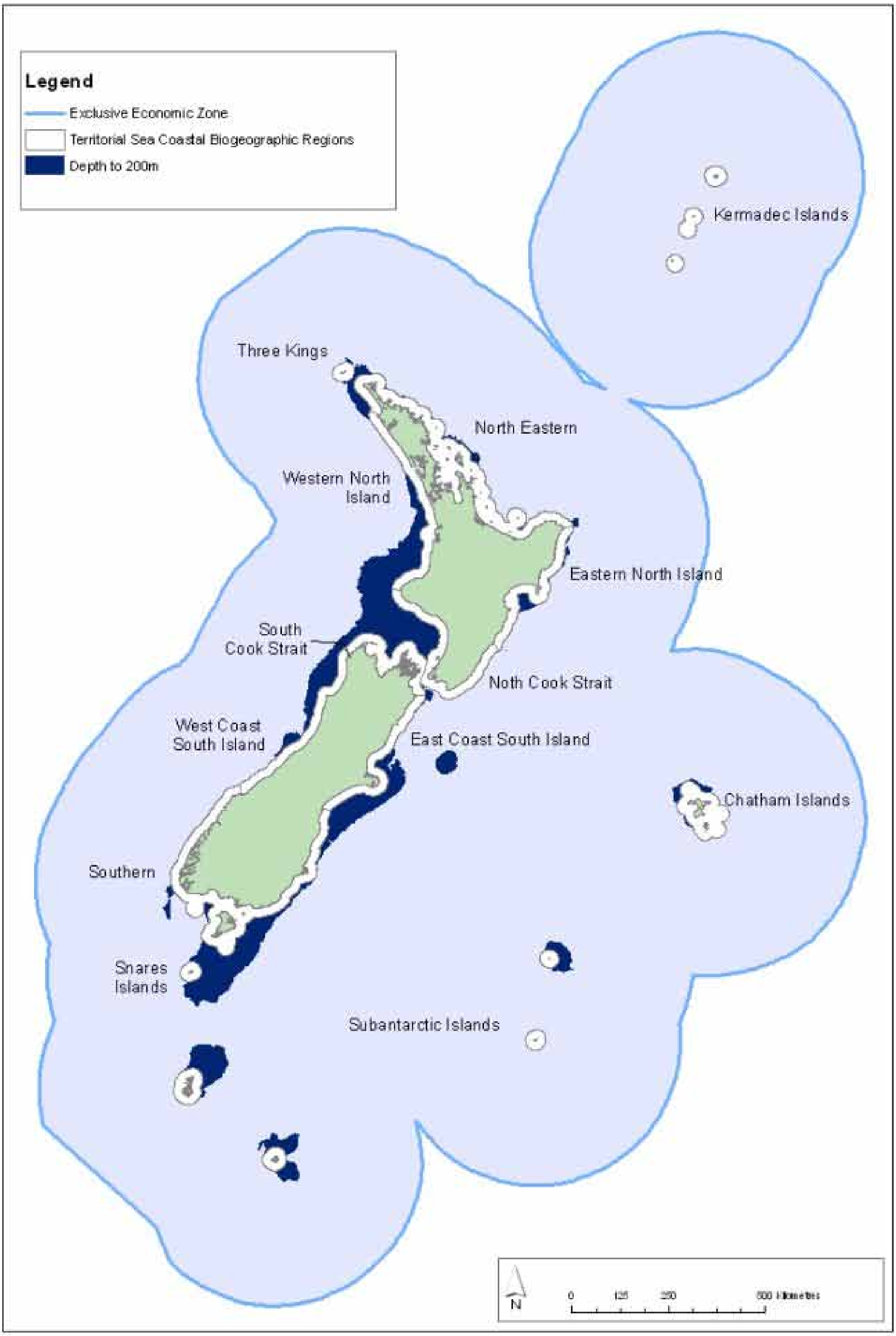

Figure 1: New Zealand's coastal biogeographic regions.

4.2 Defining Coastal Habitats and Ecosystems

31 Nested within the 13 biogeographic regions, the hierarchical classification scheme is divided into two major environment types:

- **Estuarine environments** are large coastal water regions that have geographic continuity, are bounded landward by a stretch of coastline with fresh-water input, and are bounded seaward by a salinity front
- **Marine environments** include the saline waters of the open sea, the seabed and water column of open sea coasts

32 Two key physical variables that influence coastal biodiversity – depth and substrate – will be used to identify habitat and ecosystems within each coastal biogeographic region.

33 **Depth:** There are three depth categories (intertidal, shallow subtidal to 30 metres, and deeper subtidal – between the 30 and 200 metre depth contours). This broadly reflects the role of light and physical disturbance in the coastal marine environment.

34 **Substrate:** There are eight substrate categories (mud, sand, gravel, cobble, boulders, bedrock, biogenic structures and artificial). These have been defined based on their role in structuring ecological communities. The 'artificial' category has been included to aid mapping for the purpose of MPA planning. Substrates are more fully explained in the Glossary.

35 Table 2 shows how the environment types and the primary environmental drivers (depth and substrate) fit together in a hierarchy to classify coastal habitats.

4.3 Using Additional Physical and Biological Information

36 In all biogeographic regions, additional data will be available along with the depth and substrate categories. These data will result in a more comprehensive description of the marine environment and a more detailed classification. However, while the additional information results in a more detailed and comprehensive description of the coastal marine environment, it is not required to be represented in MPAs (see section 6.2).

37 Additional biological and physical data[*] will allow more informed decisions to be made about the biodiversity value of specific sites. This can then be weighed against other considerations, such as minimising impact on existing users, when making recommendations for potential MPAs.

[*] Examples include seagrass and horse mussel beds, kelp forests, nursery areas, threatened species distributions, breeding sites, salinity gradients, wave exposure or current flow.

Table 2: Coastal classification and mapping scheme (intertidal – 200 metre depth)

Large Scale **Small Scale**

Biogeographic region	Environment	Depth	Substrate type		Examples of habitats and ecosystems
13 biogeographic regions (refer to Table 1)	Estuarine	Intertidal	Soft	Mud	Mud flat – including Mangroves, Saltmarsh, Seagrass
				Sand	Sand beach
				Gravel	Gravel beach
				Cobble	Cobble beach
			Hard	Boulders	Boulder beach
				Bedrock	Rocky platform
			Artificial		Rock walls, marinas
		Subtidal	Soft	Mud	Shallow mud flat – including Seagrass beds
				Sand	Shallow sand flat
				Gravel	Shallow gravel field
				Cobble	Shallow cobble field
			Hard	Boulders	Boulder reef
				Bedrock	Rocky reef
				Biogenic reefs	Tube worm mounds
			Artificial		Rock walls, marinas
	Marine	Intertidal	Soft	Mud	Mud flat
				Sand	Sandy beach
				Gravel	Gravel beach
				Cobble	Cobble beach
			Hard	Boulders	Boulder beach
				Bedrock	Rock platform
			Artificial		Rock walls, marinas
		Shallow Subtidal (MLWS – 30 m)	Soft	Mud	Shallow mud flat
				Sand	Shallow sand flat
				Gravel	Shallow gravel field
				Cobble	Shallow cobble field
			Hard	Boulders	Shallow boulder reef
				Bedrock	Shallow rocky reef
				Biogenic reefs	Bryozoan beds, tube worm mounds, sponge gardens
		Deep Subtidal (30 m – 200 m)	Soft	Mud	Deep mud flat
				Sand	Deep sand flat
				Gravel	Deep gravel field
				Cobble	Deep cobble field
			hard	Boulders	Deep boulder field
				Bedrock	Deep rocky reef
				Biogenic reefs	Deep bryozoan beds, rodolith beds, tube worm mounds, Sponge gardens

Note: Terms above are defined in the Glossary. Artificial substrate has been included in the classification for the purposes of mapping all features present in a biogeographic region and is not considered important for representation in the network of MPAs.

5.0 DEEP WATER MARINE CLASSIFICATION

38 Implementation of the classification in deep water will be guided by the following spatial scales:

- Broad scale variation at the meso-scale (100s to 1000s of kilometres); and
- Habitats and ecosystems at the local-scale (10s to 100s of kilometres)

39 Significant recent work on classifying New Zealand's marine environment includes, most notably, the Marine Environment Classification 2005 (MEC) which was developed for the Government by the National Institute of Water and Atmospheric Research (NIWA). The Ministry of Fisheries has commissioned a revision of the MEC to further contribute to understanding of New Zealand's marine habitats and ecosystems.

40 The Government recently accepted a proposal from representatives of the fishing industry to establish Benthic Protection Areas (BPAs); primarily in the EEZ. As part of that proposal, the Government has agreed that implementing the MPA Policy in the EEZ will not commence until 2013.

41 In the interim, further preparatory work on marine classification in the deep water will continue. This work will further refine the current MEC and lead to a more comprehensive classification of offshore marine habitats and ecosystems.

42 When implementing the MPA Policy in the offshore, it will be necessary to consider what constitutes best available information. Significant input will be sought from the panel of offshore experts which will make recommendations for offshore MPAs.

43 To give an indication of the level of detail considered necessary to represent habitats and ecosystems in the offshore marine environment, the following section discusses how the current MEC (2005) could be used to plan an offshore MPA network.

5.1 The Marine Environment Classification 2005

44 The MEC aims to provide a spatial framework to facilitate the conservation and management of indigenous marine biodiversity by subdividing the marine environment into units with similar environmental characteristics.[11]

45 The MEC uses predominantly physical variables (for example, depth, sea surface temperature, seabed slope and annual solar radiation) to create proxies for marine environments and groups them into broadly similar areas, called "environment classes". While the MEC will not predict the biota that is present in a specific area, the pattern of physical variables provides an indication of possible broad-scale ecosystem types that are likely to influence the biota associated with a particular environmental class. An important assumption is that areas within the same environment class will be expected to have more in common with each other than with areas falling into other classes.

46 It is generally accepted that the MEC is a primary tool for classification in the offshore marine environment, although it is also acknowledged that the MEC is not ideal for defining MPAs. Rather, it identifies general areas that may warrant further investigation.

47 The 20 class level of the MEC is considered to provide a useful surrogate for ecological (biological and environmental) variation. However, given that MEC represents environmental variation only at a broad scale, it is proposed that additional information be represented within each MEC class to capture further variation at the habitat and ecosystem level (see Figure 3). Table 3 provides a hierarchical classification scheme which aims to

identify habitat and ecosystem variability in the pelagic and benthic environments within the MEC at the 20 class level.

48 Within each MEC class, it is desirable that MPAs represent the variation in substrate that is known to have a significant influence on the associated biota at a variety of different depths.

Table 3: Offshore marine ecosystem and habitat classification and mapping scheme (> 200 metres depth)

Large Scale				**Small Scale**
Biogeographic range	**Environment**	**Depth**	**Substrate**	**Habitat and ecosystem examples**
MEC	Benthic or sea floor	Upper Continental slope (200-500 m)	Represent the biologically-significant variation in substrate type	High-relief hard-bottom or deep water reefs Hydrothermal seeps and vents Seamounts and guyots Banks Submarine canyons Trenches Marine Terraces Plains
		Mid Continental slope (500-1000 m)	Represent the biologically-significant variation in substrate type	
		Lower Continental slope (1000-4000 m)	Represent the biologically-significant variation in substrate type	
		Abyssal plain (>4,000 m)	Represent the biologically-significant variation in substrate type	
	Pelagic or water column	Sea surface (surface 0 m) Epipelagic (0 – 200 m) Mesopelagic (200-1000 m) Bathylpelagic (1000-4000 m) Abyssalpelagic (4000-7000 m) Hadalpelagic (>7000 m)	N/A	Eddies Mixed layers Upwellings Frontal boundaries Benthic boundary layers Stratified layers

Note: Not all depths identified above will exist within all MEC classes. The terms above are defined in the Glossary.

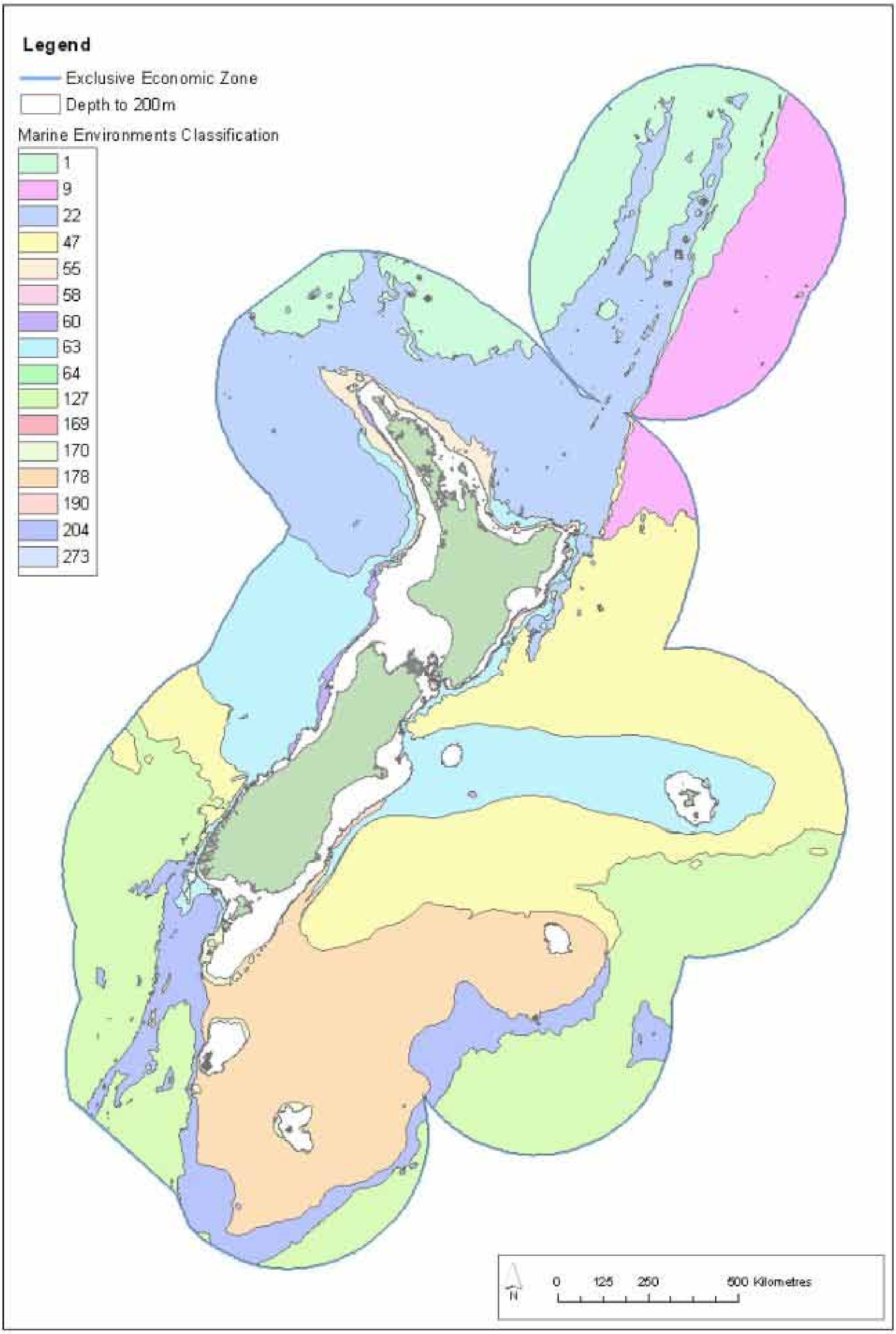

Figure 3. New Zealand's Deepwater regions.

6.0 IMPLEMENTING A NETWORK OF MPAs

49 The MPA Policy specifies two processes to develop a network of MPAs – one for the nearshore environment and one for the offshore marine environment. For the purpose of implementing the network of MPAs, the nearshore/offshore boundary will be the limit of the Territorial Sea (12 nautical miles).

50 Decisions taken in respect of Benthic Protection Areas have defined Government's intention that MPAs will initially be implemented in the Territorial Sea and that it is the Government's intention that implementation of the MPA Policy in the EEZ would not commence until 2013. In those limited cases where the Territorial Sea includes areas deeper than 200 m, the deepwater classification should be adopted to define habitats needing to be protected.

51 However, a pragmatic approach should be followed to determine whether, for these deepwater areas, fishing connections are primarily with offshore deepwater commercial operations. If this is the case it may be appropriate to allocate these areas for the consideration when implementing the MPA Policy in the offshore. If there are no, or insignificant offshore fishing connections, the delineation of MPAs may, all other things being equal, safely and freely take those deeper waters inside the 12 nautical miles limit into consideration.

52 Within the nearshore marine environment, regional marine protection planning forums (MPPFs) will be convened by the Department of Conservation (DOC) and the Ministry of Fisheries (MFish) and will be tasked to:

- Consider the coastal and deep water marine classification and inventory information
- Compile information on existing uses and interests in the area
- Identify sites and potential tools for area-based protection of biodiversity; and
- Seek to establish consensus on areas to be set aside as MPAs

53 Planning for offshore marine environment MPAs will commence in 2013 and will be implemented at a national level by an expert offshore panel. This group will have specific expertise and representation of offshore interests.

54 DOC and MFish officials will service both the marine protection planning forums and the offshore panel with information, advice, facilitation and guidance. This will include provision of ecosystem and habitat maps, and information derived using the marine and coastal classification approaches.

6.1 Policy Objectives and Use of the Classification Approaches

55 When implementing the MPA Policy, the primary consideration should be achieving its purpose and objective – that is, a comprehensive and representative network of MPAs. The Policy gives some guidance on the use of marine and coastal classification to represent marine habitats and ecosystems within MPAs:

- **Representativeness** – It is desirable that sites be prioritised on the basis that they are representative of one or more marine habitats or ecosystems. It is desirable that each MPA will contain a number of habitat and ecosystem types.
- **International or national importance** – It is desirable that sites be prioritised on the

basis that they support outstanding, rare, distinctive or internationally or nationally important marine habitats and ecosystems.

- **Network gaps and priority habitat and ecosystems** – The classification should be used to identify gaps and set priorities for representation of habitats and ecosystems within MPAs.

56 As stated in the Introduction to this paper, the classification approach adopted defines habitats and ecosystems at a scale suitable for implementing the MPA Policy. This does not constrain the collection of further information, or the expansion of the classification systems by incorporating as much information as is available.

57 Note that it is important to distinguish between the collection and classification of information and the implementation of the MPA Policy. It is not desirable, nor the intent of the MPA Policy, to acquire information at very fine scale, to use that information to classify habitats and require additional protection at increasingly finer scales. However, there is some value in collecting new information, or analysing existing data, to expand our knowledge of the marine environment.

58 It is proposed that habitats in the nearshore and offshore classification systems be separated into those that are 'required' to be protected within MPAs, and those that would be 'desirable' to protect. The MPPFs and expert offshore panel would set out to recommend protection of the required habitats.

59 Note that, for the purposes of the implementing the MPA Policy in the nearshore, the definition of 'habitat' is confined to those that are 'required' to be represented in the MPA network as identified in Table 2. The requirements for offshore protection will be identified in the preparatory work leading up to implementation in 2013.

60 When recommending the protection of required habitats, or choosing among potential sites, planning forums and the expert offshore panel may consider that additional desirable habitats could also be protected within an MPA to increase the biodiversity value of the MPA network. However, protecting additional desirable habitats would be subject to the various requirements of the MPA Policy.

6.2 Key Design Guidelines Used to Identify and Select Potential MPAs

61 Guidelines have been developed to help MPPFs and the expert offshore panel plan a representative network of MPAs. While the diversity of marine species, habitats and human uses thereof prevents a single optimum network design for all environments, the guidelines aim to provide a consistent starting point for discussions. Not all guidelines will necessarily be achieved in every MPA.

62 The guidelines fall into two categories and are further explained in 6.3.1 and 6.3.2:

- Site identification and MPA design guidelines: These provide guidance for identifying potential MPA sites; and
- Site selection guidelines: These provide guidance for selecting candidate MPAs from among potential sites which will then be recommended to Ministers for protection

6.3 Site Identification and MPA Design Guidelines

63 The site identification and MPA design guidelines provide the basis for identification of potential sites that are candidates for MPA status. Sites identified using these criteria will be considered in the context of selection guidelines (outlined below) to determine which should

be developed as proposals that can be progressed through relevant statutory processes.

- **Exposure** – It is desirable that variation in exposure be represented in MPAs. Exposure is related to the prevailing force of water movement, tidal, wave or water current. This force is an important factor that determines the kinds of animals and flora that can maintain attachment or position in a particular habitat.
- **Protect whole habitats and ecosystems** – It is desirable that sites be selected on the basis that whole habitats or ecosystems can be protected, particularly where a habitat or ecosystem represents a relatively small mapped unit. For example it would be desirable to incorporate a whole reef in an MPA rather than establishing a boundary that cuts across the reef.
- **Have fewer larger (versus numerous smaller) MPAs** – For the same amount of area to be protected it is desirable to protect fewer, larger areas rather than numerous smaller areas. This assists with minimising 'edge effects' resulting from human use of the surrounding/adjacent areas. This also allows for more efficient and cost effective compliance and enforcement.
- **Size of MPAs** – MPAs may be of various shapes and sizes. The desire to include several habitats within each MPA, have fewer larger MPAs and to protect whole habitats and ecosystems where practicable, should ensure MPAs are of sufficient size to provide for the maintenance of populations of plants and animals and to reduce edge effects resulting from human use of the surrounding areas.
- **Represent latitudinal and longitudinal variation** – Many processes create latitudinal and longitudinal (cross-shelf) differences in habitats and ecosystems. This diversity is reflected partly in the distribution of the biogeographic regions, but care should be taken to choose MPAs that include differences in habitats and ecosystems that cover both latitudinal and longitudinal or cross-shelf ranges. It may be convenient to extend MPAs from the intertidal zone to deep waters offshore.
- **Consider sea and adjacent land uses in planning MPAs** – Placement of MPAs should take into account the adjacent terrestrial environment (including islands) and associated human activities. Past and present uses may have influenced the integrity of the biological communities, and designers should consider these effects, where known, when proposing the location of MPAs. For example, existing no-take MPAs and areas adjacent to terrestrial national parks are likely to have greater biological integrity than areas that have been used heavily for resource exploitation.
- **Keep boundaries simple** – To achieve this, MPA design should aim for simple shapes and reduced fragmentation of areas. This can be achieved by using straight boundary lines and minimising the perimeter-to-area ratio. MPAs should also be designed so they can be realistically enforced. Users and surveillance staff find straight lines much easier to find and follow than lines following depth contours or distance from land or reefs. Squares are easier for users and compliance staff to find and work with than odd shapes. Boundaries should follow major latitude and longitude lines where possible. This makes it easier for users to match with charts. For nearshore zones, clear sight lines on-shore or using other fixed objects are good alternatives to areas defined by coordinates.

6.4 Site Selection Guidelines

64 Site selection guidelines provide guidance for selecting which candidate MPA sites should be recommended for protection. They will be considered in the context of the marine classification approaches and other information, and include:

- **Protect the full range of marine habitats and ecosystems** – The MPA Policy calls for the protection of 'the full range of marine habitats and ecosystems' as well as those which are rare, distinctive or internationally or nationally important. Within each biogeographic region, the approach to the classification of habitats and ecosystems should be used as a pragmatic guide to the representation needed to achieve this goal.

- **Number of MPAs** – The number of potential habitat and ecosystem types, defined by the classification and mapped within a biogeographic region, does not equate to the number of MPAs required to protect the full range of natural marine habitats and ecosystems. Multiple habitats should be protected within each MPA.
- **Have fewer larger (versus numerous smaller) MPAs** – It is beneficial to have fewer larger MPAs representative of more than one habitat or ecosystem than a large number of small MPAs.
- **Social and economic interests** – When choosing among potential sites, information related to social and economic interests should be considered to minimise adverse impacts on existing users. Such information may include: current and potential use for the purposes of extraction or exploration, or contribution to economic or intrinsic value by virtue of its protection.
- **Susceptibility to degradation** – Incorporate information on the location of, for example, coastal structures, dredging or dumping sites that potentially may impact on the integrity of the site.
- **Cultural use** – Consider information on traditional use, values, current economic value and Treaty settlement obligations.
- **Adverse impacts on users** – Where there are choices of several sites that would add a similar ecosystem or habitat to the MPA network if protected, the site(s) chosen should minimise adverse impacts on existing users and Treaty settlement obligations. Where there is a choice to be made among minimum impact sites, selection may also be guided by:
    - Accessibility for management and enforcement requirements; and
    - Benefits such as educational, diving and tourism opportunities.
- **Compatibility with adjacent land-use** – It is desirable to design MPA boundaries to align with other protected areas. This includes national parks on land and other protected waters, such as fish habitat. This allows opportunities for collaborative compliance efforts between agencies.
- **Replication** – Consideration should be given as to whether the site provides replication of habitats and ecosystems in a biogeographic region.

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8. GLOSSARY

Abyssal plain: The deep ocean floor, an expanse of low relief at depths greater than 4000 metres.

Abyssopelagic zone: The ocean water column depth 4000 to 7000-metre-depth zone, seaward of the shelf-slope break. The Bathypelagic and Abyssopelagic sometimes termed the “midnight zones".

Artificial: Human-made structures that are placed in the marine environment for the purpose of human use (for example, marinas, wharfs, marine farms), habitat enhancement or recreation.

Bathypelagic zone: The 1000 to 4000-metre-depth zone seaward of the shelf-slope break. The number of species and populations decreases greatly as one proceeds into the bathypelagic zone where there is no light source other than bioluminescence. Temperature is uniformly low, and pressures are great. This overlies the abyssopelagic zone and is overlain by the mesopelagic zone.

Bedrock: Stable hard substratum, not separated into boulders or smaller sediment units. These rock exposures, typically consisting of sedimentary rock benches or platforms, may also include other rock exposures such as metamorphic or igneous outcrops. Possibly with various degrees of concealment from attached plant and animal colonisation.

Benthic: Dwelling on or associated with the seabed. Benthic organisms live on or in the seabed. Examples include burrowing clams, sea grasses, sea urchins and acorn barnacles. Deep-sea benthic fauna are zoned with depth and show marked changes in diversity and composition with topographic features, current regimes, sediments and oxygen-minimum zones (for example, Rex 1981; Grassle 1989; Etter &, Grassle 1992; Grassle & Maciolek 1992; Levin *et al* 2001; Rowden *et al.* 2002, Nodder *et al.* 2003, Stuart *et al.* 2003, Rowden *et al.* 2003, Rowden & Clark 2004, Rowden *et al.* 2004, Rowden *et al.* 2005). A great variety of chemosynthetic communities also exist (for example, Rex *et al.* 1997; Levin *et al.* 2001; Stuart *et al.* 2003). It is clear that many deep-sea soft-sediment, hard-substrate and chemosynthetic communities share some proportion of their faunas. However, the extent to which this is true and the importance of dispersal among habitats in the persistence of species remain unclear.

Benthic boundary layer: The dynamic environment at the interface between the deep water and the ocean floor.

Biodiversity: The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (Convention on Biological Diversity). Components include:

> ***Genetic diversity:*** The variability in the genetic make up among individuals within a single species. In more technical terms, it is the genetic differences among populations of a single species and those among individuals within a population.
> ***Species diversity:*** The variety of species – whether wild or domesticated – within a particular geographical area. A species is a group of organisms, which have evolved distinct inheritable features and occupy a unique geographic area. Species are usually unable to interbreed naturally with other species due to such factors as genetic divergence, different behaviour and biological needs, and separate geographic location.
> ***Ecological (ecosystem) diversity:*** The variety of ecosystem types (for example, forests, deserts, grasslands, streams, lakes, wetlands and oceans) and their biological communities that interact with one another and their non-living environments.
> (Source - http://www.biodiversity.govt.nz/picture/doing/nzbs/glossary.html#ecosystems)

Biogenic reefs: Biogenic reefs (elevated structures on the seabed constructed of living and dead organisms) include fragile erect bryozoans and other sessile suspension feeders. Examples are bryozoan beds, rhodolith beds, tube worm mounds, sponge gardens and cold-water corals. These communities develop in a range of habitats from exposed open coasts to estuaries, marine inlets and deeper offshore habitats, and may be found in a variety of sediment types and salinity regimes.

Biogeographic region (100s to 1000s of kilometres)**:** An area that is defined according to patterns of ecological and physical characteristics in the seascape. Biogeographic regions will form the basis of marine protected area (MPA) nearshore planning.

Boundary current: Large-scale water stream in the upper ocean that separates water masses and is driven by a combination of wind temperature, geostrophic or coriolis effects.

Coastal marine: For the purposes of this classification coastal marine refers to the estuarine and coastal marine habitats and ecosystems which include the saline waters of estuarine areas and of the open coast, the seabed and water column of open sea coasts to a depth of 200m.

Chemosynthetic communities: Chemosynthetic communities include assemblages of tubeworms, clams, mussels, bacterial mats, and a variety of associated organisms. They use a carbon source independent of photosynthesis and the sun-dependent photosynthetic food chain that supports all other life on earth. Features or areas that support high-density chemosynthetic communities include cold seep hydrocarbon-charged sediments associated with anomalous mounds or knolls, and gas or oil seeps, and hydrothermal vents and seeps.

Community: An association of species which has particular species, at certain densities, in common.

Continental shelf: A broad expanse of ocean bottom sloping gently and seaward from the shoreline to the shelf-slope break. Off New Zealand, the shelf is usually 16–64 kilometres wide, but ranges from 1.6 kilometre width off Fiordland to more than 160 kilometre width for the Taranaki shelf. Eade and Carter (1975) define the "shelf break" as the depth at which there is a marked change in the slope of the shelf to greater depths, generally taken as between 130 – 200 metres.

Continental shelf break: Line marking a change from the gently inclined continental shelf to the much steeper depth gradient of the continental slope.

Continental slope: A steep-sloping bottom extending seaward from the edge of the continental shelf and downward toward the rise. Continental slopes are the relatively steep inclines between the continental shelf and the surrounding ocean basins and, in New Zealand, are typically inclined at an angle of three to six degrees (Lewis *et al.* 2006).

Deepwater marine: For the purposes of this classification deepwater marine refers to the seabed and water column habitats and ecosystems of the open ocean beyond the depth of 200m.

Demersal: Occurring near the seabed. Demersal organisms live near, but not on, the seabed, and usually feed on benthic organisms.

Depth classes of the oceanic bottom: This category of depth zone (continental shelf, upper continental slope, mid continental slope, lower continental slope and abyssal plain) for the sea floor is based on the importance of the continental platforms and their associated features. On the oceanic sea floor, vertical depth zones of the bottom are defined by depth. The depths of these zones vary depending on regional geology.

Depth classes of the oceanic water column: The oceanic regime is distinguished by water depth range. In the water column, hydrographic features are identifiable water circulations, discontinuities or barriers that affect biological processes by containing, dispersing, transporting them, or concentrating food and spawning individuals. Hydrographic features in the water column include: warm core rings, cold core rings, upwelling, downwelling, major current systems, mesoscale eddies, stratified layers, frontal boundary and benthic boundary layers.

Ecosystem: An interacting system of living and non-living parts such as sunlight, air, water, minerals and nutrients. Ecosystems encompass communities and their surrounding environments. Ecosystems can be small and short-lived, such as water-filled tree holes or rotting logs on a forest floor, or large and long-lived, such as forests or lakes.

Epipelagic zone: The 0 to 200 metre depth zone, seaward of the shelf-slope break. The epipelagic zone extends from the surface downward as far as sunlight penetrates during the day. It is a very thin layer, up to about 200 metres deep. The endemic species of this zone either do not migrate, or perform only limited vertical migrations, although there are many animals that enter the epipelagic zone from deeper layers during the night or pass their early development stages in the photic zone. The epipelagic zone overlies the mesopelagic zone.

Estuarine: The estuarine environment includes estuaries, tidal reaches, mouths of coastal rivers and coastal lagoons. The dominant functions are the mixing of freshwater and seawater, and tidal fluctuation, both of which vary depending on degrees of direct access to the sea. Estuaries are semi-enclosed bodies of water which have a free connection with the open sea. They differ from other coastal inlets in that sea water is measurably diluted by inputs of freshwater and this, combined with tidal movement, means that salinity is permanently variable. The mixing of two very different water masses gives rise to complex sedimentary and biological processes and patterns. New Zealand has diverse examples of estuarine systems including drowned river valleys, barrier-enclosed estuaries, estuarine lagoons, river mouth estuaries, structurally influenced, technically influenced (such as the Marlborough Sounds) and fiords (Hume 2003). Six broad habitat types have been identified for New Zealand fiords, based primarily on the three physical variables above (Wing et al., 2003; 2004; 2005). The diversity of estuary types and habitats are a function of New Zealand's active margin and headland dominated coastal setting, diverse geologic past and catchment sediments, variable wave climate and rainfall. Estuaries enclose a diverse range of habitats from subtidal areas to intertidal areas. These include sheltered upper estuary mangroves, seagrass beds and marshes, highly energetic beaches on the ocean side of the estuary, rocky reefs, wave built bars in estuary mouths, deep estuarine channels where swift tidal currents flow, shallow open salt water and fresh water, river deltas, tidal pools, muddy fringing marshes, mid-estuary sand banks, intertidal flats, estuarine beaches and mangrove forests.

Estuary: A semi-enclosed body of water that has a free connection with the open sea and within which seawater is diluted measurably with freshwater derived from land drainage.

Exposure: Exposure is related to the prevailing force of water movement, tidal, wave or current. This force is an important filter that determines the kinds of animals and flora that can maintain attachment or position in a particular habitat. A reduction of, or absence of, fine sediments characterises high current and wave energy areas. Energy can shape the bed form (sand waves, sand ripples) and erode or accrete areas. Highly impacted areas are typified by the presence of erosive features, such as beach scarps or bare rock substrates. **Exposed** – describes areas where wind/wave energy is enough to create substantial persistent impacts on physical and biological features such as water movement, substrate stability, or population densities (fetch >500 kilometres. Ocean swell environment; maximum current >3 knots). **Moderate** – describes areas where local wind/wave energy creates persistent impacts on physical and biological features such as water movement, substrate stability, or population densities (fetch 50-500 kilometres. Some swell areas, open bays and straits). **Sheltered** – describes areas where local wind/wave energy does not create persistent substantial impacts on physical and biological features such as water movement, substrate stability or population densities (fetch <50 kilometres. Protected areas; small bays and estuaries; maximum current <3 knots). Exposure is an important 'environmental driver' that determines the kinds of animals and flora that can maintain attachment or position in a particular habitat. Exposure level also determines the substrate type by suspending, transporting and sorting fractions of substrate particulates of smaller grain size.

Fetch: The distance across water over which the wind blows from a particular direction uninterrupted by land.

Guyot: A flat-topped extinct volcanic seamount.

Habitat: The place or type of area in which an organism naturally occurs. Habitat is a term that evokes debate and is often difficult to describe because there are different perspectives on its definition. Habitat is generally thought of as a place where an organism is found (Odum 1971), such as estuaries, salt marsh, seagrass, kelp forests and cobble fields that fringe our coastlines, to deep sea habitats and ecosystems, such as offshore bryozoan beds, deep sea coral reefs, extensive areas of fused manganese nodules that forms a solid 'pavement' at 5000 metres depth, vast areas of abyssal 'ooze' and the various depth zones of the water column (Baston 2003). Marine waters may be fully saline, brackish or almost fresh. Marine habitats include those below mean spring high tide (or below mean water level in non-tidal waters) and enclosed coastal saline or brackish waters, without a permanent surface connection to the sea but either with intermittent surface or sub-surface connections (as in lagoons) out to the New Zealand EEZ. Describing habitat is complicated by issues of scale and complexities in natural resources. Right whale habitat is described in terms of oceans (1000s of kilometres), while juvenile fish habitat is described by unique seafloor characteristics or microhabitats (centimetres to metres). Many plants and animals use different types of habitats at different times in their lives. Some species of fish and shellfish spend their early lives in estuaries or bays where food and shelter are plentiful. Later in life, these same animals move into different environments in the open ocean where they eat different types of food. In spite of how habitat is described and issues of scale, New Zealand has a rich and complex marine environment covering an area of approximately 4.1 million square kilometres.

Hadaalpelagic: Depth zone greater than 7000 metres, seaward of the shelf-slope break.

Hard bottom: Substrates defined by large particle sizes or cemented substrates, generally with organisms that live attached on the surface (for example, bedrock, boulder, deep sea manganese nodule pavements and artificial substrate).

Hydrothermal vents: Hydrothermal seeps and vents are sites in the deep ocean floor where hot, sulphur-rich water (for example, methane CH_4) is released from geothermally heated rock. Commonly found in places that are also volcanically active, where hot magma is relatively near the planet's surface. Some deep submarine hydrothermal vents (known as "black smokers") can reach temperatures of over 400° Celcius. This super-heated mineral-rich water helps support diverse communities of organisms in an otherwise species depauperate environment.

Intertidal: Those waters and marine environments that are marine in character influenced by rise and fall of twice-daily tides, of bimonthly spring and neap tides, or by ebb and flow in tidal reaches of rivers.

Mangroves: A community of manawa (*Avicennia marina* subsp. *australasica*), vascular shrubs or trees which typically produce erect aerial roots. Occurs in the warm harbour and estuarine waters of the northern third of the North Island, north of about 38^{o} South. Fringing plant communities, such as salt marshes and mangroves, play an important role in our estuaries and coastal ecosystems. These fringing habitats are a key source of organic material and nutrients, which help to fuel the estuarine food web. Stems and leaves of salt marsh and mangrove plants provide a three-dimensional structure in which animals can hide from predators, and they create habitat for fish species and wading birds.

Marine Protected Area network: A system of individual marine protected areas operating cooperatively and synergistically, at various spatial scales, and with a range of protection levels, in order to fulfil ecological aims more effectively and comprehensively than individual sites could acting alone (excerpt from the draft IUCN document "Establishing networks of marine protected areas: making it happen"). The system will also display social and economic benefits, though the latter may only become fully developed over long time frames as ecosystems recover. A network ensures functioning ecosystems by encompassing the temporal and spatial scales at which ecological systems operate.

Mesopelagic:. The 200 metre - 1000 metre depth zone, seaward of the shelf-slope break. Midwater or "twilight zone", where there is still faint light but not enough for photosynthesis. Bacteria, salps, shrimp, jellys, swimming (cirrate) octopods, vampire and other squids, and fish are typical; many are bioluminescent.

Nearshore: For the purposes of developing a network of MPAs the MPA Policy specifies two planning processes – one for the nearshore environment and one for the offshore marine environment. For the purpose of implementing the network of MPAs, but subject to the proviso in section 6.0 above, the nearshore/offshore MPA planning boundary is the limit of the Territorial Sea (12 nautical miles).

Neritic zone: This spans from the low-tide line to the edge of the continental shelf and extends to a depth of about 200 metres.

Network design principles: Principles that guide the design of the MPA network (including concepts of representative, rare/unique, viable, replication, resilience, connectivity). There have been a number of papers published recently that have evaluated the effects of larval dispersal, physical oceanography, source-sink dynamics, disturbance, and climate variability for marine protected area and reserve design and focused on the development of principles and tools to design efficient reserve systems that represent as much biodiversity as possible (for example: Bohnsack 2000, Crowder *et al.* 2000, Tuck & Possingham 2000, Botsford *et al.* 2001, Roberts *et al.* 2001, Sala *et al.* 2002, Sponaugle 2002, Allison *et al.* 2003, Botsford *et al.* 2003, Gaines *et al.* 2003, Halpern 2003, Halpern & Warner 2003, Hastings & Botsford 2003, Kinlan & Gaines 2003, Lubchenco *et al.* 2003, Neigel 2003, Roberts *et al.* 2003, Palumbi 2003, Shanks *et al.* 2003, Palumbi 2004, Bell & Okamura 2005, Fernandes *et al.* 2005, Carson & Hentschel 2006, Halpern *et al.* 2006, Leis 2006, Possingham *et al.* 2006, Nicholson *et al.* 2006, Parnell 2006, Salomon *et al.* 2006, Sarkar *et al.* 2006, Gladstone 2007, Baskett *et al.* 2007; Wagner *et al.* 2007; Winberg *et al.* 2007). A single reserve design will not be optimal for all species or in all locations. However, these studies provide general guidelines to support the identification and design of sites considered to meet biodiversity objectives. In addition, evidence suggests that there will never be a perfect surrogate or suite of surrogates that can be used to efficiently represent all elements of biodiversity. The choice of surrogate will depend on both the presumed effectiveness of the surrogates available, and the amount of time, cost and effort required to develop alternatives. Conservation planners therefore should make the best use of all available environmental and biological data to inform decision-making (Possingham *et al.* 2006).

Offshore: For the purposes of developing a network of MPAs the MPA Policy specifies two planning processes – one for the nearshore environment and one for the offshore marine environment. For the purpose of implementing the network of MPAs, but subject to the proviso in section 6.0 above, the nearshore/offshore MPA planning boundary is the limit of the Territorial Sea (12 nautical miles).

Oceanic water column: Those waters of the 'open ocean,' in areas beyond the shelf break (about 200-250 metres depth) extending to the maximum ocean depths. These waters are removed from primary continental influences, and the sea bottom interacts little or not at all with the water column.

Pelagic: Associated with open water. Pelagic organisms live in the open sea, away from the seabed.

Representativeness: Marine areas selected for inclusion in reserves should reasonably reflect the biotic diversity of the marine ecosystems from which they derive.

Salinity: The quantity of dissolved salts in water, especially of seawater or its diluted products. Salinity is recorded, by convention, as parts per thousand (‰); that is, grams of salts per litre of water. Fully saline - 30 - 40‰; variable salinity/salinity fluctuates on a regular basis - 18 - 40‰; reduced salinity -18 - 30‰; low salinity - <18‰.

Saltmarsh: A wetland in estuarine habitats of mainly mineral substrate in the intertidal zone.

Seagrass: Seagrasses are vascular marine plants with the same basic structure as terrestrial (land) plants. They have tiny flowers and strap-like leaves. They form meadows in estuaries and shallow coastal waters with sandy or muddy bottoms. Most closely related to lilies, they are quite different from seaweeds, which are algae. The leaves support an array of attached seaweeds and tiny filter-feeding animals like bryozoans, sponges, and hydroids, as well as the eggs of ascidians (sea squirts) and molluscs. They also provide food and shelter for juvenile and small fish.

Seamounts: Formations rising higher than 1000 metres from the seafloor, or formations with a vertical elevation above the surrounding base slope of 250 metres or greater.

Soft bottom: Substrate defined by small particle size and unstable bottom conditions, generally with organisms that live buried beneath the surface (for example, cobble, gravel, sand and mud bottoms).

Straits and sounds: Any relatively narrow channels linking two larger areas of sea and occurring between islands, or between islands and the mainland. Straits and sounds are often characterised by strong tidal currents.

Submarine canyon: A valley on the seafloor of the continental slope. Submarine canyons are generally found as extensions to large rivers, and have been found to extend 1 kilometre below sea level, and extend for hundreds of kilometres. The walls are generally very steep. The walls are subject to erosion by turbidity currents, bioerosion or slumping.

Substrate: The type of bottom sediments, such as sand and gravel. Substrate type and sediment grain size have a strong influence on the types of plants and animals that can inhabit a given place. Substrates and sediment sizes range from tiny mud particles, to fine sand, to coarse sand, to pebbles, to cobbles, to boulders, to solid rock outcrop. The precise mix of species inhabiting a rocky habitat is strongly affected by water depth, sunlight, wave exposure, and stability of the substrate. Species on intertidal rocky outcrops tend to be relatively large, long-lived and securely attached to the rock, while species living on wave-tossed intertidal cobbles tend to be small, mobile and short-lived. In general, stable rocks like bedrock, boulders and partially buried cobbles have greater diversity of species than rocks and finer sediments that are frequently shifted by waves (Schoch and Dethier 1996). For the purposes of this classification, the particle size of the primary material of which > 50% of the substrate is composed forms the nearshore categories.

Soft substrates (generally defined by small particle size and unstable bottom conditions):

- Mud <0.07 millimetres: Muddy bottoms are areas of fine unconsolidated sediment comprised of silt, clay and fines that may be unvegetated or patchily covered with green algae and benthic diatoms. These habitats occur in calm, sheltered, depositional environments in both the subtidal and intertidal zone. A variety of invertebrates and fish inhabit subtidal mud bottoms. Grain size can range from pure silt to mixtures containing clay and sand. The sediments of muddy habitats boast a higher proportion of nutrient-rich, organic-mineral aggregates (detritus) than the sediments in sandy habitats (Van Houte-Howes *et al.* 2004). Tidal mudflats frequently occur next to eelgrass meadows and salt marshes. Many of the invertebrates in mud bottoms live near the mud's surface because oxygen typically becomes scarce within a few centimetres of the sediment surface. In very deep, undisturbed basins, sea pens and other species may live on the muddy seabed.
- Sand 0.07-2 millimetres: Sand beaches are constantly in motion. Their shape, size, and location shift continually due to wind, waves and storms. Beaches constructed from sand tend to dominate the North Island, whereas gravel beaches are more common along the east and west coasts of the South Island, but not exclusively so (Shulmeister & Rouse 2003). Storm-generated waves and currents shape sandy bottoms into ripples and ridges in shallow subtidal sandy habitats. In deeper water, storms don't affect the bottom topography, but currents can create sand waves or the bottom can be relatively featureless. Few animals live atop the sandy seafloor. Instead, they bury themselves in the sand to avoid predators, currents and shifting grains.
- Gravel 2-75 millimetres: Mixed sand and gravel beaches are common in New Zealand, particularly on the east coast of both the North and South Islands (Shulmeister & Rouse 2003). Subtidal gravel habitats host many of the same species as boulder reefs and generally occur on flat or low slope areas forming low relief habitat.
- Cobble 75-260 millimetres: Intertidal cobble and pebble habitats tend to have higher species diversity than mud and sand because the rocks provide refuges for algae and small animals. Invertebrates and algae attach to cobbles or take shelter in crevices. Flat or partially buried cobbles often harbour the greatest diversity of species because these rocks are less frequently overturned by waves. In the wave-swept intertidal zone, cobble habitats are typically devoid of long-lived seaweed, but ephemeral algae, such as sea lettuce or laver, may colonise some relatively stable rocks. Rock barnacles often attach to cobbles, and the mussel byssal threads can partially anchor cobble to the underlying substrate. Many gastropod, amphipods, isopods and worm species dwell among cobbles or pebbles. Subtidal cobble and pebble habitats host many of the same species as boulder reefs. Some of the organisms that attach to cobble include anemones, tunicates, hydroids, soft corals and sponges. In places where storm waves and other disturbances are infrequent, these organisms may become abundant and cover cobble substrates. Generally occurring on flat or low slope areas forming low relief habitat.

Hard substrates (generally defined by large particle sizes or cemented substrates):

- Boulder >260 millimetres: Because they are not frequently overturned by waves due to their large size, boulders support similar species as rocky outcrops. Long-lived algae and animals can survive attached to them. In the intertidal zone, boulders provide a substrate for algae, molluscs, barnacles, hydroids and other sessile organisms. In addition, boulders provide shelter from wind, sun, rain and predators for small organisms that can take shelter underneath and beside them. Boulders are large rocks that can form high relief habitat when piled up or when their diameter exceeds 1 metre. Large underwater piles of boulders, known as boulder reefs, provide an important habitat for algae, anemones, molluscs and sponges that attach to the rock surfaces or dwell in crevices. Lobsters, crabs and many fish associate with boulder reefs.

- Rocky substrate: Rocky substrate, for the purposes of this classification, includes consolidated material and bedrock platforms of various relief and roughness.
- Biogenic reefs: Biogenic reefs (elevated structures on the seabed constructed of living and dead organisms) include fragile erect bryozoans and other sessile suspension feeders. For example, byrozoan beds, rhodolith beds, tube worm mounds and sponge gardens. These communities develop in a range of habitats from exposed open coasts to estuaries, marine inlets and deeper offshore habitats, and may be found in a variety of sediment types and salinity regimes.
- Artificial: Artificial category includes human developed artificial structures constructed in the coastal marine area (such as artificial reefs, marinas, marine farms and drilling platforms). The artificial category has been included to aid mapping for the purposes of MPA planning.

Subtidal: The zone of estuarine and coastal areas below the level of lowest tide; permanently inundated.

Subtidal (MLWS – 30 metres): Coastal waters where the salinity is substantially marine, that is, >30 psu throughout the year. The zone extends from below the level of lowest tide, mean low water springs (MLWS), to the 30 metre depth contour. In these waters, benthic processes can strongly influence the ecology and biology throughout the water column and the water column interacts strongly with the benthos.

Subtidal (30 metres – 200 metres): The deep nearshore marine environment is the region of marine waters between the 30 metre depth contour and the continental shelf break, at approximately at 200 metres water depth. Depending on shelf morphology, waters at the 30 metre isobath can be quite distant from the mainland or they may lie quite close to land. Depth is more important ecologically than the distance from land.

Trench: Deep and sinuous depression in the ocean floor, usually seaward of a continental margin or an arcuate group of volcanic islands.

Upwelling: A process where subsurface, nutrient-rich, and usually cooler water is carried upward into the ocean's surface layers. Upwelling is caused by a complex interaction of wind, currents and the topography of the sea floor.

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MARINE PROTECTED AREAS POLICY
AND
IMPLEMENTATION PLAN

INTERPRETATION AND APPLICATION OF THE PROTECTION STANDARD

June 2007

Department of Conservation
Ministry of Fisheries

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1.0 Purpose of this Report

1 The Protection Standard is an important part of the Marine Protected Areas Policy and Implementation Plan (MPA Policy), January 2006.

2 This paper discusses how the Ministry of Fisheries (MFish) and Department of Conservation (DOC) propose to interpret and apply the Protection Standard to provide an operational definition for marine protected areas (MPAs) in New Zealand waters.

3 The information in this paper is presented in two parts. Sections 2.0-8.0 set the scene by explaining the Protection Standard's intent and policy context, as well as its planning principles and terminology. Section 9.0 describes how the Protection Standard will work in practice.

2.0 Introduction

4 The Protection Standard is important because it sets out the outcome we want to achieve for every MPA site in New Zealand – that is, we want to have the appropriate management tool(s) in place so that an MPA's biological diversity is maintained or recovers to a healthy functioning state at the habitat and ecosystem level.

5 To declare a site an MPA, we therefore need to identify any human activities and influences that pose a foreseeable threat to its biodiversity, and we need to manage those threats by selecting appropriate management tools.

6 The Protection Standard will initially be used to help determine whether existing management tools already operating around New Zealand offer sufficient protection for sites to become MPAs. Then, when additional MPAs are required to ensure the MPA network is comprehensive and representative of New Zealand's marine habitats and ecosystems, the Protection Standard will provide guidance to determine which management tool(s) should be applied to those new sites.

7 The Protection Standard will be used in conjunction with a Classification Approach that identifies the range of marine habitats and ecosystems we need to include in our MPA network. The classification approach is explained in a separate report.

3.0 What is a Standard?

8 The purpose of an environmental standard is to specify the limit of acceptable effects of human activity on the environment. A standard defines the point at which the combined effects of all stressors on the ecosystem or habitat move from being acceptable, to unacceptable or adverse.

9 The function of the MPA Protection Standard is to define, with an appropriate degree of certainty, the attributes of the ecosystem or habitat that must be maintained at a site in order for it to be considered a marine protected area. Ideally, the Protection Standard would do this by using definitions or assessment measures that can actually be monitored to confirm that the standard is being maintained. Where information is not available to make such assessments, this should be made clear, and alternative approaches set out.

4.0 The Protection Standard

10 The Protection Standard is described in Planning Principle 2 of the MPA Policy, which states:

‘To meet the Protection Standard, a management tool must enable the maintenance or recovery of the site’s biological diversity at the habitat and ecosystem level to a healthy functioning state. In particular, the management regime must provide for the maintenance and recovery at the site of:

a) physical features and biogenic structures that support biodiversity;

b) ecological systems, natural species composition (including all life-history stages), and trophic linkages;

c) potential for the biodiversity to adapt and recover in response to perturbation.

Maintenance and recovery include, where feasible, the avoidance of change from human induced pollution, sedimentation, fishing, tourism or visitor based disturbance, undersea or seafloor commercial activities, or scientific/research activities. The selection of tools for the management regime will require assessing their ability to address such human-related threats and activities.

The New Zealand Biodiversity Strategy contemplates the use of some management tools that allow some level of extractive use in MPAs. Management tools must, however, not allow levels of biological removals or physical disturbance that would breach the requirements above.’

5.0 What Human Activities Might Need to be Managed?

11 As discussed in Planning Principle 2 above, a range of human activities in the marine environment need to be considered when applying the Protection Standard. These include human-induced pollution, sedimentation, fishing, tourism and visitor-based disturbance, undersea or seafloor commercial activities, and scientific/research activities.

12 Some of our activities have little influence on biodiversity. Other activities, however, can affect the ecology of an area by physically disturbing the seafloor, or by changing natural populations. Whether these activities meet the Protection Standard will depend on the nature, scale, intensity and duration of the activity, and the natural resilience of the habitat type in question.

13 Before a site can become an MPA, two assessments have to be made – we need to identify which human activities and influences pose a foreseeable threat to the site’s biodiversity, and we need to be able to manage those threats by selecting appropriate management tools. It is important to note that a site is unsuitable as an MPA if the management tools available are not sufficient to manage human-induced threats to biodiversity.

6.0 What are Management Tools?

14 Management tools are mechanisms that, directly or indirectly, establish a protected site and/or manage threats to the maintenance and/or recovery of its biological diversity. Direct management tools can include marine reserves, fisheries restrictions and mechanisms to reduce the adverse impacts of land-based activities or mining. Incidental indirect tools could include cable protection zones or marine mammal sanctuaries.

15 Planning Principle 5 of the MPA Policy states that the tool, or combination of tools, used to meet the Protection Standard will be selected primarily on the basis of whether they adequately manage foreseeable threats to the site’s biodiversity. Note that a marine reserve will be

established to protect at least one sample of each habitat or ecosystem type in the network. A range of management tools will be used to protect further samples. As mentioned in Planning Principle 2, the New Zealand Biodiversity Strategy contemplates the use of some management tools that allow some level of extractive use in MPAs.

16 The tools available in developing our national MPA network are generally restricted to those currently in the legislation. All must be implemented consistent with the legislation, and following the required statutory processes. For example, some provisions of the Fisheries Act 1996 may achieve the incidental management of certain threats to biodiversity resulting from fishing activities, but can only be used for the primary purpose for which they are designed. Further, they must be implemented following the required statutory notification and consultation process in the Fisheries Act.

17 Voluntary agreements are also a potential management tool. For example, there are instances where fishers already have a voluntary agreement in place not to fish at a site, or not to use certain fishing methods within a site. Voluntary agreements may form part of the management regime for an MPA providing they are secure in the long term and enforceable. Voluntary agreements may also be used as a temporary measure to achieve protection while a more permanent legislative tool is being implemented.

18 Because the MPA Policy represents a long term commitment to marine biodiversity protection, Planning Principle 6 in the MPA Policy states that the management tools used to establish MPAs should be consistent and secure in the long term, subject to any necessary changes to allow them to better achieve the MPA Policy objective. To this end, Planning Principle 9 states the tools chosen must be enforceable – where compliance and enforcement is inadequate, the MPA Policy objective is unlikely to be achieved.

19 The range of human-related threats and activities that may need to be managed, and the management tools available, are discussed in section 9.0 this document. The MPA Policy also provides more information on the range of available management tools.

7.0 Interpreting the Protection Standard

20 The Protection Standard, described in Planning Principle 2, outlines the requirement that biological diversity at the habitat and ecosystem level is maintained or enabled to recover to a healthy functioning state. In particular, the management regime must enable the maintenance and recovery at the site of the following three things, each of which is discussed in more detail in 7.1-7.3 .

a) Physical features and biogenic structure that support biodiversity

b) Ecological systems, natural species composition (including all life-history stages), and trophic linkages

c) Potential for the biodiversity to adapt and recover in response to perturbation

7.1 Planning Principle 2(a): maintenance and recovery at the site of physical features and biogenic structures that support biodiversity

21 The first of the specific considerations governs the level of physical impact on the seabed that may occur on a given habitat. It should be noted that for this provision, no distinction is made between coastal and deepwater habitats.

22 Physical features and biogenic structures are interpreted as both the biological and non-biological features of the seabed. This includes such features as cobble and boulder fields, seamounts, soft substrate burrows and mounds, structures made from remains of organisms (such as the oyster shell reefs of Foveaux Strait and the bryozoans rubble reefs of Spirits Bay), and all biota physically attached to such features.

23 The point at which physical disturbance of the features of the seafloor becomes unacceptable, and hence breaches the Protection Standard, will differ depending on the particular habitat. For example, a sandy, high energy habitat will be able to sustain significantly more physical impact than could Fiordland's 'china shops' (commonly associated with brittle coral structures). The relative difference in vulnerability associated with these two habitats will dictate the practices that may be able to operate in them and still meet the Protection Standard. An important point to note is that the Protection Standard is a consistent standard – it does not vary among environments, nor is it adjusted based on the risk to, or the vulnerability of, that environment to impact.

7.2 Planning Principle 2(b): maintenance and recovery at the site of ecological systems, natural species composition (including all life history stages) and trophic linkages

24 The second consideration is primarily concerned that activities do not result in a fundamental alteration of the ecological processes that are required to ensure the system remains in a healthy functioning state at the habitat and ecosystem level.

25 For the purposes of the MPA Policy and this Protection Standard, the terms used in 2(b) are interpreted as follows. 'Ecological systems' refers to the relationships between organisms and their physical environment, and the interrelationships among species.

26 'Natural species composition' is capable of being interpreted in different ways. It could be interpreted as requiring the complete removal of a species to alter the natural species composition; or, at the other end of the spectrum, it could mean that any removal at all would alter the natural species composition. Neither of these would be an appropriate interpretation under the MPA Policy.

27 In the context of the MPA Policy, 'natural species composition (including all life history stages)' is considered to be the combination of species that would occur naturally in the area. Given that any ecosystem or habitat in the marine environment is the result of the interplay between historical species composition, the physical environment (particularly the frequency and extent of disturbance) and the availability of settlement propagules and other sources of replenishment, the natural species composition for any given area may naturally be a constantly changing mosaic. In addition, the relative proportions of species present in an area will change naturally, depending on the influence of physical factors, such as water temperature and the availability of nutrients. In many cases, some biomass may be able to be removed whilst still maintaining the natural composition, but not to the extent that significantly depletes a species, or any life history stage.

28 'Trophic linkages' means the feeding relationships among different organisms, for example, predator/prey relationships. In the context of the MPA Policy, this means limiting removals from a system to a level that allows the system to be maintained at, or recover to, a healthy functioning

and replenishing state. Biological removals should not result in any trophic cascade,[1] prey switching or other material alteration to natural feeding behaviour.

7.3 Planning Principle 2(c): potential for the biodiversity to adapt and recover in response to perturbation

29 If the human effects on a site are such that its biodiversity is unable to adapt and recover, it is almost certain that one of the considerations discussed in 7.1 or 7.2 have been violated. Whilst some level of disturbance is consistent with Planning Principle 2(c), any perturbation that renders a system incapable of returning to its natural state is likely to be the result of considerable disturbance of the benthic environment and/or biological extraction well in excess of that contemplated by 2(a) and 2(b) above.

30 The potential of biodiversity to adapt and recover will largely be determined by the productivity of the system and the generation times of the key species. Key species may include those that form biogenic habitat or are functionally important to the ecosystem. This is particularly so in relation to disturbance in the deep ocean where conditions are generally very stable, growth is very slow and recovery times may be measured in hundreds of years.

31 Although there is a general consensus among scientists that if Planning Principles 2(a) and 2(b) are met, 2(c) will also be met, the latter is important in choosing between potential MPA sites. This is because we should avoid areas where past human activities have resulted in changes that would mean an area cannot recover to a natural state. These might include areas of past extensive sediment extraction, or areas with ongoing sedimentation or pollution problems. Fortunately, instances of past human activity resulting in the biodiversity of a site not being able to recover are thought to be rare in New Zealand.

8.0 Other Planning Principles Important to the Application of the Protection Standard

32 This section discusses aspects of three other Planning Principles in the MPA Policy which are also important to the application of the Protection Standard. These principles are:

- Planning Principle 5: Adverse impacts on existing users of the marine environment should be minimised in establishing MPAs
- Planning Principle 7: Best available information will be taken into account in decision-making
- Planning Principle 8: Decision-making on management action will be guided by a precautionary approach

8.1 Planning Principle 5: Adverse impacts on existing users of the marine environment should be minimised in establishing MPAs

[1] Trophic cascades occur when predators in a food chain reduce the abundance of their prey, thereby releasing the next lower trophic level from predation

33 Planning Principle 5 states, in part:

> 'MPAs are more likely to be established in a timely and efficient manner where appropriate recognition is given to the rights and responsibilities of users of the marine environment. Gaps in the network may be able to be addressed at a number of different sites, and the Protection Standard will be able to be met using a variety of management measures.
>
> Where there is a choice of several sites, which if protected would add similar ecosystems or habitat to the MPAs network, the sites(s) chosen should minimise adverse impacts on existing users and Treaty settlement obligations. Where there is a choice to be made among minimum impact sites, selection may also be guided by:
>
> a) Accessibility for management and enforcement requirements; and
>
> b) Benefits such as scientific study, educational, diving and tourism opportunities.'

34 New Zealanders place considerable value on using the sea. Planning Principle 5 is important because, where there are choices between several sites to fill a particular gap in the network, it guides the choice of an MPA away from areas where there would be higher impacts on existing users. The aim of Planning Principle 5 is to achieve biodiversity protection while still obtaining, as far as possible, the values we currently receive from our use of the sea. In New Zealand our small population means there are many sites that can be protected without impacting significantly on existing users.

35 Planning Principle 5 is also important because, as well as minimising impacts on existing users, selecting sites away from areas of higher human use may also better achieve the desired long term outcome of biodiversity protection. This is because remote sites are less likely to be affected by human-induced impacts such as pollution and sedimentation, which means MPA sites remote from human activities and threats are more likely to be viable in the long term. Planning Principle 5 recognises that accidents, such as unexpected pollution spills or invasive species incursions, happen from time to time, but more frequently closer to population centres, areas of developed land (farming, forestry etc) and areas of higher human use. However, there may be times where the only examples of certain habitat types are in areas of higher human use. In such cases, care will need to be taken to address biodiversity threats.

36 Another advantage of choosing sites remote from human uses is that fewer management tools may be required to meet the Protection Standard, making it easier to implement the MPA network.

8.2 Planning principle 7: Best available information will be taken into account in decision making

37 Planning Principle 7 states:

> 'Understanding of marine habitats and ecosystems is limited, as is information on current uses and the effects of those uses on biodiversity. MPA decision-making will be informed by the best available information. Best available information means the best information relating to ecological, environmental, social, cultural and economic aspects of the marine environment that is available without unreasonable cost, effort or time.'

38 Planning Principle 7 confirms that decisions must be made with readily available information and it is not appropriate to go to great expense or time or effort to obtain additional information.

39 Planning Principle 7 also means that we cannot ignore information. All information relevant to the application of the Protection Standard must be taken into account in decision making. Under New Zealand law, in implementing legislative management tools, all decisions must be based on the best information available at the time the decision is made.

8.3 Planning principle 8: Decision-making on management action will be guided by a precautionary approach

40 Planning Principle 8 states:

> 'Management actions to implement MPAs should not be postponed because of a lack of full scientific certainty, especially where significant or irreversible damage to ecosystems could occur or indigenous species are at risk of extinction.'

41 The precautionary approach is important for two reasons. First, it confirms that we need to proceed to make MPA decisions even where information is uncertain. Second, because the goal of the MPA Policy is biodiversity protection, where information is uncertain, we need to err on the side of biodiversity protection in the selection of both MPA sites and management tools. Each agency will need to apply the precautionary approach in a manner consistent with its statutory obligations.

9.0 Applying the Protection Standard in Practice

42 This section of the document explains how the Protection Standard should be applied in MPA decision making. In particular, it talks about:

- 9.1 Knowledge constraints in applying the Protection Standard
- 9.2 The implications of progressing where information is uncertain
- 9.3 The importance of monitoring biodiversity outcomes
- 9.4 Guidance on applying the Protection Standard to different human activities

9.1 Knowledge Constraints in Applying the Protection Standard

9.1.1 Applying the Protection Standard in theory

43 As discussed, the Protection Standard is an outcome-based standard that requires all MPA sites to be protected by a management regime that enables their biological diversity to be maintained at or recovered to a healthy functioning state at the habitat and ecosystem level.

44 Ideally, in applying the Protection Standard and deciding what management tools are required to meet the biodiversity outcome, we would have good information to inform our decisions. We would understand how the marine habitats and ecosystems we are trying to protect function. We would have good information on the current and foreseeable human uses of the site. We would know what level of biological and physical disturbance would result in not meeting our biodiversity outcome, and hence breach the Protection Standard.

45 Those human uses that singularly or cumulatively[2] breach the Protection Standard would then be managed by selecting appropriate management tools. Alternatively, the area could be rejected as a potential candidate for inclusion in the MPA network.

46 Monitoring would then be conducted across the MPA network to ensure all the management tools used met the Protection Standard. Where monitoring revealed an MPA was not meeting the Protection Standard, and therefore put the desired biodiversity outcomes at risk, the management tools would need to be reviewed.

9.1.2 Applying the Protection Standard in practice

47 Unfortunately, our understanding of marine habitats and ecosystem processes is limited, as is information on current uses and their effects on biodiversity. It is often said that our understanding of marine ecology is 50 years behind our understanding of terrestrial ecology.

48 While government departments will continue to undertake research to support MPA implementation, it will take many years before we have sufficient information on how our activities affect marine biodiversity and, though knowledge will improve over time, it is unlikely that we will ever fully understand marine ecosystem functioning.

49 Government decisions and international agreements, based on scientific advice, state that we need to protect biodiversity sooner rather than later to ensure our uses of the sea are sustainable in the long term. Within this context, the MPA Policy states we must ensure the Protection Standard is practical and can be applied without unduly onerous data requirements that would unnecessarily delay MPA implementation.

50 This means that, in applying the Protection Standard, we need to exercise a level of judgment about which human activities are likely to result in the Protection Standard being met – any that do not breach the standard will be deemed appropriate in an MPA. We will need to make the best decisions we can with the information that we have, or that is readily available.
In exercising judgment, we need to take into account:

- ♦ The best available information (see Planning Principle 7)
- ♦ The precautionary approach (see Planning Principle 8)

51 Specific guidance on applying the Protection Standard to a range of human activities is provided in 9.4. This is based on MFish's and DOC's interpretation of the best information available and application of the precautionary approach.

9.2 The Implications of Progressing where Information is Uncertain

52 As discussed in paragraphs 34-36, Planning Principle 5 states that adverse impacts on existing users of the marine environment should be minimised when establishing MPAs. A disadvantage of progressing MPA planning without complete information is that, in taking into account the best available information and precautionary approach, some human activities may be prohibited in an MPA even though they would be acceptable at that site if no MPA was established. This may cause conflicts within the Marine Protection Planning Forums, particularly if one group feels they have been more harshly treated than is justified by the Protection Standard.

[2] When considering the effects of human activities we cannot consider the impacts of individual activities in isolation. We need to consider the cumulative effects of all activities occurring in the area. For example, each individual type of activity, when considered on its own, may meet the Protection Standard and potentially be allowed to continue within an MPA. However, when you consider the cumulative effects of all the human activities together, they may well breach the Protection Standard and together prevent the maintenance and recovery of the biodiversity of the area.

53 Information constraints mean we may not always be able to ensure the choice of management tools for any particular site are those we would choose if we had full information, and this increases the need to work closely with affected users when selecting MPA sites, to minimise adverse impacts on their activities.

9.3 The Importance of Monitoring Outcomes

54 Because we are making decisions without complete information, and because human uses of a site will change over time, it is important we monitor the MPA network to ensure our biodiversity outcome is achieved. The monitoring process will help review any assumptions we made when establishing the MPA network and implementing the Protection Standard.

55 Network Design Principle 6 states that a monitoring programme will be undertaken. The monitoring programme will assess the MPA network's viability, and the effectiveness of individual MPAs at achieving their own specific biodiversity objectives. For each MPA, the monitoring programme will be based on the:

- Site's biodiversity objectives – based on the attributes of the habitat and ecosystem
- Performance of the MPA management tools

56 Where monitoring reveals that current management tools are not adequately protecting the site, the management tools for that MPA will need to be reviewed.

57 We will continue to improve our MPA network as the monitoring results and new research reveal more about how human activities affect marine biodiversity.

9.4 Guidance on Applying the Protection Standard to Different Human Activities

58 This section provides practical guidance for regional Marine Protection Planning Forums on applying the Protection Standard to a range of human-induced threats to biodiversity (the following list is in no particular order):

9.4.1 Human-generated pollution

9.4.2 Human-generated sedimentation

9.4.3 Mining and prospecting

9.4.4 Harbour dredging and spoil disposal sites

9.4.5 Marine construction projects

9.4.6 Tidal and wave energy generation projects

9.4.7 Biosecurity

9.4.8 Aquaculture

9.4.9 Tourism and visitor based disturbance

9.4.10 Scientific/research activities

9.4.11 Fishing

59 This guidance is based on DOC's and MFish's interpretation of the best available information, application of the precautionary approach and other MPA planning principles. The guidance will also be used to help agencies determine whether existing management tools operating around New Zealand already offer sufficient protection for the sites they apply to to become MPAs.

60 We recognise the assumptions we have made about the impacts of various human activities may not be correct in every circumstance. Where better (authoritative and reliable) information is available on the effects of human activities, regional forums should take this into account in applying the Protection Standard.

61 Government departments will continue to undertake research to improve our understanding of how human activities affect marine biodiversity. Universities and stakeholder groups are also likely to contribute relevant information. The guidance provided in the sections 9.4.1-9.4.11 of this document will be updated as new information becomes available.

62 We also hope stakeholders will continue to provide additional information where they consider it is needed to correctly interpret the effects of their activities on biodiversity.

9.4.1 Applying the Protection Standard to human-generated pollution

63 There are many types of human-generated pollution that may impact on biodiversity. These include pesticides, nutrients, heavy metals, industrial effluent, sewage and hydrocarbons.

64 Sources of pollution into the sea include point and non-point discharges, such as land run-off, sewage and effluent discharges, other point source contamination, and accidents such as oil spills.

65 Pollutants are generally more of an issue closer to human populations and developed land. Pollution will be a significant challenge for MPAs located close to urban areas.

66 The effects of pollutants depend on their concentration, toxicity and how quickly they disperse or break down in the marine environment. Pollutants can damage the physical and biogenic structures of the seafloor (Part 2(a) of the Protection Standard). Pollutants can impact on species composition and tropic linkages (Part 2(b)), and can also affect the ability of an area to recover if they are not managed or remain in the environment for long periods of time (Part 2(c)). Consequently, MPAs should not be located in areas where pollution cannot reasonably be controlled and would prevent the maintenance or recovery of the biodiversity at a site.

Information on pollutants

67 Regional and district councils and unitary authorities regulate and monitor many sources of coastal pollution. They also have information on effluent and storm water discharges that can help identify MPA sites away from areas of higher pollution risk. DOC and MFish will work with regional authorities to provide relevant information to Marine Protection Planning Forums.

Tools available to manage pollutants

68 Addressing pollution threats will involve working closely with regional and district councils and unitary authorities. Discussions should be held with these local authorities where information suggests pollution is a concern. Management of pollution sources can occur through rules in regional and district plans, conditions on discharge consents, and infrastructural changes, such as improved storm water and effluent treatment and discharge systems. Public education can also be

used to help manage pollution risks. Note that tools under the Resource Management Act 1991 (RMA) are only available out to 12 nautical miles.

69 Managing sources of pollution is particularly complex in urban areas and areas of land development. For this reason, it will often be more practical to simply choose MPA sites away from areas of higher pollution risk, such as effluent and/or storm water discharges. Pollution risks will also be lower at sites more remote from human activities.

70 There may need to be a compromise, however, where there are otherwise few opportunities to represent uncommon habitats within the network. In such cases, the prospect of better managing pollution over time should also be considered.

71 Where the only choices of a particular habitat or ecosystem are within areas of higher pollution risk, we may have no choice but to establish an MPA and work with regional councils to better manage pollution over time.

9.4.2 Applying the Protection Standard to human-generated sedimentation

72 Sedimentation is the deposition of organic and inorganic matter onto the seafloor. Marine habitats and ecosystems are adapted to certain natural rates of sedimentation. Increased levels of sedimentation resulting from land use can impact on the physical and biogenic structures of the seafloor (Part 2(a) of the Protection Standard), and ecological systems, natural species composition and trophic linkages (Part 2(b)). Ongoing sedimentation, if not managed, can prevent the biodiversity of a site from recovering (Part 2(c)).

73 By way of guidance, localised sedimentation that is not significantly above natural levels would be no reason to disqualify an area from being an MPA. Where sedimentation is a problem, we will need to look at:

- How high the sedimentation rates are above natural levels
- The vulnerability of the habitat to increased sedimentation rates
- The energy of the receiving environment in terms of its ability to shift sediment
- The likelihood of a management response to reduce sedimentation rates

As a rule, hard substrate habitats (rocks, gravels and sand) and biogenic structures are typically more sensitive to sediment-induced change than soft mud or silt-dominated habitats.

Information on sedimentation

74 Regional councils and unitary authorities monitor sediment loading in major rivers and can often provide information about which river plumes contain higher levels of sediment. For example, Environment Waikato has 100 monitoring sites in its river network. MFish and DOC will work with councils to provide information on sources of sedimentation into the coastal environment.

Tools available to manage sedimentation

75 Regional councils and unitary authorities have jurisdiction under the RMA for managing land and sea-based activities that contribute to increased sedimentation. Discussions should be had with these authorities where information suggests sedimentation is a concern.

76 Regional councils and unitary authorities around the country are already undertaking work to reduce sedimentation. This includes initiatives to educate land owners, funding to plant stream margins and fence stock away from waterways, and encouraging sustainable land use practices

with respect to vegetation clearance and forestry management practices. Rules can also be established in regional plans, and conditions placed on resource consents, to reduce the amount of sediment entering waterways.

77 However, because increased sediment loading is often from numerous sources and/or the result of historic land management practices, management is complex and there are often no quick fixes. Consequently, it may be more practical, where feasible, to avoid establishing MPA sites in areas where sedimentation is known to be a problem.

9.4.3 Applying the Protection Standard to mining and prospecting

78 Mining is the extraction of minerals from the seafloor. Prospecting is the activity of investigating a region to determine areas that would yield mineral deposits. Both mining and prospecting can result in physical disturbance of the seafloor and associated communities.

79 Extractions of sediments (normally gravel and sand) from the seabed are likely to have a high impact on the physical and biogenic structures of the seafloor and on the aquatic life associated with those structures. Consequently, it is reasonable to assume anything more than minor extraction of sediment samples would not meet Parts 2(a), 2(b) and 2(c) of the Protection Standard. Minor extractions would need to be considered on a case-by-case basis.

80 Drilling for mineral exploration or production, however, may have limited impact on the seafloor and may be acceptable in an MPA. Consideration needs to be given to the number of drill sites, the supporting onsite infrastructure, and the ecological effects of the activity, including sedimentation and/or pollution risks (such as, hydrocarbon leaching) and physical impact.

81 Whether other mining and prospecting activities are appropriate will depend on the extent and frequency of the operation and its impacts on the physical and biogenic structures of the seafloor and natural species composition. This will need to be assessed on a case-by-case basis using best available information.

Information on mining and prospecting

82 Mining and prospecting are both managed under the Crown Minerals Act 1991, administered by the Ministry of Economic Development, and, if within 12 nautical miles, the RMA. Marine Protection Planning Forums will be provided with information on current and foreseeable mining and prospecting activities in their region.

Tools available to manage mining and prospecting

83 Within the Territorial Sea (within 12 nautical miles), a resource consent from the relevant regional council or unitary authority is likely to be required to authorise the occupation of the seabed and any other adverse effects on the environment caused by prospecting, exploration, and mining (such as disturbance of the seabed).

84 Where a large area of the coastal marine area is required to be occupied for the mining activity, this is likely to be a restricted coastal activity, for which the Minister of Conservation is the consent authority under the RMA. Where a resource consent has been secured, an access arrangement with the Minister of Conservation is also required under the Crown Minerals Act. Any of these authorisations or consents can have conditions that prohibit or control mining and prospecting activities within MPAs.

9.4.4 Applying the Protection Standard to marine construction projects

85 There are a range of different construction projects that occur from time to time in the sea. These include laying and maintaining pipelines and cables, and building seawalls, groynes, breakwaters, marinas, jetties, piers and moorings.

86 All construction projects will result in some disturbance of the physical and biogenic structures of the seafloor and associated communities. Whether construction projects would breach the Protection Standard depends on their scale and the sensitivity of the habitats and ecosystems to disturbance.

87 As a guide, larger construction projects that have a high impact on the physical and biogenic structures of the seafloor and associated communities would not meet Parts 2(a), 2(b) and 2(c) of the Protection Standard. Smaller scale disturbances due to construction would need to be considered on a case-by-case basis. However, it is expected that minor disturbances caused by anchoring a mooring buoy, the laying of surface cables, or driving of piles would generally be acceptable within an MPA and would still allow for the maintenance and recovery of the biodiversity of a site. Care will need to be taken where the seabed contains fragile biophysical features, or for those that would take a long time to recover in response to disturbance.

Information on construction projects

88 Construction projects within 12 nautical miles of the shore that establish structures and/or result in disturbance of the seabed are likely to require an RMA resource consent from a regional council or unitary authority. Between 12 and 200 nautical miles, Maritime New Zealand is responsible for authorising construction activities. MFish and DOC will provide information to Marine Protection Planning Forums on known or foreseeable construction projects in their region.

Tools available to manage construction projects

89 Regional coastal plans can contain objectives, policies and rules to ensure the effects of construction projects are avoided in established MPA sites. Councils can also place conditions on resource consents to mitigate the effects of construction activities on MPAs.

90 Maritime New Zealand can also put conditions on an authorisation beyond 12 nautical miles to avoid the impacts of construction projects on MPAs.

9.4.5 Applying the Protection Standard to tidal and wave energy generation

91 A range of tidal and wave energy generation projects are currently being investigated around our coast. The establishment of tidal or wave turbines, like any construction project, will result in some level of disturbance of the physical and biogenic structures of the seafloor and associated communities. Whether these activities would prevent the maintenance or recovery of the biological diversity of a site will depend on their scale and the sensitivity of the habitats and ecosystems to disturbance.

92 The development of renewable sources of energy, however, is important to our economy, our national identity and in ensuring the overall sustainability of our activities into the future. For these reasons, it is important, where possible, that we avoid choosing MPA sites that would conflict with known or foreseeable renewable energy generation projects.

Information on tidal and wave energy projects

93 Because of government's interest in renewable energy generation, information is held on proposed projects around the coast. MFish and DOC will provide information to Marine Protection Planning Forums on known or foreseeable projects in their region.

Tools available to manage tidal and wave energy projects

94 Where it is not possible for MPA planning to avoid conflicting with renewable energy generation planning, MFish and DOC will work closely with Marine Protection Planning Forums on management options and tools. As with any construction project, regional coastal plans can contain objectives, policies and rules to ensure the effects of renewable energy generation projects are avoided in established MPA sites. Councils can also place conditions on resource consents to mitigate the effects of construction projects on MPAs.

9.4.6 Applying the Protection Standard to harbour dredging and spoil disposal

95 Harbour dredging is used to maintain shipping access to our ports and harbours. The spoil (dredged material) removed is often disposed of at sea in designated areas. Marine construction projects can also result in the need to dispose of spoil at sea.

96 It is likely, in almost all cases, that the activities of harbour dredging and disposal of spoil onto the seafloor would result in a significant impact on existing habitats and ecosystems, and would therefore not meet Parts 2(a), 2(b) or 2(c) of the Protection Standard. In addition to smothering habitats, spoil from harbours often contains pollutants. MPAs should therefore not be located in these areas.

Information on harbour dredging and spoil disposal sites

97 Regional councils and unitary authorities hold information on current harbour dredging activities and spoil disposal sites within 12 nautical miles of the coast. Between 12 and 200 nautical miles, Maritime New Zealand manages spoil disposal. DOC and MFish will work with regional authorities and Maritime New Zealand to provide relevant information to Marine Protection Planning Forums.

Tools available to manage harbour dredging and spoil disposal

98 Where harbour dredging and spoil disposal would conflict with potential MPA sites, regional authorities and Maritime New Zealand will need to be involved in identifying possible management tools.

99 Regional coastal plans can contain objectives, policies and rules to ensure the effects of construction projects are avoided in established MPA sites. Councils can also place conditions on resource consents to mitigate the effects of construction activities on MPAs.

100 Maritime New Zealand can also put conditions on an authorisation beyond 12 nautical miles to avoid the impacts of construction projects on MPAs.

9.4.7 Applying the Protection Standard to aquaculture

101 Marine aquaculture generally results in a change to the seafloor habitats and species composition beneath, and in close proximity to, the site. Aquaculture is therefore generally not appropriate within an MPA. However, there may be instances where new species are cultured, or new technologies used in deeper water, that do not result in any significant effect on either the seabed or associated species. Such activities will need to be assessed on a case-by-case basis.

102 There is often sufficient scientific information on the site-specific and cumulative effects of existing aquaculture developments in New Zealand to determine whether current aquaculture activities would impact on potential MPA sites located in close proximity. Aquaculture activities, however, are generally well managed and impacts are relatively localised. MPA sites should, in most cases, be able to be established in close proximity to existing aquaculture farms.

Information on aquaculture sites

103 Under the RMA, aquaculture can only occur within Aquaculture Management Areas (AMAs) as defined in regional coastal plans. DOC and MFish will work with regional authorities to provide this information to Marine Protection Planning Forums.

Tools available to manage aquaculture

104 Under the Marine Reserves Act 1971, aquaculture is prohibited from marine reserves. Aquaculture development elsewhere can only occur within AMAs established in regional coastal plans. Rules and policies can be established in coastal plans to manage the potential impacts of aquaculture developments on MPAs.

9.4.8 Applying the Protection Standard to areas of high biosecurity risk

105 There is already a range of introduced marine pests in New Zealand, such as *Undaria pinnatifida* and *Didemnum vexillum*. Other introduced pests may arrive in the future.

106 Introduced pest species can negatively impact on the biogenic structures of the seafloor (Part 2(a)). They can alter ecological systems, natural species composition and trophic linkages through changes to predator, prey and competitor relationships (Part 2(b)). Also, because once introduced to an area they are difficult to eradicate, they can prevent an area from recovering (Part 2(c)). MPAs should therefore not be located, where feasible, in areas where there is a high biosecurity risk.

107 International shipping is the main vector for introducing marine pests into New Zealand. Once in New Zealand, ships and boats are the main vector for transporting pests around the country. Movement of marine structures and gear between locations can also spread invasive species.

108 Invasive species incursions, to date, have centred on harbours, ports and marinas and other areas of high boating activity. Once introduced to a new site, exotic species may spread naturally from the point of introduction. The rate of spread depends on how successfully the organism grows in New Zealand conditions and its natural dispersion rates.

Information on biosecurity threats

109 Biosecurity New Zealand is responsible for managing pest species and holds information on their known distribution and threats to marine biodiversity. DOC and MFish will work with Biosecurity New Zealand to provide information to Marine Protection Planning Forums.

Tools available to manage biosecurity threats

110 There are a number of tools under the Biosecurity Act (1993) that can be used to control human activities that may contribute to the spread of pest species. Public education is also an important component of management.

111 Where biosecurity tools are required to manage threats from invasive pests to a proposed MPA, Biosecurity New Zealand will be involved in the planning process. Actions to manage biosecurity threats in MPAs may also be undertaken under other legislation, including the Marine Reserves Act and Resource Management Act.

112 In MPA planning, biosecurity risks can also be mitigated by choosing, where feasible, MPA sites away from harbours, ports and marinas, as these areas are a new invasive species' most likely first points of introduction to a region.

9.4.9 Applying the Protection Standard to tourism and visitor disturbance

113 Declaring an area an MPA may result in an increase in visitor numbers, particularly if the MPA contains interesting features. However, this will depend on the remoteness of the site.

114 Tourists or visitors to an MPA would generally have a low negative impact on biodiversity. However, high numbers of visitors may put pressure on a site. For example, anchoring vessels can damage the physical and biogenic structures of the seafloor. Feeding fish can also affect the composition of marine communities.

Information on tourist and visitor numbers

115 Records are generally not kept of visitor numbers to different sites around our coast. Anecdotal information on the current visitor numbers of a proposed MPA site can be used by Marine Protection Planning Forums to identify if there is likely to be a problem.

Tools available to manage tourism and visitor disturbance

116 Under the Marine Reserves Act, DOC can establish regulations to control visitor disturbance if this becomes an issue. The Department has also located mooring buoys within a number of existing marine reserves to avoid disturbance from anchors.

117 However, there are no tools in the current legislation to control visitor numbers outside a marine reserve. For this reason, education will be an important tool in managing visitor disturbance. Most people will avoid causing damage if they are aware of the problem.

118 In addition, most commercial tourism operators already have in place voluntary codes of practice to reduce any impacts on sites, and to educate their clients.

9.4.10 Applying the Protection Standard to scientific/research activities

119 A range of scientific/research activities are conducted in the sea. This includes research into both the use of marine resources, and how we manage the impacts of those uses. Research projects are often short term and small in scale, and would not normally prevent the maintenance or recovery of the biodiversity of a site.

Information on scientific/research activities

120 Any scientific/research activities that require the taking of fish, aquatic life or seaweed need a permit under the Fisheries Act, administered by MFish. In addition, where scientific/research activities require the establishment of structures or cause disturbance to the seabed, a resource consent is required from a regional council or unitary authority. MFish and DOC will ensure Marine Protection Planning Forums have information on current and foreseeable research activities in their region.

Tools available to manage scientific/research activities

121 As mentioned, scientific/research activities can only be conducted with a permit from MFish. In a marine reserve, an authorisation is also required from DOC to conduct scientific research within a marine reserve. Both DOC and MFish would only issue authorisations to conduct research within MPAs where the research would not breach the Protection Standard.

122 A resource consent issued by a regional authority can also have conditions aimed to avoid impacts of scientific/research activities on MPA sites.

9.4.11 Applying the Protection Standard to fishing

123 Fishing is one of the more widespread uses of our sea and, consequently, will be an issue Marine Protection Planning Forums regularly need to consider.

124 The potential effects of fishing on the biodiversity of a site can be split into two categories:

- ♦ The impacts of fishing gear on the structures of the seafloor
- ♦ The impacts of biological extraction

125 Guidance is provided below on the application of the Protection Standard for both of these effects. However, before we consider the potential effects of fishing on biodiversity, we need to be aware of the existing framework to manage fishing sustainably, overseen by the Ministry of Fisheries. This management framework, and how it is applied, is explained in paragraphs 126-130.

How the Ministry of Fisheries manages fishing

126 MFish is tasked with providing for the use of fisheries resources (fishing) while ensuring sustainability. To ensure sustainability, MFish sets total allowable catches (TACs) for fish stocks. TACs are designed to ensure fished populations remain at, or above, maximum sustainable yields. In addition, there are a range of management tools available under the Fisheries Act to help MFish manage the effects of fishing on the aquatic environment (such as, method restrictions and seasonal closures).

127 In ensuring sustainability, MFish must:

- ♦ Maintain the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and
- ♦ Avoid, remedy or mitigate any adverse effects of fishing on the aquatic environment. The aquatic environment means the natural biological resources comprising any aquatic environment, including all aquatic life.

128 In addition, section 9 of the Fisheries Act requires that all persons exercising or performing functions, duties or powers under this Act, in relation to the use of fisheries resources or ensuring sustainability, shall take into account the following environmental principles:

- ♦ Associated or dependent species should be maintained above a level that ensures their long-term viability
- ♦ Biological diversity of the aquatic environment should be maintained
- ♦ Habitats of particular significance for fisheries management should be protected

129 MFish manages the sustainability of fisheries over large geographical areas called Quota Management Areas and Fisheries Management Areas. This means, although fisheries are managed sustainably overall, localised depletion of certain species and physical disturbance of the seafloor can still occur over smaller spatial areas to an extent that would breach the Protection Standard. Where fishing activities in an MPA would prevent the maintenance or recovery of biodiversity at a site, additional management tools, on top of those already in place under the fisheries legislation, will be required to manage:

- ♦ The impacts of fishing gear on the structures of the seafloor

- The impacts of biological extraction

130 As discussed in paragraph 15, Planning Principle 5 states that a marine reserve (within which all fishing is prohibited) will be established to protect at least one sample of each habitat or ecosystem type in the network. The MPA Policy envisages that some level of extraction by fishing may occur within all other samples, providing the Protection Standard is met.

Managing the impacts of fishing gear on the physical and biogenic structures of the seafloor

131 Scientific investigations have been conducted around the world on the impacts of different fishing methods on the physical and biogenic structures of the seafloor. One such study was undertaken in the United States by the Pew Charitable Trusts (Pew).[3] Another study has recently been completed by Fisheries and Oceans Canada.[4]

132 Using the Pew analysis and other research information, we have ranked the most commonly used fishing methods in New Zealand according to the relative severity of their physical impacts on habitats and biogenic structures, as shown in the table below.

Ranking the relative impact of fishing methods (Pew categories) on the physical habitat

Pew Categories	Some common New Zealand fishing methods that fall into each of the Pew categories	Physical Habitat Impacts
Trawl - bottom	bottom trawl, bottom pair trawl, Danish seine	5
Dredging	dredge, mechanical beach harvester	5
Gillnets – bottom	beach seine/drag net, benthic set netting	3
Pots and traps	cod pots, crab pots, fish traps, rock lobster pot, ring net, scoop net, octopus pots	3
Longline – bottom	bottom long line, dahn line, trot line	2
Gillnets – midwater	set net, pair set netting, inshore drift net	1
Longline – pelagic	surface/midwater longline	1
Trawl – midwater	midwater pair trawl, midwater trawl	1
Purse seine	purse seine, lampara net	1
Hook and line	trolling, pole and line, squid jig, diving, hand gathering, rod/hand line	1

5 = Very high impact, 4 = High impact, 3 = Medium impact, 2 = Low impact, 1 = Very low impact

[3] Morgan, L.E., Chuenpagdee, R. 2003. Shifting gears: addressing the collateral impacts of fishing methods in US waters. Pew Science Series.
[4] Rice, J. 2006: Impacts of Mobile Bottom Gears on Seafloor habitats, Species and Communities: A Review and Synthesis of Selected International Reviews. Fisheries and Oceans Canada.

Bottom trawling and dredging not appropriate in an MPA

133 The best information at this time, including the Pew analysis, confirms that bottom trawling, bottom pair trawling, dredging and Danish seining have a high physical impact on the seafloor. It would be reasonable to assume that using these methods in virtually any habitat or ecosystem would not provide for the maintenance and recovery of physical features and biogenic structures that support biodiversity, as required by the Protection Standard.

Assessment of other fishing methods

134 Bottom gillnetting and potting are listed in the Pew analysis as 'medium' to 'low impact'. The appropriateness of these methods in an MPA would require consideration of the vulnerability of its habitats. The nature of the substrate and attachments will be the primary determinant of the acceptability of these methods; in most habitats and ecosystems these methods are likely to be acceptable. In soft substrate or rocky reef habitats, the use of pots or benthic nets is unlikely to cause sufficient damage to the seabed to breach the Protection Standard. However, in habitats that contain biogenic structures or other fragile biota, the use of these methods is likely to cause sufficient damage to breach the Standard.

135 Bottom long lining, mid-water trawling and gillnetting, pelagic long lining, purse seine and hook and line are all considered to have 'low impact' or 'very low impact' on the physical and biogenic environment. It would be reasonable to assume that the use of these methods, provided that they are conducted in a way that has no unacceptable impact on the seabed, would not breach the Protection Standard.

Managing the impacts of biological extraction

136 In addition to managing the effects of fishing gear on the physical and biogenic structures of the seafloor, we also need to consider the effects fishing may have on ecological systems, natural species composition (including all life-history stages), and trophic linkages.

137 Fishing removes predators, prey, competitors and associated species from the habitats and ecosystems we are trying to protect in an MPA. If we remove too many fish from a site, we can potentially affect ecological systems, natural species composition and trophic linkages.

138 The ramifications of fishing differ depending on the species being extracted, the level of extraction and the methods used. The consequences of extraction to the habitat are greater for species that have a closer ecological relationship with, or are more functionally important to, the particular site.

139 For example, a bed of horse mussels may have an important biological role as a refuge and nursery for juvenile fish. Similarly, many benthic species greatly increase habitat heterogeneity, and this has been shown to increase biological diversity. As such, sedentary and less mobile species may have an important role to play in ecosystem recovery and maintenance at smaller spatial scales.

140 In contrast, some highly mobile species that range over greater distances may not obtain any real benefit from prohibitions on harvest imposed at limited spatial scales. Similarly, if these highly mobile species are harvested inside an MPA, the degree of impact may not be substantially different to that which would be realised solely from harvesting outside an MPA; providing overall harvest limits are in place and set at appropriate levels.

141 Between the extremes of sedentary species and those that are highly mobile, there is a range of other situations that need to be considered. Some species studied in the New Zealand

marine environment show site fidelity at some stages during their life cycle or the annual cycle – for example, snapper, kingfish, rig, school shark and hammerhead shark. Some highly mobile or migratory species return and aggregate each year in the same places to breed or feed.

142 Also, some fishing gear does not discriminate between the target species and those species that live in close association. With the possible exceptions of spear fishing and hand-gathering, all classes of fishing gear result in some level of unintended catch.

143 As outlined above, the consequences of fishing extraction are greater for species that have a closer ecological relationship with, or are more functionally important to, the particular site. Often such species (crustaceans, reef fish, etc) are resident in an area and are important to the functioning of the habitats and ecosystems we are trying to protect in an MPA. As such, application of the Protection Standard to determine the effect of biological extraction should focus more closely on species that are immobile or have higher site fidelity.

Situations where a precautionary approach to biological extraction will be required

144 The risk that fishing would adversely affect ecological systems, natural species composition (including all life-history stages), and trophic linkages is likely to be higher in the following situations:

- Where fishing extracts species intentionally or incidentally that are immobile or have high site fidelity (that is, they are ecologically or functionally important to a site).
- Where fishing occurs in shallower water, less than 200 metres in depth. This is because in shallow water, benthic pelagic coupling is known to be stronger. That is, the species targeted by fishers are often in closer association with species that are immobile or have high site fidelity, thereby increasing the risk of incidental catch of those more ecologically important species. In deeper water, however, it is often possible to achieve a physical separation by fishing higher in the water column, as long as an appropriate buffer is in place between this fishing and the benthic species associated with the seafloor.
- Where fishers use intensive harvesting methods that can potentially take larger quantities of fish in each fishing event and/or are less selective in nature (such as purse seining, Danish seining, midwater trawling, midwater gillnetting and benthic netting).
- Where any commercial or non commercial fishing methods are used frequently, and take high volumes of fish from a site.

145 Where current fishing practices involve one or more of these risk factors, a more precautionary approach to MPA site selection and the choice of management tools will be required to ensure biological extraction does not breach the Protection Standard.

Preferred option for managing biological extraction by fishing

146 Ideally, in order to meet the Protection Standard, DOC and MFish consider that specific management controls could be used to limit the catch of species with particular site fidelity, or even more broadly, catch from the MPA as a whole. However, there are significant problems that make this approach difficult to implement:

- It would be difficult to assess the acceptable level of biological removals from an area that still allow it to meet the Protection Standard. It is also difficult to determine what species are important to an area, and how much of each species could be removed without impacting on ecological systems, natural species composition (including all life-history stages), and trophic linkages.

- Because each proposed MPA will have different species and different fishing impacts, separate information and analysis would be required for each one. However, information on the impacts of fishing at spatial scales smaller than Quota Management Areas and Fisheries Management Areas is uncertain, and potentially difficult and costly to obtain.

- Monitoring and controlling catch within an MPA will be expensive, and may result in compliance and enforcement issues.

147 Consequently, we need to consider more practical options for managing the effects of biological extraction within MPAs. While there are number of alternatives, paragraphs 148-160 set out MFish's and DOC's preferred option. The agencies believe this is the most practical way to proceed, given the available information, and will allow the MPA Policy to be implemented in a timely manner. Another two options that stakeholders may want to consider are also discussed in paragraphs 162-164.

Managing fishing methods within coastal MPAs (< 200 m depth)

148 In shallower water, < 200 m depth, target species are often in closer association with non-target species or species associated with the seabed. In line with the precautionary approach, and given the risk factors identified in paragraph 144, MFish and DOC believe it is unlikely that less selective intensive fishing methods would be appropriate in a coastal MPA.

149 As a result, those methods that are less selective and extract larger volumes of biomass (such as purse seining, Danish seining, midwater trawling, midwater gillnetting and benthic netting), even if sustainable under the QMS, are probably not appropriate within coastal MPAs of less than 200 metres depth.

150 The remaining methods – such as benthic longlining, potting, pelagic longlining and hook and line fishing – are generally more targeted and may remove volumes of biomass that could be considered acceptable within an MPA. Consideration will need to be given to:

- The size of the MPA
- The likely levels of biological extraction from the MPA (whether from commercial or non commercial fishing)
- The type of species being extracted and its ecological importance
- The frequency of extraction

151 Note, application of the Protection Standard to existing tools or any assessment to prohibit fishing methods from any MPA using Fisheries Act tools will still have to be considered and implemented on a case-by-case basis, consistent with the legislative provisions and required statutory processes in the Fisheries Act 1996 (see Planning Principles 7 and 8).

Managing fishing methods within deepwater MPAs (> 200 m depth)

152 Because of increasing depth in deepwater MPAs, target species that are well off the sea bottom may not be in as close association with benthic communities. This means that fishing higher in the water column is likely to be more acceptable because of the greater vertical separation between target species and the seabed and associated species.

153 Consequently, in deepwater MPAs, methods such as purse seining, Danish seining, midwater trawling, midwater gillnetting and benthic netting, would be less likely to breach the Protection Standard and would be considered on a case-by-case basis. A suitable buffer, however, would always be required to ensure separation of fishing from important communities associated with the seafloor.

154 There are certain natural features, however, in deepwater greater than 200 metres in depth, where bentho-pelagic coupling is known to be stronger and where additional caution will be required. These include upwelling zones and habitats with pronounced three-dimensional relief, such as seamounts.

Managing extraction where there is no evidence fishing is affecting biodiversity

155 As mentioned, MFish uses a range of tools to manage sustainability overall at the level of the Quota or Fisheries Management Area. In addition, application of Planning Principle 5 should mean, where feasible, MPA sites are chosen to minimise impacts on existing users, including fishers.

156 This means it is likely the areas chosen for MPAs will have low current fishing pressure, and the rates of extraction in MPAs may therefore be acceptable to meet the Protection Standard.

157 Where there is no information to suggest fishing is affecting biodiversity, monitoring should be carried out to ensure that any fishing extraction continues to allow the maintenance or recovery of the site's biodiversity.

Managing extraction where there is evidence fishing might be affecting biodiversity

158 It may be, however, that the only examples of a certain habitat type in a region are within areas of current high fishing use. Where sites are located in these areas, there may be evidence that the quantity of fish being extracted is negatively impacting on the biodiversity of a site. In these instances, there may be a need to consider the use of tools, consistent with the Fisheries Act, to reduce current extraction to a level that would meet the Protection Standard.

No fishing below 1800 metres in an MPA

159 Because of the difficulties of sampling at depths below 1800 metres, little is known about the species that live in very deep water, or how these ecosystems function. Consequently, as a precautionary approach, until more is known, no fishing should be allowed below 1800 m depth in an MPA.

160 There is little, if any, fishing below this level at present, and a ban on fishing in an MPA below 1800 m currently incurs no cost to the fishing industry. Marine resources at or below this level are considered sparse and not presently commercially viable.

Alternative options for managing the impacts of biological extraction

161 The above sections on fishing explain what MFish and DOC see as the most practical way of applying the Protection Standard to fishing. Fishers, however, may have other options how the threats of fishing to biodiversity could be managed.

Alternative management option one

162 One option might be to adopt a more adaptive approach to the management of fishing within MPAs. Rather than banning certain methods, fishers would be able to prove their activities were not breaching the Protection Standard through increased reporting of catches and fishing methods at the scale of individual MPAs. This information on actual fishing use within an MPA,

together with monitoring of the biodiversity of the site, could then be used to manage fishing levels to ensure the Protection Standard was met.

163 This approach would allow better decisions about which fishing activities could continue within MPAs, and minimise impacts on existing users. However, the infrastructure, administration and compliance costs of setting up a system to support additional record keeping at the spatial scale of MPAs would be high, and these costs would mainly fall on fishers. As mentioned, decisions need to be based on best available information, being the information available without unreasonable effort, cost and time.

Alternative management option two

164 Another management option is that fishers could decide to engage in, and rely on, the process of selecting MPA sites to work toward an MPA network that minimises impacts on their existing uses. Having done this, they could then agree to total prohibitions on fishing within those MPAs chosen to form the network.

Information on fishing use

165 MFish will provide relevant information on fishing use to assist regional Marine Protection Planning Forums.

Tools available to manage fishing

166 A range of tools are available under the fisheries legislation to help manage impacts on habitat and target and non-target species (such as, method restrictions, seasonal closures and catch limits). MFish will work closely with Marine Protection Planning Forums on the tools available. More information on fisheries tools is provided in the MPA Policy.

Conclusion

167 This document provides guidance on how the Protection Standard should be applied. MFish and DOC recognise that applying the Protection Standard in practice will not always be straight forward, and will require agencies to work closely with Marine Protection Planning Forums. This will ensure that:

- Additional guidance is provided, where needed, on the management of human threats to biodiversity
- The Protection Standard is applied consistently nationally
- The precautionary approach and best available information principles are appropriately applied
- Recommendations on management tools are consistent with the legislation

Department of Conservation
Te Papa Atawhai

Ministry of
Fisheries
Te Tautiaki i nga tini a Tangaroa

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