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The New Zealand Aquaculture Reform:
An Analysis of the Proposed Scheme for Managing the
Impacts of Aquaculture Development on the Marine
Environment

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I INTRODUCTION

Over the past decade, the rapid expansion of the aquaculture industry has led to an overwhelming increase in marine farming applications. This growth has placed pressure on regional councils to allocate unpolluted, nutrient rich waters for aquaculture use. The coastal marine area is valued by a diverse range of interest groups and competing use of coastal space is increasingly a source of conflict. Such conflict was previously managed through a combination of the processes available under the Resource Management Act 1991, the Marine Farming Act 1971 and the Fisheries Acts (1983 & 1996). In the last five years in particular, the aquaculture industry 'boom' has exposed a number of serious inadequacies in the existing policy and legislative framework for managing aquaculture activities. This exposure has prompted a massive legislative reform to streamline the application process and create a simpler, more efficient method of managing the coast. The Ministry of Fisheries (Mfish), working in conjunction with the Ministry for the Environment (MfE), prepared a discussion paper as the basis for public consultation on the issue in early 2000.¹ The Finance, Infrastructure and Economic Committee (FIN) approved the release of the discussion paper later that year. Following a 3 month public submission period, public meetings and hui were held throughout the country. The outcome of the consultation process was the development of five cabinet papers detailing specific reform proposals and recommendations. The Government agreed to the new policy proposals in November 2001. A two year moratorium on new marine farming applications came into effect in March 2002 with the aim of providing councils with a "breathing space" to implement the necessary changes. An Aquaculture Reform Bill is currently before Parliament. The Bill is expected to be passed before the end of 2003.

¹ Ministry for the Environment & Ministry of Fisheries *Join the Discussion: Public Consultation on the Future Management of Aquaculture: Discussion Document* (Wellington, 2001).

II IMPORTANCE OF AQUACULTURE TO THE NEW ZEALAND ECONOMY

Aquaculture may be defined as "The breeding and growing of aquatic organisms for harvest and use where the organisms are in exclusive possession of the farmer."² It is the fastest growing primary production sector in the world.³ Total sales from the New Zealand aquaculture industry are in an excess of \$300 million annually.⁴ Promoting the national aquaculture industry is therefore estimated to have considerable positive benefits on the national economy. Demand for farmed marine products is expected to increase as wild stocks are depleted, population continues to increase and health and dietary awareness grows. Aquaculture has the potential to supplement the global shortfall in fishery products, estimated to be approximately 30 million tonnes worldwide.⁵ The New Zealand sector is expected to increase four fold by 2020 and the New Zealand Aquaculture Council suggests production may overtake the "capture fishery" by the same year.⁶ Such a dramatic expansion will inevitably require a comprehensive management regime to ensure the sustainability of both the industry and aquatic ecosystems.

The primary purpose of the reform is to support the contribution that the sustainable development of aquaculture can make to the New Zealand economy.⁷ In an ideal situation, this would allow the industry to continue to produce at a steady level indefinitely whilst causing only negligible impacts on the environment.⁸ The pressure is on the aquaculture industry therefore, to create an environmentally

² Fisheries Act 1986, section 68.

³ *Roadshow Presentation: Aquaculture Law Reform* Graeme Coates, New Zealand Aquaculture Council

Ministry for the Environment <<http://www.mfe.govt.nz>> (last accessed 16 June 2003).

⁴ *Roadshow Presentation: Aquaculture Reforms* Matthew Everett, Ministry for the Environment Interdepartmental Steering Group

Ministry for the Environment <<http://www.mfe.govt.nz>> (last accessed 16 June 2003).

⁵ K Price & M Sly "Aquaculture: Creating More Problems Than it is Solving? A New Zealand Perspective on Regulatory and Planning Issues" NELA Conference 2002, 3.

⁶ Ministry for the Environment <<http://www.mfe.govt.nz>> *Roadshow Presentation: Aquaculture Reforms*, Ministry for the Environment. (last accessed 16 June 2003).

⁷ Cabinet Committee on Finance, Infrastructure and Environment *Paper A: Overview of the Proposed Aquaculture Reforms* (November 2001) 3.

<<http://www.mfe.govt.nz/issues/resource/aquaculture/overview-of-the-proposed-aquaculture-reforms-pdf>> (last accessed 4 April 2003).

⁸ World Aquaculture <<http://www.newmex.com/platinum/data/environment/sustain.html>. (last

sustainable industry.⁹ For its part, the government has recognised three principal areas where restraints must be placed on the expansion of the aquaculture industry. The new regime must not undermine the regime already established to sustainably manage capture fisheries, must not undermine Treaty settlements and must not allow adverse effects on the environment.¹⁰ To ensure these objectives are upheld, the government maintains it is necessary to establish a prescriptive, planned approach to managing the growth of the industry without adversely affecting the ecological health of the marine ecosystem.¹¹

accessed 22 July 2003).

⁹ World Aquaculture <<http://www.newmex.com/platinum/data/environment/sustain.html>> (last accessed 22 July 2003).

¹⁰ Cabinet Committee on Finance, Infrastructure and Environment, "Paper A: Overview of the Proposed Aquaculture Reforms" (November 2001), 1. <<http://www.mfe.govt.nz/issues/resource/aquaculture/overview-of-the-proposed-aquaculture-reforms-pdf>> (last accessed 4 April 2003).

¹¹ K Price & M Sly "Aquaculture: Creating More Problems Than it is Solving? A New Zealand Perspective on Regulatory and Planning Issues" NELA Conference 2002, 3.

III PRINCIPAL ARGUMENTS PUT FORWARD IN THIS PAPER

The Aquaculture reform recognises the importance of the substantial potential benefits of an expansion in the aquaculture industry for the New Zealand economy. However, the reform stresses the importance of ensuring this expansion does not cause serious adverse effects to the health of the aquatic ecosystem and surrounding coastal marine environment. The reform process has provided a comprehensive basis for providing for the future management of increasingly complex issues facing the coastal marine environment. However, given the uncertainties surrounding the carrying capacity of the aquatic environment and its ability to sustain an expansion in aquaculture development, a precautionary approach to the new regime should be taken. Subsequent changes and additions to the management regime may be needed as further complexities unfold.

By requiring regional councils to create Aquaculture Management Areas, the new legislative framework ensures far greater control over the spread of the aquaculture industry. This is a crucial step in achieving sustainable management as the location of marine farms is considered to be the most effective tool in managing the environmental effects of marine farming.¹² Determining where to locate Aquaculture Management Areas in order to provide for the least possible adverse environmental impacts however, requires the expenditure of considerable resources and not all councils have the resources to undertake this task adequately.¹³ Addressing this problem may require financial assistance to fund baseline studies to investigate the carrying capacity and threshold tolerances of the marine environment and its vulnerability to aquaculture activities. Councils may need more thorough and comprehensive guidance as to how to operate under the new regime.

An adaptive approach to aquaculture management is necessary to ensure sustainability and should be required under the new legislation. Regional Councils should utilise this approach in regional coastal plans. The importance of extensive and

¹²World Aquaculture <<http://www.newmex.com/platinum/data/environment/sustain.html>> (last accessed 22 July 2003).

continual monitoring should not be overlooked. The promulgation of national monitoring guidelines may be necessary to ensure adequate monitoring programmes are implemented nationwide. A commitment to act if monitoring programmes indicate failures in control and compliance regimes or threats to ecological values should be a legislative requirement.¹⁴ Weakness in the enforcement provisions of the Resource Management Act may need to be addressed. In addition, given the potential for aquaculture activities to encourage the introduction and facilitate the spread of exotic species, it may be necessary to consider the development of a national pest strategy.¹⁵

Finally, although the reform acknowledges the need for a “nationally coordinated and strategic approach” to the management of aquaculture, a more comprehensive and prescriptive approach than that provided for in the current reforms seems to be required.¹⁶ This may involve the development and application of nationally standardised consent conditions. These would ensure that management plans, monitoring programmes and staged development would all be controlled and enforced in a consistent manner. The potential to develop a set of national policy objectives in the New Zealand Coastal Policy Statement or establish criteria for environmental assessment and monitoring in the form of National Environmental Standards should also be investigated. The success of such national guidance is dependent on establishing rules and policies which are applicable nationwide yet remain sufficiently specific to be effective at a regional level.

¹³ K Price & M Sly, above, 5.

¹⁴ U.C. Barg *Guidelines for the Promotion of Environmental Management of Coastal Aquaculture Development* FAO Fisheries technical paper 328 (Food and Agriculture Organisation of the United Nations, Rome 1992) 2. <<http://www.fao.org/docrep/t/697e/t0697e03.html>. (last accessed 24 July 2003).

¹⁵ Ministry of Agriculture and Forestry *Aquaculture-Join the Discussion* (submission to Ministry of Fisheries and Ministry for the Environment Pacific Eco-Logic Ltd, Wellington, 2001).

¹⁶ Cabinet Committee on Finance, Infrastructure and Environment “Paper B: Improvements to the Coastal Planning Regime for Aquaculture” (November 2001), 4. <<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>. > (last accessed 4 April 2003).

IV PROBLEMS WITH THE EXISTING POLICY & LEGISLATIVE FRAMEWORK¹⁷

The existing legislative framework did not allow for an “integrated planning and decision-making framework” capable of managing issues relating to the carrying capacity of the aquatic ecosystem whilst allowing greater national benefit to be realised from the allocation and use of coastal space.¹⁸ This legislative failure can be summarised as follows:

A Multiple Legislative Regimes

The interface between the Resource Management Act and the Fisheries Acts do not enable concurrent consideration of sustainable management, the carrying capacity of the aquatic ecosystem, and the cumulative effects of aquaculture activities to be comprehensively assessed. Under the existing regime, regional councils were unable to consider the impact of aquaculture development on fishing. This assessment was carried out by the Ministry of Fisheries through the provisions of the Fisheries Acts. The Ministry of Fisheries applied an Undue Adverse Effect (UAE) test to determine whether an application for marine farming would be detrimental to fishing or related fishing interests. The conclusion drawn from the test was then used to determine whether a permit should be granted for marine farming in a particular area. Regional Councils were left to consider the interests of other stakeholders such as community groups, recreational fishers and Tangata Whenua. The existing planning approach did not allow any consideration of the full range of options for coastal space in an integrated manner.

¹⁷ See Figure 1

¹⁸ Cabinet Committee on Finance, Infrastructure and Environment, “Paper A: Overview of the Proposed Aquaculture Reforms” (November 2001), 2.
<<http://www.mfe.govt.nz/issues/resource/aquaculture/overview-of-the-proposed-aquaculture-reforms-pdf>> (last accessed 4 April 2003).

B Dual Application Process

Moreover under the existing regime, marine farming applications underwent a two step application process. Initially, an applicant was required to obtain a resource consent under the RMA. The application process was subsequently repeated in order to meet the Undue Adverse Effect (UAE) test under the fisheries legislation.¹⁹ This dual process proved to be time consuming, inefficient and wasteful. A more "streamlined and efficient" application process is needed and the responsibilities of the agencies involved need to be clearly defined to avoid overlap, delay and inefficient use of council resources.²⁰

C A 'Gold Rush' of Applications

The speed of growth of the aquaculture industry remains unpredictable and a failure to adequately manage planning for aquaculture has led to a 'gold rush' in marine farming applications. There are three prime causes of this proliferation in applications. Firstly, the default rule for the allocation of space is to process applications on a 'first in first served' basis. This approach does not provide for the controlled growth of marine farming and has lead directly to conflicts both within the industry itself and with the wider community.²¹ The environmental implications of such an approach are particularly worrying. Applications which are less environmentally sound may be granted resource consents simply because a more suitable application had not been put forward at the time.

Secondly, the space in the coastal marine area of most regions is 'free' in comparison with the land based system of property rights. The Resource Management Act does empower regional councils to make coastal occupation charges, but this power is not utilised in the majority of current coastal planning instruments. New Zealand society values the right to the unhindered public access to coastal resources,

¹⁹ Fisheries Act 1996, section 68J.

²⁰ Ministry for the Environment <<http://www.mfe.govt.nz/issues/resource/aquaculture/overview.pdf>> (last accessed 14 April 2003).

hence coastal charges are viewed by many as an infringement of this right.²² This value is recognised in Principle 5 of the New Zealand Coastal Policy Statement. Conflict is therefore inevitable as more coastal space becomes unavailable to the public. With no charge placed on the occupation of coastal space and a system of processing applications on a first come first served basis, applicants for coastal permits have an incentive to lodge applications quickly without a thorough consideration of the environmental effects.

Finally, there is currently no limit placed on the amount of space that an individual applicant can apply for. The RMA does not make clear whether councils have the authority to limit the area that can be covered in one application.²³ Restrictions in coastal plans which detail where aquaculture can and cannot be undertaken is an activity based approach, which may be regarded as conflicting with the effects based approach of the RMA.²⁴ The Resource Management Act approach focuses on enabling applicants to undertake activities provided an assessment is given of how any adverse effects will be avoided, reduced, or mitigated.²⁵ Restricting the areas where aquaculture can take place and creating upper limits on the size of marine farms is a prescriptive rather than an enabling approach to management. The previous enabling approach led to over 47,000 hectares of coastal space being placed in the processing queue up to the time of the moratorium.²⁶ Given the uncertainties surrounding the effects of aquaculture activities, a prescriptive approach to managing the coastal marine environment seems necessary to enable the spread of aquaculture development to be adequately controlled. The government has accepted the need for a prescriptive approach to management and the reform Bill proposes to deal with the above issues in a number of ways.

²¹ Marine Farming Association *Aquaculture-Join the Discussion* (submission to Ministry of Fisheries and Ministry for the Environment Pacific Eco-Logic Ltd, Wellington, 2001).

²² K Price & M Sly "Aquaculture: Creating More Problems Than it is Solving? A New Zealand Perspective on Regulatory and Planning Issues" NELA Conference 2002, 7.

²³ Cabinet Committee on Finance, Infrastructure and Environment "Paper B: Improvements to the Coastal Planning Regime for Aquaculture" (November 2001), 2.
<<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>> (last accessed 4 April 2003).

²⁴ Northland and Whakatane Regional Councils "Monitoring the effectiveness of the NZCPS: Views of Local Government Staff" <<http://www.doct.govt.nz/pdfs>> (last accessed 24 June 2003).

²⁵ Resource Management Act 1991, section 5(1).

V THE PROPOSED REFORM²⁷

The key proposals include:²⁸

- Changing the interface between the Resource Management Act 1991 and the Fisheries Acts so that regional councils are required to consider all environmental effects and fisheries matters *concurrently and at the planning stage* when they are providing for aquaculture under RMA coastal plans. This will be achieved by enabling councils to establish Aquaculture Management Areas (AMA's) where they will be able to control and manage the staged development of aquaculture within these areas. Aquaculture will be classified as a prohibited activity outside of these areas.
- Streamlining the application and environmental assessment process for new marine farms through a single-permit approval process which will be operated under the RMA. The reform will also provide regional councils with the range of prescriptive planning tools needed to deal with the increasing number of coastal permit applications. The previous first in first served approach to allocating permits will be replaced by tendering as the default allocation mechanism.
- Replacing the Fisheries Act 1983 marine farming permit regime with a more straightforward requirement that all fish farms be registered under the Fisheries Act 1996.
- Moving all existing marine farming leases, licences and permits into the new regime.²⁹

²⁶ K Price & M Sly "Aquaculture: Creating More Problems Than it is Solving? A New Zealand Perspective on Regulatory and Planning Issues" NELA Conference 2002, 5.

²⁷ See Figure 2.

²⁸ Cabinet Committee on Finance, Infrastructure and Environment, "Paper A: Overview of the Proposed Aquaculture Reforms" (November 2001), 1.
<<http://www.mfe.govt.nz/issues/resource/aquaculture/overview-of-the-proposed-aquaculture-reforms-pdf>> (last accessed 4 April 2003).

²⁹ Cabinet Committee on Finance, Infrastructure and Environment, "Paper A: Overview of the Proposed Aquaculture Reforms" (November 2001), 2.
<<http://www.mfe.govt.nz/issues/resource/aquaculture/overview-of-the-proposed-aquaculture-reforms-pdf>> (last accessed 4 April 2003).

This paper explores the extent to which the reform proposals deal effectively with the environmental effects, including the cumulative environmental effects, of aquaculture activities.

The reforms were prepared with the primary aim of increasing the potential contribution of the aquaculture industry to the national economy. One of the key restraints placed on the reform process was that it provide for a system to adequately deal with sustainability issues and, in particular, that it assess the cumulative effects of aquaculture on the marine environment.²⁰ Consequently, the reform submission process revealed widespread concern among many interest groups, including the tourism industry, environmental groups and recreational fisher groups, over the conflict between promoting both sustainable development/ environmental protection and expanding aquaculture development.²¹

The reform acknowledges the potentially wide ranging adverse effects of aquaculture development on the environment. The discussion paper defined environmental effects as including effects on natural character, landscape and amenity values, public access, ecological values, Tangata Whenua values, navigation, tourism and extractive fisheries.²² The extent to which the reform proposals address the effects of aquaculture on ecological conditions will be discussed below.

4. Impact of Marine Farming on Ecological Values

The main aquaculture activity in New Zealand is the farming of filter feeding bivalves. The major species farmed are the green lipped mussel and the pacific oyster.²³ These bivalve species are herbivorous and feed on aquatic plants, namely phytoplankton. They therefore do not require feeding, or the addition of chemicals to

²⁰ Cabinet Committee on Process, Infrastructure and Environment, "Paper A: Overview of the Proposed Aquaculture Reform" (November 2001), 1 (<http://www.mfi.govt.nz/press/industry/aquaculture/overview-of-the-proposed-aquaculture-reforms.pdf>) (last accessed 1 April 2003).

²¹ Fisher and Bird, NZ Federation of Freshwater Anglers, *Anglers Join the Discussion* (Ministry of Fisheries and Ministry for the Environment Pacific Road Legal Ltd, Wellington, 2001).

²² Ministry for the Environment & Ministry of Fisheries, *Join the Discussion: Public Consultation on the Future Management of Aquaculture* Discussion Document (Wellington, 2001).

²³ Ministry of Fisheries, <http://www.fish.govt.nz/industry/aquaculture/what-to-farm.htm> (last accessed 1 May 2003).

VI ENVIRONMENTAL CONSIDERATIONS

The reforms were proposed with the primary aim of increasing the potential contribution of the aquaculture industry to the national economy. One of the key restraints placed on the reform process was that it provide for a system to adequately deal with sustainability issues and, in particular, that it assess the cumulative effects of aquaculture on the marine environment.³⁰ Consequently, the reform submission process revealed widespread concern among many interest groups, including the tourism industry, environmental groups and recreational fisher groups, over the conflict between promoting both sustainable development/ environmental protection and expediting aquaculture development.³¹

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³⁰ Cabinet Committee on Finance, Infrastructure and Environment, "Paper A: Overview of the Proposed Aquaculture Reforms" (November 2001), 3.
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³¹ Forest and Bird, NZ Federation of Freshwater Anglers *Aquaculture-Join the Discussion* (submission to Ministry of Fisheries and Ministry for the Environment Pacific Eco-Logic Ltd, Wellington, 2001).

³² Ministry for the Environment & Ministry of Fisheries *Join the Discussion: Public Consultation on the Future Management of Aquaculture: Discussion Document* (Wellington, 2001).

³³ Ministry of Fisheries <<http://www.fish.govt.nz/commercial/aquaculture/about-index.html>> (last accessed 3 May 2003).

the water. Direct measurements of aquatic plants, or phytoplankton, in areas surrounding mussel farms have shown depletion levels to be relatively minor.³⁴ However, estimating the cumulative effects on plankton from multiple farms is extremely difficult. Other potential effects of mussel farms on plankton can only be determined through long term monitoring.³⁵

Overseas experience has shown that fish farming, particularly shrimp and salmon farming, is a major cause of marine environment degradation.³⁶ Atlantic salmon fish farms on coastlines have already caused substantial damage to the environment by releasing food waste, pathogens and chemicals into the water and air. This has had subsequent adverse effects on the habitat of other aquatic species in countries such as Scotland and Norway.³⁷

The New Zealand aquaculture industry also supports sizeable king salmon farms. These species, along with Paua and numerous small industries for flat oyster, freshwater crayfish, grass carp, Malaysian prawns, spiny lobsters and various aquatic plants make up the majority of aquatic species farmed in New Zealand.³⁸ In contrast to bivalves, finfish require feeding. Some of this food is inevitable lost to the environment and results in organic rich wastes, a process commonly referred to as nutrient loading. Faecal and excretory waste adds to the problem. Mussel farms, in contrast, contribute relatively little in the way of excretory waste, the main waste product being shell drop. While mussel farming tends to have a dispersed, less severe effect, the environmental effects of finfish farming are more intense and localised.³⁹

³⁴ Environment Canterbury <<http://www.ecan.govt.nz/Coast/marine-farms/opions-7.html> (30/07/03)

³⁵ R.J Goldberg and others *Marine Aquaculture in the US: Environmental Impacts and Policy Options* (PEW Oceans Commission, USA 2001) 19.

<http://www.pewoceans.org/oceanfacts/2001/11/fact_22988.pdf> (last accessed 23 May 2003).

³⁶ R.J Goldberg and others, above, 22.

³⁷ Planet Ark, *Ecology Body Warns of Dangers of Fish Farms*

<<http://planetark.org/dailynewsstory.cfm/newsid/21818/story.htm> (last accessed 16 August 2003).

³⁸ Marlborough District Council & Marlborough Chamber of Commerce Marlborough Information Website <http://marlboroughinfo.gen.nx/marinefarming_main.asp> (last accessed 30 July 2003).

³⁹ Environment Canterbury <<http://www.ecan.govt.nz/Coast/marine-farms/opions-7.html>> (last accessed 30 July 2003).

The effect of aquaculture structures on water column movements is also potentially disruptive to aquatic ecosystems.⁴⁰ Mussel farming involves floating longlines from which drop-lines carrying mussels are suspended. Pacific oyster farming consists of oysters supported on structures called racks which are erected on the lower intertidal shore. Such farming methods involve minimal fixed structures and the environmental effects are generally less severe than those experienced in salmon or prawn farming. However, the effect of semi-porous marine farm structures on currents and waves is poorly understood as research has tended to concentrate on the effects of solid structures such as those used by the transport, oil and gas industries.⁴¹

Scientific understanding of the vulnerability of many ecologically important aquatic species to aquaculture activities remains speculative. As the basis of the aquatic food chain, the distribution and abundance of phytoplankton and zooplankton is a crucial factor in maintaining the overall health of the marine ecosystem. Water circulation and movement is important in determining the distribution of phytoplankton groups and the rate at which they replenish.⁴² Evidence suggests that deep marine farm sites or those exposed to strong currents are less susceptible to adverse effects than shallower sites.⁴³ Site selection is therefore crucial in preventing the depletion of phytoplankton communities. The most significant effects in phytoplankton reduction are likely to be immediately under the line drops.⁴⁴ There are currently no studies at this fine scale.⁴⁵ However, studies show that ability of phytoplankton populations to rejuvenate is dependent on thresholds which have been estimated to be at varying levels.⁴⁶ As a precautionary measure, therefore, it is imperative that production levels are set well below these estimated thresholds.

⁴⁰ Environment Canterbury, above.

⁴¹ Environment Canterbury, above.

⁴² L Gelhorn *The Problems of intensive Aquaculture on Canada's Atlantic Coast* (Masters of Economics Research Paper, University of Saskatchewan, USA 2001).

⁴³ *Kuku Mara (Forsyth Bay) v Marlborough District Council* (16 July 2002) Environment Court W25/2002, para 95 Kenderdine J.

⁴⁴ Ministry of Fisheries <http://fish.govt.nz/commercial/aquaculture/about_index.html> (last accessed 30 July 2003).

⁴⁵ Ministry of Fisheries, above.

⁴⁶ *Kuku Mara (Forsyth Bay) v Marlborough District Council* (16 July 2002) Environment Court W25/2002, para 117 Kenderdine J.

Changes in the abundance or distribution of phytoplankton may also cause secondary effects. Scientists warn that depleting phytoplankton populations may displace or disturb higher level organisms.⁴⁷ Marine farms are often located in areas frequented by marine mammals, seabirds or fish for the purposes of feeding, migration or breeding.⁴⁸ Although the effects of aquaculture on marine mammals has not to date been sufficiently documented, there is increasing evidence to suggest that the rapid growth of the aquaculture industry may pose a threat to the health and safety of such species.⁴⁹

Changes in the abundance and composition of other species inhabiting the sea floor has the potential to cause changes to the food web over a large area surrounding marine farms. These sea floor species, known as benthic communities, are susceptible to benthic organic enrichment caused by the increase in faecal and excretory waste from marine farms. In severe cases, sea floor sediments may become oxygen depleted and result in the collapse of benthic communities. To date, such a result has not occurred in New Zealand, although there is a paucity of material on large offshore long-line mussel farms from which to make predictions. As a result, studies have made numerous assumptions and generalisations as to phytoplankton depletion, carrying capacity and sustainable production because there is little or no long term data available. As such data is site specific, comparisons with data obtained overseas is usually not appropriate.⁵⁰

Although aquaculture does not pose a unique threat of further introduction of exotic species, it may contribute to their survival and spread. Aquaculture has become a leading vector of aquatic invasive species worldwide.⁵¹ The structures of marine farms can be utilised by exotic marine species already introduced through

⁴⁷ Meri Research <<http://www.meriresearch.org/pdf/potential-impacts-of-aquaculture-on-marine-mammals>> (last accessed 30 July 2003).

⁴⁸ Environment Canterbury <<http://www.ecan.govt.nz/Coast/marine-farms/options-7.html>> (last accessed 30 July 2003).

⁴⁹ Meri Research, above.

⁵⁰ Meri Research, above.

⁵¹ Rosamond L Naylor, Susan L Williams and Donald R Strong "Aquaculture- A Gateway for Exotic Species" (2001) 294 *SCIENCE* 1655, 1656. <<http://www.sciencemag.org>> (last accessed 22 July 2003).

various, unrelated mechanisms such as through ship ballast or via visiting yachts.⁵² Unwanted invasions and their subsequent spread can cause catastrophic results as was evidenced by the invasive Asian kelp *Undaria pinnatifida*.⁵³ New Zealand's geographical isolation has meant that it has fewer introduced exotic organisms than many other countries. Without proper monitoring, aquaculture activities have the potential to threaten New Zealand's unique marine environment.⁵⁴

Despite a firm belief in the ability of the New Zealand coastal marine environment to accommodate an increase in aquaculture activities, there is also widespread recognition that there is a threshold at which further development would lead to a significant impact on the natural ecosystem.⁵⁵ Issues surrounding nutrient loading and the ability of the marine ecosystem to sustain expansion of the aquaculture industry in the long run are likely to be the key problems facing the coastal marine area.⁵⁶ Arguably, these issues have yet to be adequately resolved by the new legislation.

⁵² Environment Canterbury <<http://www.ecan.govt.nz/Coast/marine-farms/opinions-7.html>> (last accessed 30 July 2003).

⁵³ Environment Canterbury, above.

⁵⁴ Ministry of Fisheries <http://www.fish.govt.nz/sustainability/biosecurity/bio_introduction.html> (last accessed 21 June 2003).

⁵⁵ *Kuku Mara (Forsyth Bay) v Marlborough District Council* (16 July 2002) Environment Court W25/2002, para 93 Kenderdine J.

⁵⁶ Interview with Keith Johnston, Department of Conservation (Christina Kersey, 31 July 2003).

VII PROBLEMS WITH THE REFORM PROPOSALS

A Licensing and Permit Regime

The current licensing and permit regime for aquaculture is fragmented and uneven in its application. The reform proposes to streamline the management of land-based aquaculture by removing redundant or overlapping regulatory regimes. The permit application process will now be dealt with solely under the Resource Management Act. All aquaculture activity will take place under a single aquaculture harvesting right called an aqua permit. No separate marine farming permit from the Ministry of Fisheries will be required. One agency (ie. regional councils) will have responsibility for managing all effects of aquaculture on the environment, including effects on fisheries. The current overlap of functions will therefore be removed and regional councils will have responsibility for assessing all of the environmental effects of marine farming on aquatic life and habitat, including fished species.⁵⁷ Regional councils, however, do not currently have sufficient skills and knowledge of the impacts of aquaculture. The provision for improved environmental assessment in the Reform Bill does not appear to adequately address this problem.

At the preliminary planning stage of Aquaculture Management Area (AMA) establishment, councils will initiate discussion with the community, industry and government agencies on issues to narrow down areas potentially available for aquaculture.⁵⁸ The Ministry of Fisheries will make available all documentation on fishing use and sustainability. Environmental concerns will be addressed at this preliminary stage. However, the quality of the information likely to be provided by the Ministry of Fisheries to aid regional councils in the decision making process may not be adequate. The information made available to date has often been patchy and lacking

⁵⁷ Cabinet Committee on Finance, Infrastructure and Environment "Paper B: Improvements to the Coastal Planning Regime for Aquaculture" (November 2001), 1.
<<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>> (last accessed 4 April 2003).

⁵⁸ Cabinet Committee on Finance, Infrastructure and Environment "Paper B: Improvements to the Coastal Planning Regime for Aquaculture" (November 2001), 5.
<<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>> (last accessed 4 April 2003).

in comprehensiveness.⁵⁹ Because regional councils have not previously had to deal with the effects of marine activities on fish stocks, they may expect to receive much more substantial guidance than they are likely to receive at present. This knowledge gap emphasises the need for more research into the actual effects on fished species in particular regions and the knock on effects this entails for the marine ecosystem

The new legislation, however, will better enable regional councils to weigh up the competing uses of the coastal marine area. At the planning stage, they will be able to require the provision of detailed information and advice on the impact of new farm developments on the sustainability of fish resources. The Bill will provide for environmental impact assessment to take place following the amendment to the coastal plan and in accordance with the UAE assessment. After being notified for public submissions, the Council will be required to consider the effects of the proposed AMA, including the impact on the sustainability of fisheries resources and the effect on fishing. In addition to this preliminary assessment, regional councils will still have the ability to consider the impacts of specific proposals under the RMA consent provisions.⁶⁰

B Prescriptive Zoning

Poor site selection is an established causative factor leading to unsustainable marine farming practices.⁶¹ The location of marine farms is considered to be the most effective tool in managing the environmental effects of marine farming.⁶² The reform proposes a more prescriptive planning approach to ensure the coastal space is controlled properly in plan provisions which contain appropriate rules and zones. This approach also better reflects the public open space presumption in the Coastal Marine Area (CMA). The RMA already contains a presumption against allowing occupation of coastal space. The reform proposes a minor amendment to the Act to make the law on this point clear. Provision will be made in the legislation for aquaculture

⁵⁹ Interview with Keith Johnston, Department of Conservation (Christina Kersey, 31 July 2003).

⁶⁰ Resource Management Act 1991, section 108.

⁶¹ World Aquaculture <<http://www.newmex.com/platinum/data/environment/sustain.html>> (last accessed 22 July 2003).

⁶² Environment Canterbury <<http://ecan.govt.nz-greenshell-mussel-farming.pdf>> (last accessed 23 June 2003).

development to take place only within designated AMA's.⁶³ Councils will be required to establish AMA's in their coastal plans. Performance standards would be defined at this stage where possible.

The designation of AMA's within regional coastal plans will enable site selection which should ultimately lead to the establishment of aquaculture zones in areas with the least possible adverse environmental impacts. The Resource Management (Aquaculture Moratorium) Amendment Act, 2002 currently provides that a regional council must not include an AMA in a regional coastal plan unless the regional council is satisfied that the provision of the plan will avoid, remedy, or mitigate the adverse effects (including the cumulative effects) of aquaculture activities on the environment, including fishing and other uses of the coastal marine area.⁶⁴

In order to make this assessment, the Ministry of Fisheries, Ministry for the Environment and other agencies will provide councils with guidance and information to enable them to operate under the new regime. This will include any information that the proposed development may have on the aquatic environment, including the carrying capacity and the sustainability of fish resources.⁶⁵ It is therefore imperative that the carrying capacity of the coastal ecosystem to sustain aquaculture activities is assessed prior to the establishment of AMA's. Such an assessment requires extensive baseline studies and research which will take considerably longer than the duration of the moratorium (due to expire in March, 2004). Regional councils are unlikely to be able to make an assessment on how they will avoid, remedy or mitigate the adverse effects of marine farming within proposed AMA's during this time frame.

Given the backlog of consent applications pending and the potential contribution aquaculture can make to the national economy, postponing the

⁶³ Cabinet Committee on Finance, Infrastructure and Environment "Paper B: Improvements to the Coastal Planning Regime for Aquaculture" (November 2001), 2.
<<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>> (last accessed 4 April 2003).

⁶⁴ Resource management (Aquaculture Moratorium) Amendment Act 2002, section 68(2).

⁶⁵ Cabinet Committee on Finance, Infrastructure and Environment "Paper B: Improvements to the Coastal Planning Regime for Aquaculture" (November 2001), 6.
<<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>> (last accessed 4 April 2003).

establishment of AMA's until we have more information will not be a viable option. On the other hand, the existing information does not provide an adequate basis on which to make conclusive decisions on where aquaculture activities should take place. It will therefore be necessary to implement an adaptive approach to the establishment of AMA's which can respond to results of monitoring. In the interim, defining marine farming as a discretionary activity under the Resource Management Act within proposed AMA's will go some way towards enabling specific impacts to be investigated prior to assessing an application for a farm development.⁶⁶ This will allow councils to adjust the criteria for accepting or denying consent applications based on the results of monitoring.

C Adaptive Management

Adaptive management can be defined as, "An experimental approach to management, or 'structured learning by doing'. It is based on developing dynamic models that attempt to make predictions or hypotheses about the impacts of alternative management policies. Management learning then proceeds by systematic testing of these models, rather than by random trial and error. Adaptive management is most useful when large complex ecological systems are being managed and management decisions cannot wait for final research results."⁶⁷

An adaptive management approach stresses the need for baseline surveys, extensive monitoring and guidelines and ecological controls which are incorporated into management rules. Other techniques include developing comprehensive management plans covering the entire AMA as well as for each block with details of staging, a description of reporting and review requirements and resource consent conditions. Continuity and feedback of monitoring information are also crucial components. The approach also emphasises the need for disclosure of discoveries

⁶⁶ Environment Canterbury <<http://www.ecan.govt.nz/Coast/marine-farms/opinions-7html>> (last accessed 30 July 2003).

⁶⁷ *Golden Bay Marine Farmers v Tasman District Council* (27 April 2001) Environment Court W42/2001, 73 Kenderdine J.

about the ecosystem or changing information in order to ensure that the council can take steps before significant adverse effects are caused.⁶⁸

Adaptive Management was endorsed by the Environment Court in *Kuku Mara (Forsyth Bay) v Marlborough District Council*⁶⁹ and approved in *Golden Bay Marine Farmers v Tasman District Council*.⁷⁰ At issue in the latter case was a proposal to develop aquaculture on a large scale in the Tasman and Golden Bays. The court endorsed a prescriptive zoning approach whereby areas of the Coastal Marine Area (CMA) were designated for aquaculture use. Aquaculture was prohibited in the remaining CMA. The court also considered that a precautionary approach was appropriate given the lack of information on the effects of aquaculture in the Bays and stressed the need for an adaptive approach to management. Other councils may choose to follow this approach or modifications of it.

One aspect of adaptive management, the staged uptake of discrete areas of coastal space is already being undertaken by other councils for larger offshore applications which in time are likely to become AMA's. (eg. Hawke's Bay, Bay of Plenty and Canterbury). These approaches have shown that minor variations in the approaches taken by different regional councils may have considerable effects. For example, the approach taken in the Hawke's Bay plan states that before an application is able to move onto the next stage of uptake, the applicant must prove that no adverse environmental effects will arise from the proposed development. In contrast, the Tasman Bay plan allows applications to progress to the next stage if no adverse effects become apparent. The onus of proof is therefore on the council to determine.⁷¹ The Department of Conservation prefers the approach taken in Hawke's Bay and has appealed the *Tasman Bay* decision on this ground.

Although the majority of management tools outlined in the *Tasman Bay* decision (eg. the need for extensive baseline surveys, monitoring and guidelines)

⁶⁸ *Golden Bay Marine Farmers v Tasman District Council*, above, 74 Kenderdine J.

⁶⁹ *Kuku Mara (Forsyth Bay) v Marlborough District Council* (16 July 2002) Environment Court W25/2002, para 93 Kenderdine J.

⁷⁰ *Golden Bay Marine Farmers v Tasman District Council*, above, Kenderdine J.

⁷¹ Interview with Guy Kerrison, Department of Conservation (Christina Kersey, 22 June 2003).

appear to be satisfactory, other councils may not go to this level of detail when determining AMA's.⁷² The *Tasman Bay* decision does not set a precedent; the exercise is the responsibility of the council which maintain a discretion in the matter. The final check on abuse of this discretion is the ability of discontented parties to challenge the decision in the Environment Court. As a result of the *Tasman Bay* decision, there has been a suggestion that the government agencies (MfE, DOC and Mfish) as part of the aquaculture reform implementation project may decide to provide some national guidance to councils. This could take the form of voluntary guidance or something stronger such as policies in the New Zealand Coastal Policy Statement.⁷³ Given the concern over the lack of national uniformity and inconsistencies in council discretion, incorporation into the coastal policy statement is a favoured approach. Such an approach would better accord with the interests of various stakeholder groups who expressed concern at the submission stage over the absence of national policy to encourage consistency.⁷⁴

The Department of Conservation also challenged the *Tasman Bay* decision in an attempt to clarify the ability of councils to remove facilities and structures already established, if an unacceptable level of adverse environmental impact was observed. The *Tasman Bay* decision clarifies that marine farming applicants should not progress to the next stage of development, if environmental impact requirements are not satisfied. But it did not specifically enable councils to back track and remove existing facilities. Several submitters highlighted the need for councils to be able to revoke licences from marine farming ventures which did not comply with the requisite standards.⁷⁵ Providing the councils with this power seems particularly important in the case of aquaculture development, where the possible adverse effects are yet to be tested and it is likely that the industry may have proceeded to another stage in the staged development before any adverse effects demonstrate themselves.⁷⁶

⁷² Interview with Guy Kerrison, above.

⁷³ Interview with Guy Kerrison, above.

⁷⁴ Friends of Golden Bay *Aquaculture-Join the Discussion* (submission to Ministry of Fisheries and Ministry for the Environment Pacific Eco-Logic Ltd, Wellington, 2001).

⁷⁵ *Aquaculture-Join the Discussion* (submission to Ministry of Fisheries and Ministry for the Environment Pacific Eco-Logic Ltd, Wellington, 2001).

⁷⁶ *Golden Bay Marine Farmers v Tasman District Council* (27 April 2001) Environment Court W42/2001, 73 Kenderdine J.

The reform proposes to amend the coastal planning provisions of the Resource Management Act to provide councils with greater powers to manage and control development within AMA's. This will include enabling councils to determine when and at what rate discrete areas within the AMA will become available for tender.⁷⁷ Recent case law has produced innovative mechanisms for utilising this power. The *Tasman Bay* case presented scientific evidence which established that marine farming should only proceed at a rate of 50 hectares at a time in each block.⁷⁸ According to the Environment Court decision, the most appropriate method of utilisation of the AMA's for the expansion of aquaculture in the Coastal Marine Area (CMA) of Tasman and Golden Bays was by way of a progressive or staged uptake.⁷⁹ Under this approach, a limit is imposed in the first stage on any initial intense marine farming development of no more than 50 hectares in any one 250 hectare block allocated in the AMA. Following 2-3 crop cycles and subject to the ecological health of the CMA affected by the activity, at stage 2, the industry would be able to utilise further space within the AMA. This expansion would only be granted on the advice of the Ecological Advisory Group (EAG), a panel of independent expert scientists established by the relevant district council. This staged release of space would allow councils to study the cumulative environmental impacts of marine farming. New sections within the AMA's would only be released once it was established that existing cumulative effects were acceptable.

Similar approaches have been implemented in other regional coastal plans during the period of the moratorium.⁸⁰ The reform proposals identify the possibility that regional councils may decide to implement a staged uptake approach.⁸¹ The Bill

⁷⁷ Cabinet Committee on Finance, Infrastructure and Environment "Paper B: Improvements to the Coastal Planning Regime for Aquaculture" (November 2001), 8. <<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>>. (last accessed 4 April 2003).

⁷⁸ *Golden Bay Marine Farmers v Tasman District Council* (27 April 2001) Environment Court W42/2001, 71 Kenderdine J.

⁷⁹ *Golden Bay Marine Farmers v Tasman District Council* (27 April 2001) Environment Court W42/2001, 84, Kenderdine J.

⁸⁰ Environment Canterbury <<http://www.ecan.govt.nz/Coast/marine-farms/opinions-7html>> (last accessed 30 July 2003).

⁸¹ Cabinet Committee on Finance, Infrastructure and Environment "Paper B: Improvements to the Coastal Planning Regime for Aquaculture" (November 2001), 8.

will clarify the council's authority to make such provisions in regional coastal plans. At this stage, there is no indication that the legislation will require regional councils to incorporate any of the adaptive management concepts into their coastal plans.⁸² Regional councils will retain the discretion to choose whether to adopt a staged uptake approach. It is unclear at this stage, what incentives, if any, will be provided to encourage councils to adopt this approach.

Staging is an important aspect of adaptive management. The lack of information about the cumulative effects of aquaculture means that scientists are unable to predict the effects of large scale marine farms on ecological values. Of these uncertainties, the carrying capacity of the aquatic ecosystem raises most cause for concern.⁸³ As mentioned above, the only way to effectively determine this is through the use of baseline studies which take time to develop.⁸⁴ It may therefore be necessary to include a provision mandating the use of staged uptake in the new legislation. It may also be appropriate to include provisions to clarify where the burden of proving the existence of adverse environmental effects lies. Consent holders should have the onus of proving the absence of adverse environmental effects as a pre-condition to progressing to the next stage of uptake.

Although a staged or progressive uptake approach is a potentially effective management tool, some additional measures seem necessary. The decision on whether to release further sections of the AMA for tender should only be granted on the basis of advice from an independent panel of experts.⁸⁵ The rate at which subsequent areas are made available should not be too rapid. Some regional plans have suggested the release be controlled through the annual plan process whereby public input is considered every year and a decision is made on how much space within the AMA should be released for tender each year.⁸⁶ This time frame, however, may be too short

<<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>> (last accessed 4 April 2003).

⁸² Interview with Guy Kerrison, Department of Conservation (Christina Kersey, 22 June 2003).

⁸⁴ S Ongley "Aquaculture: the first major failure in Planning?" RMLA-Plenary Session 4 Ministry for the Environment, 2001, 7.

⁸⁵ *Golden Bay Marine Farmers v Tasman District Council* (27 April 2001) Environment Court W42/2001, 71 Kenderdine J.

⁸⁶ Environment Canterbury > <http://www.ecan.govt.nz/Coast/marine-farms/opinions-7htm> > (last

for sufficient monitoring and for results to be compiled and assessed. The approach advocated by the *Tasman Bay* decision, whereby further space is released following 2-3 crop cycles and subject to the ecological health of the CMA, seems sensible.

D Technical Constraints

AMA's are to be established for specific types of aquaculture, and these are to be specified in regional coastal plans. The appropriate determination of AMA sites therefore requires type-specific aquaculture data to establish an information base of the environmental effects of aquaculture activity on the marine ecosystem.⁸⁷ Such baseline studies however, require the prior establishment of aquaculture activities and a commitment to continual monitoring over a substantial time frame.⁸⁸ Aquaculture Management Areas will need to be established before the cumulative effects of the activities can be assessed. It is therefore necessary to ensure that Aquaculture Management Areas are not permanent. Depending on the results of monitoring, it may be necessary, to allow an AMA to be left fallow for a period of time to enable the ecosystem to recover. A fallow period could be imposed following the expiry of a maximum consent period of 35 years.⁸⁹ Provision could be made in the legislation to require regional councils to implement fallow periods based on the advice of independent monitoring bodies.

Ideally, an AMA should be established in an area that has been assessed for the potential adverse effects of marine farming and where it has been established that these effects will be no more than minor. The reform proposes that marine farming will be classified as a 'controlled activity' under the RMA. These activities are classed as 'controlled' because the relevant authorities are satisfied that the adverse effects of the activity are no more than minor. According to the Act, undertaking a controlled activity requires a resource consent but regional councils do not have the authority to

accessed 30 July 2003).

⁸⁷ U C Barg *Guidelines for the Promotion of Environmental Management of Coastal Aquaculture Development* FAO Fisheries technical paper 328 (Food and Agriculture Organisation of the United Nations, Rome 1992) 4. <<http://www.fao.org/docrep/t/697e/t0697e03.html>. (last accessed 24 July 2003).

⁸⁸ U C Barg, above, 4.

refuse an application for consent.⁹⁰ Given the technical constraints mentioned above, most regional councils will not have the resources to competently make such an assessment. It is likely that even within an AMA, aquaculture activities will have to be a discretionary activity as some of the effects will still need to be assessed on a case by case basis.⁹¹ Such an approach should be encouraged at least in the short term as it will enable councils to have more control to prevent activities which may be potentially harmful. Regional councils should not be pressured into making the transition into classifying aquaculture as a controlled activity before they are fully satisfied of its potential effects.

E Financial Constraints

The potential effects on landscape values, natural character, shipping, fishing and recreation can be assessed relatively competently by most regional councils. However, it is substantially more difficult and expensive to assess the ecological impacts of aquaculture. Such assessments will require detailed scientific studies involving substantial financial resources.⁹² These financial limitations will eventually be overcome through the retention of fifty percent of the tendering revenue. It may be that industry or individual applicants should be required to carry out ecological work at their own expense. Applicants are already required to fund environmental impact assessments prior to applying for resource consents. An additional requirement that all applicants contribute to a fund, controlled by the relevant regional council to be used to undertake baseline ecological monitoring studies could be introduced. The New Zealand mussel farming industry has expressed a willingness to contribute to ongoing environmental research and to incorporate the results of this research into the staged development of marine farming.⁹³ The requirement to contribute to the fund would need to be compulsory to prevent injustice. A voluntary contribution would have unjust tendering implications in the event that a particular marine farmer contributed to

⁸⁹ Environment Canterbury <<http://www.ecan.govt.nz/Coast/marine-farms/opinions-7htm>> (last accessed 30 July 2003).

⁹⁰ Resource Management Act 1991.

⁹¹ Environment Canterbury <<http://www.ecan.govt.nz/Coast/marine-farms/bm-ama.htm>> (last accessed 24 July 2003).

⁹² Environment Canterbury, above.

the fund but subsequently lost out in a tendering round to another applicant who did not contribute.⁹⁴ The RMA already makes provision for attaching a fee to applications for resource consents for purposes specified in the regional plan.⁹⁵

F Allocation Mechanisms

The decision on what method of allocation is to be used will now be made at the planning stage.⁹⁶ The reform proposes to abolish the first in first served approach to allocation existing under current law. The only alternative to this approach under the RMA was "coastal tendering" but this option could only be utilised by the Crown, acting through the Minister of Conservation. This was subject to the condition that there were, or were likely to be "competing demands for the use of the area."⁹⁷ Despite the existence of such an option, the coastal tendering provisions have never been utilised in practice. This was primarily because by the time the Minister decides that there is likely to be competing demands for the use of the area, applications for the relevant resource consents will almost always have already been made.⁹⁸ Tendering at this late stage would not be valid because it would not relate to the existing applications which led to the Minister's decision to tender in the first instance.

Under the reformed system, tendering will be the default approach to allocation of coastal space for private use. Any alternatives to tendering could be established through provisions in the approved regional coastal plan. The legislation will provide that within the AMA, the council must allocate the right to apply for consent to occupy blocks of a size determined by the council by tender.⁹⁹ The confinement to a

⁹³ Environment Canterbury <<http://ecan.govt.nz-greenshell-mussel-farming.pdf>> (last accessed 23 June 2003).

⁹⁴ Environment Canterbury <<http://www.ecan.govt.nz/Coast/marine-farms/bm-ama.htm>> (last accessed 24 July 2003).

⁹⁵ Resource Management Act 1991, section 108(1)(a).

⁹⁶ Cabinet Committee on Finance, Infrastructure and Environment "Paper B: Improvements to the Coastal Planning Regime for Aquaculture" (November 2001), 2. <<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>> (last accessed 4 April 2003).

⁹⁷ Resource Management Act 1991, section 152(4)(a).

⁹⁸ Interview with Guy Kerrison, Department of Conservation (Christina Kersey, 22 June 2003).

⁹⁹ Cabinet Committee on Finance, Infrastructure and Environment "Paper B: Improvements to the Coastal Planning Regime for Aquaculture" (November 2001), 2. <<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf>> (last accessed 4 April 2003).

right to apply for space within pre-determined sized blocks and only within the established AMA allows for greater certainty and control. It also prevents areas of significant ecological significance or value from being encroached upon by expanding marine farms. Regional councils will retain 50% of the tender money to provide appropriate planning incentives and for use in improving the management of the coastal marine area.¹⁰⁰

Resource Management Act 1991, section 104.
Resource Management Act 1991, section 104(4)(a).
Resource Management Act 1991, section 104(4)(b).
Resource Management Act 1991, section 104(4)(c).
Resource Management Act 1991, section 104(4)(d).
Resource Management Act 1991, section 104(4)(e).
Resource Management Act 1991, section 104(4)(f).
Resource Management Act 1991, section 104(4)(g).
Resource Management Act 1991, section 104(4)(h).
Resource Management Act 1991, section 104(4)(i).
Resource Management Act 1991, section 104(4)(j).
Resource Management Act 1991, section 104(4)(k).
Resource Management Act 1991, section 104(4)(l).
Resource Management Act 1991, section 104(4)(m).
Resource Management Act 1991, section 104(4)(n).
Resource Management Act 1991, section 104(4)(o).
Resource Management Act 1991, section 104(4)(p).
Resource Management Act 1991, section 104(4)(q).
Resource Management Act 1991, section 104(4)(r).
Resource Management Act 1991, section 104(4)(s).
Resource Management Act 1991, section 104(4)(t).
Resource Management Act 1991, section 104(4)(u).
Resource Management Act 1991, section 104(4)(v).
Resource Management Act 1991, section 104(4)(w).
Resource Management Act 1991, section 104(4)(x).
Resource Management Act 1991, section 104(4)(y).
Resource Management Act 1991, section 104(4)(z).

To the extent possible, given variations in the species being farmed, the specifications and farming techniques, the conditions attached to aquaculture licence consents may need to be standardised. Coupled with classifying aquaculture activities as discretionary under the RMA, this will provide councils with some guidance in making their decisions, yet still remain flexible enough to cover individual circumstances. A possible approach would be to develop standardised Management Plans as advocated by the Taranaki Bay Development the adoption of such plans as a condition of the consent.¹⁰¹ The challenge in developing such standards is to strike a balance between encouraging consistency and uniformity without overgeneralising the standards and rendering them ineffective. Public access to information on licence conditions should also be widely pursued.¹⁰²

¹⁰⁰ Resource Management Act 1991, section 104.
¹⁰¹ Resource Management Act 1991, section 104(4)(a).
¹⁰² Resource Management Act 1991, section 104(4)(b).

¹⁰⁰ Cabinet Committee on Finance, Infrastructure and Environment "Paper F: Transition to New Aquaculture Regime" (November 2001), 6.
<<http://www.mfe.govt.nz/issues/resources/aquaculture/transition-to-new-aquaculture-regime-pdf>> (last accessed 4 April 2003).

G Conditions of Consent

Section 108 of the Resource Management Act provides for conditions to be attached to resource consents.¹⁰¹ These include requiring the consent holder to undertake surveys, investigations, inspections or other specified tests.¹⁰² Management plans, review provisions, monitoring programmes and staged development should all be controlled by enforceable resource consent conditions. This will enable the regional council to act as a co-regulator at every stage in the process. The RMA also provides for the council to be able to hold the resource consent owner liable for breach of any of the conditions which occur before the expiry of the consent and for any adverse effects on the environment which become apparent during or after the expiry of the consent.¹⁰³ However, it remains at the discretion of the regional council to invoke such provisions. Incorporation of specific monitoring criteria by way of National Environmental Standards would ensure that all regional councils insisted on the establishment and enforcement of appropriate monitoring schemes.

To the extent feasible, given variations in the species being farmed, site specifications and farming techniques, the conditions attached to aquaculture licence consents may need to be standardised. Coupled with classifying aquaculture activities as discretionary under the RMA, this will provide councils with some guidance in making their decisions, yet still remain flexible enough to assess individual circumstances. A possible approach would be to develop standardised Management Plans as advocated by the *Tasman Bay* decision and the adoption of such plans as a condition of the consent.¹⁰⁴ The challenge in developing such standards is to strike a balance between encouraging consistency and uniformity without over-generalising the standards and rendering them ineffective. Public access to information on licence conditions should also be widely promoted.¹⁰⁵

¹⁰¹ Resource Management Act 1991, section 108.

¹⁰² Resource Management Act 1991, section 108(4)(c).

¹⁰³ Resource Management Act 1991, section 108(5)(c).

¹⁰⁴ *Golden Bay Marine Farmers v Tasman District Council* (27 April 2001) Environment Court W42/2001, 73 Kenderdine J.

¹⁰⁵ Office of Regulation Reform Victoria *Review of Regulatory Arrangements in the Victorian Aquaculture Industry* (Final report, Victoria, 1999)16.

In addition to obtaining a consent to occupy the coastal marine area, the Resource Management Act requires marine farming applicants to obtain consents for coastal structures,¹⁰⁶ coastal discharges,¹⁰⁷ disturbing the sea bed,¹⁰⁸ and other associated aspects of aquaculture. These numerous consents act as additional safeguards. However, although the nominal effects of these activities on the environment are relatively well established, the nature and degree of them can vary substantially between applicants.¹⁰⁹ A precautionary approach to granting consents is necessary. Regional councils should err on the side of caution when utilising their discretion to determine whether an applicant has established that any adverse effects on the environment have been sufficiently avoided, remedied or mitigated.¹¹⁰

H Best Environmental Practice Guidelines

Management plans are crucial to sustainably managing large aquaculture developments.¹¹¹ A good overall management plan covering the entire AMA and a management plan for each block within it, including details of staging, a description of reporting and review requirements, may be necessary. The plan may also establish the broad environmental rules applying to a tender area. These could then be worked into model consent conditions which would be available prior to tendering. Such an approach would be consistent with that adopted in Victoria, Australia where Best Practice Environment Management Guidelines are attached as conditions to obtaining aquaculture licenses.¹¹² The approach ensures continuous improvement in environmental management practice by linking environmental performance to license aquaculture conditions.

¹⁰⁶ Resource Management Act 1991, section 12(b).

¹⁰⁷ Resource Management Act 1991, section 87(e).

¹⁰⁸ Resource Management Act 1991, section 12(c).

¹⁰⁹ K Price & M Sly "Aquaculture: Creating More Problems Than it is Solving? A New Zealand Perspective on Regulatory and Planning Issues" NELA Conference 2002, 6.

¹¹⁰ Resource Management Act 1991, section 5(c).

¹¹¹ *Golden Bay Marine Farmers v Tasman District Council* (27 April 2001) Environment Court W42/2001, 64 Kenderdine J.

¹¹² Office of Regulation Reform Victoria *Review of Regulatory Arrangements in the Victorian Aquaculture Industry* (Final report, Victoria, 1999) 25.

The Guidelines should be performance based to allow for flexibility. Each marine farmer would then be able to tailor their management strategies to meet their business needs, provided they were within the total allowable discharge limits proposed by the guidelines.¹¹³ This method would be in accordance with the effects based approach advocated by the Resource Management Act. The New Zealand Mussel Industry has developed an Environmental Policy and Environmental Code of Practice. The Code of Practice sets out how the environmental issues associated with marine farming activities should be addressed. Despite compliance with the Code of Practice being voluntary, most marine farmers have adopted it.¹¹⁴

The Department of Conservation has also developed a set of ecological guidelines for the Marlborough Sounds region. These have subsequently been applied to other aquaculture regions. At the time of formulation, the guidelines were intended to be used as a form of best practice guidelines. However, the information used to establish the guidelines is now dated. The Department intends to modify these guidelines so that they are applicable to the rest of the country.¹¹⁵ It is important that these guidelines are then continually updated to ensure they remain current.

Best Practice Environment Guidelines need to be specific to different types of aquaculture. However, it may still be possible for industry to collaborate with regional councils to determine a set of national rules applicable to all aquaculture permit applicants. A third party environmental auditor may also be needed to monitor compliance with such guidelines. The Ecological Advisory Group could perhaps take on this role. This body could then issue some form of certificate of compliance to aquaculture licence holders. The attainment of such a certificate could then be a condition imposed on the renewal of the consent.¹¹⁶

¹¹³ Office of Regulation Reform Victoria *Review of Regulatory Arrangements in the Victorian Aquaculture Industry* (Final report, Victoria, 1999) vii.

¹¹⁴ Environment Canterbury <<http://ecan.govt.nz-greenshell-mussel-farming.pdf>> (last accessed 23 June 2003).

¹¹⁵ Interview with Keith Johnston, Department of Conservation (Christina Kersey, 31 July 2003).

¹¹⁶ Office of Regulation Reform Victoria *Review of Regulatory Arrangements in the Victorian Aquaculture Industry* (Final report, Victoria, 1999) 30.

I Assessments of Environmental Effects

As mentioned previously, the reform provides for improved environmental assessment at the planning stage. In addition, the Resource Management Act requires an assessment of any actual or potential effects that an activity may have on the environment and the ways in which any adverse effects may be mitigated to be undertaken prior to making an application for a resource consent.¹¹⁷ The RMA assessment must be conducted in accordance with the Fourth Schedule of the Act which sets out a list of criteria which must be addressed. Environmental impact assessment efforts should be guided by predetermined development priorities and well-formulated environmental protection objectives. It is equally important that, based on environmental impact assessment, the environmental performance of coastal activities is monitored and controlled according to well-defined directives and regulations specific to those activities which pose a significant threat to the coastal environment.¹¹⁸

J Monitoring and Enforcement

The Fourth Schedule states that where the scale or significance of the activity's effect are such that monitoring is required, a description of how effects will be monitored and by whom, once the proposal is approved, must be detailed by the applicant.¹¹⁹ It is the responsibility of the regional council to assess the adequacy of the information contained in the Assessment of Environmental Affects. The Ministry for the Environment has published a good practice guide for councils on auditing which identifies steps councils should follow in making their decision. However, both the guide and the Fourth Schedule of the RMA leave it to the discretion of the council to determine whether monitoring is required.¹²⁰ Given the uncertainties over the cumulative effects of aquaculture, whether or not a proposal is deemed to have the "scale or significance" to require monitoring should not remain at the discretion of the regional council to determine.

¹¹⁷ Resource Management Act 1991, section 88(b).

¹¹⁸ Options for environmental management of coastal aquaculture development, fao.org, p.1

¹¹⁹ Resource Management Act 1991, Fourth Schedule.

¹²⁰ Ministry for the Environment

<<http://www.mfe.govt.nz/issues/resource/participation/consents/applications/aee/>> (last accessed 21 June 2003).

At present, there is no legislative requirement for continuous monitoring. Given the costs of such a measure and the limited budgets of many regional councils, it is questionable whether monitoring will be implemented sufficiently on a national scale without mandating legislation. The New Zealand Coastal Policy Statement requires that the Minister of Conservation work with regional councils and with all other interested bodies to establish a national "State of the coastal environment monitoring programme".¹²¹ An aggregate annual report on the industry's environmental performance may also be desirable in order to assess the cumulative effects of the industry nationwide.¹²² Such a report could be compiled from information obtained by independent auditors. This report would identify changes in environmental impacts and trigger the necessary responses by regional councils.

Extensive and continual monitoring is important for several reasons. It would ensure compliance with controls imposed on certain types of activities. Secondly, it would provide for regular measurement of variables which are being used to indicate that specific goals are being achieved. This may require the promulgation of national guidelines.

For monitoring to be effective, however, there needs to be a commitment to act if the monitoring programme indicates that there is a lack of compliance with controls, or that they are ineffective, or a trend indicates that limiting criteria are in danger of being approached.¹²³ It is therefore imperative that appropriate enforcement mechanisms are utilised. The Resource Management Act contains enforcement provisions. Section 314(1)(b) enables councils to make an enforcement order requiring a person to do something which the Environment Court deems necessary to avoid, remedy, or mitigate any actual or likely adverse effect on the environment. But such enforcement is only possible after a case is brought before the court. Given the considerable expense and time delays involved in bringing a case to court, it may be

¹²¹ New Zealand Coastal Policy Statement, Policy 1.1.2(b).

¹²² Office of Regulation Reform Victoria *Review of Regulatory Arrangements in the Victorian Aquaculture Industry* (Final report, Victoria, 1999) 31.

necessary to enable regional councils to have the authority to ensure compliance. Such an authority would need to be strictly defined to avoid abuse of this discretion. In addition, it may be necessary for the government to invest in environmental education programmes for the coast to educate regional councils as to the importance and requirements of monitoring.¹²⁴

K National Assistance

It is important that regional councils receive assistance in the form of national guidelines and methodology for undertaking environmental assessments and monitoring. They will also need support from central government to establish baseline information on the long term effects of aquaculture development. The reform recognises the need for a “nationally co-ordinated and strategic approach” to the management of aquaculture.¹²⁵ This may take the form of developing a set of national policy objectives in the New Zealand Coastal Policy Statement or establishing criteria for environmental assessment and monitoring in the form of National Environmental Standards. At the very least, it would seem necessary to establish national non-statutory guidelines.

L Control of Disease and Pests

The spread of aquaculture has raised widespread public concern over biosecurity and disease issues. The reform proposes that the control of disease and pests on farms will be undertaken by use of provisions in both the RMA and the Biosecurity Act.¹²⁶ The Ministry of Fisheries is the main government agency responsible for managing the potential risks of invasive species to the marine environment. It has developed

¹²³ U.C. Barg *Options for Environmental Management of Coastal Aquaculture* FAO Fisheries technical paper 328 (Food and Agriculture Organisation of the United Nations, Rome 1992) 2. <<http://www.fao.org/docrep/t/697e/t0697e03.html>> (last accessed 24 July 2003).

¹²⁴ Monitoring the Effectiveness of the NZCPS: View of Local Government Staff <<http://www.doc.govt.nz/pdfs/>> (last accessed 18 June 2003).

¹²⁵ Cabinet Committee on Finance, Infrastructure and Environment “Paper B: Improvements to the Coastal Planning Regime for Aquaculture” (November 2001), 4. <<http://www.mfe.govt.nz/issues/resource/aquaculture/improvements-to-the-coastal-planning-regime-for-aquaculture-pdf.>> (last accessed 4 April 2003).

¹²⁶ Cabinet Committee on Finance, Infrastructure and Environment “Paper D: Improving the Fisheries Compliance Regime for Aquaculture” (November 2001), 1.

numerous policies, monitoring and compliance regimes, baseline studies and other surveillance work to try and prevent the introduction of exotic species. The surveillance methods employed by the Ministry depend on the public and those working in coastal areas to look out for and report new invaders. Education has been the primary tool used to facilitate such voluntary measures.¹²⁷ Given the propensity for aquaculture activities to facilitate the spread of exotic species, it may be necessary to consider whether a national pest management strategy needs to be developed.¹²⁸ Some of the tender money retained by regional councils could also be used to conduct regional studies of the existence of and potential effects of exotic species. Aquaculture permit applicants could also be required to consider the potential biosecurity risks posed by their activities and detail the approach they intend to take to avoid, reduce or mitigate such risks.

¹²⁷ Ministry of fisheries <http://www.fish.govt.nz/sustainability/biosecurity/bio_introduction.html> (last accessed 13 July 2003).

¹²⁸ Ministry of Agriculture and Forestry *Aquaculture-Join the Discussion* (submission to Ministry of Fisheries and Ministry for the Environment Pacific Eco-Logic Ltd, Wellington, 2001).

VIII CONCLUSION

This paper highlights several potential problems with the proposed management of the effects of aquaculture on the marine environment. Regional councils have not been given adequate financial and technical assistance to competently manage their new responsibilities under the reformed regime. There are currently insufficient resources available to fund the studies necessary to determine the threshold tolerances of marine ecosystems and their vulnerability to aquaculture activities. In addition, scientific understanding of the potential for aquaculture activities to encourage the introduction and facilitate the spread of exotic species remains speculative. Moreover, despite considerable scientific uncertainty as to the effects of aquaculture on the marine environment, the new legislation is likely to remain silent to the need for regional councils to adopt an adaptive management response. In addition, the importance of a co-ordinated approach to continual and extensive monitoring has been largely overlooked. The new legislation does not appear to place sufficient emphasis on the importance of ensuring a commitment to act if monitoring programmes indicate failures in the regime or threats to ecological values. Finally, the reform process has not adequately addressed the need to establish a more nationally co-ordinated and strategic approach to the management of aquaculture. Although substantially resolving the problem of the 'ad hoc' development and spread of the industry, a more prescriptive approach involving the development of national objectives and standards may be necessary.

IX FIGURES

Figure 1: Summary of Existing Legislative Framework

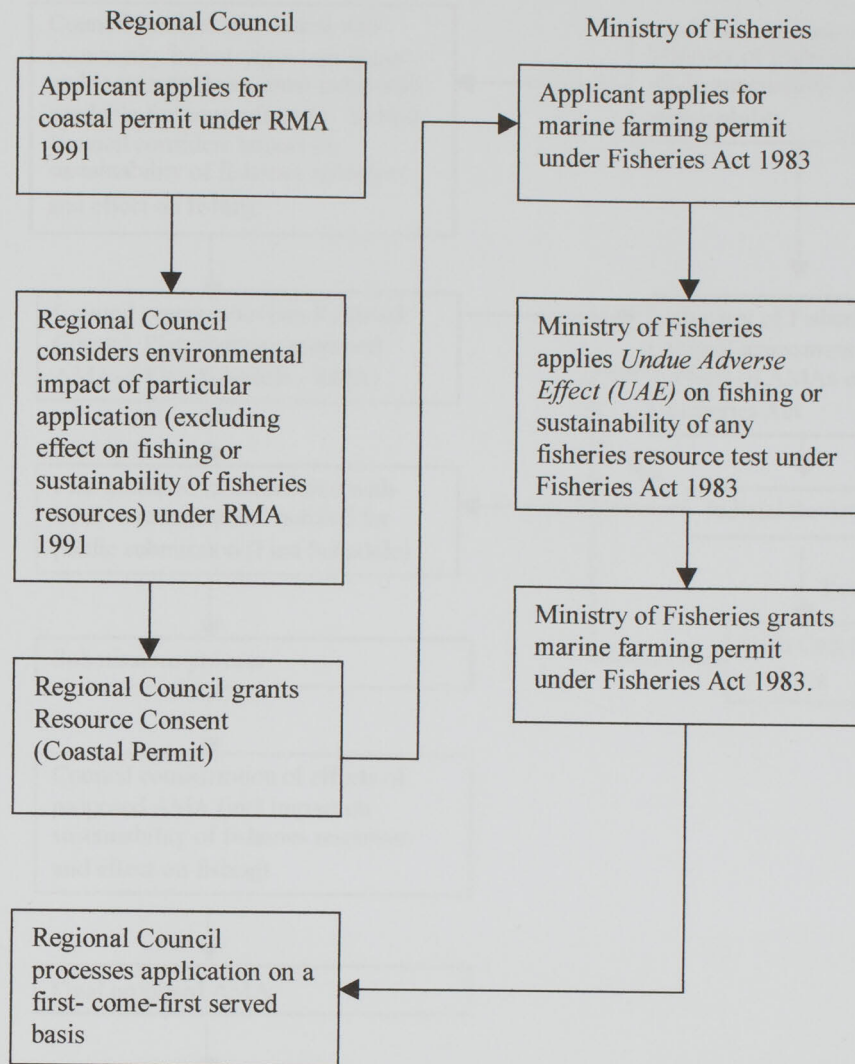
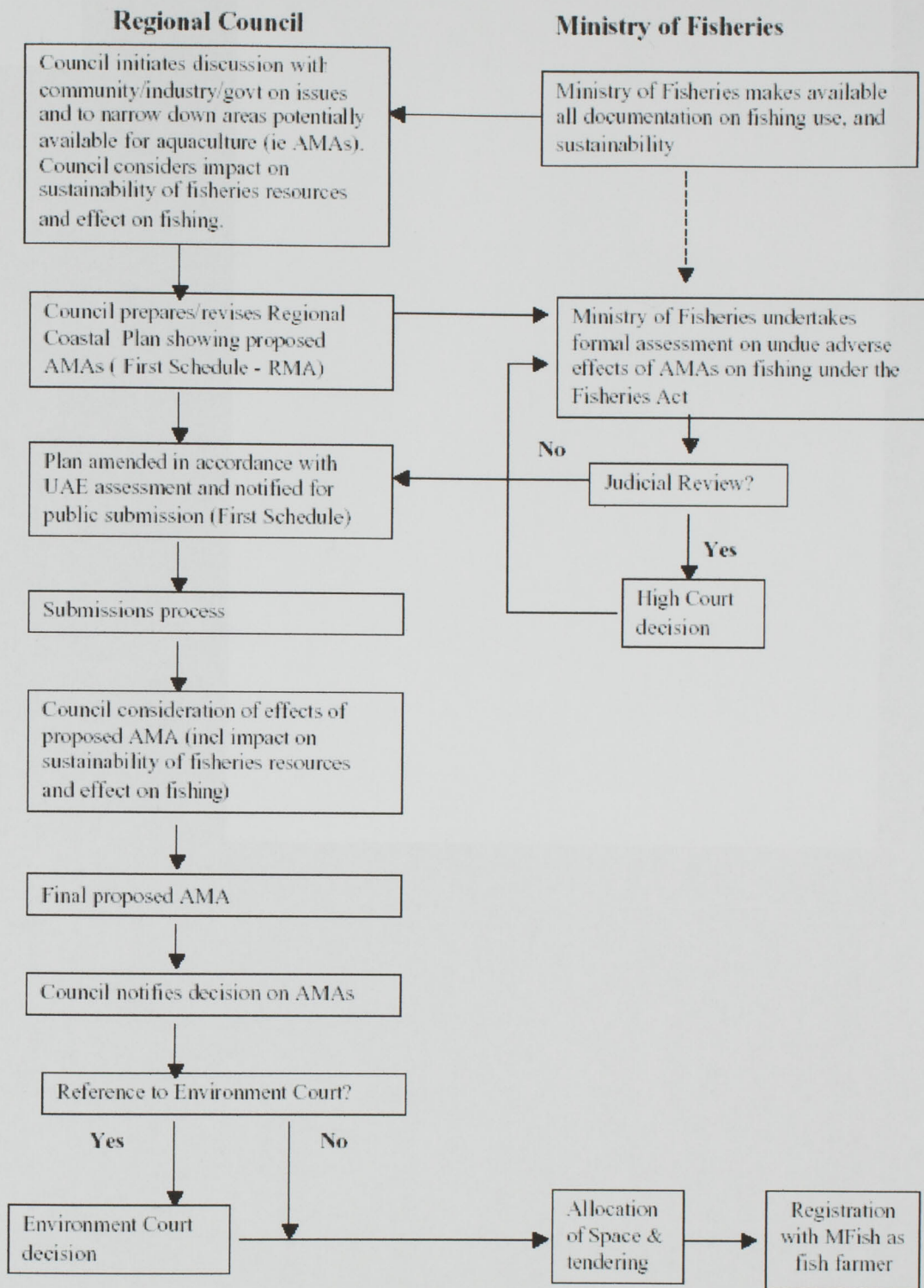


Figure 2: Summary of Proposed Legislative Framework



NOTE: To ensure optimal placement of AMAs, councils need to consider all impacts of AMAs (incl impacts on fishing) during development of Regional Coastal Plans. The undue adverse effects test is only a safety net to ensure that AMAs do not have an unreasonable impact on fishing. It is not designed as the sole separate consideration of fisheries impacts.

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