A Geography of Marine Farming Rights in New Zealand:
Some Rubbings of Patterns on the Face of the Sea

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ABSTRACT

Sustainable development of global marine resources has been the focus of various United Nations' agencies and coastal nations since World War II. As capture fisheries resources have come under pressure and perhaps reached their sustainable limit concern has been expressed over the ability to continue to meet the protein needs of expanding populations. One potentially significant contributor to addressing the food needs of the world is marine farming (mariculture). The expansion of marine farming in developing countries has been well-addressed in the literature, but marine farming in developed countries has received less attention. The traditional biophysical requirements of marine farming (sheltered clean water of appropriate depth) have led to conflicts with other users of the coastal environment. In the developed countries in particular, suitable sites are contested places of consumption (recreation, tourism) as well as production (capture fisheries). Moreover, the adjacent terrestrial land and water uses can significantly affect acceptability of marine farming.

The avoidance of conflicts and the achievement of sustainable development in such settings are largely dependent on the systems of governance. In developed countries, these are often articulated through planning regimes and associated 'rights'. The global terrestrial planning response in the first two thirds of the 20th Century was dominated by a modernist approach to planning. In the later stages, a post-modern challenge coincided with the rise of neo-liberalism in many developed countries. Planning in New Zealand has shown a similar pattern. The extent to which modern, postmodern and neo-liberal approaches might have been manifest in the marine environment, especially with regard to marine farming, has received little attention.

In most developed countries there has been an institutional separation between terrestrial and marine administrative agencies that has resulted in conflict between these agencies and between the regimes they work within and help create. Integrated Coastal Management emerged as a response to this situation and had become the dominant planning regime for coastal resources by the last decade of the 20th Century. It was largely uncritically promoted and accepted, especially by United Nations and coastal state government agencies. These themes provide the broad theoretical and practical context for this thesis.

Since the 1970s, there has been a revolutionary break in New Zealand's resource management from a centralized command and control style of modernist planning to a neo-liberal, planning regime characterised by elements of modernism and postmodernism. Concurrently it has revamped, but failed to integrate, coastal and fisheries management and planning. Ironically, each of the resulting primary marine resource management statutes (the Resource Management Act 1991 (RMA) and the Fisheries Act 1983/1996 (FA83/96)) is considered to implement a world-leading model. Marine farming lies at the interface between the regimes created by these and preceding Acts and the nature of the regimes is explored in relation to marine farming.

The development of the regimes and the rationale for them is set out with the aid of Scott's (1989, 2000b) axial model of the characteristics of a property right. The

thesis groups the development of the New Zealand planning regimes for marine farming into four era: pre-modern (1866-1964), proto-modern (1964-1971), modern (1971-1991), and transitional (1991-2001). The evolution of the industry is shown largely to follow a generalized model of the industry in developed countries. This suggests that the nature of the property rights available for marine farming in New Zealand is not of great significance in the general development of the industry.

The planning regime, however, significantly affects the spatial pattern of development of the industry. An analysis of provisions for marine farms in various plans suggests quite different planning 'styles' and approaches have been adopted in different parts of the country at different times. A Geographic Information System of all individual marine farms in New Zealand is developed to the stage where it can be combined with other data to investigate the spatial patterns that have evolved in New Zealand. A typology of patterns of farm arrangement in relation to other farms is apparent from the resultant mapped information. These patterns are shown to represent the outcomes of a combination of competing rights and the responses of and to the contemporaneous planning regimes. The consequences of adopting different styles of planning are apparent.

This macro-level research is extended to the micro-level by an exploration of variables affecting the individual farmer's locational decisions. A national postal questionnaire survey of marine farm owners yielded 148 usable responses (32% response rate). Inferential statistical analytical tools were used to test the significance of relationships between particular variables. Multivariate analyses were used to cluster the respondents and the variables and to search for latent factors. These analyses supported field interview findings with regard to the importance of particular variables, especially planning regimes in directing the location and nature of marine farming. The results enabled development of a descriptive model for exploring and comparing the quality of different means of acquiring marine space for marine farming.

The analyses also confirmed that significant changes were occurring within the structure of the industry. Analysis of the field interviews, maps, policy documents, Environment Court decisions and other secondary material shows the major capture fishing companies are increasingly dominating the industry. There was a notable presence of a category of 'entrepreneur site developers' exploiting the neo-liberal nature of the planning regimes of the 1990s to open up new areas for marine farming on scales unprecedented in the rest of the world. The consequent race for space has met with stiff resistance from the capture fishing industry, but more especially from the recreational sector. This has led to significant transaction costs.

The Government response, a partial moratorium on marine farm development in November 2001, is shown to emulate the modernist command and control style of planning of twenty years earlier and to signal a failure of neo-liberal ideology to meet the needs of the industry and the public at large.

Dedication

To Jill
Wiremu and Tam
with all my love

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List of Abbreviations[1]

AEA:	Aquaculture Exclusion Area
AMA:	Aquaculture Management Area
ARA:	Auckland Regional Authority
ARC:	Auckland Regional Council
ASRA:	Aquaculture Seasonal Restriction Area
BCAS:	British Columbia Aquaculture System
BGB:	Big Glory Bay
CEO:	Chief Executive Officer
CfE:	Commission for the Environment
CMA:	Coastal Marine Area
CMZ1:	Coastal Management Zone 1
CMZ2:	Coastal Management Zone 2
CP:	Coastal Permit
CPR:	Common Property Resource
CSEP:	Challenger Scallop Enhancement Programme
DLS:	Department of Lands and Survey
DoC:	Department of Conservation
DoM:	Marine Department (also known as the Department of Marine)
EEZ:	Exclusive Economic Zone
EPEP:	Environmental Protection and Enhancement Procedures
EW:	Environment Waikato (Waikato Regional Council)
FA:	Fisheries Act
FA83:	Fisheries Act 1983
FA96:	Fisheries Act 1996
FA83/96:	Fisheries Act 1983 and 1986 combined regime
FAO:	Food and Agriculture Organization of the United Nations
FIB:	New Zealand Fishing Industry Board
FIC:	(NZ Parliamentary) Fishing Industry (Select) Committee (1960)
FISC:	(NZ Parliamentary) Fishing Industry Select Committee (1969-72)
GATT:	General Agreement on Tariffs and Trade
GESAMP:	The IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GIS:	Geographic Information System
GST:	General Systems Theory
ha:	hectares
HA50:	Harbours Act 1950
HMDT:	Hauraki Marine Development Trust
ICM:	Integrate Coastal Management
ICAM:	Integrated Coastal Area Management
ICZM:	Integrated Coastal Zone Management
ITQ:	Individual Transferable Quota
km:	kilometers

[1] Unless otherwise specified all ministries and departments are of the New Zealand government. The description of the species (e.g., OYS) is that used by MFish in its NAD (see Appendix 4).

LE:	lease
LGA89:	Local Government Act 1989
LI:	licence
m:	metres
MAF:	Ministry of Agriculture and Fisheries
MAFF:	Ministry of Agriculture, Forestry and Fisheries (British Columbia)
MAFFish:	Ministry of Agriculture and Fisheries Fisheries (Division)
MDC:	Marlborough District Council
MF:	marine farm permit (under the FA83/96)
MFA68:	Marine Farming Act 1968
MFA71:	Marine Farming Act 1971
MFish:	Ministry of Fisheries
MfE:	Ministry for the Environment
MHMPA:	Manukau Harbour Maritime Planning Authority
MHWS:	Mean Hisgh Water Springs (Springtide)
MoT:	Ministry of Transport
MOU:	Memorandum of Understanding
MSA:	Maritime Safety Authority
MSG:	Green-lipped mussels (Greenshell^{TM} Mussels)
MSMPA:	Marlborough Sounds Maritime Planning Authority
MSP:	Mussel spat
MTA94:	Maritime Transport Act 1994
NAD:	MFisheries National Aquaculture Database
MWD:	Ministry of Works and Development
NAFTA:	North American Free Trade Agreement
NCP73:	National Coastal Policy 1973
NDC:	National Development Conference
nm:	nautical miles
NWASCA:	National Water and Soil Conservation Authority
NZ:	New Zealand
NZCPS94:	New Zealand Coastal Policy Statement 1994
NZMS:	New Zealand Map Series
NZSIC:	New Zealand Standard Industrial Classification
OECD:	Organisation for Economic Cooperation and Development
OYS:	Dredge oyster
OSP:	Oyster spat
PMSMPS:	Proposed Marlborough Sounds Maritime Planning Scheme
POY:	Pacific oyster
PRCPS:	Proposed Regional Coastal Plan for Southland
QMA:	Quota Management Area
QMS:	Quota Management System
RMA:	Resource Management Act 1991
RMLR:	Resource Management Law Reform
ROFA64:	Rock Oyster Farming Act 1964
ROY:	Rock oyster
SAM:	Chinook salmon
SCA:	Scallop
SCA7:	Quota management area 7 for scallop
SEAFIC:	NZ Seafood Industry Council (superceded FIB)

StatsNZ:	Statistics New Zealand (Department of Statistics)
SRC:	Southland Regional Council
SRPS:	Southland Regional Planning Scheme
SUC:	Southland United Council
t:	tones
TACC:	Total Allowable Commercial Catch (of fish)
TCPA53:	Town and Country Planning Act 1953
TCPA77:	Town and Country Planning At 1977
TCPD:	Town and Country Planning Division (of the MWD)
TDC:	Tasman District Council
WSCA:	Water and soil Conservation Act 1967
UNCLOS III:	United Nations Convention on the Law of the Sea as amended after the third United Nations Conference on the Law of the Sea

Chapter One: Introduction

It is unlikely that there is any nation in the world that has seen such far-reaching and dramatic changes to its fisheries and marine resource management regimes as those that have taken place in the last thirty years in New Zealand. The 1970s featured the declaration of the world's then fourth largest 200 nautical mile (nm) Exclusive Economic Zone (EEZ) and the 12nm Territorial Sea. Associated with these developments was a boom in the commercial fishing industry. The 1980s saw a dramatic restructuring of the political scene and associated changes in government structures and New Zealand's economy and socio-cultural character. In the marine environment these were accompanied by implementation of the world's most extensive Quota Management System (QMS) for fisheries and consequent legal challenges by Maori. Then, in the 1990s, the Resource Management Law Reform process reached its conclusion with the passage of the Resource Management Act 1991, introducing a comprehensive coastal management system underpinned by a paradigmatic change from activities-based to effects-based planning. Concurrently, settlement of Maori Treaty of Waitangi claims to fisheries resources resulted in Maori becoming very prominent players in the fishing sector.

These changes need to be seen within a global context of concern over management of the world's environment generally at a time when many nations were seeking greater liberalization of trade. In the marine context this was epitomized in the third round of negotiations over the United Nations Convention on the Law of the Sea (UNCLOS III). Should nation states have control and gain the benefits of their adjoining waters (and if so for what distance seaward), or should those who invested in the technology to exploit these waters be given secure rights to do so? The debates between nations seeking to extend their control, to 'enclose' the adjacent marine commons and those seeking to maintain these areas as common heritage with resources available to everyone have their primary legal origins in the conflicting treatises of Grotius (1633) and Selden (1652). The resolution of the debates with the coming into force of UNCLOS III in the1990s has led to those coastal nations that are parties to the Convention, such as New Zealand, extending their jurisdiction to the edge of the continental shelf or to 300 nautical miles

from the coastline, whichever is the lesser. In return for the extended jurisdiction, such nations are expected to exercise responsible management of the former marine commons, through appropriate environmental management frameworks that enable the sustainable development of these areas (see Juda 1996 for a fuller explanation).

The addition of such a large area of unallocated marine space to its jurisdiction will pose significant management challenges for New Zealand. Among these is the development of an oceans policy that the Government embarked on in 2000. Such challenges are not new. Indeed, the extension of New Zealand's territorial sea and declaration of its EEZ anticipated progress with UNCLOS III. The experience gained from managing the territorial sea and EEZ may assist in responding to the wider area management issues. Unfortunately, no detailed analysis of the New Zealand experience has been attempted. Moreover, as will be shown during this thesis, the approaches to managing New Zealand's marine resources have faced ideological, political, socio-cultural and technical difficulties that have yet to be resolved. In particular, a neo-liberal planning regime has been implemented in the 1990s, through the Resource Management Act, that arguably departs radically from previous planning regimes. That regime has significantly clashed with the neo-liberal QMS approach adopted for fisheries management. The fundamental argument *for* this thesis, therefore, is that without some understanding of the recent marine resource management experience we are under-prepared for the challenges of extending our jurisdiction further into the oceans and meeting our management responsibilities under UNCLOS III (cf. Knight 2000a,b).

This introductory chapter outlines the relevant underlying theories and planning approaches, the key components of the New Zealand marine resource management regime, and the rationale for focusing attention on 'marine farming'. It then sets out the major argument of the thesis and provides a 'chart' to assist the reader to navigate the subsequent parts and chapters of the thesis.

1.1 Theoretical Framework

The theoretical framework of this thesis is dependent on drawing together three particular streams of literature dealing with, respectively, common property resources, planning and integrated coastal management. The focus of the thesis is on the application of these theories rather than the theories themselves. My purpose here is to outline some of the theoretical issues relevant to my research.

1.1.2 Common Property Theories

Since establishing its EEZ in 1977, New Zealand, as has been the case internationally, has treated its marine area as a common property resource (CPR), an area in which no-one has a claim to individual ownership and to which everyone has rights of use. There are exceptions to this general approach, and increasingly we have seen the development of means of managing our marine area which place formal constraints on its use. For instance, over the decades legislation has been written which provides for the establishment of marine reserves (Marine Reserves Act 1971), zones for water skiers (Harbours Act 1950), mineral prospecting (Crown Minerals Act 1991), and marine farms (Marine Farming Act 1971). Each of these statutory developments has the effect of potentially excluding or restricting some people from marine space (areas) that previously had been considered common property.

The allocation and management of a common property resource has been at the heart of much theoretical debate over the last half-century. Two clear schools of thought have emerged: the bio-economic, exemplified by the writings of such people as Gordon (1954), Hardin (1968), Scott (1989, 1993, 2000a), Pearse (1991); and the socio-anthropological, exemplified by McCay and Acheson (1987), Palsson (1991), Berkes (1989), Durrenburger (1994), Feeny *et al* (1990), Ostrom (1990), Hanna (1990), Pomeroy (1994), Edwards and Steins (1998) and Pinkerton (1989). Both tend to focus on rights-based solutions to conflicts over common property resources. The essential difference between the two approaches has been in the nature of rights, who should hold the rights and the extent to which the liberty to exercise the rights is constrained.

The bio-economic approach has advocated the enclosure and privatisation of common property resources as the best means of providing sufficient incentives for their long-term sustainability. Common property resources are therefore seen as anathema to good management, creating a 'race' to use the resources before someone else does, with ultimately an overuse and degradation of the resource. This negative perspective of the 'commons' has been advocated through an effective, emotive rhetoric encapsulated in the title "The Tragedy of the Commons" of Hardin's (1968) much quoted bio-economic article. Hanna (1990) has demonstrated Hardin's (1968) flawed understanding of the history of the English 'commons' and his failure to differentiate 'open access' resources from situations where the resources are 'held in common'. Despite this the metaphorical 'tragedy' story underlies much of the argument of the bio-economic theorists. Their solutions emphasise the allocation of rights, or 'bundles of entitlements', to individuals to achieve sustainability of resource use.

The socio-anthropological school (which is a narrow description because historians, political scientists and geographers have also made significant contributions to it) views the rise of private ownership of resources as an historical aberration which has yet to prove itself as having any great benefit to sustainable resource management. Some authors have even suggested that it has contributed to major environmental failures (Feeny *et al* 1996). The socio-anthropological school proposes further investigation and development of community-based management of common property. Such approaches often underlie community-based planning that regulates activities.

The mid-1990s saw some recognition by protagonists of the two schools of the merits of each of the other's perspectives (Schlager and Ostrom 1993, Scott 1993, Townsend 1995), but this has yet to be fully worked through and critically assessed (Food and Agriculture Organisation (FAO) 2000). Such an assessment is beyond the scope of this thesis, but the possibility that the two approaches might achieve some degree of commonality and even integration in certain circumstances should not be overlooked. A key contribution of this debate, however, has been a sharpened focus on the nature of property 'rights'.

The crux of the debate arises from Lockean conceptions of the ability of people to acquire ownership of something by co-mingling their labour with the natural resource (Locke @1690, reproduced in Laslett 1967). The concept is the base of 'adding value' in that the addition of labour to a natural commodity 'creates' a product which is of higher value than would be the case had there been no addition of labour. Our concern here, however, is not the value of the product, but the ownership of the product. For instance, fish in the sea are unowned, but if I cast a line into the sea and catch a fish, is that fish mine? The answer to such questions might depend on the theoretical (and philosophical) position you adopt. From a Lockean perspective, as outlined above, by mixing my labour (fishing) with the resource (fish) I obtain a form of ownership of the resource ('It's my fish').

The counter argument, however, is that simply by adding two things together does not mean that the end result is any more one than the other. If the fish was considered originally to be the property of the community (i.e., it is a CPR), then the fact that someone used their labour to capture the fish would not necessarily make the fish any less the property of the community. Depending on the nature of the society it may, or may not, decide that the person who captured the fish should obtain any or all of the added use value that the capture of the fish had created. The society may also determine the nature of the ownership of the fish as separate from the issue of the value of the fish. For instance, fish catches in some Pacific Island communities are usually shared, not taken by the individual (Ruddle 1996a,b). Therefore it has been argued that rights are not 'natural' in the Lockean sense, but are instead, in the tradition of Rousseau, defined by society through its various institutions (Rousseau 1762).

The outcome of this debate has been recognition that property rights are in fact divisible along several dimensions or axes that describe particular characteristics of the property rights (Scott 1989, 2000b, Schlager and Ostrom 1993). Following Scott (1989, 2000b) and Harte and Bess (2000), the relative strength of different types of property right can be plotted on these axes to enable easy comparison (discussed in Chapter Three). This descriptive 'model' is used to aid comparisons of different regulatory regimes in Chapters Three and Four.

Much research has focused on the nature of property rights in given situations, the nature of the institutional framework that has given rise to the rights, the degree to which they contribute to sustainable development, and how best to move from one institutional framework to another (e.g., Shotton 2000a, b). In these discussions the terms 'users', 'stakeholders', 'shareholders' and 'interests' have often been used interchangeably. Groups have often been assumed to be relatively homogenous (e.g., 'communities' are considered as clearly identifiable and to have common 'interests'). Competition between groups with different interests within particular sectors has been recognised, but differences between members of these groups have not been given the same attention by bio-economic theorists. Within a fishery sector, for example, the interests of the local fishers might be distinguished from those of the factory fishing vessels from elsewhere, but little comment has been made on the different interests of people *within* either the 'local fishers' or 'factory fishers' groups. The socio-anthropological school has, however, given some attention to the heterogeneous nature of actors in various 'interest' or 'stakeholder' groups (Creed 1991, Keohane and Ostrom 1994, van der Schans 1996, Marshall 2000).

The positioning games and rhetorical nature of the debates which occur in shifting from one governance regime to another have been subjected to detailed analysis (Creed 1991) and it is clear that in different forums, and at different times, individuals and communities may define their interests as being more, or less, inclusive of interests and stakeholders. In a single forum Creed noted that spokespeople are quite ambiguous in the ways in which they define their 'community'. Creed's analysis of the texts of the speakers enabled her to identify: i) the heterogenous nature of the 'communities' involved, and ii) the deliberately strategic use of the rhetorical ambiguities employed by the speakers.

'Scale' as a factor in defining the nature and the boundaries of the community has also only received relatively little attention from CPR theorists. On what scale does one measure the resource, and measure the community, or communities, with interests in the resource? How should 'local community' be defined as distinct from 'regional', 'national' or 'global' community? By what mechanisms should the global or the national interests (e.g., in the survival of whales and producing sufficient food for the

world, or the public interest of a nation and its economic development) be transmitted into the local settings other than by centralized decision-making processes? Such issues have resulted in recognition of the analogous nature of research on global politics and the smaller scale, localised CPR work. Despite substantive critiques, comparisons of institutional mechanisms to cross such community boundaries are not common in CPR research on developed country issues (Keohane and Ostrom 1994, Hameed 1998).

Even when speaking more generally, the CPR researchers appear to maintain a closed system perspective. For instance, Hanna (1997), drawing on Ciriacy-Wantrup and Bishop (1975), discusses a continuum of resource ownership regimes ranging from 'unowned' to common property resources. She suggests that the 18th Century history of 'frontier' development of the American West exemplifies the 'unowned' situation wherein "property rights to the resource are attained at the point of capture" and "resource management on a frontier is either absent or limited to soft constraints which are unbinding during the development phase" (Hanna 1997: 223). She considers this 'frontier' phase analogous to current American fisheries management and able to be correlated with particular personality attributes of the users. Hanna (1997: 10) contrasts this approach with that of a resource managed under a CPR regime wherein "the group of co-owners... have rights and duties with respect to resource use". Under such a regime, the resource base has defined boundaries and all aspects of access and management of the resource are "developed by the community of owners and managers" (Hanna 1997: 10). A key difference between CPR and frontier regimes, she suggests, is that in the former the community recognises the need to sustain the ability of the resource to provide services for future generations.

There are two points I wish to emphasise here. The first is that Hanna assumes that the users are, or should be, the 'co-owners' (later referred to as 'shareholders') of a CPR, but she does not define the concept 'user'. Second, she assumes that a frontier exists where there is no ownership of resources such as American fisheries. Dealing with the latter point first, I argue that such resources are owned in common by the peoples of the world. They are part of global biodiversity and are therefore part of the 'common concern' of people throughout the globe. This has been explicitly stated in the Convention on Biological Diversity and in Agenda 21, albeit with some caveats. This

leads to the issue of defining who should be considered 'co-owners'. If, as discussed above, an 'interest' is a 'stake', and a 'stake' is a 'share', then CPR theory needs to address how to encompass the international shareholders in the local governance regime.

A further major difficulty with the CPR approach is that CPR theorists usually focus on a single sector, usually extractive, in the ecosystem and this also relates to the issue of homogeneity of actors in groups. Thus there are many articles written on CPR in relation to various fisheries (e.g., Scott 1993, 2000a, McCay 1998, McCay *et al* 1998, Wilson *et al* 1994, and various authors in Shotton 2000a, b) and to the role of various players in the fishery (e.g., Jentoft and Mikalsen 1994), or in regard to wildlife and traditional hunting rights (eg. Usher 1992, Lueck 1995). Alternatively the literature focuses on a single physical resource and ownership rights, for example land (Bosselman 1975, McChesney 1992, Rambo 1995, Krannich and Smith 1998) or water (Emel and Roberts 1995, McNally and Matthews 1995).

In the marine environment, there is very little literature in the CPR area that addresses the relationship of extractive users of resources (e.g., whalers) with other users of the ecosystems' services (e.g., eco-tourists). For a more integrated approach to governance of the resources within a marine area one must turn to the literature on integrated coastal management.

1.1.2 Integrated Coastal Management (ICM)

For at least the last three decades the international literature has highlighted failures in coastal policy, planning and management (Cicin-Sain and Knecht 1998). These failures usually involve competing sectors or activities within the same area. Much of the failure has been blamed on uncoordinated planning for use of the coastal marine environment (Sorensen and McCreary 1990). Governments throughout the world have responded to the demands on their marine resources with a variety of planning approaches (Sorensen and McCreary 1990). A convergence of views appears to have been reached, particularly in Agenda 21 (United Nations 1992) that the concept of Integrated Coastal

Zone Management (ICZM) is a desirable avenue to pursue (World Bank n.d., Cicin-Sain 1993b).

Vallega (1996) argues that there has been an evolutionary growth in coastal area management since the 1960s as coastal managers have moved from single-issue or single-sector management through to a stage of 'mature' multiple-use management, with ICZM primacy being established in the 1990s. ICZM, also known as Integrated Coastal Area Management (ICAM), or more recently Integrated Coastal Management (ICM), has proven a problematic concept (Vallega 1993). As Cicin-Sain (1993a) notes, however, there are no substantive differences between the definitions of different terms used by leading proponents (Chua 1993, Cicin-Sain 1993a, Kenchington and Crawford 1993, OECD 1993, Sorensen 1993, Vallega 1993, World Bank n.d.). I will use ICM to encompass all three. Essentially, ICM has been defined as:

> a continuous and dynamic decision-making process by which decisions are made for the sustainable use, development, and protection of coastal and marine areas and resources. First and foremost, the process is designed to overcome the fragmentation inherent in both the sectoral management approach and the splits in jurisdiction among levels of government at the land-water interface. This is done by ensuring that the decisions of all levels of government are harmonized and consistent with the coastal policies of the nation in question (Cicin-Sain and Knecht 1998: 39).

It is frequently promoted as being the holistic antithesis of a fragmented approach (fragmentation being seen in negative terms), and as having essentially rational processes for addressing an objective reality while incorporating public participation (Cicin-Sain 1993a, Sorensen 1993).

Few have attempted to defend the pre-ICM regimes. Those who have, have done so on the basis that a collegial, networked planning approach can be a more efficient and effective way of achieving the flexibility required to manage coastal resources (Born and Miller 1988). Such an approach relies on the 'wise' judgement of decision-makers being exercised without the transparency of public scrutiny or public consultation processes required by ICM.

In one of the few theoretical and critical commentaries on the evolution of ICM, Vallega (1993), drawing on General Systems Theory (GST), has explicitly noted the political agenda of the scientists and managers who have promoted ICM and has pointed to the challenge now faced by the same people to implement the concept. Vallega argues that there is a need to move from the structuralist methodologies of previous studies of coastal management (incidentally, also characteristic of CPR research) to GST-based methodological approaches. To Vallega (1993: 154) the "conventional structuralist" approach, with its emphasis on the understanding of structures through "the description of their components and their reciprocal relationships", had served a useful purpose in progressing to ICM. He considered that GST offered significant advantages, particularly as its focus on processes/changes (and their relationships with their contexts) reflected the dynamic nature of coastal environments.

My reading of the literature, however, suggests that there has been a remarkable lack of integration evident in the very concept of integrated coastal and marine resource management. Most published literature focuses on sectors (e.g., fishing, mining), or on the influence of management of particular environments on particular sectors (e.g., the effect of mangrove depletion and soil degradation on nearby spawning grounds for fisheries), and then proposes an unexamined ICM solution. The wider context of integrating oceanic-marine with coastal-marine management (including the terrestrial area behind the land sea interface) did not receive the same attention until Cicin-Sain and Knecht (1998). The failures of separate institutions with overlapping responsibilities to integrate their operational, planning and policy functions, and indeed the rivalry between some of these institutions, is usually highlighted as being the main cause of the problems (Sorensen and McCreary 1990, Vallega 1993, Cicin-Sain and Knecht 1998). In effect the responsibility, and therefore the accountability, for failure has been placed at the door of public agencies/institutions.

Van der Weide (1993: 146) similarly argues for the development of "an integrated model for *the* coastal system" (emphasis added). This would be followed by "the development of a descriptive model of the activities in the coastal area, together with the supporting infrastructure. GIS is the appropriate tool to support such a description" (van der Weide1993: 147). In similar vein, Vallega (1993:156) sees ICM as occurring when

ecosystems and coastal uses are integrated as "modules" of a single system, "the coastal system". He considers one of the strengths of a GST-based approach to be that it is "strictly goal-oriented" and that this enables an integrated objective to be stated in terms of holism, ethical needs, economic efficiency, and a clearly stated environmental goal (Vallega 1993:156-157).

The GST-based approaches described by van der Weide and Vallega are examples of a particular branch of systems thinking described in the literature as 'hard systems' thinking. Hard systems thinking has been subject to considerable criticism (e.g., Gregory 1980, Morgan 1981a, Rennie 1985, Checkland 1981). I will not go into these critiques in depth here, but note that among the most trenchant of these is a critique of the assumption, made by the GST proponents, that 'systems' (e.g., 'the' coastal system) exist independently of the system observer/namer. A second major difficulty, noted by Checkland (1981), is that the goal-seeking orientation of hard-systems thinking tends to result in premature identification of 'the problem' and of system components to be modeled. Checkland (1981, Checkland and Scholes 1990) has instead advanced the concept of 'soft systems thinking', which is informed by GST, but which focuses on the human perceptions of the 'real' world and attempts to 'learn about a situation', including the human factors. Data management, however, can be problematic (Rennie 1993a).

Van der Weide's (1993) approach exhibits the difficulties that Checkland (1981) suggests exist with hard-systems thinking. Van der Weide gives passing mention to the 'socio-economic system' and immediately commences to build a model of 'the coastal system', explicitly excluding the human elements/modules and in the process effectively abandoning ICM. Vallega (1993), however, is much more integrative in his approach, explicitly including ethics and politics as major and indispensable components in his systems approach to ICM. In this fashion he comes closer to soft systems thinking and illustrates the importance of taking into account human agents in ICM.

It should be noted that in my previous work in government and in some publications (e.g., Rennie 1993b) I have strongly advocated ICM. However, I now hold some doubts about this approach. These doubts are grounded in the failure of ICM proponents (myself included) to critically examine what I now see as the rational, modernist

assumptions underlying some forms of the approach. In effect coastal planning has avoided the critical examination to which planning at large has been subjected, particularly from post-modern theorists. Even Vallega's (1993: 152-153) analysis did not challenge the nature of the change in paradigms from one of fragmentation to one of integration. Instead he described the culmination of the political agenda for ICM as a stage of "maturity" in coastal management, featuring consistency with sustainable development principles, a non-mechanistic concept of the ecosystem, and a multidisciplinary approach (Vallega 1993: 152-153).

Nichols (1999) recently mounted a strong critique of ICM. She has directly challenged its intellectual hegemony and legitimizing discourse, especially within development agencies working in less developed nations. In particular, she has argued that ICM is primarily a mechanism for advancing the neo-liberal ideologies of the West and in the process has led to the penetration of 'extra-local' and state capital into communities, resulting in the loss of their sustainability. She suggests that a key strategy within the ICM approach is to officially recognize as 'stakeholders' those groups who do not "conform to the ICM vision but cannot be justifiably excluded on the grounds of interest clashes with agenda-setters" (Nichols 1999: 394). This recognition enables the "controlled mobilization" of these groups and either results in their cooptation or legitimizes the removal of their 'rights'. She argues that the resulting suppression of pre-existing local economies (e.g., local fisheries) by extra-local globalised economic activities (e.g., tourism and fish farming) is supported by the rhetoric of sustainable development and ICM. These newer activities have been more environmentally damaging than the activities that preceded them.

A major weakness in Nichols' argument, however, is that all the examples she draws on are from developing countries (e.g., Sri Lanka). In this thesis I argue that ICM can take both a traditional modernist form, extending and legitimizing the centralized state's control, and that it can be a more post-modern regime, enabling local communities to reach local solutions to their problems. I will also be assessing Nichols' views from the vantage point of exploring an attempt to apply ICM (through the Resource Management Act 1991) in a developed country context.

In summary, the academic world, international agencies and national governments have generally promoted an unexamined ICM throughout the 1990s. The approach attempts to achieve transparent, dynamic and continuous decision-making that is vertically and horizontally integrated between different government institutions, and that achieves sustainable development. The approach may, however, also have become a hegemonic tool to facilitate the penetration of the capitalist enterprise into local coastal communities. Before moving to discuss ICM in New Zealand it is useful to briefly traverse the basic planning approaches as they have evolved since the 1960s.

1.1.3 Modern and Post-Modern Planning and their Tools

I do not intend to go into the post-modern/modern debate in planning theory in depth (see Beauregard (1989), Friedmann (1993, 1994) for more detailed discussion). However, a brief summary of my understanding of this debate is necessary to place the thesis within an appropriate planning context.

The modernist agenda in planning can be summarised as being one dependent on three key assumptions: (i) there is an objective reality (with mechanistic tendencies in the everyday context of social reproduction); (ii) rationally optimal solutions can be identified for everyday problems (reflecting the mechanistic model); and (iii) mechanisms can be designed, as part of planning, which will result in optimal solutions being achieved (which draws in part on 'hard' systems, utilitarian thinking derived from the operational research applications of General Systems Theory). The traditional response was to gather considerable information on the capability of resources to be used for particular activities and then to decide between the competing possible users of the resource on the basis of some form of optimised multiple use strategy (Beauregard 1989). The ability of the general public to be credibly involved in the process was restricted by the technological expertise required (Alexander 1994).

Modernist planning also sought to address the excesses of unconstrained capital-driven development (Beauregard 1989). The spatial contests between competing investment strategies of different individuals were seen as leading to inefficient, fragmented development that lacked 'ordered functionality'. The state was seen as having an

independent role to bring order to the chaos, usually through a ‘master plan’. ‘Wise’ decision-makers would identify the ‘best use’ of land without much public scrutiny or participation.

The post-modern challenge to such planning approaches emphasised the subjectivity of experience and the power relationships embedded and embodied in planning documents. (Beauregard 1989). Emphasis was placed on a ‘situated knowledge’, admitted the inherently political nature of planning and placed primacy on the devolution of decision-making powers to local communities (Friedmann 1993, 1994). Some of the literature takes the form of critiques of the tendencies of rational, modernist planning to create, and/or be, mechanisms of domination by power elites (Forester 1989, Hillier 1992). The ‘harsher’ post-modern planning response has been to emphasise a libertarian, ‘emancipatory’, almost ‘anti-planning’ approach (Beauregard 1989). Instead of planning for multiple best use of a resource, these writers recognize pluralism, celebrate difference and seek ‘real-time’ issue-focused planning working directly with small groups rather than master plans designed to achieve grand ‘visions’ (Friedmann 1993, 1994).

In its ‘gentler’ forms the neo-post-modern approach has emerged as a focus on the planner as a facilitator, enabling many 'voices' to be heard, and enabling the emergence of new situations through such processes (Friedman 1993, 1994). The proponents of this ‘style’ of planning draw on Habermas’ (1984, 1987, 1993) theories of ‘communicative rationality’ and communicative ‘ideals’ and speak in terms of ‘communicative planning’ and conflict resolution through consultation and mediation (Forester 1989, Healy 1996).

As noted above, ICM became a political agenda that has reached the stage of policy acceptance without critical examination, and is now being implemented. I suggest, however, that in its attempts to achieve integration it has also promoted the monolithic structures and vision-based, function-based, objective planning processes that typify the modernist planning paradigm. Indeed, the fragmented approach that it replaced may in fact have represented a planning situation where contests between power and the manifestation of power were rife. Such fragmented situations might have been more

amenable to creative, local solutions in keeping with the theme of post-modern pluralism.

ICM may not have to be a monolithic top-down exercise. Few of its practitioners would consider it to be so. Indeed it is able to envisage an approach designed to maximize local community control over decision-making, effectively devolving the state role to the local community. The extent to which ICM may achieve this might be dependent on the degree of genuine control that local communities are able to exercise unconstrained by the conditionality of such devolved powers. In other words, to what extent do the policies and views of central government bind or dictate the nature of the resolution of conflicts over the use of coastal space? To what extent are local planning regimes enabled within the vertically integrated framework? These questions suggest a need to understand the basic tools of the planner.

The planner has two basic types of planning in which to be involved: statutory planning and non-statutory planning. Within statutory planning the planner's processes and tools are constrained to those provided in law. Non-statutory planning is essentially any form of planning not prescribed or proscribed by statute.

Planners may be involved in development planning, development control, or advocacy. Development planning, if done rationally, involves the acquisition of knowledge (of resources, peoples/governments desires, available and potential technologies, etc.) and the marshalling of these resources into a programme of activities that lead to the desired development goals. It is inherently modernist. Essentially, it works to facilitate developers' activities that fit with the 'programme'.

Development control, on the other hand, adopts the view that there is some 'public interest' (e.g., health and well-being) that must be 'protected' by controlling those things/activities that would be a 'nuisance' to that public interest. Essentially it attempts to mitigate market externalities. It is characterized by having processes that require a developer to obtain authority from the planning system (representing the 'public interest') to undertake the particular development. It has modernist tendencies, but the interests it serves to protect from development may well be determined through post-

modern processes. Control may be exercised at any hierarchical government level, including local, and at any spatial scale.

Advocacy planning, on the other hand, eschews any responsibility to a 'public interest', adopting instead the approach of being an advocate for whatever client the planner serves. If the employer of the planner is required to serve the 'public interest' then the planner will advocate for the public interest. In this respect they may advocate for modernist planning approaches or post-modern approaches depending on their 'style' and their client's needs.

The methods available to planners tend to lie within three categories: performance standards, zoning, and 'contracts'. In most situations a combination of all three is used (indeed, a plan is a form of contract), but the way in which they are used will often reflect an ideological perspective or the nature of the role the planner is fulfilling. Put simply, zoning is a method that allocates space by one of several methods. Activities-based zoning categorises certain land or resource-using activities (e.g., as marine farming) and then identifies areas (zones) to which particular rules apply governing those categories of activities (e.g., as an area in which the predominant use is marine farming). Alternatively, the zoning may be based on categories of 'effects' that are to be encouraged or avoided.

To illustrate, under a biophysical effects-zoning approach, a building might be required to avoid casting shade on certain areas or to be harmonious in visual appearance with its surroundings. The activities for which the building is used are irrelevant. Under an activities-zoning approach, the building is not important, but its use as, say, a church might be allowed, whereas its use as a casino might not. Indeed, the use of the site for either activity might not even require a building. Often particular activities will be inextricably linked with particular structures that in turn have particular effects (e.g., salmon farming with net cages and their impact on visual amenity). This can lead to some confusion in the way the two are addressed by the decision-makers and the response of lay people.

A performance standards approach might involve setting certain standards and every activity is assessed against the standard. Under this approach a zone may be used. If no zone is used, then the standard may apply to all areas within the jurisdiction of the relevant planning system. A contract approach may involve simply deciding on a case-by-case basis what will or will not be done and the constraints or commitments, if any, would be written into the contract. This is usually associated with a standards approach with the activity allowed subject to certain conditions. It may also be employed with zones. For instance, a plan may include a zone where the landowner must prepare a site plan and all activities that are within the provisions of the site plan are allowed to proceed, provided the original plan is acceptable to the planning authority. The site plan becomes a contract within the overall plan.

Clearly, plans might include zones that specify situations where contracts would be required for certain activities having particular effects and those contracts would incorporate particular standards. Zones, whether set by effects or activities or a combination of both, also often incorporate standards in determining whether the activity/effect has crossed a particular threshold where new standards or approvals are required.

It is important to recognize that either activities- or effects- based approaches, contracts or performance standards can be used to implement different ideological positions. The effects-based approach described in the casino/church case above, for instance, has limited its concerns to biophysical effects. This is clearly more conducive to a neo-liberal, post-modern planning approach wherein capital is free to invest in either a church or a casino with no regard to the socio-cultural consequences. If the plan required that adverse socio-cultural effects had to be considered, then the effects of the casino on, say, particular moral values held by the community would be considered. It is the substantive content of the plans and policies that signals the ideological basis of the regime, just as the processes (the locus of decision-making and the levels of participation of the people) mark the modern or post-modern spirit of the regime.

Much planning research is devoted to either: describing, reviewing or assessing particular planning systems approaches/plans; seeking new technologies to use in

planning (e.g., Geographical Information Systems); developing new processes for achieving the outcomes of 'clients' (e.g., identifying the 'public interest' or means to positively support a particular ethnic, age or gender minority); or developing new 'critical' approaches to any one of the above. In relation to planning, the research reported in this thesis falls largely in the body of literature critically reviewing planning systems. In the process it develops a new heuristic tool for assessing different systems for acquiring property rights, but more importantly, the research connects spatial outcomes with ideological positions underpinning particular planning systems and approaches employed for the coastal marine environment in New Zealand.

In relation to planning, I argue in this thesis that a post-modern, effects-based marine management approach that provided diverse local solutions was adopted in New Zealand in the late 1980s and that recently this has been rejected in favour of an earlier, modernist approach.

1.2 Key Components of the New Zealand Marine Resource Management Regime

New Zealand has not been immune from the political agendas that Vallega (1993) has identified as having led to the present international acceptance of ICM. The significant costs incurred by developers in trying to navigate their passage through the shoals of previously fragmented, competing/non-integrated institutions were highlighted during the Resource Management Law Reform (RMLR) process in the 1980s and were used as a basis for advocating a move toward more integrated, streamlined institutional structures (e.g., Ministry for the Environment 1988). Also, as noted above, the literature advocating ICM has been reflected in a number of international agreements (e.g., Chapter 17 of Agenda 21 (Vallega 1995)) and has been adopted as a priority for conserving coastal and marine biological diversity under the Convention on Biological Diversity (New Zealand Delegation 1996). While the degree to which countries are bound by such agreements varies, New Zealand is a party to some of these agreements and has certain legal obligations under them that may be reflected in domestic processes (Hewison 1994, Ministry of Foreign Affairs and Trade 1994).

The Resource Management Act 1991 (RMA) has been seen as one of the exemplars of ICM (Sorensen 1993, Cicin-Sain and Knecht 1998, GESAMP 2001). It creates transparent mechanisms to integrate management across the land/sea interface and establishes a community and effects-based planning regime for the Coastal Marine Area (CMA) extending from the line of 'Mean High Water Springs (MHWS)' to the outer limits of the territorial sea. It also includes specific provisions relating to New Zealand's international obligations and has sustainable management as its purpose. Similarly, changes to the fisheries legislation over the last 20 years reflect, in part, attempts to implement international agreements as well as a largely neo-liberal ideological agenda derived from international bio-economic theoretical literature on the allocation of marine rights to harvest fish (Boyd and Dewees 1992, Clark *et al* 1988, Wheeler *et al* 1992). These saw the establishment of a unique system for fisheries management, based on individual transferable quota (ITQ), known as the quota management system (QMS).

As I have argued elsewhere this is not an integrated system for coastal zone management (Rennie 1993b, 1994b, 2000a). The RMA, for instance, explicitly excludes fisheries from its ambit (Rosier 1993). Separate Acts do not necessarily mean that the system is fragmented. This thesis will demonstrate, however, that although the two principal Acts (RMA and the Fisheries Act 1983/1996) were designed to enable spatial rights to be allocated through integrated mechanisms, overlapping rights to water space have created significant problems. These problems have been exacerbated by the different ideological positions underlying the mechanisms of the principal Acts.

1.3 Why Marine Farming?

The expansion of aquaculture production is seen as essential to meet global food and lifestyle needs in this century (Mace 1997). In the 1990s marine farming (mariculture) had grown to the extent that it accounted for over 50% (about 20 million tonnes) of global aquaculture production (Rana and Immink 1998). It has become a small, but significant part of global and New Zealand (almost 100,000t) fish production (Figures 1.1 and 1.2). Moreover, with capture fisheries considered to have reached their probable

peak production globally, marine farming offers among the best opportunities for maintaining and expanding fish production (Mace 1997, Rana and Immink 1998).

Figure 1.1 World fish production 1970-1999 (Source FAO)

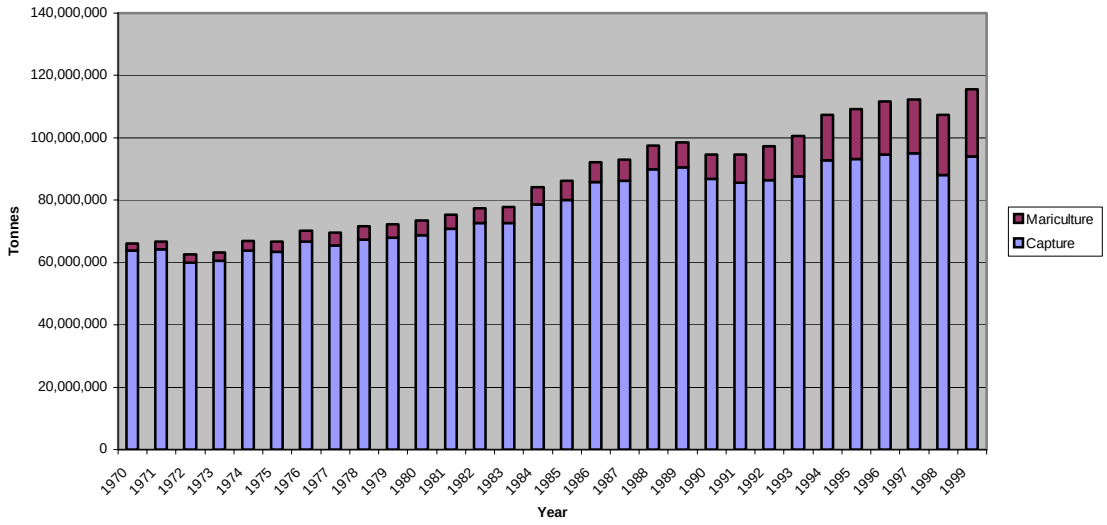
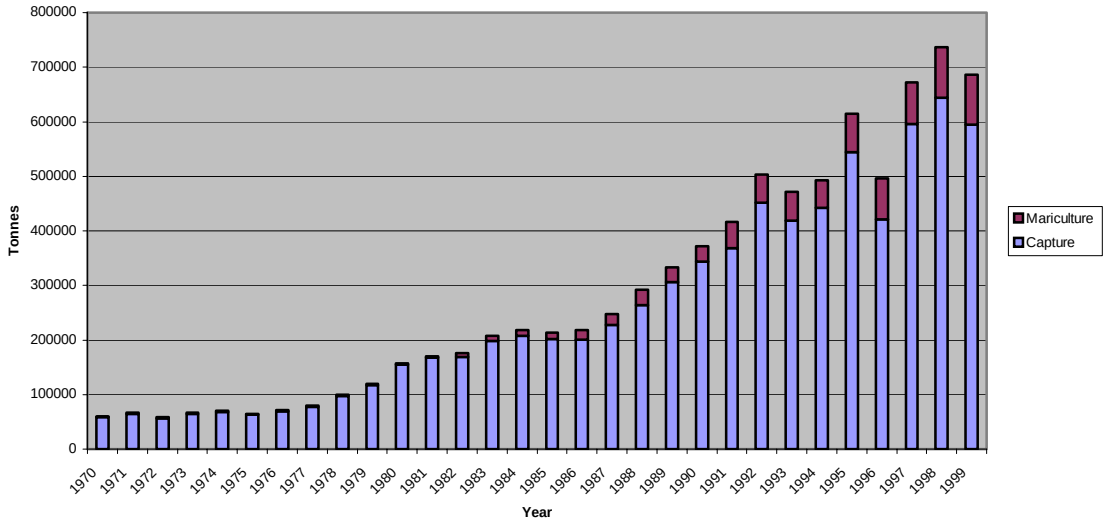


Figure 1.2 New Zealand fish production 1970-1999 (Source FAO)



In recent years, the United Nations Food and Agriculture Organisation (FAO) has focused its attention on legislative regimes to facilitate sustainable development and expansion, within a rights-based approach, of marine farming (FAO 2000, Shotton 2000a, b). The IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) recently identified New Zealand's planning regime as a model approach for other nations to consider (GESAMP 2001). That such internationally influential organisations are promoting the New Zealand marine farming and coastal planning experience suggests that marine farming would be a suitable focus for the research, but there are other more local and theoretical reasons equally as important.

Marine farming sits astride the legislation governing fisheries and that governing other coastal management issues. It is also undergoing rapid technological development and geographical expansion, both globally and in New Zealand. New technologies for marine farming have been developed which conceivably could turn large areas of the seabed, water column, or sea surface into marine farms. Concurrent with these changes has been a spate of applications for marine farming permits in areas that had, until recently, not been considered as possible marine farming locations. The common property nature of New Zealand's marine space has come under particular pressure from marine farming. Competition between the marine farming, capture fisheries and conservation/recreation sectors has led to conflicts between interests in the allocation of that space. Marine farming is therefore an appropriate activity on which to focus this research

Marine farming has also become a focus for a number of researchers exploring the relationship between property rights, planning and the development of marine resources. In Canada, Dwire (1994) identifies the conflict between traditional uses of land and water, especially by traditional fishers, as the most 'potent' constraint to the development of the aquaculture industry. She notes in particular the ambiguities in property rights in the marine environment. Phyne's (1994, 1999) analysis of aquaculture development in Scotland, Ireland and Nova Scotia supports Dwire's analysis. In addition, both Dwire and Phyne agree that dissatisfaction with the responses of the courts to the social conflicts that have resulted from aquaculture development has

led to a focus on communicative planning techniques of consultation and mediation procedures. Such procedures have been built into some of the planning systems partly as a means to avoid the courts. Dwire (1994) and Phyne (1994) also note, however, that the nature of the rhetoric in such forums and the development of equitable participation processes are critical to the development of consensus or equitable decision-making.

In her comprehensive overview of property rights in the coastal zone of England and Wales, Pickering (1993: 32) concludes that:

> property rights in the coastal zone have developed in parallel with man's (sic) exploration of space, both horizontally and vertically, and investigations into science and technology. With each new step perceptions of value changed as with perceptions of what is possible or desirable, generating new issues and questions as to the nature and extent of the rights over the new discoveries. This has resulted in the uncoordinated and ad hoc development of a management framework ... property rights have become the linchpin of that framework ... Across the coastal zone there is inconsistency in the evolutionary stage to which this property rights framework has evolved, marine areas being much younger and defined with less clarity.

Such an analysis suggests scope to devise and investigate imaginative frameworks for allocating property rights. These frameworks might be well-informed by spatially explanatory and predictive models. This thesis demonstrates, however, that the need for soundly based theories explaining the spatial location of marine farms has not been met and it attempts to go some way toward filling this gap in our knowledge.

Developing spatial models assumes particular importance if policy or legislation is designed which might affect the decision-making behaviour of marine farmers. As a general principle of parliamentary process in New Zealand, the implications of changes in policy or legislation are subject to scrutiny and Cabinet procedures even require the preparation of 'Regulatory Impact Statements' for proposed policies and legislation. In addition, the level of uncertainty that abounds in a situation of limited understanding creates opportunities for manipulation by policy entrepreneurs, politicians and institutions. Manipulation may be in the direction of favoured groups, perhaps in an inequitable and even undesirable reproduction of, or revolution against,

existing power relations. If the behaviour of marine farmers in responding to changes in the policy or legislative regime within which they operate is not well-understood, then farmers' reactions to changes in those regimes will be less easily anticipated. The policy entrepreneurs will have greater ability to manipulate decisions and the implications for farmers and other interested and affected parties may be inadequately considered.

As a policy advisor to governments on marine farming and other planning legislation and as a researcher into the relationship between farmers and the planning regimes that result from policy and legislative changes, I can attest to the fact that understanding the implications of changes has been hampered by the lack of sufficiently detailed maps with sufficient coverage of farms, and their ownership, to depict the spatial development of the industry. The basic tools for a geography of marine farming, a marine cadastre, simply did not exist prior to my research.

1.4 The Argument of this Thesis

In a common property situation, where there has not been a first order allocation of space to much of New Zealand's coastal marine area, the planning restrictions act as a *de facto* first order allocation mechanism. The RMA was heralded as a neo-liberal planning regime freeing up the environment for use while attempting to maintain biophysical bottom lines that ensured the sustainability of the environment. The sustainability of communities and businesses was to be determined by the market as, arguably, the most efficient mechanism for allocating resources.

The question which intrigued me for some time, and which formed the original core of this thesis, was how the individuals and institutions involved in the competition for rights to space would respond to the changed planning regime. Would there be a 'race for space'? Would the result be a marine equivalent of something like the carving up of the American West? This carving up of space had simplistically been characterized by a stage where ranchers laid claim to vast areas of public land and branded any stock that came within their boundaries. This was followed by a phase of strategic 'squatting' by both newcomers and the ranchers themselves on prime waterholes. Other potential

users would be physically excluded from such 'oases' by fences. This squatting might place the legitimate holders or claimants to rights to use these waterholes at a significant disadvantage. Arguably it helped to trigger range wars sometimes fought with guns, but also fought in courts. Would this provide a metaphorical development path for marine farming in New Zealand?

If so, had we reached a stage of contestation between the 'ranchers of the sea' (as commercial fishing magnate Peter Talley (1993) described himself and fellow major capture fishing quota-holding companies) and the marine farming 'squatters'; the latter currently staking out claims to marine equivalents of 'oases'? Would theories developed from the USA and other rangeland development experience be applicable to New Zealand's marine space, particularly given the nature of the management regimes in place and the differences in the relationships with indigenous peoples? If so, would the differences offer the opportunity to improve on the solutions that emerged over time in the 'wild west'? Could New Zealand develop ways and means of allocating marine space in a manner that was equitable in terms of both present and future generations of activities and users? Or were we 'doomed' to repeat the American western experience?

Half-way through my research programme, however, a number of these questions were answered by events in the 'real' world. There was such an extensive 'race for space', including entirely new areas, that in November 2001 the Labour/Alliance Coalition Government announced its intention to introduce a moratorium on processing and granting all marine farming applications throughout New Zealand with immediate effect. This was achieved through the Resource Management (Aquaculture Moratorium) Amendment Act 2002 enacted in March 2002. The Government clearly intended to abandon the existing approach to marine farming and institute a 'new' approach. The new approach is in fact largely an old one and signals a rejection of the neo-liberal basis of the RMA and a return to an older, prescriptive, sectoral, activities-based planning approach.

The research reported here involved linking an existing national database of marine farms with their spatial locations. This revealed several spatial patterns of farming development. These patterns are explained in terms of differences in planning

responses to pressures and conflicts. The weights accorded to particular sectors within the conflicts reflect the ideology of their governing legislation. The ideology and its expression change over time resulting in spatial outcomes that reflect their historicity. To the extent that regional planning is enabled by the governing regime there have been regionally different spatial outcomes in response to regional pressures and conflicts, biophysical parameters, and individual actions. I use the evidence of regional spatial variations, the locus of decision-making and the variations introduced by individuals and institutions, to support this argument.

The spatial patterns that emerged under the RMA support the neo-liberal, pluralist arguments that it was intended to implement. It was 'working'. The fundamental problem with such a neo-liberal approach, however, is the transaction costs involved in revealing and negotiating between the rights of the many users of the commons in relation to allocating specific exclusive spaces. These were exacerbated by the failure to develop an integrated coastal regime at the outset. Faced with such costs, the neo-liberal philosophy has been temporarily rejected in favour of a return to a prescriptive activity-based planning regime similar to that rejected in pre-neo-liberal days.

1.5 Structure of the Thesis

The thesis comprises thirteen chapters divided into four parts introduced by this Chapter. In Part One, comprising Chapters Two to Four, the concepts used in the thesis and the context in which it is undertaken are discussed in greater detail.

Chapter Two addresses the terminology, discusses types of farms and international trends in marine farming. Chapter Three then focuses on the first century of marine farming in New Zealand, including a survey of regulatory regimes leading up to the influential Marine Farming Act 1971. This is followed by an outline of the last thirty years (1971-2001) of marine farming in New Zealand in Chapter Four. Particular attention is given to the nature of the property rights created under these regimes drawing on Scott's (2000b) six axis model to aid the comparison.

Part Two draws on the international body of theoretical literature to identify the variables that determine the spatial distribution of farms and the nature of farming spatial development. In Chapter Five the socio-cultural determinants of marine farm location are reviewed. Chapter Six then suggests that the development of marine farming can be described in evolutionary phases and spatial models. These provide the theoretical and contextual backgrounds for the research methods outlined in Part Three.

Part Three opens with Chapter Seven discussing the fundamental research assumptions and introduces an attempt to develop a Geographic Information System of marine farms in New Zealand. Chapter Eight discusses both the methods employed to undertake a national survey of marine farmers as well as the documentary research completed in association with analyzing relevant regional plans.

Part Four presents the result of the empirical research in three chapters. The first (Chapter Nine) interprets the various provisions in planning instruments that have affected marine farming in New Zealand with particular emphasis on regional variations in policy and planning. Chapter Ten provides a macro-perspective on the development and distribution of marine farming using GIS procedures to describe the spatial patterns. Chapter Eleven sets out the findings of the surveys of the locational choices of marine farmers with particular attention to the role of socio-cultural factors in these choices.

The concluding Part Five incorporates two chapters. The first of these (Chapter Twelve), synthesizes the significant findings about marine farming in New Zealand, relating these back to the wider literature, including assessments of relevant spatial and temporal models. Chapter Thirteen reviews the main findings of the thesis in the context of expectations outlined in Chapters One and Seven. The key theoretical and methodological contributions made by this research are highlighted here. The chapter concludes with some suggestions about areas of fruitful future inquiry into the geography of marine farming.

Increasing pressures for the formal allocation of marine space to varying activities, particularly marine farming, form the broad context of my research. This research is informed by theoretical concepts drawn from common property, ICM and marine farming literature. Attention is drawn to the possibly analogous experience in the development of terrestrial rangelands as a basis for modeling the outcome of the spatial allocation process for marine farming. The research is guided by a desire to explain the spatial distribution of marine farms in New Zealand and contribute to the development of models of more general application that deal with the allocation of marine space.

Chapter Two: The Allocation of Marine Space for Marine Farming: An Overview of International Trends and Issues

If the New Zealand marine farming situation is to be understood and the contours of its development assessed, some useful pointers can be gained from the history of development of marine farming in Western countries. This chapter clarifies some key definitional issues regarding the methods of farming and the ambiguities inherent in the descriptive terminology used. In particular it points to the difficulty in readily transposing language associated with terrestrial land use to the marine setting. It also draws attention to the difficulties of defining the concept of a marine 'farm'. The rationale for marine farm development is briefly reviewed and the apparent focus of the literature on an uncritical enabling of marine farm expansion is noted as part of the background for discussion in later chapters.

The experience in developed western nations of farming salmon, oysters and mussels is reviewed with some comparisons with the New Zealand experience. This provides the basis for the more in depth focus in the next two chapters on the development of marine farming in New Zealand.

2.1 Defining Marine Farming

Before discussing the concept of 'space', it is useful to develop an operational definition of the concepts 'marine farming' and 'marine farms'. Aquaculture, the deliberate manipulation of the aquatic environment to cultivate or enhance the production of aquatic flora or fauna, has been undertaken in China since at least 2000 B.C. (Gordin 1990, Boghen 1995b: 3). The first treatise on aquaculture is credited to Fan Li (China) in 475 B.C. (Dill 1967: i). Marine farming (of oysters primarily) is believed to have occurred in Japan about at least 2000 B.C. (Boghen 1995b: 3) and possibly as early as 4000 B.C. (Milne 1972: 13). Egyptians record aquaculture occurring in 2500 B.C. (Boghen 1995b: 3) and Europeans have been farming oysters at least since the time of Aristotle and Pliny (Milne 1972: 13).

Marine farming is distinguishable from aquaculture in that it specifically takes place in marine areas, rather than fresh water streams or lakes. Marine farming should also be distinguished from land-based farming of marine species, including situations where aquaculture takes place on land near the coast and involves the exchange or throughput of marine waters (e.g., land-based abalone [paua] farms). However, an impoundment created for farming marine species in salt-water ponds at the shore appears most usually to be considered as marine farming (e.g., shrimp farms in ponds on coastal areas previously supporting mangrove forests).

The rapid development of marine farming in developed countries over the last thirty years has taken a number of forms. These include:

- enhancing fisheries (ocean ranching) through the release of fingerlings grown in land-based hatcheries (e.g., salmon (Solomon 1988, Amend 1989, Barnabé 1994a));
- habitat enhancement in the form of 'culch' (essentially spreading a surface, possibly of old shell, suitable for oyster spat to settle on) and artificial reefs (more often used as 'Fish Aggregation Devices') (Iversen 1968, Weeks and Sturmer 1996);
- 'relaying' of shellfish from one area of the sea bed to another (Havinga 1964, Weeks and Sturmer 1996);
- fixed and/or moored-floating structures on the foreshore (area between mean high and low water spring tidal ranges), sea-bed, or in the water column (Milne 1972, Rosenthal, Allen *et al* 1995); and
- free-floating, ship-based (i.e., in the holds of former oil tankers) (Rosenthal, Allen *et al* 1995).

In some cases, a fixed structure may simply be an effective 'gate' enclosing a fiord or bay and allowing fish to swim (or be relocated from elsewhere) into the bay, but not to leave. Milne (1972: 15) used six 'zones' (modified as 'domains' by Rosenthal, Allen *et al* 1995: 400-401) to classify marine farming in terms of where the activity occurs in relation to a combination of water depth and land. However, such an approach includes land-based activities that depend on seawater pumped to them. It also excludes 'ocean ranching' or the free-floating farms. In this regard, Iversen

(1968: 31) defined ‘sea farming’ in terms of commercial use and specifically required the farmed areas to be leased or owned, thereby excluding ocean ranching and licences. A classification system more germane to this thesis, essentially incorporating the dimensions of Milne (1972) and Rosenthal, Allen *et al* (1995), would expand to include ocean ranching and free-floating farms. For all intents and purposes, however, the ocean ranching and free-floating farming options are not addressed here as they are of quite different nature and purpose to that usually considered as marine farming in New Zealand and neither require water space to be allocated to a farmer.

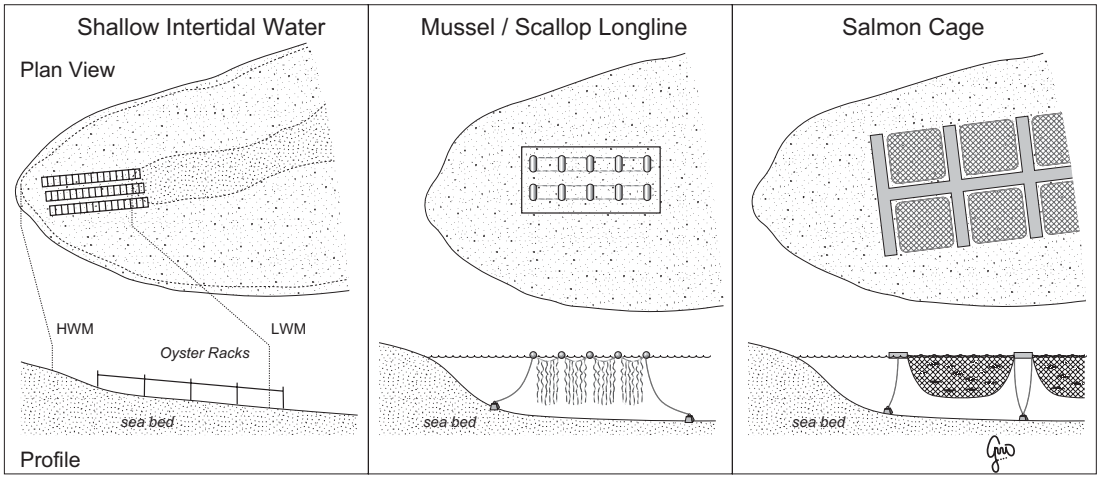
Aquaculture has also been classified by some agri-systems theorists in terms of technology employed and productivity anticipated, or, in systems terminology, inputs and outputs. Weeks and Pollnac (1992: 1), for instance, refer to “intensive, semi-intensive and extensive”, but note that while these terms are in common use among researchers “there is limited agreement as to the exact conditions each describes”.

Under the Weeks and Pollnac (1992: 1-2) approach, “an intensive system requires the most technology but is more productive per unit of space than a semi-intensive or extensive system … a semi intensive system requires new inputs … [and] extensive aquaculture is little more than the capture and rearing of wild stock in containment areas using few or no inputs”. Under this approach a land-based aquaculture operation, which required water, food, ponds/raceways, and hormones, would be ‘intensive’ farming. Moored-floating cages which require artificial inputs of food and antibiotics, might be ‘semi-intensive’, and the farming of oysters grown from wild seed, and which requires no artificial food or nutrient inputs, would be an ‘extensive’ form of farming. The imprecision in terminology used by agri-systems theorists in attempting to apply terrestrial agri-farm concepts to marine farming is problematic. Similar problems also exist with loosely conceptualising some forms of marine farming as ‘industrial’ (e.g., Dwire 1994, 1996, Phyne 1996a, Iversen 1968) or ‘subsistence’ (Boghen 1995b, Iversen 1968).

2.1.1 Definitions in the New Zealand Context

If international definitions are employed in the New Zealand context, marine farming predominantly takes four forms: net cage operations (salmon), racks (oysters), sea-bed enhancement/reseeding (arguably a form of non-intensive 'relaying' (scallops)), and longlines (predominantly mussels). There are, however, some experimental operations such as pond culture of seaweed and paua, and barrel culture of paua. These experimental farms will be commented on where relevant in this thesis. They require marine space and for that reason their treatment does not differ from the more established farming types for the purposes of this research. The seabed enhancement of scallops is also a special case and will be dealt with separately as it has not been treated as marine farming under New Zealand law. The predominant forms of marine farming recognized in New Zealand are, therefore, the intertidal rack farms and the deeper water longline and net cage farms (Figure 2.1).

Figure 2.1 Predominant forms of marine farming in New Zealand



Essentially, net cage is a semi-intensive form of marine farming while rack and long line farms are extensive forms. Longline farms, because of a greater use of technology, are more intensive than the rack culture. Within certain limits, they are all capable of supporting, sometimes concurrently, more than one species. However, the significant issue here is that they occupy different types of marine space. Seabed farming, for instance, is based essentially on the seabed and, in some countries, rights to use the space may be limited to the seabed and super-adjacent water (e.g., the six

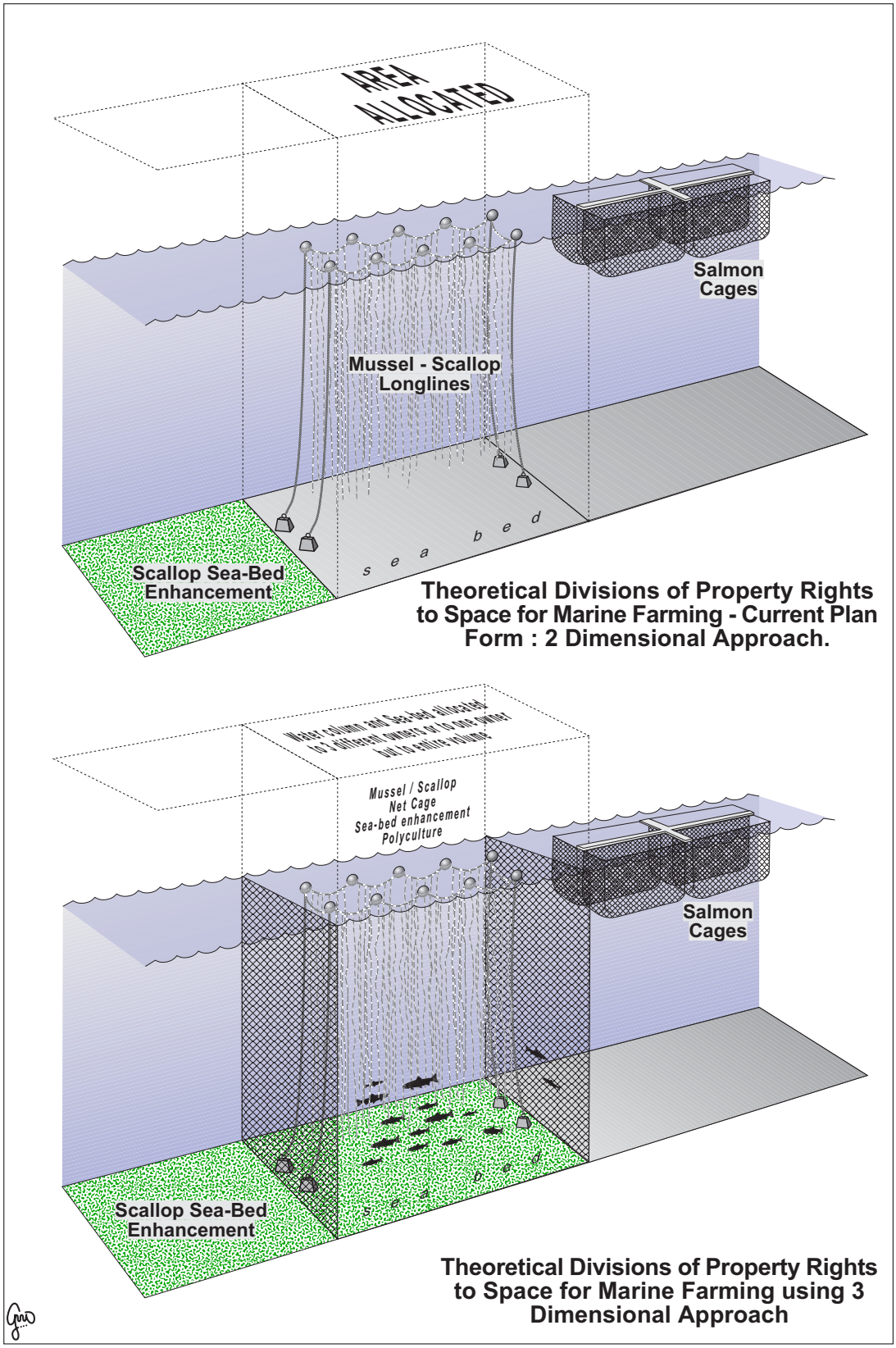
inches of water immediately above the seabed). Alternatively, seabed farms may be required to stay a certain distance below the water surface at lowest spring tide. Net cages and longlines might require ten metres or so of water column, but not necessarily the seabed except where the anchors are placed.

Occupying different parts of the water column opens the possibility for the column to be partitioned between different owners using different parts for different species. The sea bed could be used for scallops, the column for net-enclosed free swimming fin-fish, and within this area a system of floating longlines could be present. This would create a polycultural column of water, but considered in two dimensional space (as in a cadastre or plan) each would occupy the same horizontal space Figure 2.2). In New Zealand at least, a two-dimensional approach is adopted to recording property rights with the column owned, leased or licensed for marine farming by allocating the column to one only marine farmer.

Also important is the concept of 'farm'. The individual leases and licenses in New Zealand have traditionally each been called a 'farm', but it appears the industry has now grown to a stage where such a description needs to be carefully considered. For instance, an owner of one lease might obtain an additional lease adjacent or near to her/his original one. Then another lease is obtained in the next bay, and one in a bay 200 miles away. Do the farmer's holdings comprise one, two, three, or four farms?

In the context of general discussion in this thesis the concept 'farm' is used broadly, in keeping with the literature (c.f., Iversen 1968). The terms 'permit' or 'site', however, are adopted to encompass the New Zealand concepts of an individual lease, license, or 'marine farming permit'. The term 'permit' therefore equates to the use of 'title' on land. When the context requires more specific terminology the New Zealand practice of differentiating between these through using the initials LI (licence), LE (lease), and MF (marine farming permit) is employed.

Figure 2.2 Hypothetical three dimensional allocation of marine farming rights



In adopting this practice it is important to note the distinctively different nature of a lease from that of a licence or marine farming permit. I deliberately depart from Seabrooke and Pickering's (1994) view that in the marine context there is essentially no difference between the terms 'lease' and 'licence'. That may be the case in England, which is the focus of their analysis, but in New Zealand the difference between these two property rights is substantive and, as the next two chapters show, has significantly affected the nature of the rights that have been provided. Essentially, in the New Zealand marine farming context:

> A *lease* will provide a leasehold estate over an area within which the lessee may carry on the business of marine farming for his sole use and benefit, and over which the public do not have right of access except by marked accessways.
>
> A *licence*, however, will give the holder only the exclusive right to farm fish or marine vegetation within the licensed area. It will not provide for restrictions on movements over or through the waters in the area, or activities which normally take place therein, e.g., boating, fishing, or swimming, except those inevitably imposed by the structures necessary to the farming activity (Marine Department 1972: 25)

A marine farming permit is available under the Fisheries Act 1983 and essentially enables someone, who has already obtained a coastal permit under the Resource Management Act 1991, to then undertake the activity of marine farming on that site. The combination of the coastal permit and the marine farming permit comprise the 'dual permit' regime referred to in later chapters. For the purposes of this thesis, however, marine farming permit is used inclusively and coastal permits are only referred to where there is a need to separate the two. There are two reasons for this approach. A marine farmer does not have a right to farm a site unless holding both the coastal permit and the marine farming permit. There are situations where the coastal permit has been issued, but the marine farming permit denied. Secondly, comparable national databases exist for LI, LE and MF, but there is no comparable database for coastal permits.

2.1.2 Marine and Land Farm Analogies

A number of authors have drawn analogies between terrestrial agriculture development and the evolution of marine farming (e.g., McKee 1967, Tiddens 1990, Weeks and Pollnac 1992). Symbolic of this relationship is the occasional use of the phrase 'blue revolution', metaphorically (sometimes more explicitly) implying direct parallels with the terrestrial 'green revolution' (Rubino and Stoffle 1990, Weeks and Pollnac 1992). Indeed, when I commenced this research, I was also attracted to a comparison of rangelands' development in the American West with the development of marine space. The influence of terrestrial farm concepts is readily apparent in the frequent use of the term marine 'farm' (especially in the New Zealand context where it has been cemented into our jargon through the title of the Marine Farming Act 1971). In his influential text, *Farming the Edge of the Sea*, Iversen (1968: 31) chose the phrase 'sea farming' over 'mariculture' as the former was "more popular and more easily understood". Use of the term 'mariculture' to distinguish marine farming from other forms of aquaculture generally is, therefore, far less frequently used than might otherwise be expected.

A lack of attention to creating a common jargon with which mariculture researchers and practitioners can effectively communicate can lead to oversights and imprecision in research practice. For instance, in New Zealand the legal practice of providing marine farm owners with 'variations' to enable them to grow more than one species on their farm is referred to as enabling 'diversification'. Elsewhere it is usually known as 'polyculture' (Barnabé 1994b, Rosenthal, Allen *et al* 1995: 395). Perhaps because of the relatively recent development of diversification practices, both the New Zealand and the international literatures appear to have stopped short of clarifying the nature of a diversified farm as opposed to a diversified industry. Mariculture appears to lack the equivalent of terrestrial typological developments such as, 'pastoral', 'crop' or 'mixed' farming. A variety of imprecise terms, such as 'rear', 'culture', and 'raise', have been used and have long been recognized as problematic (Iversen 1968: 31).

Consequently, if a lease is obtained for one species at one site and a completely different species at an adjacent or other site (possibly nearby, in the next bay or 200 miles away), it is unclear whether or not to describe this as a single, 'diversified' farm or two farms. This would appear to be quite different from the situation where an owner having a lease for one species obtains a variation to enable a second (or more) species to be grown on the same site.

Although diversification is seen as part of the future of marine farming (Rosenthal, Scarratt *et al* 1995), failure to identify the changing nature of marine farming, the growth of diversification and the rationale behind it, might impede developing an understanding of the rationale for locational decisions made by farmers. Without an adequate terminology to describe the industry, important exploratory questions may not emerge. For instance, without clearly specifying concepts relating to the nature of marine farm diversification, would researchers ask questions such as, 'Do marine farmers diversify (through using farms with different species in distant places) as a response to different environmental parameters, to different market conditions, or to different planning regimes?' Understanding the rationale for diversification might be crucial to understanding the geographical development of the industry (see Chapter Eleven).

To some extent terminological shortcomings are also apparent in the lack of theoretical development explaining marine farm ownership structures. Most international studies that address ownership have concentrated their attention on the relationship between absentee owners and geographically local communities (van der Schans 1996), with few attempts to generalise typologies of farm ownership structures within the industry (although Ruddy and Varley (1991) differentiate between 'small-scale' and 'large-scale' farming). As will be discussed in Chapter Eight these issues are methodologically important in the New Zealand situation.

Despite these shortcomings, the conversion of marine space to 'industrial' space has emerged as an issue in some marine farming research. Dwire (1994, 1996), for instance, draws attention to the perception of some forms of marine farming as 'industrial' farming, or an 'industrial workplace'. This raises the question as to

whether a marine 'farm' is best considered to be in the 'primary' or the 'secondary' sector, or is it in fact a preliminary form of processing? Is it analogous to the terrestrial farming sectors involving caged-chicken farms and beef-feedlots? How are the latter distinguishable from free-range chicken farms and beef farms? Would such a distinction be applicable to marine farming?

Some authors have drawn explicitly on systems theory to link and model marine farming activities and associated environmental parameters (e.g., Brass and Ernst 1992, Rosenthal, Allen *et al* 1995). These tend to follow two forms; a specifically technological flavour associated with terrestrial pond aquaculture (e.g., Bolte *et al* 2000), or an agri-systems approach that sees aquaculture as part of a farm production system (e.g., Weeks and Pollnac 1992). The latter is also dominated by examples from terrestrial pond aquaculture (usually in the USA), although it is occasionally extended to marine aquaculture (e.g., Weeks and Pollnac 1992), and appears most often employed by economists or specialists in agriculture extension.

Such attempts, however, usually distinguish different types of marine farming in terms of the systems inputs required to maintain them. A salmon farm is seen as a form of intensive (or 'industrial') farming because it requires artificially provided food inputs and is therefore more labour intensive than the semi-intensive mussel farm (which 'grazes' from the naturally supplied food floating in the water column). Fully developed systems models of mariculture have not emerged and perhaps only salmon and similar intensively farmed species can be considered to be analogous to the models developed for terrestrial aquaculture (e.g., catfish ponds could be considered similar in input and output terms to salmon cage farming). Such models, however, see terrestrial fish farming primarily in terms of a form of diversification from other terrestrial crops grown by the farmer. As noted above, the nature of diversification of marine farming is different and has yet to be fully articulated.

Such approaches are quite different from the production-commodity chains familiar to geographers. It would be overly simplistic to consider marine farming as part of Le Heron's (Le Heron and Pawson 1996) fisheries eco-commodity system, as the farmed activity makes it quite different in nature from the capture fishery (see also

Iversen 1968: 33). Marine farming also does not fit neatly into the agricultural eco-commodity system for a variety of reasons, including that the products tend to be processed in the factories of the fisheries eco-commodity system. In this thesis, I considered that attempting to characterise a separate marine farming eco-commodity system might place too much emphasis on one functional set of relations for marine farming, possibly foreclosing too soon on fruitful alternative systemic constructions. The systemic model developed for marine farming in New Zealand therefore emerges as a consequence of this research and is discussed in the analysis of the research results (Chapter Twelve).

In summary, the terminology for marine farming appears very much in its infancy and has yet to develop any sophistication to describe its complex nature. Compared with its terrestrial equivalents, the marine farming literature has not developed a common jargon using shared terminological distinctions. This has limited the production of appropriate models to describe the spatial development of marine farming and may therefore have contributed to poor development of planning models to assist in managing/forecasting its future geographical evolution. Those forecasts are overwhelmingly for further expansion and it is useful here to look briefly at the justification offered for such expectations.

2.2 The Rationale for Expanding Marine Farm Production

There appear to be three main underlying reasons for expectations of marine farm expansion: to emancipate humans from the deterministic constraints of the environment; to meet the universally proclaimed goals of sustainable development; and because colonisation of the sea is a natural progression for humankind.

2.2.1 Aquaculture as Environmentally Emancipatory

The philosophically based rationale, tentatively advanced to explain the growth of aquaculture in general, is that it is fundamentally emancipatory, freeing humans from the deterministic constraints of the environment and opening new possibilities for development. Gordin (1990) sees potential for completely self-contained aquaculture

that is no longer dependent on natural resources and that is therefore able to be located wherever demand and cost permit. However, he considers this to be unlikely to happen anywhere in the foreseeable future. Van der Schans (1996), in perhaps the most rigorous (but possibly misguided) attempt to place the development of aquaculture within an ideological context, has posited a connection between the technological development of aquaculture and the emancipatory philosophical thinking of critical theorists that underlies the post-modern planning approaches (discussed in Chapter One). He argued that "Despite its potential for negative impacts aquaculture provides people with an opportunity to become more independent of nature. As such it may contribute to the ideal of human emancipation…." (van der Schans 1996: 148). Whether this 'emancipation' is sufficient a reason in itself to justify the development and expansion of marine farming is open to question.

There is no doubt that the development of new technology might well facilitate the extension of farming activities further seaward (Milne 1972), resulting in 'colonisation' of the marine environment (Seabrooke and Pickering 1994). This in turn can be expected to contribute to, and be anticipated by, planning systems. This might lead to an ideal form of human emancipation, or the costs associated with such technology might in fact contribute more to a restructuring of marine farming communities and of the relationship of humans with the environment. The area appears largely unexamined in the literature and will be briefly discussed in relation to the alternative approaches adopted by marine farmers and different planners in the New Zealand context in Chapter Twelve.

2.2.2 Sustainable Development?

The more commonly argued rationale for marine farming expansion is that it contributes to the ideal of sustainable development, both in terms of substituting for the more finite capture fisheries food sources (which are believed to have peaked) (Iversen 1968, GESAMP 2001), as well as in terms of providing employment for underemployed and unemployed people in developing and developed countries (Weeks and Pollnac 1992, Ruddy and Varley 1991). Bailey *et al* (1996: 7), however, identify some key research gaps "about what provides optimal conditions for

sustainable development" of aquaculture. They also note the 'general optimism' regarding aquaculture, and a reading of the papers in their volume clearly demonstrates that the authors are supportive of aquaculture as a form of sustainable development. This seems to be a general feature of the academic literature on aquaculture, even in developing countries where considerable negative effects have been reported (e.g., Weeks and Pollnac 1992).

The basis for this assumption appears to have largely eluded critical examination. Instead, there is a recognition that the open oceans are not without limits and that capture fishing is reaching, or may already have passed, its maximum sustainable levels of fish production. With a few exceptions (e.g., Rubino and Stoffle 1990), this is then followed by an uncritical assumption that to meet the food requirements of a growing global population, more intensive fish production techniques are needed. Some form of aquaculture is therefore assumed to be necessary to meet this demand and consequently the literature has focussed on how to facilitate the development of aquaculture. Where environmental problems occur as a result of marine farming or marine farms have failed for other reasons, these are attributed to poor site selection rather than to any fundamental errors in the rationale for marine farming (e.g., Brass and Ernst 1992). The resultant literature is replete with articles describing the matters that should be taken into account when selecting sites for different types of farming (e.g., Anutha and O'Sullivan 1994a, Boghen 1995a).

2.2.3 Natural Progression

If the moral and ethical questions and issues associated with promoting aquaculture are seldom considered this may be because it is assumed that aquaculture is an example of sustainable development (Gordin 1990). Moreover, researchers generally present marine farming as almost a natural progression from "a traditional mode of production based on foraging to one based on cultivation" (Dwire 1994: 1585). The shift in modes of production is enabled by the new technology and requires a 'sea-change' in attitude to achieve acceptance from the more traditional users of the marine environment (Dwire 1994, Millar and Aiken 1995). Consequently research has focussed on ways to improve the biophysically sustainable nature of aquaculture

(e.g., by addressing waste-disposal), improving the technological capabilities and efficiency of farming, and developing and facilitating socio-political and cultural acceptance of the new activity.

Social science and planning research has focussed on conflict resolution mechanisms (e.g., Millar and Aiken 1995). Little credence seems to be given to concerns voiced by opponents of aquaculture except if they relate to unsustainable practices (e.g., waste production, disease), health (e.g., avoidance of dolmoic acid poisoning), or conflicting values for common property resources. The solutions therefore become technical (including better science in the choice of sites), farm management (e.g., quality assurance systems (Brass and Ernst 1991)), or inventing appropriate property rights systems and planning or licensing mechanisms. The questions of whether any or all marine farming should be allowed or whether there should be limits ascribed to the extent of private sea (spatial) ownership have not been seriously considered, except from the perspective of ecological carrying capacity (Eklund 1996).

There have been, however, plans and regulations developed that clearly imply marine farming should not be allowed in certain settings (e.g., shipping lanes, navigation routes, marine reserves). The literature furthermore suggests that there are clear locational patterns apparent for marine farms, but no previous attempt appears to have been made to review this literature to see if there are consistent trends in the spatial development and occupation of marine farms.

2.3 Seeking Trends in Marine Farming Development

Unfortunately, surprisingly little has been written on spatial models of marine farming. Anutha and O'Sullivan (1994c) have made one of the few major attempts, but they primarily focussed on the nature of the planning regimes to resolve conflicts, as opposed to theoretical modeling of the outcomes of those regimes or conflicts. Rosenthal, Allen *et al* (1995) used seven 'environmental aquaculture zones' in Atlantic Canada based primarily on the major water masses of the region. As Rosenthal, Allen *et al* (1995) note, however, these were rather arbitrary and each individual site needed to be assessed on its own merits, regardless of the zone in which it might be located. In practical terms

then, these aquaculture zones neither described the historical development of marine farming, nor gave much useful guidance as to the future spread of marine farming.

In the following discussion of the history of marine farming in developed countries, I will focus only on the species of particular relevance to the New Zealand situation: salmon, oysters, and mussels.

2.3.1 Salmon Farming

The culturing of salmon using smolt was perfected in Sweden in the 1940s and 1950s, but the breakthroughs in marine farming of salmon occurred in Norway in the 1960s with the development of sea-cage farms by the Vik brothers, resulting in the rapid global expansion of marine salmon farming during the 1970s (Saunders 1995, Coull 1996). By 1985 farmed Atlantic salmon provided 30,700 tonnes of a total world production of 40,500t (Laird and Needham 1988). In 1991 Norway's salmon production alone had reached 160,000t (Saunders 1995). Prior to the sea-cage development, marine salmon farming had used either gated embayments or passages, or impounded or fenced enclosures of sea space. Only sea-cage farming is practised in New Zealand and so it forms the focus of this discussion.

The success of the Norwegian industry influenced farmers around the world, partly through their investment in other countries. For example, sea-cage salmonid (trout and salmon) farming began experimentally in British Columbia in 1972 and remained largely experimental until 1980. The arrival of Norwegian capital led to a more than ten-fold increase in ten years (Truscott 1994). Atlantic Canada also commenced experimental salmonid farming in the 1970s in Nova Scotia and New Brunswick, but was largely unsuccessful. The first commercial salmon farm began in Lords Cove, Dear Island, New Brunswick in 1978 and the industry grew initially outside Passamaquoddy Bay in the lower Southwestern Bay of Fundy. By 1995 sixty-four farms were operating in the area with a further twenty-three farms across the border in Maine (one of which had operated since 1982).

These farms are based in areas protected from heavy seas and have suitable water temperatures for salmon (Saunders 1995). The fetch is important in determining the nature of the wave action to which sea-cage farms are exposed. A maximum of 3km open fetch to the sea in any direction was found to be a useful guide for determining the viability of a site with the commonly used technology of the 1980s (Needham 1988). In Ireland and Scotland, however, by the late 1980s it had already been recognised that "the only sites left to exploit" were the most exposed sites and specially designed cages were being developed for these situations (Needham 1988: 120). Attempts to use submergible cages have not proven practical for salmon farming and, although theoretically practical, the use of self-contained ships (e.g., former oil tankers converted to be floating fish farms) has yet to become a feature of salmon farming (Rosenthal, Allen *et al* 1995).

In Norway, initial bad site selection had meant that the farms were located in fiords with poor water exchange (usually too long and narrow) and consequently experienced high waste accumulation. The Norwegians learnt from their mistakes and subsequently located close to established infrastructure in sheltered locations with good water exchange (Rosenthal, Allen *et al* 1995). The Bay of Fundy's considerable tidal range creates strong flushing effects through the salmon farms. This ensures there is little build-up of contaminants and debris under farms (Saunders 1995).

Saunders (1995) notes, however, that in addition to water temperature and protection from heavy seas, the spread of Atlantic Canada salmon farming has been significantly constrained by a lack of infrastructural support (especially technological, marketing, financial, and production infrastructure). This limited the size of marine farms, which ironically may have facilitated the development of more intensive, sound husbandry practices (Saunders 1995). Most farms are in bays of the Fundy Islands. In Nova Scotia the industry has grown much more slowly. Saunders (1995) attributes this to a lack of public support, conflicts with traditional fisheries and other users, and lack of a financial infrastructure. Despite occasionally depressed salmon markets, sociological imperatives are seen as driving the development of sea-cage salmon farming along with other forms of mariculture throughout Atlantic Canada (Boghen 1995b, Saunders 1995).

While the development of salmon farming in New Zealand will be discussed in more detail in later chapters, it is important to note here that the species grown in New Zealand is different from that in most other parts of the world. Atlantic Salmon (*Salmo salar*) is the predominant farmed species worldwide. Attempts to introduce this species to New Zealand, however, were unsuccessful (Laird and Needham 1988). Instead, New Zealand salmon farming (including ocean ranching) has developed around the Pacific salmon (*Oncorhynchus* sp.), specifically the quinnat (*Oncorhynchus tshawytscha*), also commonly known as chinook or king salmon (USA, Canada), spring (Canada), masunosuka (Japan) and chavycha (Russia) (Laird and Needham 1988, Milne 1972).

Chinook were first cultured in 1872 in the McCloud River, a tributary of California's Sacramento River. Eggs were transplanted to 15 other countries, but New Zealand (in 1901) was the only country where a self-sustaining population became established (in the Waitaki River). Subsequent drowning of the McCloud by a reservoir has led some authors to suggest that the New Zealand stock may be the only McCloud River stock left in the world (Laird and Needham 1988). Ironically, under the Convention on Biological Diversity, this would mean that New Zealand had an obligation to conserve this exotic species, but this appears to have gone unremarked in the literature.

2.3.2 Oyster Farming

There are two main groups of farmed oyster species, the 'flat' and the 'cupped'. The flat oysters belong to the genus *Ostrea* and have two flat shells, whereas the cupped oyster is of the genus *Crassostrea* and features a flat upper shell and a cup-shaped, rounded lower shell. *O. edulis* (the European oyster) is primarily farmed in Britain, France (especially around Brittany), Norway and Spain. The species commonly referred to as the American oyster (in fact only one of several species of farmed oyster in America) is *C. virginica*. In Japan and the Pacific Coast of North America, *C. gigas* (the Japanese or Pacific oyster) has been the source of export earnings since the eighteenth century and is the dominant species farmed (Milne 1972). This species is also extensively farmed in British Columbia where it has managed to establish seeding areas since its arrival in 1912, but it has had more difficulty establishing in the USA.

As with salmon, the initial species of oyster farmed in New Zealand *Crassostrea glomerata*, is not the same as that generally discussed in the Western literature on oyster farming. *C. gigas* was first identified in New Zealand, 1971 (Dinamani 1971) and is now the dominant farmed oyster (I will discuss the indigenous rock oyster (*C. glomerata*) farms that dominated earlier days in Chapter Three). This does not significantly affect the nature of the discussion as the range of potential farming techniques is essentially the same regardless of species.

Some farms comprise shallow ponds (*claires* in France) or intertidal or sublittoral areas where enhancement and management is practised (*parcs* in France and parts of Canada). Other approaches include forms of longlines, growing the oysters on poles or sticks stuck into the seabed or, most common in New Zealand, using racks (with mesh bottoms or shallow baskets) in the intertidal areas.

The American oyster (*Crassostrea virginica*) has been widely cultivated in North America commencing as early as 1810 in New Jersey (Lavoie 1995). In 1865 cultivation commenced in Canada with Prince Edward Island passing legislation enabling the leasing of specific areas for oyster farming. By 1981 there were 2,000 leases in Canada's Maritimes, ranging in size from 0.4ha to 40ha (Lavoie 1982). By 1992 this had dropped to 1800 leases covering, 4,949ha in total. The development of the industry was facilitated by federally provided seed oysters, free lease surveys and free advice (Lavoie 1995:193). In the 1980s, more advanced farmers identified the need to purchase seed from specialist seed producers rather than rely on (sometimes scarce) free government seed. There is, however, potential for considerably increased production and Lavoie (1995: 193) has argued that the factors hindering industry expansion were primarily "historical, administrative, social and political". The development process in Atlantic Canada is largely similar to that of New Zealand discussed in Chapters Three and Four.

Historically, however, oyster farming in Atlantic Canada was seen as a supplement for fishers. Moreover, in contrast to New Zealand (Chapter Three) the initial allocation of leases was frequently based upon dividing available seabed between all those who showed an interest in holding a lease, resulting in many leases being too small to be

commercially viable. Many leases became family heirlooms and were not offered for sale, even though at that scale they were not commercially viable and were low producing. There was no mandatory surrendering or buy-back of unused areas, annual rent fees were very low and large areas of potentially productive sea-bed "remain unproductive in the hands of absentee leaseholders and of people who retain them as hobbies, potential retirement projects, part of their estates, etc." (Lavoie 1995: 193).

The presence of high unemployment in areas of good oyster potential also contributed to successive federal and provincial governments providing considerable assistance to unemployed and unskilled labour, who, in Lavoie's (1995) view, had little chance of success without proper supervision. Such supervision did not eventuate. Lavoie argues that, since the 1960s, using oyster culture for job-creation has continually and unsuccessfully been tried in the Maritimes. This has contributed, in his view, to a bad reputation for oyster farming when it should have reflected on the nature of the job-creation programmes – a finding similar to that of Weeks and Sturmer (1996) in Southern USA.

Oyster culture is seen as occurring best at moderate depths in sheltered bays and estuaries with warm waters, and firm and stable sea-bed. Ice is a major problem for Atlantic Canada oyster cultivation. In addition, Lavoie (1995) notes that location should also take into account travel time, proximity to human activities, proximity to shore, and proximity to the owner's residence (to guard against poaching). Some of these factors may have both beneficial and adverse effects. For instance, there are any number of human activities that might create pollution or turbidity, and while being close to shore enhances productivity due to the effects of terrestrial fertilisers on marine plankton growth, run off may also contain toxic chemicals/pollutants and cause siltation.

The European oyster (*Ostrea edulis*) has been farmed at least since the time of the Romans and is particularly popular both as food and as a farm product in France. In the Netherlands all natural beds and potential fattening grounds have been leased since the 1870s and new areas have been developed (Iversen 1968). Again there have been significant socio-cultural aspects that have impeded the development of the oyster

industry in places where it has been theoretically viable on biophysical grounds alone (Iversen 1968, van Ginkel 1999a,b).

The history of transplanting or introducing exotic oysters is relevant to the New Zealand situation and, as will be discussed in Chapter Four, some of that experience has affected the spread of the industry. The European oyster was first successfully transplanted to North America in 1948 (by Loosanof to Milford, Connecticut (Newkirk *et al* 1995)). Interest in culture really only arose in the 1960s, in Maine. It has suffered everywhere from parasites, notably variants of *Bonamia*. The species is tolerant of considerable variation in its environment, but it may be tolerant to salinity at one temperature, but quite intolerant to the same salinity at a different temperature. Newkirk *et al* (1995) ambiguously note, however, that freshwater run-off from a river or stream should be avoided, although a small input might be desirable. A good food supply in the water is also desirable.

As an exotic, the growth of commercially cultivated *O. eduli* in Canada has been hampered by lack of seed and a desire not to import it into habitats of *Crassostrea virginica*. Ironically, importations of *Crassostrea virginica* to England at the end of the 20th century also introduced exotic predators that devastated indigenous species (Milne 1972).

2.3.3 Mussel Farming

Mussel farming has a chequered history with consumer resistance and an inability to establish the traditional blue mussel (*Mytilus edulis*) as a luxury item resulting in difficult economic conditions for the developed country farmers (Iversen 1968). Farming techniques are very similar to those for oysters, although the 'rack' method has not been taken up to any great degree in New Zealand. An Irishman, stranded without money in France, is credited as having established the French *bouchot* method of rotating sticks stuck in the ground from deeper to shallower more exposed intertidal areas to induce 'conditioning'. Conditioning mussels to withstand longer periods of exposure out of the water improves their freshness when they arrive at the market (Iversen 1968: 133-134).

The Netherlands has traditionally had predominantly seabed mussel farming operations, the French used the pole and longline methods, and Spain (traditionally the third largest European producer) uses lines suspended from rafts (Havinga 1964). The Netherlands sea bed approach comprised allocating individual farmers *parcs* (which could range in size from 5 to 18 ha) and a farmer could have more than one *parc* at a time (Iversen 1968: 135, Havinga 1964, van Ginkel 1990, 1999a,b). The techniques that do not involve contact of the mussels (or their supports) with the seabed are more labour intensive, but notably have fewer problems with predators like whelks. The seabed farming, however, involves clearing the area of predators and weeding and cultivation practices that are not dissimilar to terrestrial farm practices. Potentially a well-managed *parc* could be quite labour intensive in itself, but it is spread over a wider horizontal space and less dependent on artificial structures. Such *parcs* can be categorized loosely as extensive rather than intensive farming.

The North American mussel industry originated in pickling and canning wild blue mussels during the two world wars (Lutz 1980), but unreliable product supply and competition from other sources of protein led to its eventual demise. In Canada, mussel farming (predominantly *Mytilus edulis*) as an industry re-emerged in the 1970s, motivated by the success of the European industry and proved more successful in Atlantic Canada than in Western Canada. By 1993 there were approximately 5000ha leased for mussels in Atlantic Canada, with about 80 percent of the total production coming from Prince Edward Island. Mallet and Myrand (1995: 257) attribute the relative success of Atlantic Canada to a combination of "favorable environmental conditions, a relatively abundant seed supply, growing markets, dedicated efforts by the private and government sectors, and, most importantly, the application of the longline-culture technique". They also note that the size of farms has been increasing as less commercially viable smaller ventures were being purchased by larger operations.

The focus on longlines contrasts with the traditional approaches of The Netherlands and USA where bottom culture dominates. Essentially, the initial Canadian approach was to adopt the Spanish raft system for cultivation, but this was not viable due to damage to rafts caused by ice and the high cost of labour. Consequently Canada followed the

Japanese scallop longline technique (first attempted in Canada by Memorial University of Newfoundland for scallop in the 1970s (Couturier *et al* 1995)). These longlines were easier to immerse under the ice, were less vulnerable to wind and required lower initial investment (Mallet and Myrand 1995). The mussels reach harvestable size in about 18-22 months, and in some places are harvested through the ice using mobile igloos.

The key to site selection falls in two parts, the first relates to spat (seed) harvesting and is largely outside the focus of the current thesis, except to note that in Canada they prefer to have a different site for spat harvesting from the one used for farming ('grow-out'). The farm sites most sought are those that provide the best biophysical conditions for maximum productivity, but Mallet and Myrand (1995:279) also note that "social and economic constraints" are important in determining the viability of the farms. Accessibility (roads and wharves) is considered to be critical for economic viability of farms, and travel time and transportation to markets are also important. Remoteness is not desirable. Competition from other activities (e.g., navigation, commercial fisheries, recreation and tourism), however, make some biophysically suitable sites impossible to develop and some settlements may not welcome mussel farming activities (Mallet and Myrand 1995).

Biophysical factors of importance are essentially similar to those for other mariculture activities, but with adjustment for the different nature of the species and farming techniques. For instance, the high current velocities that are advantageous for salmon farming in the Bay of Fundy are considered to hinder both mussel growth and survival and the viability of longline culture techniques, but if the currents are too weak this also limits their productivity. Mallet and Myrand (1995:282) cite studies in several countries that suggest there is potential for low-growth as a consequence of stocking levels creating a demand for food that exceeds supply. Accurate, reliable models to effectively forecast optimum carrying capacity are still under development.

Mallet and Myrand (1995: 288-289) provide one of the few discussions of the structure of the mussel farming industry. They identify three types:

- part-timers (either newcomers experimenting with techniques or sites, or those supplementing family income);
- small-scale growers, who do not own their own processing plant, but consider their farm as their 'sole employment'; and
- larger-scale operators, owning their own processing plants and pushing to expand to achieve economies of scale and returns on their investment.

Mallet and Myrand (1995) share Lavoie's (1995) view that the background and capability of the farmer is critical to success of the venture. They also note the importance to the industry of the stability and infrastructural support derived from the "coordination of several producers with one central processing operation" (Mallet and Myrand 1995: 289).

The New Zealand industry has similarities with the Canadian experience. However, here it should be noted again that the species on which the New Zealand mussel industry currently depends is not the blue mussel, but the green-lipped mussel (*Perna caniculus*), a native endemic species. New Zealand is the only producer of this species in the world and the mussel has been trademarked by the industry as Greenshell mussel (Jeffs *et al* 1999).

2.4 Summary and Conclusions

In summary, the farming of the different species of particular relevance to New Zealand can take several forms and in later chapters I will discuss how these forms have been taken up, or otherwise, in this country. Moreover it is apparent that a number of the biophysical variables that affect the location of marine farms may be common, although the nature of the species may lead to different spatial consequences. Of more significance for my thesis is the importance of the socio-cultural aspects that have been important in affecting the development of farming of each of the species. It is also interesting to note that two of the three species most important to the New Zealand industry are exotics, suggesting a need for possibly greater experimentation to establish them as farmable in our environment. They all involve primarily 'grow-out' operations, bringing seed/spat/fry from elsewhere and growing it to a marketable size.

The inexact terminology used to describe the marine farming industry, discussed in the early stages of this chapter, is problematic. This is made more so, as discussed in Chapters Three and Four, by the limitations in New Zealand statutes. Ocean-ranching and seabed enhancement are often discussed as forms of aquaculture in New Zealand research literature, but are not covered by marine farming legislation as no statutory mechanism has existed since 1971 to allocate title to space for marine farming of such unconfined or uncontrolled species. Moreover, in New Zealand, licences are considered to be part of marine farming if provided under relevant marine farming legislation. I have adopted a pragmatic approach to such issues and kept with the legal definitions of marine farming in New Zealand. This includes largely accepting the two-dimensional view of allocated farming rights to the water column, but in Chapters Twelve and Thirteen I return to highlight the difficulties this poses in resolving marine resource conflicts in New Zealand.

Classification of farming in terms of the investment and resources used and needed for the different activities offers some utility for New Zealand. Salmon farming depends on hatcheries and artificial feeding and is a more technology and capital-intensive industry. Mussel and oyster seed/spat are usually caught in the wild (sometimes on the farm itself, but usually at a separate location). The mussels and oysters essentially graze on the plankton and nutrients brought to them on passing water flows and are much less capital and technology intensive. Consequently, the salmon farms are more likely to be developed by larger businesses with more capital backing than the oyster and mussel farms. It is also possible to suggest a general pattern for the evolution of marine farming, drawing on the shared characteristics identified through my reading of the literature. This is discussed in Chapters Five and Six.

Finally, this Chapter has also drawn attention to three underlying reasons given for the need to expand marine farming: emancipation, sustainable development and, simply, a natural progression. These rhetorical and metaphorical ‘perspectives’ are discussed further in Chapters Five, Twelve and Thirteen, but I first wish to summarize the development of marine farming in New Zealand to provide a local dimension to this historical overview.

Chapter Three: The First Century of Marine Farming in New Zealand: A Survey of Regulatory Regimes

> *"The North is fortunate to have dreamers and schemers and parliamentary representatives who are bold enough to stimulate practical incentives to bring about an unknown industry well suited to Northland's climatic conditions"*
> *(Newspaper article cited by Sloane, New Zealand Parliamentary Debates, 1964: 3125.)*

The preceding chapter has identified factors that may have influenced the development of marine farming in the developed world. In this and the next chapter, the regulatory regimes for marine farming in New Zealand are described to contextualise the development of the industry and the analyses in subsequent Chapters. Although the focus of the thesis is on the spatial developments since the 1960s, this Chapter focuses on the period since marine farming first received legislative attention in New Zealand in 1866 until 1971. Chapter Four continues the description from 1971 up to the present, the period of significant growth in the New Zealand industry.

The relevant material has been presented around the concept of specific era in the development of the marine farming industry. The regulatory regimes that largely define each era are described in some detail because the nature of the regulatory regime has been repeatedly identified as possibly the major constraint on the marine farming industry (MAFFish 1989, MFish and MfE 2000). Scott's (1989, 2000a,b) model of 'rights', introduced in the preceding chapters, is expanded upon and used to aid description and interpretation of the material presented.

Once the regulatory regimes and associated property rights matters have been set out, this chapter features contextual material relevant to the variables identified in the international literature outlined in Chapter Two and elaborated in Part Two. This is later drawn on in an attempt to demonstrate how the regulatory environment responded to and created its context. The chapter draws extensively on published

Parliamentary records to provide the substantive and rhetorical contexts of key decisions regarding the development of the industry and the relevant regimes.

3.1 Models of Rights

Contemporaneous with the conduct of the research presented here, other theorists (Shotton 2000a,b) have explored the nature of common property management regimes in fisheries by developing and expanding Scott's (1988) early work on the nature of property rights. Two papers compared marine farmers' rights with capture fishers' rights in New Zealand (Drummond *et al* 2000, Harte and Bess 2000). Of these, Harte and Bess use Scott's six axial model to illustrate and compare the nature of these rights[1]. The model impresses as a useful tool to clearly show differences between rights available under different regulatory regimes. It is employed for that purpose in this chapter. The reasons for and the detail of the assessments recorded on each of the axes are set out in Appendix One.

Essentially Scott (1988, 2000a,b) identified six key characteristics of a property right as comprising: exclusivity, transferability, security (originally labeled as 'quality of title'), duration, flexibility and divisibility (Box 3.1). As Harte and Bess (2000: 334) explain

> Each combination of characteristics can be shown by the six-pointed, star-shaped figure formed by joining the measured points on the six characteristic axes …A property-rights regime that maximizes all characteristics creates a large hexagon when the end points of each axis are linked. The mapping of the characteristic scores helps reveal the differences in the specification of property rights ….

[1] I was originally introduced to this model in a seminar by Scott held at the Head Office of the Ministry of Fisheries in the early 1990s. At that time, Scott was one of several international 'experts' brought to New Zealand by the Ministry as part of its process to facilitate informed discussion of strategic policy directions for the future management of fisheries (and marine farming) in New Zealand. Notably all the experts specialized in rights-based management regimes for common property resources. Although Scott's model has been used in discussions within official circles (and my own lectures and research) since that date, Harte and Bess (2000) is, as far as I am aware, the first published application of the model to marine farming.

Box 3.1 Scott's six-axial property rights model used to compare New Zealand marine farmers' and commercial fishers' rights under the RMA 1991/FA 1983 regimes (after Harte and Bess 2000: 334-335).

The six axes suggested by Scott as defined by Harte and Bess (2000: 334-335) are as follows:

"*Duration* – refers to the time-frame that property rights are in effect. A short duration leads to costly or uncertain renewal and, or, extension of property rights. More permanent duration is valuable to property rights holders as it reduces renewal costs and uncertainty and raises incentives to invest in enhancing their fisheries. ITQ owners have durable property rights since ITQ is in perpetuity, subject to changes in TACC.

Flexibility refers to the ability of property rights holders to structure operations to achieve goals of their choice such as maximising profits by way of increasing the value of their catch rather than the volume. Flexibility in the exercise of rights and responsibilities is similar for both ITQ owners and marine farmers.

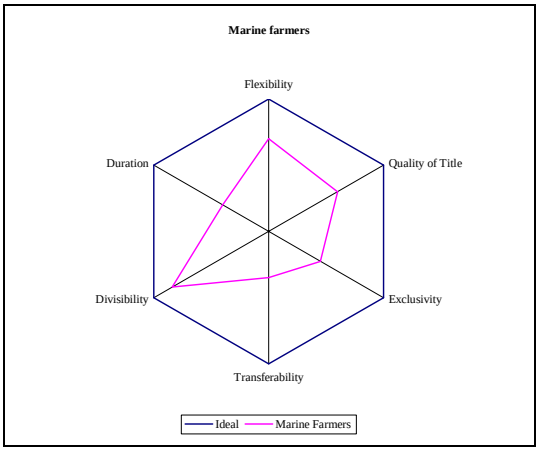
Exclusivity refers to the extent that a person's property rights overlap with the rights of others. More exclusive rights are less likely to have operational clashes with other property rights holders and more likely that similar rights holders will coordinate their activities. Since ITQ owners compete to exercise their rights to a common fishery and, or, common fishing grounds, their harvest rights are less exclusive than the rights of marine farmers who have sole occupancy of a portion of coastal space.

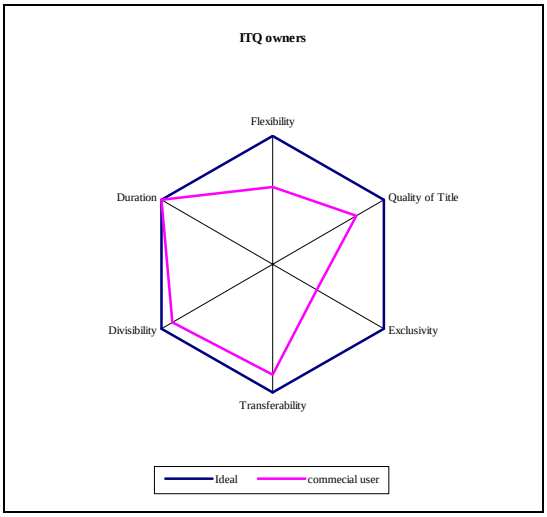
Transferability refers to the ability to transfer title to property rights, thereby providing more efficient operators the option to buy rights from less efficient operators. ITQ is an instrument for transferability, which assists retirement from fisheries and reduces overcapitalisation. Only ITQ owners' rights are fully transferable.

Divisibility refers to the ability to divide (a) property rights more narrowly, producing new recognised rights specified perhaps by season, region, ground, species, age or other classification and (b), the amount of quota into smaller amounts and to transfer some quota to others. Only ITQ owners' rights are fully divisible.

Quality of title refers to certainty and security. The more predictable entitlement of the property rights the higher the quality of their title. If property rights holders can expect little change over time to their entitlements, the more certain and secure are their rights, which increases the likelihood that they will invest in the management of their fishery. ITQ owners'rights have considerably higher quality of title than marine farmers'."

Harte and Bess (2000: 335) produced the following star diagrams to illustrate the differences between ITQ owners property rights and those of marine farmers in New Zealand in 1999 under the combination of the Fisheries Act 1983 and the Resource Management Act 1991.





It is critically important to recognize that estimating the actual strength of the specific rights is usually carried out in quite an arbitrary fashion and the assumptions may not be clearly stated or supported. There are several points at which one might quibble over the assessments given by Harte and Bess. For example, the relative placement of the rights of marine farmers *vis a vis* those of ITQ holders is not fully explained. Does it represent the fact that the maximum length of a coastal permit for a marine farm is 35 years whereas that for ITQ is secured *in perpetuity*, or does it reflect the potential for regional coastal plans to be reviewed and changed with consequent adjustments to the terms and conditions of a marine farming permit's duration? In which case should these be represented on the duration axis, with the assumptions explicit? Scale problems also exist. For instance, exactly where on the duration axis would one rank a five year permit compared to a thirty-five year permit compared with an *in perpetuity* right?

Moreover, the actual characteristics chosen by Scott could also be subject to a substantive critique. The extent, for instance, that the spatial characteristics of a property right might be adequately addressed in such a model is an obvious starting point for a geographer. The mutual exclusivity of each of the axes is also debatable. Such matters, however, are beyond the scope of this thesis. For the moment I have accepted the limitations of the model and used it to illustrate relative differences between characteristics of marine farming regimes employed in New Zealand at various times.

3.2 Regulatory Regimes in New Zealand

Marine farm property rights and the allocation of space for marine farming are largely determined by legislation in New Zealand. Regulatory regimes in the New Zealand marine farming context are also essentially determined by central legislation and accordingly key legislative changes provide useful markers for changes from one regime to another. It must be noted, however, that there is usually a delay period between the legislation being enacted and its coming into force. 'Savings' provisions in the relevant legislation also commonly provide for applications for marine farms that were made under the previous legislation to be processed as if the new Act had

no affect. Farms established under one regime may be 'parented' into the new legislation by simply treating them as if the rights had been issued under the new regime.

Such matters tend to confuse the situation with regard to the on-the-ground change in marine farming. They may, for instance lead to a 'lag' effect between enactment of legislation and the establishment of new farms under the new regime. Significant changes in the rights that owners perceive they may hold under new legislation compared to those they hold or might hold under the preceding legislation may affect the behaviour of the (potential) marine farmer. While this constraint is acknowledged, the enactment of legislation governing marine farming in New Zealand will be used as the basis for identifying new era when there is a significant change in either the nature of the farming permitted or the regulatory regime. Consequently the development of marine farming can be divided into the following era:

- pre-modern (1866-1964),
- proto- modern (1964-1971),
- modern (1971-1991),
- transitional (1991- present).

The boundaries between these four era are somewhat blurred by intervening factors, but they provide a useful categorization. Of these four, the 'transitional' era provides the most difficulty in classification. By 2001 a new post-modern era, that I had anticipated would result from the RMA, seemed to be emerging. As will be discussed in the next chapter, the Resource Management Act 1991, on which the new regime was founded, had not come fully into effect by the completion of this thesis. Moreover, moves by the Government in November 2001 suggest that this post-modern era may be stillborn. As discussed in the Chapter Twelve, the Government appears to be reverting to approaches similar to those of the modern era of 1971-1991.

3.3 The Pre-Modern Era (1866-1964)

'Riparian rights', in the context of this thesis, is used broadly to describe situations where landowners have some form of rights as to activities that might be undertaken in or on foreshore, seabed and water adjacent to their property. Such rights were clearly present from the outset of marine farming in New Zealand. The Oyster Fisheries Act 1866 (s. III) provided for a 'permission' to be obtained from the Governor for:

> …any person to form or plant any artificial oyster bed on the shore adjacent to any Crown lands bordering on the sea or any estuary and also for the occupier of any lands bordering on the sea or any estuary or for any other person *with the consent of such occupier* to form or plant any artificial oyster-bed on the shore adjacent to such last-mentioned lands. [emphasis added]

In addition to the adjacent landowner's consent being required, if the adjacent landowner was the Crown, then the permission of the local Crown representative (the Commissioner of Crown Lands of the Province) was required. Notably, these artificial beds could not be established where natural beds were already present, so farms could not be used to stake claims to oyster beds as occurred more recently in Ireland (Steins 1998). Apparently out of 'consideration' for Maori (Waitangi Tribunal 1988: 81) the Act excluded 'rock oysters' between high and low water marks, but covered 'shore oysters' and 'mud oysters' out to a depth of 10 fathoms. The confused state of taxonomic identification of oysters in New Zealand has been well-traversed by Jeffs and Crease (1996) who concluded that the initial taxonomic distinction between species based on their habitat was incorrect. The Act was extended to cover the foreshore oysters eight years later.

The upper term of permissions[2] was set at fourteen years. Such permissions did

> … not give any exclusive right or title to the occupation of the said shore or sea ground except for [oyster farming] or prevent the full and

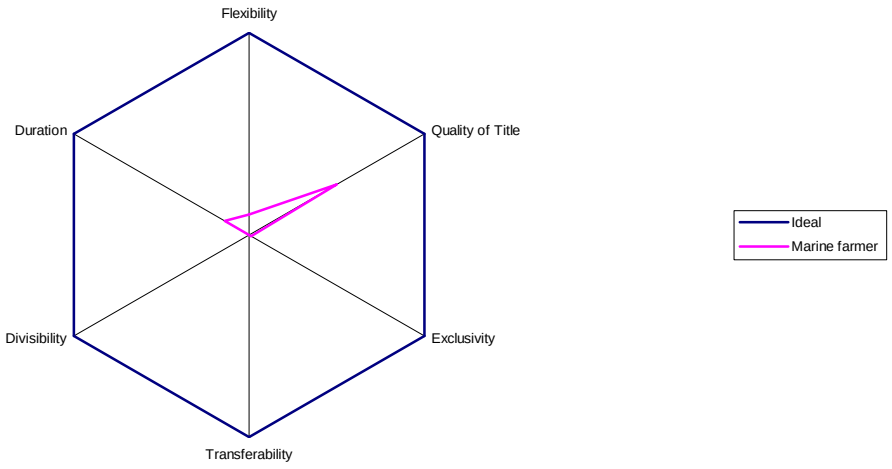
[2] The Waitangi Tribunal (1988: 81) refers to these "permissions" as leases, but in subsequent legislation (e.g., The Sea-fisheries Act 1894, s.23) they are referred to as "licenses" and I have found no statutory reference to them as having the status of leases at any time.

> free exercise and enjoyment of any right whatsoever in or along the said shore or sea ground. (Oyster Fisheries Act 1866, s. IV)

It is therefore quite clear that marine farming was intended to be only in places where other conflicting rights were not present. What comprised those other rights was not specified and therefore enabled considerable breadth in case-by-case interpretations, but the way in which these were exercised (if at all), is beyond the scope of this thesis.

In terms of Scott's model, the parameters of the permission were very poorly described in the Act. The Act was silent on matters of registration, but the right came directly from the Governor and there were no provisions setting out criteria on which the right might be removed. The direct link to the Governor suggests reasonable, but not necessarily strong, security. In all other respects it appears a very weak right (Figure 3.1).

Figure 3.1 Property rights dimensions under the Oyster Fisheries Act 1866



Eleven years later The Fish Protection Act 1877 (s.3) provided for the Governor in Council to make regulations that "May set apart and reserve any part of any fishery for the natural or artificial propagation of fish" (such regulations to be published in the Gazette). The Governor could also grant exclusive rights to use any fishery, but (s.4): "Nothing in this Act contained shall be deemed to repeal, alter, or affect any of

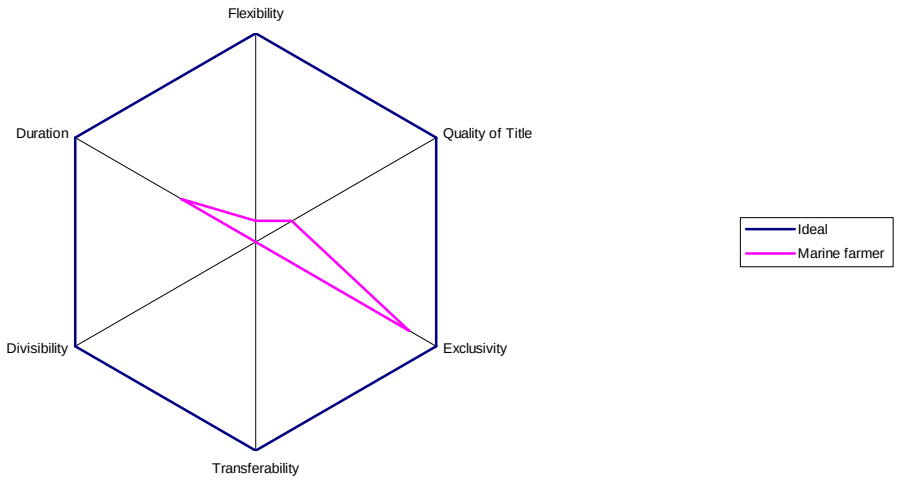
the provisions of the Treaty of Waitangi, or to take away, annul, or abridge any of the rights of the aboriginal natives to any fishery secured to them thereunder". Treaty rights were therefore secured, if undefined.

The Fisheries Conservation Act, 1884 (s. 5 and s. 11 – which refer to 'pisciculture') maintained and extended these provisions. It was followed by The Oyster Fisheries Act 1892 that covered tidal lands and waters (between normal spring tides) and also one marine league seaward (3 nautical miles). It repealed previous oyster fisheries Acts and the Fisheries Conservation Act 1884 with respect to oysters. Of particular interest is Section 14 of the Act. It provided for exclusive 'Native oyster fisheries' in the vicinity of any 'Native pa or village' where Maori could take oysters at any time for their own food. It appears to be a response to complaints that non-Maori had been granted commercial licenses over oyster beds customarily exploited by Maori (Waitangi Tribunal 1988:81). This section of the Act also enabled the making of regulations preventing the sale of oysters from such beds by Maori (the Fisheries Act 1923 (s.10) provided for excess mature oysters to be sold to the Crown).

The beds in the vicinity of any pa or native village might well be considered beds to which Maori from these areas had either or both traditional and riparian rights. The Act, therefore, provided the means to limit Maori fishing to personal consumption from particular beds for which they may have been, in a communal sense, the existing or riparian rights holders. Riparian rights were maintained for artificial oyster beds in all other respects, including to the extent that Maori could (if shown to be the adjacent land-owners) effectively veto applications. The Waitangi Tribunal has argued that these early Acts reflected and affirmed assumptions (including that Maori mainly fished for personal consumption) made as to the nature of Maori fishing interests that became ingrained in subsequent legislation (e.g., the Harbours Act 1878, s. 147) and fisheries management thinking. Of particular relevance to my thesis is the primary assumption that "the foreshore and the seas beyond them were held by the Crown without encumbrance" (Waitangi Tribunal 1988: 81-82). I will return to this when discussing the present era.

The Oyster Fisheries Act 1892 also extended the maximum term of a licence[3] to 20 years, with a right of renewal for a further 21 years (s. 16), but for the first time a developmental requirement was included. This significantly weakens the security and flexibility of the right (Figure 3.2). Licence holders had to form and plant their beds within three years or have their licences revoked (s. 17). The Act specifically stated that a licence was permissive and did not "give any exclusive right or title to the occupation of the said shore or sea-ground" (s. 16). Where the licences were for seashore outside any borough or county they were deemed to be within the adjoining borough or county for jurisdictional purposes.

Figure 3.2 Property rights dimensions under the Oyster Fisheries Act 1892



The Sea-fisheries Act 1894 consolidated and, in some places, significantly amended earlier legislation, notably omitting the Treaty clause of the Fish Protection Act 1877 (Waitangi Tribunal 1988: 88-89). A section stating simply that 'Nothing in this Act shall affect any existing Maori fishing rights' was inserted in 1903 and maintained in similar form in subsequent fisheries legislation up to and including the Fisheries Act 1983.

[3] In some Acts the noun is spelt 'license' and in others it is 'licence'. For consistency, I have used 'licence' throughout, unless quoting directly.

The Sea-fisheries Act 1894 modified the regulation-making provisions of the Fish Protection Act 1877 by restricting to tidal waters the area that might be set aside for "the natural or artificial propagation of fish, oysters, or seals" (ss. 5(15)) (i.e., excluded fresh waters). This was replicated in the Fisheries Act 1908 (ss. 15(p)) and was not repealed until 1983. Although this provision potentially provided considerable flexibility in species able to be farmed, its implementation depended on the making of regulations. Consequently, I have not included this provision when ascribing a flexibility rating to the various statutes affected.

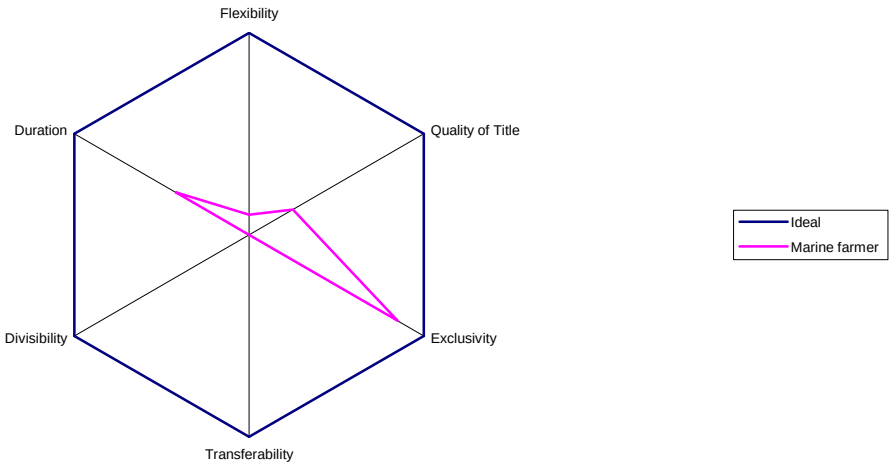
The Sea-fisheries Act 1894 also provided for exclusive 14-year licences to take oysters from natural beds of not more than 5 acres per licence below "highwater", or with no side more than 110yds along foreshore or between high and low tide. The activities allowed by these licences effectively equate to farming. These licences, however, were to be allocated by sale through either a public tender or auction. In 1903, this was amended to enable adjoining landowners to obtain licences without having to have their sites publicly tendered or auctioned.

The licences could be revoked for improper cultivation. Initial ownership of a licence was extended from 20 to 21 years with a right of renewal for a further 21 years. Despite these seemingly significant licence periods, section 27 of the Act provided for any part of the licence to be taken for public works construction with only three months notice, thereby reducing security (Figure 3.3). Section 17 of the Act also replicated section 14 of the Oyster Fisheries Act 1892 with regard to Native exclusive areas adjacent to a pa or village for Natives.[4]

The extent to which the legislation resulted in marine farming is unclear. In 1897, 18 "leases" had been issued, in the Manukau Harbour oyster fishery, but an exhaustive analysis of this era is beyond the resources of my research (Waitangi Tribunal 1988: 87). Between 1913 and 1933 Maori oyster reserves were provided in Kaipara, Whangaruru, Whangaparoa, and Mangonui Inlet (Waitangi Tribunal 1988: 87).

[4] The Waitangi Tribunal (1988) claims that 'It was a fact however that the 1894 Act specifically forbad the sale of oysters from those beds reserved for Maori'. Section 17, however, is unchanged from section 14 of the preceding 1892 Act. It appears the 1892 Act established the restrictions on sale.

Figure 3.3 Property rights dimensions under the Sea-fisheries Act 1894



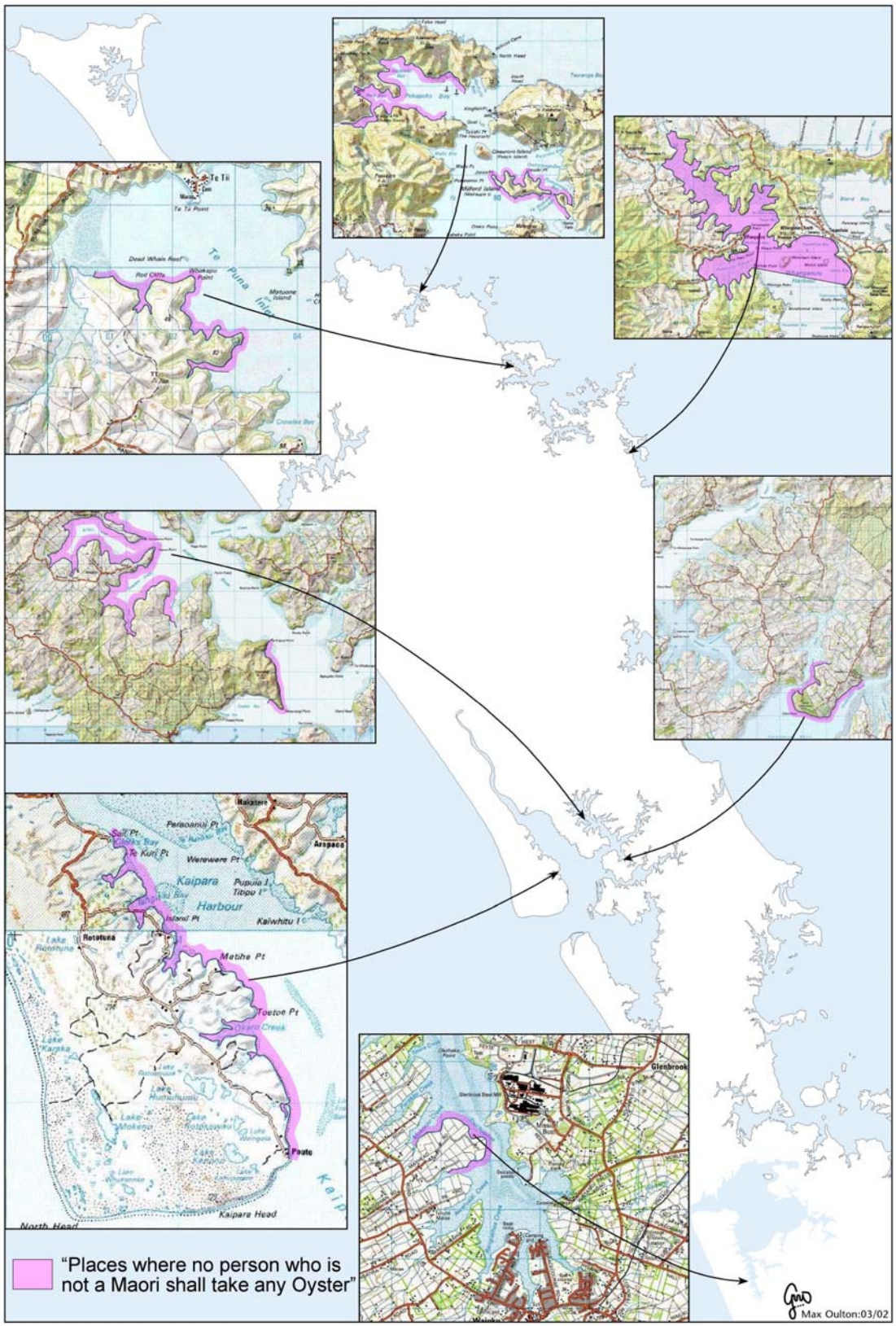
Several Maori oyster-fisheries were created and continued to exist in the modern era in the Northland/Auckland regions (Figure 3.4, Regulation 9 of the Fisheries (Auckland and Kermadec Area Amateur Fishing) Regulations 1986), but Maori generally were not allowed to sell, purchase, or barter any oysters taken from such Maori oyster-fisheries. Such non-commercial use Maori reserves should have prevented marine farms being developed in these areas.

Prior to 1962 "Cultivation [of rock oysters] consisted mainly in increasing the areas for spat settlement by laying out rock spalls in selected areas where spatfall and growth rates were believed to be good, but also in the control of predators of the oysters" (Fishing Industry Select Committee (FISC) 1972: 44). The Department of Marine had operated the fishery essentially by policing the regulations to protect the fishery and had employed workers to 'cultivate' and pick the oysters. During the 1960s, labour shortages developed as wages rose elsewhere in the economy and it became difficult to keep prices to then acceptable levels (FISC 1972: 44).

3.4 Proto-Modern Era (1964-1971)

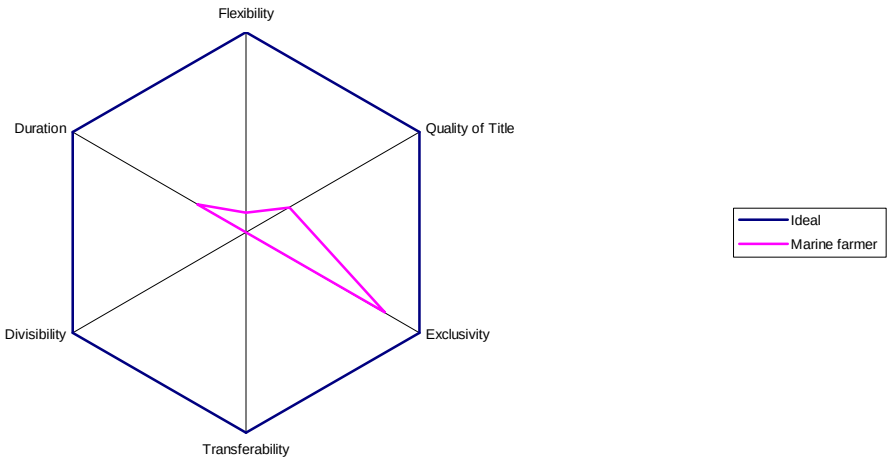
The Rock Oyster Farming Act 1964 (ROFA64) was specifically intended to enable would-be marine farmers to obtain a secure property right for space in the marine

Figure 3.4 Auckland-Northland Maori Oyster Fishery reserves under 1946 regulations



environment without needing a special Act of Parliament. Previously the Crown could only authorise temporary permits because Section 150 of the Harbours Act 1950 was considered to prevent the allocation of more secure property rights for activities such as this. The ROFA64 marks the advent of the concept of modern marine farming in New Zealand. It was, however, limited in the species covered and other developments during this period have led me to consider this to be a prototype of the modern era that was established more fully by the Marine Farming Act 1971. The nature of the rights it provided was little changed from its predecessors (Figure 3.5).

Figure 3.5 Property rights dimensions under the Rock Oyster Farming Act 1964



The ROFA64 did provide for leases to be granted over any part of the bed of the sea or river whether tidal or otherwise. An oyster farm was specifically defined as "any lease-land and any erection or structure thereon or therein used for or in connection with the propagation or cultivation of rock oysters" (s. 2). The application had to be notified in local newspapers and submitted to the Secretary for Marine or other authority in which the land was vested. Adjacent land-owners or administrators had to be notified. Objections had to be lodged within 14 days and the Minister could not grant an application within a month of the first notification of the application having been made.

Sub-section 4(7) was especially important. It required the Minister to "have regard to any objections…and to any representations made by the applicant…and, if satisfied that the grant of a lease would interfere with any existing right of navigation or would not be in the public interest, shall refuse to grant" the application. The critical criteria therefore were 'existing rights of navigation' and 'public interest'. Although this provided some guidance as to the existing rights in an area, discretion was left to the Minister, and local landowners no longer had an automatic veto. Apart from the vestigial right to be notified, substantive riparian rights had therefore been effectively removed without compensation. Adjacent landowners would need to prove an existing right of navigation or that it was in the public interest to have the Minister decline an application for an oyster farm adjacent to their land.

The lease could be subject to conditions and requirements to pay rentals and could not exceed fourteen years, a third less than previously available, but could contain provisions for renewal (s.5). Moreover, if the Minister was not satisfied reasonable attempts had been made to establish an oyster farm on at least part of the farm within two years, the lease could be cancelled without compensation. Similar powers existed should the Minister be 'of the opinion' that the lease was not being used in whole or part for rock oyster cultivation. The level of security of the title for the oyster farmer had, therefore, been significantly reduced and, coupled with the nature of the criteria employed in deciding on the application, there is clearly a considerable empowerment of the public relative to the private landowners and would-be farmers.

Leases and any transfer, subleasing, mortgage, transmission, or other disposition were to be registered in the Land Registry Office, thus providing some compensatory enhancement of the security of title. Of particular importance, however, was the provision of wide regulatory powers under section 8. Regulations could be made covering almost every aspect of rock oyster farming. Moreover, section 10 specifically proscribed the taking of oysters from artificial beds or other non-lease land, unless permitted to do so by the regulations. Thus the flexibility to use the oyster farming right was entirely at the discretion of the regulation-makers, the Minister and his Marine Department.

Under the Rock Oyster Farming Regulations 1964 (s. 15) the leased areas were to be divided into rectangular shaped lots of 5 acres each, with access ways of at least half a chain in width between each adjoining lot's boundaries (subsequently 2ha and 10m respectively). The lessee had to commence development of the leased-land in the first year of the lease. The regulations also specified that where more than one application was received to lease the same area the Minister (or Harbour Board or local authority if the land was vested in either) was to determine priority in the allocation of leases. Some guidance was provided in section 10 of the Regulations as to options that the Minister might consider. These were allocation "by lot, or by having regard to the financial or other circumstances of the applicant, or to the likelihood of the applicant being able successfully to develop an oyster farm". Effectively, the Minister could 'pick winners' if of a mind to.

Riparian rights were retained in greater strength in the regulations than they were in the Act itself. Neighbouring landowners were able to drain (discharge) water from their land into the leased area without having to compensate the lessee for damage to the lease-land or any stock being grown by the lessee. Provisions were also made for access of landowners to land abutting oyster leases and this could include formal provision of an 'access way'.

Under the standard terms of the lease form (Form 3 of the Schedule to the Rock Oyster Farming Regulations 1964), the lessor (Minister/Harbour Board/local authority) could also grant the neighbouring landowner license to build a wide variety of structures on the foreshore including, for example, wharves, bathing sheds and freezing works. In such cases, the lessee had to allow the structures to be built and used without compensation of any kind.

The lessee could also be required to hand over lease-land for construction of protective or any other harbour works at three months notice without compensation (other than refund of advanced rentals paid for that part of the lease so removed). The lessee would, however, have a preferential right to any similar area of lease-land that might be available for acquisition *at that time*. Given that there could be no guarantee of such similar areas being available when needed, this provision of the

lease should have discouraged potential lessees from seeking places in the vicinity of harbour works or vulnerable land or navigation channels.

There was some consideration of the environmental effects of oyster farm development. Lessees were required to restore the leased land to its original condition when the lease terminated. Moreover, restrictions were imposed on the design of structures to: provide space for the ebb and flow of tides; ensure they did not cause or tend to cause erosion or accretion; and ensure that the structures were designed to take into account the effects of storms and other like occurrences. The Minister could also add restrictions on structures if, in his opinion, the structures created or were likely to create "any unreasonable or unnecessary despoilment of the natural beauty of any area or which may constitute a hazard to navigation" (s. 31). Rubbish had also to be managed appropriately. Bad management of a farm could result in forfeiture and a five-year ban on being granted another lease.

Lessees had to be holding the leases exclusively for their own benefit. A lease could be inherited, but section 40 of the Regulations specifically prohibited subleasing, subletting or assigning the whole or any part of the lease-land to any other person, although assignment could be undertaken with permission of the Minister (or other lessor). These were significant constraints on the transferability and flexibility of the lease right and undoubtedly influenced the nature of the rock oyster farming industry.

Lessees could obtain a renewal of their lease if they applied for one in the second to last year of their initial lease, but this was restricted to being a right to only one renewal (s.43). A preferment right was also included in the regulations. A lease holder who applied for a lease of the same area in the three month period before the end of the existing lease, provided s/he was in good standing, was to be given preference against another applicant *if* the area was to be leased again. These provisions in combination meant that if a site was going to continue to be leased for oysters, then an oyster farmer could ensure a continued lease by maintaining good standing (i.e., meeting all the provisions and conditions of the lease, including financial requirements). In practice, this is close to a right *in perpetuity*.

A clear distinction between the right to farm a property and the right to harvest product from that farm was also present under the ROFA64. A licence was required to pick oysters and these were essentially tied to the lease. Under the Rock Oyster Farming Regulations 1964 (amendment No. 1 1966/142), for instance, a lessee applied for a licence to pick oysters, or for an employee picker over 16 years of age. Employees' licences were only valid while employed by the lessee. No licence, however, could be issued to an employee unless the lessee held a licence. Licences could not be transferred. As no licence could be issued for taking less then 100 lots and a lessee had to pay one shilling for each lot (18 litre = 1 lot) the lessee had to pay a minimum of 100 shillings to harvest the farmed oysters.

Applications for a lease required a 10 pound deposit and evidence of having been notified in newspapers. It was also necessary to supply two copies (initially supplied by Lands and Survey but this was repealed in 1966) of a vertical aerial photo annotated to show relationships of the site to adjacent land-boundary surveys, or two copies of a plan showing the boundaries and other information. Annual rentals for leases were required to be paid in advance. Provision also existed for the payment of royalties as well as rentals (s. 19).

In summary, a reasonable outlay of capital was required before any return could be made on an investment and labourers were very much dependent on keeping their jobs to retain their picking licence. This appears to reflect a desire to ensure that only those with sufficient capital to fully develop and farm a site should be allowed to occupy the public domain for personal profit and to restrict the number of people with licences, perhaps to help prevent poaching.

That most subsequent regulations and department or council policies/guidelines largely provided provisions similar to those of the ROFA64 regulations (as amended in 1966) is testament to their utility as guidelines. In subsequent discussions I will not go into similar levels of detail except where there has been a significant generic change or specific local consequences of a minor change.

3.4.1 The Marine Farming Act 1968

After four years the Rock Oyster Farming Act 1964 was complemented by the Marine Farming Act 1968 (MFA68). This signaled an expansion into species other than oysters and an attempt to address marine farming as a distinct activity and sector. The long title of the MFA68 (passed into law on 18 December 1968) provided a clear and unambiguous government policy direction:

> …to facilitate the establishment and development in New Zealand waters of an industry for the farming of sea fish and marine vegetation and to provide for leases of marine farms and the marketing of fish reared and vegetation cultivated in marine farms.

'Fish' included every species capable of being farmed commercially, except rock oysters (governed by the ROFA64), salmon or trout. The Act (s. 2) enabled any part of the seabed or foreshore "that is vested in the Crown" or internal waters of New Zealand to be leased for marine farming. Significantly, foreshore and seabed vested in Harbour Boards or local councils could not be leased under this Act. The leased 'area' was not merely the land beneath the water, but included "any water at any material time upon or vertically above any such part" (s. 2). There appears no general ability for the water column to be vertically segmented and used for different purposes or by different farmers.

Many of the requirements of the ROFA64 Regulations were replicated in the MFA68, but although the size of a lease was limited to 2ha the Act specifically stated that there were no restrictions on how many leases a person could hold. The Secretary could also require an applicant "to supply such other information as may be necessary to enable the Minister to decide whether or not a lease should be offered" (s. 4). This is quite wide reaching and allows the Minister and Secretary considerable discretion given that criteria on which the Minister should make a decision were not specified in the Act. Where an applicant withdrew the application the deposit was forfeited, but if declined it was returned to the applicant. If more than one applicant sought the same area the Minister had absolute discretion to decide who should be offered the lease.

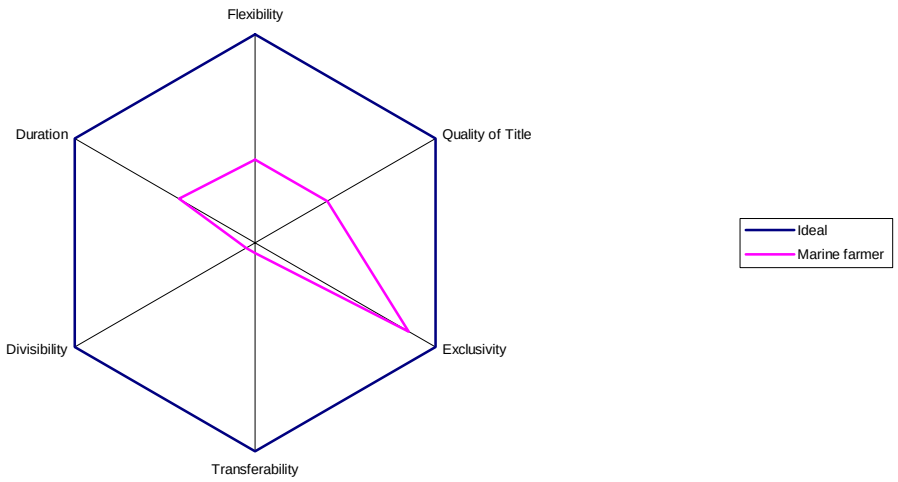
The period of the lease could not exceed fourteen years, but the terms of a lease could include a right of renewal for "one or more terms" (s. 3) thereby improving the potential durability and security of the title available. No criteria were provided to guide the Minister of Marine as to whether or not applicants should be granted rights of renewal or for how many terms such rights of renewal should apply. Furthermore, even if there was no right of renewal in the original lease, the Minister could grant an extension of up to fourteen years for any lease provided this was done prior to expiry of the previous lease and was formally registered. The provisions and conditions of an existing lease could also be changed as agreed between the Minister and the lessee and therefore a right of renewal could potentially be included at any stage. During Parliament's debate on the Bill, the Minister of Marine noted: "In the event of a renewal of a lease not being granted, then a lessee may, in pursuance of the provisions of the Property Law Act, apply to the courts for relief" (*New Zealand Parliamentary Debates* (NZPD) 359: 3870 (Scott)). This suggests that some degree of compensation was envisaged even if not written directly into the legislation and, consequently, the duration aspect of the right was stronger. The need for the agreement of the leaseholder to any change in the conditions governing the lease, also, considerably strengthened the security of the rights of the leaseholder (Figure 3.6). If the lease was not renewed, or extended, the lessee still had "a right to be offered a new lease of the area in preference to any other person who may have applied for a lease of the area" (MFA68 s. 16).

If a lease became available for re-offering to the public, the Minister could allocate it by any one of public tender, auction, or public application and ballot (s. 17). The successful acquirer of a re-offered lease had to pay for any improvements in addition to the rent and other charges, and this money would be paid to the previous lessee. This provided an incentive for leaseholders to maintain their farms in good state even if they were not considering continuation of their activity. It also placed the costs of transferring the lease with the Government.

Provisions for access ways and strips were also picked up from the Rock Oyster Farming Regulations and their purpose clarified in the legislation. The Minister could require provision of 'access strips' of at least 11 yards between adjacent leases "for

the purpose of enabling members of the public (whether by means of boats or otherwise) to pass and repass along the strip" (s. 20). Moreover, the lessee or "the owner or occupier of any land or area adjoining or in the vicinity of the leased area" (s. 19) could apply for an access way over any part of the leased area to enable access to the land.

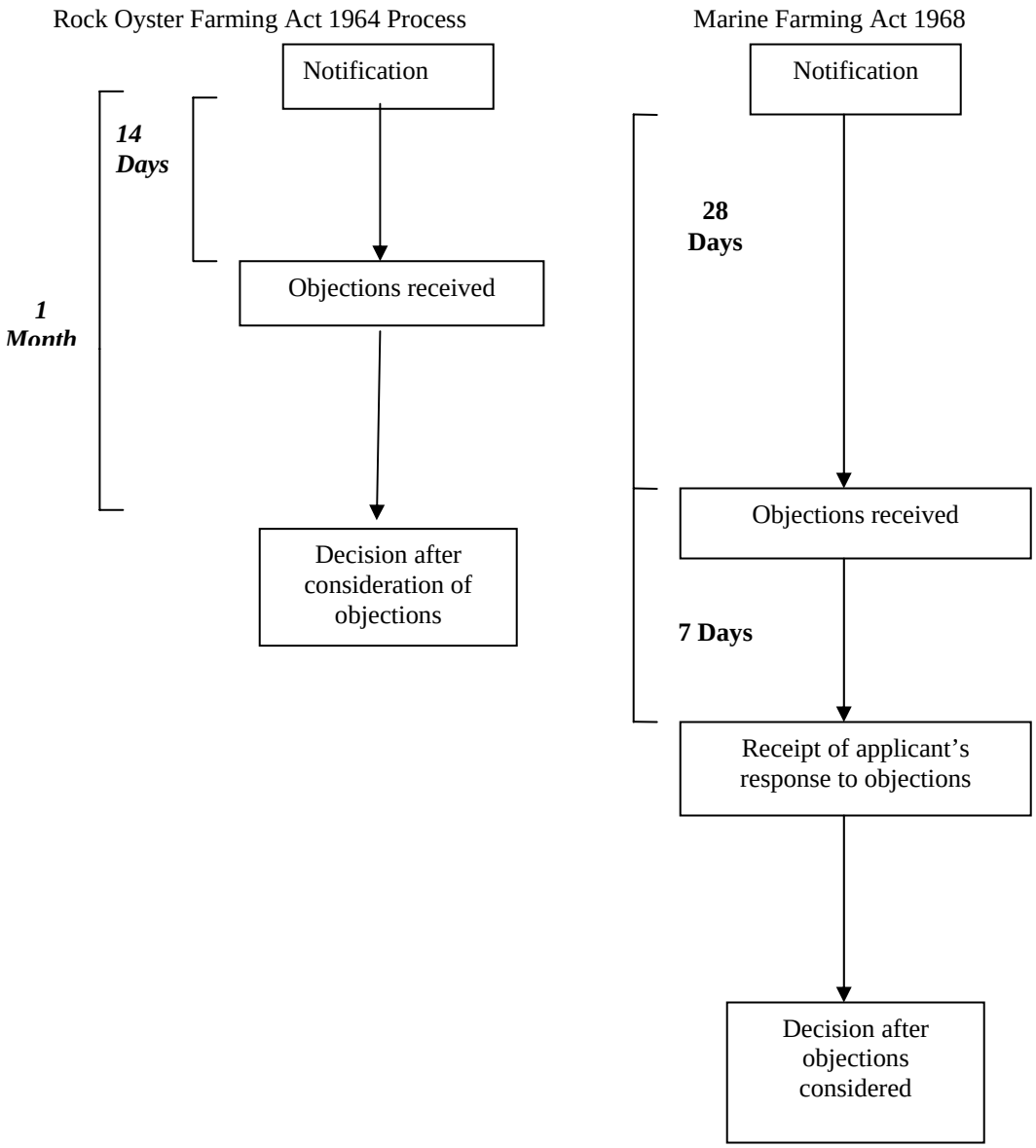
Figure 3.6 Property rights dimensions under the Marine Farming Act 1968



Interestingly, although a deposit of up to $100 could be required, this was returned if the application was declined, but retained if the application was withdrawn. The financial incentives were therefore weighted in favour of an applicant keeping an application in the process and for the Minister to approve the application. Moreover, the Minister was not allowed to consider the value of any improvements made by the lessee to the leased area when calculating the rent payable to the government (s. 9). Leases could be jointly owned, sublet, assigned or parted with if the Minister gave prior consent (s. 11).

The species of fish or vegetation to be farmed had to be included in the public notification of the application and objections in writing had to be lodged within twenty-eight days of the first public notification, a doubling of the previous period for objections (Figure 3.7). The applicant then had seven days in which to make a written submission to the Minister in response to the objection.

Figure 3.7: Statutory timeframes for application processes 1964 and 1968



A lease could not be granted until the objections had been disposed of. Other than these timeframes the Minister was specifically not bound to follow any formal procedure and only required to have regard to the objections and submissions and the 'rules of natural justice'.

The criteria on which an objection was to be upheld were more clearly specified than previously. An objection was to be upheld if granting a lease would:

(a) Interfere unduly with any existing right of navigation;
(b) Substantially interfere with commercial fishing;
(c) Substantially affect any existing usage of the area for recreational purposes;
(d) Otherwise be contrary to the public interest.
(Section 6, Marine Farming Act 1968)

There was no requirement to consider such matters if an objection was not received.

If the Minister offered a lease to the applicant, the applicant had one month to execute the lease and also was required to pay the costs of preparation and registration of the lease. The lease agreement could include, among other conditions, the forfeiture of the lease if it was abandoned or the lessee had not 'made reasonable attempts' to establish a marine farm within two years. This was a significant change from previous legislation as it left it to the discretion of the Minister as to whether or not to include and enforce development requirements. Failure to do either could lead to speculative investment in obtaining lease rights.

Of particular interest are the provisions of sections 10-14 relating to the nature of the property rights and restrictions on their exercise. Section 10 was quite specific as to the nature of the 'property and other rights conferred on the lessee'. These included 'a leasehold estate', the 'exclusive right during the currency of the lease to farm the species of fish or marine vegetation specified on the lease', but no right, title, or claim to any minerals. Any assignment, subletting or parting of the leased area required prior written permission from the Minister, which significantly weakens the transferability of the right.

A section relating to rafts, thereby recognising the potential of new technology, was included for the first time in the Marine Farming Act 1968 (s. 23). The section's requirements related to safety, not to public interest or navigation concerns as these were addressed under the Harbours Act 1950 (discussed in Chapter Four). The Minister could also close a leased area if satisfied 'on reasonable grounds' that there were diseases, pests, or potential or actual contamination likely to render the farmed species unfit for human consumption.

There was also provision for the Governor-General by Order in Council to make regulations that were able to encompass a very wide range of matters – from management and control of the leased areas to marketing and sale of product (s. 38). Essentially the lessee had no protection or security of right with regard to the most fundamental aspects of operating a business if the Minister wished to regulate the industry or the particular farm(s).

3.5 Property Rights Under the Pre- and Proto-Modern Regimes

A comparison of the property rights that a lease/licence provided under the various regimes clearly illustrates the relatively low strength of the rights under the statutes with the exception of exclusivity (Figure 3.8). The relatively large size of the MFA68 polygon also illustrates the much greater strength of the marine farmer's right under this statute. Areas of divisibility and transferability were those in which all the regimes were very weak compared to the 'ideal' (Figure 3.9). A market simply could not operate efficiently with so limited an ability to transfer or subdivide a farm.

The MFA68 signaled a clear shift in the strength towards the farmer's 'ideal' on every axis. It is also apparent, however, that the basic parameters of the rights were established by the Oyster Fisheries Act 1892. In three of the six axes, the MFA68 essentially returned the rights to the level that were available under the 1892 Act. Considered only in terms of the rights available, the modern era the regime shift appears to occur with the MFA68, but taking into account the context of the legislation, the ROFA64 appears more appropriate.

Figure 3.8 Marine farmers rights 1866-1968

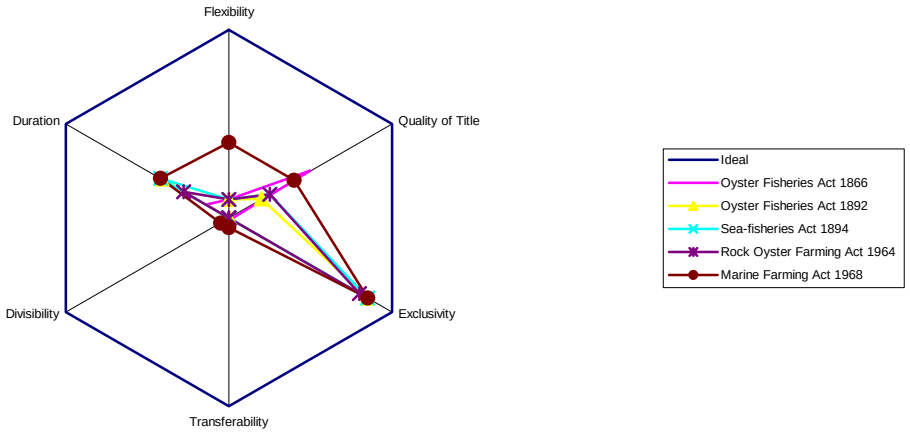
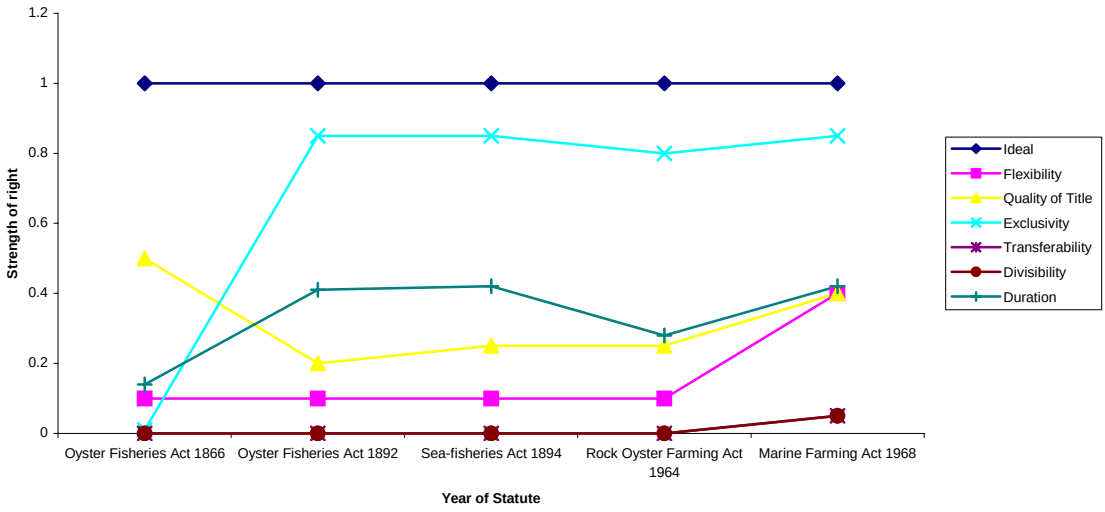


Figure 3.9 Changes in the strength of marine farmers rights 1866-1968



3.6 Contextualising the Proto-Modern Era

Space does not permit a detailed analysis of the context of the proto-modern era and only key features are summarised here (Table 3.1). In 1962, Parliament's Fishing Industry Committee (FIC) recommended that commercial trout and salmon farming be permitted, and made other recommendations encouraging marine farming.

Table 3.1 Key 'events' in the development of marine farming during the Proto-Modern Era.

1958	Marine Department took spat from Kaipara to Waiheke Island
1961	Parliamentary Fishing Industry Committee (FIC), chaired by W.J. Scott, later the Minister of Marine, and including future Prime Ministers Kirk and Muldoon and future Minister of Agriculture and Fisheries MacIntyre) established primarily to decide whether or not a development corporation would be a 'good' means to accelerate sound economic expansion of the industry.
1962	FIC recommendations include to: favourably consider proposals to farm dredge oysters ('Bluff oysters', *Tiostrea chilensis*), find improved rock oyster farming methods and consider pursuing oyster farming leases, give attention to artificially cultivating mussels, and especially that "the farming of trout and salmon on a commercial basis be permitted" (FIC 1962: 77). Recommends "the department find more suitable methods of producing rock oysters in commercial quantities economically. If the results prove that intensive cultivation is a commercial possibility then the Marine Department should consider arranging oyster farming leases" and that the Department should "assist those taking up oyster leases with helpful guidance in intensive cultivation methods" (FIC 1962: 75). The FIC also recommends the establishment of the Fishing Industry Board. Department of Marine (DoM)(1962: 30) indicates a general concern over the need to maintain high water quality. "It is not desirable on any grounds that any of New Zealand's rivers, however remote and far from civilisation they may be at present, should be allowed to become virtually industrial sewers carrying waste to the sea".
1963	Fishing Industry Board (FIB) established. There was a "serious shortage of skilled pickers" that was causing the industry difficulties in the early 1960s (DoM 1963: 26; DoM 1962: 30).
1964	Rock Oyster Farming Act and associated regulations – establishes legal basis for rock oyster farming on leases with maximum size of 2ha (5 acres).
1965	Experimental State farms established in Kaipara and the Bay of Islands (DoM 1965). Two month contract for New South Wales oyster farmer. McFarlane commences experiments in commercial mussel farming using Spanish raft technology in Hauraki Gulf as Hauraki mussel fishery crashes. Fisheries Amendment Act 1965 enables rock oyster farmers to sell their oysters at any time of the year probably significantly contributed to the ability of the rock oyster farming industry to expand.
1966	Rock Oyster Farming Regulations 1964, Amendment No.1 Experienced rock oyster farmer from New South Wales (Les Curtin) recruited in August as marine farm advisor. Demonstration rock oyster farming areas established.
1967	Water and Soil Conservation Act passed, to be administered by Ministry of Works, regional water boards and national water council.
1968	Mussel catch down from 35,000 sacks to 400 sacks in the Hauraki Gulf alone (NZPD: 3870), but Macfarlane Mussel Co. proves ability to commercially farm mussels using Spanish raft technique (NZPD 1968: 3870, Fisher 1993). Marine Farming Act – sets new criteria for obtaining farms and covers all species of fish except rock oysters, salmon and trout. Oysters caught on sticks in Te Kaoa River and Mahurangi Harbour were set out in Orongo Bay.

Table 3.1 Continued

1969	Fishing Industry Select Committee established. Whangaroa Harbour marine farm plan drawn up by Department of Marine. A plan commenced for Mangonui Harbour. Commercial dredging for mussels in Hauraki Gulf ends due to stock depletion, Tasman Bay-Marlborough Sounds also show signs of overfishing leading to concentration of interest in both areas in raft and pontoon mussel farming (DoM 1970: 43). Rock oyster farming boom. Spat catching sites in Mahurangi Harbour (in Huawai Bay and Te Kapa River at Poplar Bay), and Bon Accord Harbour (Kawau Island) in 1968-69 and it distributed all 100,000 asbestos cement sticks in September 1969 with the expectation they would reach maturity in 1972-73. In 1969-70 the Department increased the sticks put out for catching to 400,000, and private farmers set out a further 100,000 on racks erected by the Department. The Department established a depot at Parry's Landing, Pukapuka River (Mahurangi Harbour) (DoM 1970: 37-38). It also commenced building large (24,000 stick) stick farms at Te Tii and Orongo Bay (both in the Bay of Islands) and at Te Kouma Harbour (Coromandel). Minister of Marine states " there is no intention on the part of the Government in operating rock oyster farms to compete with the private sector" (NZPD 1969: 2645 (Scott)).
1970	Government extends 'State Loan and Mortgage Guarantee Scheme' to cover rock oyster farmers in Northland. Builds large (24,000 stick) stick farms at Te Tii and Orongo Bay and at Te Kouma Harbour (Coromandel). Concrete slabs laid out at Deep Creek in the Kaipara Harbour for spat collection. Government reduces its exporting of rock oysters to ensure that local needs are met first (DoM 1971: 39). 1st Report of Fishing Industry Select Committee – Bluff oyster fishery – recommends exploring dredge oyster farming, and that, to prevent marine farming being used for 'poaching', only dredge oysters bred on a farm, that is, bred from the seed oysters (not the seed oysters themselves) should be able to be sold. In other words, the oysters taken to seed a farm could not be sold once they reached maturity, research on the propagation of oysters for farming should also be applied to regeneration of the natural beds, and special provisions for experimental licences should not be included in legislation. FIB CEO (Campbell) world tour includes US Shellfish Sanitation Program. Viga (Spain) mussel farms, and meets experts on trout and salmon farming. Secretary of Marine visits US Shellfish Sanitation Program.
1971	Total market returns from oysters in 1970-71 were valued at $156,574 to private farms and $13,357 to Government farms. Private sector produces five times as many oysters as the DoM, but heavily dependent on foreshore picking of natural beds with subsequent fattening on trays on racks. Marine Farming Act passed consolidating Rock Oyster Farming Act 1964 with Marine Farming Act 1968.

During the 1960s, rock oyster labour shortages developed as wages rose elsewhere in the economy and it became difficult to keep prices to then acceptable levels (FISC 1972: 44). Although the strongest pro-farming recommendation was with respect to allowing trout and salmon farming, a strong opposition lobby prevented this from occurring and early marine farming was dominated by rock oyster farming and initial experiments with mussel farming as the capture mussel fishery collapsed successively in the Hauraki Gulf and the Tasman/Golden Bay areas.

Parliament was, however, divided along political party lines as to how marine farming should be addressed. During the 1964 Parliamentary debate (NZPD 1964: 3112-3130) leading to the passage of the ROFA64 the farmer and business backed National Party strongly favoured private sector development assisted by Government research, technology, provision of material and extension work. Its Members of Parliament considered rock oyster farming would be a 'sideline' activity for terrestrial farmers extending their operations into the sea, but wanted to develop this 'industry'. It was not envisaged as an activity for everyone, but for those who already had land and capital resources. They considered there was considerable coastline available for farming.

In contrast, the Labour Party played to its electorate base among Maori and workers and its Members argued that marine farming could be a tool for regional development in depressed areas and could provide investment opportunities for Maori to earn additional income. This would require subsidies (especially for Maori) and public/private research partnerships. The government should not take all the risks in starting up marine farming when it was the private sector that stood to benefit. The Labour members took the position that for the industry as a whole to grow knowledge from private research must be shared. It sought a return to the government from any investment in the industry, arguing against the subsidized encroachment of private enterprise on the 'public commons' without a return to the public.

Labour Members also placed emphasis on the local communities' need for employment and food. It sought some form of price support for local marketing of the product, seeing the prospect that, like crayfish, the potential earnings from export

markets could see the local market either deprived of oysters or having to pay 'luxury' export prices. Ironically, by 1968 they were arguing for an export oriented luxury fish farming industry (NZPD 1967:1861-1863) and it was the National Government that introduced price freezes on fish in the early 1970s.

A Labour Member (Moyle) questioned the discretion in the legislation pondering how the Minister of Marine might determine a farm's economic viability, with comparisons drawn between the "small" farms in France and the "large" farms in Australia (NZPD 1964: 3115 (Moyle)). He specifically did not want large areas "given away" as leases at the outset of the development of the industry.

The debate over the availability of marine space focussed specifically on the concept of the 'commons':

> Many people are very interested in the question of the alienation of the common rights of the New Zealand public to enjoy our coastline. We have a new and growing recreation…of skin diving. I should not like to think that undue alienation of large tracts of our shore line would take place under this legislation and prevent the enjoyment of this sport by an increasing number of New Zealanders. … Have we a guarantee that in the process of leasing this lease land as defined in the Bill the common rights of the ordinary individual in his enjoyment of the New Zealand coastline will be adequately protected? (NZPD 1964: 3115 (Moyle)).

Overall, the debate reveals that water quality, spat survival, shelter, the need for land for farm associated facilities, road access, water temperature, suitability of the surface the oysters were grown on, the risk of disease and the level of predation by pests were considered important variables in the success of oyster farming. The slow growth rate (3-4 years, slow relative to Australian oysters 2-3 years), combined with what was considered a considerable up-front capital investment, had significant implications for who might be able to be involved in the farming ventures. This essentially provided the basis for departure between the two parties, both ideologically and in terms of pragmatic implementation. Despite their disagreements, however, the Government and Opposition both agreed that there were

key roles, firstly, for government to encourage the development of the industry and, secondly, for public objection in the process of allocating space for farms.

In summing up the 1964 debate, the Minister of Marine (Scott) also described the way in which he envisaged the legislation being implemented:

> The department will first of all assess whether the establishment of an oyster farm in a certain area would be injurious to navigation, and if it were, the application would be turned down straight away. If there were regular yachting anchorages nearby there would be no thought of establishing an oyster farm there (NZPD 1964: 3130 (Scott)).

With regard to Maori, the Minister noted the "extensive areas set aside under Oyster Fishing Regulations of 1946" and that these areas would be preserved (NZPD 1964: 3130 (Scott)). Moreover, where there were no reserves, Maori rights would be protected in the same way as other adjacent landowners. The Minister did not, however, offer any means for assisting Maori into farm ownership.

During the third reading of the Bill, Finlay (Labour opposition) and Scott (Minister of Marine) took the unusual step of placing on Parliament's record an agreement reached when the House was in Committee regarding the nature of objections considered by the Minister when deciding on applications for leases. It is a revealing exchange:

> (Finlay, Waitakere)…This is important because the institution of oyster farming will mean the setting up of various types of equipment on the doorstep of a person who happens to own land adjoining the waterfront and who will therefore suffer a great interference with the use of the waterfront either for bathing or for boating. It could well be that the establishment of one of these oyster farms would gravely affect the value and certainly limit the enjoyment of land which a person happens to own adjoining a waterfront area.
>
> The grounds upon which he may object …are limited to two. One ground that an applicant can advance is the proposition that the grant of a lease would interfere with an existing right of navigation; the other is that the proposal would not be in the public interest. …[The bill] refers to an existing right of navigation, but did not permit the Minister to have regard to any future right of navigation. Also that it compelled him to

> have regard only for the public interest…it would be better if [the Minister] could have some regard for private interest and the interference with a person's property rights that might result from the establishment of an oyster farm on the foreshore adjacent to the property…the Minister told me that if any objections were made by a riparian owner to the grant of a lease, then he would not consent to the lease being granted if it was on Crown property or harbour board land. If the assurance is written into the record I would be happy to accept it. We are concerned with long-term projects. The leases contemplated are for periods up to 14 years, with the right of renewal…
>
> Scott (Minister of Marine): "... I am quite happy to put on record the undertaking that I gave to the member for Waitakere the other night. I said that if objections were called for and an objection was received, then I would not approve of the granting of a lease. In many cases it would be the adjoining landowner who would make the application, and he would therefore be the only one with the right of appeal, although I suppose adjacent landowners could also be involved…It may well be that as time passes, experience will show the need for some alterations. It may be necessary or wise to have an appeal authority … I am quite happy to give the unqualified assurance that I gave the other night (NZPD 1964: 3396-3397).

This exchange confirmed that although a riparian right was not written into the legislation itself, it was intended that the Act be administered as if there were such a right. It is notable that the 'environment' was not mentioned at any stage in the debate and it appeared public interest referred only to the use of public beaches and water areas for recreation.

In summary, the Parliamentary Debate over the ROFA64 reveals that conflicts over the use of the common water space were present in the thinking of the lawmakers from the beginning. These conflicts were clearly expected to be as influential in determining where the marine farms developed as were the biophysical variables. Indeed, to an extent the growth in knowledge and technology were expected to continue to enable marine farming to develop in new environments including deepwater. The developments would be primarily constrained by the social variables manifested through the existence of other property rights, some of which were held in common.

During the period following the passing of the ROFA64 the Marine Department (DoM) was at the forefront in the development of rock oyster farming. Experimental State farms were established in Kaipara and the Bay of Islands and Australian farming expertise was employed to provide advice on farming (Marine Department (DoM) 1965). The 1965 amendment of the Fisheries Act 1908, to enable rock oyster farmers to sell their oysters at any time of the year, probably significantly contributed to the ability of the rock oyster farming industry to expand. By 1969, the potential for competition between state and private farms had come to the attention of Parliament and it subsequently reduced its exports and focused on supporting the private sector. Other forms of subsidies were advanced in 1970.

Applications for rock oyster farms boomed in 1969, even though (until 1972) farming depended on picking oysters from natural beds and then fattening them on private and state farms rather than relying completely on farm-reared stock. According to Department of Marine figures, in the period from the passing of the ROFA in 1964 to March 1970 it had received over 250 applications for leases, 166 of those in the 12 months from March 1969 to March 1970 (Table 3.2). With encouragement from the Department the number of registered companies applying was increasing (15 of the 166 applications). In the following 12 months food-processing companies started seeking sites, but the rate of applications overall reduced considerably. By March 1971, the amount of space sought in applications ranged from 5 to 150 acres, 62 of the total applications had been withdrawn, abandoned or declined (most in 1970-71), 65 were producing (about half the rest were under development), and 101 (down from 126 twelve months earlier) were at various stages in the application process (DoM 1971). Although such leases were required to be notified in the New Zealand Gazette, the number of leases issued (calculated from those recorded in the Gazette) from 1964 to 1971 suggests that many were not officially notified (Table 3.2). This makes it difficult to assess the spatial distribution with any accuracy. The Department, however, noted that

> … most interest is centred on the Kaipara, Mahurangi, and Bay of Islands harbours, leases have also been granted in the Maketu estuary, the Ohiwa, Tauranga, Whangamata, Coromandel, Whangarei, Whangaroa, and Hokianga harbours, and at Kawau and Waiheke

> Islands… [and] applications have also been received for areas in the Mangonui, Parengarenga, and Raglan harbours. (DoM 1970: 24)

Table 3.2: Rock Oyster Farming Act 1964 applications approved prior to MFA71 (Source DoM 1970, 1971) and those reported in the New Zealand Gazette

Year	Applications	Approved	Acres approved	Declined	Gazetted Leases
1964-March 1969	84	68			29 (1967-1969)
1969-1970	166	34	783 (since 1964)	21 (since 1964)	29
1970- 1971	46	31	753 (1970-1971)	41 (1970-1971)	7

The Ministry also developed a survey scheme plan for a potentially productive area in Whangaroa Harbour in 1969 "to prevent the scattered siting of farms" in the Harbour (DoM 1970: 37). Another was prepared for Maunganui Harbour the following year.

In comparison, although none had been granted, applications under the MFA68 were mainly for areas in Foveaux Strait and the Marlborough Sounds, as well as the Northland harbours[5], and had reached 46 by April 1971. Areas sought ranged from 1.25 to 60,000 acres and applications had been for mussels, dredge oysters, kelp and crabs (DoM 1970: 24).

The relative affluence of New Zealand society in the middle to late 1960s was, however, leading to increased competition for marine space. Coastal subdivisions, speed boating, water skiers, coastal baches and surfers became an increasing part of the New Zealand coastal culture and ownership of coastal land had become valuable (DoM 1967, Morton *et al* 1973, Pearson 1979, Williamson 2000). The lines of debate between the two major political parties remained essentially the same as in

[5] Some harbours were defined as being within particular Harbour Board areas (e.g., Waitemata Harbour lay within the Auckland Harbour Board jurisdiction) and some harbour lands were vested in or administered by the relevant Board. Not all harbours were within specific Harbour Board areas. Accordingly, I have capitalised 'Harbour" when using it as a proper noun or referring to harbour lands under Harbour Board control in terms of marine farming. In the 1990s, following the 'privatisation' of ports (see the Port Companies Act 1988), foreshore and seabed previously under Harbour Board control was reallocated (usually to the Crown) through the Foreshore and Seabed Endowment Revesting Act 1991. The reallocation of substantial lands under this Act has received little attention in the academic literature.

1964, but with more emphasis on attracting farmers away from areas of potential conflict with other users and into isolated places. Consequently farms were not expected to be allowed in Harbour areas (NZPD 1968: 2827, 3872).

It could be argued that recreation had always been considered as part of the 'public interest'. The increased presence of the recreational sector, however, led to it being explicitly accommodated in the legislation, in addition to the retained 'public interest' clause. This clearly strengthened the right of the recreational sector relative to other rights, such as those of the adjacent landowner, and can be considered indicative of a change in government policy that had now moved toward a strengthening of the public's rights with regard to the marine commons. Moreover, the rationale for access ways changed from being for landowners to reach their land, to being for leaseholders, with an area beyond someone else's inshore lease, to have access to the deepwater lease (NZPD 1968: 3873).

In 1969, a Parliamentary Fishing Industry Select Committee (FISC) was established to, among other things, review the findings of the 1962 Committee and report on ways to further advance fisheries. The committee eventually made four reports, the first of which included a number of recommendations regarding farming of dredge oysters (FISC 1970). In the process the committee had to address some of the conflicts.

The Committee did not support the industry's position that scenic values should be excluded from the decision-making criteria for marine farms. The Committee concluded that "the Minister has the necessary discretion to weigh in the balance the interests of the applicant, the objectors, and the public in general to ensure in fact that marginal considerations of scenery do not frustrate worth-while developments which generally are acceptable to the public" (FISC 1970: 33). The degree of 'marginality' was not clarified.

3.7 Summary and Conclusions

This Chapter has provided a context for understanding the spatial distribution of modern marine farming and the key issues surrounding the industry up to the early 1970s. Scott's property rights model was employed to help describe the nature of the rights held under different regulatory regimes.

The locus of decision-making was very much at the national level throughout the period covered, with the Department of Marine making decisions on individual applications and also preparing the first plan for marine farms in Whangaroa Harbour. The planning regime, such as it was, was development oriented and considerable discretion was in the hands of the decision-makers.

Four perspectives on marine farming are also evident: a part of the 'fishing' industry, a marine 'industry', 'a natural progression from the farming and forestry industries of the terrestrial environment', and a 'sideline' extension of the terrestrial farmer's operations. Whereas the move into rock oyster farming might be seen from each of these perspectives, the move toward mussel and dredge oyster farming is much more a reaction to overfishing and depletion of natural stock.

The property rights that were available to a marine farmer have varied little during the century covered. The development of the improved property rights in 1968 appears closely entwined with the growth of the industry, but the rock oyster boom was still governed by the ROFA64 at that stage, not the MFA68. Subsidies and government support appear more influential than the property rights available.

Of particular interest has been the significant shift in perspective on the priority of rights over the marine space. Initially, the individual landowner's riparian rights had priority, but by the end of the 1960s a more communitarian perspective emerged and the recreational users were explicitly recognized. The emergence of marine farming essentially occurred after the 1960s rush for coastal subdivisions, recreational boating and other coastal water recreational activities. The apparent conflicts being experienced between the new farming industry and the recreational sector by 1970

are important to bear in mind when looking at development of the industry over the next thirty years.

The next chapter explores the way in which marine farming has developed over the last thirty years and the important changes in the regulatory regimes, and in the mechanisms of allocating marine space within them.

Chapter Four: The Last Thirty Years in New Zealand

> *There will always be opponents of anything new or anything that smacks of manipulating nature, even if the manipulation benefits humanity and does no harm to nature… our cave-dwelling ancestors did not consider their lifestyle to be blissful, and thus they set out to better their lot through the much maligned process now referred to as progress.*
>
> *Hon. Duncan MacIntyre, Minister of Fisheries (1980:5)*

The dominant marine farming regulatory regime in New Zealand for the last thirty years has been that of the Marine Farming Act 1971. It significantly amended and consolidated the preceding marine farming legislation and introduced specific marine farm planning provisions. This regime, however, had to be implemented at a time of considerable social, economic, political and institutional change. The outcome of that change was the regime introduced by the Resource Management Act 1991 (RMA).

This Chapter views the socio-cultural, political and economic changes during the last thirty years of the 20th Century from the perspective of their impact on marine farming. This completes the historical overview and provides the institutional context for analyzing the spatial development of New Zealand's marine farming in Chapters Nine to Twelve. The thirty year period is discussed primarily in terms of the two era identified in the preceding chapter: the 'modern' era (1971-1991) and the 'transitional' era (1991- 2001). These are joined by a discussion of the development of the industry over the thirty years and related government restructuring.

4.1 The Modern Era (1971-1991)

The Marine Farming Act 1971 (MFA71) came into force on 1 January 1972. It was touted as a consolidation of the Rock Oyster Farming Act 1964 with the Marine Farming Act 1968 but, although largely building on experience gained under those regimes, it made some influential changes. Among the most significant changes were: the creation of a licensing system to complement the lease system, further refinement of the criteria to be considered when reaching a decision to approve or decline an application, greater freedom in the size of farms allowed, and the creation of provisions for marine farm plans.

4.1.1 Leases and Licenses

The distinction between a lease and a licence assumes importance in that the lease provided the holder with the exclusive right to the *area*, whereas the licence did not provide exclusive rights to the area, but to undertaking the specified *activity* within that area. The lease was a legal alienation of the area from the public for the period of the lease. The licence did not alienate the area from the public. The public could pass freely through a licensed area, but only had the right to use the access ways to pass through a leased area. The lease was therefore a direct challenge to the common law right of navigation and public access over the sea. A licence provided the farmer with precedence to farm ahead of the rights of others to use the area for incompatible activities. Effective exclusivity for the farming activity was therefore obtained under either right.

Leases and licences were divisible and transferable, but this was severely constrained by requiring the consent of the controlling authority and this greatly weakened the strength of the right. The conditions that the lease or licence could include were expanded. Forfeiture could occur, "subject to the payment of compensation" if the area (or part of it) "is required for any public purpose" (s. 9). The compensation clause made it a more secure form of tenure.

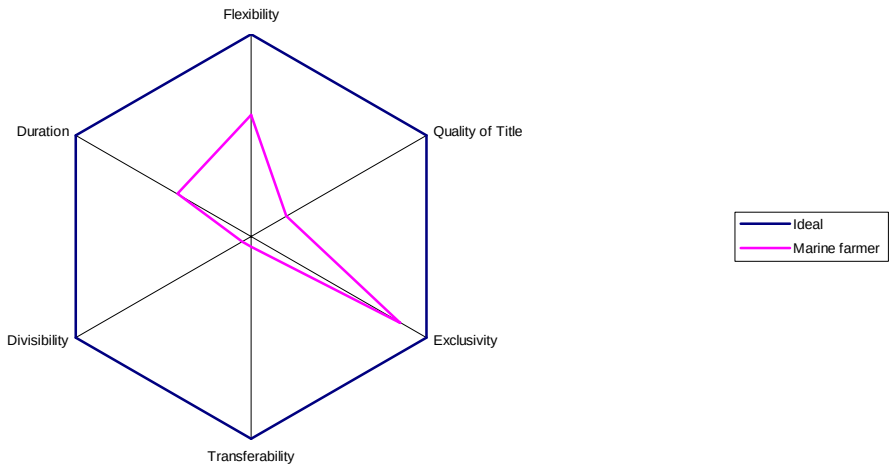
The lease or licence, however, still could be forfeited for lack of development within two years. Furthermore, licences could be revoked if after that two-year period the licensee did not continue to fully develop and operate the farm "to the satisfaction of the controlling authority" (s.9). Operating outside the conditions of the licence/lease could result in instant forfeiture. Security and flexibility to respond to, for example, market fluctuations, were quite constrained.

The maximum term for a license or lease was fourteen years, but they could be issued with a right of renewal of one or more terms. There were provisions for extensions, and for preferential rights to the site if the lease/licence lapsed. In each case specified parties were required to be notified and could provide comments (s. 13 and s. 22).

Interestingly, the adjacent landowner and local iwi were not included among these parties.

Although these provisions could lead to the duration of the farm on the site extending beyond fourteen years, the lack of set criteria for reaching a decision, and the number of people required to specifically comment, would reduce the sense of security of investing in an application (Figure 4.1).

Figure 4.1 Property rights dimensions under the Marine Farming Act 1971



4.1.2 Application Process under MFA71

The MFA71 opened up more areas for farming by enabling local authorities and harbour boards to issue licences within areas vested in them as the controlling authority. Significantly, however, the prior consent of the Minister was required before other controlling authorities could issue licenses or leases for particular areas. Central government therefore retained control over the industry's development. The provisions on size were altered from MFA68 to read "an area no greater than that which the controlling authority considers the applicant can successfully develop as a marine farm within the term of the lease or licence" (MFA71, s.3). Presumably,

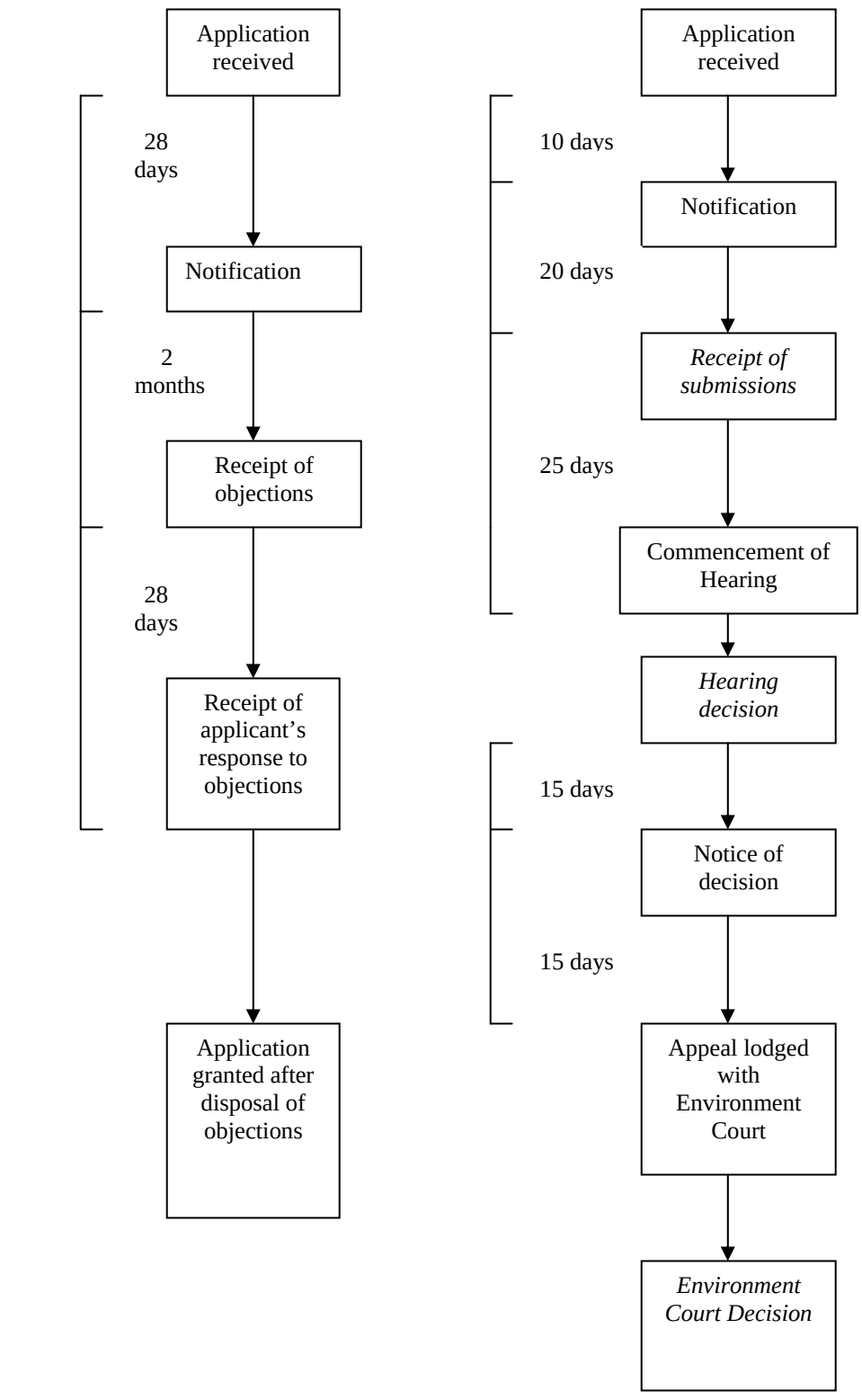
those with greater capital resources and hence capacity to successfully develop a farm, would be able to gain greater areas for a farm than those with fewer resources.

Several more minor changes simplified the administrative processes and reduced the costs to applicants. For instance, the age of applicants was lowered to 18 or more years of age and the application fee was reduced to a maximum of $50. Regardless of whether or not the application was granted or declined, the application fee was refunded or credited to the applicant. If the application was withdrawn, however, the Crown had the option of retaining the application fee. Once lodged, therefore, the incentive was to keep the application live.

More timeframes were introduced, adding greater certainty to the process (Figure 4.2). The applicant had also to specifically notify the adjoining landowners; adjoining foreshore or foreshore reserve administrators; the holder of any mining interest in the site or adjoining land; the harbour board (where not the controlling authority); and the local territorial authority. There was no mandatory formal process for considering submissions, but a lease or license could not be issued until objections had been disposed of. There were often objections to applications and after they came into effect in 1974 central government's Environmental Protection and Enhancement Procedures (EPEP) required the controlling authority to carry out an environmental impact assessment prior to granting a lease or licence. If the effects were of a sufficient scale an Environmental Impact Report was required from the controlling authority and, after receiving public submissions, the Commission for the Environment audited the report (Morgan 1981b).

Section 7 of the MFA71 clearly placed marine farming as secondary to the rights of navigation, commercial fishing, recreation, science, mining, the adjoining land use, and the 'public interest'.

Figure 4.2: Timeframes for processes under the MFA71 and RMA



The criteria required the controlling authority to uphold objections if the lease or licence would:

(a) Interfere unduly with any existing right of navigation;
(b) Interfere unduly with commercial fishing;
(c) Interfere unduly with any existing or proposed usage for recreational or scientific purposes of the foreshore or the sea in the vicinity;
(d) Otherwise be contrary to the public interest or adversely affect unduly the use by the proprietor thereof of any land adjoining or in the vicinity of the area or the interests of the holder of any mining interest in any such land.

As with MFA68, if no objection was received there were no criteria against which the controlling authority had to consider the application before deciding whether or not to grant the licence/lease.

If more than one application was received for the same site, the controlling authority had discretion to choose the preferred applicant by lot, or "by having regard to the financial or other circumstances of the applicant, or to the likelihood of the applicant being able successfully to develop a marine farm" (s. 8). Notably methods that had been available under previous legislation, for example tendering and public auction or the discretion to use any other than the specified means, were **not** included in this Act. The decision of the controlling authority was final.

MAF found that to carry out full assessments and address the objections the entire process took about thirty months (Tortell 1982). Such a lengthy process and the costs involved for the government agencies carrying out the impact assessments were significant. Undue delays in the processing of applications have been a concern of the industry throughout its history (Carter 1990, Holden 1980, Tortell 1982, Gardner 1984, MFish and MfE 2000). More efficient processes of allocating space for marine farms were available, however, through the marine farm planning provisions of the MFA71.

The MFA71 (s. 4) provided for the Minister to set aside areas, either *for* marine farming or, alternatively, as *not being available for* leasing or licensing. Such

determinations had to be notified in the Gazette. Areas notified as open for marine farming had to be considered suitable by the Minister and had to have had plans prepared for them. The Minister could then call for public applications for leases or licences of such areas (or parts of them) located in accordance with the plans. The criteria on which the Minister was to assess the suitability of the areas for marine farming were not set out in the Act.

From 1971 until it was largely repealed by the RMA in 1991 the MFA71 was amended several times. In 1975, five-year 'research licences' and 'pilot commercial scheme licences' were created. These were replaced by 'special permits' through the Fisheries Act 1983 (FA83). The 1975 amendments also introduced provisions for 'spat catching areas' that were repealed by the Marine Farming Amendment Act 1993. Salmon farming was allowed in 1983. The FA83 also provided an appeal process to the Fisheries Authority, but this appears to have had little use or impact. An analysis of the use of spat catching provisions, special permits or appeals to the Fisheries Authority are beyond the scope of this thesis but, where directly relevant, some aspects will be discussed in later chapters.

4.1.3 Additional Statutes and Permits

The modern era was characterized by many overlapping statutory provisions. Those that were once of most import for marine farming were the Harbours Act 1950 (HA50), the Water and Soil Conservation Act 1967 (WSCA) and the Town and Country Planning Acts 1953 and 1977 (TCPA53 and TCPA77 respectively).

The HA50 provided for leasing or licensing of the use or occupation of foreshore and seabed. The criterion to be considered by the controlling authority was that the work or structure would "not be or tend to the injury of navigation" (s. 178, HA50). Conditions could be added if "necessary for the preservation of any public right" (s. 178, HA50). Subsequent amendments broadened the criteria. A structure could only be approved if it would not "unduly interfere with or adversely affect the interest of the public (whether by being or tending to be to the injury of navigation or otherwise)" (s. 178). Conditions could still be added to preserve "any public right"

(s. 178). Leases could not be issued if the granting of them would "impede or disturb navigation" or the "public convenience" (s. 154) and were limited to 21 years. Licences were usually not to exceed 14 years and could not be issued for anything that would "unduly interfere with or unduly restrict any public right of navigation or the public convenience" (s. 159 and s. 162).

A discharge permit for activities such as feeding salmon was required under the WSCA, but this was seldom enforced and seemed to escape the attention of administering authorities until the late 1980s (Hare and Brash 1993). In 1977, the Government included specific provisions for 'maritime planning schemes' in the Town and Country Planning Act 1977 (TCPA77). Some local authorities also prepared regional and district planning schemes addressing marine areas. They could contain rules affecting (even prohibiting) marine farming and fishing (see *Ogier v. Tauranga County Council* 1985)[1]. This was of considerable concern to the fishing and marine farming industries and to the Ministry of Agriculture and Fisheries, and appeared to negatively colour their attitude toward planning generally. These schemes are discussed further in Chapter Nine.

4.2 Contextualising the Marine Farming Act 1971

In the late 1960s, the National led government adopted a modernist 'indicative planning' approach for all major sectors of the economy. In 1968, a National Development Conference (NDC) was convened to "outline a programme and set targets for national development" for the next decade (NDC 1968: 151). Conference plenaries were held in 1968 and 1969. The National Development Council and a number of its Committees monitored progress over the succeeding years. The plans and conferences/committees were most influential in the 1970s and are therefore addressed as part of the MFA71 context.

The 1969 plenary approved a recommendation from the Physical Environment Committee that Government take urgent action to develop planning and policy

[1] For reasons of space and data reliability, the latter explained in the bibliography of case law cited, I have not adopted standard legal referencing in the text of this thesis.

solutions to control subdivision in coastal and lakeshore areas. The Physical Environment Committee, despite some supportive comments from its chair (M. M. Burns recorded in NDC 1969b: 103), made no mention of growing food in aquatic environments in its report. Fisheries had a separate committee and specific targets.

In effect, ideological and institutional separation had emerged. The physical environment was considered primarily in terms of the terrestrial environment and preserving its scenic and 'play space' (recreational) values (NDC 1969a, b). This included protecting public access to the play space. The fishing and marine farming sectors, on the other hand, were seeking to further industrialise this space and to expand industrial use they needed rhetoric that supported and justified the reduction in public rights to the sea. Their spokesmen, for instance the FIB General Manager (Campbell recorded in NDC 1969b: 94), employed words and phrases such as 'utilisation' (as opposed to 'alienation'), 'fair', balanced', 'progress', 'well-planned development', and 'commercial operation rights' contrasted with the public's 'citizen rights'.

The Marine Department, in addition to its fisheries and marine farming responsibilities, was also responsible for HA50 matters. It was therefore well-placed to achieve a degree of integration. The Ministry of Works, however, administered the WSCA, with regional water boards, and the TCPA53/77. A mechanism to integrate management and administration between these two agencies needed to be found. The failure of the Physical Environment Committee to constructively engage with the marine environment and its would-be developers, perhaps set the compass for further resource management fragmentation.

In both National Development Conference plenaries (1968, 1969a, b), the Fisheries Committee's emphasis was on the potential of pelagic fisheries, but by the time of the second plenary in 1969, the recommendations approved by the Conference also supported "all legislative action to permit, facilitate and encourage fish farming is completed as soon as possible" (NDC 1969b: recommendation 252). Included in these recommendations were proposals that both FIB and the Marine Department should "give particular attention to the development of new fish farming projects"

(NDC 1969b: recommendation 253), and that Government should examine transferring the Fisheries Divisions (including research) of the Marine Department to the Department of Agriculture (recommendation 239). The latter Department was to administer the granting of export licences for fish as it did for meat (NDC 1969b: recommendations 240 and 241).

The 1969 plenary, following its Fisheries Committee (1969: 48) comment that "…[marine] farming cannot be based on peasant type operations", sought greater economies of scale for the industry. To achieve these economies "the Marine Department should, in the interests of well-planned development and in consultation with the Fishing Industry Board, exercise control over the establishment of fish farms, and encourage larger rather than smaller units" (NDC 1969b: recommendation 254). The FIB was also to "encourage the establishment of fish farmers' associations" (NDC 1969b: recommendation 255) and to be more active in marketing. The Marine Department was to continue to be closely involved in extension and development of fish farming skills.

Despite an early 1970s price freeze to ensure fish remained affordable for New Zealanders, the focus had clearly moved from fish for food for the local market to fish for export. The rationale for shifting fisheries to the Department of Agriculture was that it was more familiar with the exporting sector (including international markets) and processing than was the Marine Department. It was also clearly more development oriented than had been the Marine Department which appeared to have potentially conflicting mandates (e.g., HA50 and MFA71).

It must be recalled that Parliament's Fishing Industry Select Committee (FISC) had been sitting since 1969 (see Chapter Three) and submitted four reports to Parliament (FISC 1970, 1971a, b, 1972). That the Committee was considering fish farming in freshwater was the reason that marine salmon farming was omitted from inclusion in the MFA71. Provisions for freshwater farming were expected to operate in a complementary manner to those for saltwater farming and to "facilitate and regulate" all fish farming between them. It did not make sense to proceed with marine salmon farms until freshwater farming was resolved (FISC 1971a: 35). This decision

effectively resulted in the MFA71 not providing for salmon marine farming until 1983 as it was linked with trout farming proposals that recreational fishers successfully lobbied against. Freshwater fish farming regulations remain separate from marine farming legislation.

Of particular importance to this thesis, the Committee adopted an ecological-technological focus to its recommendations on location of farms. In its view decisions should be "guided" by considerations as to water volume, temperature, oxygen content and economic viability. No social variables, such as competition with other users, were considered at all in determining location, perhaps reflecting confidence in the existing processes of the MFA71. The Committee saw the use of saltwater farms, explicitly in "estuarine waters", as suitable for rearing hatchery-bred fish.

The Committee also noted that the capital-intensive nature of these farms required that the farmer have "some permanency in his operations" (FISC 1971a: 40). It considered the 10-year (with subsequent 5-year renewals) approach in Victoria (Australia), and the 14-year term in the MFA71, and opted for 14 years for consistency. The high levels of capital also led them to recommend that the licensing fee be increased to the same as in Victoria ($200/year) as this would not be an unreasonable amount given the scale of operations and "should go some way towards recovering the costs of administering the industry" (FISC 1971a: 41). Notably, they did not suggest recovering the full costs of processing applications, let alone pursuing appropriate royalties or other rentals.

Rock oyster and other shellfish farming were among the other matters the Committee discussed in its final (1972) report. The submissions were summarized by the Committee into issues of the siting of leases, the provision of loans, marketing, and the role of the Marine Department. It is quite clear from the discussions and, to a lesser extent, its recommendations that the Committee saw the provisions in the MFA71 as providing a 'conflict resolution' approach through the tests set down for the controlling authority when considering each proposal. This was to be a case-by-

case balancing act. The Committee did not support use of the section 4 'planning' provisions of the Act:

> What this amounts to in reality is adjudicating between the applicant who after all has a legitimate right to promote his own interests by way of rock oyster farming and the rest of society which also has legitimate rights to the use and enjoyment of the area proposed for lease… the Committee does not subscribe to any blanket geographical definition of no-farming or indeed of farming areas as each area should be considered in the light of the activities already being carried on there and the objections raised. There could well be some places in the Bay of Islands where undue interference would not arise from farming. In the same way there could be areas in some very remote and secluded parts of New Zealand where valid objections could still, for particular reasons, arise (FISC 1972: 49).

The Committee saw some merit in an overall development plan prepared by the industry that should be taken to the Government for implementation once complete. Concerns regarding water quality, driven primarily by a desire for market access to the USA rather than a concern over local health, may have also guided future locational decisions.

Submissions on mussels were far fewer and came from people involved in the Nelson Bays – Tasman and Marlborough areas. It is interesting to note that just as there had been a call for a ban on more rock oyster farms in the Bay of Islands, there were concerns about the proliferation of mussel rafts in Nelson/Marlborough. The Committee, however, was "impressed with the progress" (FISC 1972: 56). As with rock oysters, the Committee considered that the existing legislation would:

> ensure that undesirable proliferation will not occur and indeed there seems some scope for proliferation of rafts to relieve the fishing pressure on the dredgeable resources. This…would not be undesirable at all, but the Committee does consider that proliferation could be undesirable if it so occupied the waters as unreasonably to restrict the scope for other aquatic activities (FISC 1972:57).

Despite the existing and potential conflicts over space the FISC remained opposed to using the provisions of section 4 to plan for orderly development. This has important parallels in debates of the 1990s over the most appropriate system of allocating space for marine farming and will be revisited in that context in Chapter Nine. The provision for setting aside areas was not used for another seven years after the

Committee's report, suggesting that its initial thinking held sway for some time. There may also have been other reasons for the delay, especially the restructuring of the government departments in the early 1970s. Before discussing the developments in the marine farming industry in the last thirty years it is useful to consider, firstly, the social and administrative changes and, secondly, the resultant 1991-2001 planning regime.

4.3 Government Administration and Restructuring

Government restructuring between 1971 and 2001 has significantly affected administration of marine farming and the subsequent development of the industry. There is insufficient space here to detail the changes and only the key points are addressed (see Table 4.1 for a summary of key changes in relation to marine farming).

4.3.1 Administrative Bodies

In 1972 the Marine Department (DoM) was disestablished. Its Harbours Act 1950 (HA50) navigation, foreshore and seabed responsibilities were given to the Ministry of Transport (MoT), while the fisheries research and management functions, including administering the Marine Farming Act 1971 (MFA71), went to the Ministry of Agriculture and Fisheries (MAF).

The management of the marine environment became administratively fragmented. An applicant for a marine farm could be expected to require approvals from a number of different authorities, but the process of obtaining those concurrences was handled by MAF. MAF also had responsibility for assessing the impacts of the proposed farm in terms of the MFA71 and to consider objections. It had a primary production orientation and export market expertise somewhat at odds with concepts of controlling the expansion of the marine farming industry. It also had little direct working involvement with local authorities.

Table 4.1 Key administration roles in relation to marine farming 1971-2001

Department, Ministry, or other Authority	Abbreviation	Marine farming role began	Marine farming role ended	Key involvement	Key legislation
Marine	DoM	Pre-1971	1972	Lead agency for industry, research and extension, authorizing farms	HA50, MFA71, fisheries acts
Agriculture and Fisheries	MAF	1972	1995	Lead agency for industry, fisheries, research and extension, authorizing farms, and marine farm plans and marine reserves (MAF only)	MFA71, FA83/96
Fisheries	MFish	1995			
Transport	MoT	1972	1993	Navigation and safety and public access	HA50, TCPA77
Maritime Safety Authority	MSA	1993			RMA, MTA94, LGA89
Works (and Development)	MWD	1972	1987	Terrestrial planning, natural character, public access, authorizing marine farm structures and leases	TCPA53/77, HA50, WSCA
Lands and Survey	DLS	Pre-1971	1987	Land reserve administration, natural character, public access	Reserves Act 1977
Conservation	DoC	1987		MWD (until 1991) and DLS responsibilities, regional coastal plan approval, some approvals of specified coastal permits, marine reserves	HA50, RMA, TCPA77, Conservation Act 1987
Regional Water Boards	Variable	Pre-1971	1989	Water quality classification	WSCA
Regional authorities/councils	Variable	Pre-1971		Rules in plans governing resource use, post-1991 regional coastal plans and coastal permits	TCPA77, RMA
United councils	Variable	1977	1989	Rules in plans governing resource use	TCPA77
District councils	Variable	Pre-1971		Terrestrial plans and pre-1991 rules in plans where marine areas within council boundaries. If a unitary council then has regional council roles.	TCPA77, RMA
Harbour Boards/ Maritime Planning Authorities	Variable	Pre-1971	1991	Pre-1991 had localised responsibility for maritime planning schemes and HA50 licnsing of structures.	HA50, TCPA53/77
Health	Health	1980		Shellfish Sanitation Programme	MOU

The TCPA53/77 dominated management on the terrestrial side of the coast. The TCPA53/77 and the Water Resources Council, which made water classifications under the WSCA, were administratively supported by the Ministry of Works and Development (MWD, formerly the Ministry of Works) (MfE 1988, Maplesden 2000). The MWD therefore had the lead central government role in relation to maritime planning schemes and other regional or district planning schemes. It was also responsible for administering the National Coastal Policy 1973 which emphasized preserving the natural character of the coast and the maintenance of public access to and along the coast (TCPD 1972, Cornforth 1984).

MWD was closely allied with the Department of Lands and Survey (DLS) which had similar requirements under the Reserves Act 1977 and was seeking to expand the coastal reserve land nationally (Maplesden 2000). The MoT, MWD and DLS therefore had close, if not always harmonious, working relationships with local authorities, national and regional water boards and maritime planning authorities. Their coastal and marine roles were more in terms of development control than promoting industry expansion.

The different mandates of MAF on the one hand and MWD, DLS, MoT and DoC on the other resulted in conflicts over marine farming (Lang and McQuoid 1974, Gardner 1984). Tortell (1982: 34) has summarized the situation well:

> Since natural waters are basically public property in New Zealand, and since the granting of a marine farming licence is, in effect, transferring ownership to a private individual, it is just that each application should be carefully scrutinized and evaluated…The process is long and takes a minimum of 30 months at present. It is also unsatisfactory, since it does little to mitigate public antagonism to marine farming. Aquaculture in New Zealand seems to be opposed on principle. The granting of a marine farming licence is seen by many as a capricious act by the Ministry to donate public areas for selfish exploitation by an individual. This unfortunate state of affairs is caused by the absence of an aquaculture development plan, the lack of public participation to date in the process of planning for marine farming, the denial of any right of appeal after the Minister of Fisheries has decided whether to uphold or reject an objection, and a general lack of appreciation of the food value and export potential of aquaculture products…. The case for aquaculture, in the face of competing uses of water, is at present so weak that in any planning exercise marine

> farming is reluctantly tolerated only in those areas which are of little use for anything else. Thus, areas made available for aquaculture are not always suitable.
>
> It is essential that MAF undertake a comprehensive survey of the coastal zone with the object of determining which areas are suitable for marine farming. Only by taking such an initiative can MAF expect to make a strong case for marine farming when planning is undertaken for coastal zone uses.

MAF also had significant internal difficulties. The blend of ex-Marine Department functions and responsibilities with those of the old Ministry of Agriculture meant that the marine farming industry became a very small sector in the Ministry's perspective. Fisheries management and research were 'added on' to a bigger Ministry with a more fiscally important terrestrial farming sector. Marine farming, despite its name, continued to be administered as part of fisheries. Moreover, the focus shifted during the mid-late 1970s to the implications of extending New Zealand's fisheries management responsibilities to the newly declared 200nm Exclusive Economic Zone (EEZ) (Waugh 1980). There were also administrative problems between central and regional offices of MAF (Gardner 1984).

Declaration of the EEZ was followed by subsidies to the fishing industry which expanded rapidly and placed pressure on the fish stocks. MAF's response to the pressures was, initially, to introduce the concept of Fishery Management Plans (FMP) in 1983. This was discarded (before reaching implementation) in favour of the Quota Management System (QMS) and the associated Individual Transferable Quota (ITQ) in 1986 (Rennie 1993b). MAF, however, worked closely with the FIB and the Department of Health through the 1970s to achieve a sanitation system that would enable export certification of shellfish and thereby open the USA market to, especially, the mussel farming industry[2]. This goal

[2] The Shellfish Sanitation Programme was founded on an agreement (required under the Memorandum of Understanding between MAF and the USA's FDA) between MAF and the Department of Health and the National Health Institute. DoH had responsibility for testing growing waters, recommending their suitability for harvesting and laying down harvesting criteria if necessary. MAF was to oversee farming operations and harvesting (Fisheries Management Division), hygienic transportation, processing, and packaging, and export certification (Meat Division) and research information and laboratory backup ((Fisheries Research Division). The National Health Institute was to fill a similar role to MAF Research Division (MAF 1981:17).

was achieved in 1980 (MAF 1981) and helped provide the conditions for the subsequent expansion in the mussel industry.

Beyond the technical aspects, the specific emphasis on marine farming within the Ministry took two main forms: marine farm 'planning' (including appropriate regimes) and development of farming of both high value (e.g., salmon and snapper) and pressured inshore species (e.g., paua, rock lobster, scallops) (Hopkins 1981, Colman 1982, Cosh 1982, Jarman 1982, Smith and Taylor 1982). MAF and FIB initially held the view that the MFA71 took precedence in time and therefore effect over the later TCPA77. They were somewhat reluctant to risk compromising this seeming advantage (Currie in Lynch 1982:32, Jarman 1982)[3]. The result was that MAF did not have a coherent and consistent marine farming policy (see, for instance, Smith and Taylor 1982) and MAF's marine farm plans largely prohibited farming (as is discussed in Chapter Nine).

4.3.2 Government Policy Changes

The significant changes in government policies as a result of the arrival of the neo-liberal Labour Government in 1984 led to fundamental changes in government administration and a new round of restructuring (Le Heron and Pawson 1996, Kelsey 1993). Major government departments, for instance MWD, were restructured and disestablished. Those that were not restructured were required to take a market orientation in their work.

A market model was also adopted for policy advice, with government agencies expected to have more clearly differentiated mandates. Theoretically this would aid transparent, accountable and efficient decision-making. Competition between agencies was expected to result in the best possible arguments being put before the elected representatives making the major policy decisions. The Department of Conservation (DoC) was created, among other things, to advocate conservation of natural resources, to foster their recreational use and to administer conservation land and relevant legislation previously

[3]This assumption of precedence was flawed, as was demonstrated in *Ogier v. Tauranga County Council* (1985).

housed in the MWD, DLS, MoT, MAF and Internal Affairs. This resulted in some potential conflicts of interest for DoC. For instance, it had to address applications for marine farms in terms of the 'public interest' provisions of the HA50 at the same time as advocating for conservation and fostering recreational use of the same areas under the Conservation Act 1987. To ensure its approach was consistent and transparent DoC released a policy on marine farming within two years of being formed (DoC 1989). Later, DoC was to take a major role under the RMA (Table 4.1).

For MAF the neo-liberal policies meant a move from an emphasis on "increasing production as a method of assuring export income" to "utilizing marketing skills to sell…at the highest possible return" (MAF 1985: 3). The dollar was floated and subsidies were discontinued at the same time as many barriers to external products were removed and quality control on exports was shifted from MAF to the industry. Concurrently, MAF reallocated its resources toward aquaculture and addressing "the growth of demand for multiple use of water in all environments" (MAF 1986: 38).

MAF sought to improve licensing procedures, shorten application processing times and clarify its role as the lead government agency for aquaculture. It reviewed its aquaculture legislation and concluded that it was fragmented and that specific aquaculture legislation would "facilitate the development of a wide range of aquaculture ventures" (MAF 1989: 50). Ten years later it had still not achieved these goals (MFish and MfE 2000).

In November 1989, MAF published its much-awaited proposals for new aquaculture policy and legislation (MAFFish 1989). The policies were not very directive, but indicated an attempt to place aquaculture on a more equal footing with other uses of public space. These proposals were, however, overtaken by events, notably the passage of the Resource Management Act 1991[4]. MAF's difficulties lay primarily in the conflict

[4] To this point in the chronology of the thesis I have relied on a combination of published material and interviews. In January 1990, I commenced work in the Department of Conservation with specific responsibility for addressing the Department's mandates under the Conservation Act and the Harbours Act (and subsequently Resource Management Act) with respect to the interface of fisheries and marine farming legislation and policy matters. From this chronological point I will be drawing on my own recollections as well as interviews and published material.

between the individual or privatised rights-based management it had promoted with the Quota Management System (QMS) and the community-based approach within the TCPA77 and the RMA. It suffered a significant setback when Maori successfully challenged its assumed right to implement a QMS. Consequently, MAF had prioritised resolving conflicts with Maori and the fishing industry over the QMS. In this distracted state, and with competition rife between the agencies, MAF's primary goal in relation to the RMA was to keep fisheries out of the RMA (Rennie 1993b, 2000a). It succeeded, but among the outcomes of its endeavours was perpetuation of a system wherein farmers needed to acquire two permits, and regional councils and DoC had primary responsibility for planning in the marine environment (Rennie 1993b, 1994a).

4.4 The Transitional Era (1991 to present)

The Resource Management Act 1991 (RMA) approach required transparency and accountability, and devolving the management of the effects of activities to the communities who bore those effects. The RMA, therefore, devolved planning for the marine environment to the regional councils. In keeping with the neo-liberal philosophy of a level playing field between all uses and a market model that allowed no hidden subsidies or 'picking winners', no specific provisions were made for marine farming under the RMA. Whereas on land the RMA essentially allowed landowners to use their land as they wished unless prevented by a rule in a plan, in the coastal marine area, where the Crown presumed ownership, the RMA effectively prohibited all activities unless permitted by a rule in a regional coastal plan or by a coastal permit. Regional coastal plans were mandatory and were not to be inconsistent with a New Zealand Coastal Policy Statement (prepared by the Minister of Conservation). For the first time the entire territorial sea would be covered by integrated plans and policies, but they were to be effects-based (Rennie 1993b, 1994b). These plans are discussed in Chapter Nine.

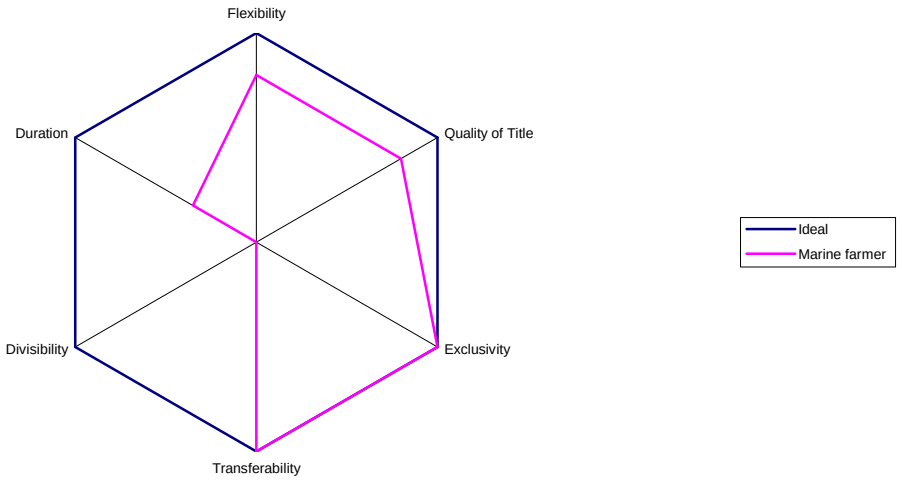
4.4.1 The Coastal and Marine Farm Permits

A coastal permit under the RMA was transferable, but not divisible. It had a maximum duration of 35 years with no provisions for renewal and there was extensive scope for

conditions to be placed on the consent limiting its flexibility. The RMA did not, however, include any specific provisions beyond a general requirement to 'avoid, remedy or mitigate' effects that might be construed as constraining flexibility for the farmer to utilize the site. It also did not establish any priorities to any other use of the coastal marine area although it set a number of matters that needed to be considered to varying degrees in granting a permit, including the need to consider relevant plans and policies. Once granted, a coastal permit had considerable security (review provisions were relatively weak) and it also granted exclusivity to the space occupied for the activity to the extent necessary to conduct the activity (Figure 4.3). It thus was similar to the exclusivity available under the MFA71 licences, but the overall bundle of rights was stronger than those of any preceding rights for farmers.

The application process had more specific timeframes than those provided under the MFA71 (Figure 4.2). Unless otherwise provided for in the regional coastal plan marine farming applications would almost inevitably be publicly notified. The criteria to be considered were much more extensive and ambiguous and the openness of the process provided for appeals of decisions to the Environment Court (the renamed Planning Tribunal). Much more significantly, however, the onus of proof of the effects of the proposed activity was placed on the applicant. This effectively shifted the costs of assessing the application to the marine farmer, but this was in accord with the principles of removing hidden subsidies and ensuring that users of public resources paid the full costs of such use. Competing applications were to be assessed on a 'first come, first served' basis. If considerable competition was anticipated, the Minister of Conservation could institute a two-year moratorium and tender the right to apply for a coastal permit. This would not affect existing applications for the area. A moratorium was imposed from 1996-1998 covering the entire Marlborough Sounds region, but tendering did not occur (see Chapter Nine).

Figure 4.3 Property rights dimensions under the RMA and FA83/96



To establish a marine farm a 'marine farming permit' (MF) under Part IVA of the Fisheries Act 1983 has been required since a 1993 amendment. The MF is tied to the coastal permit and could not be issued unless the coastal permit had been granted. The duration, transferability, exclusivity, security and divisibility of the MF are all identical to that of the specific coastal permit to which it is tied. This was despite the Fisheries Task Force (Wheeler *et al* 1992) recommending *in perpetuity* duration for the MF. The Director-General of Fisheries could place conditions on the permit in relation to farming activities, thereby limiting its flexibility, but otherwise there were no provisions constraining flexibility other than the ability to state the species that could be farmed.

A MF could not be issued unless the Director General was satisfied that the activities would not have "undue adverse effects on fishing and the sustainability of any fisheries resource" (s. 67J, FA83). This maintained the preference for fishing activities (including recreational) over marine farming. Under the FA83 therefore there was not a level playing field. Moreover the interface between the RMA and the FA83/96 makes it clear

that allocation of fisheries between different fishing sectors is the prerogative of the FA83/96, not the RMA.

4.4.2 Implementing the RMA Regime

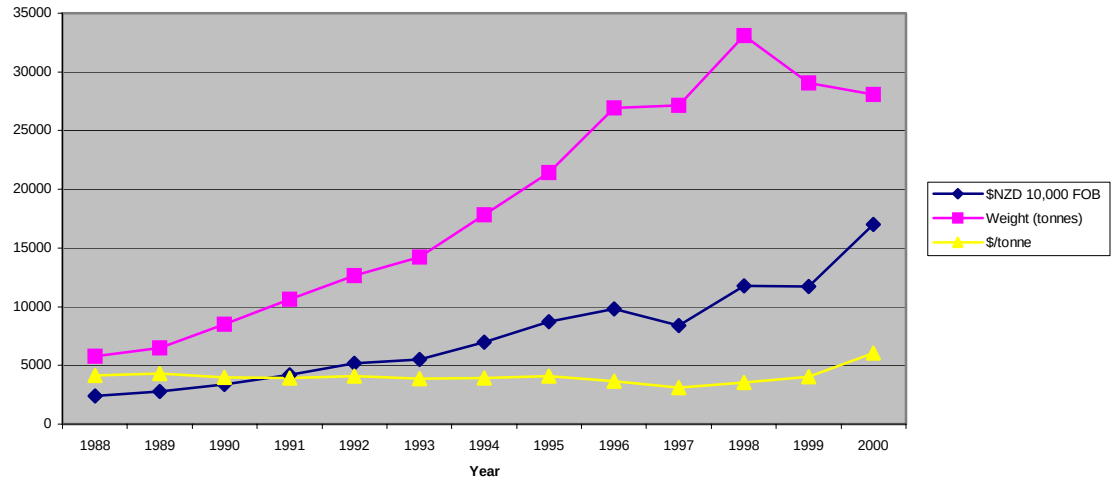
The Resource Management Act 1991(RMA) resulted in considerable uncertainty. The transition to the new regime was 'messy'. The RMA had been promoted broadly as simplifying the consent process. Much was made of the number of pieces of legislation that were being repealed by the Act. The effects-based approach was also strongly promoted. On land, planning under the TCPA77 had been well-established and there had been a first-order allocation of ownership of space. In the marine environment, as discussed in Chapter Nine, the antecedents of regional coastal plans were much more varied and incomplete. Moreover, the New Zealand Coastal policy statement was not completed until 1994, and a decade after the Act was passed few regional coastal plans had become fully operative. This meant that the implementation of the RMA was largely addressed on a case-by-case basis, through existing plans and by the development of case law (see Chapter Nine). The conflicts between government agencies, notably DoC and MAF/MFish, continued.

4.5 Industry Development

As discussed in Chapter One, the development of marine farming industry production from 1971 to 2001 has been dramatic, particularly in the last two decades. Green-lipped mussels have led the growth with an initial commercial farmed harvest in 1971 of less than 20t rising to over 33,000t in 1998 (FIB 1972: 31). The dollar value per tonne of the endemic green-lipped mussels, however, stayed relatively constant over the last two decades (Figure 4.4) [5].

[5] Interestingly, subsequent authors report the year of the first commercial harvest as being in 1974 or 1975. Waugh (1980: 8) claims 30t in 1975, MAF (1975) records a commercial harvest of 20tons in 1974. Others refer to the first *significant* commercial harvest of 300t in 1977 (Hickman 1987). I have adopted the first contemporary authoritative mention of a commercial harvest. The difference is probably due to the first

Figure 4.4: Green lipped mussel production and value in New Zealand dollars (Data source NZ Mussel Industry Council)



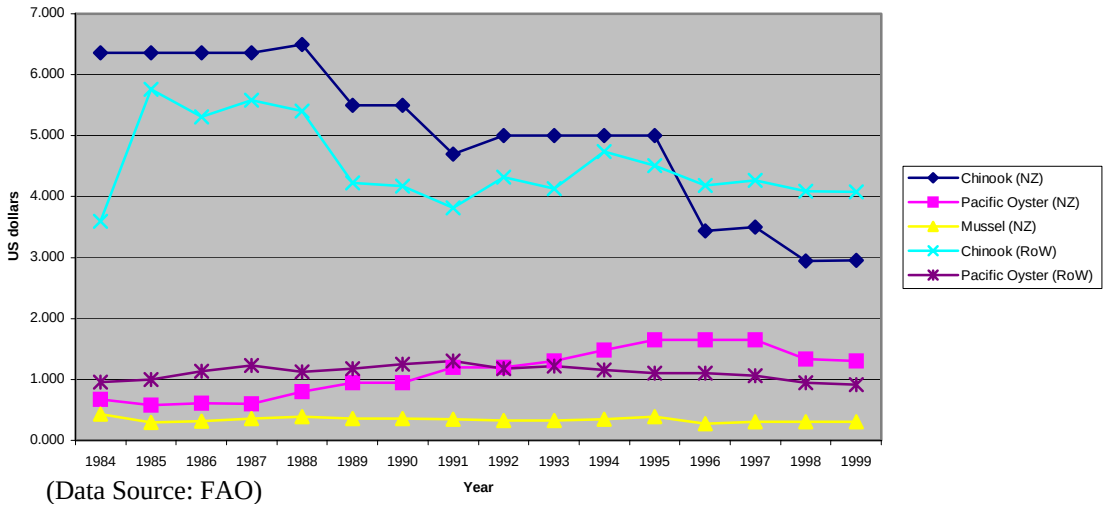
In contrast, a comparison of available international and New Zealand data on the value of chinook salmon and Pacific oyster production shows that, with the exception of chinook since 1996, New Zealand product has generally received a premium price (Figure 4.5). The decline since 1995 may well reflect competition of other 'out of season' salmon producers like Chile (Barton 1997).

Underpinning the growth of the industry has been a combined effort of individual entrepreneurs, government, university and industry investment in research and development (Jeffs *et al* 1999). Although initial mussel farming experiments were by an entrepreneurial mussel fisher in 1965 in the Hauraki Gulf, others soon duplicated these efforts in the Marlborough Sounds. The FIB was especially influential in identifying spat catching sites and, in 1974, introducing and promoting Japanese longline technology to replace the less aesthetically pleasing Spanish raft technology in the Marlborough Sounds (Hickman 1979a,b, Jenkins 1985, Tong 1989). BP and MAF successfully experimented with and established commercial salmon farming in Big Glory Bay (Stewart Island) in 1982 (O'Sullivan 1985) and it spread from there to the Marlborough Sounds and Akaroa

farms having their structures licensed by the Harbour Board (as 'moorings') and relying on daily catch limits to harvest the mussels (see Fisher 1993).

Harbour, developing exposed site technology in the process (Taylor *et al* 1985, Todd and Coates 1989).

Figure 4.5: Marine Farming Value per tonne of Product (New Zealand and Rest of the World) 1984-1999



(Data Source: FAO)

Serendipity has played a major role in the development of the New Zealand marine farming industry. Despite early recognition of the potential of net cage farming of salmon for New Zealand (Hardy 1971) and the influence of Norwegian investors in the global salmon farming industry (Wood *et al* 1990), in New Zealand this industry resulted primarily from a combination of BP becoming involved in the Scottish industry when trying to address a problem of bacteria in its oil tanks coupled with the establishment of New Zealand salmon hatcheries for proposed ocean ranching activities, rather than a national move to ocean net cage farming (O'Sullivan 1985, Gillard 1985, Todd and Coates 1989). When Pacific oyster first accidentally arrived in New Zealand in the early 1970s it was seen as a threat to the rock oyster industry, and activities that might lead to spreading Pacific oysters to other parts of the country were opposed (Waugh and Dix recorded in Meredyth-Young and Jenkins 1980: 38, Fisher 1993). It was through deliberately ignoring MAF advice that a Batley farmer introduced Pacific oyster to the Kaipara where it became well-established (Walsby 1989). By 1978, it was an accepted

farmed species that could be grown alongside rock oysters and its faster growth and high fecundity helped the oyster farming industry to survive (Wyborn 1980).

But perhaps the two most significant serendipitous events in New Zealand marine farming related to mussels. Green-lipped mussels were reported internationally as having significant health benefits in the early 1970s and this provided a kick-start to the fledgling industry (Fisher 1993, Mussel Exporters Committee 1993). Then, in 1974, a scientist stumbled upon spat-laden seaweed washed up on the west coast beaches near Kaitaia (Fisher 1993). This 'Kaitaia spat' became the main source (@80% (Jeffs *et al* 1999)) of spat for mussel farming in New Zealand, augmenting or replacing locally caught spat, and has spawned a specialized spat catching and transport system (Hickman 1987, 1995).

Unlike the rock oyster, salmon and Pacific oyster farming, mussel farming was driven by the collapse of traditional wild fisheries (Hickman 1979a). The success of farming these species, however, has driven investigations into a very wide range of other species using a variety of techniques. Hatchery technology has been developed for several species, but for oyster and mussels the ready availability of wild spat and low margins of profitability rendered the hatchery technology uneconomic (Curtin 1979, Todd 1985, Tong 1989).

Other technological developments, for example screw anchors and subsurface longlines, have enabled the expansion of farming into deeper, more exposed waters. Almost every aspect of the industry has increased its automation, reducing the need for labour while increasing the need for capital resources and creating openings for specialists in various aspects of the industry (Cameron 1981, Jenkins 1985, Edmond *et al* 1986, Hickman 1989a,b, 1995, Ludemann 1990, Fisher 1993). Manuals and policies have been produced guiding farmers in establishing their farms in inshore and deep-water sites (Curtin 1968, 1971, Jenkins 1979, 1985, Johns and Hickman 1985, Martin 1989, Hovell 1991, MSA 2001, DoC 1989).

There have been significant societal value changes. In 1980 for instance, the Director of MAF Fisheries advocated changing the law "… to permit introductions of potentially

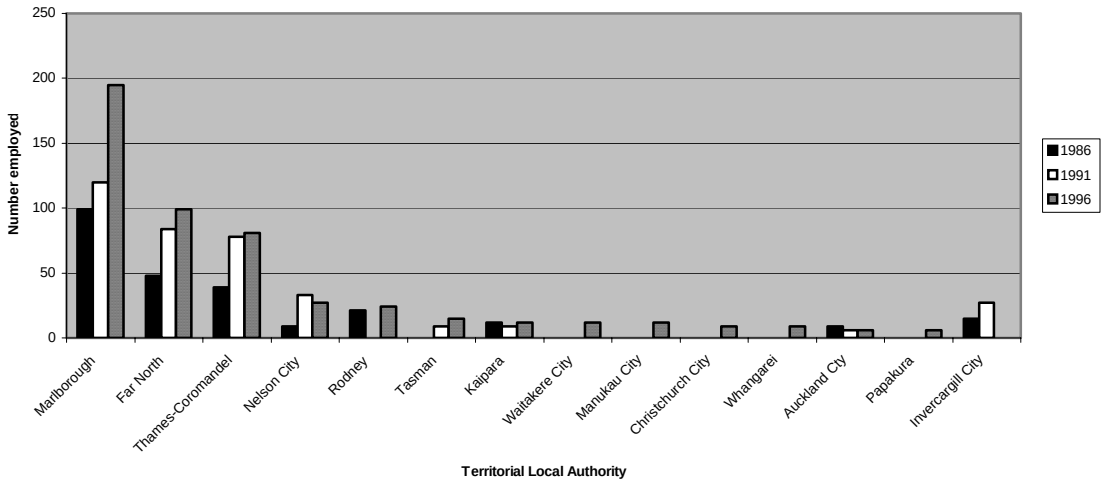
desirable species for domestication" (Waugh 1980: 8). In the 1990s, New Zealand recognized the desire of Maori to retain control over and sustain their endemic local species diversity. Maori concerns and the requirements of international agreements, like the Convention on Biological Diversity, were incorporated into legislation such as the Resource Management Act 1991 (Rennie 1998a). This strengthened restrictions on the use of species that do not already exist within an area (*Greensill v. Waikato Regional Council* (1995), *Pigeon Bay Aquaculture v. Canterbury Regional Council* (1999)).

Perhaps the most significant changes, however, have been within the industry itself. Although major processing companies have been involved since the early 1970s, they have increasingly come to dominate the industry. This is seen as having increased the vertical integration of the industry and aided its stability (Hickman 1995). The extent of this dominance, although often commented on, has received little detailed examination because of the complexity of the industry. Many of the participants appear to be part-timers and possibly distant investors attracted by tax incentives (Edmond *et al* 1986, Hickman 1991, 1995, Rennie 1997).

Statistics on employment in 'marine' farming are not collected nationally by Statistics New Zealand, but between the 1986 and 1996 national census, those employed in shellfish farming had increased from five (264 people) to seven percent (504 people) of the total employment in the fishing industry sector. The most dramatic increase in numbers was in Marlborough District, which had almost doubled to nearly 200 people in full or part-time employment in shellfish farming in the 1996 Census (Figure 4.6). These figures considerably underestimate the significance of the marine farming industry. In the year ending 31 March 1998, for instance, a study of the mussel industry suggested that it employed 1587 full time equivalents, and contributed $91.8 million in export earnings, with regional export receipts of: Nelson $32.8m, Marlborough $29.9m, Canterbury $15.9m, Hauraki $11.5m and Southland $1.8m (Philip Donnelly & Associates Ltd. 1999)[6].

[6] The regional data reflect the location of the processing facilities. Much of Marlborough's product was processed in Nelson and Christchurch. Hauraki included Coromandel, Great Barrier and Waiheke Islands and processing activities in Auckland and Tauranga.

Figure 4.6: Shellfish farming employment reported by census 1986-1996 (Source StatsNZ NZSIC)



4.6 The End of the Transition?

Competition for space between marine farming and commercial fishing became a significant problem during the 1990s, despite increased integration between fishing and marine farming companies (Hickman 1997). In 2000, the MFish and MfE sought submissions on a range of proposals to "improve the future management of aquaculture in New Zealand" (MFish and MfE 2000: 5). It claimed that "…aquaculture could make a greater contribution to the economy if the legislative framework under which this operates was updated" (MFish and MfE 2000: 4) and consequently identified as the key priority "A legislative framework that can deliver integrated and sustainable development" (MFish and MfE 2000: 7). This legislation would "… provide more certainty to all participants…[and] should enable the greatest benefit to be obtained from the use of coastal space, without undermining the rights of existing fishers or allowing undue adverse impacts on the aquatic environment" (MFish and MfE 2000: 7). Diagrams indicated that this would enable exponential sustainable development growth in the

industry compared to the alternative of 'no to low' sustainable development growth scenario if there was no change (MFish and MfE 2000: 5).

Two possible approaches were set out in the document, one a joint RMA/FA regime, the other a solely RMA approach. The first included a number of options ranging from increasing responsibilities for managing effects under either the RMA or the FA96, and variations on concurrent decision-making processes for the two permits. Among the proposals was one "…to encourage area-use or trade agreements to be entered into between new marine farm applicants, fishers and other stakeholders" (MFish and MfE 2000: 5).

In October 2000 the government launched its process for developing an oceans policy which, by March 2002, had commenced looking at ways to integrate management of marine resources. Concurrent and preceding both discussion processes, the marine farming industry was undergoing considerable growth, at least in terms of the areas being acquired for farming. Concerns over this rapid growth in both the number and the size of the areas sought for marine farms led the Government to announce a moratorium on all applications from 28 November 2001. This moratorium was to enable the regional councils to develop 'appropriate' rules in their plans for managing marine farming and the Government to introduce new aquaculture legislation. The legislation to enact the moratorium is currently before Parliament.

4.7 Summary and Conclusions

The last thirty years have seen a rapid increase in marine farming in New Zealand, based largely around mussel farming. There have been technical innovations and changes within the industry structure. These have happened within two contrasting regulatory regimes that help delimit the 'modern and 'transitional' era for the industry. By 2002, it appeared as if the transition was ending, but it was not yet certain in which direction the regulatory regime would develop.

The two regulatory regimes have been described by changes in the nature of the property rights available, with the RMA offering a much stronger bundle of rights than was available under the MFA71, but also putting the onus of the environmental assessment on the applicant. Both regimes had planning provisions. The RMA also more clearly specified the criteria to be considered and tightened the timeframes for considering applications, but whereas the RMA did not accord special weight to any sector, the FA83 and MFA71 gave considerable weight to the effects of marine farming on the fishing sector.

Having introduced marine farming concepts, its global development and its local history, Part Two of this thesis shifts the focus to consideration of the variables, especially social, that might determine the spatial location of marine farms. It suggests that different spatial patterns may develop as a consequence of different assumptions and consequent planning approaches by those administering different marine farming regimes.

Chapter Five: Key Variables Influencing the Locations of Marine Farms

Chapters Five and Six (Part Two) review the factors identified in the literature by researchers and practitioners as influencing decisions that have determined the location of marine farming. In this Chapter these factors are considered at the micro-scale, in terms of variables that affect the decisions of individual farmers as to where to site their farms. This review provides the basis to guide questionnaire design (Chapter Eight), data analysis (Chapter Eleven), and the discussion and conclusions (Chapters Twelve and Thirteen). Chapter Six shifts the focus to a broader scale. The nature of the arguments in that Chapter are more speculative, and draw on analogies with terrestrial development to tentatively propose models of spatial development that different combinations of variables might be expected to manifest at given stages in the development of marine farming.

This Chapter is structured to facilitate a critical discussion of the customary distinction in the literature between biophysical and socio-cultural variables that might affect marine farmers' decisions when choosing sites to farm. The standard biophysical variables identified from the literature are set out, followed by the socio-cultural variables (and here I include politics, economics and planning as subsets of a socio-cultural general category). There is considerable agreement within the literature as to the relevant biophysical variables and consequently the discussion of these here is less extensive than that relating to the more speculative literature, often citing anecdotal evidence, describing socio-cultural variables. The concluding section argues that a community of marine farmers is probably not homogeneous. Important biophysical variables can be identified, but the relative importance of different socio-cultural variables is far less clear and varies in different contexts.

5.1 Biophysical Variables

An extensive reading of the literature suggests approximately twenty biophysical variables influence the spatial development of marine farming (Table 5.1). These

variables are not necessarily mutually exclusive. For instance, the biophysical variable I have labeled as 'exposure' is in part the culmination of depth, fetch, temperature, salinity (etc.). It has been treated separately because it especially encapsulates the concept of 'sheltered water', a feature considered desirable for marine farming in most of the literature reviewed (e.g., Iverson 1968, Milne 1972, Coull 1988, Truscott 1994, Boghen 1995a, Nash 1995). Temperature, salinity and depth are also listed as separate criteria as they each can have a variety of different effects in combination with other variables. For instance, temperature affects salinity, and vice-versa, and each may affect individual species' ability to be farmed. Tidal flows and fluctuations in water level affect the exposure of species to radiation, atmospheric conditions and water conditions as well as affecting accessibility of a site. The spat of different species, for instance, may settle at different water levels.

Predators, parasites and competitors may affect farming methods, technology and associated costs. Bacteria or toxin occurrences are usually associated with other human activities (e.g., sewage discharge or ship ballast water exchange) and farmers may avoid areas of potential contamination or may have to close affected farms. Algal blooms, while they have had significant effects, may either be increasing in occurrence or simply be more frequently noticed and identified, but when they occur they may be problematic and lead to farm failure or deter potential investors. These factors are often linked or subsumed within a broad 'water quality' variable.

The availability of food, the growth rate and reproductive performance of the species and subspecies/breeds will each impact on the financial viability of a farm. The natural availability of food from passing water contributes to the growth rate, and different 'breeds' of species may also grow at different rates, affecting financial viability of farms. The presence of spat/seed/smolt on site may be preferred to the use of hatchery or non-local stock.

The level of importance that is attached to a biophysical variable depends in part on the degree to which particular species can tolerate changes in the variable.

Table 5.1 Variables identified as affecting the spatial development of marine farming*.

Category	Variable
Bio-physical	Exposure (to wind, waves, air, radiation and water currents)
	Temperature
	Salinity
	Depth (affects, especially, exposure)
	Tides and water level fluctuation
	Currents and water exchange
	Ice
	Geological conditions (e.g., sea-bed composition – hardness, roughness and chemical composition)
	Turbidity (suspended sediments)
	Presence or absence of predators (e.g., birds or seals), parasites (e.g., cestodes) or. competitors.
	Bacterial contamination (e.g., faecal coliform bacteria)
	Depuration (cleansing), a process either naturally occurring or artificially induced to cleanse shellfish of bacteria that would otherwise prevent safe consumption)
	Toxin occurrence (e.g., paralytic shellfish poisoning (PSP))
	Occurrence of phytoplanktonic 'blooms'
	Food availability/prey (e.g., plankton for shellfish), often linked with water quality.
	Species reproductive and growth performance (e.g., length of time to reach reproductive age, seasonality)
	Spat/seed/smolt source
Socio-cultural	Social milieu (e.g., rural communities and industrial versus play-space)
	Nature of property rights
	Economics and commercial viability
	Planning/regulatory regime
	Husbandry/farming practices (e.g., some practices may be more acceptable in particular communities than others, some may pose lower risks of importing disease or contaminating the environment than others)
	Proximity factors (e.g., to other farms, to shore, market, processor, home, cheap labour)
	Human agency (individuals making things happen while others lose community trust and support)
	Political support/action (including subsidies, education/training and research)
	Competition from other users (e.g., ports, navigation)
	Perceived actual or potential environmental impacts

* Drawn from the following publications: Iversen 1968, 1996, Ibrekk *et al* 1993, Milne 1972, Edwards 1978, Coull 1988, Barnabé 1994a, Truscott 1994, Burbridge and Burbridge 1994, Boghen 1995a, Nash 1992, 1995, Rosenthal, Allen *et al* 1995, Rosenthal, Scarratt *et al* 1995, Anutha and O'Sullivan 1994a, Anutha 1994a, b, c, Anutha and Johnston 1996, Bailey *et al* 1996, Bardach *et al* 1972, Barton 1997, 1998, Barton and Staniford 1998, Bennett 1991, Bjorndal 1988, Chua 1992, Lloyd and Livingstone 1991a, b, Phyne 1994, 1996a, b, c, 1997, 1999, Ruddy and Varley 1991, Sandberg and Didriksen 1991, Tiddens 1990, Van der Schans 1996, Van Ginkel 1989, 1990, 1994, 1996a, b, 1998, 1999a, b, Wood *et al* 1990, Curtin 1968, 1971, Greenway 1969, Jenkins 1979, 1985, Hickman 1979a, b, 1982, 1987, 1989a, b, c, 1991, Johns and Hickman 1985, Todd and Coates 1989.

Some species are naturally more tolerant to different environmental parameters than others, and this tolerance may vary for a species at different stages of its life cycle

(e.g., tolerance for salinity or temperature at spawning may differ from that during growth stages). As noted above, it is difficult to consider the biophysical variables independently because of the multi-directional interactions between them.

More significantly, however, the importance of biophysical variables is largely dependent on the methods and technology used for farming. When biophysical variables are identified in the literature it is usually in the context of some assumed standard form of technology and farming practice. As the basis of marine farming is to provide, artificially, conditions conducive to the growth of a profitable product, then the extent to which the biophysical variables constrain the evolution of marine farming is dependent on the available technology to overcome natural constraints. Farming and technological solutions, however, may not be implemented for a variety of socio-cultural reasons. The technology and farming practices therefore need to be considered within the context of the socio-cultural variables that encourage or inhibit the acceptance of marine farming.

5.2 Socio-Cultural Variables

The socio-cultural variables are interlinked with the biophysical, but are more difficult to specify. To some degree this reflects the complexity present in the range of cultural contexts in which marine farming takes place. Primarily, however, it represents the lack of a consistent jargon (as discussed in Chapter Two), the diversity of disciplinary backgrounds, and the relative lack of research specifically on these variables. With a few exceptions (e.g., Nash 1995), most aquaculture textbooks cover socio-cultural aspects with a couple of paragraphs or introductory comments written by non-social scientists as sections within their predominantly species-structured and biophysically focussed chapters. Some extend, particularly in recent years, to include one or two chapters on socio-cultural issues (compare for instance Boghen 1989 with Boghen 1995a). Generally, however, the social science of marine farming is in its infancy and lacks clear paradigms, concepts and terminology, despite the best efforts of some authors (e.g., Bailey *et al* 1996).

Despite these shortcomings my review of the literature on marine farming in developed countries suggests that the socio-cultural variables listed in Table 5.1 capture most (hopefully all) of the variables that are shared in most situations. The socio-cultural variables affecting the individual decisions made by farmers and other key decision-makers provide the basis for understanding the interaction between the biophysical environment and the temporal and spatial development of the industry (discussed in Chapter Six). Because they have received little attention in the literature, my discussion of them is more extensive than that for the biophysical variables.

5.2.1 Social Milieu

By using the term 'social milieu' I deliberately seek to situate my analysis of the development of marine farming within the Vidalian tradition of possibilist regionalism, informed by structuration theory and systems theory in the spirit of contemporary regional geography (Buttimer 1976, Pred 1984, Pudup 1988, Agnew 1987a, b, Sayer 1989, Thrift 1991, Gregory 1993). Essentially, one of the arguments in much of the literature is that new marine farming has to be represented to a community in rhetoric that makes it compatible to the local people's perception of the character of the 'place'. The compatibility is the consequence of the 'fit' of the new form of farming with the existing social structures and relationships. The ability of the proponents of a farming venture to draw on appropriate rhetoric to cloak a development in acceptability, so that it becomes either an integral part of or, alternatively, a positive feature in the socio-cultural landscape of the place, may be critical to the success of the proposal.

For instance, Eklund (1996: 60), discussing Finnish aquaculture, draws attention to the region's peasant tradition of entrepreneurship and multiple occupations. This was coupled with a pro-aquaculture position dominated by rhetoric that sought to portray aquaculture as a

> natural development evolving from fishing to aquaculture (i.e. from hunting to husbandry). In this view, aquaculture is seen as a natural basis for regional socio-economic innovation and development.

> Nature is seen in terms of a rural landscape, where people use natural resources in order to survive in an industrialized society.

Thus, aquaculture also offered a means to retain the youth in the community - to avoid its depopulation by providing employment through developing the "underdeveloped' Archipelago Sea.

The anti-aquaculture lobby adopted an alternative "environmental frame of reference" in its rhetoric. It portrayed fish farming as contributing to "the endangered Baltic's" eutrophication problems. In this context it was "morally and politically wrong to accept new economic activity that adds nutrients to the Baltic ecosystem". The Archipelago Sea was "a unique and beautiful landscape that has the potential to refresh the human spirit as well as to provide an economic base founded on tourism" (Eklund 1996: 60). In Eklund's (1996: 60) view, both sides of the contest "In struggling over policy, are referring to dramatically different ideological landscapes".

The social milieu is of most importance in regulatory environments where the local community has considerable sway in the final decision. This may be in relation to either individual farms or to proposals for zones in a plan that enable marine farming to occur. The rhetoric used is mediated to some extent by the locus of decision-making (whether at the local community level or at central government). The importance of planning regimes in this context is that their nature can facilitate or inhibit the degree to which the local social milieu becomes the locus of decision-making. Moreover, when central governments devolve power to communities it usually is a conditional transfer or delegation. Those conditions may affect what can and cannot be considered in the decision-making. For instance, under the Resource Management Act/Fisheries Act (RMA/FA) regime (Chapter Four) the community must consider the effects of a farm against a variety of criteria. This is in contrast to previous regimes where the community had little statutory say in decisions on marine farming and the central government had very few specific criteria to consider. Consequently the individual farming proponent might not have considered support or opposition from the local community or its various sectors as very important prior to the RMA/FA regime.

Where the 'fit' between a proposal and the local community is not readily achieved conflicts emerge. Underlying the conflicts is the nature and structure of the local community, as Dwire (1994, 1996), Phyne (1999), van der Schans (1996), Eklund (1996), Millar and Aitken (1995) and Millar (1996) clearly demonstrate. Millar and Aitken (1995) note that marine farming flourished in Prince Edward Island because the Island's farming culture understood it. In Nova Scotia, Phyne (1994, 1996a) suggests that "an alliance of professional and traditional fishing interests" (Phyne 1996a: 75) led opposition to aquaculture, but does not comment on whether a rural population is likely to support it. Dwire (1994, 1996), however, contested these views, arguing that within Nova Scotian communities, a diverse group of people support or oppose marine farming and there is no 'cut and dried' division between particular productive sectors. She (Dwire 1996) suggests that being within commuting distance of metropols means more employment alternatives and consequently such communities are less motivated to support initiatives to generate local community employment.

It is not just the activity, but the marine farmers themselves who do not always 'fit' with the local social milieu. For instance, in her study of Shelburn (Nova Scotia), Dwire (1994: 1584) comments:

> A further factor contributing to aquaculturists' alienation is that they are more cosmopolitan than the majority of the communities' residents and frequently originate from urban centres outside the province. Moreover, although their fish farms are located along the mainland coastline, they establish houses in inland and isolated areas.

She concludes that the primary support for aquaculture in that instance was external to the local community. By contrast, Sandberg and Didriksen (1991) argue that the initial 'pioneering entrepreneurs' of salmon farming in Norway were largely local fishers and farmers prepared to take risks. Those external to the local community, the 'distant urbanites' were unprepared to invest in the early stages because of the risks of failure. These outsiders were responsible for the later flood of over-investment in the industry. At different stages in its development therefore, marine farming may

attract investment from locals or outsiders, but the dominance of one or the other group appears influenced by geographically specific socio-cultural factors.

Van der Schans (1996) also argues against oversimplification. He characterises marine farming conflicts in Scotland as examples of 20th Century colonisation that took two distinct forms. On the one hand (in accordance with Dwire's (1996) observations), locals perceived marine farming as being dominated by large non-local companies with better access to information and capital. These companies also arguably laid claim to marine areas in order to prevent others claiming them. On the other hand, van der Schans notes that where locals supported marine farming development they faced opposition from a group of "white settlers" - second home owners and wild salmon anglers from England who were able to enjoy Scotland "without being materially dependent on its development" (van der Schans 1996: 151). To van der Schans, this perceived lack of local control, supported by the multiple planning agencies, led to a fragmentation of the local community's lifeworld. It consequently hampered the communicative processes that he considered necessary to facilitate effective integration of marine farming with the social milieu of the community.

Despite the presence of opposition in some communities, it may be possible to construct a different perception of marine farming, one that makes the activity compatible with the existing social milieu. Aarset and Foss (1996) and Perez *et al* (1996) note that aquaculture can form part of a 'diversification strategy' for existing community members, and may be accepted as such. However, the issue of social compatibility may also be determined by the organization of the industry. Consequently, in Norway (Sandberg and Didriksen 1991, Aarset and Foss 1996, Holm and Jentoft 1996, Jakobsen 1999), the Shetland Islands (Coull 1996, van der Schans 1996, Millar and Aitken 1995), New Brunswick (Phyne 1994, 1996a), Florida (Weeks and Sturmer 1996), Alaska (Amend 1989) and Finland (Eklund 1996), restrictions on marine farm ownership have been directed at ensuring the industry stays within community control, rather than being dominated by outside or multi-national corporations.

The considerable conflicts that occurred in Ireland and Nova Scotia can be interpreted as a failure to adopt such local-ownership approaches (Phyne 1994, 1996c, 1999, Steins 1997). It was exacerbated in Ireland by conflicts between the different types of farming used by locals and outsiders. The more capital-intensive salmon farms, essentially owned by external corporations (after initially being owned by electricity companies), were opposed by the traditional local oyster fishers. The fishers formed co-operatives to obtain oyster farming rights primarily to prevent salmon farmers from establishing farms over traditional oyster fisheries (Steins 1997, 1998). This indicates the need to differentiate the structures of the industry, sorting the smaller farmers from the larger, the local from the distant, and identifying the nature of the conflicts involved. It also highlights the need to consider the individual motivations of those obtaining sites. They may not necessarily be seeking to farm the sites themselves as much as to prevent others from farming there.

In summary, compatibility with the social milieu appears very important for establishing marine farming. Where the regulatory regime or socio-cultural practices facilitate community decision-making, proponents of marine farms are likely to seek sites in areas where they might be socially compatible, use technology or methods that might make the activity socially compatible, or promote marine farming within rhetoric that persuades the local community to accept marine farming as compatible with the community. In this last instance, farmers could be expected to actively participate in local plan making, through, for instance, making submissions on plans.

Those communities where marine farming appears most likely to be established are ‘rural’ and ‘isolated’, or ‘peripheral’ communities where the bulk of the community is attuned to primary production and where the existing local community power structure supports diversification of economic activity. Where the promoters are perceived as ‘outsiders’ intruding on the community it will be more difficult to establish farms. Consequently, farmers are likely to choose to farm within the community closest to them, unless they perceive their farm as somehow not ‘fitting’ with that milieu.

5.2.2 Nature of Property Rights

The nature of property rights has been discussed extensively in Part One. Here attention is focused on the role of these rights in influencing individual decisions. Essentially, beneath the many conflicts over marine farming lies the conflict between governance of the common property marine resources of the sea and the need for a marine farmer to have sufficient confidence in the individual rights available to investors in the industry. As Wildsmith (1995: 553) puts it:

> All enterprise requires investment, whether of capital or labor, and all investors are concerned about security… A leading consideration in assessing security is the extent to which enforceable legal rights exist.

In this context access to the water column is particularly important. In England, "By the common law, all the King's subjects have, in general, a right of passage over the sea with their ships, boats and other vessels, for the purposes of navigation, commerce, trade and intercourse" ([*Blundell v. Catteral* (1821) 5 B & Ald 268, p. 294] cited in Seabrooke and Pickering 1994:174). Following from this it appears that rights of ownership of the seabed "including that of alienation, are generally accepted not to extend to interference with or the payment of tolls for, the exercise of the right of navigation or any other right of the public" (Seabrooke and Pickering 1994: 175). In other respects the Crown has a "clear patrimonial right of property in the seabed" and can therefore lease or license its use (Seabrooke and Pickering 1994: 175).

This "public right of navigation" is a "right to wander" which “supersedes the property rights of the Crown and their grantees" (Seabrooke and Pickering 1994: 174). This presumed right, explicitly stated as such in English case law in 1865 and reinforced by UNCLOS III, has led to the expectation among the general public in countries with law closely related to British law that the marine area is a commons which should be retained as ‘free to access’. This expectation lies at the heart of much of the opposition to marine farms that, by their nature, restrict access to areas of the sea surface.

In a case involving the interference to navigation caused by a salmon farm in Scotland, however, the judge ruled that: "the navigator had to demonstrate that the salmon farm interfered with clearly marked sea routes; ...while the public right of navigation on the sea is very wide it does not give the public the right to sail over every square inch of its surface". Consent for the farm had also been given by the Department of Transport before the lease was issued (*Walford v. David* 1989, 8787 cited in Phyne 1994: 407).

Balancing these expectations of use and access has led to a range of different responses. For instance, Nova Scotian leases include the seabed and water column, but these provisions are not replicated in the other Atlantic Canada provinces. Instead they have dual permitting systems. One permit provides a right to use the area; a second provides the right to occupy it (Wildsmith 1995). In Florida, one marine farming demonstration site failed because the rights it held restricted it to farming only the six inches of superadjacent water of the seabed lease. The Florida Department of Natural Resources subsequently altered its policy to one that would "confine increased use of the water column to areas which would accommodate a minimum draft of four feet above structures at mean low water" (Weeks and Sturmer 1996: 120).

In summary, this property rights variable is shared in all discussions about marine farming, but from four completely different directions. The marine farmer is concerned with security in terms of the investment. The public is concerned with the appropriation of the commons by private capital, as this is effectively an encroachment on the public commons. Other users of the area, or adjacent areas, are concerned about the possible effects on their activities. Finally, the state or Crown may seek to realize an economic return from the use of its resources.

If a neo-liberal approach is employed to determine social outcomes, then the nature of the property rights, their flexibility, tradability and longevity become critical. For example, there is a considerable difference between the 50 year seabed leases obtainable in Newfoundland, and Nova Scotia’s ten years “with a right of renewal by

the lessee at the Minister's option for further terms of five years each" (Nova Scotia Aquaculture Act s. 14 cited in Wildsmith 1995: 549) and the rights available in New Zealand at various times (see Chapters Three and Four)

At any given time the property rights available essentially reflect the current state of play in a never-ending contest between competing ideological positions. Under this scenario, the nature of the rights provided reflects the dominance of particular ideological positions at the particular time that the rights were incorporated into law. The variety of rights regimes that have evolved may indicate that marine farming will proceed regardless of the nature of the property rights available.

Arguments that marine farming requires more secure property rights may be exaggerated. Some rights might be essential, but I have read no papers in the marine farming literature that address what might be the minimum rights required to secure investors, nor do there appear to be papers suggesting an upper limit to the rights necessary for secure investment. Nevertheless, the discussions of these rights remain fundamental to the nature of the allocation of space and are perhaps the most consistently raised issue in the socio-cultural marine farming literature. Logically, one would expect the individual farmer to choose to locate a farm in an area where the rights to the farmer most approximated the ideals in Scott's model (see Chapter Two). The uptake of new marine farms, in turn, would occur in periods when regimes were in place that favoured the rights of the individual farmer over those of the community.

5.2.3 Economics and Commercial Viability

The literature clearly indicates that initial investment in high risk, high technology, but potentially lucrative marine farming ventures, required government or large corporation backing or, alternatively, very small scale experimentation. Once such marine farming was proven technically viable its expansion was considerably affected by market demand and cost factors. Low technology forms of farming (e.g., shellfish farming) in Europe were not so disadvantaged, but New Zealand faced high

transportation and labour costs (Chapters Three and Four). Because the financial costs of farm development in Western countries tend to be greater than those of developing countries or non-market economies (Barnabé 1994b), they produce products that can only realize a profitable return from internal markets or those of other developed countries. If they cannot establish the product in a luxury market then they have difficulty competing.

State subsidies and tax breaks led to the boom and bust history of the salmon farming industry in Norway (Sandberg and Didriksen 1991, Jakobsen 1999). The resultant restrictions on investment in Norway led to the globalisation of Norwegian entrepreneurial investment. This greatly assisted the global development of salmon farming (Nowell 1990, Tiddens 1990, Wood *et al* 1990, Sandberg and Didriksen 1991, Truscott 1994, van der Schans 1996).

The change from fresh to a predominantly frozen fish product also opened up both the bulk market for distant farmers and niche markets for those who can supply fresh fish to luxury markets. Understanding the concepts of market segmentation and targeting sales has become part and parcel of the viability of the industry (Harris 1995). Financial infrastructure enabling loans and other forms of capital investment is also seen as highly important. The costs of transport and infrastructure when establishing marine farms in remote places may prevent the development of marine farms in places that are desirable on biophysical or socio-cultural grounds.

The markets and the industry are also highly vulnerable to health issues (e.g., toxic contamination), especially with filter feeders (e.g., shellfish), but also in relation to the use of food additives for those species that are fed artificial food (e.g., salmon). If farmed fish are the source of a health scare, demand falls and markets respond with lower prices. This may significantly affect the incomes of the capture fishers and, in turn, fuel their opposition to marine farming. In effect, capture fishermen may see farmed fish as potentially affecting their incomes and ultimately the viability of their lifestyles and perhaps the viability of their communities (Ridler 1995, Green and Kahn 1997).

Farmed fish may add to the diversification of rural economies and boost depressed regions, but the presence of farmed fish and of fish farms may also jeopardize the market for recreational fishing experiences and lead to opposition from sport fishers, fish guides and the related tourism industry (Ridler 1995). In communities where there are unresolved indigenous rights issues, the ownership of marine space and production rights may be a source of costly contests. These broader negative economic effects of farmed fish are seldom discussed, but they may contribute to the variable degrees of opposition to marine farming expressed in the planning and permitting processes.

The type of planning regime also affects the economics of developing marine farms. If it imposes high costs on proponents and supporters of marine farms then farms may not develop (Scarsbrick 1997). Alternatively, if the costs of opposition are borne primarily by the opponents, then this may facilitate the development of marine farms because the opponents cannot afford to articulate their opposition.

Ultimately, marine farmers need a return sufficient to encourage them to invest and maintain involvement in the industry. Factors that add to or reduce net returns will affect their locational choices and the spatial and temporal development of the industry.

5.2.4 Planning/Regulatory Regime

As the planning/regulatory regime is a major focus of this research project, and is addressed in a number of places in this thesis, I will not dwell on it here. Essentially, my review of the literature suggests that shifts in the broader discipline of 'planning', to more community-based, transparent decision-making, are present throughout the Western marine farming experience. This has not been paralleled by a development of visionary approaches to directing where marine farming should develop.

Marine resources have seldom been classified in terms of productivity and carrying capacity to assist development planning (British Columbia is a notable exception (Truscott 1994)). This is primarily due to a lack of sufficient knowledge of marine resources. Planners have also struggled with the interface between land and sea planning regimes (e.g., Lloyd 2000). Plans are dominated by regulatory controls representing attempts to achieve 'desirable' social outcomes (e.g., local ownership and employment goals) as much as to incorporate environmental impact assessment (Priyan and Smith 1994).

The degree to which the planning system, especially as an extension of the State (Cloke and Little 1990), operates in favour of particular interests, such as those of production or capital, and takes into account the concerns of indigenous people, will affect development decisions (Nicholls 1999). For instance, co-management approaches to conflict resolution are advocated within integrated coastal management (ICM) and planning generally, but these are invariably supported by structures enabling costly appeals to seemingly independent, often judicial, authorities (e.g., Amend 1989, Millar and Aitken 1995, Cicin-Sain and Knecht 1998). Those able to afford the costs of such appeals will be advantaged and this may discourage others from participating in the final decisions.

In summary, the processes of the planning regime, especially the degree to which it supports or attenuates the property rights of different interests, and the locus and transparency of the decision-making, have a profound impact on the development of marine farming.

5.2.5 Husbandry/Farming Practices

Husbandry/farming practices primarily relate to the development of new technologies and practices. These may reflect the pressures applied by communities, responses to (new) planning or regulatory regimes, or opportunities to obtain market and production advantages. Among those of most relevance to this thesis are the techniques employed to address the constraints of the biophysical environment. For

instance, the effect on the Japanese oyster industry of the development of longline techniques was quite marked. It "made it possible to grow oysters in exposed situations in the open sea where raft culture is not possible" and the growth in Japanese production reflected its ability to exploit these new areas (Bardach *et al* 1972: 703). The development of largely submerged marine farming technology may address much of the concern over visual pollution held by adjacent land users. Effective seabed-farming practices may address concerns over navigation and visual effects. Such approaches may be less financially feasible for the farmer due to lower production and increased predator or other problems, but they may result in reduced costs in obtaining rights to farm in particular areas. This may effectively assist the farming to 'fit' with the social milieu of the area.

For instance, cottage or hobby farm practices might be more labour intensive and less capital intensive than commercial operations. Therefore they may result in better economic returns to a community and a farmer, but leave both more vulnerable to market fluctuations (Ridler 1995: 564). Cottage farms may, therefore, be more socially compatible, but less acceptable to the individual farmer. Coull (1996) (and Phyne 1996b for Ireland), however, notes that spreading ownership of marine farming throughout the Shetland's community made the industry less vulnerable in difficult years than it was in those areas where a few big farms dominated.

Iversen (1968: 293) suggests that individuals should choose sites with the capacity for future expansion, but is unclear as to the limits of that expansion. If the type of farming intrudes, to a greater or lesser degree, on existing uses of the ocean and adjacent land areas it is more likely to raise concerns among established users of the area. Chua (1992) has usefully identified the nature of the conflicts that different types of farming activities might have with other uses of the coast, based in part on the type of environmental effects the activities have. However, the degree to which conflicts might occur depends largely on the level of impact a community is prepared to accept, not on an 'objective' biophysical parameter (Eklund (1996)).

5.2.6 Proximity Factors

I have identified 'proximity' separately because of the frequent use of the words 'isolated' and 'remote' in the literature. Unfortunately, remoteness and isolation were seldom specified in terms of the 'things' that they were remote or isolated from. In some cases proximity was clearly in terms of accessibility from land, but even then it was not possible to gauge at what scale something became relatively inaccessible and therefore more remote. Proximity also occurred in relation to: the potential negative cumulative effects of marine farms located 'close' to each other; the desirability of achieving economies of scale in the industry through having farms located close to each other; transportation and labour costs; and, the effects of being 'too close' to sources of pollution or centres of population.

It was not clear, however, whether or not there might be generalisable matters of proximity that could perhaps be identified for particular species or farming practices. In large part this was because of the imprecision in the literature. Few papers include maps showing the location of marine farms one to another or at a sufficiently large scale to be able to identify the relationship of the farms with each other or any of the other items identified. In short there is a marked absence of a geographical perspective in the literature (see also Barton and Staniford 1998). It appears, however, that for some species and in some situations, proximity to any of the above may be beneficial or detrimental to the establishment of a marine farm (Preston *et al* 1997, Jakobsen 1999).

5.2.7 Human Agency

An understanding of the variables affecting decisions about the location of marine farms requires recognition of Giddens' (1984) human agency concept. In essence, this concept accepts that in a given situation humans are not totally helpless within the systems (e.g., regulatory regimes) that govern their world. They can act to change that world. It also recognizes that organizations comprise humans with human

characteristics and this may play a crucial role in the operation and relationships within and between organizations, and in their relationships with the public.

Several cases have been reported in the literature of individuals and their characteristics playing significant roles in the location of marine farming (e.g., Tiddens 1990, Boghen 1995c, Phyne 1996a, Weeks and Sturmer 1996, Dwire 1996, Millar 1996). In the USA, Weeks and Sturmer (1996: 122) conclude their comparison of two aquaculture technology transfer projects by noting that "The assumption that all problems can be solved by social engineering is presumptuous and forgets human agency - the ability of individuals and communities to exercise power, even if limited, within larger political and economic contexts".

In summary, the individuality of each actor in a situation may be important to the decision on marine farming applications in a number of ways. For instance, the characteristics of individual actors could affect: the compatibility of the farm with the social milieu; the commercial viability of the farm; the capacity to adopt and share new ideas and approaches; the diligence of those administering the planning regime; the degree of political interference; and the level and nature of participation in decision-making (no matter where it is located).

5.2.8 Political Support/Action

Political support/action affecting locational decisions may be found in the implementation of international agreements such as GATT, NAFTA, or European Union directives (Jakobsen 1999, Coull 1999, Jarvinen and Magnusson 2000). More commonly it lies in national policies on education and extension services (Mallet and Myrand 1995, Weeks and Sturmer 1996), the structure of the industry, regional development, subsidies, revolving funds and tax breaks, support for industry organisations, or government research and development (Amend 1989, Heen *et al* 1993, Tiddens 1990, Aarset and Foss 1996, Eklund 1996, Holm and Jentoft 1996).

Government support is subjected to lobbying (see, for instance, Ruddy and Varley 1991, Boghen 1995a, b, c, Drinnan 1995) and the political support of key players may be critical in the provision of funds and/or subsidies in the development and continued existence of marine farming (Phyne 1996a, b, c). For instance, if the judiciary reaches a conclusion disliked by those with political power, then the legislation may be altered to achieve the outcome originally sought. To some extent, countries with key constitutional documents may be less prone to such obvious exercises of power than those, like New Zealand, without strong constitutions (Wildsmith 1995).

Tiddens (1990), Anutha and Johnson (1996), Phyne (1994, 1996b, 1999), and Rennie (1993b, 2000a) argue that government policy is also dependent on the portfolio distribution and institutional history of relations between and within government agencies. This can have a critical impact on the relative strength of different policies and processes in resolving conflicts and in forward-planning.

The significant role of local government support is also apparent (Heen *et al* 1993, van der Schans 1996, Weeks and Sturmer 1996, Coull 1996). For example, the Shetland Islands Council licensing policy includes:

> (b) to use salmon farming as a key element of Rural Development Strategy and to ensure that there is as great a geographical spread of the industry and its participants as possible bearing in mind the natural and technical limits on potential sites.… (SIC Works Licensing Policy Document: 1, cited in van der Schans 1996:161)

In Florida, "In an unprecedented move, the [Florida State] Department of Natural Resources allowed the Boards of County Commissioners of... [two] counties to serve as conceptual lease applicants". Consequently these two counties held lease rights to 800 acres which they then transferred to newly trained aquaculturists as they completed their qualifications (Weeks and Sturmer 1996: 120).

Such novel approaches are dependent on the overall structure and type of government and on ideologies held with respect to the role of government, but they may be critical for the development of the industry (Heen *et al* 1993). Farmers may well

choose sites on the basis of the degree of government support they might expect to farm one site rather than another.

5.2.9 Competition from Other Users and Perceived Actual or Potential Environmental Impacts

Competition for use of particular areas of interest to marine farming is closely connected to the perceived actual or potential environmental impacts of farming. These are usually mediated through the planning regime and related legislation. There are almost unlimited potential competitors. They may include different species (e.g., birds), past and future generations who are not in a position to speak on their own behalf (but who may have advocates speaking for them), as well as the plethora of current passive and active users. The degree to which they are able to articulate their opposition to marine farming may vary considerably and might depend on the nature of the resources available to them. Particularly prominent competitors identified in the literature are: recreational users, commercial fishers, adjacent landowners, commercial shipping, and environmental interests (Hickman 1982, Wood *et al* 1990, Chua 1992, Weeber and Gibbs 1998).

The environmental effects are frequently used as the basis for opposition to marine farms and to the decisions on the location of marine farms (Eklund 1996, Barton 1997). The magnitude and significance of the effects become the focus of the contests between proponents and opponents but, despite the literature being reasonably clear on the nature of the effects of individual farms, models to determine the cumulative effects remain underdeveloped and/or very site specific. The less robust the information advanced the greater the degree of discretion available, and the arguments become grounded in 'perceptions' of impacts (Tiddens 1990, Chua 1992, Eklund 1996).

5.3 Summary and Conclusions

In this Chapter, the biophysical and socio-cultural variables affecting individual decisions regarding the location of marine farming sites have been considered

separately. Ultimately, any attempt to analyse variables affecting the location of marine farming will require arbitrary divisions and, although this division has some intuitive appeal, it tends to oversimplify a complex interactive set of processes. For instance, discussions about marine farming are usually based on the existing predominant farming practice and technology. From this, estimates are made of the effects of marine farming to determine, among other matters, the 'standard economic unit' and the ability of farming structures to cope with adverse environmental conditions (e.g., their need for shelter).

It seems apparent that there are some factors that are slightly more fundamental to marine farming than others. The life-supporting capacity of the environment is fundamental and '**water quality'** is clearly critically important. The overseas literature also rates highly the undefined concept of '**shelter**'. Farming seeks to create the environmental parameters that will increase the productivity of a particular species in a particular area. The intention is to modify the biophysical parameters and this is clearly dependent on technology. **Technology** is therefore crucial to the use of new areas and/or new species by marine farmers. For the farmer, technology affects the type of **farming methods** able to be used and the **cost** (financial or otherwise) of the resources employed.

The nature of the technology and the farming practices adopted are also critical to the **social acceptability**, if any, of marine farming. The **resources** available for the development of the technology will depend on the interest of **individuals** in the private and public sectors, and their motivations might be quite varied. Different personality traits and ideological positions will influence views of what is social acceptable within a pluralist society. Some 'entrepreneurial pioneers' are likely to adopt higher risk, more resource demanding positions than would more conservative would-be farmers or non-local, perhaps urban, investors. The set of criteria that each might consider important in determining their preferred site would therefore be expected to differ also. If so, how might a heterogeneous community of farmers rate the importance of the key variables identified in the literature? And how might this

have affected the spatial pattern of marine farming under the planning provisions of the modern and transitional era?

If water quality and shelter are key biophysical variables, what are the key socio-cultural variables? The literature clearly indicates the ability to fit with the existing **social milieu** is important, but how important is it in relation to variables such as cheap labour or **proximity** to the local community, to markets or to home? In a commons, property rights become hotly debated, but the literature seems to use property rights as a form of 'short-hand', perhaps indicative of unresolved **community conflicts** rather than of major impediments to marine farming. This makes the regulatory regime especially important.

Regulatory regimes may incorporate a number of different approaches to the development of marine farming and these too depend on assumptions and perceptions of the nature of the 'standard' farming activities and their effects as well as wider societal goals and ideologies. The consequences for the development of marine farming, both over time and in terms of its spatial outcomes, have not received rigorous research attention in the literature, nor have models of the possible development of the industry under different scenarios been postulated or examined. In Chapter Six the variables identified in this chapter, especially those in bold, are drawn on to inform speculations about models of both spatial and temporal development of the industry. I will return to these variables, and their relative influence, in the context of marine farm location in New Zealand in Chapter Eleven.

Chapter Six: Some Speculations on the Evolution and Spatial Development of Marine Farming

The spatial development of marine farming essentially reflects the combined effects of decisions made by farm owners on the one hand and those responsible for governing the marine commons on the other. In Chapter Five a number of variables were identified as affecting the decisions of farmers when they chose sites for their farms. Similar variables, but perhaps with different levels of importance, are likely to apply to planners and policy-makers. As discussed in Part One of this thesis, planning approaches and government policies change over time and these changes are likely to be reflected in patterns of spatial development in marine farming areas.

This Chapter is based on two assumptions: first, that there are relatively distinct stages in the development of a marine farming industry; second, that at different stages in the evolution of marine farming different regulatory regimes may leave distinctive spatial 'signatures' (patterns). For example, a particular regulatory regime may result in different spatial patterns of development when an industry is rapidly expanding from those formed when it is in decline. These distinct patterns will occur regardless of whether the expansion is a product of the regulatory regime or independent of it, but the nature of the pattern will reflect the regime.

Policy-makers and planners are likely to make assumptions regarding the determinants of the farmers' locational decisions. The anticipated response of farmers to particular regulatory regimes will shape the nature of the regime and the techniques for allocating marine space (see, for instance, the discussion of regulatory approaches and allocative mechanisms in Ministry of Fisheries and Ministry for the Environment 2000). Consequently, during a time of relative decline, governments might seek to create regimes that facilitate expansion of marine farming, if that is considered desirable. At other stages, governments may seek to constrain rapid expansion, or may respond to other pressures in a manner that (indirectly) constrains or facilitates development. For instance, in providing *in perpetuity* property rights to quota holders under the Quota Management System for fisheries, the New Zealand

Government may have inadvertently strengthened the position of fishers relative to that of marine farmers. The latter are consequently more constrained by opposition from fishers than they would otherwise have been when seeking to have space set aside for the development of marine farming in commercial fishing areas.

Analyzing the implications of different policy decisions and regulatory regimes should be aided by an understanding of the 'signatures' or 'patterns' that might result from different regimes. Unfortunately the literature on such matters is very sparse. Consequently, in this Chapter several speculative 'models' are presented and related to marine farming and planning for the industry.[1]

The Chapter is divided into sections dealing with temporal and spatial models. The temporal model discussed in the first part draws on the observations of several authors regarding stages in the development of the industry overseas. It also draws on New Zealand's historical experience of marine farming as discussed in Chapters Three and Four.

The spatial models presented in the second part of the Chapter are deliberately speculative. A set of contrasting spatial models is developed by drawing on analogous terrestrial models. In the New Zealand context at least, planning is very much based around the concept of mappable zones (whether in terms of effects or activities). The discussion is linked, accordingly, to attempts to illustrate the patterns that might eventuate from each of the spatial models. The means of seeking patterns in the marine farming world will be discussed further in later chapters, especially Chapter Seven.

When combined with an analysis of the variables considered important by New Zealand farmers (reported in Chapter Eleven) and the planning approaches employed (Chapter Nine), these spatio-temporal models and patterns may help explain

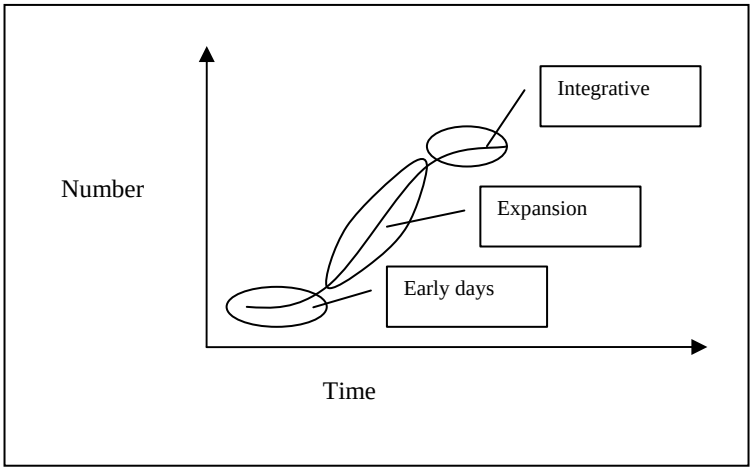
[1] This is not the place to discuss the difference between a theory, a hypothesis, a model or simply a useful proposition, speculation, or conjecture. These are largely semantic issues of limited relevance to the substantive interests of this thesis. Accordingly, I have set these issues to one side and used 'model' in its broadest sense to encompass concepts that can be effectively drawn on to assist in exploring geographies of marine farming.

observational data (Chapter Ten) on the location of New Zealand's marine farms. This enables the linkage between individual decisions and their aggregate spatial expression to be analysed in relation to the regulatory regimes (Chapter Twelve). It also provides the basis for some concluding comments on an aquacultural geography in Chapter Thirteen.

6.1 Phases in the Development of Marine Farming

Although the nature of marine farming may differ from country to country, the literature suggests that in Western countries it is implicitly assumed that the classic logistic curve may usefully model the pattern of development of the industry over time. Essentially, there are three phases: 'early days', 'expansion', and 'integrative' (Figure 6.1). It is important to recognize that the periods of time taken for the industry to move through each of these phases differ, both between and within countries. They also differ by species, and some species have experienced boom and bust cycles (e.g., salmon in Norway). The curve should also not be expected to be smooth, but represents a trend around which there may be considerable fluctuations. There are, however, some general features of each of the three phases that are apparent in most instances of the development of marine farming and perhaps of most industries.

Figure 6.1 A three phase model of the development of marine farming



6.1.1 Early Days

There is an initial 'experimental' stage which may be either state supported or, especially in the case of high technology farming, with significant (multi-national) corporate investment (e.g., Unilever's investment in salmon farming in Scotland (van der Schans 1996)). This experimental stage has been followed by a 'start up' stage involving little planning. Instead there has been the *ad hoc* issuance of permits allowing the occupancy of marine space. These two stages are sometimes combined as one "*postembryonic*, or *development*, stage" (Boghen 1995b: 11). Characteristically, there is significant research effort by small groups of publicly funded scientists in government institutions or universities, and "a very few dedicated pioneers" or entrepreneurs in the private sector (Boghen 1995b: 11, Bjorndal 1988, Sandberg and Didriksen 1991, Tiddens 1990). For the purpose of this thesis I will continue to refer to the combination of these stages as the 'early days' phase in the industry.

Despite forms of marine farming having been provided for in New Zealand law since the 19th Century, the 'early days' phase of modern marine farming essentially encompasses the 1960s up to the Marine Farming Act 1971. The postembryonic stage relates best to the period from 1964-68, and the start-up occupied the 1968-71 period. This phase was dominated by experiments in rock oyster and mussel farming, and the equivalent phase did not occur for Pacific oysters and salmon until the 1970s and 1980s respectively. The experiments in scallop, snapper, paua and dredge oyster farming have yet to move beyond the 'early days' phase. With the exception of salmon, however, since 1971 the legislation has treated all these species on a similar basis and consequently I have applied the phase to the industry as a whole.

6.1.2 Expansion

Governments tend to become quite excited by the potential of marine farming as both an industry providing regional employment and/or economic benefits, particularly to remote, underdeveloped regions (Wood *et al* 1990). In the 1970s aquaculture

generally was also seen by governments as a morally justifiable response to demands for food (especially fish) to meet the needs of the growing world population. Contemporaneous with government excitement, individual entrepreneurs recognized the potential profitability of the new industry and invested in its growth, fuelling its rapid expansion (Coull 1988).

This ‘expansion’ stage is perhaps exemplified by the metaphor of the 'blue-revolution' (Weeks and Pollnac 1992, Coull 1993). The adverse social and environmental impacts of the 'revolution' tended to be overlooked as also did the reality that for most developed countries the market for marine fish farming production is either domestic or for other developed countries, possibly supplanting food from developing countries. Marine farming in developed countries does not meet the needs of developing countries, although the practice of high technology salmon farming has been exported to some developing temperate countries (e.g., Chile) where production costs were lower and regulatory regimes less restrictive (Wood *et al* 1990, Barton 1997, 1998). Little consideration appears to have been given in this expansion phase to ethical implications of intensive farming, such as concerns about 'battery-hen production' techniques for fish farming (especially for salmon farming in net cages).

The ‘expansion’ phase is characterised by, possibly overzealous (Dwire 1994), policies supporting the growth of the industry and often includes government assistance to encourage marine farming in particular areas (Bjorndahl 1988). This support might be financial or through policies on ownership (Wood *et al* 1990, Sandberg and Didriksen 1991). The expansion phase is also usually characterized, as in the case of New Zealand (Chapter Four), by support from the government institutions responsible for fishing, rather than cross-cutting government policies demanding support from all government organisations.

The consequence of this approach has been the development of single-sector aquaculture planning rather than integrated coastal management (ICM) (Sorensen and McCreary 1990, Anutha and O’Sullivan 1994c, Cicin-Sain and Knecht 1998). In British Columbia and Nova Scotia, for instance, marine farming and its supporting

government agencies have had to compete for slices of marine space against other industries, such as forestry and mining (Truscott 1994, Phyne 1996b). In an effort to give some certainty to marine farmers, their supporting government agencies have sometimes prepared (with or without statutory support) plans that zone areas as being 'for marine farming'. They also tend to prohibit marine farming from other areas (Amend 1989, Lloyd and Livingstone 1991a, Anutha and O'Sullivan 1994a, Truscott 1994, Phyne 1994, 1996b, van der Schans 1996, Anutha and Johnston 1996, McLoughlin 1997).

In New Zealand, the marine farming industry has gone through this expansionist phase in fits and starts from 1971 to the present, overlapping with the integrative phase that commenced in 1991. The phase was best characterized by the 'modern' era, but the expansion appears to have continued on into a 'transitional' era unabated and perhaps exacerbated.

6.1.3 An 'Integrative' Phase?

The expansion phase appears to be followed by an 'integrative' phase. Governments, partly reacting to increased levels of conflict between the expanding industry and other uses of the same environment, move towards ICM regulatory regimes for reasons discussed in Chapter One. The industry continues to seek growth, but now within regimes that recognize more explicitly the multi-use nature of the marine commons. During this phase, perhaps responding to the demands of multilateral 'free trade' agreements as well as local demands to be even-handed in dealing with conflicting user needs, some governments tend to reduce government assistance and subsidies to the industry (Jarvinen and Magnusson 2000). Others, such as Ireland, justify continued subsidization in terms of regional development needs (Ruddy and Varley 1991). The industry finds itself seeking fresh capital inputs from new sources or arguing for developments to proceed on grounds of regional development and sustainability (Jarvinen and Magnusson 2000).

In terms of regulatory regimes, the key distinction between an integrat**ive** phase and an integrat**ed** phase is that the integrative phase involves a *transition* from single sector to integrated planning. An integrated phase is one in which *integration has been achieved.* Consequently this phase is characterised by integrated planning and decision-making processes. The final form of ICM may differ considerably (for three very different approaches see Kenchington 1994, MacDonald 1994, and Rennie 1994b[1]), but is anticipated to be more efficient, co-operative, and user-friendly than single-sector planning (see also the discussion in Chapter One).

A leading Atlantic Canada authority, Andrew Boghen (1995c: xi-xii), described the change from expansionist to integrative phases thus:

> There is no doubt that in the past, the primary focus of aquaculture in Atlantic Canada was on research and, to a lesser extent, the establishment of appropriate administrative infrastructures. While good scientific research is critical to the advancement of the industry and has in fact become one of the unfortunate victims of our government's program of fiscal restraint, there is a growing awareness that if aquaculture is to realize its full potential it must, above all else, be regarded as a commercial endeavor.
>
> Aquaculture is indeed a business whose major commodity is food and whose driving forces are profit and jobs. Because it is profit more than anything else that generates interest in aquaculture development in Canada, we must begin to think in terms of sustainable profit, just as we have become accustomed to think of sustainable development in an ecological context. Without commercial stability and accountability, unqualified 'fly-by-night' growers will undermine the industry, weaken the social fabric of the community, and, in the short and possibly even the long term, cause serious environmental disruption. This is bad for business and bad for aquaculture.

It is interesting to note the range of issues encapsulated by Boghen in this statement. There is the acknowledgement of the original research and development focus, the subsequent withdrawal of government financial assistance and the recognition of the driving profit motivation that has emerged. There are also, however, the cross-cutting social concepts of 'jobs' as a motivater, the deriding of "*unqualified* 'fly-by-night'

[1] In passing it is interesting to note that whereas Tasmania adopted much of the New Zealand Resource Management Act approach (and wording!) it preferred the Town and Country Planning Act maritime planning scheme approach for implementing ICM (Anutha and Johnston 1996), an approach New Zealand discarded with the advent of the RMA (Rennie 1994b).

growers", and mention of the social fabric of the community. There is also a begrudging recognition that over time the mariculturists have come to think in an ecological context and concern themselves with 'serious environmental disruption'.

Earlier in the same preface, Boghen notes that in the six year period since the first edition of the book (Boghen 1989) there had been significant social changes. He notes: "With this in mind, a preoccupation with the *environment*, which has become the order of the day, must necessarily be broadened to include concerns about the social, economic and political *environments* as well" (Boghen 1995c: x). Consequently, a chapter specifically on conflict resolution, including "multi-user conflicts over a finite resource", was included in the second edition (Boghen 1995c: xi). Boghen's reluctant, belated recognition of the need for an holistic approach to considering mariculture is reasonably representative of the literature (Barton and Staniford 1998). Most researchers writing on developed countries' marine farming draw attention to the phenomenal growth in aquaculture production during the expansion phase and look for ways to further that growth (e.g., Bailey *et al* 1996).

In relation to British Columbia, Truscott (1994) describes industry integration as a 'restructuring stage', that occurs after an 'entrepreneurial stage', and before governmental 'integrated planning'. He appears to incorporate 'entrepreneurial' within the 'expansionist' phase, and his restructuring stage appears linked with his integrated planning stage. Although evidence of industry restructuring is present in New Zealand mussel and salmon farming (Edmond *et al* 1986, Wood *et al* 1990, Hickman 1995) I am not convinced that it necessarily predates attempts to integrate planning. Non-statutory attempts to integrate marine farm plans had occurred contemporaneous with the various periods of industry restructuring (see Chapters Four and Nine). I have therefore retained the broader 'integrative' concept as being primarily determined by deliberate attempts to integrate the planning and policy contexts for the industry rather than industry integration.

Whether the late-1970s/early-1980s New Zealand experience forms part of an integrative phase is arguable as there was little statutory expression of an ICM

approach (Chapter Four). At least since the passage of the RMA, however, and perhaps dating from the review of coastal legislation initiated after the formation of the Department of Conservation in 1987, New Zealand's marine regulatory regimes have been in an integrative phase.

This perhaps highlights the difficulty of identifying when a new, post-integrative phase will commence and what might characterize it. Within the industry, for instance, the farming of particular species may experience expansion phases followed by periods of collapse or standstill, perhaps even consolidation, followed by further expansion or even slow decline. Periods of decline may be masked by increased value of secondary processing of the products, diversification into new species, and/or higher profitability as a consequence of, for example, exchange rate fluctuations (Coull 1999).

It can be argued that the New Zealand industry has expanded rapidly during the integrative phase (see Chapter Ten), but this may be due to delays in completing the integration rather than a failure of the model itself. Alternatively, it could be argued that the national moratorium implemented since 2001 represents a response to the failure to achieve integration. If, however, the integrated planning regime effectively facilitates marine farming expansion, then the integrative phase may appear as a simple inflexion point on the curve prior to a new expansion phase for the industry. This new expansion phase might be fuelled by technological developments at all levels of the production, harvesting, processing and marketing chains and could include diversification into new species (Coull 1999). I will return to this in Chapters Twelve and Thirteen as these matters lie at the heart of my analysis of the change from modern to post-modern planning.

6.2 Towards an Aquacultural Geography

The preceding discussion should not be taken as indicative that all countries' development paths have been identical. There have been similarities and differences in the operation of variables affecting the development of marine farming between

and within different countries. For instance, the nature of property rights available, the ownership structures, the type of planning regimes, the species farmed and the farming methods employed all vary to some degree, but marine farming appears to have similar basic requirements in each of the developed, temperate Western countries (see Chapters Two and Five).

Unfortunately there is little readily available literature on the spatial distribution of farms and very few published articles are accompanied by maps detailing individual farm sites. In a sense the geography of marine farming is in an analogous position to the early days of agricultural geography – it needs to map out its 'place'. Barton and Staniford (1998), in attempting to set a research agenda for an 'aquacultural geography' based on principles of sustainable development, argue that geographers have overly focused on the terrestrial environment to which the sea is usually of peripheral interest. In setting their agenda, however, they overlook the potential contribution of a synthesing *regional* geography to such research endeavours. The desirability of establishing a better understanding of the geographical development of marine farming is subsumed by their interest in achieving sustainable development of the industry.

Understanding the influence of regulatory regimes on the aggregate outcome of individual locational decisions made by marine farmers, in different places at different times, seems essential to an aquacultural geography regardless of its normative intentions. Otherwise the anticipated outcomes of changes in those regimes may not be realized and the impact they have had on regional development may well be misunderstood. Given the lack of an aquacultural geography that addresses the spatial outcome of regulatory regimes at a regional or sub-regional scale, the remainder of this chapter is focused on developing some speculative models of the spatial development of patterns marine farming might be expected to manifest under different regimes and policies.

6.3 Some Theoretical Models of Marine Farming Location

In this section, I develop some models of patterns that might be expected to occur in the allocation of marine space for marine farms. These are based in large part on a combination of traditional geographical models for terrestrial land use (e.g., Haggett *et al* 1977) and the variables that the review in Chapter Five indicated are likely to affect the choices of marine farmers. The models chosen as relevant, and the form in which they are presented, draw on inferences from comments made by various authors discussed in Chapter Five (notably comments relating to remoteness, the consequences of government policies, and the impact of new technological developments and factors affecting commercial viability).

6.3.1 Standard Mariculture Spatial Models

Despite the absence of general theories of the spatial evolution of marine farming, a number of mariculture researchers have expressed views on the past and likely future evolution of farming. Two loose sets of expectations are apparent:

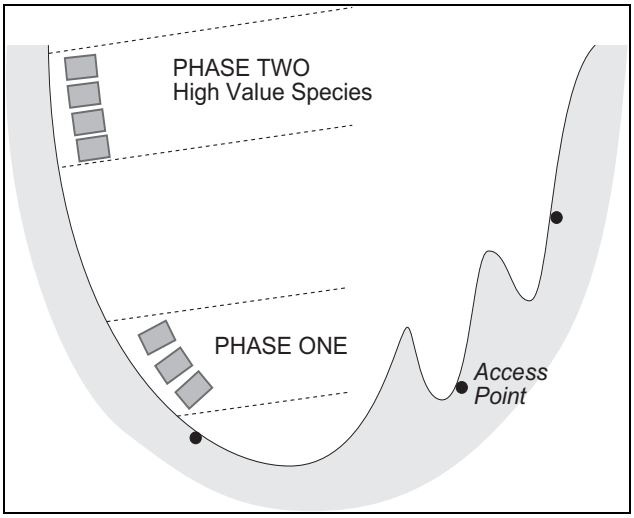
(1) A simple, uni-directional single spatial shift model: Marine farming will be increasingly pressured to move from the sheltered inshore locations to the remote, more exposed outer coasts; or

(2) A graduated, uni-directional progressive shift model. There is a compromise location somewhere between the ideal of being in accessible, sheltered waters, which are close to markets and processors, and alternative locations remote from potential conflicts with other water users (e.g., urban polluters and recreational users).

The first view is reasonably self-explanatory and the expected resultant spatial pattern is relatively straight-forward (Figure 6.2). In the first phase of marine farm development (perhaps equating to the early days in the evolution of the industry) sites are chosen close to a home base, access, or market/processing point. The regulators

or the farming investors recognize the inevitability of having to shift away from highly sought after inshore waters which may have become polluted due to urban expansion. The costs of farming at a distance might be much higher and necessitate farming higher value species, but in any case the second generation of farms (phase two in Figure 6.2) is established in more distant sites that are likely to be more favourable over the long term.

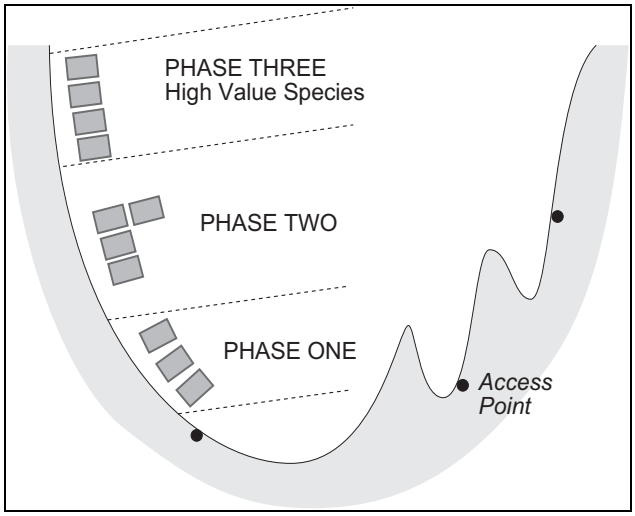
Figure 6.2 A simple uni-directional single shift pattern



The second model is slightly more complex although the argument is very similar. Essentially, as urban (or peri-urban) populations expand and urban areas grow (or their commuter satellite centres spread) toward the farmers, the market will move closer to the farmers (reducing costs of transport), but so too will the pressures on the use of the water. The pressures may be particularly strong near access sites for recreation. A *progressive* relocation of marine farming further toward the outer reaches of harbours/inlets/fiords will occur as marine farmers find the competition for the water space is too intense. As this process continues through a number of iterations those sites initially acceptable may become, in hindsight, transitory. Such an iterative pattern of relocation would, over time, result in a migration of marine farms from the nearer locations to more distal ones (with high values species), pushed by the expanding commuter/urban population (Figure 6.3).

Planners accepting such a model might be expected to limit the term of leases/licences in line with expected terrestrial or urban growth patterns and to reserve suitable areas for marine farming in the more distant coastal extremities. As an interim measure planners may focus attention on middle distance locations and plan for them. If urban areas are not expected to expand, or leisure activities are not anticipated to increase around sites readily accessible to urbanites, then the degree to which the more distant coastal extremities of an area need to be reserved for marine farms will be considerably less.

Figure 6.3 A graduated uni-directional farm migration pattern



This argument is in fact a more refined version of the first model of a simplistic, direct movement from inshore to more exposed, outer coasts (Phase Three sites). It also may be seen as a variant of a 'von Thunen model' that emphasizes the importance of cost surfaces in determining land-use variations (Chisholm 1962, Haggett *et al* 1977). A distance-decay function is often part of the model and it should be possible to use it to consider the competition for water space from other users. Thus only those activities, for example, cultivation of high value species able to return a profit sufficient to offset the costs of being distant from a market, might be found in outer coast, offshore or isolated (difficult to access) locations. Unfortunately, due to problems with collecting data on distance to farms (discussed in Chapter Eight), this aspect of the model is not explored here. Other aspects of the model that were beyond the scope of the current research to investigate were the

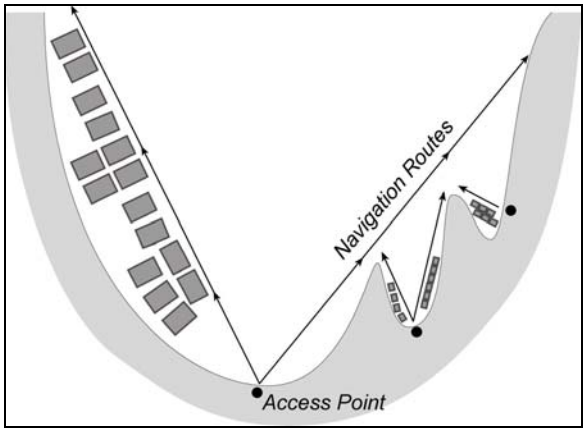
effects of differences in farm management practices and variations in the productivity of particular marine environments.

6.3.2 Ribbon Development

The ribbon development model draws on traditional concepts of urban settlement. Unless constrained by significant biophysical parameters or plan rules, both of which might impose considerable costs, a pattern of ribbon development of housing may occur along the margins of roads on land as each house seeks ready and direct access to the road. A single ribbon may be 'thickened' by a second ribbon of houses and so on (Haggett *et al* 1977).

When considering the conflicts between navigation and marine farming it seems reasonable to suggest that although the 'right to wander' over marine space may be limited, there are definite 'navigation routes (fairways)' in the marine environment (Chapter Five). If the regulatory regime gives precedence to navigation, then ribbon development may also occur in the marine environment as marine farms spread along the sides of major navigation (transport) routes (Figure 6.4).

Figure 6.4 A ribbon development pattern



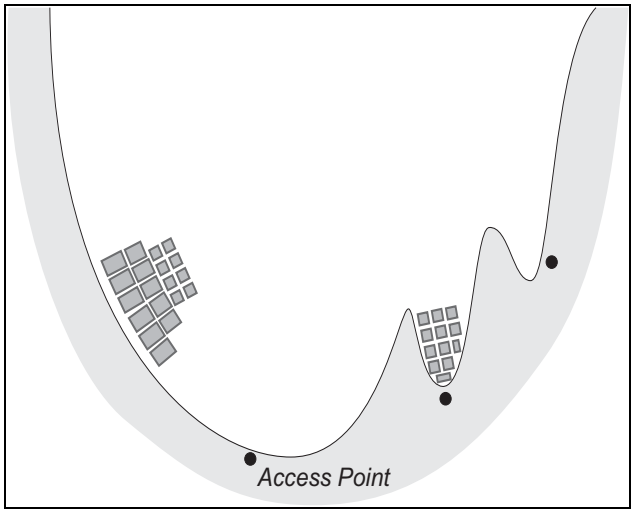
These routes should not be impeded, and are necessary for farmers as they transport their produce to the land access points to which the routes lead. These land access points are important for accessing markets for the product as well as for getting equipment and materials to the sites. Seabed farming, however, would not

necessarily impede navigation and it is conceivable that rights for marine farms could be allocated in navigational channels for such seabed activities *if* the regulatory regime enabled such a distinction.

6.3.3 Centralised Model

Running counter to the ribbon development model is the agglomeration or centralisation model. Under this model, promoted in Atlantic Canada (Boghen 1995a), efficiency gains are anticipated through the concentration of similar activities in particular areas (Figure 6.5). This would result in large groups (or blocks) of farms in an area to achieve economies of scale within the industry. This pattern may be a consequence of deliberate government policy, such as that promoted in New Zealand in the 1970s (Chapter Four). Alternatively, it may arise by default as farmers are discouraged from using particular areas considered important for competing uses. Eventually the marine farmers are left with a more restricted area in which they can carry out their activities. The primary driver for this model, however, is that it is *intended* to concentrate the farming activities in favourable sites, rather than that they are concentrated *by default*, possibly in less favourable locations.

Figure 6.5 A centralised pattern



This model draws in part from terrestrial planners' concepts of creating zones for industrial estates or development centres. The approach has been described as an

example of ‘integrated coastal planning’ in Hawaii, where it was applied to combine land and marine areas as an aquaculture park (MacDonald 1994). In Hawaii, the approach was used for more highly technical, industrialized, intensive marine farming activities and it may be more appropriate for species such as net-cage farmed fish (e.g., salmon) than to the less intensive activities (e.g., oysters). In Atlantic Canada, however, encouragement was given to concentrate the development of the less intensive, shellfish farms in blocks to achieve economies of scale (Boghen 1995a).

Given the late 1960s/early 1970s urgings of New Zealand central government officials that marine farming should move away from smallholder farms to larger, industrial scale developments to achieve economies of scale (Chapters Three and Four) then this pattern could be expected to feature prominently in New Zealand. Farmers might be reluctant to adopt such an approach, however, if they considered the effects of being close to other farms might expose them to greater risks of disease, pollution and/or competition for natural food supplies and spat. If this pattern is present it might be more apparent during modernist planning regimes where there was considerable central government control than under post-modern regimes.

6.3.4 Conflict Resolution Model

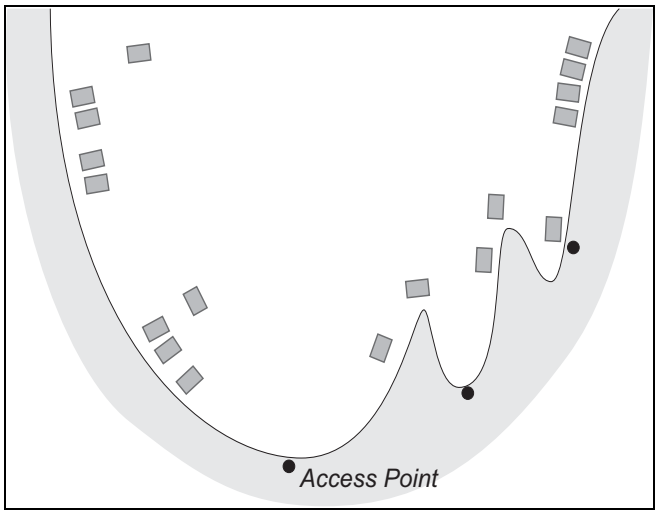
It is possible that a conflict resolution model could emerge not so much from any theoretical position as from pragmatic government responses to pressure to resolve conflicts. These responses could have led administrators to develop regulatory regimes (possibly even plans) based on assumptions of conflict avoidance, especially with respect to conflicts arising from perceived environmental effects of particular standard types of marine farms (e.g., the common mussel longline farms). Plans based on such approaches would identify where proposals for marine farming are likely to meet greatest opposition and zone these areas in a manner to prohibit marine farming.

Areas where marine farms were expected least likely to conflict with other uses would then be zoned to permit marine farming as of right, and the intervening areas

would then become ‘zones of contest’ where discretion is exercised. This approach differs from the ‘by default’ option discussed for the centralised farm model because it is deliberately planned, and zoned. It does not arise as a result of individual applications. It is exemplified by the ‘Tasmanian Department of Primary Industry and Fishing’ and ‘British Columbia Lands’, critiqued by Anutha and Johnston (1996) and Truscott (1994) respectively. It also seems present in Nova Scotia (Dwire 1996), Finland (Eklund 1996) and Scotland (Lloyd and Livingstone 1991a, b).

In situations where the regulatory regime gives planners or decision-makers considerable discretion, individual power would assume great importance under this model. The resultant pattern of farms would be likely to reflect a scattering of semi-agglomerations, but with occasional single farms or small clusters seemingly with little rhyme or reason evident (Figure 6.6).

Figure 6.6 A conflict resolution pattern



Human agency theory may be especially fruitful in explaining observed local patterns of spatial development under such regulatory regimes. The location of such zones and the spatial expression of farm ownership and farming activities within them may not be as predictable, clear or consistent as they would in situations with less discretion.

This approach is distinctly different from earlier 'proactive', activity-based attempts at zoning *for* marine farming wherein zones were based essentially on the ecological criteria for farming and ignored the social component (see, for instance, Lloyd and Livingston 1991b, and Anutha and O'Sullivan 1994a). In the New Zealand context, the early days of marine farming might be expected to reflect such an approach with marine farmers having to avoid sites where terrestrial farmers had opposed their presence. In the expansion phase, competition with commercial fishers and recreational users might have led to such a conflict resolution approach, with cases decided on their individual merit. It is also necessary to recognize that the scattered pattern that results from such an approach might also result from a policy requiring an even geographical spread of farms (e.g., the Shetland Islands as discussed in Chapter Five). In other words these seemingly random scattered patterns might have a variety of causes.

6.3.5 Rangelands Models

Drawing on the experience of rangelands development and allocation may provide some useful insights into the spatial patterns that might be expected because of the underlying property rights associated with rangelands and marine 'commons' (cf. Tiddens 1990, Hanna 1997). Rangelands in the USA, Australia and New Zealand are public land, primarily administered by central governments (Holmes 1995). There are distinct differences in the management approaches adopted in the USA and those generally adopted by New Zealand and Australia. Holmes (1995: 265-267) describes these as the American and Antipodean models respectively.

Holmes argues that, initially, governments attempted to restrain the spread of settlement in all three countries. Untrammeled private ownership of the wide 'empty lands' was resisted, enabling "governments to pursue land-related policies through proprietal ('landlord') powers as well as sovereignty powers" (Holmes 1995: 265). Limited term leasehold approaches were adopted in the antipodean model, initially as a temporary expedient measure, with the government being able to impose standards in relation to minimal stocking levels and other aspects of farm management. The

initial expediency was driven primarily by a desire to use the resources, while waiting for the 'agriculture frontier' to push into these areas. Environmental constraints essentially prevented agriculture extending into the rangelands areas and pastoralism became recognised as the 'best' (most food productive or highest value) use. Lack of competition for the areas meant that strong institutional ties developed between pastoralists and the relevant government authorities. The result was a creeping incrementalist strengthening of property rights for farmers, with such things as 'rights of renewal' incorporated into leases. As discussed in Chapters Three and Four, such rights of renewal are also found in various forms in New Zealand's marine farming legislation.

In America, however, almost all land was held federally, not by states or provinces with localised interests. The agricultural frontier was also able to extend across the western rangelands. The Homestead Acts supported this development, enabling land to be freeholded into 160 acres or leased (Tiddens 1990, Holmes 1995). This led to strategic acquisition of land parcels and essentially unregulated open access to federal rangelands with associated environmental mismanagement. It was not until the Taylor Grazing Act 1934 that the emphasis of land use policy was changed from disposal of public lands to bureaucratic administration of them. The result has been a sharp differentiation between 'home ranch' areas and associated grazed open rangeland. The home ranch areas are almost invariably the highly productive 'oasis' sites, whereas the open range tends to be less-productive land (Tiddens 1990, Holmes 1995).

Holmes (1995) notes also that the use of leaseholds (rather than freeholding) provides government with greater flexibility to accommodate new 'best uses' as they emerge from a changing society. Multi-use management became the preferred approach, with more secure rights being provided to preferred best uses. Holmes (1995: 276) also suggests that distinctive zonal differences in land occupancy and resource use enables Australia's rangelands to be divided into three zones: "the more closely settled inner pastoral margin; the zone of manageable pastoral lands; and the outer marginal zone." These primarily reflect productivity and Holmes advocates different

institutional structures be adopted to manage each zone. More secure, long term or perpetual rights would be provided in the more productive inner zones to facilitate investment and development; longterm leases in the middle zone, coupled with government provision of necessary infrastructure, and limited public access; and in the outer zone, flexible, short term leases enabling wild capture of stock rather than active farming/pastoralism. Different forms of planning would apply to each zone with the outer zones requiring the most comprehensive planning to accommodate multiple uses and address the vulnerability of the ecosystems.

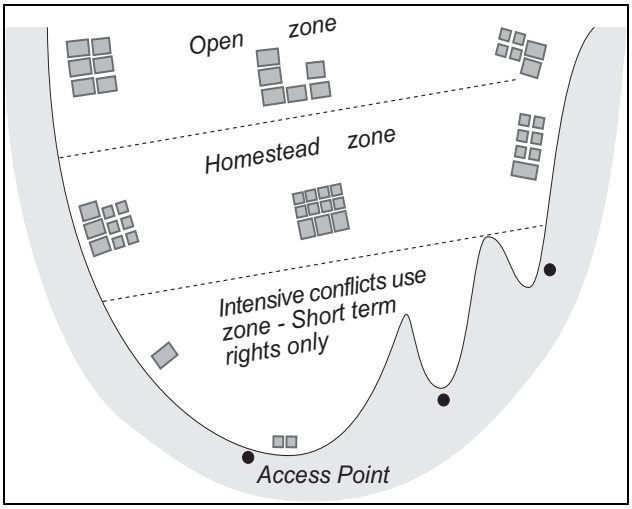
The New Zealand rangeland situation, however, is somewhat different. A much broader range of potential activities are present, but efforts to restructure the institutions ran into major difficulties because of the perpetual rights of renewal of leasehold land and leaseholders arguing that any attempt by government to alter ownership structures was a breach of contract (OConnor 1993, Holmes 1995). Devolution of environmental matters to regional councils meant also that the rangeland responsibilities would no longer be managed in an integrated fashion. In addition, Maori land claims intervened in attempts to restructure the ownership rights between 'conservation' land (available for multi-purpose public use) and production land (to be freeholded to the farmer) (Holmes 1995).

These rangelands models may have analogies in the marine farming experience in New Zealand. Certainly, marine farming overseas has seen the farms 'homesteading' 'oasis' sites of productivity of importance to local fishers (Phyne 1999, Steins 1998). Whether an Antipodean or an American model of rangeland development is more directly analogous to the marine farming experience may provide insights into critical differences between administration of land and sea resources. The models might also usefully inform explanations of marine farming in New Zealand. Certainly some interesting variations may be anticipated, given the introduction of the Quota Management System with its individualised, perpetual rights to harvest fish from identified areas in which marine farmers are starting to establish their 'homestead' operations (Rennie 1993b, 1997). The relationship and level of integration between

the two sectors is important to consider. A model based on Holmes' (1995) rangelands' concepts might appear similar to that illustrated in Figure 6.7.

The high level of conflict in the inner zone might render it more marginal and less productive for marine farming. It might, however, be useable for high risk, perhaps experimental, high value or low cost farming. The regulatory regime would provide only short term rights to farmers to retain flexibility to meet the other needs and to fit with the expectations of the social milieu in such high use areas. A 'homestead zone' with long term rights would sit in the middle-distance. It would have the capacity to provide centralized blocks around the oasis sites and would have reasonably high concentration. An 'open zone', further out to sea and more remote, would be less productive because of the higher costs of technology in such areas and might have to compensate by having larger individual farm sites to ensure sufficient returns to make the venture worthwhile to the farmer. These sites would require even longer term leases, possibly *in perpetuity*, to justify the farmers taking the risk of investing.

Figure 6.7 A rangelands model



This is the most speculative of the models proposed here. It is used in part to indicate a different type of regulatory regime wherein the Crown assumes a much more modernist approach, but also allows for appropriate incentives and flexibility to adapt to technological innovations.

6.4 Summary and Conclusions

In this Chapter I have suggested that the development of marine farming follows a standard logistic curve comprising three phases: 'early days', 'expansion', and 'integrative'. The 'integrative' phase is characterized by attempts to provide an integrated policy and planning environment, rather than necessarily a period of industry restructuring, although the two may occur contemporaneously. It is also important to note that the integrative phase may take the form of an inflexion point followed by any one of an expansive phase, no growth or even a decline. More important in this phase is the withdrawal of direct government subsidization of the industry as it becomes integrated with the rest of the users of the marine environment and other sectors of the local and, possibly, global economy.

Industry may respond to the integrative phase in many different ways, including higher value processing, obtaining more farm space or diversification into different species, products and markets. This phase is one that has coincided with and is largely defined by the international move to Integrated Coastal Management which is such a recent (1990s) phenomenon that a general industry response has yet to be reported in the research literature. I have argued, based on the discussion of the regimes in Chapters Three and Four, that New Zealand has been in an integrative phase at least since the late-1980s, but that integration had not been fully achieved by 2002. To a large extent, therefore, the expansion phase in New Zealand occurred during a 'modernist' marine farm planning era, and the integrative phase includes the more post-modern 'transitional' era discussed in Chapter Four.

If this is a valid periodisation, then the planning and policy regime will undoubtedly affect the spatial development of the industry, perhaps to a greater degree than has previously been recognized in the literature on variables affecting farmer's choice of farm sites. It is suggested that an aquacultural geography needs to take this into account and consider the possibility that different types of regulatory regimes may leave distinct spatial signatures or patterns. A selection of possible models and their associated spatial patterns has been outlined to illustrate this concept. These draw

largely on terrestrial experience and have been presented very simplistically because the lack of empirical research on the patterns of marine farming severely constrains the degree to which it is appropriate to speculate, extrapolate or refine such models. For instance, the terrestrial analogies may well be inappropriate in the marine context despite their frequent metaphorical use in the literature. It is also quite probable that some spatial patterns are multi-causal and/or that some causes may not show distinct spatial outcomes.

The change in regulatory regimes over time, combined with the industry having different stages of development, means that in different temporal periods quite different patterns might be manifest. Development of different species may commence at different times and have different rates of progress through the development phases. It is therefore important to consider the spatial expression at different times under different regulatory regimes, rather than simply consider the most recent expression.

It is also important to recognise that the relationship between regulatory regimes and the spatial expression of marine farming development is, in large part, determined by the perceptions and responses of farmers. Indeed, anticipation of the possible and probable responses lies behind decisions on the design of particular regulatory regimes. If the role of the local social milieu is as important as suggested in Chapter Five, then different regions within a country may have quite different patterns of marine farm development. This is especially likely to be the case if the regulatory regimes provide for considerable local community participation in planning, as does the Resource Management Act 1991, or the state uses the planning mechanisms to achieve state development objectives under a modernist regulatory regime. The views of the farmers are therefore critical in seeking to understand the spatial development of marine farming and the role played by the regulatory regimes.

This Chapter completes Part Two of this thesis. This Part has clearly established the need to explore the individual variables that affect marine farmers' decisions on sites to farm and the desirability of assessing the spatial expression of the aggregate of

those decisions and those of the governors of the marine commons. The matters discussed in this Chapter will be revisited in the discussion and concluding Chapters (Chapters Twelve and Thirteen). In Part Three of the thesis I set out the methods I used to obtain empirical data to explore these issues.

Chapter Seven: Research Context, Methodology and a GIS

Parts One and Two of this thesis have suggested that planning regimes, especially if seen as an apparatus of state, can play a significant role in affecting the development of marine farming, its spatial expression and social structure. New Zealand provides an excellent opportunity to explore the impacts of different regulatory regimes on marine farming development. This is because since 1971 there have been statutory provisions for marine farm planning. Non-statutory plans were also in place prior to any statutory plans (see Chapter Nine). The Resource Management Act 1991 (RMA) changed the nature of the planning legislation so significantly (as discussed in Chapters One and Four) that it enables comparisons between the pre- and post- RMA periods.

The first part of this chapter outlines the key features of the planning regimes in New Zealand and their impact on marine farmers. This is followed by a summary of the primary assumptions underlying the research, the methodologies employed and the methods used to elucidate the spatial patterns of marine farming in New Zealand. In Chapter Eight, the survey and documentary methods employed to find explanations for the patterns are described. These two chapters comprise Part Three of the thesis and together they describe the methodology and methods used to explore the questions raised here and in the preceding Parts of the thesis.

7.1 Key Features of Relevant Planning Regimes

The degree to which different planning regimes enabled individual discretion, facilitated the expression of community concerns, empowered capital or people, and represented an extension of the state and its will, has been identified as important in shaping the development of marine farming (Chapters One, Five and Six).

As noted in Chapters One and Four the RMA does not give much weight, if any, to socio-cultural variables other than those related to Maori as tangata whenua and Treaty partners. This is in stark contrast to the much greater importance placed on

socio-cultural variables in previous and overseas planning legislation. The RMA is the tool under which planning for the allocation of marine water space out to the 12 nautical mile limit of the entire territorial sea has been implemented for New Zealand (Rennie 1993b, 2000a). This effectively means that the rules in regional coastal plans prepared under the RMA will provide the first comprehensive guidance to decision-makers as to the allocation of all its marine territory between different uses.

These plans are, effectively, the equivalent of district plans and district planning schemes that have been established for all New Zealand's mainland areas under the various Town and Country Planning Acts and the RMA. The consequences of the RMA's implementation at sea are therefore likely to be greater than its implementation on land. The first order allocation of land (through 'title') from the Crown to individuals has largely been completed for the nation's terrestrial resources and the RMA does not operate to allocate land title. In the marine environment, however, it effectively does provide temporary 'title' through coastal permits of up to 35-years duration.

Key features of the pre-RMA regime include that there was a mishmash of non-integrated planning approaches and regulatory arrangements (see Chapters Three, Four and Nine). Once any form of planning had commenced, there was a considerable range of criteria on which the planning and allocation of space for marine farms were based. Some statutes (e.g., TCPA77) had the locus of decision-making closer to the affected communities than did others (e.g., MFA71) and social factors were given greater weight prior to the RMA.

The introduction of the RMA moved the emphasis of coastal planning to an effects-based approach and to sustaining the biophysical environment. Consequently it could be expected that the types of rules in coastal plans after the RMA would be more focused on the effects on the biophysical environment than those before the RMA. This would place the onus on developers to adopt technology to reduce the effects of their activities on the environment so that they could farm in places once their effects on the biophysical environment were considered sufficiently limited to be acceptable. Zones, if used in the plans, were not expected to provide specifically for, or constrain,

activities such as mariculture. This approach was expected to result in marine farmers adopting new technologies and management practices to obtain or use space that might have previously been unavailable to them (Rennie 1993b). At the same time they would lack the certainty that might be derived, in pre-RMA days, from the government or local authorities identifying mariculture as a preferred activity in parts of the marine environment.

The nature of property rights has changed. As illustrated in Chapter Four, the RMA/FA right is considerably stronger than those available under previous New Zealand regimes. Whether the stronger right is the preferred right might be reflected in the degree to which old rights are retained in preference to converting to the new RMA based rights.

Finally, the RMA makes more specific provision for Maori and environmental issues to be considered. These changes should therefore result in greater certainty as to what might be considered in the decision-making than did previous more general 'public interest' provisions. Shifting the onus of preparing the environmental impact assessment from the decision-makers to the applicants, however, may have increased the start-up costs for marine farmers under the RMA regime.

Therefore, spatial patterns that might result under the RMA could be expected to be quite different from those of the preceding regime. These might be characterized by: new areas being obtained by farmers; higher start up costs, leading to fewer small players being able to participate and a resulting change in the structure of the industry; greater community involvement; and new or different forms of marine farming becoming prevalent.

In order to be able to assess the spatial expression of any changes that may have eventuated from the change in planning regimes, maps are required that show the location of specific marine farms. Detailed maps are remarkably absent from most of the readily accessible published international literature. Useful maps should enable ready identification of the different types of rights attached to each marine farm, including the nature of species involved (provided by 'variations' if not included in

the original permit), the owner, the owner's address, the commencement date and duration of the rights, the area occupied and shape of the farm, and the proximity of the farm to various other features (e.g., bathymetry, access points, and other farms). Efficient manipulation of such data would appear best achieved through using a Geographic Information System (GIS) (Nath *et al* 2000).

7.2 Understanding Marine Farmers

Simply being able to identify the spatial patterns of marine farms in relation to particular historic periods would, however, not be sufficient for assessing the impact of different planning regimes. That would require some understanding of the variables that have affected marine farmers in their choice of location. In my review of the literature (see Chapters Five and Six) I was unable to locate any material that provided examples of scientifically rigorous studies in developed, Western nations that identify the weighting given by the marine farmers themselves to variables that affected their choice of sites.

In many articles, unsupported assertions were made as if the factors determining sites were self-evident. In other instances, anecdotal evidence was provided in support of particular views and the explanations provided by scientists (social and biophysical) were based on their assessments of what *should be* viable sites. The degree to which such advice may or may not have been heeded by the actual marine farmers appears to have been rarely investigated (see Weeks and Sturmer 1996 for an exception). It is frequently noted in the literature that many of the original pioneers essentially 'learned by doing' and that many subsequent marine farmers often were not as well-informed or as capable (Tiddens 1990, Boghen 1995b, Sandberg and Didriksen 1991). It seems important, therefore, to have some understanding of the factors that New Zealand's marine farmers tend to consider. The relative weight they give to the variables when reaching decisions on the suitability of sites is of obvious importance. The methods for doing so are discussed in Chapter Eight.

7.3 Primary Assumptions

The primary assumptions guiding the methodology employed in this research have therefore been:

- ideological positions have driven changes in the regulatory regimes;
- the RMA encourages a post-modern, neo-liberal planning regime that has had substantially different spatial outcomes for marine farming development than the preceding modernist MFA71 regime and its predecessors;
- socio-cultural variables are sufficiently important in determining the spatial development to warrant particular attention;
- biophysical variables are mediated through individual perceptions and the weight accorded to the variables may therefore differ between individuals, possibly as a consequence of differing individual characteristics;
- if particular relationships exist between characteristics of the individuals involved in decisions about the location, the types of farms/farming practices, and the weighting given to particular variables, then these can be assessed using tools available to social science; and
- variables identified in the international literature about developed, Western nation marine farming are applicable to some degree to New Zealand.

The literature and experience reviewed in Parts One and Two suggest these are sound assumptions. Research based on them will provide useful insights into a geography of marine farming even if some are subsequently found to be flawed. For instance, regulatory regimes may have resulted through a form of incrementalism, a muddling through that has no clear ideological direction, but as an official working for the government during the 1980/90s it was very clear to me that certain ideological positions drove the development of both the RMA and the associated fisheries regimes (see also Memon 1991, 1993, Buhrs and Bartlett 1993, Rennie 1993b, Memon and Gleeson 1995). Research based on the assumption that ideological positions have driven changes in the regulatory regimes would provide useful insights even if it was not applicable to earlier regimes.

The assumption that is perhaps most vulnerable, is that the international variables affecting individual farmers choices are generally relevant within the New Zealand context. Some might suggest, for instance, that the relationship of the Crown and Maori and the nature and role of Maori culture in New Zealand might lead to different outcomes than those found overseas. If my assumptions were incorrect then this might have major implications for the outcome of the research. Although the views of key New Zealand authors (such as Jenkins, Curtin and Hickman) were incorporated within the review that gave rise to the table of variables (Table 5.1 in Chapter Five) no New Zealand studies of farmers' views on such variables was found. Consequently, as discussed in Chapter Eight, part of the research questionnaire sought to confirm the validity of this particular assumption.

7.4 Time Period Studied

The research required broad-scale data on the nature of New Zealand marine farming covering a time period sufficient to encompass the significant changes in government policy and in society in general. As noted in Chapter Four, a two-year moratorium on marine farming in the Marlborough Sounds ended in 1998. A study of changes in marine farming over the 30-year period 1968-1998 would encompass the significant social and institutional changes as well as incorporate key marker dates for era in marine farming. This period would be sufficiently long also to enable such changes to be reflected in the spatial pattern of the industry, as well as possibly enabling an assessment of evolutionary changes in the industry in the New Zealand context. Consequently, the period 1968-1998 was initially chosen as the period on which this thesis would focus. The reality of field data collection (discussed in Chapter Eight), coupled with the significant changes in policy in November 2001, as I was preparing the final drafts of this thesis, necessitated extending the period covered to the year 2002 for some aspects of the research.

7.5 Selecting an Appropriate Methodology

Explaining the patterns observed requires an understanding of the weight given to various key variables by the decision-makers. This appeared best approached

through a survey technique (discussed in Chapter Eight). The issue of compatibility with the social milieu must also be addressed. Although an approach based on assessing the socio-economic data for an area or region surrounding marine farming was a possibility, this appeared not to have been done in the past except in British Columbia (Truscott 1994, Nath *et al* 2000). Instead, the rhetorical landscapes that were created by conflicting parties during the statutory decision-making process had played significant roles in influencing the approving authorities and individual farmers and community members (Dwire 1994, 1996, Eklund 1996).

The role of key groups and individuals in influencing the outcome of the processes of allocating space needed to be addressed if the role of human agency was to be adequately investigated. Who actually wielded influence was anticipated to be difficult to identify. Some influential people may draw their power from the positions they hold, others may have power from sources that are not so obvious, and those that do exercise power may not be readily apparent from outside their organisation. Where individuals were influential, they were expected to be identified during the survey process and case law analysis.

The institutional structures (including the planning and property rights regimes) involved are critical to the research and have been described in Part One. The formal *de jure* institutions are set out in various statutory documents and these are further interpreted through policies, plans and case law. An analysis of these was essential (and is largely set out in Chapters Three and Four), but this might not identify all the *de facto* institutional regimes in place. The latter might be obtainable through interviews and survey data and through analysis of relevant key documents from case law or planning hearings. The documentary analysis employed is discussed in Chapter Eight.

In summary, it was initially envisaged that the methodology would comprise an historical tracking of the development of marine farming in New Zealand (Part One). This would be followed by an analysis of policy and planning documents to elucidate the formal processes for allocating space (e.g., legislation, national statements of policy, coastal plans, and relevant case law). A subsequent analysis of key case law

would provide a more in depth understanding of the issues that were critical in the final decisions. This would be supplemented by a national questionnaire survey of marine farmers to identify weighting given to key variables and individual characteristics that might have affected their decision-making.

A series of interviews with people in the bureaucracy charged with advising marine farmers and decision-makers was also considered necessary. It was envisaged that this would help to identify the influence of human agency within the bureaucracy, as well as the role of institutional conflicts in reaching key decisions. The necessity for this was suggested by the literature reviewed (Dwire 1994, 1996, Phyne 1994, 1996a, b, c, 1999, Lloyd and Livingstone 1991a, b) and by my experience working in government departments.

7.5.1 Significant Events During the Research

Contemporaneous with the development of this thesis five significant events occurred that led to a modification of the methodology. In 1996, the Minister of Conservation announced a moratorium on marine farming applications in the Marlborough Sound. This was to enable the Crown to implement a tendering process to allocate rights to apply for coastal permits for marine farming. This unprecedented step had been invoked to address the large number of applications being received.

Concurrent with the pressure on the Marlborough Sounds, Environment Waikato was faced with a large number of applications for an area in the Firth of Thames. Environment Waikato addressed this through the permitting system and concluded the process by effectively establishing its own moratorium on marine farming, pending completion of its regional coastal plan which included an entirely different planning response to marine farm development than that adopted elsewhere in the country (see Chapter Nine).

The third significant event was a consequence of the Marlborough moratorium. Maori were concerned over the implications of the tendering of rights to space in the marine area when their claims to these areas had yet to be addressed. They

challenged the presumption of Crown ownership of the foreshore and seabed and, unsuccessfully, sought an extension of the moratorium to enable their concerns to be addressed (Appendix Three). The removal of the moratorium resulted in a renewed rush for the available space.

The fourth significant event was the public release of a government policy discussion document seeking views on alternative proposals for significant changes to the existing legislation (Ministry of Fisheries and the Ministry for the Environment 2000). The timing of this release coincided with both my national survey and fieldwork interviews and these each had to be modified to take into account the highly charged political context in which I was working.

Finally, as noted in Chapter One, the Government introduced a national moratorium in November 2001 in response to the rush for marine space and a significant court case in Golden Bay (see Chapter Nine). It also signaled its intention to introduce legislation that would lead to a standardized approach to allocating space for marine farming.

7.5.2 Summary of the Thesis Methodology Employed

In summary, the revised methodology comprised:

(i) reviewing the international literature to articulate a set of variables and models that might explain the observable location of marine farming in New Zealand over the period 1968-1998;
(ii) transferring to a Geographical Information System (GIS) the mapped locations of marine farm leases, licenses or permits granted in the period 1968-1998 by year of granting, owner, species approved for growth on the farm and other relevant information;
(iii) identifying and describing the significant variables determining the location of marine farms in New Zealand through:
    a) analysing legislation, policy, planning, and case law documents;

b) surveying marine farmers to identify the weighting accorded to common and differentiated factors in selecting locations for marine farms; and

c) analysing selected case study areas/processes, using data derived from interviews of farmers and officials, and documentary material;

(iv) relating the processes identified in (iii) to the mapped location of marine farms, with particular attention to any changes that might have occurred during the 1968-1998 period;

(v) attempting to explain any inconsistencies between the outcome of the empirical work and the initial theoretically derived variables and spatial models developed in (i).

There has been some debate over the validity of such multi-method approaches, especially in relation to the nature of their linkages with epistemology (see, for instance, Brocklesby and Cummings 1995, McKendrick 1999, Graham 1999). I have addressed such issues extensively elsewhere and, drawing on Feyerbend (1975), I argued the acceptability of multi-method approaches within a phenomenologically-informed approach to regional geography (Rennie 1989). This is not to suggest that a multi-method approach is acceptable to all epistemologies or research contexts, simply that it is acceptable within the exploratory context of this thesis (Miller and Crabtree 1992, McKendrick 1999, Everitt and Dunn 2001). The following sections provide a detailed description of the methods employed for items (ii), (iv) and (v) above. Item (i) was addressed in Part Two, and item (iii) is the focus of Chapter Eight.

7.6 A GIS of New Zealand's Marine Farms

Moran (1997: 3) draws attention to the utility of mapping the size of terrestrial farms in New Zealand, arguing that

> the size of farm holdings is among the best indicators of change in rural societies and economies. It encapsulates both the present nature of the rural milieu and the path of its evolution. If it were possible to flick through the changes in size and ownership of rural land parcels much of the rural history of any nation would be revealed.

> Unfortunately this is seldom possible because few nations have a complete record of the changes in size, let alone ownership, of parcels of rural land.

The 'parcels' of land are identified on an existing cadastre, have legal titles and are able to be exchanged in the market. They may be subdivided (or severed) by surveying and separating one parcel into two or more parcels, each with its own title. An individual farm usually comprises more than one title, enabling farm size to reduce due to the sale of one or more titles, or through subdivision of title(s) and subsequent sale of title(s). Similarly, the farm may increase size through the purchase of titles. Moran draws his data from the Census of Agriculture.

However, despite his initial claim regarding the utility of farm size as an indicator of change, Moran (1997: 3) proceeds to comment that:

> the attractiveness of farm size as an empirical measure of the structure and history of rural economies is not matched by a theory appropriate for the analysis of its geography...different types of farming are frequently interspersed and the policies and regulation of local authorities complicate the land market.

If Moran's views on the utility of farm size as an indicator of social change are applicable also to marine farming, then it would appear sensible to ensure that the size of marine farms be included in the data. If, for instance, the size of farms has been dictated by government policy, as it has in some places overseas (e.g., Weeks and Sturmer 1996) and at times in New Zealand, then this is indicative of policy and a legitimate aspect of the current research.

The size of farms can be calculated on a relatively aspatial basis within administrative regions from data on Ministry of Fisheries (MFish) or council files. If, however, in the marine farming situation there are different types of farms interspersed with each other, then the average size of farms in regions, or in bays, is of limited utility. Similarly, as noted in Chapter One, marine farms may comprise more than one species on the same site or one owner may hold several different permits for different species. An assessment of the average size of farms that incorporate several leases will be quite different from an average of the size of individual leases.

The concept of ‘space’, as noted in Chapter One, is potentially problematic. This becomes especially important if a seabed farm overlaps with a water column farm. There may also be a tendency for certain types of marine farms to prefer particular physical situations, possibly in the intertidal area, perhaps in water deeper than 10 metres. It was anticipated that such factors might be considered to be critical in the siting of marine farms and accordingly depth and local topographic features, which might lead a farm to be more or less exposed to currents, wind or waves, are necessary factors to be considered. Unfortunately, however, the costs of obtaining such information at a level of detail sufficient to include in the analysis was beyond the scope of this thesis and consequently, depth, shelter and current flows were addressed through the national survey.

A further consideration in developing a database of farms was the necessity of being able to relate the granting of a permit to a particular era, or period, and ownership. This would enable the growth in the number of farms to be analysed, including ownership changes. The relatively recent establishment of a marine farming industry greatly simplifies the identification of marine farms, their size and ownership changes.

The lack of a cadastre of marine farming, however, remained a significant problem. One of the most fundamental requirements of this thesis was clearly a means by which to develop usable data that clearly showed the location of farms with different attributes at an appropriate scale.

The data on marine farms needed to be mapped at a scale sufficiently large to be able to see individual leases as clearly separate from other leases. Effectively, it was necessary to be able to ‘zoom-in’ on an individual farm as well as step back to the bay, regional or even national level. A Geographical Information System (GIS) offered an efficient means of achieving this level of flexibility in presentation of the data. The data needed to include, at least; the farm boundaries, the bathymetry of the area and the shape of the coastline. The mapped farms would be linked to data on

ownership and the nature of the rights owned. It appeared that this could be best achieved through using a GIS that incorporated a relevant database.

7.6.1 The National Aquaculture Database

Each marine farm has required approval of some type (lease, licence, coastal permit, marine farm permit or special permit) and those 'permits' have included the area to be occupied, the location of the farm, the owner and the species approved for growing. These approvals have been placed on the Ministry of Fisheries' national aquaculture database. This database is open to the public and was made readily available to me in *Excel* format, initially from the Ministry of Fisheries (MFish). Since 1999 however, *FishServe*, the private company that the Ministry has contracted ('outsourced') to manage the database, has controlled data access (Campbell 2000)). This tabular database includes a column labeled 'Location', but unfortunately this does not provide a specifically mappable location of the farm. Instead, it records a general location (e.g., a large harbour, bay, region or stretch of coast) whose parameters reflect a combination of the regional boundaries of the three Ministry of Fisheries' regional offices and the identifier used by the MFish officer who provided/entered the data into the database.

As I have discussed elsewhere (Rennie 2000b), no standard code-book was available to assist in explaining how these descriptors should be interpreted. Any questions I had relating to these or other matters on the database had to be referred back to regional offices to respond and such a response was not always forthcoming. Whether these responses were based on personal recollection or on filed documentation was not clear to me and in some cases the original officers had long since moved on. The small size of most marine farms and the degree to which they are concentrated in particular locations meant that relatively large-scale maps were required to identify spatial patterns in any detail.

7.6.2 Developing a GIS

During the latter stages of the research, after I had developed my approach, two particularly relevant papers were published discussing the application of GIS to marine farming. Nath *et al* (2000) provide a useful overview of published and unpublished studies on using GIS as a spatial decision support tool in aquaculture, whereas Arnold *et al* (2000) discuss the application of GIS to selecting sites for aquaculture production of shellfish in Florida. Of particular relevance is the British Columbia Aquaculture System (BCAS) reported in Nath *et al* (2000: 261- 265). This GIS is noted as unique in combining collaborative interagency participation and databases with site assessment and routine database management, and is used by a wide range of endusers. It uses *ArcView* software to access different modules for different enduser needs, including map displays. Although not specifically discussed, Nath *et al* (2000: 264) note that data in the system includes "information on all aquaculture leases". Moreover Nath *et al* (2000: 262) point out, citing a personal communication from Carswell (MAFF), that:

> …decision-makers in various governmental positions routinely consult with GIS analysts not only to evaluate aquaculture potential, but to combine such analyses with information about unemployment rates and per capita income in order to set policies that potentially facilitate aquaculture development in disadvantaged zones…Carswell also indicates that BCAS is being used by private consultants to advise farmers with regard to identifying suitable sites for shellfish aquaculture. However, because of a current moratorium on further development of finfish aquaculture, this module is not being extensively used at the current time.

I was unable to find any similar comprehensive GIS operating in New Zealand, although a Marlborough GIS was used in a similar fashion. Of special interest to my research was that although Nath *et al* (2000: 274) recommend "ArcInfo (Version 8, ESRI Inc.)", the BCAS example they cite uses an *ArcView* platform similar to the one used for the GIS in this thesis and that used by Arnold *et al* (2000). The decision to use *ArcView* (Version 3.2, ESRI Inc.) for this research was reached in discussion with the University of Waikato's GIS technician (Darryl Gilgren) after the *ArcInfo*

(Version 6, ESRI Inc.) programme, then available in the Department of Geography, was found to be too cumbersome for the purposes of this thesis.

Scale is important in determining the reliability of various GIS based analyses. The reliability of any mapped data is essentially dependent on the scale used for the collection of the input data. Nath *et al* (2000: 264) note that the resolution of the data is not really at a sufficiently large scale (1:40,000 is used) for detailed site selection. Arnold *et al* (2000) were able to use data at a minimum cell size of 1:1ha as that was the level of resolution for the key seagrass parameter they used for their base map. Scale in the current research is quite variable for reasons discussed below.

7.6.3 Map Data Sources

In New Zealand, survey plans showing the location of each farm site and farm layout must be included with applications for permits and with any amendments resulting from changes made during the consent processing. These plans, in most instances, ultimately become the sole identifiers of the specific cartesian space for which a right of marine farming occupation has been allocated. These are horizontal plan formats and do not show depth or height allocations. They are also usually presented as if the surface to which they apply is a featureless flat plane. They are usually drawn with no indication of any bathymetry or other information and are often provided in the form of A4 paper size attachments to the application. These plans may have corners of the farm located to trigonometric points on land or they may simply show rectangular polygons in relation to other, already allocated, sites and their location has to be estimated on the basis of bearings given and distance measures noted on the plan. On more recent plans there are often specific grid references included for corners of the farm.

Some regional councils have mapped these farms into GIS databases and it had been hoped that these could be assembled to enable a single complete New Zealand database to be assembled. Unfortunately, at the commencement of the research, only two councils (Marlborough District and Southland Regional) had fully operative GIS systems that included the farms. Contemporaneous with the research, a third council

(Waikato) commenced placing its farms onto a database, but this was an *Intergraph* software based database that their GIS manager did not consider compatible with the other databases and was not considered likely to be completed in time for incorporation with my data. One council (Canterbury) could generate consent location points from its GIS system, but did not have polygons of the farms and could not differentiate the farms from other consents involving structures without returning to the original paper files. Still another council could generate some maps that superficially had a GIS appearance, but by its own admission were not GIS-based (Tasman District).

Of the two councils that had established databases, it was not clear how they had translated their original survey plans to GIS formats, but in view of their need for considerable accuracy, it was assumed that whatever system they used was sufficiently accurate for the purposes of my research. The Marlborough District Council GIS was continually updated and I obtained a second coverage of the Sounds in 2000.

For those locations where GIS was not available from other sources, the survey plans were obtained from the councils or MFish as appropriate. Some consideration was given to digitizing these, but given the nature of the research for which I was using the work, it was decided that a logistically simpler technique could provide sufficient accuracy. This was especially the case with older maps that located farms in relation to local trig stations, hills or other features that were hard to identify unless actually present on the water in their vicinity. Many of the older maps used an archaic grid system that was also somewhat problematic. I was primarily interested in locations of rights to have marine farms in relation to key coastline features or other farms. A high degree of accuracy in identifying locations (e.g., using on-site GPS) was not essential (as opposed, for instance, to the level of accuracy that an enforcement officer would require).

Air photographs of farms were also not expected to be useful as they would be constrained by an assumption that the farms were actually occupying the space that they had been legally allocated, an assumption that several people involved in the

industry said was probably unjustifiable. Leaving aside whether or not photographic runs existed for the different periods sought, photo identification also depended on farms having been developed over the full area to which the owners had gained rights, again an unlikely scenario.

7.6.4 Coverage

For those councils where GIS coverage was not available, the primary method chosen was to type in the coordinates. Where these were not provided the maps of the farms were scanned as 'objects' into files linked with the GIS and then manually orientated to the coastline based on the digitised NZMS Map series 260 (scale 1:50,000). This work was undertaken variously by the Department's GIS technician (Daryl Gilgren) or a GIS graduate student assistant (Craig Briggs). The scanned images were then 'mapped' using vectors to enclose the polygon in which the image fell. If grid locations were provided with the maps these were entered into the GIS and the resulting polygon was compared visually with the map. These polygons were then saved as a layer that could be reproduced in relation to the coastline.

There were frequently difficulties with the coastline on the GIS that may have had their origin in any one of several sources of error, including, for instance, the digitization of the NZMS maps, the scale at which they were originally produced, or the surveyor's choice of between at least seven reference lines that might have been used in defining the line of the coast (Gibb 1978). In using the GIS, I found the New Zealand Land Resource Inventory layers provided a useful 'coastline' because these included layers showing mud and other shoals to seaward of the mapped coastline even though these are based on NZMS 1 (scale 1:63,360).

Each farm site was identified by the type of right (licence (LI), lease (LE), marine farming permit (MF)) and a unique number within all numbers issued for that type. This created some difficulties where more than one site had the same number (i.e., two or more farm sites/lots might have the same permit number if their maps were originally associated with a single application and consent). Where sites changed their numbers over time (for instance, due to being severed from the other sites

because of an ownership change, effectively a type of subdivision) the new numbers were used from the date that they became operative. This procedure enabled polygons representing the farms to be incorporated into the GIS and then linked with other databases.

In the longer term, this database will need to be tested and refined to ensure the accuracy of each farm's location, but that was not the primary purpose of the current research. A usable database, that GIS specialists within the Geography Department considered was reasonably reliable for the purposes of this thesis, was partially completed during the thesis process. A complete coverage of New Zealand was not achieved, however, due primarily to the loss of GIS expertise during a crucial stage in the research. In effect this meant the Chatham Islands and Tasman and Golden Bay sites have not been included in the coverage. Regardless of these limitations on the GIS, the coverage appears to be the most comprehensive in New Zealand and enabled most of the spatial analyses originally envisaged.

More significantly, in other parts of the country (Waikato and Northland especially), many of the links between the attributes and the farm polygons were not completed, or were not checked for errors, and the expertise was not available to address these at the time of the analysis. I therefore reverted to more traditional and arduous means (pen and paper) to manually work my way through the database and the original maps. Each bay or reach of water with a marine farm in it was assigned a unique number. Each farm on the database for which I had an original map (some of which were provided from the imported GIS data) was assigned the relevant bay number in the database. This enabled statistical analyses discussed in the next chapter, and would not have been achieved within the logistical constraints of this doctorate without the GIS information received from Marlborough and Southland. In a reverse exercise, a layout of the farms present on a GIS was printed and I manually linked each database entry to the maps to enable me to better identify the ownership and related patterns present.

7.6.5 Attributes

The 'attributes' in the GIS linked database could be combined in any one of many forms on an individual layout, but the key categories were those relating to each farm site, each owner, each species, and each survey respondent (Table 7.1). As discussed in Chapter Four, since 1991 a marine farmer must have both a CP (coastal permit) and a MF (marine farming permit) to be able to have an operative marine farm. CP numbers are not based on a nationally consistent style or system. They are held in the database, but were not used as a layer in most of the analysis because the CPs are obtained prior to the MF permit and do not entitle a marine farmer to commence farming. Obtaining an MF meant that the CP had already been obtained and if the CP subsequently lapsed for whatever reason the MF expires concurrently. Therefore the MF was a more reliable indicator of the holding of the necessary marine farm rights. In some places in the analysis in Chapter Ten (for instance, in relation to Marlborough District Council) I use CP applications to indicate the potential future direction of the industry. Where this is done it is clearly indicated.

Table 7.1: Categories of data in GIS database

Key attribute category	**Details available (theme)**	**Unit**
Farm site	Farm identifier	[type of right][number]
	Type of right	LI, LE, MF
	Farm effective	Date
	Farm expiry	Date
	Location	Number
	Size	Hectares
Right owner's name	Right owner effective	Date
	Right owner expiry	Date
Species type	Species effective	Date
	Species expiry	Date
Respondent name and number	Data from survey	Various

The GIS 'themes' used enabled spatial patterns in farm development over time to be visually represented in maps for different themes at different times. For example, where the coverage was complete, all farms owned by Sanford's at a particular time could be readily represented on screen in map form and printed if necessary. Originally, I had hoped to include a theme showing access points, but these were eventually not included in the GIS because identifying the access points used by

individual farmers would be too difficult to accomplish at a national scale of investigation and could also vary considerably within the same area as my field investigations revealed. Instead, I attempted to address the proximity to access points through the national survey.

7.7 Summary and Conclusions

The methodology employed in this thesis has been outlined in this Chapter. A key requirement for implementing the methodology was the linking of the spatial and non-spatial data. A comprehensive GIS linking the Ministry of Fisheries national aquaculture database with a database of responses from my survey was to be used to facilitate analysis of spatial patterns and determinants of spatial decision-making. The experience with the GIS, my first use of this technology, has provided some insights into the potential of a GIS for facilitating integrated coastal management. Essentially the *ArcView* platform would usefully meet the needs of most national level administrators seeking to draw out or analyse policy relevant data, but it is dependent on the nature of the data available. The lack of enforceable national standards and formats for entering coastal permit data into a GIS and the lack of GIS use for coastal resource management may reflect a lack of national interest or a deliberate post-modern approach to environmental resource data management.

In either case the lack of a nationally integrated GIS runs counter to attempts to establish integrated coastal zone management. Integrated coastal management assumes vertical and horizontal integration and nesting of management and information systems. The ability to integrate databases from the regional to the national level or between different regions is a fundamental part of that process. Allowing each region to choose and develop its own approach to database management is also contrary to the principle of facilitating ideal communication that underlies communicative planning. Whether deliberate or not (a matter beyond the scope of this thesis to explore) the failure to require integrated database management systems has resulted in a post-modern database reality that is quite in keeping with the post-modern nature of parts of the RMA regime.

The utility of the national aquaculture database also would be much improved if it was linked to geographical reference points for the farms. If a marine cadastre is eventually developed for New Zealand it will need to integrate not only the marine farming database, but also features of the biophysical environment and other occupiers of marine space. At present, and despite the production of many useful maps as part of planning and research programmes around New Zealand, GIS technology has not been well-utilised for coastal management purposes. A start has been made on addressing some of these shortcomings through the thesis research.

The most comprehensive existing national coverage of marine farms, effectively a cadastre, was compiled by combining file copies of maps from administering agencies and adding these to existing GIS coverages of the Southland and Marlborough regions. Although logistical problems prevented the GIS being made completely operational prior to completion of the research reported here, it has enabled the manual linking of the databases with their spatial reference points. This has enabled, especially, the analysis of spatial patterns.

Chapter Eight: Assessing Variables Influencing Locational Decisions

It is one thing to know where marine farms have been established, but quite another to explain why they have come to be where they are. The observable macro-scale patterns are in large part a consequence of many micro-scale decisions. The research needs to consider aspects such as the locus of decision-making, the variables considered and the weighting accorded them, and the effects of individuals and institutions on the decisions. To explain the location of farms requires access to authentic decision-makers. The previous Chapter introduced the overall multi-method methodology for the research. This Chapter describes the methods used to acquire explanatory information relevant to the thesis through a survey of marine farm owners, documentary analysis, interviews and participant observation.

8.1 Potential Sources of Information

The 'formal' processes and criteria for making decisions were described in relation to various statutes in Part One. This identified the locus of formal decision-making and the role that plans and policies could play in the decision-making process. The extent to which central or local government planning and policy determines the final location of farms might be found by analyzing rules documents and by interviewing relevant policy-makers and planners.

If the decisions on farms are relatively unconstrained by plans and policies, leaving considerable discretion to be exercised on a case-by-case basis, then each decision should be subjected to careful analysis. This was beyond the logistical capacity of this research. Understanding the individuals and institutions, therefore, was approached through integrating analyses of formal processes for allocating space to marine farms, with methods to identify the variables important to the marine farmers and officials, and a comparison of selected illustrative regions.

The reasons why marine farmers have chosen to locate their farms in specific places can be obtained through a variety of methods. The most authentic source of data is,

of course, the farmers. It is possible, however, that the farms have changed hands over the years, that the farmers have forgotten the reasons behind their original decisions, or have reconceptualised their reasons over time. They may also have political or other reasons for claiming certain factors as important.

Planners, advisors and consent authority staff who deal with many farmers may have developed, over time, a 'feel' for the factors that influence farmers as a group, as well as for specific instances within the group. Their views may have been formulated through ongoing discussions with the applicants during the process and this experience should not be discounted simply because it is not authentically farmer experience. The process of gaining a consent is not usually simply one of an application being received in a vacuum, but rather one where there is considerable dialogue between the applicant and the consent authority and other advisors before the application is actually lodged. This process in itself may lead to some sites being judged as nonviable before the final application is made. These non-farmers (planners, officials and other advisors) are therefore participants in the process with authentic experience of it. They are, of course, equally vulnerable to post-decision rationalisation, political agendas, and forgetfulness but, providing they have been in an area for a significant length of time, they are also more likely to have a broader overview over space and time than would an individual farmer.

A third potential source of data is the reports compiled during the process of obtaining consent. These may include the initial application documents, the planners' reports, the decision-makers reports and explanations (if any) for their decisions and, if the matter reaches the courts, case law. Case law, the decisions made by the courts, clearly set out the logic of the decisions made and, more significantly, established precedents for decisions throughout the country. The importance of case law was borne out again and again in my interviews and discussions with marine farmers, their advisors (often lawyers) and planners. Essentially, few marine farmers or other decision-makers were prepared to apply for a site if there were strong grounds established in case law for considering applications for such sites were unlikely to succeed. In such cases, however, the court is effectively reacting to an application and the initial decision to apply for that site is the applicant's. The reasons for

approving or declining the application might be clear, but the reasons for the original choice of site are determined by the applicant.

The actual location of sites can provide some insights into the decision-making criteria through the presence or absence of particular characteristics of the sites and the degree to which these may be common among farms. Such relationships, however, may be coincidental as much as causal and the farmers' reasons are still required. The location of existing farms therefore reflects the outcome of formal and informal process and may not reflect the original preference of the farmers. There is no reliable record of applications that have not been pursued to the completion of the formal decision-making process. Therefore, the methods for obtaining the data from marine farmers and the relevant officials are critical. Focus groups involving farmers and/or officials/advisors might have been useful, but were considered too difficult to organise on a sufficiently large scale to be able to generalise the results. Interviews with a sample of selected individuals who have had longstanding relationships with the industry and the application process could be expected to provide useful insights, but also might be too limited to generalise to other situations. Identifying such individuals might also be problematic.

A national survey of marine farmers would provide access to the views of the marine farmers, but would be limited by the choice of original sample size, response rate, and the limitations inherent to the survey technique. For instance, there are quite different limitations on the sample size and responses that might be able to be obtained through telephone surveys as opposed to those obtained through postal surveys or individually administered surveys. These constraints may be logistical or may reflect the preference of potential respondents for different approaches. If the method was used only to sample marine farmers the effects of the planners and the planning process might be misinterpreted. Just as the farmers' views may not necessarily be fully understood by the planners and officials, the marine farmers may not accurately report or represent the views of these officials and decision-makers.

Taking into account the limitations of survey techniques, I considered that the advantages to be gained by directly approaching the farmers through a survey method

outweighed the disadvantages and relative advantages of other techniques. The survey, however, would not be sufficient to gain the depth of understanding I sought. By combining interviews with key people, case law from court decisions, data on the location of farms from the GIS, and a national survey of farmers themselves it was anticipated that a picture would emerge that would address the research questions.

8.2 The National Survey

Key considerations in any survey include the sample size, response rate, questionnaire design, administration of the survey and data management. These issues are discussed in the following sections.

8.2.1 Survey Sample

To be able to triangulate data gathering methods, to improve the reliability of the results, requires that the responses of the individual farmers to a survey be able to be compared for the particular site with other data on the site. This requires that respondents to the survey be identifiable. The MFish national aquaculture database (see Chapter Seven) initially appears to include all marine farmers who have ever owned a farm. At the outset I intended to survey the entire population of marine farmers, past and present, to maximise the potential number of respondents (a total of less than 500 owners according to the database). This would, however, require all the addresses to be up to date and it was clear that this was not the case. The addresses of owners were for the date when they owned their farms and farmers could easily have moved to new addresses or perhaps even have died. The MFish database does not include telephone numbers and these are not always obtainable. A telephone survey can be costly because of the toll-calls involved. Consequently, I decided to survey only those owners recorded as owning a farm at some stage between 1 January and 31 December 1998, the year the Marlborough moratorium ended.

A postal survey was possible, but it initially appeared from the database that there had been a higher turnover of marine farms than I had anticipated. Those with whom I had discussed the industry over the years had generally presented it as reasonably

stable. It was known that there were a few 'speculators', but otherwise it was considered that, essentially, the same people were involved from its inception to the present. In hindsight, I suspect that this perception reflects in part the number of farms that are managed by people who are not the owners (hence, ownership changes are not as obvious because the managers remain the same). The presence throughout the industry's history of several key dominant players also probably influences this perception. Moreover, the database is quite misleading in identifying the owners, giving an appearance of many more owners than there are in reality. This last point is especially important.

The MFish database has a column labeled 'client number'. Each client number relates to a unique 'owner's name'. Where the client ('owner') has already received a client number, then that number is used for all future sites owned by that owner. Unfortunately, the ownership structure of marine farms is complex. Perhaps as a consequence, the use of the client numbers is extremely precise. In some cases, for instance, an owner's name will appear in combination with a wide range of other names, presumably of different investors. Effectively, only the person who is present in every combination is involved in the farm decision-making or management and perhaps may own the majority share of each farm. However, each different combination is considered a single 'owner' and is given a unique client number. In such situations, the key person in the ownership combinations would receive several different survey forms covering each farm that has a different client number.

The precision of the client numbering system has other implications. If, for instance, two people jointly own a site, they receive the one client number. If they then obtain a second site and list the names in their application (or purchase documents) in the same order as those that appear on the first site, then they will keep the same client number for the second site. If, however, they happen to list their names in reverse order, then they will be issued with a new client number for the second site. If they subsequently decide to call themselves a partnership and put each site under the name of the new partnership, then a new client number is allocated to the partnership. Both sites are recorded as having had their previous owners 'expire' and to now be owned by a new owner – the partnership. There is a consequent proliferation of new client

numbers. Where this has resulted simply from the names of the owners being listed in a different order on the ownership documents this may lead to an overestimate of the turnover of farms. In some instances, there may be legal reasons for partnership to be a new legal identity, in other instances it may be something done for personal or marketing purposes.

Identifying duplicate ownership through the 'owner's address' seemed to offer a possible solution (I had done this previously (Rennie 1997)). Many of the 'owners', however, are managers of other peoples' farms. Consequently, the addresses that are repeated may belong to a manager, some of whom, as it subsequently turned out, forwarded the survey forms to the actual owners. Others completed them on behalf of the owners. Some addresses are simply the addresses of lawyers or accountants operating as post-boxes for the owners, and the extent to which they forwarded surveys to the owners is unclear. Several different addresses are recorded for seemingly the same 'owner'. In some cases two people had the same surname and initials, but may not have been related in any way; in other cases they were related, but hard to differentiate. Relying on the 'owner's address' to identify owners who had duplicate client numbers was too unreliable for it to be of much value.

Accordingly, I sent the initial questionnaire to each owner individually identified by a unique client number. Consequently, many farm owners received more than one survey form, but this was preferable to overlooking a farmer. The covering letter included a brief explanation of the reasons why the recipient may have received more than one questionnaire and requested that they answer only one. They were asked to return any extra questionnaires with the completed questionnaire so that I could note the connection.

As discussed below, the design of the survey led to an alteration to my original survey approach. Eventually the population of marine farms was divided into three strata: those recorded on the database as owners of one farm; those recorded as owning two to ten farms, and those recorded as owning more than ten farms. The first two categories I surveyed using a postal questionnaire and the third group I attempted to survey through personal interviews.

8.2.2 Maximising Response Rate

Experience in New Zealand suggests that a 30% response rate is acceptable for a postal survey where anonymity is assured and where it is assumed that all addresses are current (see, for instance, Edmond *et al* 1986). As noted above, the possibility of using postal questionnaires where the respondent was unlikely to be identified was considered and discarded. Because the industry had relatively few owners, anonymous respondents might still have been identified by the information they provided. This was likely to be apparent to them and create suspicion over claims of anonymity. Furthermore, the questionnaire was intended to be matched with other data, so I needed to be able to identify the respondent.

A 'personalized' questionnaire, one which showed at least familiarity with a farmer's 'permits', was used to facilitate a response and reduce the likelihood of falsification of responses. I hoped to add a personal element of responsibility to the answers given by directly identifying the farmer by client number and the permits held. By using data from a public record and by providing a commitment to not make publicly available any information that would make respondents identifiable, without first obtaining their permission, also satisfied the primary ethical requirements of the University of Waikato.

The size of the questionnaire and the nature of the questions asked may affect the response rate. In designing the questionnaire I tried to avoid questions that might appear too personal and restricted them to matters directly relevant to my research. I did not therefore seek information on income and used very broad ranges for questions on age and open-ended questions regarding educational level. Even then the questionnaires had over one hundred variables and comprised about fifty questions spread through twenty- page questionnaire booklets (Appendix Two). The only question that appeared to elicit any negative response was the question 'Are you Maori?' At least one person found this offensive and others may have felt so as well.

Each questionnaire included a tea bag, a coffee bag and either a *Timeout* or a *Kitkat* chocolate bar (then being nationally promoted through advertisements stating "Take a

break, have a *Kitkat*"). The covering letter acknowledged the time that farmers were giving up, indicated that the gifts were a small recognition of their time and that while they had their 'break' they might like to complete the questionnaire. A self-addressed, stamped envelope was also included. This was intended to encourage a sense of reciprocity and ease of response.

As an incentive respondents went into a draw for their choice of a year's subscription to one of *NZ Seafood*, the *New Zealand Geographical Society*, the *New Zealand Geographic*, or a copy of either *Bateman's Contemporary Atlas of New Zealand* or the *Historical Atlas of New Zealand*. I also promised copies of a summary of the results of the survey would be sent to respondents. In the replies I received, it was very evident that the gifts especially were much appreciated. Some colleagues consider it unethical to include 'bribes' in surveys, but I felt strongly that it was more unethical to collect data without providing some form of reciprocal gift or opportunity.

8.2.3 Key Question Groupings

The questions were shaped to explore, in combination, particular thrusts of the research. There was a need for some general individual descriptive variables (for instance, gender, age, and ethnicity) that would assist in cross-tabulation with other variables, but also would help to characterize my respondents. The groups of questions related to:

- the relative weightings given to particular variables drawn from the literature;
- proximity to things like land access, other farms, rural areas and rivers;
- the planning process both pre- and post-RMA;
- experience and knowledge of marine farming;
- support received from government;
- industry structure;
- processes preferred for allocating space;
- the preferred locus of decisions (e.g., regional council, iwi, central government agency); and

- the nature of the owner's involvement with the farm (for instance, was it a business or a lifestyle venture and how long had the farmer been farming it?).

For those farmers who owned between two and ten farms (multi-owners) I added questions relating to the reasons for choosing additional sites, their shape and size.

Most questions were asked twice to enable comparison between different time periods. The first time the question was asked was in relation to the situation when the farm was first obtained, the second time related to either the present situation (year 2000) or that applying in 1998. The different end dates reflect the fact that most of the industry had become preoccupied with the discussion paper released shortly before my questionnaires were circulated. For questions related to more general issues (e.g., who should allocate rights for farms and through what processes) it seemed that the answers would be formulated on the experience and debates of late 2000 rather than in 1998. The map data had been entered into the GIS from 1998 and there was insufficient time to obtain and add to the GIS the maps of farms approved since that date. The 1998 date was used for questions that related more specifically to the farms.

Likert ranking scales were used for questions seeking the relative weights owners gave different variables drawn from Chapter Five. Five-point scales, enabling ratings from 'Critically Important' to 'Not Important', were used to identify the relative 'importance' of variables that were usually assumed to be important in site selection (e.g., shelter and water quality). A five-point scale ranging from 'Extremely Desirable' to 'Extremely Undesirable' was used for variables that seemingly had a more ambiguous effect on farmers' decision-making (e.g., some 'proximity' variables). This reduced the sensitivity of the questionnaire in some areas. For instance, 'Community support/opposition' was one variable that was tested only for 'importance'. This was because I was interested in the significance that the farmer attributed to the role of the community and could cross-tabulate this with other questions relating to the residence of the owner in relation to the community closest to the farm site. I was not interested in comparing whether community opposition

was considered more important than community support, but that is clearly an area for future exploration.

By contrast, the international research had shown that some people viewed proximity to a river or stream to be undesirable (a source of detritus and pollutants), whereas others considered it to be desirable (a source of nutrients). Although I used qualitative concepts (e.g., 'near'), the responses provided relative indications of variable against variable. Technological changes were likely to alter understanding of distance (e.g., what might have been 'isolated' in the 1970s, might be 'near' in the 1990s). Quantified unit measures could have been misleading. The 'desirability' dimension was also used for questions on processes of allocating space and the locus of decision-making. In some instances there were simple choices (e.g., would 'rules in plans' or 'new technology' be *more* important in determining the location of marine farms over the next ten years?).

The only controversial question related to ethnicity. I used a simple yes/no question 'Are you Maori?' This phrasing was preferable to seeking more detailed information on ethnicity. I was not interested in ethnicity generally, but in whether a person identified themselves as 'Maori'. This was sought specifically because of the actions being taken by Maori with regard to seabed claims and the potential implications for fitting with the social milieu of an area. Although other ethnic groups with distinctive world views and socio-cultural relationships might be involved in marine farming in New Zealand, Maori may have taken a different approach to marine farming for a number of reasons. These include that: Maori have a history of being at the lower end of employment; fisheries matters had been among Treaty of Waitangi grievances lodged against the Crown and had been the focus of significant Waitangi Tribunal reports (e.g., Waitangi Tribunal 1985, 1992); special provisions had addressed Maori issues throughout the period covered; and, during Parliamentary debates there had been concerns over the problems facing Maori seeking to become involved in the industry (see Chapters Three and Four). The level of Maori involvement and the answers that Maori respondents gave seemed important to distinguish from other responses.

The least satisfactory questions sought time and distance information on the proximity of farm sites to specified places (e.g., the owner's home, the market, and the 'usual land access point'). These questions were always problematic, especially as the number of questions in the questionnaire was to be kept to a minimum and questions were to be simply phrased to encourage responses. Where more than one farm site was involved the questions became even more problematic. For instance, a farmer might move to a new residence that might be more distant from one of the sites owned, but closer to another site. A tabular approach was used for the single farm owners, but this was not well-received. A smaller set of questions was used for the two-ten owner questionnaire even though this meant less detail would be obtained. Unfortunately, these questions did not provide a high level of useful data, partly due to ambiguity in some questions.

A codebook was prepared prior to finalizing the questionnaires and each question was considered carefully in terms of the implication of being open-ended or closed, and whether pre-coded or post-coded. A number of questions had to be post-coded and this was achieved through initially recording the words used by the respondents and then seeking similarities between the responses that would enable them to be grouped into a more limited number of variables and coded accordingly. The statistical analyses that might be useful were also considered prior to finalizing the questionnaires. This ensured that data obtained was suitable for appropriate quantitative analyses.

8.2.4 Survey Administration and Data Management

The questionnaire was pre-tested with colleagues and a private-sector social science researcher. This led to the booklet format and layout. A pilot survey was conducted involving a planner/lobbyist/biologist who had spent ten years working almost exclusively for the marine farming sector, an academic who had been a marine farm worker, a current marine farmer and industry advocate, and two experienced MFish officers from different regions involved with the industry. This was a very small, targeted pilot survey as I wanted all active marine farmers to receive the final questionnaire and did not want to expose potential respondents to unnecessary

duplication. Few changes were required after the pilot survey, but some questions were clarified. Even in hindsight I am not convinced that a fuller or random pilot testing of the survey would have enhanced its effectiveness. The questions relating to travel-time and distance were known to be problematic before and after the pilot study and no substantial improvements within the constraints of the survey size and focus emerged.

One questionnaire was sent to all those listed as only owning one farm in 1998 and the second questionnaire was sent to the farmers owning two-ten farms. These were sent in September and October 2000 respectively. As responses were received they were hand-checked against the list of mail-out addresses and given a unique number. They were also identified in relation to all other returns from the same farmer (thus a single farmer might return several questionnaires and each one, whether completed or not, was given its own number and connected to the respondent by a second number). It was important that I understood the ways in which respondents had responded to the survey so I personally entered all the data directly into an *Excel* spreadsheet. The many comments provided to explain particular answers were recorded on the spreadsheet using the 'insert comment' facility and tagged directly to the specific question to which the comment applied. A separate 'comment' column was included to record any general comments.

I modified the MFish national aquaculture database by adding unique numbers to identify the specific bays where a farm was found. This overcame many of the difficulties I was experiencing with my GIS (see Chapter Seven). This database was then merged with the data from the survey using *SPSS* (Version 10.0.7, SPSS Inc.). This provided the primary database for the analyses reported in Chapter Eleven.

According to the MFish database, 1330 permits, licences or leases had been issued in New Zealand by July 2000, but only 988 were in effect at some stage during 1998 (Table 8.1). Moreover, there were only 469 owners of ten or fewer sites in 1998 (Table 8.2).

Table 8.1 Response rate to survey in terms of type of right and number of sites owned

	Rights on database in 1998	Rights issued at some stage since 1967 as at July 2000	Rights owned by respondents at some stage up to end 1998	Response rate compared to database in 1998	Response rate compared to all rights ever issued at July 2000
Leases	176	352	68	39%	19%
Licences	502	547	135	27%	25%
Marine farm permits	310	431	70	23%	16%
Total	988	1330	271	27%	20%

Table 8.2 Summary of owner response rates to national survey

	Possible responses	Actual responses	Response rate
Own one site	318	102	32%
Own 2-10 sites	151	46	31%
Total	469	148	32%

No previous national surveys of marine farmers using this (or any other database) appear to have been publicly reported and therefore there was no basis on which to compare my 32% response rate against an industry response rate norm. It compared favourably with the 30% response rate achieved by Edmond *et al* (1986) in their government-supported survey of Marlborough Sounds' mussel farmers. Although my 30% target was achieved, I also sent a follow-up letter to all non-respondents with an incentive offer of entry into a prize draw for a bottle of wine if returned within a specified timeframe. This elicited three additional responses, making a total of 148.

There was an uneven distribution of responses in terms of the rights held (Table 8.3). When considered in relation to the number of rights of each type held in 1998, it is clear that there was over-representation of leases held by respondents and under-representation of marine farming permits. Licences in the sample were within one percent of the number present in 1998 (Table 8.3).

Table 8.3 Respondents' ownership of rights by type of right held compared with total rights issued

	Percentage of total existing rights in 1998	Percentage of total rights issued since 1967 as at July 2000	Percentage of total rights held by respondents
Leases	18%	27%	25%
Licences	51%	41%	50%
Marine farm permits	31%	32%	26%
Total	100%	100%	101%

8.2.5 Explanations of Non-Response

Factors that might have contributed to non-response included: potential duplication of recipients; changes in addresses; the length of the questionnaire and its comprehensiveness; the concurrent distracting focus on the Ministry of Fisheries and Ministry for the Environment (2000) discussion paper; a concurrent major algae bloom that threatened the viability of the industry; and the reluctance that some farmers might feel in completing questionnaires that did not guarantee anonymity.

Some multi-owners wrote that their operations were too complex or, alternatively, too specialized for them to answer the questionnaire. A few of these agreed to personal interviews instead. Other farmers in complex (or highly specialized) operations completed the questionnaires seemingly without difficulty. Some capable and influential single-farm owners did not respond at all. Although my interviews with marine farmers were targeted at those who owned more than ten farms, some of these had received questionnaires through having farms under other names. Few of the marine farmers I interviewed who had received questionnaires had returned them, partly reflecting the fact that they owned too many farms for the questionnaires to be effective. I interviewed some recognized innovators and they too felt that the questionnaires did not fit their situation well. Such problems are typical weaknesses of postal questionnaire approaches when the target population lacks homogeneity (Frankfort-Nachmias and Nachmias 1996).

Unfortunately, where owners received several forms they occasionally did not include the extra forms in their return envelopes meaning that these were recorded as non-respondents. Many had farms that had changed hands or the owners left everything in the hands of managers and so did not respond. One farmer I met when doing interviews told me that he had received my questionnaires, but had not filled them out because in his view everyone sending out such forms had a hidden agenda. He was not sure what mine was, but had not responded. I never received his response despite my attempts to reassure him. Some other respondents also made comments that seemed suspicious of my motives. Assessing the degree to which this suspicion affected the response rate and may have been related to the concurrent MFish discussion document (MFish and MfE 2000) and/or my background in the industry is beyond the scope of the research.

One response offering a surprising insight was that some owners who had bought existing farms considered the survey was not relevant to them, or at least that the questions relating to factors affecting the choice of site were not relevant. This suggested, and was supported by interviews, that owners who bought farm sites had no interest in seeking to buy a 'good' site, but bought any site that was available. The reasons for this could have been that the market was very tight and any farm was worth purchasing, no matter what limitations it might suffer from, or that the investors simply were not prudent.

A further insight into the factors affecting response emerged when I sought to clarify the number of farms owned by one farmer. After a series of email exchanges the owner suddenly recalled that the site I thought he owned was:

> an extension to LI [YYY]. I filled out your questionnaire about [YYY] and forgot totally that the powers that be decree the extensions [to a farm] have a totally different number to the original farm. Once the extension is granted you tend to bury it amongst everything else and never refer to that number again. The farms are just run under the original numbers…

The extension had been a different name. Had I not been in email contact with these owners, I would not have known what had happened to that site. Many farms have

such extensions and it is quite possible that this sequence of events was repeated on a number of occasions. If so, my effective response rate is probably higher in terms of the coverage of 'farms' (as opposed to rights) than it may appear.

The ownership structures were not simple and are discussed with some illustrative examples in the findings reported in Chapters Ten and Eleven. Suffice to say here, that by the end of the research, while I understand much more about the nature of the ownership structures, it would still be very difficult for me to identify the ownership of some of the companies. I can speculate in a reasonably informed way about who is involved in some situations, but a full and detailed search of registered company information was beyond the scope of the current research. Even then many of the companies may remain opaque, especially where shelf companies or unregistered partnerships are involved. It is not possible to say for certain who really *controls* the ownership of many of the farms. It is important to note, therefore, that the response rates reported here are in relation to the client numbers recorded on the MFish database. The response rate is not a percentage of the owners or controllers of farms in New Zealand.

8.3 Document Analysis

The allocation of space for marine farms reflects both formal and informal institutional processes. The analysis of formal processes focused on the statutory procedures and criteria for obtaining permits and on non-statutory policies and planning documents. The technique of analysis employed was that of reflective reading. As I had considerable personal experience in the areas of policy, planning and statutory advice, I decided that this would be a more efficient and effective way of picking up the nuances of the documents than would alternatives such as the quantitative discourse and content analysis packages used in similar research (e.g., Silverman 1998, Tonkiss 1998, Peace 1999).

Each application for a marine farm generates considerable documentation, whether approved or declined. The same applies for almost every rule in a plan, a section in an Act or regulation, or any policy statement (statutory or non-statutory), regardless

of the level of government involved or the time period in which the matter occurs. I originally considered random sampling of documents. This was subsequently abandoned for a more targeted approach to document analysis.

8.3.1 Planning Documents

Official planning documents relating to the pre-RMA period were hard to locate. This reflected both the length of time that had passed since some of them were developed and the restructuring of government agencies. Many documents had been consigned to archives located in different parts of the country and were not readily accessible. A detailed historical analysis of those plans I could readily obtain is reported in Chapter Nine.

Regional coastal plans (RCP) prepared under the RMA provided another difficulty. Proposed RCPs were required by law to be publicly notified within two years of the 1994 New Zealand Coastal Policy Statement. The provisions of these plans were then subject to amendment by councils as a consequence of statutory public consultation and subsequent appeals to the Environment Court. Plans that had completed these processes would then be approved by the Minister of Conservation as operative. My initial expectations were that most regions would have operative RCPs available for analysis by 1999. In fact only two of the nation's sixteen regions had operative regional coastal plans by then and only four more had become fully operative prior to the imposition of the national moratorium in November 2001 (Table 8.4).

Table 8.4 Operative Regional Coastal Plans Prepared Under the RMA as at 14 December 2001

Date Operative	Region
20 September 1997	Manawatu-Wanganui
1 October 1997	Taranaki
28 June 1999	Hawkes Bay
19 June 2000	Wellington
7 February 2001	West Coast
1 September 2001	Otago

Rules regarding marine farming were among the most problematic issues in the approval of plans. A full analysis of the rules in plans, especially the changes that occurred between the proposed plans and the final operative plans, would be of

considerable value, but must await completion of the plans and is therefore beyond the scope of this thesis. I did, however, compare the rules in the operative regional coastal plans with those in the proposed plans for other regions, especially comparing the proposals in the areas where marine farms are already well-established. This was partly to assess the degree to which plans in regions under pressure from marine farm development might differ from each other and from those in regions where marine farming was not present (reported in Chapter Nine).

8.3.2 Case Law

Case law played a significant role during the 'transitional era' (i.e., post-1991), setting precedents and influencing the thinking of decision-makers, policy developers and planners, especially in the absence of operational RCPs. The Environment Court's decisions transparently set out its views of the logic of the arguments presented and the rationale behind the decisions reached. In many respects, as Dwire (1994) implies, these fora are the locus for the exercise of many forms of power. I drew on contacts at regional and central government level and among the private sector and examined case citations in case law and other publications (e.g., *Seafood New Zealand*, the *Resource Management Law Association's Newsletter*, and *Planning Quarterly*) to identify cases. These were reviewed and those drawn on are summarised in Appendix Three.

8.3.3 Statutory Analysis

Statutory documents (e.g., Acts, regulations, and quasi statutory policies) were considered alongside other national policy documents to assist an understanding of the formal institutional framework and processes through which marine farm owners obtained their rights. These documents also provide the mechanisms through which marine farming or competing activities can be constrained from interfering with each other. They are expected to represent the wishes of the community and are therefore indicative of the mood of the electorate as perceived by politicians at particular points of time. In this regard, they were used after gaining an understanding of the issues, positions and rhetoric used in shaping some of the statutes, regulations and policies.

Relevant Parliamentary Select Committee or other reports were identified through the indexes to the *Appendices to the Journal of the House of Representatives (AJHR)*, the *New Zealand Gazette* (the Gazette), and the *New Zealand Parliamentary Debates (NZPD)*, and through references in various planning and policy documents, other publications, and comments from interviewees.

8.3.4 Other Documents

From time to time during my attention was drawn to other reports that had bearing on the spatial decisions on marine farming. These are referred to where appropriate.

8.4 Interviews and Participant Observation

Understanding the patterns revealed by quantitative techniques and reflective reading of appropriate documentation can be aided by qualitative data and insights gathered from interviews and participant observation of marine farming related activities.

8.4.1 Interviews

Interviews offer direct involvement with the interviewee to achieve authentic data. They may be quite resource intensive, but also have considerable advantages in that they provide the flexibility to rephrase questions and to probe interviewees further in relation to responses received from them (Frankfort-Nachmias and Nachmias 1996, Kitchin and Tate 2000, Seale and Filmer 1998). 'Focused' interviews were used because I wanted to probe more deeply than would have been possible had I just repeated the questions in the postal survey. The topics and general nature of the questions were predetermined, but I had the flexibility to pursue interesting aspects as they arose. The particular disadvantage with this approach is that the data derived from the interviews could not be analysed alongside the ranked and other data obtained from the postal questionnaire. There were so few large farmers (less than twenty) in the industry that I felt the loss of quantitative analytical capacity would not be of great moment.

The interviews were conducted with people involved in planning, advisory and decision-making roles as well as farm owners and managers. Interviewees were identified through one or more of the following means: the positions they held (e.g., regional coastal planner), the number of farms they owned or managed, and/or the history or nature of their involvement in the industry (often identified by word-of-mouth). Most marine farm owners who appeared to own more than ten marine farms in 1998 were approached for interviews where this proved logistically possible and where a means existed to contact them. Those who were not prepared to be interviewed, declined on grounds of commercial sensitivity and/or lack of time. Some owners were also selected for follow-up interviews based on comments in their questionnaire responses.

Once the interviewee had been identified I made telephone contact and, where requested, provided a letter, facsimile or email outlining the nature of the questions to be asked. Depending on logistical matters or interviewee preference the interviews were conducted by telephone, email or in person at a place and time chosen by the interviewee. Each interviewee was provided with an ethical statement and form authorizing and setting constraints on the use (or otherwise) of any material gathered from the interview. The interviewees were asked for permission to tape-record the interview and in most instances this was granted. Using a tape recorder may have inhibited some of the interviewees (Kitchin and Tate 2000), however, most were professionals or experienced farm owners/lobbyists and showed no signs of inhibition. The consent form also provided an additional level of confidence and my past contacts and knowledge of the industry appeared to encourage most participants to be fairly open in their discussions. Detailed hand notes were taken during and immediately after the interviews.

Members of one organisation refused to be recorded and would not sign the consent form. They then happily consented to be interviewed and volunteered considerable information that, if printed, could place people in difficult positions. In this instance the interviewees clearly waived their right to any protection. In my experience this is most unusual, but it appeared to reflect fear of potential legal action. Their concerns

were so great that they were not prepared to sign any forms, even those that provided them control of the use of material they divulged during the interview.

Thirty-two interviews were undertaken, comprising fourteen owners or owner representatives, and the remainder being a mixture of officials at all levels of government, industry consultants and lobbyists. In some instances these people had filled several different roles. I have decided not to identify interviewees in greater detail as they were very candid and, given the close nature of the industry, it would be very easy to accidentally identify people. I have decided to avoid using quotes from the interviews as much as possible and to draw generally on the information gleaned to inform my analysis of other data rather than make them a focus of analysis.

8.4.2 Participant Observation

Over the last seventeen years I have visited marine farms in New Zealand and Australia and discussed marine farming as part of my overall interest in coastal management issues. My role in the Department of Conservation from January 1990 until September 1994 was primarily to address policy issues involving the interface of the RMA and fisheries legislation, including marine farming. I have advised Cabinet and Parliamentary Select Committees and the Minister of Conservation. My role has included drafting the New Zealand Coastal Policy Statement and coastal tendering provisions in the RMA. I have met often with industry members, various officials and lobbyists.

During my doctorate I have: participated in workshops and seminars on marine farming issues run by Environment Waikato (EW) and DoC; advised DoC officials on marine farming legislation and policy; and attended the aquaculture session at the 2001 Seafood Industry Conference. Serendipitously, while interviewing people in the Marlborough Sounds (2000), I joined a MacLab boat to visit marine farm sites for which it was seeking permits. On the boat I met several key players in the development of the industry in the 1990s, as well as participated in (mostly passively, occasionally actively) the discussions that took place with their lawyers, investors, planners, landscape and navigation experts. This was an exceptional experience and

although not originally part of the intended fieldwork, it provided an unparalleled opportunity to observe and hear discussions of the variables involved. Unfortunately in none of the above situations was it possible or appropriate for tape-recording and conditions were usually not conducive to note-taking. I made notes immediately after the events where possible.

8.5 Pragmatism and Reality in Methodology

In undertaking the research for this thesis three particular problems were encountered: constraints inherent in the data, changes in the situation that occur during the course of the research, and potential bias resulting from my past involvement with the industry.

8.5.1 Constraints on the Data

In addition to the constraints on the data sources and techniques already discussed, there are some more general concerns related to the research. For instance, asking people to recall their views and reasons for doing things up to thirty years after the event may lead to inaccurate data being collected. On the other hand, it may lead to more acute observations or reflections than might have been the case at the time or in a less extended time frame. It is not practical to cross-check each questionnaire respondent's or interviewee's recollections against documentary evidence of the time, even assuming all such documents still exist. However, it was hoped that the purchase of a first marine farm permit/title by the owner, or the passage of an influential rule in a plan, would be a particularly significant life event and may therefore be better recalled than most.

During analysis, I became concerned about some of the results emerging from the MFish database. It became apparent that the database might not be as complete as it appeared. My questions to FishServe were relayed by it to its MFish contacts some of who did not respond. There is, therefore, some uncertainty about the completeness of the data in the database. It appears sound for the period since 1991, but prior to that the data might not be complete. Consequently, the research based on that

database is more reliable with regard to contemporary marine farming than early marine farming.

8.5.2 Contemporaneous Changes

The research for this thesis was conducted as a part-time doctorate commencing in 1997 and finishing in 2002. During this period, research had to be fitted around full-time employment and there were limited opportunities to work for concentrated periods of time on particular aspects of the data. To overcome this I employed technicians at various stages to assist with components of the work. In such instances, I would set out protocols to be followed, but occasionally these were not consistently followed. The Department's GIS technician also left at a critical stage and was not replaced for several months. This interfered with and constrained interview fieldwork, postal survey analyses and GIS data table linkages, resulting in these activities happening at times quite removed from those originally intended. Adaptations to the methodology have had to be employed to address these matters and some interviews/questionnaire responses may consequently reflect views that might have been different had all data-gathering occurred contemporaneously.

The significant events that happened during this thesis (see Chapter Seven) affected the research findings. Some of these were addressed by the research but if farmers were surveyed now there might be different weightings attached to the variables.

8.5.3 My Personal Background

As noted above with regard to participant observation, I have had a role in the development of the industry under the RMA. With approximately 12 years of work experience in the central government bureaucracy, especially in the Department of Conservation, it would have been impossible for me to attempt to fill a neutral observer role in interviews and participant observation settings. In particular, I was contacted by a number of people who sought my advice in drafting their responses to the Ministry of Fisheries' and Ministry for the Environment's (2000) discussion paper. At the same time the Ministry of Fisheries raised with me the possibility that

I undertake the analysis of the submissions on a contractual basis. I did not pursue these opportunities.

At workshops I was asked to contribute my expertise and knowledge to the discussions (indeed, my experience gained my access to these workshops). When traveling on the MacLab boat my views as a planner and person with inside knowledge of the Department of Conservation were sought on several occasions. Some of the respondents to the postal questionnaires contacted me to confirm that I was the person they recalled lobbying when I was in the Department of Conservation. Some of those I interviewed I had fought hard in my former roles. All these factors could have introduced bias to the data collected.

There are, however, considerable advantages to having my particular background. The in-house training and experience gained through my career has been drawn on to inform my research in a number of places, including my reflective reading. My experience provided me with contacts and an understanding of various contexts within which the policy- and decision-making took place. I have therefore adopted an ethnographic approach to my participant observation and surveys wherein I was recognized as involved, possibly useful, but also non-threatening (Kitchin and Tate 2000). To a very large extent I felt able to empathize with the planners and policy officers. To a lesser extent, as a person who has also been involved during the research period with an application for a coastal permit (for a reef) that has been challenged in the High Court, and as an 'expert witness' for a developer of another reef, I have some empathy with the difficulties faced by the marine farmers and expert advisors.

The extent to which my background may have detrimentally affected the research is difficult for me to assess. On balance, however, I gained the impression that the combination of being no longer in a position of power and having had a reasonable reputation as a 'professional' meant that few of my interviewees or respondents were troubled by my background. In fact, some of them seemed to welcome the opportunity to reminisce or to talk with me in a situation where I was no longer restricted to representing the Department of Conservation's position. People on both

sides of one particularly controversial application approached me for advice, which suggests that I was able to maintain my reputation for professional neutrality and credibility.

Although awkward, I decided that in the interests of my research I should not provide advice on proposed submissions on the discussion document or agree to analyse the submissions. I felt that in either role I might become too closely identified with particular positions and consequently lose my neutrality. My input to other discussions was intended to be neutral and sought to clarify potential issues or matters being considered rather than to take or support a position. In summary, I believe my background has added to the validity of the research rather than detracting from it.

8.6 Summary and Conclusions

The methodology and the techniques described in this and the previous Chapters represent a unique attempt to understand the last forty years of critical decision-making determining the spatial distribution of a relatively understudied and significant New Zealand industry. Combining hard, empirical data on farm location with the data on decision-making processes provides a sound basis for exploring and testing assumptions regarding the development of the industry. If there are concerns with the data these relate primarily to the pre-RMA regimes. The data obtained for the period since 1991 provide an exceptionally good foundation for exploring, especially, the inter-relationship between planning and marine farming in the New Zealand context.

Chapter Nine: A Survey of Marine Farm Planning in New Zealand

This Chapter is the first of three, comprising Part Four of this thesis, reporting on the results of the empirical research conducted as part of this thesis. The Chapter firstly reviews non-statutory plans, then looks at statutory planning and, in more detail, maritime planning schemes, marine farm plans, and approaches adopted in particular regions especially since implementation of the Resource Management Act 1991 (RMA).

Space does not permit a comprehensive, detailed discussion of all plans that have affected marine farming in New Zealand. The 'transitional era' (i.e., the period since 1991) has posed some particular research problems due to the lack of operative regional coastal plans prepared under the RMA and accordingly this Chapter also addresses some of the case law that has dominated planning during this era. The plans discussed here include specific examples as illustrative case studies. In areas where marine farming has been a significant development it has received the most specific attention in plans. Analyses of these plans reveal the clearest patterns. The Chapter focuses on the primary areas of marine farming with one exception, Northland

Northland is not addressed in detail as in most respects its approach to plans and the resultant pattern is essentially a less sophisticated version than that of Marlborough. It differs from Marlborough primarily in the extent to which its major farming sites were developed prior to 1971 (Chapter Three) and in that the Northland United Council implemented an effective moratorium through its regional planning scheme for most of the region. This approach is discussed with examples from Tasman and Southland and space did not permit further exploration of it in this Chapter.

It should also be noted that the analyses undertaken in this Chapter pre-date the 26 March 2002 passage of the Resource Management (Aquaculture Moratorium) Amendment Act 2002. Reflective comments are made where appropriate on the aquaculture management area concept introduced into the RMA by that Act.

9.1 Non-Statutory Plans

It is important to distinguish between statutory and non-statutory plans. Statutory plans are mandated by specific provisions in statutes (e.g., MFA71, s.4). The provisions of statutory plans usually have some force in law. Non-statutory plans are those without specific legislative backing and are usually prepared to guide authorities and others in how particular matters should be undertaken or addressed. In effect they are little more than a set of detailed and agreed guiding policies, but usually incorporating a spatial component with different policies applied to different zones, activities or effects.

The first marine farming plan in New Zealand was a non-statutory plan setting out farm sites in Whangaroa Harbour. Drawn up in 1969 by the Department of Marine in response to demands for leases in the Harbour, the plan established a set of lease sites that were then allocated by lot among the applicants. The sites took a rectangular grid pattern within a large rectangular grid.

After disestablishment of the Marine Department in 1972, the Ministry of Works (MWD), Department of Lands and Survey (DLS), the Commission for the Environment (CfE), and the Ministry of Transport (MoT), especially, encouraged integrated land sea planning (Lang and McQuoid 1974, McCombs 1978, McCombs and Christie 1980, Robertson 1980, McCombs and Hansen 1982, Tortell 1981, 1982). Non-statutory plans were produced by various agencies for several places (Milne 1980), including: the Marlborough Sounds (MAF *et al* 1976), Waitemata Harbour (Auckland Harbour Board and Auckland Regional Authority n.d. [1975], Willis 1980), Tasman and Golden Bays (McCombs and Nahkies 1981), Great Barrier Island (Joint Planning Team 1979) and the Coromandel Peninsula (Lang and McQuoid 1974). These formed the basis for decisions on consents and were largely adopted into a number of subsequent statutory plans which are discussed separately. In the interim, prior to the statutory plans, these non-statutory plans guided government decisions on leases and licences.

Non-statutory policies also had considerable effect (Box 9.1). The MoT, for instance, adopted a policy that favoured licences not leases of the public 'commons' and opposed speculation. They argued: "Because public water-space is used for marine farming, the Ministry opposes the selling of marine farming licences for private gain, particularly where a licence has been granted but not utilized by the farmer" (MoT 1980b: 7).

Box 9.1 National coastal policies

There have been two national coastal policies in New Zealand, the non-statutory 1973 national coastal policy (NCP73) and the 1994 statutory New Zealand Coastal Policy Statement (NZCPS94). The Government's 1973 national coastal policy was primarily reacting to the rapid coastal subdivision of the 1960s (TCPD 1972, Morton *et al* 1973). The TCPD (1972) report placed safeguarding and extending the recreational value of coastal lands for the future public as its "foremost consideration" in development (TCPD 1972: xii). The Government then amended the Town and Country Planning Act 1953 (TCPA53), by making it a matter of national importance to preserve the 'natural character' of the coastal environment and this was continued in TCPA77 (Maplesden 2000). The national coastal policy remained unchanged until 1994 when the mandatory (under the RMA) New Zealand Coastal Policy Statement (NZCPS94) was released.

The NZCPS94 retained a strong emphasis on preserving the natural character of, and public access to and along, the coast, and the prevention of sporadic and sprawling development. Among its general principles it recognized that some activities, important to the social and economic well-being of people and communities, were functionally required to be in the marine environment and that appropriate use and development in appropriate places was not precluded. But the principles also included that "People and communities expect that lands of the Crown in the coastal marine area shall generally be available for free public use and enjoyment".

Prior to NZCPS94, natural character was very much oriented toward the terrestrial side of the coastline, but included scenic views across water. Although these views are couched in terms of the land's natural character, the public's enjoyment and the reasons for access include recreation on water, and the natural character of the seascape appears implicitly present. In the NZCPS94, 'seascape' was explicitly included and the concept of natural character was given clearer ecological definition although it continued to be conflated with visual amenity. Visual amenity, natural character, prevention of sporadic and sprawling development, and public access to and along the coast have been among the most frequently used arguments against the development of marine farms under the RMA.

The MoT strongly advocated planning on a basis of levels of conflict. The greater the level of conflict between users, the greater the need to have planning, with national level administration being appropriate where there was little conflict. Strong statutory planning, based around maritime planning schemes, was considered appropriate where conflict was intense. Between these extremes the MoT saw varying levels of administration with broad regional planning schemes, district

planning schemes or reserve management plans and then non-statutory management plans (McCombs and Hansen 1982).

This is not the place for a detailed critique of the approach advocated by the MoT, but there appears little logic in its criteria for determining the appropriate planning approach for the different planning solutions. Most significantly, the approach advocated was reactive, development control; "as conflicts arise it is desirable for [local authorities] to develop their ideas as to how their water areas should be managed, and to draft policies for their future development and management" (McCombs and Hansen 1982: 12). Such an approach seems anathema to the very concept of 'planning' especially when the approach to preparing the plans that is then advocated is based on extensive inventories and knowledge, neither of which is likely to be readily available or speedily obtainable when reacting in a conflict situation. It was also based on activities, rather than effects.

McCombs and Hansen (1982) also suggested that areas should be identified and reserved for future ports in preference to other activities. When addressing marine farms, however, they drew attention to the lack of statutory procedures for deciding where to permit or not permit farms, and then argued for a "multiple use" planning approach that would place all the other potentially competing activities on an "equal footing" with marine farms (McCombs and Hansen 1982: 35).

9.2 Statutory Planning

Non-statutory planning, while quite influential and largely integrative if activities-based, was effectively a 1970s phenomenon. In relation to marine farming it was essentially used as a means for central government departments without statutory mandates over marine farming (e.g., Lands and Survey) to influence the Ministry of Agriculture and Fisheries (MAF) in its approval of leases/licences and the development of marine farm plans. To some extent those agencies with statutory mandates (MoT and MWD) could use these plans to support their decisions on (denying) concurrence with lease/licence applications in accord with 'public interest' requirements. Some local authorities were also attempting to influence these matters

through non-statutory plans, but during the 1970s they began to employ new statutory tools to wrest some control from central government.

The national Water Resources Council was one of the first to feel the effects of litigation over its interpretation of statutory provisions. Its policy was to base water classifications on best multiple use of the water body, including its use for waste disposal. To allow flexibility for future discharges, and daunted by the difficulty of assessing what the existing quality of a natural water body (with natural and unnatural fluctuations) might be, the Council often used minimum standards as the basis for classifications (Palmer 1977).

MAF and the Bay of Islands Oyster Farmers' Association (with others) were successful in legal action to secure their and, by inference, the Fishing Industry Board's (FIB) rights to be heard. More significantly, the legal actions resulted in the 'minimum standard approach' being discarded. Instead, the classifications essentially had to try to maintain the existing water standard and, using conditions on 'consents to discharge', help maintain the water quality for the benefit of future generations. Standards suitable for shellfish farming in Waikare Inlet (Bay of Islands) and in Southland resulted from these precedent setting cases (*Water Resources Council v. Southland Skindivers Club Inc* [1976] 1 NZLR 1, *Water Resources Council v. Dalton [1975] 5 NZTPA 225*).

During the 1970s, the creation of regional authorities at the local government level by the Local Government Act 1974 accompanied a number of different types of planning for the coast. Among these was a statutory harbour plan for the Manukau Harbour (Auckland Harbour Board and Auckland Regional Authority n.d.[1978][1]). Whereas the earlier non-statutory Waitemata Harbour Plan contained no mention of marine farming, the Manukau Harbour Plan (p. 55) stated that "Marine farming is an appropriate use of Harbour space", and included among its policies that applications

[1] The Manukau Harbour Plan was produced to fulfill the requirements of the Auckland Harbour Board (Auckland Regional Authority Pikes Point East Reclamation) Empowering Act 1976 to produce "…a study of the Manukau Harbour, with a view to formulating a plan, with proposals and policies for conservation and development of that Harbour" within two years (AHB and ARA n.d. [1978]: 12). It was expected to be the basis for maritime and regional planning schemes.

for farms had to be assessed against policies for managing the visual attributes of the harbour, the use of minerals and navigation. It also required the criteria of the MFA71 be applied to every application, regardless of whether there were any objections.

9.2.1 Regional and District Planning Schemes

The Local Government Act 1974 enabled united councils and regional authorities to include the 12 nautical mile territorial sea within their boundaries if they wished, and to establish rules in their regional planning schemes to cover these areas (McCombs 1980c). District councils sometimes covered marine areas too (e.g., in harbours) (Willis 1982, Hansen 1982). Such policies and rules became part of the transitional regional coastal plans under the RMA and remain in effect until the regional coastal plans prepared under the RMA become operative.

The influence of regional authorities and united councils who included marine policies or rules in their regional schemes was therefore especially significant in areas where maritime planning schemes (or district schemes) were not present. Amongst these, the provisions of the Auckland Regional Authority, and Nelson and Southland United Councils' (Box 9.2) regional planning schemes have had clearly significant impacts on marine farming.

The general approach in such plans appeared to be one of identifying areas where activities, such as marine farming, were definitely considered inappropriate, but otherwise providing for their consideration as either a supported activity (e.g., Northland United Council 1986) or simply as one of many discretionary activities. These plans became transitional regional coastal plans after the RMA was passed and effectively remained in force until new plans prepared under the RMA processes were in place. Their zones were therefore critically important as will be discussed using illustrative case studies below. Although some of these plans were commenced earlier than the maritime planning schemes the latter are more specifically intended as marine planning tools.

Box 9.2 Southland: A local authority case study

Southland United Council (SUC) extended its regional planning jurisdiction under the TCPA77 to include the territorial sea in October 1980. It did so ostensibly to achieve greater coordination between the various bodies with administrative functions for aspects of this area. In June 1981, SUC and Stewart Island County Council produced a Stewart Island Marine Planning Study and Marine Farming Policy in response to pressures as a result of experiments in salmon farming in Big Glory Bay (BGB). The Councils sought to focus MAF attention on facilitating marine farming in the region. They asked MAF to allow up to 27 marine farms in BGB and prohibit marine farming in the rest of Stewart Island.

The policy also sought an alternative to the 'first come, first served' allocation of marine farm sites, which it considered was inappropriate for the Island. Criteria for siting farms were suggested, and an environmental impact assessment, regular monitoring and reassessments of the number of sites available, and investigation of the suitability of other locations for farming were also sought. MAF responded by issuing 17 special permits for salmon farming in BGB and the requested prohibition was gazetted in 1983. Initially intended for a two-year period to enable investigations this 'moratorium' remains in force in 2002. MAF updated, but did not gazette, its plan in 1986. This has guided MAF administration of marine farming in the area. The plan focused on then current issues, the effects of salmon farming on the environment and conflicts with navigation, recreation and commercial fishing (Hovell 1991).

On 7 June 1989, after extensive public consultation, Section III of the Southland Regional Planning Scheme (Coastal and Marine Resources) (SRPS) came into force. The five aquaculture policies in Section III of the SRPS comprised general policies applicable everywhere within the region, and geographically delimited area policies (for Stewart Island and for Fiordland National Park). The general policy was accompanied by a set of navigation-related criteria, and procedural policies. The general policy (FB-1: Use of the Resource) read "to encourage aquaculture to develop in areas which are suitable for it and where it can be developed in a manner which will minimise conflict with other legitimate uses of the coastal zone". In its explanation the Council noted that the industry was undeveloped and had potential to "increase greatly the production…from the region". To implement this policy the Council would "seek to have the procedures changed in order to minimise the procedural delays which have proved so frustrating to all involved…" while ensuring consultation with other authorities and that the sites were suitable.

"Policy FB-2: Navigation" included a number of spatial requirements that may determine the pattern of the development of marine farming. These were drawn from Ministry of Transport criteria and the relevant rationale was to permit the traffic of small craft and to minimise navigational danger and interference with other coastal users. Navigation was to be protected in accord with national and *international* law. The Council (FB-3: Procedure) sought "a change in the law … so that suitable sites are surveyed and made available by application and if necessary by ballot on behalf of prospective marine farmers to the Department of Agriculture and Fisheries". This was because the procedures were slow (5 years or more), did not adequately identify sites for the public, did not keep speculators out, and placed the onus of selecting sites on the applicant without certainty the site would be approved. There were also concerns over MAF's failure to enforce the removal of farm structures after the operations had ended and that salmon farms had not obtained the required water rights (Hovell 1991, Hare and Brash 1993).

Support for marine farming was due to the 'significant' economic benefits to the 'community', but the Scheme required proof that these benefits would accrue to Stewart Island before it considered modification of Stewart Island's environment could be justified. A working party was established whose recommendations would be introduced as a change to the Scheme. Although the Party identified a number of sites (e.g., New River Estuary and parts of Port Adventure) where marine farming could take place, the change never eventuated. A 1991 marine farm planning study (Hovell 1991) identified several locations as suitable that had previously been considered unsuitable and some of these (East Awarua Bay) have subsequently been defined as non-complying in the Proposed Regional Coastal Plan for Southland (SRC 1997).

9.2.2 Maritime Planning Schemes

Maritime Planning Schemes (MPS), to be prepared by Maritime Planning Authorities (usually the relevant Harbour Board), marked the first attempt to establish coordinated statutory planning specifically of the areas above and below the mean high water mark. Four MPS were proposed and three were approved prior to being overtaken by the RMA (Table 9.1, Figures 9.1 and 9.2).

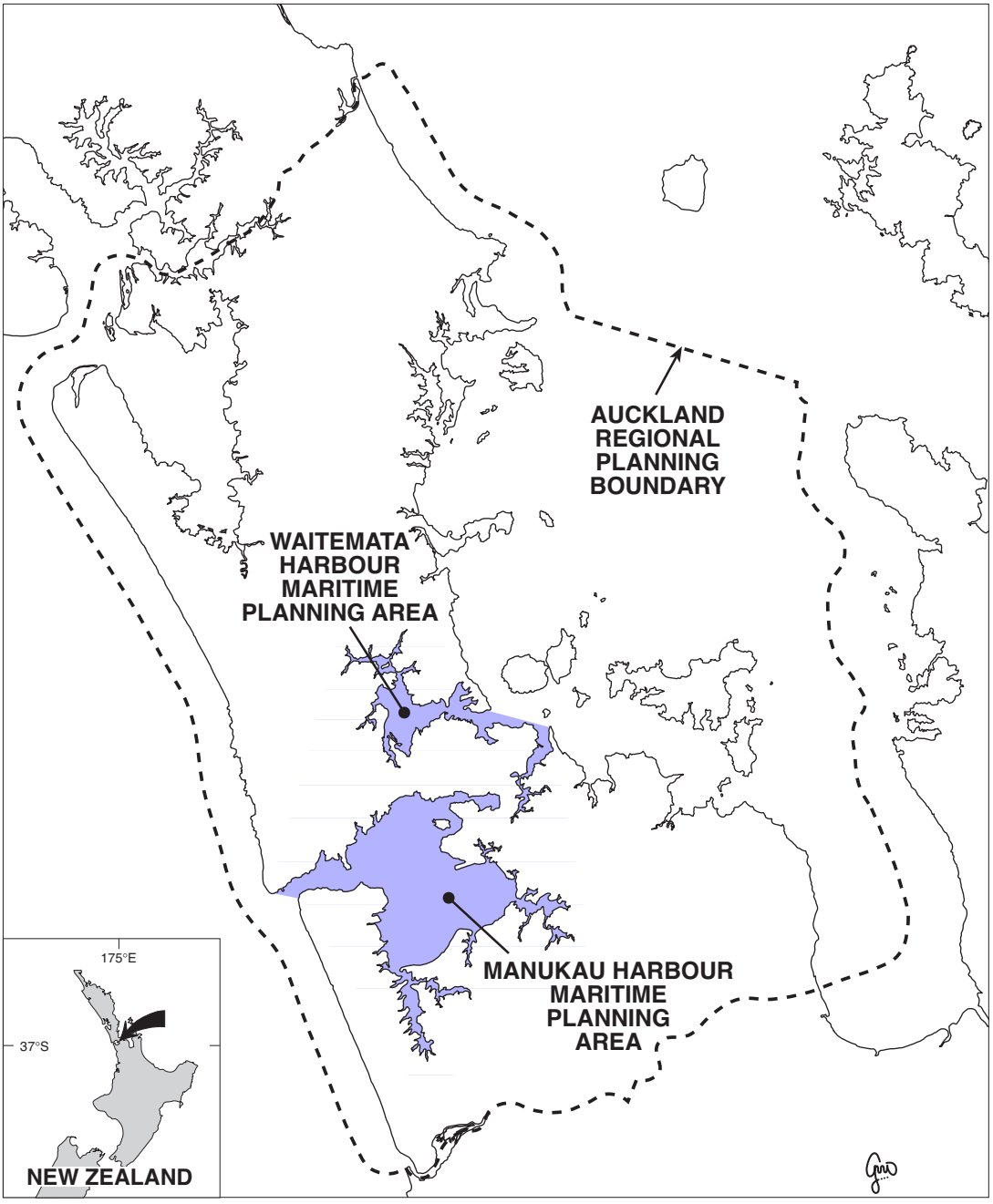
Table 9.1 Maritime planning schemes

Name of Maritime Planning Area	Maritime Planning Authority Approved	Maritime Planning Scheme Approved	Planning Authority
Waitemata	1979	1985	Auckland Harbour Board
Manukau	1979	1989	Auckland Harbour Board
Wellington	1979	1988	Wellington Harbour Board
Marlborough	1980	Proposed 1988, superceded by RMA	Marlborough Harbour Board

A 1980 survey of harbour boards showed that although most lodged *pro forma* applications to be appointed maritime planning authorities, they had no intention of undertaking any planning, beyond the port planning required by the New Zealand Ports Authority Act 1968, until significant conflict between users had arisen (Ministry of Transport 1980a, b). Such port plans were very much focused on transportation and the potential for conflict between regional plans and port plans was readily apparent, especially with the Environmental Protection and Enhancement Procedures (EPEP) needing to be taken into account (McCombs 1980). Without the support of harbour boards, the extension of maritime planning schemes to other parts of the country was effectively stymied.

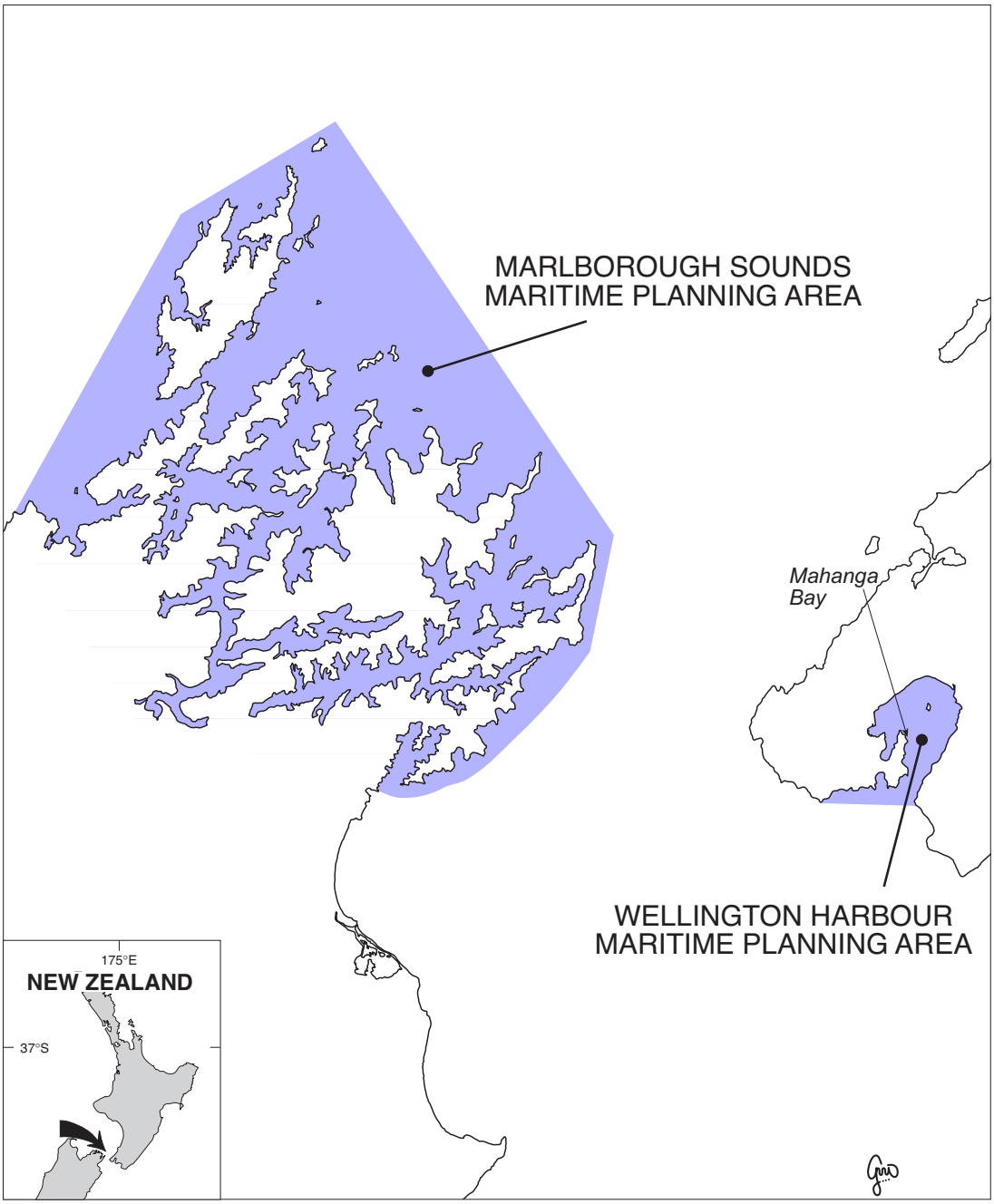
Of the four maritime planning schemes, Marlborough's proposed scheme (Marlborough Sounds Maritime Planning Authority (MSMPA) 1988) was the most focused on marine farming and is discussed in detail separately below.

Figure 9.1 Waitemata and Manukau Maritime Planning Areas and Auckland Regional Planning Scheme planning boundary



Of the others, Wellington responded to a request from MAF and created a small, special marine farming zone, restricted to research farms, adjacent to the MAF hatchery in Mahanga Bay (Figure 9.2, Box 9.3, Table 9. 2). The Waitemata Harbour Maritime Planning Scheme essentially prohibited marine farming from its entire area.

Figure 9.2 Wellington and Marlborough Sounds Maritime Planning Areas



The rationale for excluding marine farming in Waitemata was explicit (Box 9.3). Although the rules did not specifically *prohibit* marine farming, when read in context, the intention was sufficiently clear.

Box 9.3 Maritime planning scheme provisions

Wellington Harbour Maritime Planning Scheme 1988

3B5 General Area Dominant Uses [all uses can continue, but the dominant use has priority](j) Marine farming for scientific [purposes]

Waitemata Harbour Maritime Planning Scheme 1985

5.7.4 The Authority considers that marine farming is an inappropriate use within the maritime planning area. In particular, it considers that marine farms are unsuitable as they would impede or restrict navigation and recreational uses and activities and possibly interfere with the use of the harbour as a port; could intrude into the visual environment; and could be detrimental to the harbour ecology. Marine farming is therefore not a permitted use.
Objective
5.7.5 To ensure that the resources and uses of the harbour provided for in Parts 4 and 5 of this scheme are not compromised by the establishment of marine farms in the maritime planning area.

Manukau Harbour Maritime Planning Scheme 1989

5.5.4 …the Authority considers that *from a planning point of view* marine farming is *generally* an inappropriate use within the maritime planning area. In particular, it considers that the marine farms are *likely to be* unsuitable as they *could* impede or restrict navigation, recreational uses and activities, and the use of the harbour by the Maori people, could intrude into the visual environment, and could be detrimental to the harbour ecology. Marine farming is therefore not a permitted use and any marine farm proposal would need consent to an exception application where its impacts can be evaluated. [Emphasis added, italicized words differentiate the statement from that of the Waitemata MPS]

Objective
5.5.5 To ensure that the resource…[a number of criteria set as in 5.7.5 of Waitemata MPS above]

Marlborough Sounds Proposed Maritime Planning Scheme 1988
Marine Farming
Objective
20.1.1 Achievement of the economic benefits potentially available from various forms of marine farming, in addition to the benefits, economic or otherwise, which accrue from the use and enjoyment of the Sounds for a wide variety of activities.

Policies
20.2.1 Marine farming operations which in visual and ecological effect are comparable to mussel farming by the long line method, and which are located in areas identified for marine farming on the planning maps, will be permitted as of right.
20.2.2 Marine farming by other methods, or in other locations, or the farming of new species, will require application as exceptions to this Scheme.
20.2.3 Where farming of new species or by new techniques is proposed, the Authority may impose conditions of consent requiring an assessment of the existing environment of the site and its vicinity prior to the commencement of marine farming, and subsequent monitoring of environmental effects, especially water quality and the local marine ecology.

Table 9.2 Activity based zones used in the water in maritime planning schemes

Wellington	General Area Dominant Uses (in specified parts) (j) Marine farming for scientific purposes in Mahinga Bay area General Area Prohibited Uses (e) Marine farming except that required for scientific research purposes Port (includes 'special cargo' and 'port development')
Manakau	Conservation Habitat Recreation Port (several)
Waitemata	Conservation Recreation (several) Permitted Dredging Area Prohibited Anchorage Areas Prohibited (to everything) Areas (Defence Areas) Pleasure Boat or Barge Mooring Areas Port (several) Viaduct Basin Development
Marlborough	Protected Areas Anchorages Moorings Stockyards/Stock Landing Areas Harbour Works Marine Farming - Areas allocated by scheme - Transfer sites - Spat collecting/Holding areas - Existing farms

Manukau adopted a general zoning approach, but also showed, more than any other MPS, a strong appreciation of its Maori history and the need to recognise Maori concerns. The scheme was clearly much influenced by the Waitangi Tribunal's (1985) report on Maori claims to the Manukau. With regard to natural values, the scheme identified "open space" values as important. These were derived from the Harbour's "expansive form and extensive shoreline backed by landscapes which are predominantly rural or predominantly natural in character… the predominantly rural character of the shoreline and significant natural features around the shore should be protected or preserved" (Manukau Harbour Maritime Planning Authority (MHMPA) 1989: s3.4).

The thrust of the scheme was toward minimal development of the Harbour, preferring the maintenance and enhancement of the public space (for recreation) and Maori fishery use ahead of most other uses (the Harbour being predominantly zoned as 'conservation' or 'habitat' protection) (Table 9.2). Marine farming had to be applied for as an 'exception' anywhere within the Harbour and as the Harbour was vested in the Auckland Harbour Board, which was also the MHMPA, an applicant needed its approval for a marine farm (instead of the Minister of Works'/Conservation's). The Scheme's marine farming policy therefore was very influential in determining whether marine farming would proceed. The overall outcome discouraged applicants, but the wording was significantly different from that for the Waitemata Scheme. The changes (italicised in the policy in Box 9.3) provide slightly more leeway for envisaging that marine farming might be accepted in Manukau Harbour in specific instances (it has not occurred).

The generality and certainty of opposition to marine farming in the Waitemata Scheme was not repeated in the Manukau Scheme, but essentially the only difference in criteria used in the two schemes was the substitution of effects on Maori (in the Manukau Scheme), for effects on port development (in the Waitemata Scheme). The very different nature of the terrestrial landscapes and level of development of the two harbours did not affect the outcome for marine farming which, in both cases, was more restrictive than that for the urban setting of Wellington Harbour[2].

The Waitemata and Manukau schemes were restricted to their respective harbours, but they were supported for the wider Auckland region by the coastal and marine plan of the Auckland Regional Planning Scheme (Figure 9.1). It essentially prohibited marine farming anywhere other than in the existing locations and allowed for expansion only in Mahurangi Harbour, an area it recognised as 'nationally important' and where it also adopted rules to protect and maintain the quality of the water for marine farming.

[2] Despite Wellington being largely urban, it should be noted that Mahanga Bay is backed by steep, forested, prison land with the relatively unattractive hatchery as the only visible land use adjacent to the marine farm zone. The road around the shoreline of the Bay is, however, a very popular part of a scenic drive.

9.2.3 Marlborough

The Marlborough MPS was quite different, reflecting both the region it covered and its antecedents. The first significant planning study to address marine farming as such was one prepared by four Crown agencies in 1976 (MAF *et al* 1976). This study had no statutory power, but helped to set the basis for the policies adopted by each of its participating government agencies. The report looked at the effects of activities on each other and their effect on the environment generally (e.g., effects on and of mussel farming (MAF *et al* 1976: 92)). It considered the requirements of farms (Box 9.4), but also considered the criteria of the MFA71, and the different property rights in the lease and licence concepts. Havelock was identified as the preferred primary servicing centre, providing wharfage, handling and processing, and farm supply and maintenance services. Secondary service centres were identified as Nelson and Blenheim (MAF *et al* 1976: 72 –74).

The problem facing the Crown study team, however, was not simply marine farming, but how to balance use of the Sounds between the existing pastoral and reserved land, and recreation and tourism usages, and the two major developing industries - forestry and marine farming. It settled on planning goals that emphasised the need to conserve and enhance amenity values while allowing developments to occur that were consistent with this goal. Viable commercial forestry, fishing and marine farming were to be provided for within this overall context (MAF *et al* 1976: 20-21). The team produced a map identifying eight use areas, one of which was designated as appropriate for mussel farming (Figure 9.3).

Concurrent with the Crown study, the Marlborough Regional Development Council produced a major report on the whole region's resources and their potential (Duckworth *et al* 1976). The fisheries section was partly contributed by Bruce Hern, subsequently a well-known marine farmer. The report noted among other things that:

> Almost the whole of the Kenepuru Sound and the more protected areas of the Pelorus Sound appear suitable for mussel farming, but the resource is limited by environmental considerations, alternative recreational uses, an existing scallop industry and potential alternative land uses. By October 1976, 107 applications had been made for

> licences to farm mussels in the Marlborough Sounds, averaging 3 hectares, but only 4 licenses had been granted and 19 had been declined. Those which were declined were mostly in an unacceptable place, halfway along the South side of Kenepuru Sound, where there is a lot of recreational boat traffic.
> (Duckworth *et al* 1976:180)

This was the same area as that identified by the Crown study, between Schnapper Point and Portage (south side of Kenepuru Sound), as highly desirable, but inappropriate for marine farming for social/public access (recreation) or navigational reasons. The industry was having difficulty finding space because of the precedence accorded other uses and neither it nor MAF trusted local councils or other government organisations (Lockley 1980, Gardner 1984). The Fishing Industry Board stated a clear preference to work with MAF as opposed to councils (Lockley 1980). The conflict between local and central government and within central government, also present in the Auckland region (Joint Planning Team 1979, Willis 1982), represents a failure of 'networked planning' approaches.

Box 9.4 General requirements for marine farming as identified in planning documents

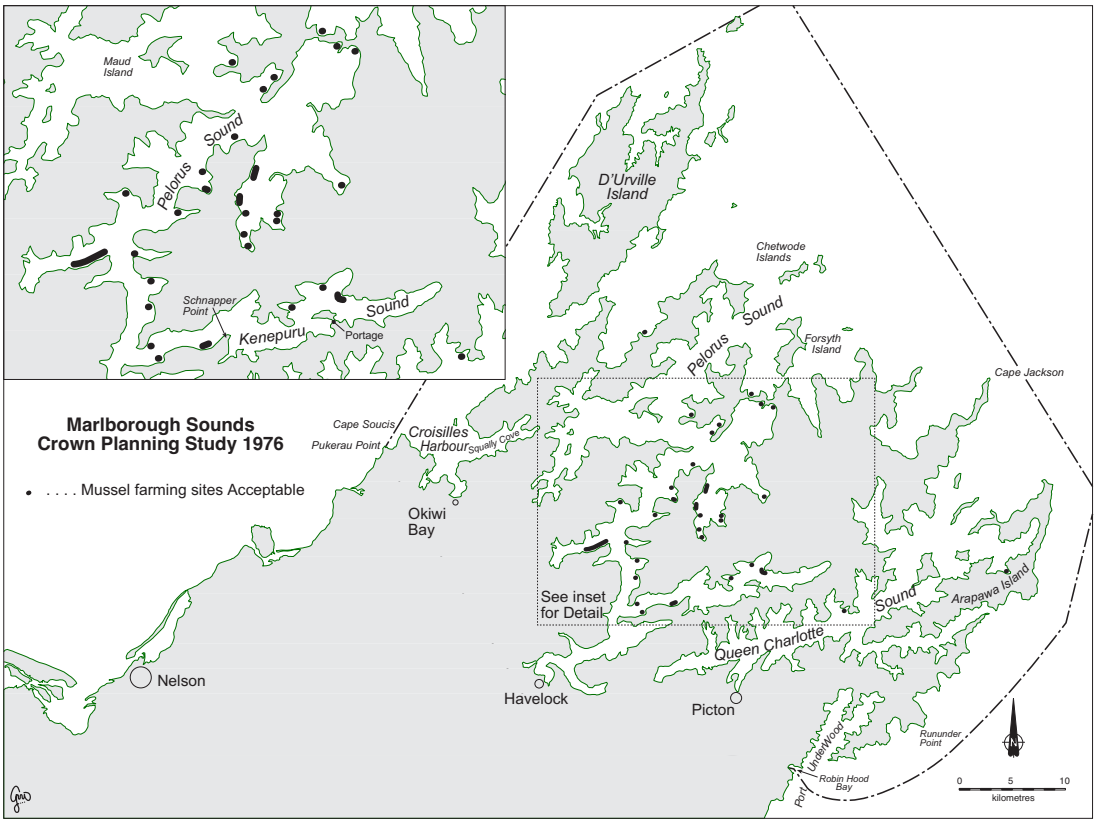
Marlborough Crown Study (MAF et al 1976)
General requirements for mussel farming:
- reasonable shelter from adverse weather conditions and strong wave attack
- minimum water depths of 3 metres
- good tidal flow for planktonic feeding and cleaning, current of 1knot minimum, 3-4 knots maximum
- abundance of planktonic food
- water of high quality
- spat collection sites
- land space for storage and maintenance equipment
- 3-4 hectares of space for a minimum basic economic unit for a one-person operation

"Mussel farms should not be located in the recreational/residential foci – Queen Charlotte Sound, Tennyson Inlet, Southern Kenepuru from Schnapper Point to Portage.
Alongside the main transportation corridors – roads and waterways –mussel farms should be as unobtrusive visually as possible.
Siting of mussel farms remote from recreational use areas is desirable because of fewer conflicts." (MAF *et al* 1976: 131)

Marlborough Sounds (Proposed) Maritime Planning Scheme (1988)
- good water quality
- landing facilities
- storage and maintenance facilities
- reliable spat source

Waitemata (1985) and Manukau (1989) Harbour MPS
- good water quality
- suitable water depths (which may vary according to the species to be farmed)
- an area as free as possible from disturbance from the public and harbour activities
- access to processing and marketing.

Figure 9.3 Marlborough Sounds 1976: Crown Planning Study acceptable marine farm sites



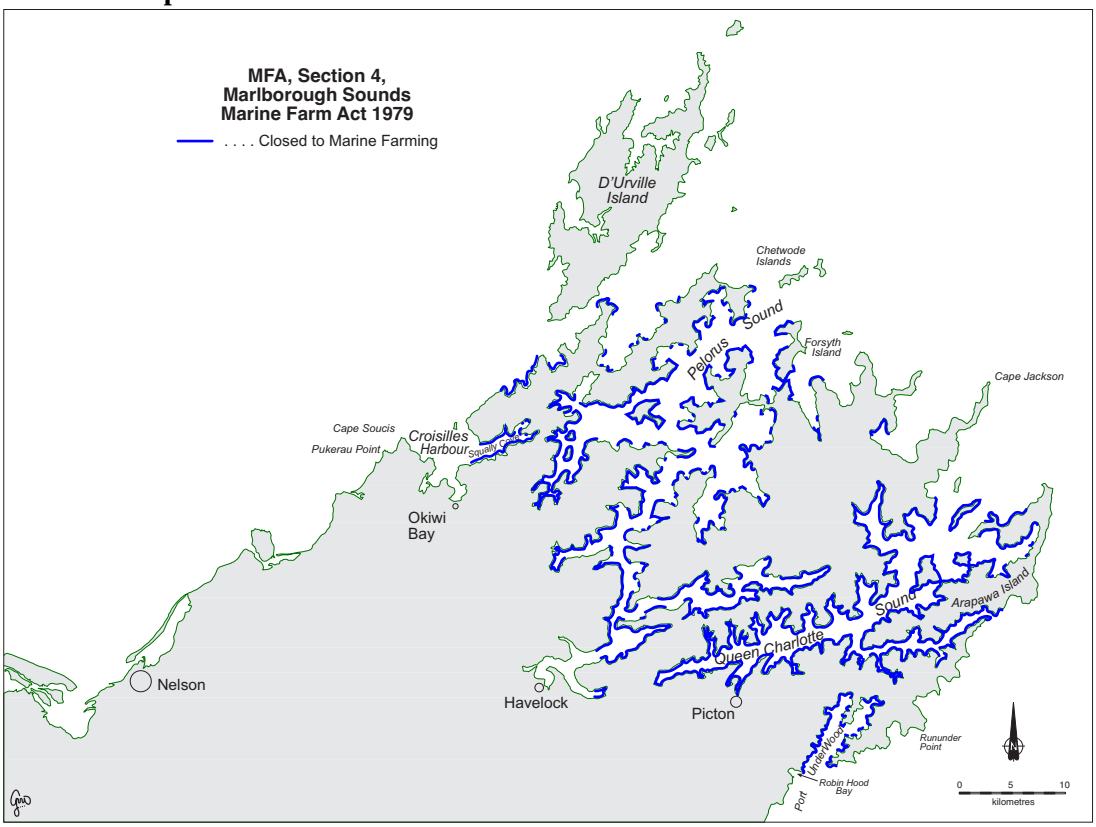
The report also noted that mussel farming, of all the marine fisheries activities (excluding recreational/tourism), had considerable potential to assist in regional development, possibly reversing population decline (Duckworth *et al* 1976). Employment and retention of population in a depressed region were therefore important from the regional perspective. The major concern facing the industry was the potential impact on water quality of forestry. The report concluded that a priority (number 8 of 18) for regional development was to "Promote a controlled expansion of mussel farming" (Duckworth *et al* 1976: 180).

The Crown study and the Duckworth report left no doubt as to the potential that mussels were seen to have, but as with the Auckland areas, they were to take second place to the demands of recreation and public access to the commons. The reports were followed by McCombs' (1978) study and the efforts of MAF to identify appropriate sites for marine farming that resulted in the 1979, five-year, section 4,

MFA71, plan for the Marlborough Sounds (Figure 9.4, and see section 9.3 below). The negative nature of the approach was later rejected by the Council (Royle 1982).

In 1981, the Marlborough Sounds Maritime Planning Authority (MSMPA) began preparing its Maritime Planning Scheme. Public notification of its intention to do so drew 407 responses, and the Authority proceeded to give greater priority to marine farming. From 1981 to 1984 a subcommittee of the Authority undertook inspections of "the entire Sounds coastline", but then the Authority recognised that treating marine farming in isolation from other activities would not resolve the conflicts already apparent (MSMPA 1988: 7). In the context of this thesis, such a conclusion is significant as it is one of the few comprehensive attempts to address planning for marine farming within an integrated regime framework. That it failed to achieve the outcome sought by an activities-based, single-sector plan, despite all the preceding information gathering exercises, indicates that such a modernist approach, while attractive, is unlikely to succeed in such a region.

Figure 9.4 Marlborough Sounds 1979: Sites closed to marine farming under MAF marine farm plan



The 1988 Proposed Scheme, however, retained a number of significant provisions for marine farming as a specified activity, one of several, and included provisions for transfer and spat catching and holding. These reflected the Authority's view (MSMPA 1988: 110-111) that:

> Marine farming appears to be a wise and, particularly for mussel or seaweed farming (indigenous species), relatively benign use of natural resources. It is difficult to accept this use should be restricted or curtailed simply because an adjoining land use is frequently operated in a manner which does not contain its effects within its site boundaries.

This was a direct challenge to the perceived injustice of the precedence given to adjacent terrestrial activities.

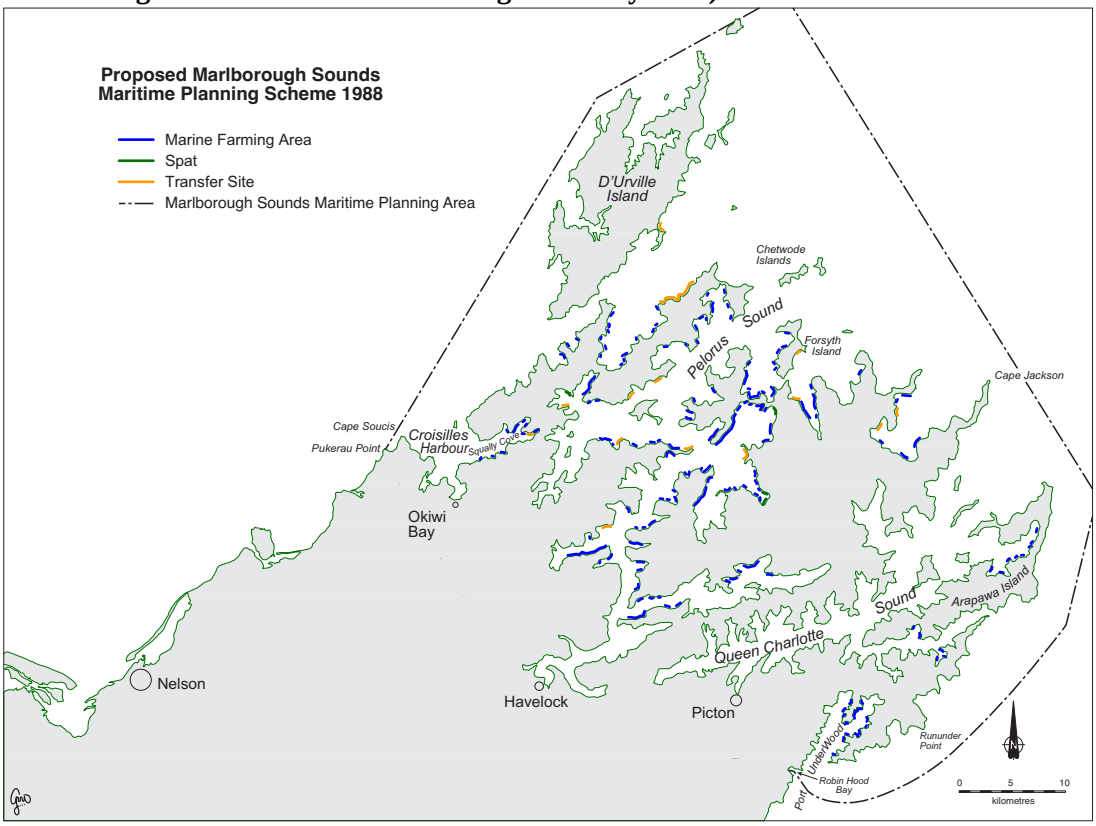
The provisions for marine farming were placed within an overall goal "To provide for multiple use of the Marlborough Sounds in a way which is compatible with the physical and environmental qualities of the area" (MSMPA 1988:1). The Authority explicitly recognised that "a dominant influence" on its approach was

> the fact that the waters and marine resources of the Sounds are in public ownership. The concepts of guardianship and sustainable use of resources are central to the role of the Authority and this Scheme. Private use of these resources must be tempered by consideration of retaining the resources for the use and enjoyment of future generations. This leads to the view that permission for development involving public resources cannot be assumed as of right for individuals. …Whereas land use planning restricts an owner's right to use private land as he wishes, maritime planning controls the extent to which a public resource is used for private purposes. Consequently the greater need for certainty in maritime planning is the extent to which the public asset will remain available for use and enjoyment by the widest range of groups among the public.

This provided the rationale for identifying sites where marine farming using longlines would be a *permitted* use (Figure 9.5). This reversed MAF's 1979 plan approach which had identified areas *closed* to marine farming. It also provided the basis for preferring licences to leases. In so doing, it dealt with the issue of whether or not leases or licences differed in their 'real' restrictions on public access: "Aside from the legal issue, the practical effect is that the presence of a marine farm does detract from

the interest an area might otherwise hold for recreational activities" (MSMPA 1988: 108).

Figure 9.5 Marlborough Sounds 1988: Permitted marine farming areas (Adapted from Marlborough Sounds Maritime Planning Authority 1988)



As well as identifying locations where farms were to be permitted (they still required MFA71 licences/leases), the Scheme also allowed applications for farms outside these areas as 'exceptions'. There were general criteria in the Scheme that had to be met regardless of whether a farm was proposed within a permitted area or outside one.

As Figure 9.5 illustrates, the MSMPS essentially required a ribbon development pattern, with farms hugging the coast. The pattern aligned with the 'inhospitable' land rather than the navigation routes. The permitted areas also had to continue to avoid sites that were adjacent to prominent headlands or backdrops of scenic value (i.e., high natural character). The pattern of recreation use, of fairways to and from anchorages and beaches, of navigation routes and of viewsheds, all entirely social

factors, predominated over the ecological in determining where farms would be permitted and the shape that they would take.

9.3 Marine Farm Planning by MAF

As indicated previously, MAF was involved in a number of non-statutory marine farming studies. Between August 1979 and January 1988 it gazetted nine marine farm 'plans' under Section 4, MFA71 (Table 9.3).The first major marine farming study was for the Marlborough Sounds and sought to identify those areas of the Sounds where mussel farming would *not* be authorised. Marine farmers and others were able to make submissions on the basis of a first draft by MAF while the Marlborough local authorities worked on their Scheme criteria. This was expected to provide greater certainty for all involved (McCombs 1978). Similar processes were followed elsewhere.

The resulting Marlborough marine farm plan was gazetted in August 1979 and covered the entire Sounds (Figure 9.4 above). Many areas were identified as not available for marine farming. These were usually close to the shoreline, leaving substantial areas open to application toward the centre of bays, but many headlands were specifically excluded from marine farming to avoid intruding on visual amenities. As noted above, areas left 'open' by the marine farm plan became areas where farming was either 'permitted' or could be sought as an 'exception' under the subsequent PMSMPS (MSMPA 1988). This change meant that applications in the centre of bays were less likely to succeed.

The second set of marine farming plans were made in November 1979 for Golden Bay's Wainui Inlet, but not gazetted until December 1981. These essentially prohibited farming in areas where there were no existing farms. Early in 1981, MAF advised the Nelson United Council that it had received 27 applications in its area. MAF indicated it did not intend to grant any licenses until it received guidance from the Council as to where such activities would be acceptable. A subsequent planning exercise conducted by the Council drew on all relevant government agencies and public participation and resulted in the Marine Farming Study – Nelson Bays, March

1984. MAF consequentially gazetted a marine farm plan giving effect to the Council's plan.

Table 9.3 Marine Farming Act 1971 section 4 farm plan New Zealand Gazette notifications

Date signed by Minister	Gazette year and page published	General description	Area
1 Aug., 1979	No.16, 1979: 2435	Marlborough Sounds – Not available for marine farming licences or leases for five years (Notice No. 2211, Ag. 54/7/I)	"All those areas in the Marlborough sounds as shown on the Marlborough Sounds Marine Farming Plan No. M.A.F. 147 (Sheets 1 to 59)...and thereon as marked."
27 Nov., 1979 (see also revocation notice in 1984)	No.146, 1981: 3726	Golden Bay – Not available for marine farming licences or leases (Notice No. 2726, Ag. 9/5/G)	"... all that area situated in the Waimui Inlet, Golden Bay as shown on plans No. MAF 150 and MAF 150A and crosshatched in red...shall not be available for leasing or licensing"
7 Oct., 1981 (see extension of area in 1987)	No.122, 1981: 2917	Mahurangi Harbour – Not available for marine farming leases or licences (Notice No. 2697, Ag. 9/5/K)	1. The following "shall not be available for leasing or licensing...all that area of foreshore, seabed and water in the Mahurangi Harbour excepting those outlined in red and identified as 'oyster lease' and 'available for oyster farming' on plan number MAF 194" 2. The following "is suitable for marine farming but shall not be available for leasing or licensing...All that area of seabed and water in the Mahurangi Harbour coloured blue and identified as 'cleansing area' on plan number MAF 194."
26 Aug., 1983	No.143, 1983: 2998	Stewart Island - Not available for marine farming (Notice No. 3086, Ag.9/5/D.)	"...the foreshore, seabed, and waters, surrounding Stewart Island shall not be available for marine farm leasing or licensing, except those areas within Big Glory Bay identified as 'marine farming licence', and 'available for marine farming' as outlined in red on plan MAF-195...until such time as revoked or amended subsequent to a review 2 years from the date of this determination"
17 May 1983	No.71, 1983: 1659	Coromandel Peninsula - Not available for marine farming leases or licences (Notice No. 3028, Ag. 9/5/I)	"...all that area of foreshore, seabed and water in the area from Wilsons Bay to Otautu Bay, Westcoast, Coromandel Peninsula and offshore to the gazetted boundary of the Auckland Regional Authority regional planning area and shall not be available for leasing or licensing...except those defined in red and identified as 'oyster leases' and 'available

Table 9.3 Marine Farming Act 1971 section 4 farm plan New Zealand Gazette notifications (continued)

			for marine farming' on plans numbered MAF 197 and MAF 198…[and this determination] shall remain in effect until such time as it is revoked".
10 Jul., 1984	No.125, 1984: 2770	Farewell Spit, Golden and Tasman Bays - Not available for marine farming leasing or licensing (Notice No. 3286: Ag. 9/6/22/7) Gazette notice no.146, page 3726 of 10 December 1981 revoked.	"…all that area of foreshore, seabed, and waters in the area from Cape Soucis to Farewell Spit, Golden and Tasman Bays, comprising the regional planning area of the Nelson Bays United council, shall not be available for marine farming under that Council's Marine Farming Study – Nelson Bays, March 1984…[this determination remains in effect] until such time as it is revoked or varied in accordance with the study."
1 Nov., 1984	No.204, 1984: 4796	Hauraki Gulf – Not available for marine farming leasing or licensing (Notice No. 3379; Ag. 9/5/m)	"… all the foreshore, seabed and waters of the Hauraki Gulf within the Auckland Regional Authority planning boundaries (but excluding the Mahurangi Harbour), shall not be available for marine farm leasing or licensing under the Act, except for those areas identified as available for marine farming on plan MAF No.199, sheets 1 to 5…[this determination remains in effect] until such time as it is revoked, varied, or amended subsequent to a review 5 years from the date of this notice."
27 Jul., 1987	No.128, 1987: 3726	Mahurangi Harbour- Not available for marine farming leases or licences (Notice No. 4134)	In addition to the area determined unavailable by notice 2697, Ag. 9/5/K dated 7 October 1981, the "area of foreshore, seabed and water in the Mahurangi Harbour of 4.8687 hectares adjacent to leases 109, 63 and 254, outlined in yellow on plan No. MAF 194 and as shown marked A on S.O. Plan 61368" shall "not be available for leasing or licensing". This determination "shall remain in effect until such time as it is revoked".
27 Jan., 1988	No.28, 1988: 561	Hokianga Harbour – Not available for marine farming leasing or licensing (Notice No. 4297)	"…foreshore, seabed and water in the lower Hokianga Harbour enclosed by a line from Rangi Point (at 35°27'55" south and 173°22'42" East) to Koutu Point (at 35°28'23" South and 173°24'04" East), and to a line between the harbour heads from North Head (at 35°31'28" South and 173°22'05" East) to South Head (at 35°32'05" South and Longitude 173°22'00" East)". This determination "shall remain in effect until such time as it is revoked".

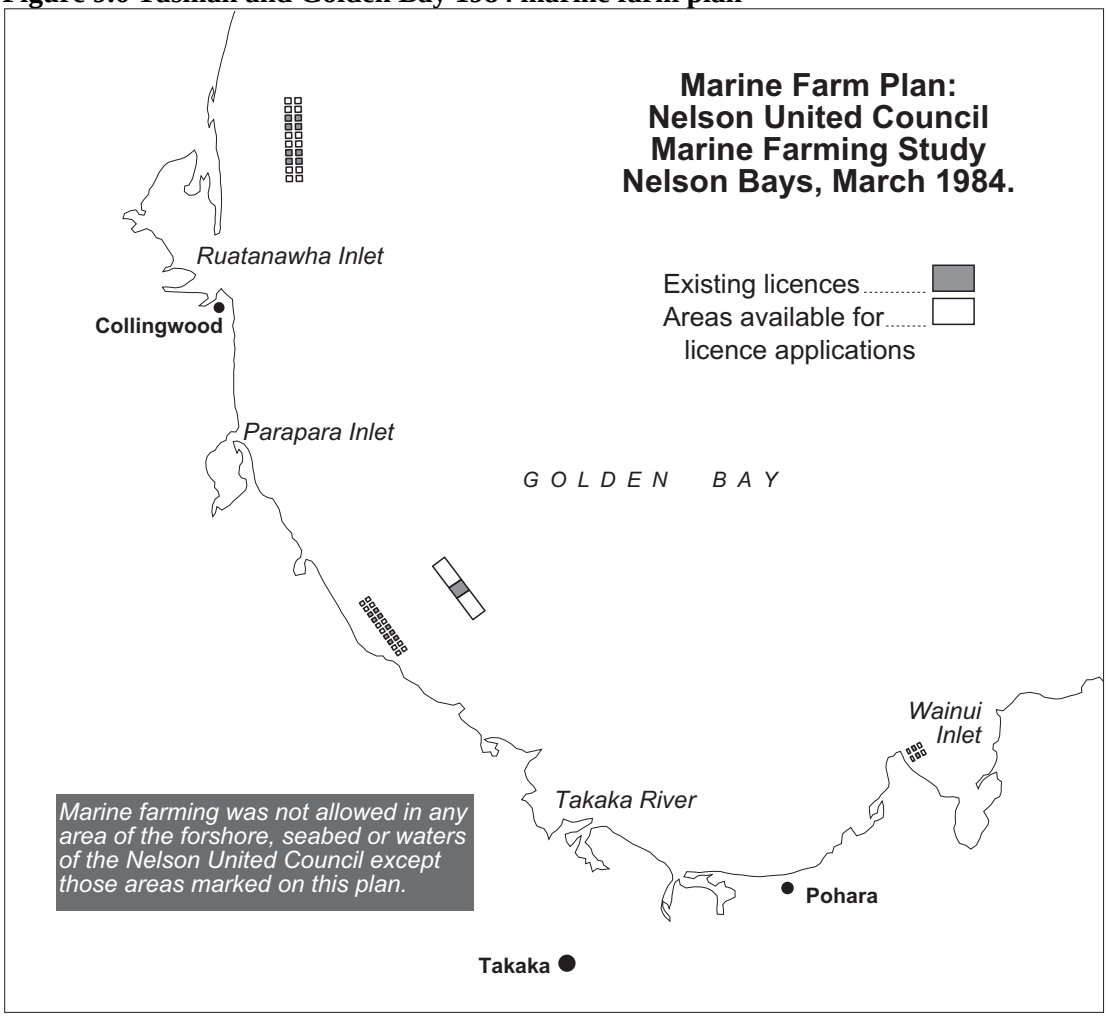
Notably this plan had not been prepared by MAF staff and was much more extensive in its prohibitions than had been the Marlborough Sounds plan. Essentially, marine farming was constrained to existing sites in Wainui Inlet, and two sites identified in the plan offshore from Ruataniwha Inlet (the Waikato farms) and between Parapara Inlet and Takaka River (the Onekaka farms) (Figure 9.6). In 1981, MAF gazetted plans for Mahurangi Harbour, identifying areas available for oyster leases and other suitable areas, but that would not be allocated, as well as the remaining prohibited areas. The suitable areas not allocated were effectively saved as depuration areas. The prohibitions were extended further in 1987 (Table 9.3, Figure 9.7).

Initial interest in Stewart Island's Patterson Inlet and Port Adventure came to an end in 1983 with the gazettal of prohibitions on marine farming anywhere other than Big Glory Bay, which had some restrictions (Box 9.3, Figure 9.8). Also in 1983, MAF gazetted prohibitions to the further expansion of marine farming in the Coromandel Peninsula other than existing and identified available sites. In the following year, corresponding restrictions were imposed in the Hauraki Gulf and other areas of the Auckland Regional Authority's east coast region. In keeping with Auckland's Regional Planning Scheme only existing farms and the areas planned within the Mahurangi Harbour were not prohibited on Auckland's east coast. The Manukau Harbour was not included in the prohibitions (Figure 9.7). The final substantively new area to have prohibitions emplaced under the MFA71 was the southern Hokianga Harbour in 1988 (Figure 9.9).

9.4 The Transitional Era

The passage of the RMA required regional councils to prepare regional coastal plans covering the territorial sea to the line of Mean High Water Springs. Some councils extended these plans to include their terrestrial responsibilities. Many provisions were challenged in the Environment Court. Concurrently, many new applications were lodged and this resulted in precedent setting case law that guided subsequent changes to plans as well as decisions on other cases in similar situations.

Figure 9.6 Tasman and Golden Bay 1984 marine farm plan



Most regions with limited marine farming at the time of preparing their proposed plans made marine farms essentially discretionary activities to be considered on a case by case basis (e.g., Canterbury, Otago, Gisborne, and Hawkes Bay). In the space available it is therefore most instructive to consider the experience of the authorities managing the Hauraki Gulf, Environment Waikato (EW) and Auckland Regional Council (ARC), Southland (Southland Regional Council (SRC)) and most of the Golden Bay and Marlborough Sounds regions (Tasman and Marlborough District Councils (TDC and MDC)).

Figure 9.7 Hauraki Gulf marine farming plans, 1981-1987

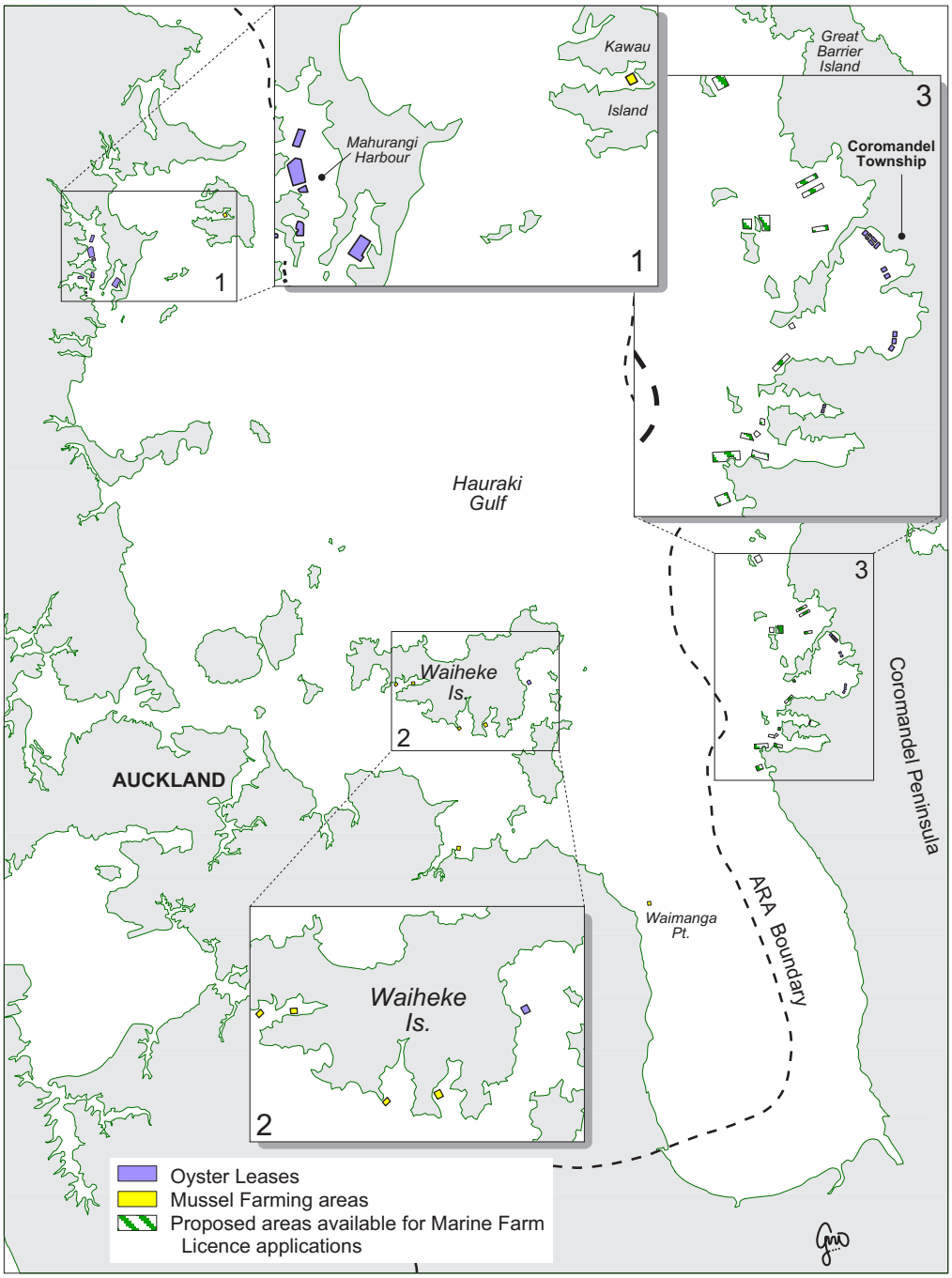


Figure 9.8 Stewart Island 1983 marine farming plan

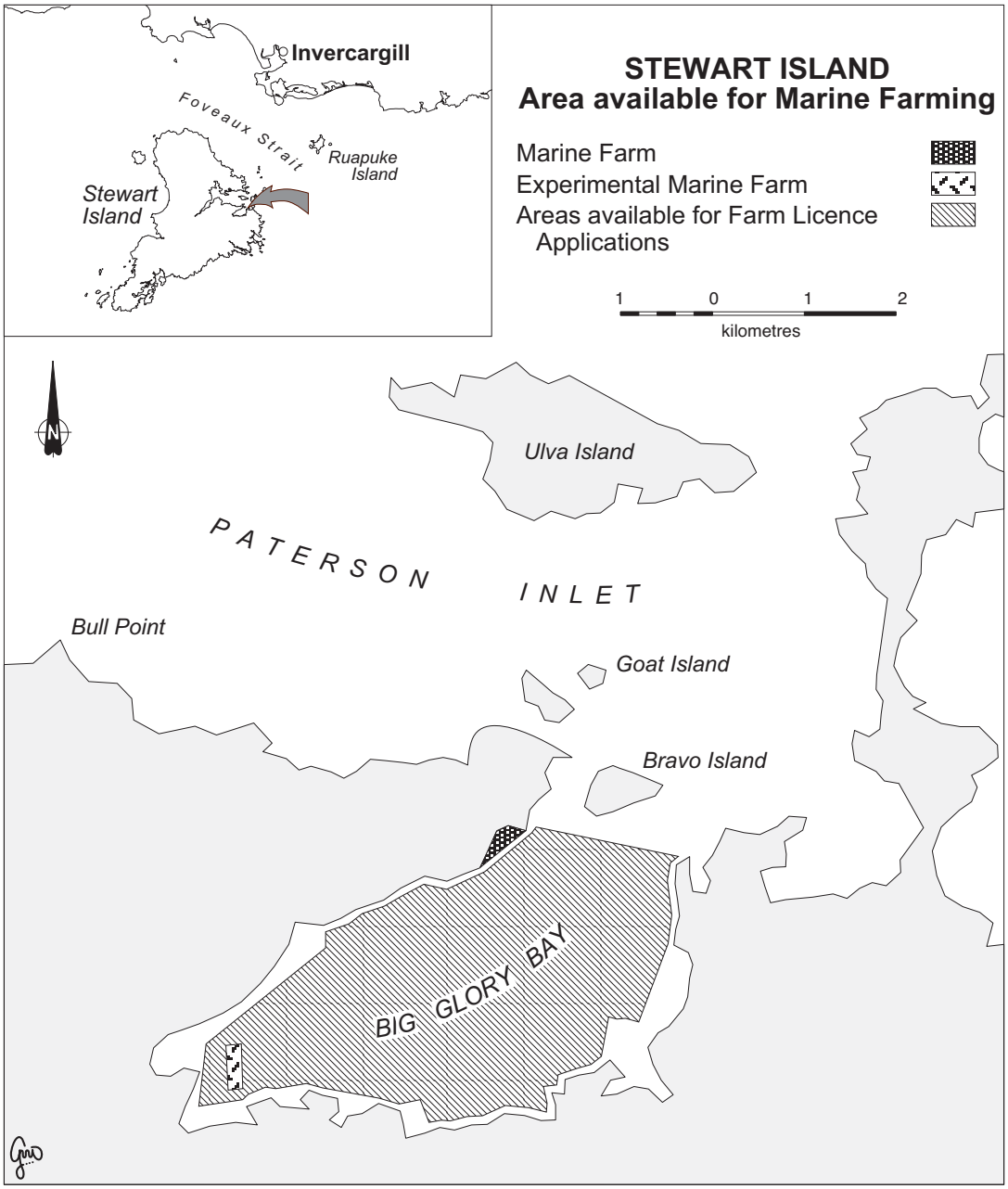
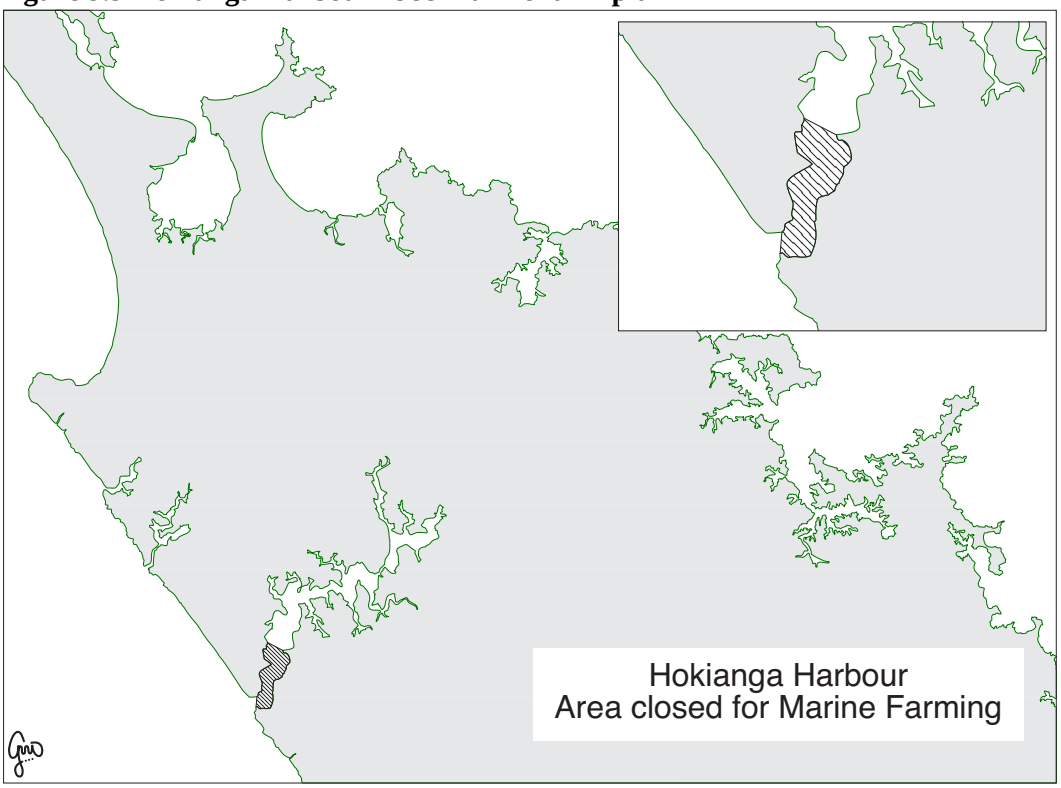


Figure 9.9 Hokianga Harbour 1988 marine farm plan

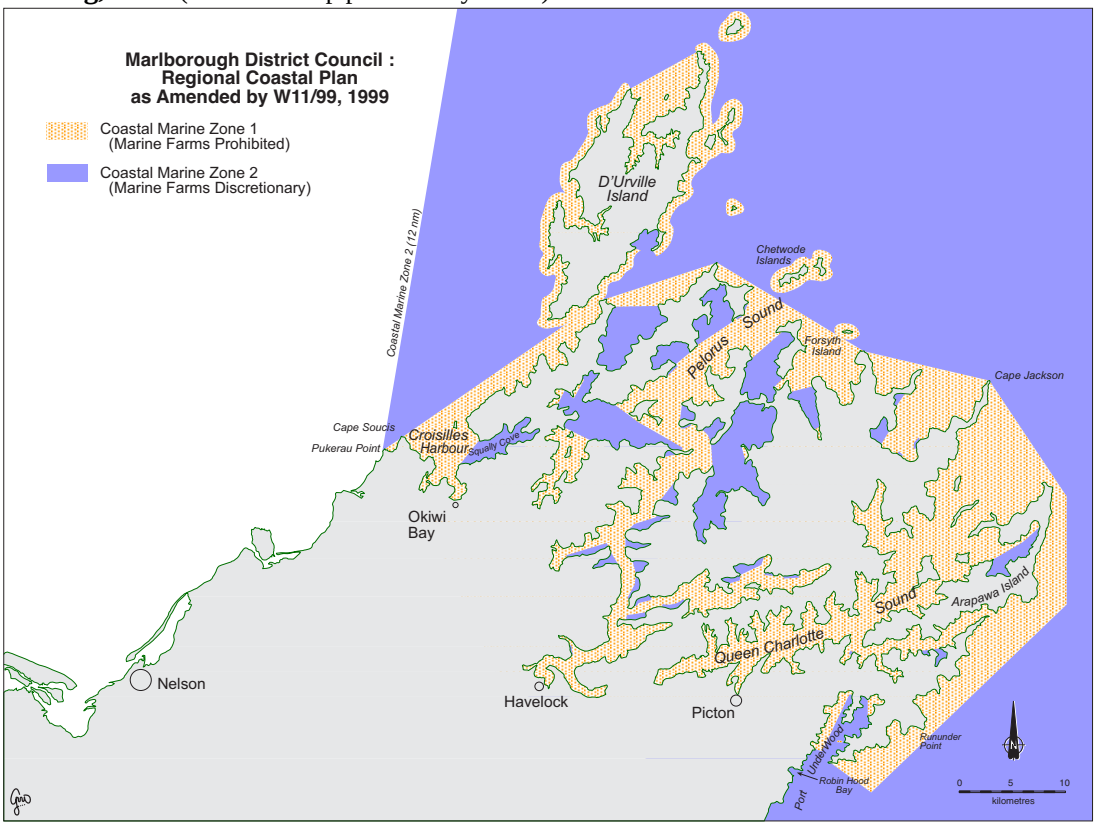


9.4.1 Marlborough Sounds

The Sounds have been the area in which much of the key relevant case law has been established (Appendix Three). It is also the setting for the aborted attempt to implement the coastal tendering regime of the RMA. For marine farming purposes, the Proposed Marlborough Sounds Resource Management Plan essentially divided the marine space into two Coastal Marine Zones (neutrally named CMZ1 and CMZ2, Figure 9.10). Marine farms were generally prohibited in CMZ1. Standards are set for marine farms in CMZ2 that require farms be located between 50 and 200m from mean low water mark if they are to be treated as 'discretionary' activities. If farms are sought within CMZ2, but outside the discretionary area, they are non-complying unless they have controlled, limited discretionary, or discretionary status under other sections. Discretionary or non-complying activities are considered on a case-by-case basis. Consent can be granted for a non-complying activity only if the activity has no

more than minor effects, whereas discretionary activities might have quite significant adverse effects and still be approved. This favours development of marine farming within the area 50-200m from the shore.

Figure 9.10 Marlborough Sounds proposed regional coastal plan key zones for marine farming, 1999 (Based on map provided by MDC)



The general approach of the plan has been to enable farm continuation and small scale expansion at most existing sites by encircling them with CMZ2 zones where they would otherwise be in CMZ1. Marine farmers are 'permitted' to alter their existing layout within specified parameters. The plan encourages the use of subsurface technology for farms in scenic places by reserving discretion to the Council to decide visual amenity issues.

The bulk of the CMZ2 areas between 50 and 200m of low water mark are already occupied by farms with 'controlled activity' status (i.e., permitted if they meet certain standards specified in the plan). This means that the areas available for new marine

farming are effectively those in which marine farms would be generally non-complying.

Interestingly, Northland's proposed plan (not discussed here) is very similar to Marlborough's, but without the distance criteria to distinguish discretionary and non-complying marine farming activities.

9.4.2 Golden Bay

Arguably the most significant of a number of important cases under the RMA/FA 83/96 regime was Kenderdine's 220 page Interim Report *(Golden Bay Marine Farmers and Ors v. TDC* (2001)*).* It represented the Court's findings after more than 12 weeks of Environment Court hearings (November 1999-July 2000) into marine farming provisions of the Tasman District Council's Proposed Regional Coastal Plan. This hearing was underway during my fieldwork in the Marlborough region and undoubtedly influenced interviewees.

The extent and complexity of the hearings reflected the strength of the conflicts over the prospect of large-scale marine farming in Tasman and Golden Bays. The estimated $7 million cost to all parties (The Nelson Mail, 3 May 2002:3) indicates the perceived value of the stakes involved. A local environmental organization claimed it had spent $ 50,000 and the Council had spent $500,000 (The Nelson Mail, 3 May 2002:3). One lawyer was rumoured to have presented bills totaling $450,000 for his services at the time I was doing my fieldwork, and some of the major players in the capture commercial fishing industry were believed to be bankrolling smaller players as well as their own cases. Among the major fishing companies involved were Talleys, Sanford's and Sealords and at least one of these was believed by some interviewees to be backing both sides, possibly in an attempt to prolong the case for corporate strategic reasons.

The background to marine farms in the Nelson and Tasman Bays reflects a traditional activities-based planning approach. As discussed above, in the 1970s pressure for space led to marine farm planning studies and the closure of most areas to marine

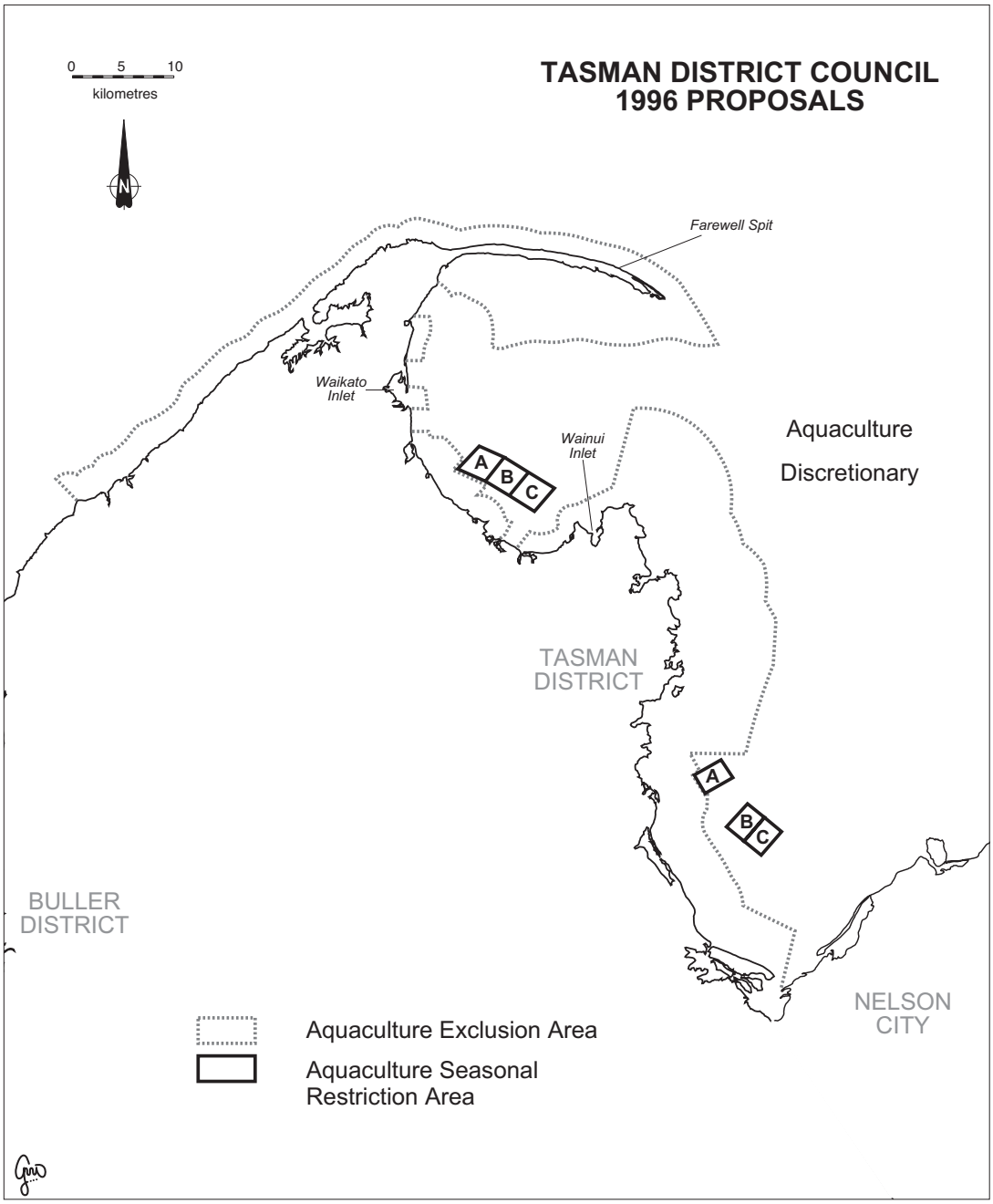
farming using section 4 of the MFA (Figure 9.6)[3]. A proposed regional coastal plan was notified in May 1996 under the RMA. It did not include zones or discrete areas for marine farming, but did have an Aquaculture Exclusion Area (AEA) and some Aquaculture Seasonal Restriction Areas (ASRA, intended for scallop spat catching structures) (Figure 9.11).

The TDC saw marine farming as a means to boost the local economy and consequently had sought to expand the area available by making aquaculture discretionary in the remaining CMA. The ASRA included existing spat catching areas, whereas the AEA essentially followed distance from shore (1, 3, and 6 nautical miles (nm)) and depth contours (10m depth around Farewell Spit). The 6nm measure was used around especially sensitive ecological areas. Outside the AEA, competing marine farming applications were to be decided by ballot before having the applications considered by council.

After receiving submissions, TDC changed its plan to one with an Aquaculture Management Area (AMA) and redrew the AEA boundaries at 3nm and 6nm from shore with some minor exceptions (Figure 9.12). The ballot approach was also dropped as being *ultra vires*, the RMA only providing for 'first come, first served' resolution of competing applications (see Appendix Three). The rationale for the AEA was essentially to protect natural values, species and recreational use. The AMA included controlled and discretionary classifications for marine farming structures. Some of the existing marine farms (at Wainui) were not included in the AMA and had only discretionary status, whereas the entire block of Waikato farms and an additional 300m for expansion comprised the Golden Bay AMA. Outside the AEA, marine farming remained a discretionary activity (this was deliberately preferred to non-complying for efficiency of processing applications).

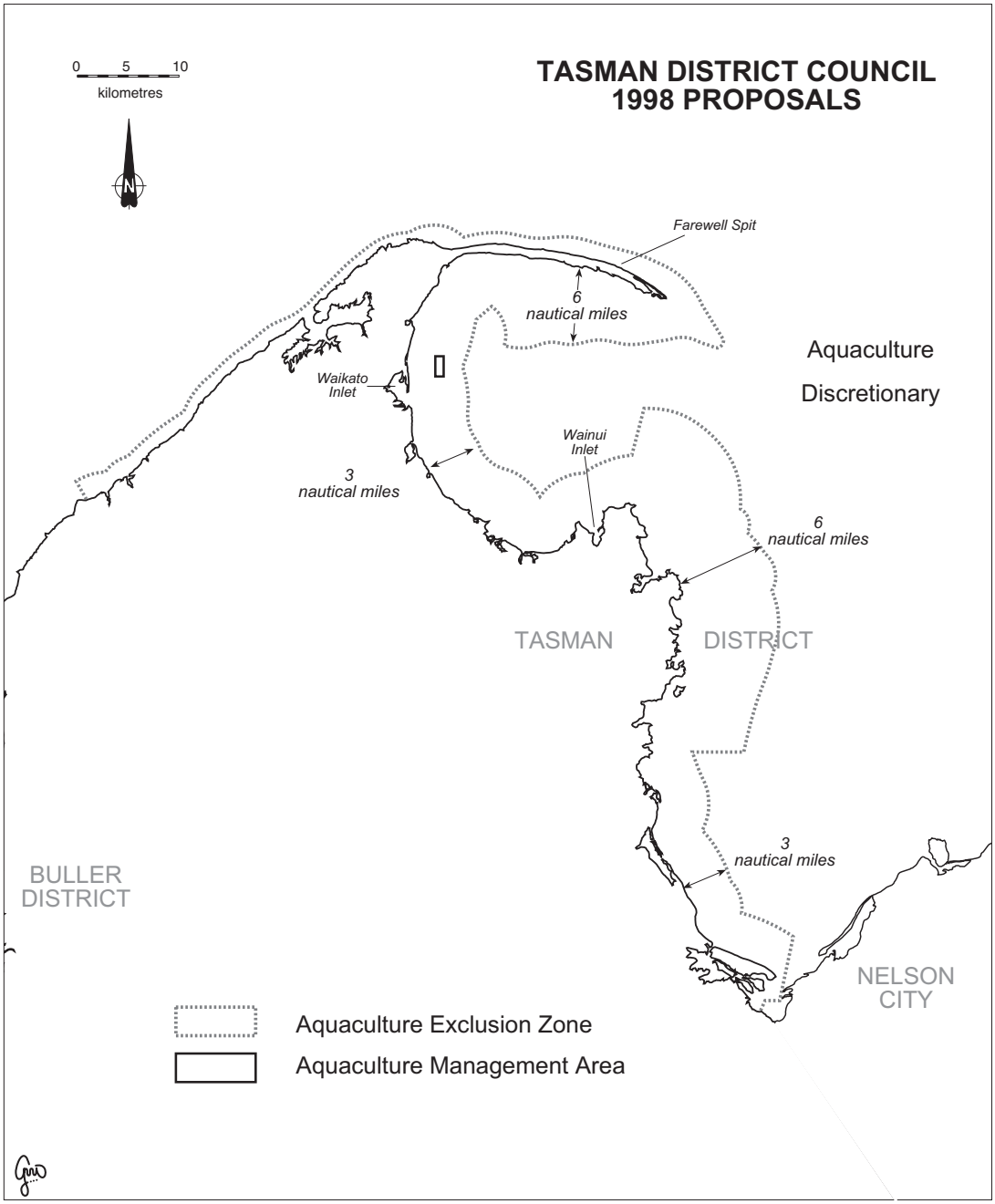
[3] The initially marine farming studies undertaken by the Ministry of Transport and MAF were subsumed within the auspices of the Nelson United Council. The Nelson United Council later became part of the Nelson-Marlborough Regional Council. In the 1990s the regional council split into unitary councils. The relevant parts of the Tasman and Golden Bays came under the jurisdiction of the Tasman District Council which, as a unitary authority, had both regional and district council RMA functions.

Figure 9.11 Tasman District Council proposed aquaculture areas, 1996 (Based on map provided by Tasman District Council)



The plan, therefore, more or less required marine farming to develop further out than 3nm, with the exception of previously approved sites. TDC acknowledged the arbitrary nature of the 3nm limit, but also argued it was justifiable on many grounds, including the precautionary principle.

Figure 9.12 Tasman District Council proposed aquaculture areas, 1998 (Based on map provided by Tasman District Council)



The removal of the ASRA was because the principle purpose for its existence, facilitating scallop enhancement, was outside the RMA. The bulk of the former ASRA sites fell within the AEA and was prohibited. Removing the ASRA affected Challenger's scallop enhancement programme (Box 9.5). Most of the references to

the Environment Court sought enlarged AMA(s) and/or prohibition elsewhere. They almost all included alternative plan drawings to support their positions and the cases included some of the leading coastal planners in the country. The Court was only able to zone areas for aquaculture that had been identified initially in the original submissions on the plans and those in the references to it.

Box 9.5 Challenger Scallop Enhancement Programme

Declining scallop catches led to the imposition of a controlled fishery status for the Challenger scallop fishery (essentially Marlborough Sounds, Tasman and Golden Bay fisheries). This limited the number of fishers permitted to fish in the fishery. This fishery was introduced to the QMS and the permitted fishers (approximately 50) became the quota holders. The Ministry of Fisheries and the fishers successfully experimented with reseeding the beds and rotating the harvesting of the beds. Initially this was managed by MAF Fisheries (Nelson) headed by Peter Brierly.

MAF and industry developed the Challenger scallop quota holders into an incorporated society with Mike Arbuckle, former MAF Fisheries Head Office strategic policy analyst, as CEO. Arbuckle initially rejected any role for the RMA in fisheries management and argued that ITQ did not include a spatial component. He was a leading MFish advocate for keeping fisheries out of the RMA, removing input controls from fisheries and relying on quota holders with *in perpetuity* rights to formulate their own organisational structures to sustainably manage fisheries. The Challenger Scallop Enhancement Company became 'the' model for this approach (Arbuckle and Drummond 2000).

Ironically, in 2000 as part of Challenger's challenge of proposed planning restrictions in the Tasman District Council's regional coastal plan, Arbuckle argued that the Challenger Scallop Enhancement Plan (CSEP), approved in 1998 under the FA96, should be supported by the RMA. Tasman's proposed 3nm Aquaculture Exclusion Area would have considerably affected Challenger's spat catching sites. To protect them he sought recognition of the CSEP as a 'plan under other legislation' that the RMA required councils to take into consideration. He was unsuccessful, essentially on the grounds that the CSEP would give priority to scallop enhancement activities over the activities of other fishers and the RMA is constrained from enabling such priority between categories of fishers (see also s 6(1) FA96). Moreover, the RMA plans are about physical and natural resources, not the integration of rights such as those of ITQ holders.

Arbuckle also argued that the RMA regime and planning process had created "speculative chaos", a "gold rush" of applications for marine farms

> … sited over the scallop fishery. They are sited over the most productive areas of the scallop fishery. They are sited over extensive beds due for harvest over the next 3 years. They are sited in a manner that will destroy the management framework for the fishery and the investments already made.
>
> (cited in para. 229 of W42/2001)

He also employed Dr B. Sharp an economist to give evidence in support. That evidence claimed that the potential loss of ITQ property rights was a major issue.

Challenger's QMA (SCA7) comprises 213,000ha, however, the area suitable for enhancement in Tasman District is 140,500ha, of which only 117,000ha (42,000ha in Golden Bay and 75,000ha in Tasman Bay) are used. About 500ha/yr are used for spat catching, but even after 13 years of experience the company was unable to identify the spaces that were most certain for spat catching. These are still massive areas compared to the typical traditional marine farm site of 3ha. With sites of 50ha or more now regularly sought under the RMA, if the locations of the sites are directly in conflict with Challenger interests, the conflict over the allocation of rights to the commons has become critical.

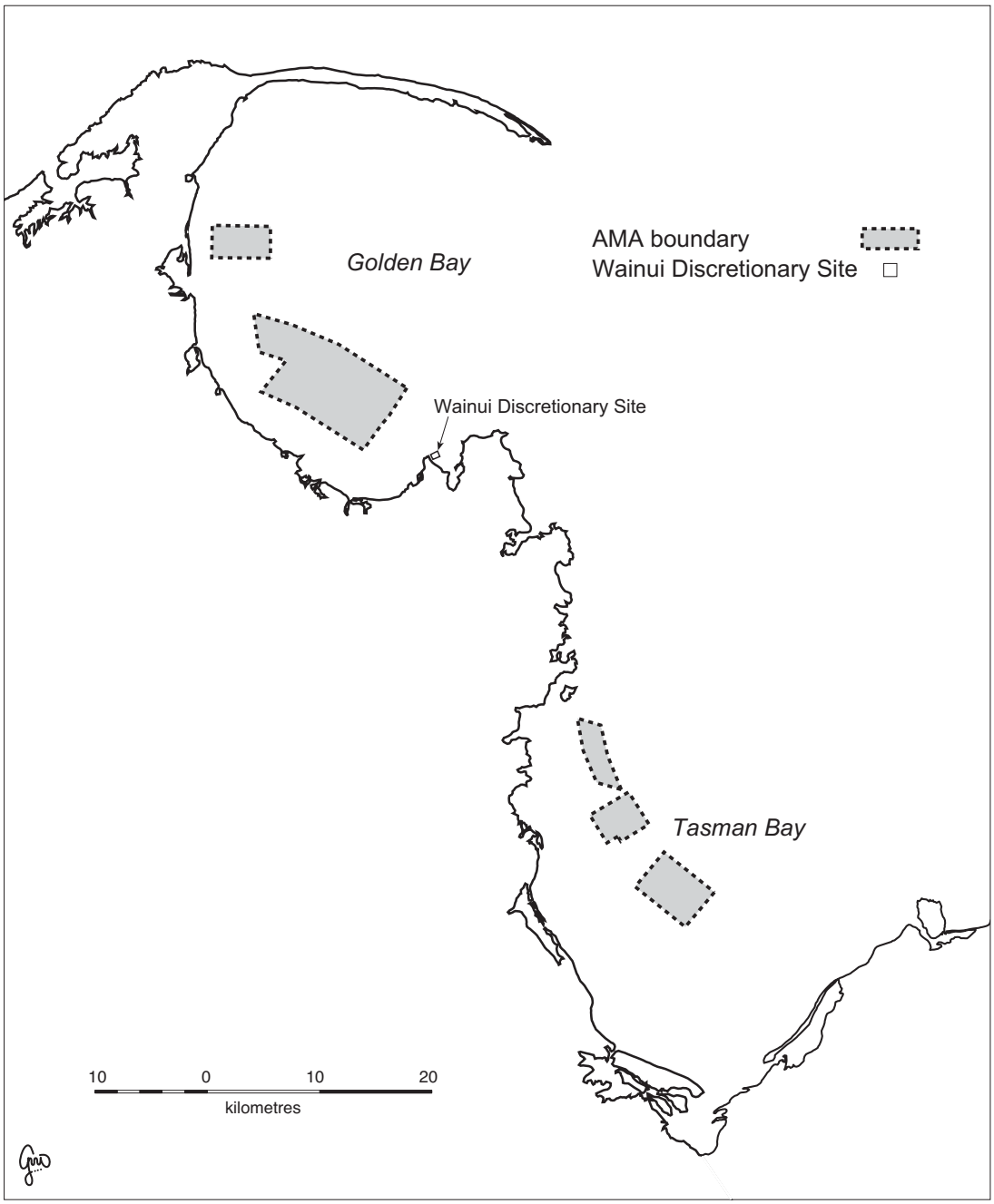
The Court concluded that TDC's proposed zoning would not work for four main reasons:

- the scale of the aquaculture area sought through various applications then in process would have destroyed the natural character;
- it would have effectively prohibited some sites from operating despite existing consents;
- it would be economically inefficient; and
- TDC needed areas to monitor the effect of marine farms so that it could better determine the nature of effects. Having such a large discretionary area would have made such monitoring extremely difficult.

In particular, the Court (para. 435-436) accepted that a blanket discretionary approach was *ad hoc*, was not 'management' and was inefficient. The Court undertook a site by site analysis against the criteria in the RMA. Visual amenity and natural character were especially important in the Court's decision at Onekaka. The Wainui site also had major adverse effects on natural character but, as no referee had sought its deletion and given iwi support for its retention, its right to remain in the site for the duration of its permit was upheld. It appears unlikely that it would gain another permit for the site when it does expire, which indicates the significance of having scope for not renewing a consent. An offer by one of the applicants to provide 20% of the space on their site to iwi was seen favourably by the Court and affected its decisions on how much space should be allocated.

The Court decided to create three AMAs and to prohibit aquaculture outside these except for some estuarine areas (Figure 9.13). The Wainui site was to remain as a discretionary site. The AMAs would be developed in 50ha stages and within them spat catching would be a controlled activity. Spat holding and mussel farming would be restricted discretionary activities, and TDC's discretion would be restricted to specified matters. Aspects of the case had yet to be finally determined in March 2002.

Figure 9.13 Environment Court's (Judge Kenderdine) proposed aquaculture areas for Tasman District, 2001 (Based on Appendix ZZ of *Golden Bay Marine Farmers v TDC* (2001))



A full analysis of this case is beyond the scope of the current thesis, but it is illustrative of both the transitional nature of the current regime and of its strengths and weaknesses. On the one hand the neo-liberal drive to let the market determine social issues is reflected in the costs involved – if you do not have a big cheque book then the game is not for you. On the other, the outcome achieved by the Court was anything but a market-based solution. Rather it resembled the recognition of

longstanding, but non-marked boundaries of existing communal rights in the marine environment and a compromise between the old common law rights to the use of the marine commons, only loosely protected by legislation, and the new *de jure* enclosure of the commons.

9.4.3 Hauraki Gulf

The Hauraki Gulf is one large embayment administratively shared between the Auckland and Waikato Regional Councils (ARC and EW[4] respectively). As noted previously, the Auckland Regional Scheme essentially prohibited marine farming from within its regional boundaries other than the farms already in place at the time. In the Waikato region marine farm plans under section 4 of MFA71 had prohibited farms from areas north of Wilson's Bay on the Coromandel Peninsula other than those in specified sites. These became rules in the transitional regional coastal plans for both regions under the RMA. The 1989 restructuring of local government had led to EW's boundary moving further offshore to cover areas formally under ARC control. The prohibitions that had applied under the old Auckland scheme became rules in the transitional plan for the former Auckland areas that were now within the Waikato region.

The result was that a large irregularly shaped area of the southeastern end of the Hauraki Gulf within the Waikato region had no prohibitions for marine farms. The advent of improved technology enabling deeper water farming in more exposed settings and a solid market for mussels saw a rush of overlapping applications for the sites in the Waikato area where they were not prohibited. EW adopted a conflict resolution approach to the area and declined all the applications, after extensive hearings, on the basis that they were preparing a regional coastal plan in consultation with the industry. During that process popular sailing and boating routes played a major part in determining appropriate routes. As with Tasman, EW found that adapting marine farms to fit with local routes and visual amenity values pushed them

[4] Waikato Regional Council, reputedly possibly the most innovative regional council, adopted the name Environment Waikato (EW). In the 2000s all regional councils adopted similar names, but I refer to them here by the names that they were most commonly known by throughout the 1990s.

further offshore than was acceptable under the standard policies of the Maritime Safety Authority (MSA). This led to some initial conflict with MSA, who attempted to apply its Marlborough Sounds' model to the Hauraki Gulf. The policy basically entailed keeping farms close inshore, preferably within 200m of the low water mark, to keep fairways and navigation routes unimpeded. EW prevailed and the MSA position also failed in Golden Bay.

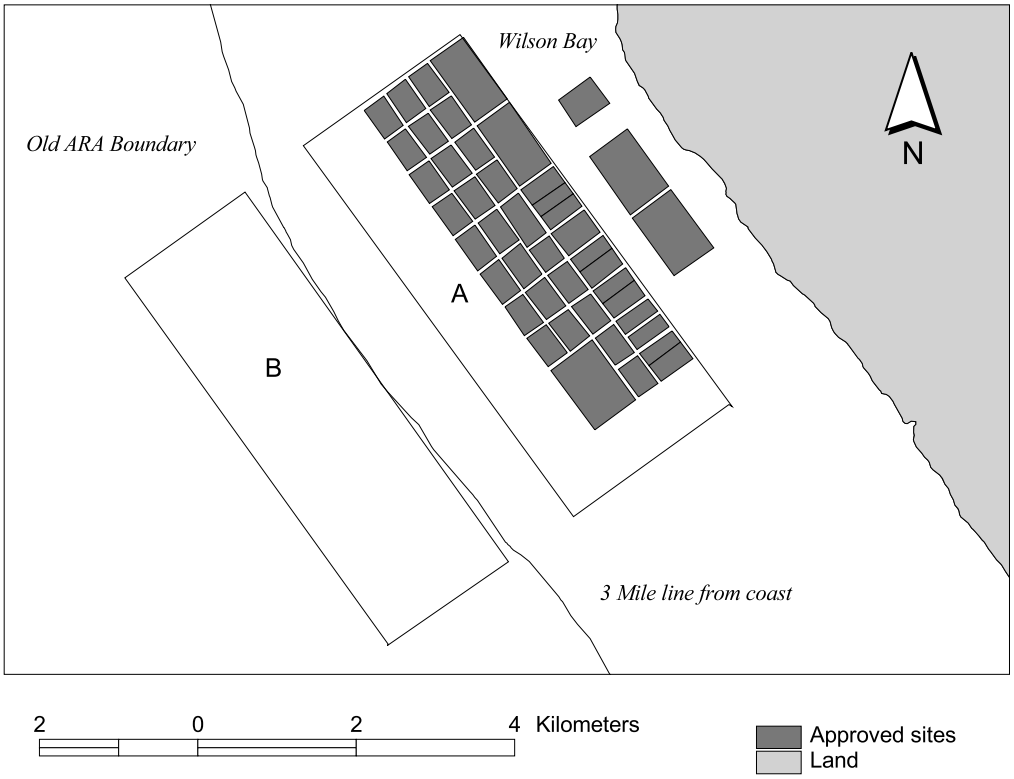
The outcome of these consultations was the notification of a variation to the proposed plan, effectively an entire new chapter on marine farming. The new provisions proposed an AMA for farms using current predominant farming technology and species (i.e., longline mussels and oysters) (Box 9.6). Outside the AMA such farming techniques were to be prohibited, but applications involving other technology and/or species would be discretionary. This contrasts with the Golden Bay decision which made no provision for new technology or methods[5]. This proposal was appealed to the Environment Court.

As with the Golden Bay, the cumulative effects were the key factors determining EW's AMA location, size and planning approach. EW's AMA's were to be developed in stages and monitored to ensure the availability of food to the rest of the ecosystem, especially the internationally recognised wetland and bird sanctuary (Miranda) at the western base of the Gulf.

The ARC had not been under similar pressure due to the prohibitions in its transitional plan and it adopted a zoning approach whereby marine farming would become discretionary in the area in which it was previously prohibited. The ARC was somewhat surprised when entrepreneurs from Marlborough applied for a coastal permit for spat catching. These entrepreneurs argued that spat catching was not

[5] It is interesting to note that in the early 1990s planners for the Thames-Coromandel District Council, which has responsibility for the Peninsula, sought a greater say for district councils on the basis of the need for integrated planning. They saw the expansion of the industry as having a significant impact on roading requirements and the tourism industry. Industry argued that they had no necessary need to use the roads as they could barge product direct to Auckland City across the gulf. The district council's concerns reduced with a change in councilors to a very pro-development council that restructured to remove its planning staff and operate instead using contracted planners on an 'as needed' basis.

Box 9.6 Waikato Regional Council's Proposed Aquaculture Management Areas, October 1999



Intended as a precautionary approach to marine farm development, Environment Waikato's Aquaculture Management Area was proposed in October 1999 (Environment Waikato 1999). It was designed to avoid cumulative adverse effects by setting aside two aquaculture management areas (AMAs) labelled A and B. Policies relating to marine farming included recognising its social and economic benefits, enabling safe recreation and navigation, integration between land and sea administrations and effects, and "efficient use and development of coastal space". Among the environmental results anticipated was that "Sprawling and sporadic development of marine farming structures" would be avoided. Justificatory statements for policies included that they would "promote a co-operative and consistent farm management approach"(6.1.3); "Sea areas immediately offshore from boat ramps, jetties, wharves and land-based reserves should remain clear of marine farms"(6.1.2), and:

> "The western coast of the Coromandel Peninsula is currently subject to a high demand for space for marine farming, and there is limited suitable space available for marine farming in other parts of the Region…sporadic developments will be avoided and the appropriate use of any space allocated will be encouraged…development will be required to progress significantly in the [AMA] zone before further development in that area will be considered. Where farming does not occur in any area that has been allocated for marine farming, coastal tendering… will be used as a method to efficiently re-allocate the undeveloped space". (6.1.4)

"Conventional longline" marine farming was a controlled activity in the AMA. The AMA was divided into two areas comprising 400ha and 500ha respectively ("A" and "B" on the map). Initially half of each area would be allocated and once both had been at least 75% developed" with no apparent adverse effects, the remaining areas within each would be allocated. Environmental monitoring was required. All other marine farming in or outside the AMA was discretionary except in some prohibited areas (notably an internationally important bird sanctuary) and existing farm sites where renewal of permits was a controlled activity and, among other things, subject to being "fully developed".

encompassed by the existing restrictions because it was not farming. Other applications followed. Among other matters, opponents were concerned that if 'temporary' spat catching structures were approved, these might become 'permanent' structures for marine farms with mussels.

The areas sought within ARC's region were far greater than the total of EW's AMA on the opposite side of the Gulf. If successful the applications would undermine the approach taken by EW for the part of the Gulf it administered. EW made submissions on the applications and has hosted workshops on marine farming for regional councils and central government departments to discuss approaches generally.

9.4.4 Southland

Southland Regional Council specifically chose to remove the prohibitions imposed by the MAF plans (Table 9.3). The region was perceived as in economic decline during the 1990s. My interviews and other surveys (Carrell *et al* 1996) indicate a high level of support in Stewart Island for expansion of marine farming. Despite concerns that too little of the economic benefits were flowing to the Stewart Island community, the marine farming industry was seen as a major employer, helping to maintain the population of the Island. Carrell *et al* (1996) found support for a more directive, if non-statutory, planning approach to identify areas where marine farming would be supported or encouraged. This was expected to provide more certainty to the industry. Southland Regional Council (SRC) did not take this approach.

The only area in which marine farming is prohibited in the proposed Regional Coastal Plan for Southland (PRCPS), released in February 1997, is in marine reserves and the Big Glory Bay Navigation Channel. To provide some guidance to the industry and public, the SRC used a distinction between non-complying and discretionary activities. Marine farming is a 'non-complying activity', in several locations around Stewart Island (e.g., Paterson Inlet, except Big Glory Bay, Port Pegasus, Lords River and parts of Port William), the eastern part of Awarua Bay and the entire Fiordland coast. These locations received this status for a variety of

reasons including maintaining public access and recreation, ecological values, navigation safety and visual amenity. Everywhere else, including Big Glory Bay, marine farming is considered a discretionary activity. SRC's rationale for this was that the developing technology and new species enabled many of the farms to tailor their proposals to minimise effects. Site by site assessments against the criteria of the relevant plans and legislation was considered the fairest approach.

This effectively meant that places such as Port Adventure (which has already been shown to be suitable for marine farming) would lose their prohibited status once the plan became operative. Marine farmers and officials interviewed expected a rush to obtain consents in these areas when the plan became operational. During my fieldwork in 2001 it was apparent that the SRC did not have the resources to prepare an alternative approach. When questioned on this, the regional councilor responsible commented to the effect that "Our marine farmers are a different type to those up north. We do not envisage the same sort of rush here as has occurred elsewhere" (my notes of the open forum discussion at the SEAFIC conference in Invercargill in 2001).

Southland adopted another approach, however, that appears unique to the needs of its industry. In Paterson Inlet, just outside Big Glory Bay, it identified a 'salmon farming refuge zone' to which salmon farms threatened by algal blooms could move and stay temporarily (until their site in Big Glory has been cleared of the bloom). This site was used in 1989 as a refuge when a dinoflagellate algae bloom resulted in the death of approximately 600 tonnes of salmon in Big Glory Bay. It was used again between November 1992 and mid-January 1993 during another bloom. Arguably, if there were more sites approved for marine farming around Paterson Inlet and Stewart Island a refuge would not be required, just as the 'transfer' sites in Marlborough were found to be unnecessary.

Southland has also taken a different approach to other councils in attempting to provide greater security for marine farm owners. The SRC proposed plans did not limit the tenure of coastal permits for marine farms. Plan provisions also provided existing occupiers with a preferential right of renewal for their area over competing

similar uses. No limit was placed on the number of renewals although farmers had to maintain their sites in good condition.

It is readily apparent that the concentration of marine farms in Big Glory Bay is entirely a consequence of the planning prohibitions established under the previous planning regime. The RMA regime, and the recognition by the planners of its effects-based approach encouraging innovation by farmers, has led to plans that will enable a considerably different pattern of marine farming to develop in Stewart Island once the new plans become operative.

9.5 Summary and Conclusions: Comparing Plans

The tensions between central and local government, and between different government agencies (discussed in Chapters Three and Four), have not prevented the development of plans that cover marine farming. Until the 1990s, however, such plans were a response to conflicts and demand from farmers for space. This has been expressed in different phases of plan-making. Despite provisions in the Marine Farming Act 1971 enabling the making of marine farm plans from 1971, this largely did not occur until the 1979-1984 period when seven of the nine plans were made. These plans were of necessity activity-based and closed large areas to marine farming. They were also focused on the Tasman/Golden Bay, Marlborough Sounds, Stewart Island, and Hauraki Gulf (up to and including Mahurangi) areas. The Hokianga Harbour restrictions were almost an afterthought.

These plans all built on non-statutory planning undertaken by a number of central and local government bodies and their timing suggests a reaction to the development of maritime planning provisions and the extension of, especially, regional government planning abilities to include the marine environment out to twelve nautical miles under the Town and Country Planning Act 1977. It is interesting to note also that the specific mechanism developed for integrated maritime planning, the maritime planning scheme, was only fully implemented in three significant ports, was used by harbour boards, and essentially closed the areas to any form of marine farming. The Marlborough Sounds Scheme was never completed, was built from preceding non-

statutory and statutory planning exercises, and was quite restrictive in the areas it provided for marine farming.

The Resource Management Act 1991 has resulted in a considerable variety of planning approaches. Those councils who have had little pressure from the industry for marine farms have tended to use discretionary or non-complying classifications and to not mention marine farming as an activity at all. Their approach is to address applications on a case by case assessment of the effects on the criteria considered important in their community. As these plans become operative they do allow considerable scope for marine farmers to develop technology to enable them to farm almost anywhere, provided they use acceptable technology and farming practices. Those areas with considerable experience of marine farming, however, have taken much more activities-based approaches, attempting to define 'standard' marine farming types and then making rules to direct the standard marine farming activity to particular areas through a combination of discretionary, non-complying and exclusion zones, sometimes with some aquaculture management areas that essentially permit marine farming of the 'standard' type. This has led inevitably to major court actions from the industry and opponents. In its most detailed analysis the Environment Court has described the use of discretionary and non-complying zones as inefficient and *ad hoc* and has instead opted for aquaculture management areas and exclusion areas only. The national moratorium on marine farming implemented in November 2001, has picked up the Environment Court approach and since March 2002 all regions have been required to revise their plans within two years to include specified aquaculture management areas.

The patterns encouraged by the different types of planning also appear to illustrate some of the models speculated in Chapter Six. The pre-1991 Marlborough Sounds approach was designed to encourage ribbon development, but along the shore to avoid, rather than gain easy access to, fairways and navigation routes. The pre-1991 Stewart Island plans adopted the concentration approach, but the post-1991 plan envisaged opening the area to effects-based plans. This contrasts with Northland where pre-1971 plans had planned concentrated development sites in some places in response to the pressure on space, but used essentially discretionary approaches

elsewhere. The proposed regional coastal plan follows the Marlborough approach, reinforcing the existing locations and providing discretionary/non-complying and closed zones.

The Tasman and Waikato planning approaches are quite different. Both have very large semi-enclosed embayments with some very significant ecological sites. Each has attempted, under the RMA, to adopt a single shift model that takes the marine farming into offshore sites. The difference between the two is that Waikato sought to protect its ecosystems through establishing an aquaculture management area, whereas Tasman after initial interest in this approach, rejected it, only to have it re-imposed by the Environment Court. Tasman also sought to have an inshore exclusion zone, whereas Waikato was more prepared to consider non-standard marine farming on the basis of its effects, an approach that it seems the Environment Court subsequently rejected.

The Marlborough Sounds post-1991 proposed plan also illustrates a new approach. It has cemented the ribbon development where it has already occurred and encouraged it further with its combination of non-complying and discretionary categories. More significantly, however, it has opened up considerable expanses of some Sounds for potential marine farming while also closing other Sounds. It has effectively divided the Sounds between uses based on a preconception of the nature of the type of farms that might occur. In terms of the patterns speculated in Chapter Six, however, it has also decided that remote headlands around the outer ends of the Sounds are to be kept free of marine farms, effectively creating a large band free of farms between the outer zones and further out to sea. This resembles the conflict resolution model in Chapter Six and this is even more apparent as, possibly, an interim approach when one considers that the earlier Sounds plans had sought to keep headlands and points of high visual amenity free of farms, but that the new discretionary zoning more or less enables many such areas to now be farmed. Essentially the new overall Sounds and adjacent seas zoning is a large scale version of the older ‘within’ the Sounds planning approaches.

Finally, the analysis of the plans and other documents in this Chapter has also revealed some of the variables considered important in determining the planning approaches adopted. Navigation, visual amenity and public access were fundamental in determining spatial patterns. The early plan provisions also reflect assumptions about the need for shelter for standard types of marine farming. Property rights have been of critical importance and this has been apparent in both the case law challenges and the presumptions of the importance of public commons and recreational space. Provisions for Maori aided a development in Tasman in 2001, but hindered development in Manukau Harbour in the 1970s.

Alongside these variables there appears to be an ongoing tension between the desire for 'orderly' development and the need to enable discretionary effects-based consideration of new technology and species which might lead to 'sporadic and sprawling' allocation of marine farming rights. The new aquaculture management areas are primarily justified on the grounds of potential cumulative effects, rather than the economies of scale that were encouraged by the central government in earlier times. Even under earlier plans, including the Marine Farming Act plans, community involvement in the planning process meant the concentration of farm sites to avoid the potential combined effects of uncontrolled marine farming development on the environment, public access, recreation and visual amenity. As this Chapter illustrates, however, many plans were drawn to accommodate existing sites and even within plans there are considerable opportunities for different forms of development. The next Chapter presents the results from the analysis of the GIS records of sites chosen by owners.

Chapter Ten: Spatial and Temporal Development of Marine Farming in New Zealand

This Chapter presents the results of an examination of three data sets in a search for spatial patterns in the development of marine farming in New Zealand. The data sets comprise official notifications in the *New Zealand Gazette*, the MFish National Aquaculture Database (NAD) and the GIS database developed through the current research. The spatial growth of the industry nationally is examined first, followed by an exploration of regional and sub-regional patterns.

The findings are constrained by the limitations of the databases discussed in Chapters Five and Six. In addition, there are some minor discrepancies between data sources on the proto-modern era of marine farming. These were unable to be resolved during the course of the research. Notably, the NAD does not align perfectly with the information in the notifications of leases in the *New Zealand Gazette* (compiled in Appendix Five). As this does not significantly affect the analysis the data used in this Chapter are generally drawn from the NAD unless otherwise specified.

10.1 National Overview

The acquisition of marine farming rights in New Zealand had three distinct boom periods this century: late 1960s, early 1980s and the mid-1990s (Figure 10.1). The cumulative growth in farm rights existing each year shows similar more rapid growth periods (Figure 10.2). The 1960s' boom originated in the north with rock oyster leases. The numbering of the leases (LE), licenses (LI) and marine farming permits (MF) used by the administering authorities, however, does not necessarily follow the strict chronological order of their being granted. Consequently, the earliest lease that appears on the NAD is for LE16 which began on 1 February 1967 in Orongo Bay, in the Bay of Islands. Six other leases were approved that year in Orongo Bay and elsewhere in the Bay of Islands, and in bays of Kawau and Waiheke Islands.

Figure 10.1 Marine farming rights by year granted (data sourced from NAD)

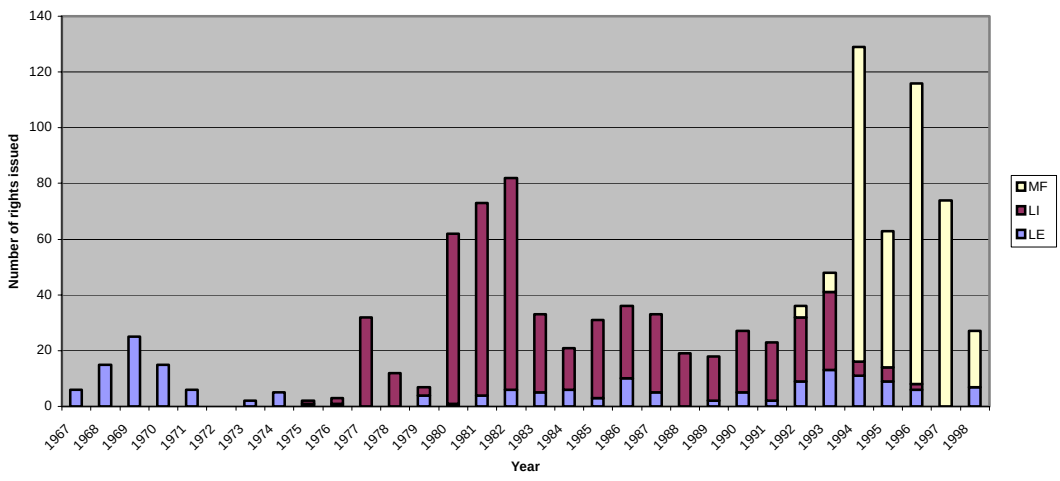
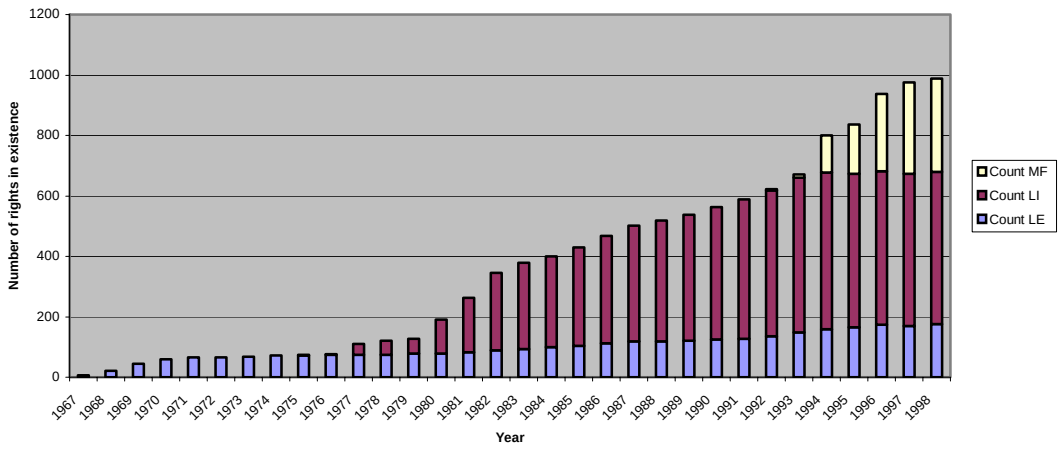


Figure 10.2 Cumulative net growth in marine farm rights 1967-98 (Data sourced from NAD)



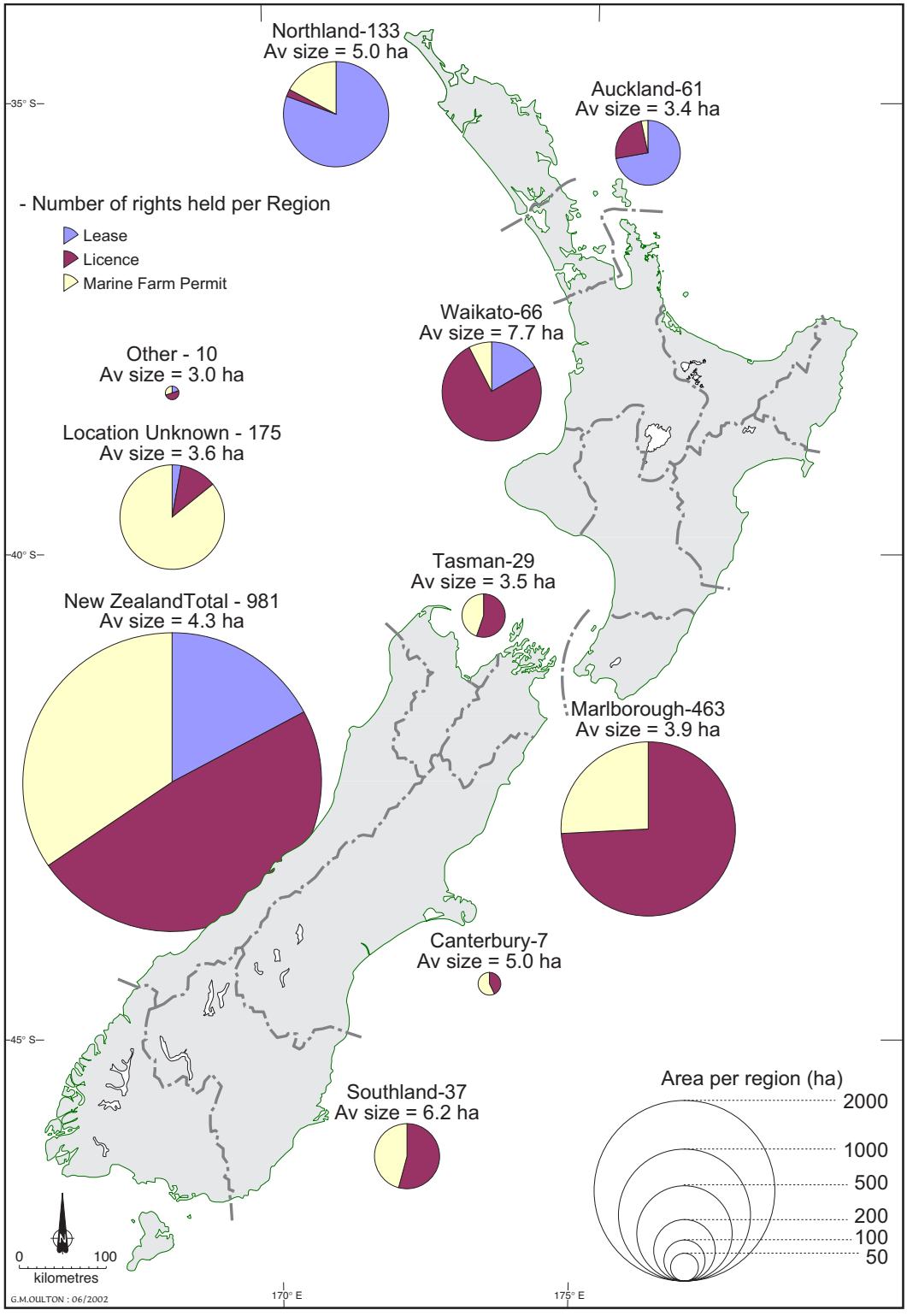
The following year (1968), in addition to further leases in the Bay of Islands, leases were established in Northland's Karikari Bay, Whangaroa Harbour, and Kaipara Harbour. Auckland's Mahurangi Harbour, subsequently a major marine farming area, had its first leases effective that year and leases were also issued for Wyuna Bay on the Coromandel Peninsula and Ohiwa Harbour in the Bay of Plenty. In 1970 leases were issued in Parengarenga Harbour in the far north. The *New Zealand Gazette* records several leases being issued in Maketu Estaury in 1968-69, but these are not present on the NAD and their failure has not been explored in this research. Essentially, from 1967 to 1975 marine farm development remained concentrated in Northland and Mahurangi Harbour, and to

a much lesser extent also in the Coromandel Peninsula. The primary LE areas had been identified and the broad patterns of development had been established by the mid-1970s.

In 1975, however, the first farms were established (as licences) in the Marlborough Sounds. From 1 November 1975, when LI1 was issued in Kenepuru Sound, until December 1980 more than eighty licences and two leases were issued in the Marlborough Sounds. Interest in space for marine farms has remained high in that region throughout the subsequent two decades. In 1981 the first licences were issued in Southland, in Big Glory Bay. This became a major focus of industry development. Great Barrier Island and Kawhia Harbour received their first licences in 1982 and 1983 respectively. Tamaki Strait and the western side of the Firth of Thames gained leases and licences in 1986 and 1987. Licences were issued for Mahia Peninsula (Hawkes Bay) in 1989 and in 1991 the first licence was issued in Canterbury, for a salmon farm in Akaroa Harbour. In 1997 marine farm permits were issued in Wellington Harbour, near the former MFish laboratory, and for an artificial saltwater pond on the Wairarapa Coast. This polyculture pond, excavated to admit seawater inland from the former high water mark, is first such marine farm in New Zealand. By the end of 2000 applications had been made for farms in Jackson's Bay in the West Coast (subsequently declined) and Clifford Bay near Blenheim (approved). The areas receiving the most applications by 2000, however, were the Marlborough Sounds, the Firth of Thames, Tasman and Golden Bays, and Banks Peninsula.

The overall spatial pattern of rights tends to reflect the period of development of the region (Figure 10.3). The Northland and Mahurangi farms are predominantly leases, reflecting their early start in the industry. Those areas developed subsequent to the Marine Farming Act 1971 are dominated by licences, except for those places that have had most of their development occur in the 1990s. Marine farming permits dominate in those areas as a consequence of the RMA replacing the MFA71.

Figure 10.3 Regional distribution of rights existing in 2000



Few expired leases and licences have been replaced with marine farming permits. Instead, owners have tended to seek renewals of the existing lease or licence. The lack of a greater number of licences and marine farming permits in places such as Northland, Stewart Island and Auckland, reflects the planning restrictions on the available space (Chapter Nine). Planning restrictions alone cannot explain the relatively recent interest in Banks Peninsula or the non-development of the Otago, Kaikoura, Oamaru, Timaru and East Cape peninsular areas.

10.2 Distribution of Rights to Grow Species

The distribution of different types of rights to space does not necessarily represent the diversity of the species able to be grown. An analysis of the distribution of types of species and the dates of rights to grow these, as recorded on the NAD, is instructive.

10.2.1 Species Held on Leases

The leases (LE) have been dominated by rights to farm rock oysters (ROY). From 1967 to 1992 only three other species were authorised for farming on leases: a Pacific oyster lease (POY), two for green-lipped mussels (MSG), and three for dredge oysters (OYS). Polyculture was possible from the outset with a Waiheke Island farm (LE7) being authorised to grow MSG and ROY in 1967. This lease comprised two separate lots in one bay and it is not clear whether these species were grown in combination on each lot or separately, one species to a lot. Legally, they could be grown on either, or in combination, thereby adding to the flexibility of the right.

In 1993 a farm (LE48) in Kenepuru Sound, Marlborough, gained the rights to farm eleven species and a year later added a twelfth. Apart from LE7 and LE48, however, only one (LE148 in Tamaki Strait) of the leases on the NAD has more than one species approved for it. In 1998, LE48 was owned by Southern Mussel Farms Limited, who obtained the variations to add the new species at the time of purchasing the farm from its previous owners. LE7 was owned by a partnership between the Tiscornia family and D. Nicholson, and LE148 was owned by Pakihi

Marine Farms. These are the only leases held by Southern Mussels and Pakihi Marine farms, but Nicholson and the Tiscornia family separately each own one other farm. These diversifiers are, therefore, not dominant farmers in the leasehold farming industry, at least under these names.

Despite the increased number of species authorised to be grown on LE titles, individual leases are essentially 'monocultural'. Notably, the individual leases that have diversified have not been in the core areas of leasehold farms. The level of diversification also needs to be seen within the broader context of what a lease might be to its owner. The lease might, for instance, be a diversification in itself by adding to an existing terrestrial operation as originally envisaged by politicians (Chapter Three). The owner may also own more than one lease and have different species approved for other leases, so that the two leases themselves might not each comprise the farm, but together they may well form a diversified farm. Pacific oysters being approved for leases in the later stages of the industry may indicate a dual species farm industry developing on leasehold marine space.

10.2.2 Species Held on Licences

The first licences were issued in 1975, but until 1991 only four species had been licensed: green-lipped mussels (MSG), scallops (SCA), dredge oysters (OYS) and Chinook salmon (SAM). From 1991 to 1998 a further 30 species were authorised for licence farms. MSG, however, remained the most common of the 1466 species authorisations issued for licences since 1975 (509, compared with the next most frequent - 159 scallop approvals).

Two hundred and ten (40%) of the total number of licences had approvals for more than one species, indicating greater flexibility in the options available to those farmers in the use of these sites. Three quarters (159) of these 210 licences have six or fewer species authorised, but some licences (3) had as many as eighteen species authorised. By November 2000, Nelson-based Southern Marine Farms dominated the many-species (i.e., ten or more species) licences, holding sixteen and sharing another two with Sanford (South Island) Limited (Table 10.1). No other owner owned more than four many-species licences. Southern Marine Farms, however, held only one of the farms authorised to have eighteen species,

the other two were held by Okiwi Bay Oysters and Aquaking (both companies based in Croissilles Harbour, Marlborough Sounds). Bryan Skeggs held two farms with seventeen approved species on each. He is also a partner in Aqua King and a member of the Skeggs family that owns Marlborough Mussel Company Limited and a large fishing/processing company.

10.2.3 Species on Marine Farming Permits

Marine farming permits were first issued in 1992, but for the first two years only two Pacific oyster permits (POY), two oyster spat (OSP) and six mussel spat (MSP) permits were approved. The variety of species for which permits were obtained increased to forty in the period 1994 to 1998. This is a greater diversity of species potentially able to be farmed than for either leases or licences.

Table 10.1 Owners of sites in 2000 with ten or more species approved

	Owner	Number of sites owned with more than 10 species approved	Maximum number of species on any one site
Leases	Southern Mussel Farms Ltd.	1	12
Licences	Aqua King Ltd	2	18
	Bates, C.T.	1	15
	Goulding Family Trust	1	12
	Jessep G.A. & M.T.	1	12
	Jessep J.A.	2	13
	Kiwi Marine Farms Ltd.	1	12
	Marlborough Mussel Company Ltd.	2	13
	Okiwi Bay Oysters	3	18
	Paul Marine Farms Ltd.	1	13
	Sanford (S.I.) & Southern Mussel Farms Ltd.	2	15
	Shand T. & R.H.	1	12
	Skeggs, B.J.	4	17
	Southern Mussel Farms Ltd.	16	18
Marine Farming Permits	Aqua King	6	16
	Beattie, R.D.	1	21
	Croisilles Oysters Ltd.	1	12
	Davison M.J.H. & R.L.	1	15
	Foveaux Oysters Ltd.	1	15
	Hauraki Marine Development Trust	4	13
	Okiwi Bay Oysters	3	17
	Skeggs, B.J.	2	14

Of the 375 marine farm permits issued from 1992 to 1998, 65% (n=244) are multi-species farms. Over 85% of these 244 permits have two to five species. Despite the range of species authorised for MF rights, the mode for multi-species farms was only four species (92 marine farm permits compared with 49 that have 3 species and 131 that have just one species). The most species authorised for a single marine farming permit is 21 (MF302, in Wellington Harbour). The next highest has seventeen approved species.

In 1998, just six owners held the twenty-three permits that had eleven or more authorised species. Dominant among these was the Hauraki Marine Development Trust (HMDT) with ten such permits and Aqua King with six and a share of a seventh with the Hippolite family (also known as Okiwi Bay Oysters). By November 2000, six of HMDT's permits no longer existed, leaving Aqua King as the owner of the most many-species Marine Farm Permits (Table 10.1).

The Wellington farm with 21 species approved was originally established by Nelson's Peter Brierley (ex-MAF Fisheries Nelson Manager). He subsequently sold MF302 to Roger Beattie who owns the Christchurch-based company, 'Sea-Right'. Sea-Right owned other multi-species farms, one of which had ten approved species and has been a recognised leader in developing techniques for marine paua farming and pearl culture (Hindmarsh 1998). Interestingly, Southern Marine Farms, who had dominated the many-species farms in both leasehold and licences, did not feature among the many-species owners of marine farming permits. Aquaking, Okiwi Bay Oysters and Bryan Skeggs were the only owners to feature in both the many species categories of license and marine farming permits.

10.2.4 Species Summary

There has been a shift in the 1990s to owners gaining rights to farm more species on the one permit/license/lease than had been the case previously. The increase probably represents a combination of improved technology, greater understanding of new species, new biophysical environments being developed, low marginal profits for existing species, recognition of (potentially) new markets and, perhaps, a desire to reduce exposure to risks by having greater flexibility to respond to

changes in the social or biophysical environment. My interviews, however, indicated that several farmers took the opportunity to diversify before the RMA regime came into effect because they saw diversification under the new regime as potentially more costly than the $50 it cost under the MFA71 regime.

Almost all the farms that had more than ten species approved were in the Marlborough region. Notable exceptions, however, were the two licences in commercial harbours (Foveaux Oyster's in Bluff Harbour and Beattie's in Wellington). Akaroa Harbour farms (Bates and Sea-Right) also showed considerable diversification, but the iwi-owned Hauraki Marine Development Trust's farms in the Hauraki Gulf (Wilson's Bay) appear somewhat anomalous in being semi-open water sites.

10.3 Regional and Sub-Regional Variations in Marine Farm Development

This national overview does not enable the patterns of marine farm development that might be expected under different planning approaches to be examined. Consequently the spatial development was explored at larger, regional and sub-regional scales. The results presented here are structured around generic 'types' of observable patterns that emerged from combining GIS and NAD data.

10.3.1 Northland

Marine farming in Northland is based in the sheltered large eastern harbours and bays, especially the Bay of Islands. Kaipara remains important, but less so than the east coast. The pattern of development appears to show variations around three major themes: ribbon, block and exploratory.

Ribbon Development: The Orongo Bay 'double arc'

Orongo Bay, the first to feature on the NAD, shows a pattern of development that might be expected to be replicated elsewhere. The Bay is sheltered from ocean swell, was backed by farmland with ready road access and, although near the town of Russell, is not on a major tourist road or recreational boating route. One

of the Marine Department demonstration farms was located in it (see Chapter Three).

The first sites were established in 1967 and 1968 alongside the Marine Department sites, the latter not being leased until 1986 (Figure 10.4a, c). In 1970, the northernmost lease (LE23) was subdivided and became two new leases split equally between the partners in the original lease (Appendix Five). By 1990, therefore, there was an almost complete arc of farms in a ribbon around the shoreline. In 1991, the remaining 'vacant' area in the 'ribbon' of farms was 'infilled' and, a second ribbon of leases was established adjoining the existing farms, but extending further into the deeper water of the Bay. Note that these are new leases issued after the RMA had come into force, but as they had been applied for prior to that event, they were able to be issued under the MFA71.

Then, in 1994, the parts closest to the shore of the two southernmost leases (LE 55 and LE 153) were surrendered (Figure 10.4c). A 15 metre wide access way between them was created through surrender of more space. Kororareka Oysters Ltd., the owner of one of these leases and its adjoining deeper water lease, then subdivided its two leases to create Pacific oyster leases owned by Andelain Farms, which also owned several other rock oyster leases in the Bay (Figure 10.4b, d). In 1999, these POY leases were further subdivided and the new leases that were created were sold. Note that the spacing between farms illustrates the effect of the requirements for access ways.

Figure 10.4a Orongo Bay marine farms (years of lease establishment)

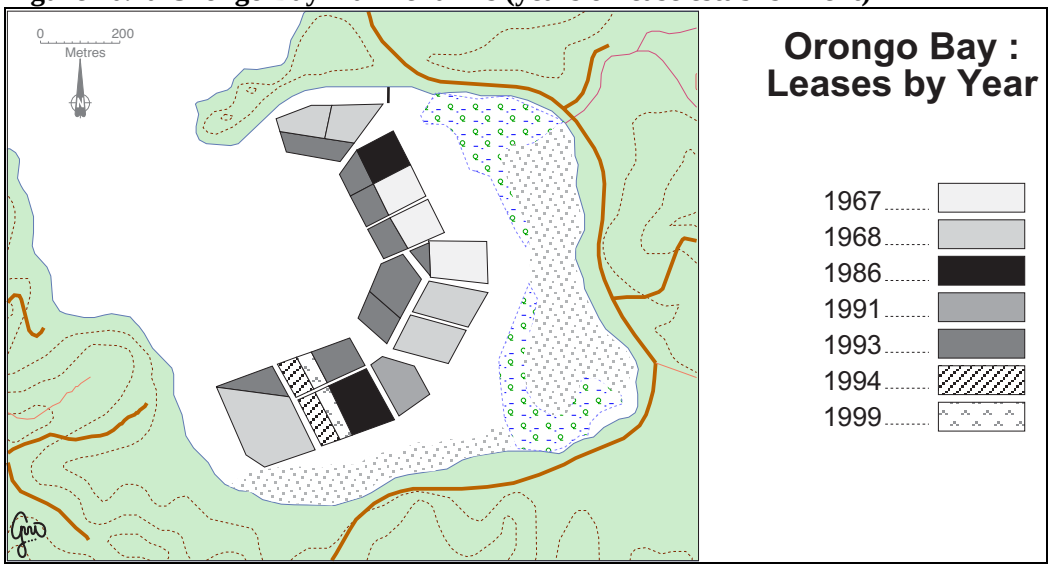


Figure 10.4b Orongo Bay marine farms (owners in 2000)

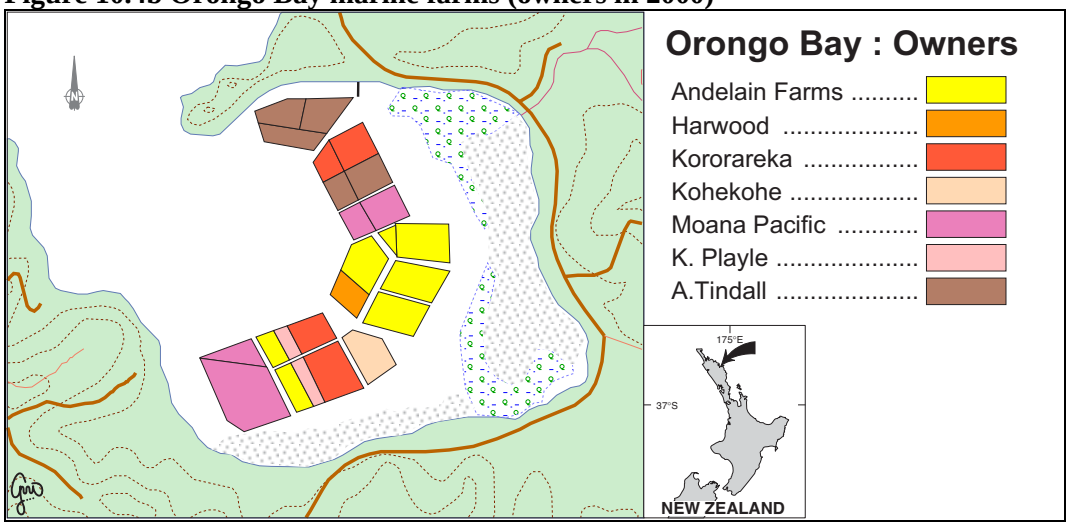


Figure 10.4c Orongo Bay marine farms (subdivision history)

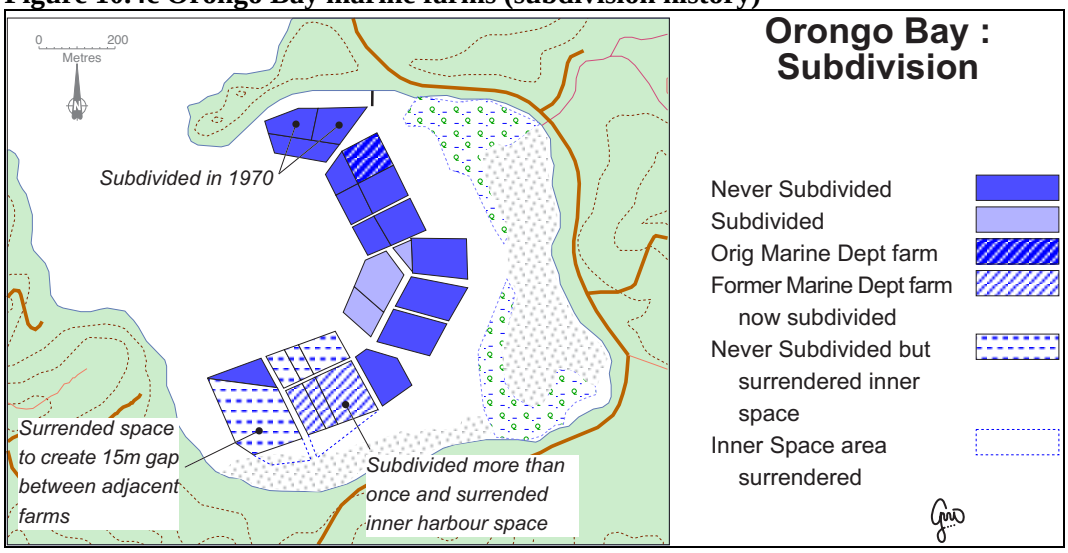
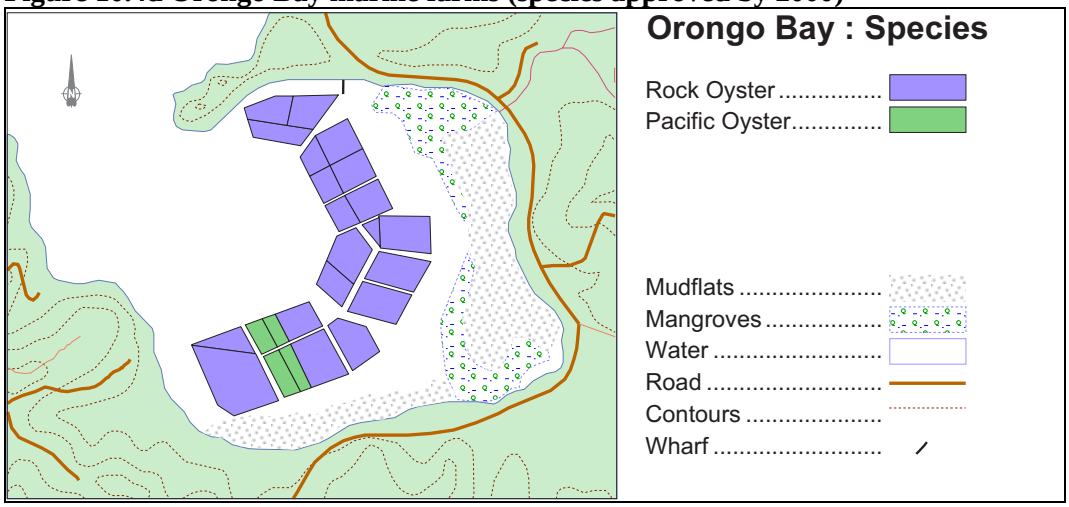


Figure 10.4d Orongo Bay marine farms (species approved by 2000)



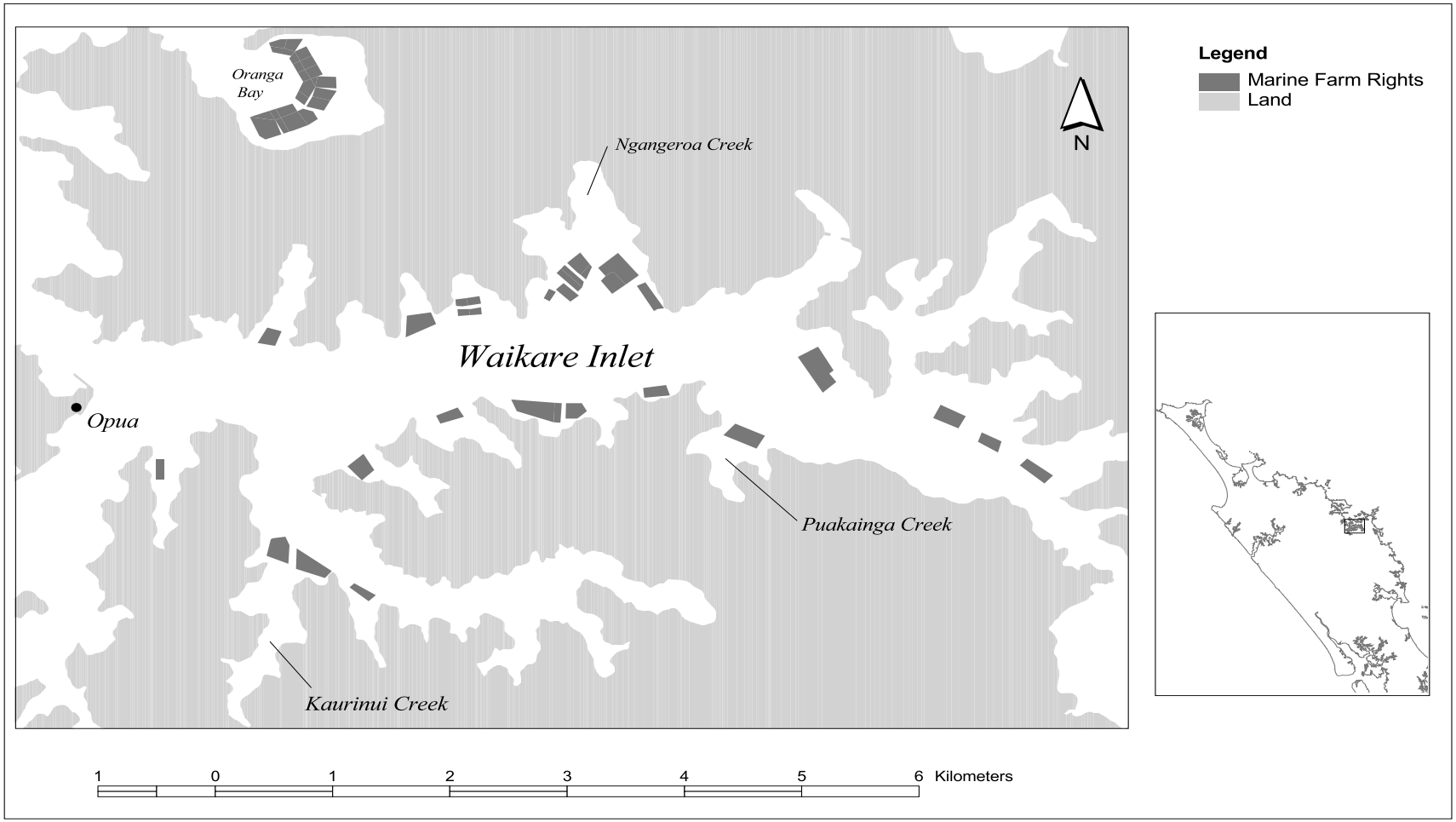
In summary, in Orongo Bay, a focus of government assisted marine farm development, all farms were rock oyster leases and a sequential filling of the marine space is evident with the initial farms occupying an area closer to the shoreline than the subsequent arc of farms. Moreover, some inner areas were surrendered, reflecting unfavourable conditions. Once the two arcs of farms were in place the next stage comprised an intensification of farming through subdivision. This suggests that either all areas available or suitable for oyster farming had been taken up, and/or the costs of developing deeper water areas would be prohibitive.

Ribbon Development: Nascent and ad hoc Northland subdivision, expansion and infill farms

Other farms within the Bay of Islands show similar patterns of expansion seaward (e.g., Kerikeri Inlet). In the Waikare Inlet, however, a ribbon development pattern is accompanied by expansion, subdivision and infill farm development, but it does not achieve a consistent arc or double arc formation. The MFish database does not contain full information on many of the farms in this inlet and it has not been logistically practicable to seek complete details from MFish archives with regard to all these farms. From the *Gazette* notices and maps of leases, however, it appears that some of the original farms were subdivided with partial renumbering (e.g., Ngangeroa Creek).

Viewing Waikare Inlet as a whole, it becomes readily apparent that the development of marine farms reflects ribbon patterns, with the long sides of farms usually aligned to parallel the alignment of the estuary. Although the main channels of the inlet have remained clear of leases, the entrances to lesser tributaries or bays within the inlet (e.g., Kaurinui Creek, Ngangeroa Creek and Puakainga Creek) are largely obstructed by the presence of leases across the greater part of their mouths. There is no real focus, but rather an *ad hoc*, disjointed case-by-case development (Figure 10.5).

Figure 10.5 Waikare Inlet Marine Farms



Kaipara similarly demonstrates nascent and exploratory ribbon patterns, but the physiography of the area, with its elongated river estuaries emptying or expanding into the Harbour, contrasts markedly with the pocket bay and headland physiography of the Bay of Islands. As a result Kaipara's ribbon development occurs along the sides of the river channels as well as the shoreline.There are more elongated farm shapes present, and the gaps in the ribbon are more obvious because they are not separated by sheltering or prominent headlands as occurs in places in Waikare Inlet. Infill developments and subdivision have been occurring in places such as the Whakapirau Creek, but there is little space to expand into a double arc formation (Figure 10.6).

Grid-Block Development: Whangaroa and Houhora Harbours

Whangaroa Harbour provides quite a different spatial development pattern. In the shallow inner and estuarine basin of this Harbour, the Department of Marine identified one large, almost square, rectangular area (originally some 235 acres) for leasing to marine farmers (Figure 10.7). This is the Whangaroa marine farm plan area (see Chapter Nine). The long axis of the area was aligned with the general bathymetry of the basin and that places it at a seemingly odd, oblique angle to the shore. This area was initially divided into a grid of twelve lots. The four leases resulting from this area each comprised an outer lot, a middle lot and an inshore lot. No two lots on the same lease were adjacent to each other. Subsequently lot 3 of LE139 was subdivided into LE333 and 344. The spatial pattern here is similar to that of the contemporaneously developed Mahurangi Harbour (see below).

Houhora Harbour has an almost square grid pattern of ten marine farms (five leases, five marine permits) developed in the inner estuarine harbour area near Jackson's Point (Figure 10.7). Unlike the Whangaroa Harbour situation, the lots that comprise individual leases are adjacent to each other. They range up to 10ha in size and the lots are generally either 200m^2 or half of that size. Most of the lots are separated by 30m wide access ways. All the farms were established in either 1992 (the leases) or 1994 (most of the permits).

Figure 10.6 Arapaoa River - Kaipara Harbour Marine Farms

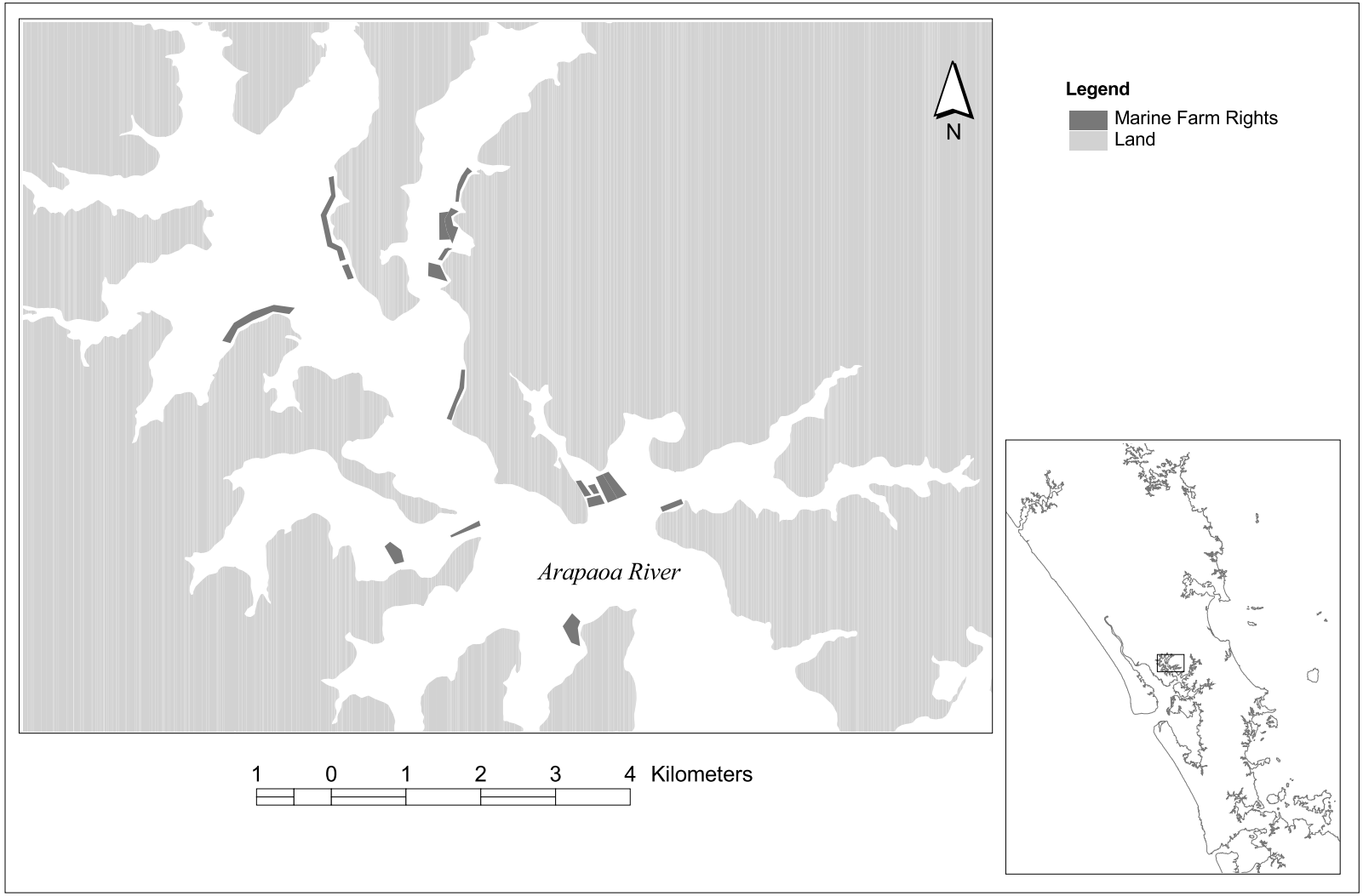
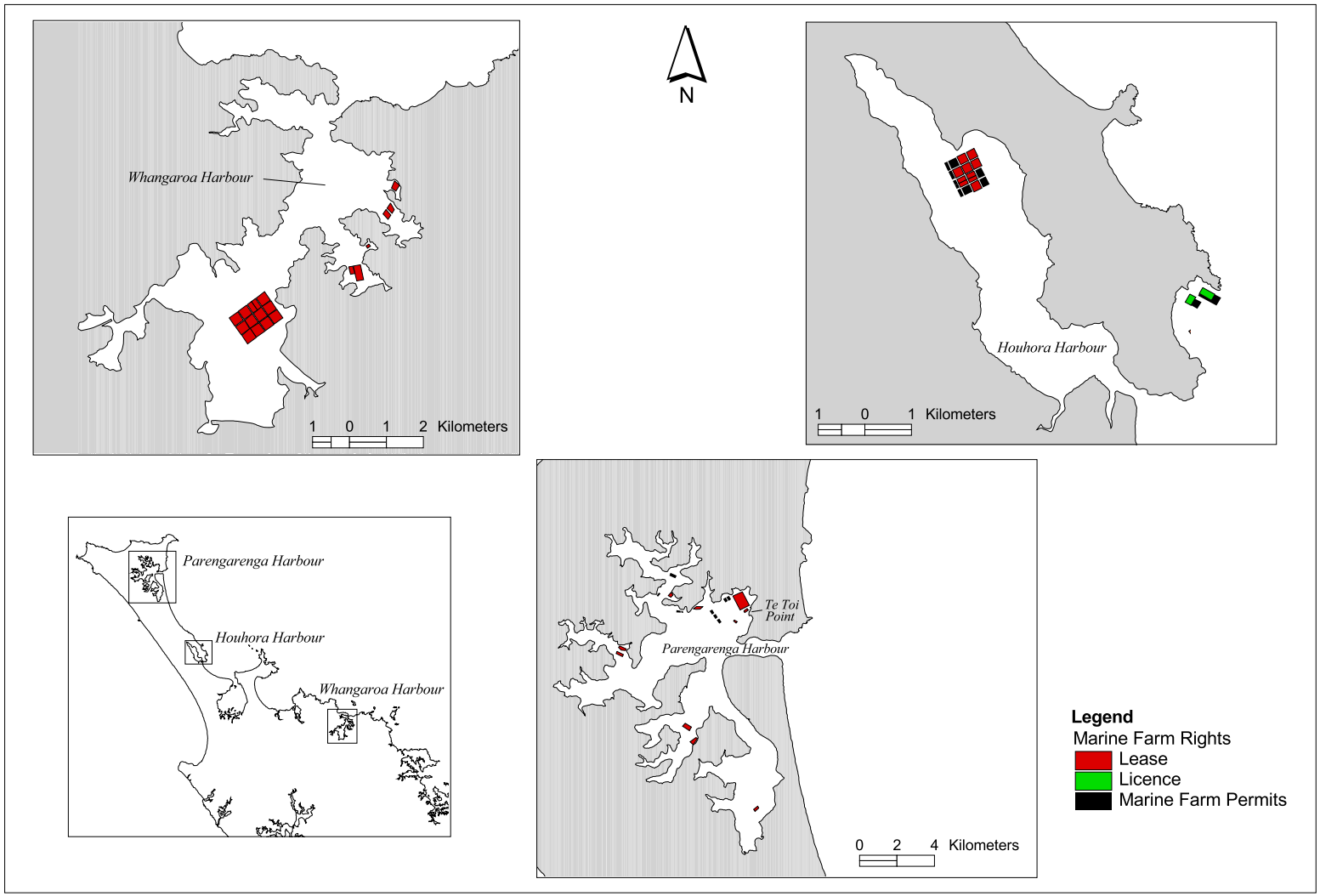


Figure 10.7 Whangaroa, Houhora and Parengarenga Harbours



This was a development planned just prior to the passage of the RMA and represented a trade-off between DoC and MAF. DoC gained agreement that Raungungu Harbour would not be allowed to have further farms develop in it in return for allowing the local community to develop marine farming as a means of providing employment, especially for Maori, in an economically depressed region.

Within eight years, Sanford Ltd. had acquired six of the ten farms from the original owners and members of the Petera family (a local Maori family) retained or had acquired ownership (or managed) the remaining four farms. Ironically, the farms now cover and extend beyond the area MAF and the Commission for the Environment (CfE) rejected for leasing in the 1970s because of community resistance to the impacts the farms would have on recreation and tourism (CfE 1975).

In the open coast of Houhora Bay, two licenses were established in the mid-1980s and each doubled or almost doubled its size (to 9ha and 5.5ha respectively) with seaward extensions gained through marine farming permits in 1994. This appears to be the only Northland location where the initial farms were developed on the open coast as licences and then leases were established within the adjacent sheltered harbour. The expansion of the farms in the Bay occurred synchronously with the development of the farms in the Harbour.

Exploratory Development: Parengarenga Harbour

Parengarenga Harbour shows perhaps the least orderly development of marine farming of the major Northland areas. There have been two major growth periods. Most of the leases were scattered, semi-randomly in the second half of 1970, a pattern best described as ‘exploratory’. It included a large lease at Te Toi Point (Figure 10.7). Marine farming permits were issued in the early-mid 1990s and two more were granted in 1998. The leases are almost all rock oyster, whereas most of the marine farming permits are for Pacific oyster. The farms are generally rectangular and aligned close to the coast of the harbour or on the edge of channels through the estuary. The farms on the northern coast of the harbour

form a disjointed ribbon along that shore, but with an offshoot following the edge of deeper water channels.

10.3.2 Auckland

Auckland has three distinctly different types of marine farming environments. The estuarine sheltered waters of the Mahurangi, southern Kaipara and the inner bays of Kawau and Waiheke Islands are well-suited to intertidal rock oyster growing. In the mid-1990s Pacific oysters have begun to be established through subdivisions of rock oyster leases. The second environment comprises the deeper, sheltered bays around the outer edges of Waiheke Island and in Port Fitzroy Inlet, Great Barrier Island. The third environment is the extensive open, deep-water of the Firth of Thames and the Hauraki Gulf. To date the last of these, within the Auckland region, has been developed only in the Matingarahi Bay area.

The bulk of the farms are leases, but licenses dominate on Great Barrier Island and the Firth of Thames (reflecting their later, deeper water development) and some marine farming permits also appear in Waiheke Island. These island farms, the Te Kapa 'oasis' pattern, and the farms in the Firth of Thames most distinguish the Auckland patterns from those of Northland.

The focus of the reporting on Auckland region is the 'oasis' or 'ring' pattern of Te Kapa, and the 'blocks' elsewhere in the Mahurangi Harbour and Firth of Thames. As many of the concepts have already been introduced and explained, the discussion is briefer than for Northland and focuses on illustrative examples. Mahurangi had its first farms established in 1967 as rock oyster leases. It has three main areas: Te Kapa Inlet, Dyers Creek and Brownes Bay. Two other farms are present in Pukapuka Inlet. Some Mahurangi Harbour farms have been subdivided and granted permission to grow Pacific oysters and some have surrendered space. In 1998 Wilf Berger and Bio-Marine (J. Dollimore and J. Nicholson) owned 6 farms (10.9ha) and 9 farms (23ha), respectively, of the 38 (101ha) leases in Mahurangi Harbour. A handful of farmers own up to two leases and the remainder are single lease owners.

Concentric Ring: Te Kapa Inlet

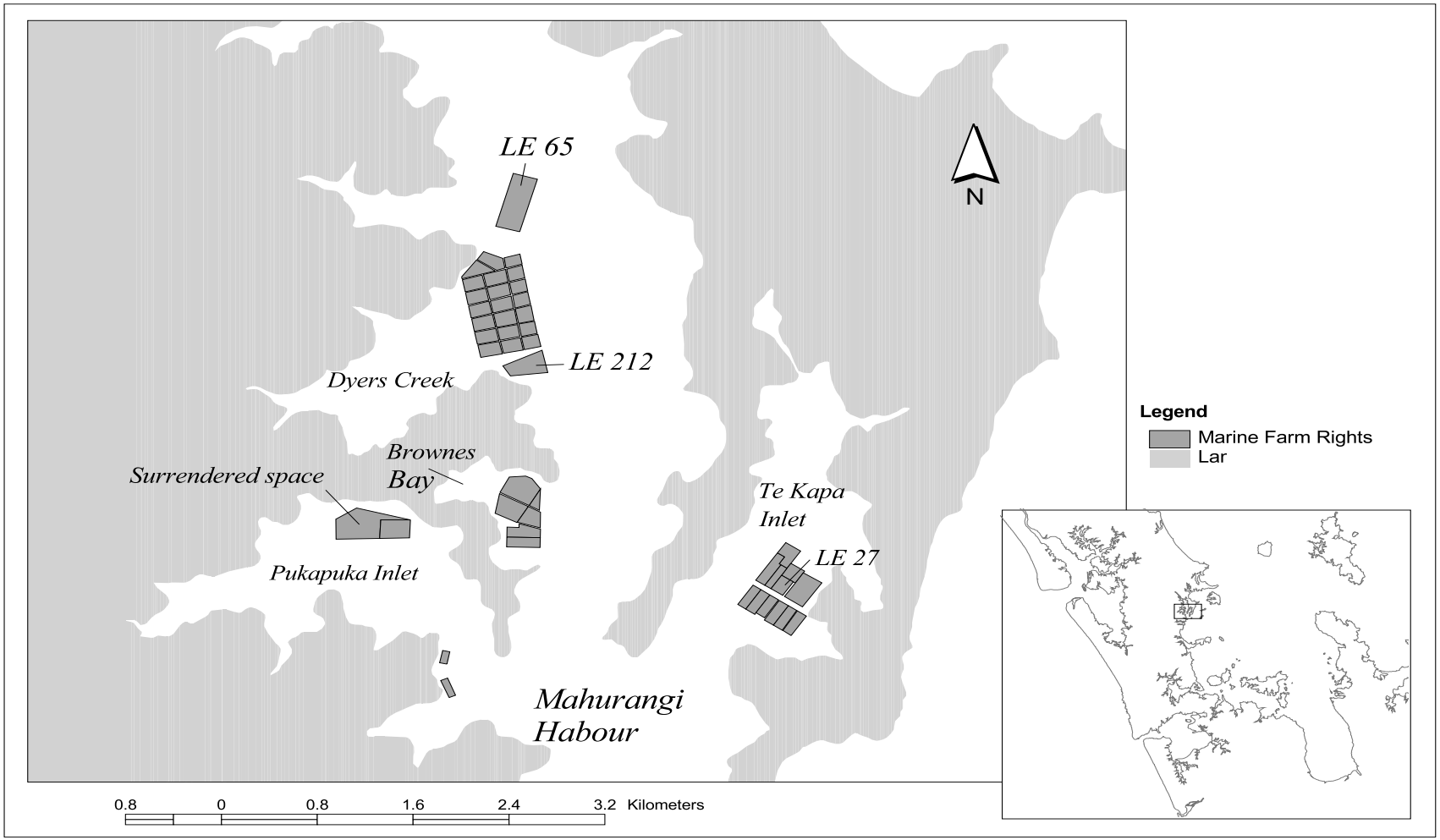
The Te Kapa Inlet sites in Mahurangi Harbour began to be taken up in 1968 (LE27) and all the sites were allocated by 1984 (Figure 10.8). By the end of the development twelve farms occupied about 27ha. The uptake of the farms, however, is distinctly different from that experienced elsewhere in New Zealand. The grid pattern for the marine farms formed a 'ring' around the original 'oasis' site, LE27. The ring of farms is not perfectly symmetrical, due to the rectangular layout of most of the farms as well as the presence of land and very shallow water close to the farm to the east and northeast.

Grid- Block: Irregular

By 2000 the Dyers Creek grid amounted to over 40ha (Figure 10.8). Additional sites to north and south of the main grid comprised over 14.5ha. Almost the entire grid was allocated (two lots to a lease) in 1969 as part of a non-statutory planning response of the Marine Department to pressure from local would-be lessees. An additional row of six lots comprising three leases was added in the deeper water main channel side of the grid between 1983 and 1987 in space allocated by the MFA71 marine farm plan (see Chapter Nine). Two leases (LE212 and 65), that are separate from the main grid, were added in 1970 and 1982 respectively.

The final shape of the farms resembles a six-by-three rectangular grid lying across the entrance of Dyers Creek, but aligned with the western side of the main channel in the Harbour. The regular character of the block is marred by the upper harbour end of the grid which has a triangular shape to avoid navigation routes and the shore. Brownes Bay experienced a similar two-phase development. Its outer side is straight and aligned inside a line connecting the two headlands of the Bay, thereby not protruding into the main navigational channels (Figure 10.8).

Figure 10.8 Mahurangi Habour Marine Farms



Grid – Block: Regular

Rather oddly located almost 775m offshore from the Matingarahi Bay (western Firth of Thames), this three by three square grid of 5ha farms is exposed to wind and waves for at least 20 km in all directions except the west (Figure 10.9). The location was identified on the 1984 MFA71 plan (see Chapter Nine) and followed the experiments at Te Kaha (see Chapter Four, Johns and Hickman 1985). The farms, each with dimensions of 250m by 200m, separated by 50m access ways, began to be allocated in 1987 and all had been taken up by November 1994. The site differs from that in Mahurangi and Whangaroa Harbours in that there appears to be no alignment with shore, bathymetry or navigation routes, and each block in the grid has a separate title, rather than having two lots on a title. This is a MAF-planned deep-water site and one of the most exposed sites for marine farming in New Zealand in 1998. Balloting was used to decide who would own some farms.

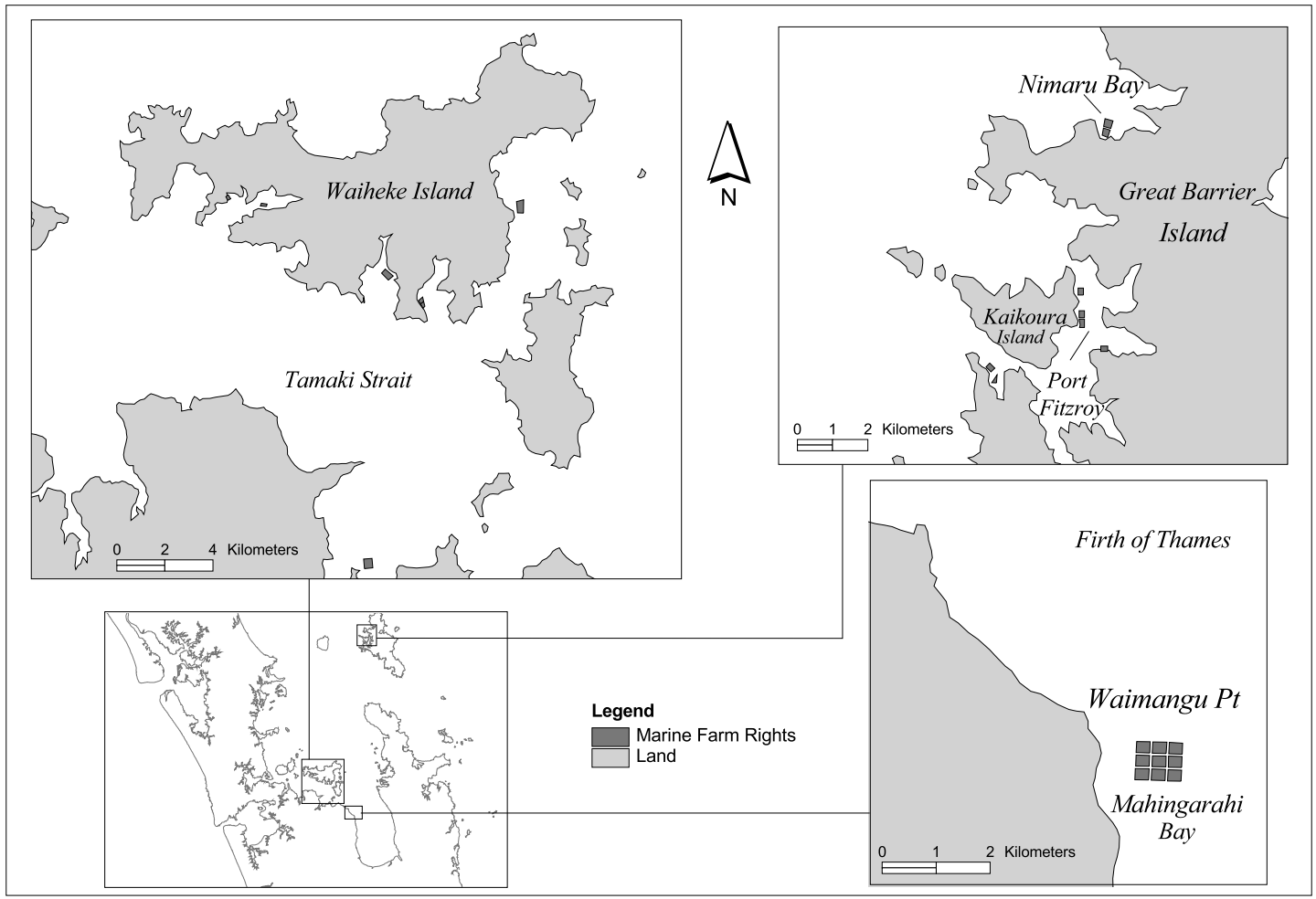
These are all green-lipped mussel farms. By 2000, the local Aislabie family owned five, two were owned by Henderson- based (Auckland) Westpac Mussel Distributors (who also have a site in the Mahurangi Harbour), and two were owned separately by the Bartrom family and Peter Bull of Coromandel.

The Islands – Waiheke and Great Barrier: Exploratory patterns

Apart from two early 1980s licences, the Great Barrier Island farms (Figure 10.9) are entirely a 1990s phenomenon. Their development occurred subsequent to the early 1970s planning discussed in Chapter Nine, but they have not been subject to a MFA71 plan. The non-statutory marine farm plan, prepared by the Joint Planning Team (1979) on the basis of minimising conflict with other uses, recommended the entire Port Fitzroy inlet be retained farm free, but this has the most sites allocated. The farms in Nimaru Bay and south of Kaikoura Island were considered acceptable locations.

The Island farms are generally characterised by the presence of deeper water farms. The older Waiheke Island farms are spread around the eastern and southern bays of the island with no more than two farms to a bay (Figure 10.9).

Figure 10.9 Waiheke and Great Barrier Islands and Mahingarahi Bay



Their sites were retained in the 1984 statutory plan prepared under the MFA71. Both Islands therefore demonstrate exploratory patterns of development that largely ignore or pre-date marine farm plans. On each island only one farm owner had diversified and no one appeared to own more than one farm. Interestingly, however, the owners of Waiheke Island farms almost all have postal addresses other than the Island, whereas only one Great Barrier owner had a non-Great Barrier Island address in 2000.

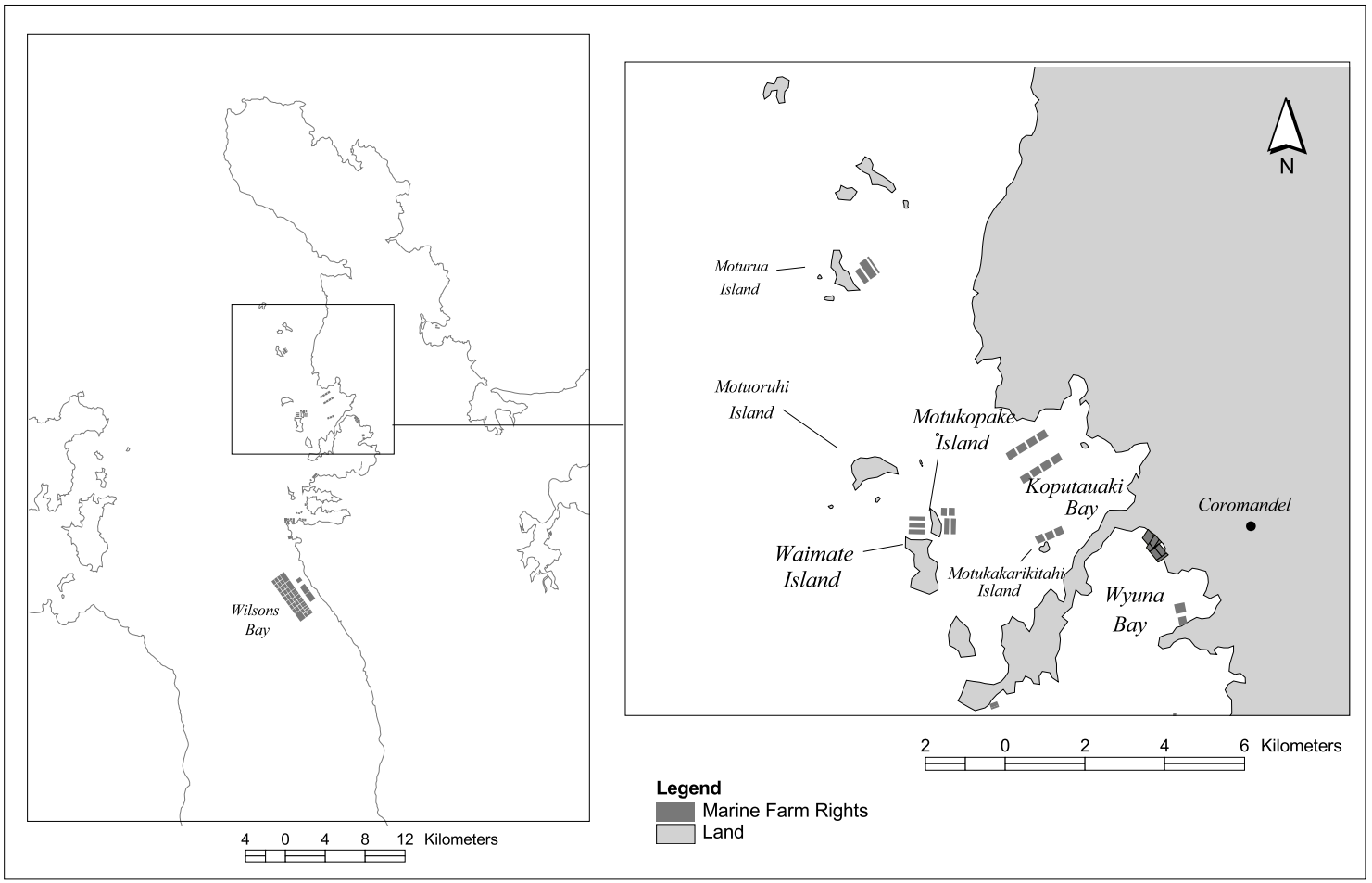
10.3.3 Waikato

Despite its long marine farming history and recent high interest, the Waikato region has far fewer farms than in Northland and Auckland regions. On the west coast of the region there is a farm in each of the Kawhia and Aotea Harbours. The east coast of the Coromandel Peninsula also has (or has had) farms in each of Whangamata, Whitianga, and Whangapoua Harbours and in Kennedy's Bay and Port Charles. Of these, Kennedy's Bay had four farms in 2000, the other locations only one or two each.

The focus of marine farms in the Waikato region is the eastern Coromandel Peninsula in the vicinity of Coromandel township (Figure 10.10). The farms in this area take two forms – a double arc/ribbon pattern similar to that in Orongo Bay is present in Wyuna Bay while there is a unique 'parallel row' grid pattern in Koputauaki Bay. The remaining farms form nascent ribbon developments around deeper outer areas. There is also an open water grid with similarities to that in Matingarahi Bay, on the coast south of Coromandel in an area commonly referred to as Wilson's Bay. This is also the location for the proposed Aquaculture Management Area (AMA) (see Chapter Nine). Some of the farms appearing in Figure 10.10 have been surrendered in anticipation of the AMA development.

Leases, licenses and marine farming permits are all present. The temporal development shows an early inner harbour rock oyster phase (1970s), followed by an outer harbour mussel longline phase (1980s), which in the 1990s has seen a move into open water farming and diversification. Some farmers grow oysters initially inshore and transfer them to longlines to mature.

Figure 10.10 West Coromandel Peninsula Marine Farms



Ownership patterns show a large number of multiple farm owners, some of who (e.g., Sanfords, Westpac Mussel Distributors) have farms in quite different parts of the country, others have farms in separate local bays and/or across the Firth at Matingarahi (e.g., the Bartrom and Bull families). Recent developments have significant ownership by iwi-owned organizations (e.g., Hauraki Marine Development Trust).

The Wilsons Bay farms are notable for the variety of species for which farming rights are held, but otherwise display a regular block-grid pattern. Wyuna Bay's double arc is a little more complex. Its initial 1969/70 allocations were infilled and extended seaward, notably in 1987. In 2000, the Wyuna double arc was held entirely by the iwi-owned Pacific Marine Farms (1996) Ltd.

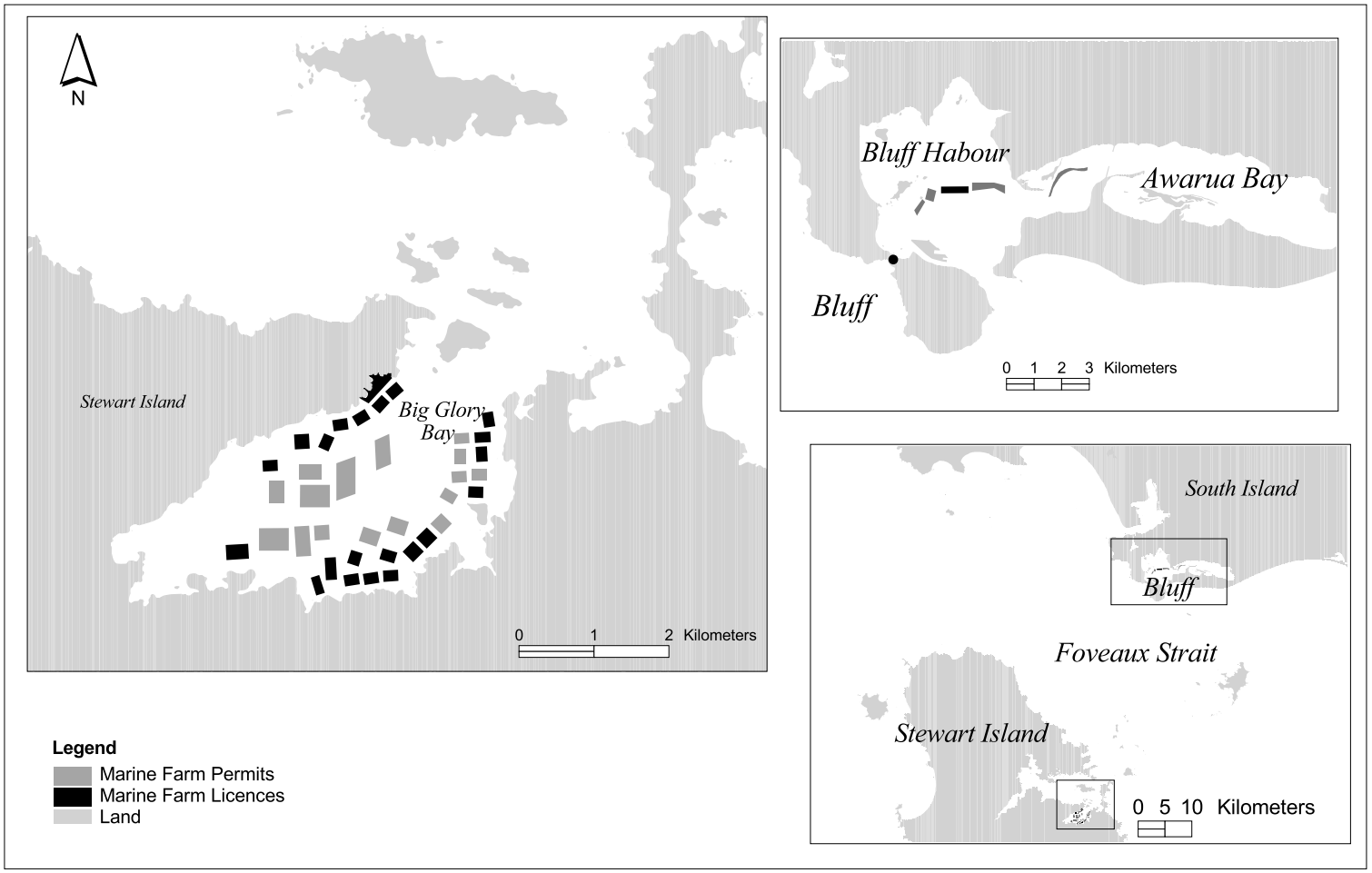
Parallel Row: Koputauaki Bay and its Islands

Parallel rows of three or four licenses aligned at right angles to the shore are features of Koputauaki Bay (Figure 10.10). Adjacent to Motukopake Island in Koputauaki Bay, three farms laid in parallel form a triple row or a rectangular square in the right angle formed by Waimate and Motukopake Islands, in the lee of Motuoruhi Island. On the eastern side of Motukopake Island another four farms form a double row shape. These are located to allow navigation and recreational use in accord with the initially non-statutory Department of Lands and Survey plan (Lang and McQuoid 1974) that subsequently gained statutory plan status under MFA71 in 1983 (see Chapter Nine). All the licenses were allocated in 1984-88: first Motukopake Island, then Koputauaki Bay and, finally, in the lee of Moturua Island. All the farms were for green-lipped mussel and, by 2000, five were owned by Paddy Bull Ltd. and one by the Bartroms. Sanfords had three of the parallel row farms in Koputauaki Bay and Westpac Mussel Distributors also had a farm there.

10.3.4 Southland

Although earlier experimental farms existed, the NAD records marine farming in Southland as commencing with a 5.85ha license for dredge oysters (OYS) in December 1981 (LI149) in Big Glory Bay(Figure 10.11).

Figure 10.11 Southland Marine Farms



In 1996, Campbelltown Seafoods added rights to farm six other species at the site. Eleven green-lipped mussel licences were allocated a total of 35.5 ha water space in 1985. In 1987, three more farms were added, and a further four before 1993, bringing the total area allocated for marine farming in Big Glory Bay to over 62 ha. All of these farms were licenses and they followed a ribbon pattern of development along the coast, but allowing access around them and between them and the shoreline.

The post-RMA period has seen interesting changes. A widely diversified licence was allocated in Bluff Harbour in 1993 and others have sought space in that Harbour in the late 1990s. More significantly, a new phase in development of Big Glory Bay occurred in 1996 when twelve marine farming permits were issued. Two more farms were allocated space over the next two years. These farms brought the total Big Glory Bay water space allocated for marine farming in 2000 to 141 ha. Moreover the marine farming permits were added in a deeper water ribbon outside the existing ribbon of farms, creating a double arc pattern (Figure 10.11).

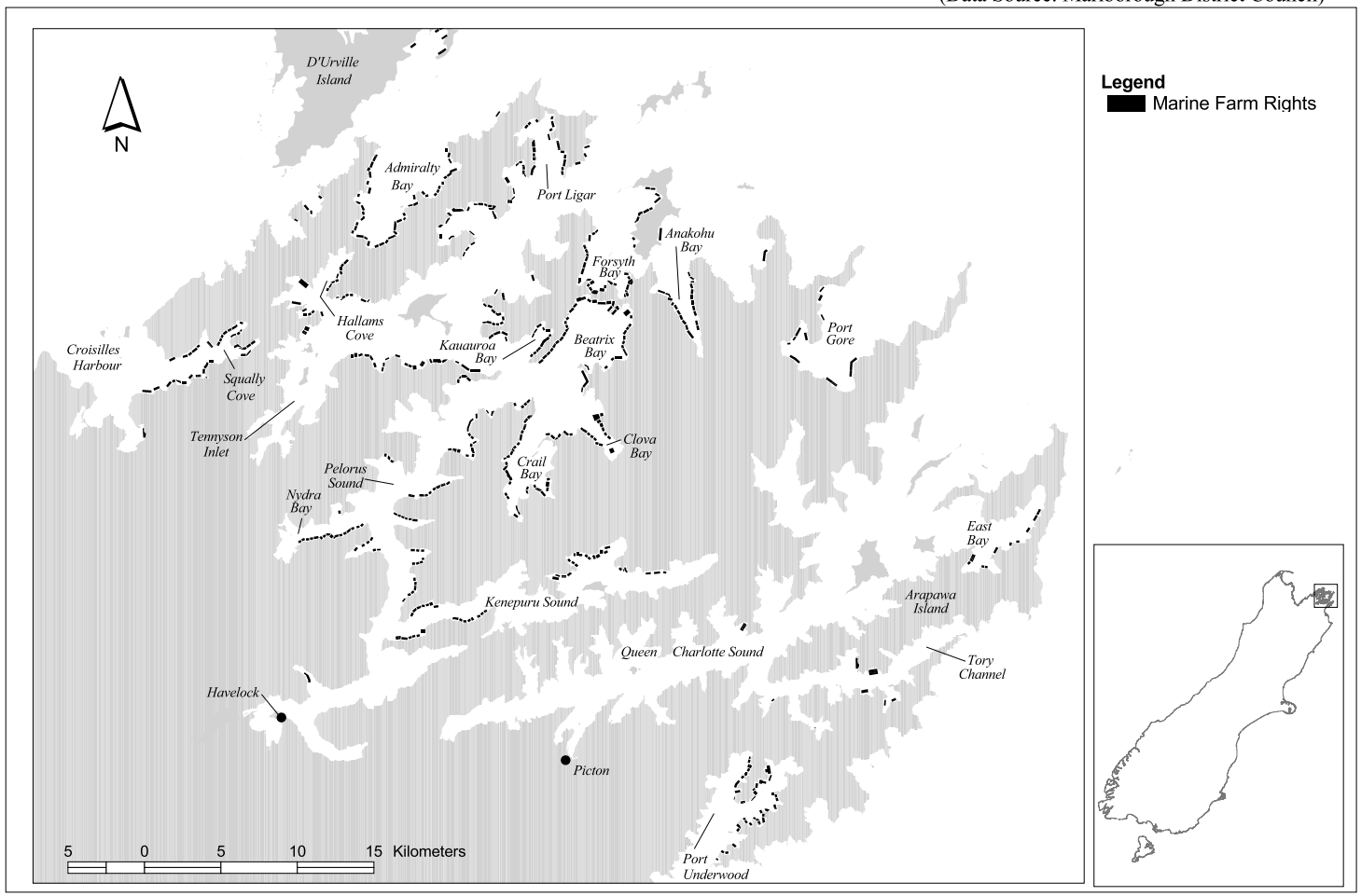
The species for which farming rights are held are very diverse, but the core remains mussels, scallops, oysters and salmon. Most species diversification, regardless of the type of right, occurred in the 1990s. The average farm size also increased considerably, from 3.3 ha for the licenses to 5.6 ha for the marine farming permits. By 2000, Sanford (South Island) Ltd owned fourteen of the farms and four local Southland owners held 29 of the remaining 33 rights.

10.3.5 Marlborough

The first marine farm appearing on the MFish database was allocated its space in 1975 in Queen Charlotte Sound (LI1) and it remains the only farm on the northern side of the Sound today (Figure 10.12). In 1976, licences were issued in each of Pelorus and Kenepuru Sounds. Since then the drowned river basins of the Marlborough Sounds have become the national centre of marine farming. Farming in this region is so extensive that it is not feasible to present a bay-by-bay analysis.

Figure 10.12 Marlborough Sounds Marine Farms in July 2000

(Data Source: Marlborough District Council)



Although the extent of farming is sufficient to warrant such an approach when compared with other areas covered in this thesis, the patterns of development have largely already been discussed. Instead, the focus here is on the overall 'ribbon with infilling' pattern of marine farm development. As illustrated in Figure 10.12, marine farms in the Sounds in 2000 were dominated by a ribbon pattern of development. The majority of Queen Charlotte Sound is farm-free (although farms have developed in the Tory Channel and East Bay, Arapawa Island). Tennyson Inlet and alternative sides of the reaches of Pelorus Sound are also largely clear of farms. There is little sign of double arc ribbon development, or of grid development, although there has clearly been infilling. A more detailed map would indicate that some of the infilling has taken place as a form of extending existing farms, but each such extension is required to obtain a new license or marine farm permit. Consequently, some older farms are having their licences replaced by permits that create an extended form of the original farm.

The scale of operations in the Marlborough Sounds is so grand that it is easy to overlook trends in development. The spread of farms over time was examined to see if there had been a consistent pattern of macro-scale development.

In 1977 over 30 farms were allocated space in 12 different bays/reaches. The bulk of the initial development was in the inner Kenepuru Sound and inner Pelorus Sound, although farms were also established in Kauauroa Bay. The following year expansion focussed on Crail Bay, essentially over the ridgeline from the inner Kenepuru Sound, although quite some distance by boat from the inner Pelorus area. In 1980 another 32 farms were added, most in the Crail Bay and the western end of Kenepuru Sound. The first Croissilles Harbour and Forsyth Bay farms also appeared in 1980.

Almost 60 farms were allocated space in 1981, over 70 in 1982, and then a drop off to just over 20 in 1983. Kenepuru Sound, Crail Bay and Kauauroa Bay remained in demand in 1981. Clova, Hallams, and Port Ligar areas, effectively the outer areas of Pelorus Sound, had slightly more new sites, and the outer area of Port Underwood also featured. During 1982 Anakoha Bay (13 farms), another outer bay, was the dominant development area, and across the two years Port Underwood was also prominent. In 1983 another outer bay, Admiralty Bay, was

the dominant area. Forsyth Bay was also prominent when the two years 1983/84 are considered together. Surprisingly, the inner Pelorus Sound's Nydia Bay took half of the eight 1985 allocations, but the initial Marlborough Sounds' rush was essentially over. Only six to fourteen farm areas were allocated each year from 1984 to 1993. Considered within a regional context, the Nydia Bay farms are a form of infilling.

In 1994, a second rush (this time for marine farming permits) became manifest. Thirty-one permits were issued in 1994, spread throughout the developed Sounds areas, but with the Croissilles, Admiralty Bay and Port Ligar areas combining to take up a third of the sites. Port Gore featured the following year, although again the nineteen farms were spread around the Sounds reasonably evenly. Inner to mid-sounds locations dominated the 53 farms allocated in 1996.

In summary, the temporal development of the Marlborough Sounds had an initial exploratory allocation in three sounds. This was followed by a focus on inner waters followed by a fairly rapid uptake towards the middle and outer parts of Pelorus Sounds. The development of the more distant outer bays such as Admiralty Bay and Port Underwood occurred in the 1982-84 period. This marked the end of the first phase of development and was locked in place by the Proposed Maritime Sounds Maritime Planning Scheme (PMSMPS) in 1988. Subsequent developments appear to have focussed on 'infilling' or farm 'extensions' to complete ribbon patterns throughout the Sounds prior to the moratorium on applications in 1996.

The post-moratorium (i.e., post-1998) rush for bigger sites in more open waters or in central areas was quite predictable and in keeping with the developments in the Firth of Thames and Southland. They were largely enabled by the case law rulings that gave little weight to the Proposed Marlborough Sounds Planning Scheme (see Appendix Three). The proposed regional coastal plan prepared under the RMA used 'discretionary' zones over large areas enabling the applications (discussed in Chapter Nine). The larger companies (e.g., Sanford (South Island) Ltd., The NZ Salmon Company, Southern Mussel Company, Marlborough Mussel Company, and Marlborough Seafoods) increased their

proportion of sites in the Marlborough Sounds, although some 'smaller' operators (e.g., Okiwi Bay Oysters, Bryan Skeggs, PBA and Aquaking) also featured.

There were a few owners who appeared interested in short-term initial ownership – site developers or, perhaps, 'speculators' (e.g., First Wave and various Roach family arrangements). The partners in First Wave (lawyer Jon Tidswell and marine biologist Tim Adams) are (in 2002) partners in eight other limited liability companies, each with names reflecting the location of the areas in which they have usually applied for new, large 'block' farms (e.g., Thames Mussels Ltd.). The various ownership combinations are quite difficult to identify, however, with the King-Turner, Goulding, Pooley, Godsiff, Archer, and Prichard names appearing frequently over the years in a wide range of combinations. In some areas particular local families were especially prominent reflecting their homes' proximity to the farm sites (e.g., the Shands at Port Ligar, and the Godsiffs in Kenepuru). Another feature is the presence in each of the major development bays (e.g., Anakoha Bay and Port Underwood) of the co-operative farms that are held in the name of the NZ Marine Farmers Association (primarily for spat catching and holding).

10.3.6 Large Scale Exploratory Blocks

During the course of my research, there has been a very rapid expansion in marine farming activity of a new variety, which has flourished since the removal of the Sounds' moratorium. Consequently, Figure 10.13 shows the existing marine farms and the new applications as they stood in July 2000. The difference between the two situations is significant. Several new farm blocks (some with significant iwi capital) had been applied for in Admiralty Bay, an extremely large farm was sought in Beatrix Bay and smaller, but substantial, farms in East Bay, Forsyth Bay and to a lesser extent in Port Gore. These would, if successful, effectively fill these bays. If these applications were for smaller sites in the same locations they could be seen as seaward expansions in a second or third arc very similar to those in Big Glory Bay. In fact, those applications that have been finally resolved (e.g., Beatrix Bay) were approved at a much smaller size, but most remained unresolved at the time of the research and the scale of the farms still suggests they must be considered as a new pattern.

Figure 10.13 Marlborough Sounds Existing Marine Farms and Consent Applications in July 2000

Despite their size, these large farms are designed to fill the space in bays adjacent to existing farms without expanding into the navigational channels beyond the bays. Even more significant are the large areas applied for outside the Marlborough Sounds. Notable here is that these are not grids, but single marine farm applications. Their pattern is exploratory and the location represents as much a compromise between existing zone provisions as biophysical factors. The Cloudy Bay application, for instance, lies just outside the prohibited zone in the proposed Marlborough regional coastal plan and an area effectively prohibited because of the undersea Cook Strait power cable. The application for this farm specified that a number of lots would be created and sub-leased to tenants on the farm in a progressively developed grid-block pattern. Effectively these farms signal a 21st Century style of marine farming in New Zealand.

10.4 Conclusion: Summarising the Patterns of Development

Changes recorded on the NAD show that there has been a tendency to retain lease rights in preference to later rights. Obtaining rights to diversify on a site has been especially apparent since the early 1990s, but those farms with a high number of species approved are held by a very small group of owners. The size of farms has increased over time, but this has been masked by extensions to existing farms being incorporated into the NAD as new farms. Very few farm owners appear to own farms in different locations, but a concentration of ownership of farms in the hands of a relatively small group of owners is apparent. Maori are also emerging as significant owners in most regions, usually through iwi-ownership structures.

The development of marine farms, as tracked by the spatial allocation over time of the various major sites in New Zealand, shows some consistent trends. At the regional level, there has been an initial preference for inner, sheltered waters or intertidal areas, with subsequent movement toward outer areas and eventually open water farm sites. Prior to or contemporaneous with the open water expansion, however, there is usually a period of infilling and subdivision in existing areas. The results presented in this Chapter also suggest a broad typology based on variations around four basic development patterns: exploratory, ribbon, grid-block, and concentric ring (Table 10.2.).

Table 10.2 Typology of patterns of marine farm development in New Zealand

	Sub-category	Description	Exemplar
Exploratory	**Exploratory**	**Sporadic, individual sites, disconnected, sites may be large or small.**	**Waiheke Island**
Ribbon	**Nascent**	**Partial infilling of exploratory sites forming a ribbon with gaps.**	**Waikare Inlet**
	Single arc	**Infilling leads to single arc.**	**Early Orongo Bay**
	Double arc	**Seaward expansion of single arc leads to second outer arc.**	**Late Orongo Bay**
	Parallel row	**Contemporaneous parallel rows developed.**	**Koputauaki Bay**
Block-grid	**Regular**	**Square or rectangular block with access ways separating lots or leases giving grid-like appearance.**	**Whangaroa Harbour**
	Irregular	**Based on regular, but with rectangular shape disrupted by need to fit with physiographic or other constraints.**	**Dyers Creek**
Concentric ring	**Oasis**	**Farm block develops around and encircles original site.**	**Te Kapa Inlet**

The various arc patterns may be readily apparent in small bays and may be isolated from other farm areas, as in the Orongo Bay or, when seen in a broader context, they may comprise part of a larger ribbon pattern, as is the Ngangeroa Creek when considered within the wider Waikare Inlet context. In some cases the categories are distinguishable by the process of development. Te Kapa could be considered an irregular block and Matingarahi block has a central site and could be considered a concentric ring. If the process of development is taken into account, however, then the encirclement of an original oasis site (Te Kapa) can be distinguished from contemporaneous development of a block (Matingarahi). The same process criteria distinguish the parallel row from the double arc. Note that

the latter may also have considerable space between the arcs (e.g., Big Glory Bay). Over time one pattern may evolve into another, as in the formation of an irregular block from an initial regular one, or the transformation from exploratory to nascent ribbon, to single arc, to double arc.

Factors that may have given rise to the observed patterns are discussed in relation to relevant theory and plans in Chapter Twelve. In Chapter Eleven, the data analysed in this Chapter will be extended to the micro-level of the individual owner through an examination of information obtained from surveys and interviews.

Chapter Eleven: Key Variables Influencing Marine Farmers' Choices of Farm Sites in New Zealand

In Chapter Ten, the focus on spatial patterns showed that in places it was possible to identify seemingly clear physiographical parameters affecting the location of marine farms. For instance, there was a tendency for farms to align with shorelines or harbour channels. As more farms develop there has been infilling, subdivision and intensified use of some spaces, and a latter-day expansion into more open waters. New farms, or extensions to existing farms, have been established in inner areas simultaneously with the further development of open sea areas. There also appear to be places of concentrated development, perhaps to achieve economies of scale, and some areas of scattered, exploratory site acquisition. Some of these patterns of development may be explained by the planning regimes discussed in Chapter Nine, but there are instances where those plans followed already established farm sites. There are also many examples of places where plans did not prevent farms being established, but farms did not eventuate. Exploring the marine farm owners' perceptions of locations, and rationale for obtaining particular sites should assist with interpreting the observed spatial patterns.

In this chapter the focus is on characterising the industry and exploring the perceptions the farm owners had about factors that influenced their farm location decisions. The data analysis techniques, notably factor and cluster analysis, are described. This is followed by an overview of characteristics of the respondents. Differences are identified in responses between single- and multi-farm owners and there are some regional variations. The subsequent analyses focus on differences in respondents' views on variables that influenced their decisions on sites, the desirability of particular settings, institutions and mechanisms for allocating space, and variables influencing the acquisition of additional space for farming. Where there are sufficient responses, these views are considered in terms of variations by region, single/multi-ownership, and changes over time.

11.1 Data Analysis Techniques

The survey of marine farm owners, as discussed in Chapter Eight, has been undertaken in three parts: a postal survey of those farmers recorded as having only one marine farm ('single-owners'); a postal survey of those recorded as having two to ten farms ('multi-owners'); and interviews with the owners of more than ten farms ('many-owners'). The postal surveys had some additional questions for multi-owners. In reality, however, the way in which the MFish database records owners meant that it was extremely difficult to identify clearly the farm owners.

Consequently, where it is useful to explore the views of single-owners separately from multi-owners this has been based on the survey form completed by the respondent. Those who answered the single-owner questionnaire are treated as single-owners in the analysis even though they might have owned several farms. This is not overly problematic as my analysis of responses suggests that relatively few multi-owners have completed single-owner forms and their contribution will therefore not introduce significant errors into the analysis.

The survey and other data enabled a wide range of analyses. Only those considered most insightful for this thesis are reported here. Cluster and factor analyses were used to identify more general patterns in responses to sets of questions primarily based on Likert scales. These techniques were chosen as they enable exploration of the data for patterns that might not have been expected and thereby opening up a wider range of possible explanations of the data (Everitt and Dunn 2001). The main cluster and factor analyses techniques used in this Chapter are discussed below and other statistical tests used are summarised in Appendix Six. Cross-tabulations, factor analysis, clustering and other statistical analyses were performed using *SPSS version 10.0.7* software (released by SPSS Inc in June 2000). Unless otherwise specified, references to significance in this Chapter indicate that differences between groups being compared via Chi-square analysis are statistically significant at the 0.05 level. More rigorous levels of significance might be appropriate in future research designed on the basis of strong sets of hypotheses, but in exploratory research in a new field the 0.05 level was considered to be reasonably robust and sufficiently indicative of significant relationships in the data.

To simplify the analysis, and in recognition that those who had farms in 'island' settings might present a distinctive view, I recoded respondents from islands in the Auckland region (e.g., Great Barrier Island and Waiheke Island) into a separate 'regional' group labelled 'Islands' for some analyses. As Southland responses are also predominantly from Stewart Island the Islands Group and Stewart Island could have been grouped, but as they fell under different MFish, DoC and regional council jurisdictions I did not combine them.

1.1.1 Factor Analysis

Following Toth and Brown (1997), I used exploratory principle axis factor analysis to analyse multivariate data sets to identify a smaller number of underlying 'latent variables' or 'common factors' (King 1969, Loehlin 1992). Principle axis factor analysis is based on the assumption that there is an unknown underlying model that is causally connected with the observed data. The aim is to identify the factors and the 'pattern' of 'factor loadings' (correlation coefficients) between the variables and the factors. If the factors are not independent (i.e., there is some intercorrelation between factors) then principle factor analysis enables this 'structure' to be taken into account. I made no assumptions regarding intercorrelations, but did not wish to rule out the possibility that they existed. I also followed standard practice in seeking a 'simple' model solution working from the factor that accounted for the most covariance in the data set toward the least and seeking the fewest number of connections between the factors and variables. Thus each succeeding factor identified accounts for less variance than those preceding it (King 1969, Loehlin 1992).

Exploratory principal axis factor analysis must be used cautiously. It requires estimates of the initial 'communalities' (the amount of variance shared by a variable with other variables via the same common factor). Secondly, the decision to seek a 'simple' underlying solution is arbitrary and leads to a search for few common factors when there may be more factors of importance. Thirdly, the number of factors chosen is arbitrary and may lead to different patterns of correlations. Fourthly, the use of ordinal scaled data may lead to distortions in the factor scores for cases and, finally, the common factors identified still require

subjective interpretation and explanation (King 1969, Ehrenberg and Goodhardt 1976, Loehlin 1992, Everitt and Dunn 2001). Despite these limitations, and although interval or ratio data is preferable, the technique has generated useful insights from ordinal data (Toth and Brown 1997, Everitt and Dunn 2001).

The principal axis factor analyses were undertaken using the standard 'squared multiple correlations' method of estimating the communalities and extracting factors. Two subjective but widely used methods were employed to determine the number of factors to be extracted; the Kaiser-Guttman rule (only use factors with eigenvalues greater than 1.0) and 'scree' plots of the eigenvalues (Loehlin 1992). To further simplify the models both orthogonal 'varimax' (which assumes no factor intercorrelations) and oblique 'direct oblimin' (which assumes some intercorrelation) rotations were used (see King 1969 or Loehlin 1992 for mathematical descriptions). The simplest solution resulting from the rotations was accepted for further discussion.

11.1.2 Cluster Analysis

Cluster analysis of complex data enables the analyst to classify cases into 'homogenous', (usually) mutually exclusive groups (clusters) by identifying similarities (proximities) between the cases (Coakes and Steed 1999, Everitt and Dunn 2001). These 'typologies' of cases can be used to describe patterns of similarities or differences in the data. Clustering can also be used for analysing variables (Drew and Bishop 1999). Two forms of clustering techniques, 'K-means' ('Quick Cluster') and 'hierarchical clustering', were used on the survey data.

K-means clustering is a method for 'optimising' the partitioning of cases (or variables) into clusters when the number of clusters sought has already been decided. The optimising criterion minimised the sum of the within-cluster sum of squares for each variable ('within-group dispersion') (Everitt 1993, Drew and Bishop 1999, Everitt and Dunn 2001). The final solution of the algorithm provides a set of 'prototypical' scores for each variable within each cluster (i.e., the means for each variable in the particular cluster) and these were drawn on to assist the 'naming' of the cluster. There is some debate as to whether the K-

means technique should be used on ordinal data or should only be applied to interval data (compare, for instance, Drew and Bishop 1999 and Tacq 1997). Following Drew and Bishop (1999), I consider the Likert scale does not introduce scalar distortions sufficient to invalidate the technique for the purposes it is used here.

The use of hierarchical clustering for ordinal data is not in dispute and it is in common use (Everitt 1993, Gordon 1996, 1999, Everitt and Dunn 2001). Different hierarchical clustering strategies, however, can lead to quite different results (Everitt 1993, Gordon 1996, 1999, Everitt and Dunn 2001). This is even more problematic when the analysis is deliberately exploratory (as in the current research) rather than confirmatory. I used the 'between-groups average linkage' agglomeration strategy to balance the need for clusters that are internally cohesive and the need to differentiate between the clusters (Gordon 1999).

Both techniques can be criticised as imposing structures on the data. The K-means method has a tendency to impose a spherical structure on the clusters (Everitt 1993). Hierarchical agglomeration is a stepwise approach that only defines optimality between the set of possible amalgamations at each stage, rather than optimise for the data as a whole. A variety of different approaches to improve internal and/or external validity have been proposed, but each has its drawbacks and conclusive techniques of validating the resulting classifications simply do not exist (Gordon 1996, 1999). If few iterations are required to reach a 'stable solution' it is usually assumed that the technique is less likely to have imposed a structure on the data than if many iterations are required (King 1969, Everitt 1993). In his extensive reviews Gordon (1996, 1999) also suggests that if clusters remain stable under several different techniques this is a useful indicator of validity. The data reported in this chapter have been subjected to several different clustering approaches. Following Drew and Bishop (1999), 'multiple discriminant analysis' was also attempted on some of the resultant clusters. Ultimately, however, the key to each clustering technique is the initial choice of variables and cases used, the number of clusters accepted as 'the solution' and the subsequent naming of the clusters. The results presented here represent those clusters that appeared intuitively to have the most validity and to provide more insights than other cluster solutions.

11.2 Respondent Profiles

The 32% response rate to the postal survey has been discussed in Chapter Eight. It was noted that leases were over-represented in the responses. Despite a larger number of the respondents' marine farming permits (MF) being held by multi-owners (47 as opposed to 23 held by single-owners), there was no significant difference between the distribution of lease (LE), licence (LI), and marine farm permit (MF) rights held by multi-farm owner respondents and those of single-farm owner respondents.

The responses received included owners of 21 farms that were established from 1968 to 1971 (all still effective), 139 established from 1972 to 1991, and 111 from 1992 to 1998, with a further 4 effective in 1999. With one exception, all eight farms that had expired before 1998 had become effective since 1991. For reasons of confidentiality the specific locations of the respondents cannot be provided, but the spatial distribution of responses followed the overall distribution of farms between single and multi-farm owner categories. There were too few respondents to enable a sub-regional analysis and retain the anonymity of survey respondents. Consequently a bay-by-bay analysis was not attempted. There were also too few multi-owners to enable useful, anonymous regional level explorations of multi- or single-owner distributions.

11.2.1 Personal Attributes

The 'single-owner' respondents were predominantly male, aged over fifty and with no specialised training or qualification relevant to marine farming, but with an average of about 14 years experience (Figure 11.1a-f). In contrast, the 'multi-owner' respondents were almost all male, significantly younger, with a similar number of years experience to the 'single-owners', but with a higher proportion of formally trained/qualified respondents. There were more multi-farm respondents in Marlborough and Northland than there were single, but single-owners predominate among respondents from most other regions (Figure 11.2).

Figure 11.1a Experience of male single- and multi-farm owner respondents

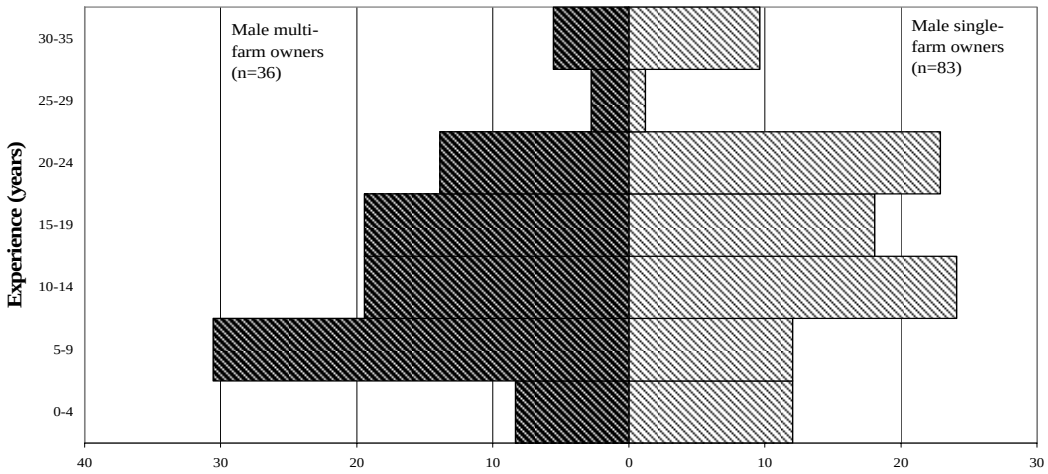


Figure 11.1b Experience of female single- and multi-farm owner respondents

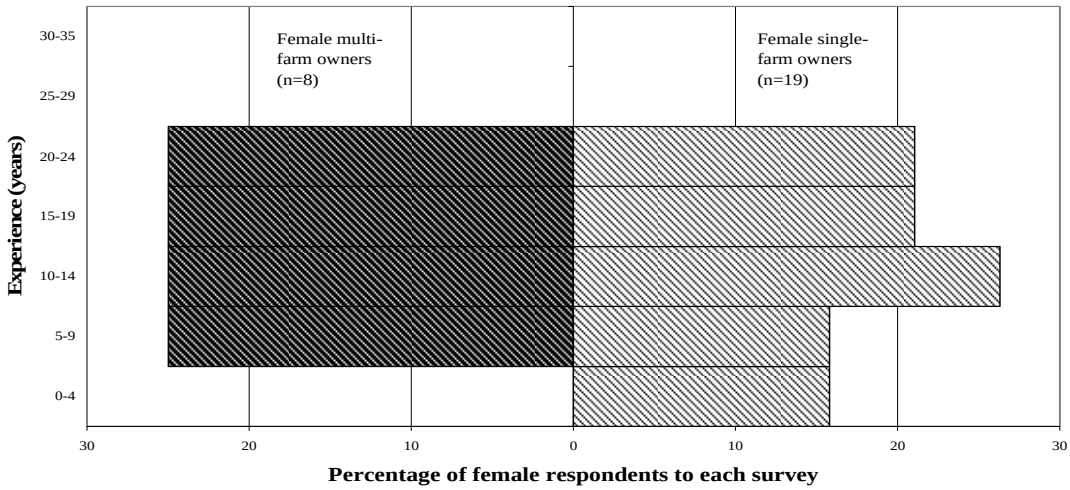


Figure 11.1c Age group of male single- and multi-farm owner respondents

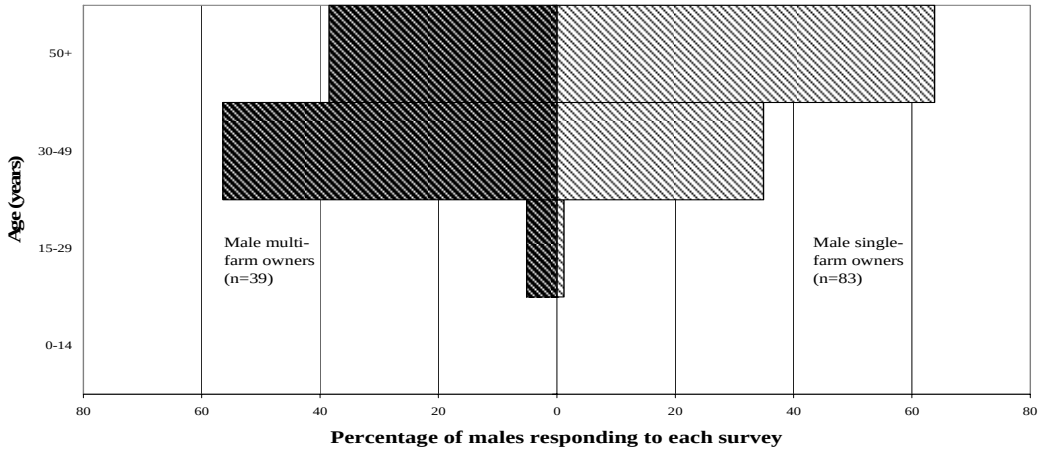


Figure 11.1d Age group of female single- and multi-farm owner respondents

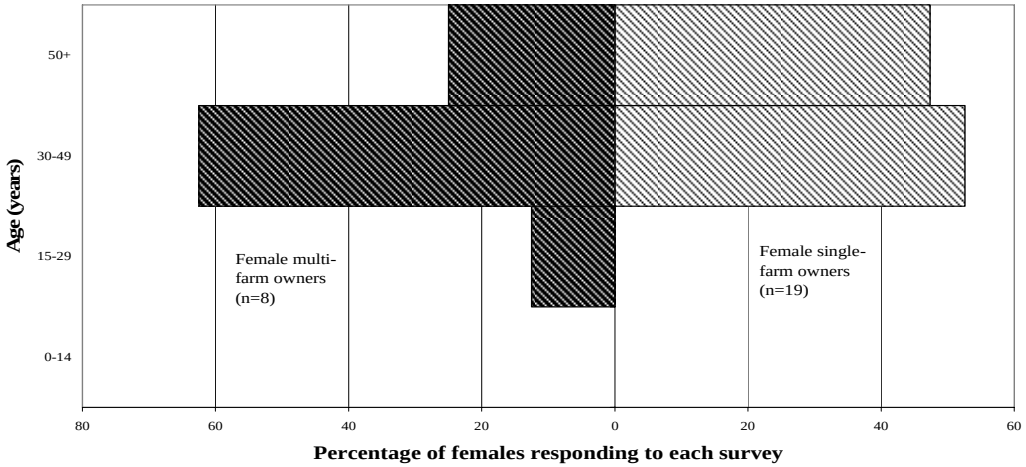


Figure 11.1e Trained single and multi-farm owner respondents

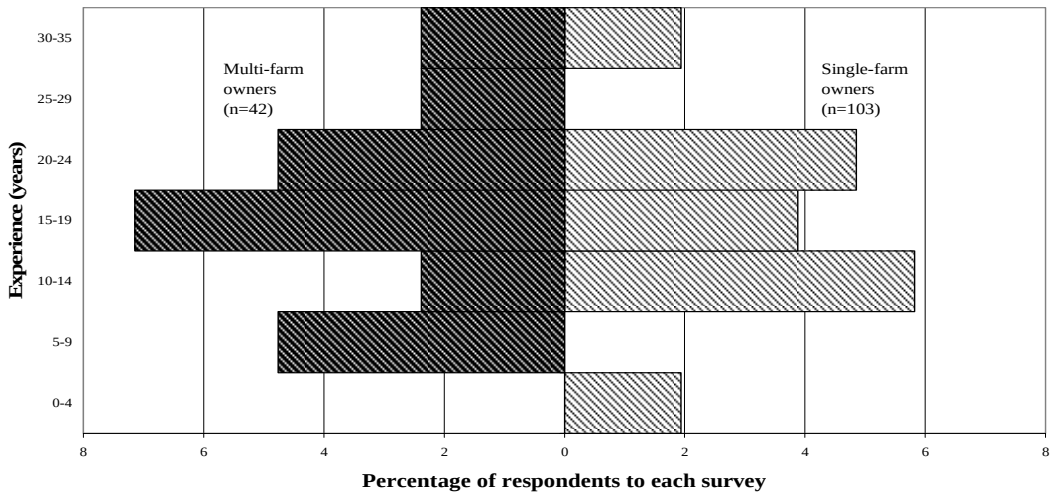


Figure 11.1f Untrained single and multi-farm owner respondents

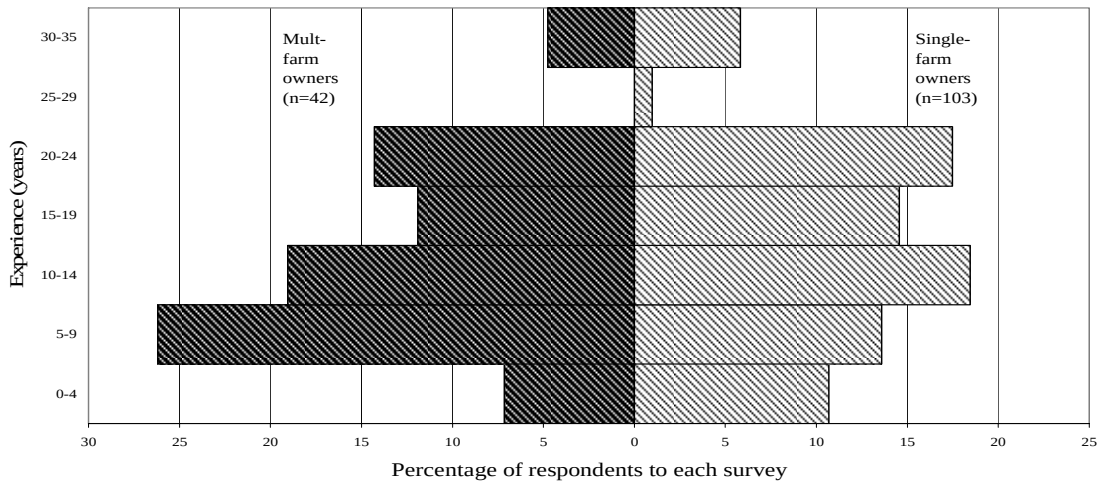
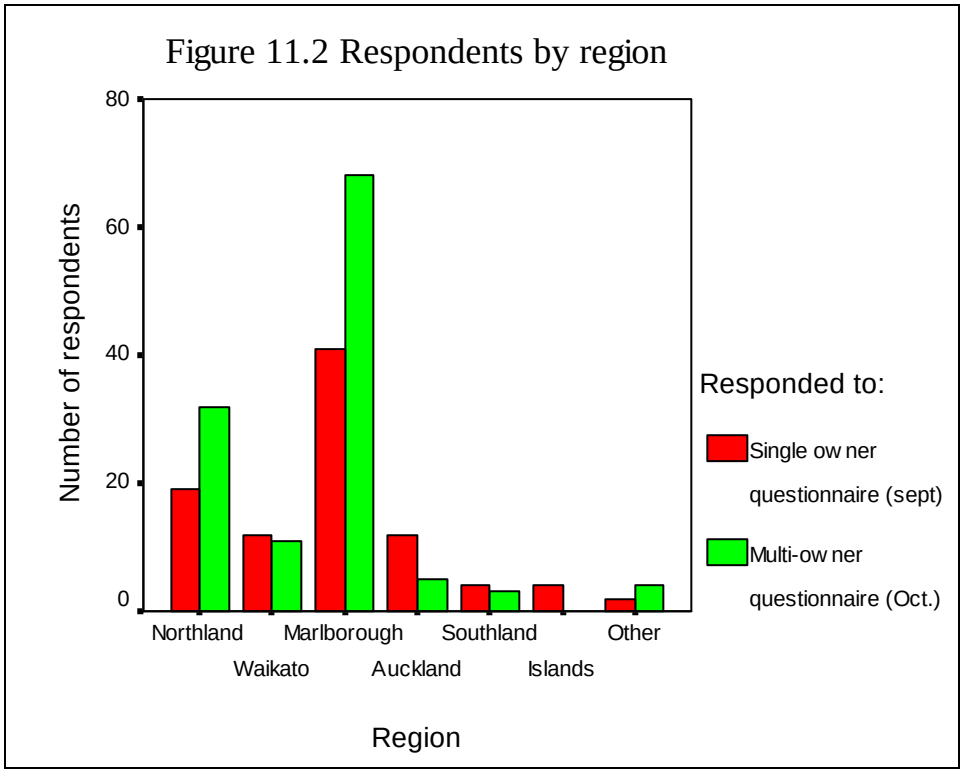
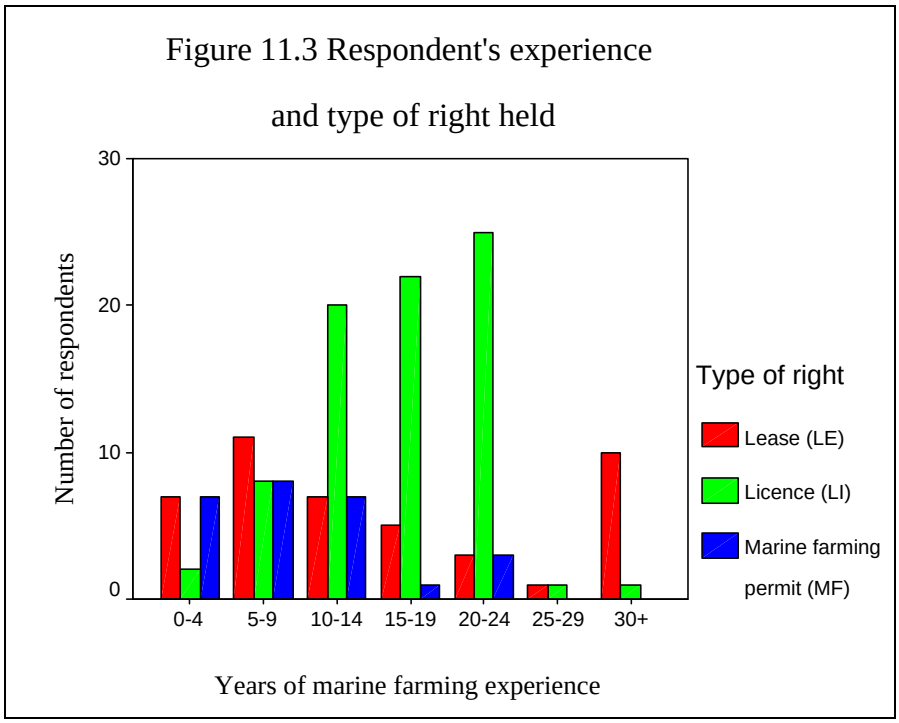


Figure 11.2 Respondents by region



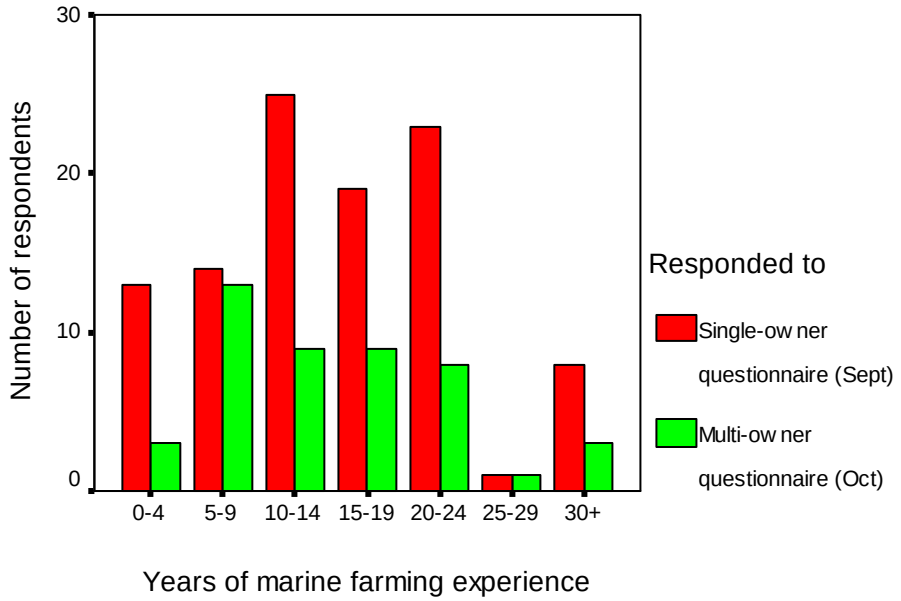
There were more respondents with less than ten years (i.e., post-RMA) and with more than 30 years farming experience that owned LE rights than either MF or LI rights (Figure 11.3).

Figure 11.3 Respondent's experience and type of right held



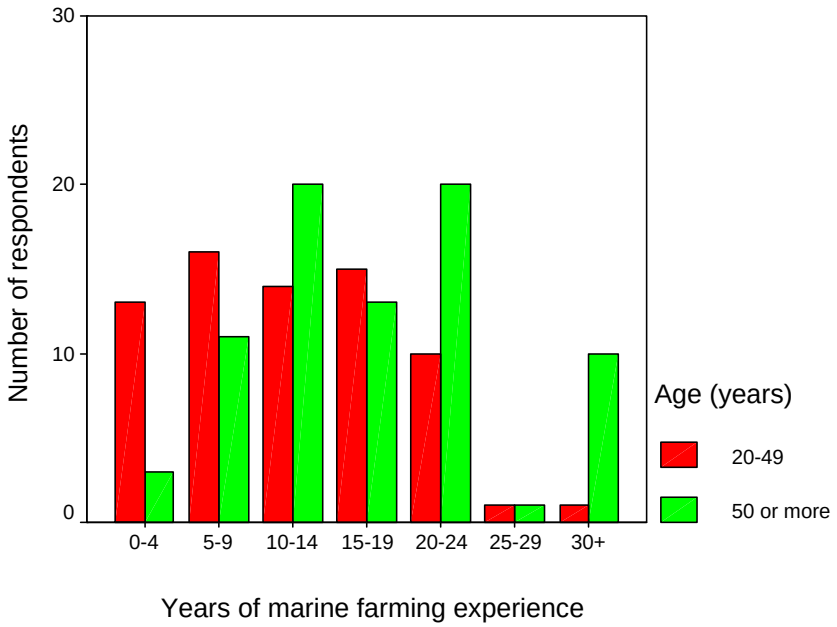
Licences were the dominant form of right held by those with 10-24 years experience (i.e., likely to have acquired their farms between 1975 and 1990) and those with more than 25 years experience had not obtained any MF rights. The preponderance of LE among those with less than ten years experience suggests a new generation of leaseholders or investors has arrived and this may be associated with the subdivisions noted in Chapter Ten. Interestingly, the multi-owner respondents had more people under 50 years of age in almost every experience group. In contrast, the single farm respondents had relatively large peaks of older people in the 10-14, 20-24 and 30plus years of experience (11.4a, b).

Figure 11.4a Years of experience of respondents



Assuming that the majority of respondents had relatively uninterrupted involvement in marine farming, those single-owners with up to 10 years experience (i.e., probably began farming post-RMA) were likely to be older than the post-RMA multi-owners. Indeed, there appears to be a general trend for single-owners to have started farming at an older age than their equivalent multi-farm owners (figure 11.4a, b). If the assumption holds that years of experience is a useful proxy for the year of commencement of the respondent in the industry, then it appears that younger farmers obtained additional sites, left the industry, or were not inclined to respond to my survey.

Figure 11.4b Experience and age of respondents



The proportion of Maori respondents was similar to that of Maori in the general population, but higher among the multi-owners (13.6%) than among the single owners (12%). Maori respondents were predominantly in Northland and the Marlborough regions and showed no apparent regional differences in multi-/single-ownership.

11.2.2 Marine Farming: Business or lifestyle?

In 2000 and when farms were originally obtained, the majority of owners saw their farm as an owner-operated business and, less often, as a family-owned business, except in Marlborough (Figure 11.5a, b). The single-owners show a similar, but less pronounced, pattern. A higher percentage of single-owner respondents saw their farms as hobby/lifestyle or hapu/iwi-owned farms compared to the multi-owners.

Figure 11.5a Respondent's view of farm in 2000

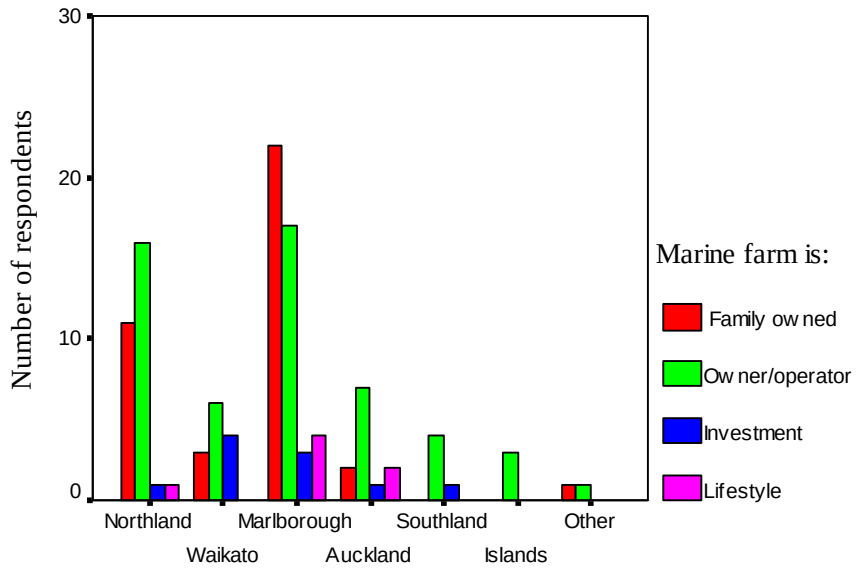
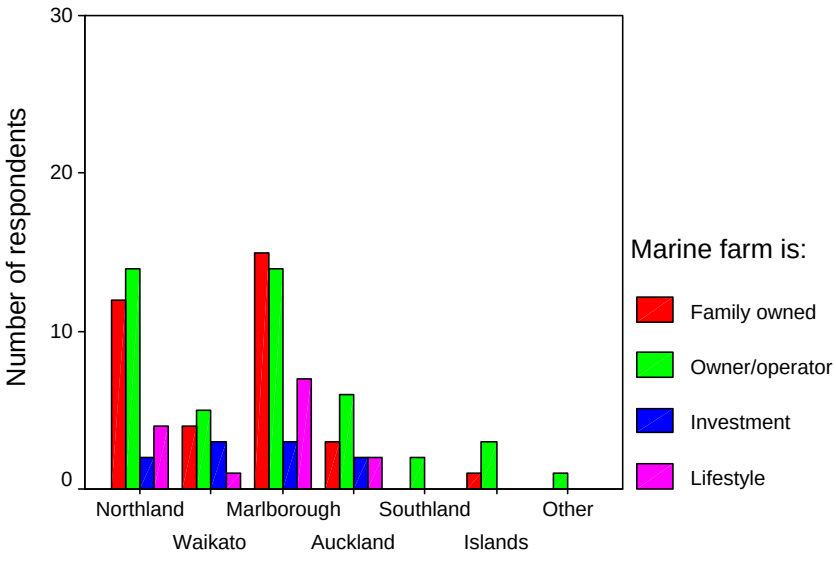


Figure 11.5b Respondent's view of farm originally

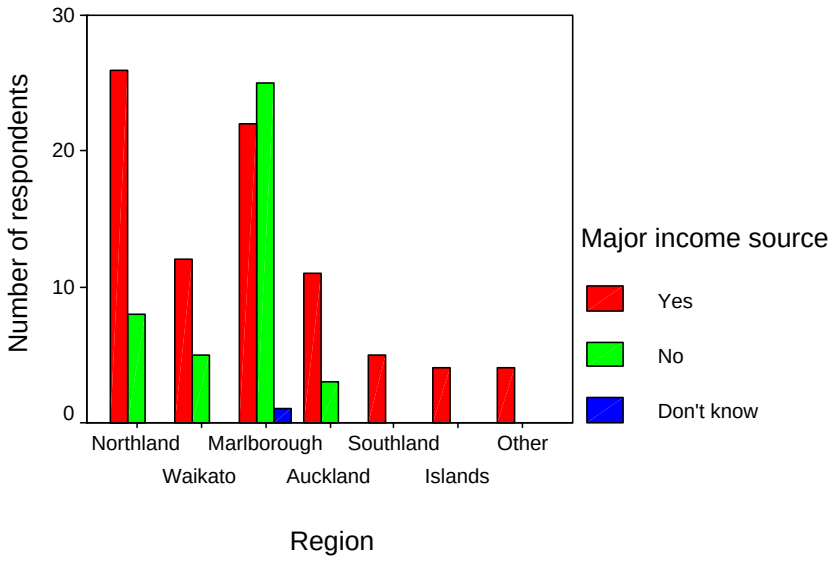


The lack of corporate/private investors suggests that such companies would fall into the 'many-farm owner' category that was not surveyed by post. The survey respondents probably also tended to be the active owners rather than their partner investors. There were similar proportions of respondents in the family-owned and owner-operated categories when they originally started farming, but a higher

proportion of hobby farms. Among the single-owners there were also more hapu/iwi and research farms. Approximately 85% of the multi-owners intended to make marine farming their primary source of income when they started farming, whereas about 40% of the single-owners did not see marine farming as their primary source of income when they started farming (Figure 11.6).

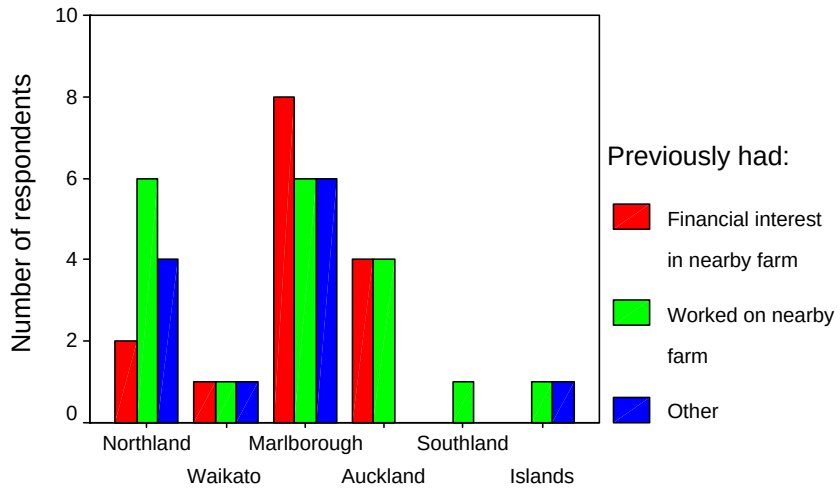
In combination, these statistics suggest that the smaller farmers may have been pioneering researchers, supporting the activity as hobby farms to get established before converting their farms into businesses. Indeed, one respondent commented that he started out seeing his farm as a business, but realised later that he should have started it as a hobby farm and kept another job concurrently so that he could survive the riskier learning phases. In 2000 he was treating it as a hobby farm. The multi-owners, on the other hand, largely became involved in the industry after it had been shown to be viable, so they saw it as a business from the outset.

Figure 11.6 Owner's farming intention when farm first obtained



In every region, except Marlborough, marine farming was intended to be the major source of income for the owners when they first obtained their farms (Figure 11.6). Marlborough respondents were also more likely to have had a financial interest in, than to have worked on, a nearby farm prior to obtaining their own farm (Figure 11.7).

Figure 11.7 Owner's financial or employment interest in nearby farm prior to obtaining first farm



There may also be a retrospective component in the responses. Those who had made farming their primary source of income report that this was always their intention. Those less successful, however, may seek to retain their self-esteem by claiming that they never intended to make farming their primary source of income. There is no practical way to test for such a claim.

All farms that were sold within two years of their owner acquiring them were considered by me to be 'speculation' farms, an admittedly arbitrary measure. Only nine (6%) of the 153 farms obtained by respondents since December 1992 were sold within two years of the owner obtaining them. A six percent turnover of farms within two years of acquisition does not appear overly high in a stable marine farming industry. Some of the well-known major current 'speculators' (or 'site developers' as they sometimes describe themselves) did not respond to the survey. The figure for farm speculators could therefore have been considerably larger if the response rate had been better.

11.2.3 Backgrounds of Farmers

Few of either category of questionnaire respondents had relevant specialist qualifications. The most frequently mentioned qualification was 'commercial

boat/launch master certificate' – essentially a marine equivalent of a terrestrial farmer's 'heavy traffic' (i.e., 'truck') driver's licence.

The background experience of the respondents is, however, substantially different. The single-owners were predominantly land farmers before becoming involved in marine farming. This background was closely followed by the 'fishing' category for the single-owners. Among multi-owners, land farming was also the most frequently recorded background, closely followed by 'marine farming' and 'marine science'.

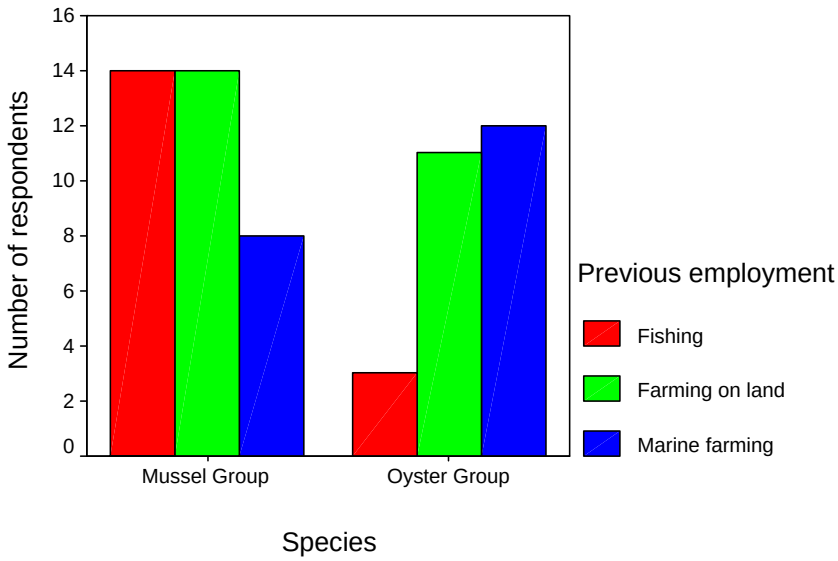
The relationship between species and previous employment was examined using the species first approved for a farm as the key species for each farm. Previous employment was recoded into four categories: fishing, farming on land, marine farming, and 'other'. The combined category of 'other' employment was clearly the dominant background for both mussels (MSG) and rock oysters (ROY). There was such diversity within the 'other' category of previous employment that no single occupational group could be identified that was of similar scale to the three main backgrounds.

I recoded mussels and scallops together (the 'mussel group'). They essentially involve the same type of activity and are usually associated, if not at the initial allocation of space for the farm then at a later stage. I also recoded rock oyster, Pacific oyster, and oyster (dredge) together as an 'oyster farming group'. These two groups differed significantly in the previous employment of their owners. A higher proportion of the mussel group respondents had fishing as their previous employment when compared to employment of the oyster group. The relatively high proportion of oyster farmers who had marine farming as their previous employment exacerbated the difference between the two groups (Figure 11.8).

Farming on land was by far the most commonly reported form of previous employment for the mussel dominated Marlborough region, but marine farming was the dominant category in both oyster regions, Northland and Auckland. The results strongly support anecdotal evidence that oyster farmers are predominantly from farming backgrounds, but this must now be extended to include marine farming as a background. The analysis is much more equivocal with regard to the

view often expressed that mussel farmers being predominantly from fishing backgrounds.

Figure 11.8 Species respondents first farmed and previous employment



11.2.4 Industry Integration and Specialisation

It was anticipated that the multi-owners would be more likely to be in vertically integrated companies, with management, harvesting, processing and, possibly, marketing carried out by the same company that owned the farm. Alternatively, if there was a large degree of specialisation in the industry these might all be separate functions.

The survey data showed remarkable similarity between the multi- and single-owner respondents' involvement in harvesting and managing their farms and disposing of their product (Table 11.1). Marlborough respondents, however, appeared more specialised than those in most other regions (Figure 11.10a, b) and less likely than those in other regions to consider their individual sites as a complete farm unit.

Table11.1 Owners' activities and destinations of product (%)

	Manage own farm	Harvest own product	Market own product	Process own product	Sell at least 50% of their product	Sell some product direct to market	Give away more than 5% of product
Multi-owners	60	46.5	22	23	N/C*	17	2
Single-owners	60	46.5	25	14	86	11	8

* Not calculable due to the nature of the responses (i.e., several respondents provided extensive ranges rather than specific percentages, others did not respond)

Figure 11.9 Regional distribution of owner-managed farms

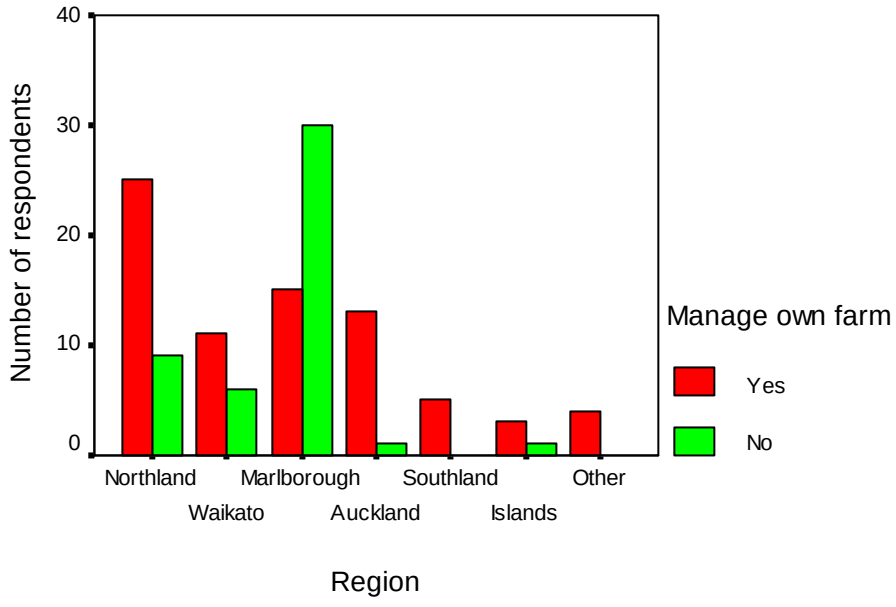
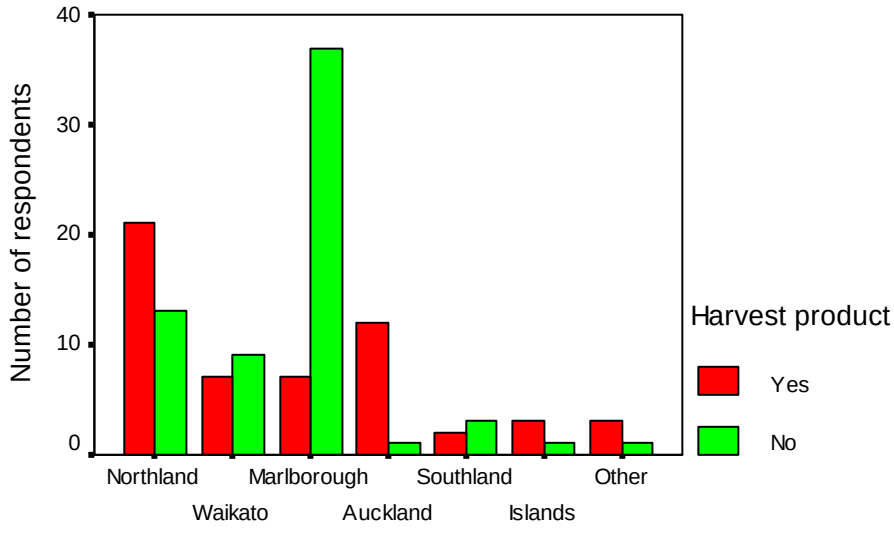


Figure 11.10 Regional distribution of owner-harvested farms



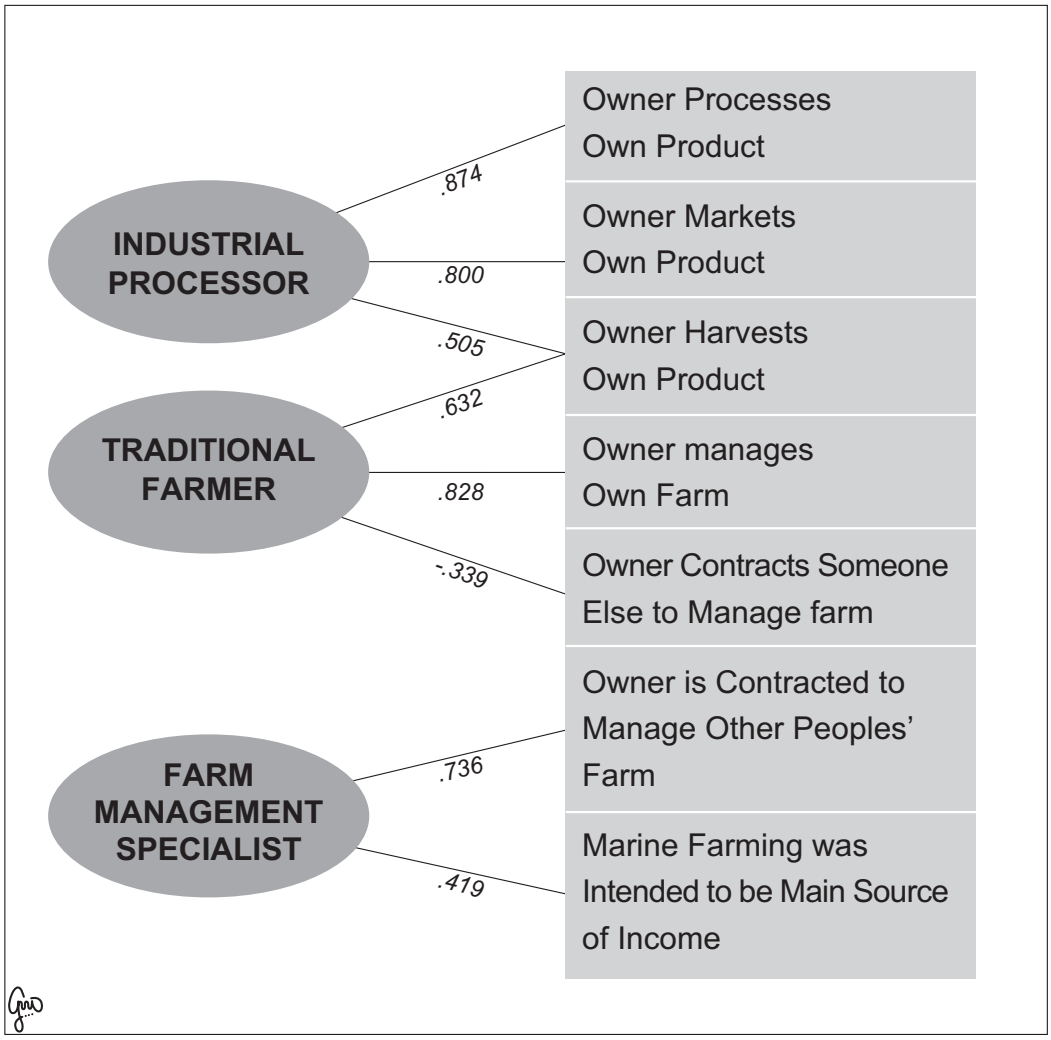
A principal axis factor analysis (using varimax rotation) of questions relating to industry integration and specialisation suggested three latent factors accounted for 56% of the covariance in responses. I named these factors: 'Industrial processor', 'Traditional farmer' and 'Farm management specialist' (Figure 11.11)[1]. The variable 'Owner harvests the product from his/her own farm' is a complex variable, but this was not able to be usefully simplified using oblique rotation. It is positioned in the diagram to represent the crossover between the more industrial end of the business and the more traditional farming end. To some extent this harvest variable reflects a degree of integration between farming and processing.

An examination of factor scores plotted in relation to regional distribution, single-/multi- ownership, type of right held and species showed no distinct trends. The number of multi-owner respondents was too small to be able to draw any definitive conclusions. The factor analysis, however, supports a model in which owners of marine farming rights adopt one of three distinctive approaches to their farms that is not related to the species or type of right. These approaches affect

[1] The first factor has an eigenvalue of 2.5 after final extraction whereas the other two are below 0.8, suggesting that the industrial processing factor is the predominant factor. The Kaiser-Meyer-Olkon (KMO) measure of sampling adequacy and Bartlett test of sphericity were acceptable (0.7 and 0.000 respectively – see Appendix 6 for explanation).

the level of integration and specialisation within the industry. The analysis leaves open the possibility of subregional variations or, alternatively, of there being a degree of homogeneity in the type of regions from which respondents came.

Figure 11.11 Integration of marine farming



11.2.5 Summary of Respondents' Profile

The profile of the respondents indicated considerable similarity in the characteristics and farm types of the two categories of respondents, and differences between them appear to have logical explanations. The average 'years of experience' means that sufficient respondents were involved in the industry before the RMA to enable robust comparisons between the pre- and post-RMA regimes. There are considerable variations in ownership rights and species approved for farming, especially between Marlborough and Northland. The Marlborough region appears to exhibit greater specialisation and owner

involvement as investors (as opposed to farmers) than does Northland. Factor analysis, however, did not support regional variations in the *approach* by farmers to integration and specialisation suggested by the factor analysis. This suggests that the observed regional variations may be due to some other factor.

11.3 Variables Affecting the Location of Marine Farms

There was considerable agreement between respondents on the importance or otherwise of particular variables affecting their choice of location. Water quality was, for instance, generally considered very or critically important (Figure 11.12a). There were, however, obvious regional differences in the views on the importance of some variables and these had also varied over time (Figure 11.12a-f).

11.3.1 Differences in Importance of Factors Influencing Farm Location Decisions

The multi-owners gave all of their variables, on average, higher ratings of importance than did the single-owners (Table 11.2). The most obvious difference in the order of ranking of the variables rated as most important was that the multi-owners rated proximity to 'sources of spat/seed/fingerlings/smolt' as more important than sheltered water when they obtained their first site (Table 11.3). They also did not consider planning restrictions as important as did the single-owners.

Both sets of owners gave higher ratings of importance to the support/opposition from the local community in 2000 than when they first started farming. The changes in ratings elevated planning restrictions to second most important variable. Both also gave the proximity of the site to home a lower rating in 2000. Although shelter remained important for single-owners, the multi-owners dropped it to lower than both community and iwi/hapu support/opposition.

Figure 11.12a Importance of water quality in 2000, by region

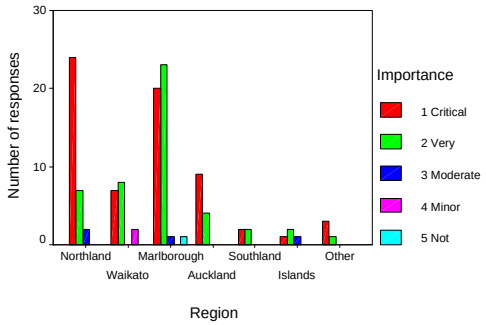


Figure 11.12b Original importance of community, by region

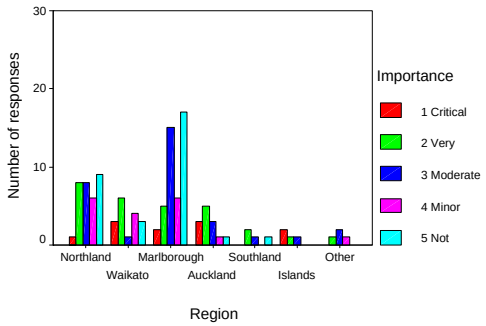


Figure 11.12c Original importance of proximity to land access, by region

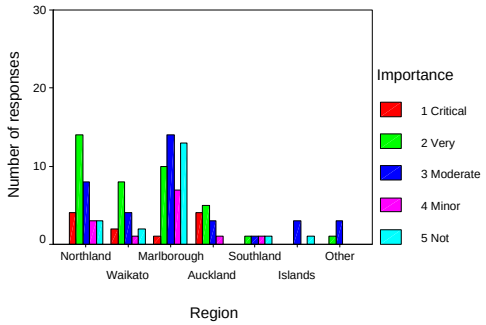


Figure 11.12d Importance of shelter in 2000, by region

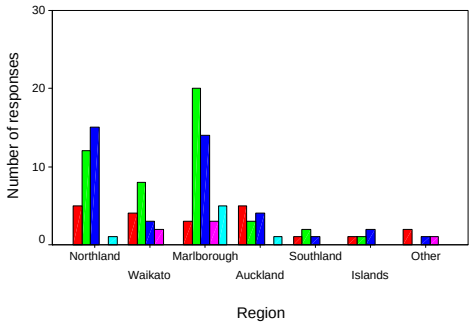


Figure 11.12e Importance of community in 2000, by region

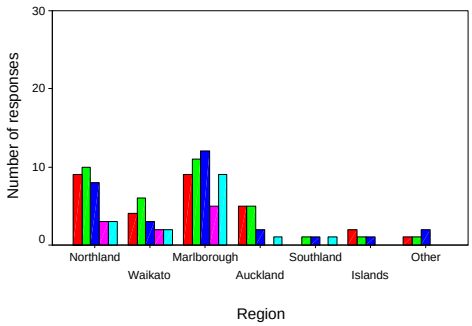


Figure 11.12a Importance of proximity to land access in 2000, by region

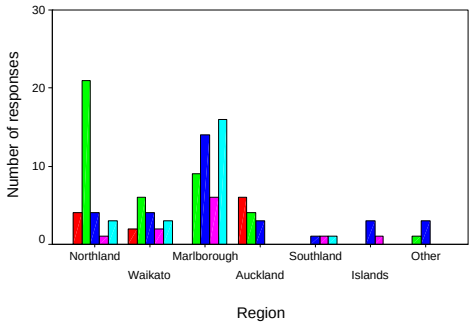


Table 11.2 Average rating of variables' importance in determining where to buy or establish a marine farm site

	When (first) site obtained		In 2000	
Variable	Single site owned	2-10 sites owned	Single site owned	2-10 sites owned
Water Quality	2.4	1.7	1.7	1.5
Shelter	2.7	2.1	2.4	2.1
Close to home	2.9	2.1	3.1	2.6
Close to spat source	3.7	1.9	3.4	2.2
Opposition/support from community	3.0	2.4	2.5	1.9
Close to market	3.5	2.6	3.4	2.5
Close to land access	3.0	2.4	2.8	2.4
Planning restrictions	2.9	2.5	1.9	1.8
Opposition/support from iwi/hapu	3.3	2.6	2.3	1.9
Opposition/support from recreational users	3.7	2.8	3.2	2.2
Opposition/support from commercial fishers	3.6	2.9	3.1	2.5
Availability of cheap labour	4.1	2.8	3.6	2.7
Opportunity to employ local community youth	3.6	2.7	3.4	2.6
Support/encouragement from Government	3.4	2.8	2.6	2.8

Key: 1 = Critically Important, 2 = Very Important, 3 = Important, 4 = Minor Importance, 5 = Not Important

Table 11.3 Most critical variables for obtaining site

When (first) site obtained		In 2000	
Single site owned	2-10 sites owned	Single site owned	2-10 sites owned
- Water Quality - Shelter - Close to Home - Planning Restrictions	- Water Quality - Close to Spat Source - Shelter - Close to Home	- Water Quality - Planning Restrictions - Shelter	- Water Quality - Planning Restrictions - Opposition/support from community - Opposition/support from iwi/hapu

In summary, as anticipated from the literature reviewed, all the variables are of some importance. Some, however, are of greater importance than others and there are regional distinctions and differences between single-owners and multi-owners.

Clearly, water quality is of most importance, but sheltered water has become much less significant over the years. Planning and community views, including each of the separate community groups (iwi, recreational and commercial), have increased in significance. Access has a surprisingly low relative importance for both groups, but is still of at least moderate importance.

The more frequent and wider exposure of the multi-owners to the processes of obtaining a site (whether through application or purchase) may have resulted in their developing the view that all the factors are of at least moderate importance. Clearly, variables that might be considered indicative of using marine farming as a means of development of rural areas and providing employment for local youth are considered relatively unimportant, as is government support or encouragement. The higher ranking that single-owners gave to government support/encouragement may reflect increased costs of obtaining sites. For instance, the increased level of iwi involvement and the planning requirements may have pushed up application costs. Consequently they see some form of subsidy from government as important.

11.3.2 Clusters of Important Variables Affecting the Location of Marine Farms

Hierarchical clustering of the responses for when sites were first obtained ('original' classification), led to a three-cluster solution. Repeating the process for the year 2000 showed some interesting changes (Table 11.4). A two-cluster solution was most appropriate for the 2000 classification, but to make comparisons easier a three cluster approach was used. In a two-cluster solution for the 2000 classification the first ('Community') and second ('Economic') clusters combine (light shading in Table 11.4).

Respondents would have been affected by the socio-cultural context at the time that they first obtained their sites. As this occurred at different times the contexts may have been quite varied. This may be reflected in the 'original' classification and it is therefore less robust than the '2000' classification. For this reason I have not attempted to name the 'original' clusters.

Table 11.4 Clustering of similar variables that affected decisions on farm sites

Original Classification		2000 classification	
Cluster One	Recreational fishers/boaters' support/opposition	Community cluster	Recreational fishers/boaters' support/opposition
	Commercial fishers' support/opposition		Commercial fishers' support/opposition
	Iwi/hapu support/opposition		Iwi/hapu support/opposition
	Local cheap labour		Community support/opposition
	Providing employment for community youth	Economic cluster	Local cheap labour
	Government support/encouragement		Providing employment for community youth
Cluster Two	Close to market/processing/pack-aging facilities		Government support/encouragement
	Close to easy landing access place		Close to market/processing/pack-aging facilities
	Close to home		Close to easy landing access place
	Close to spat/smolt source		Close to home
Cluster Three	Water quality		Close to spat/smolt source
	Shelter	Fundamentals cluster	Water quality
	Community support/opposition		Shelter
	Planning restrictions		Planning restrictions

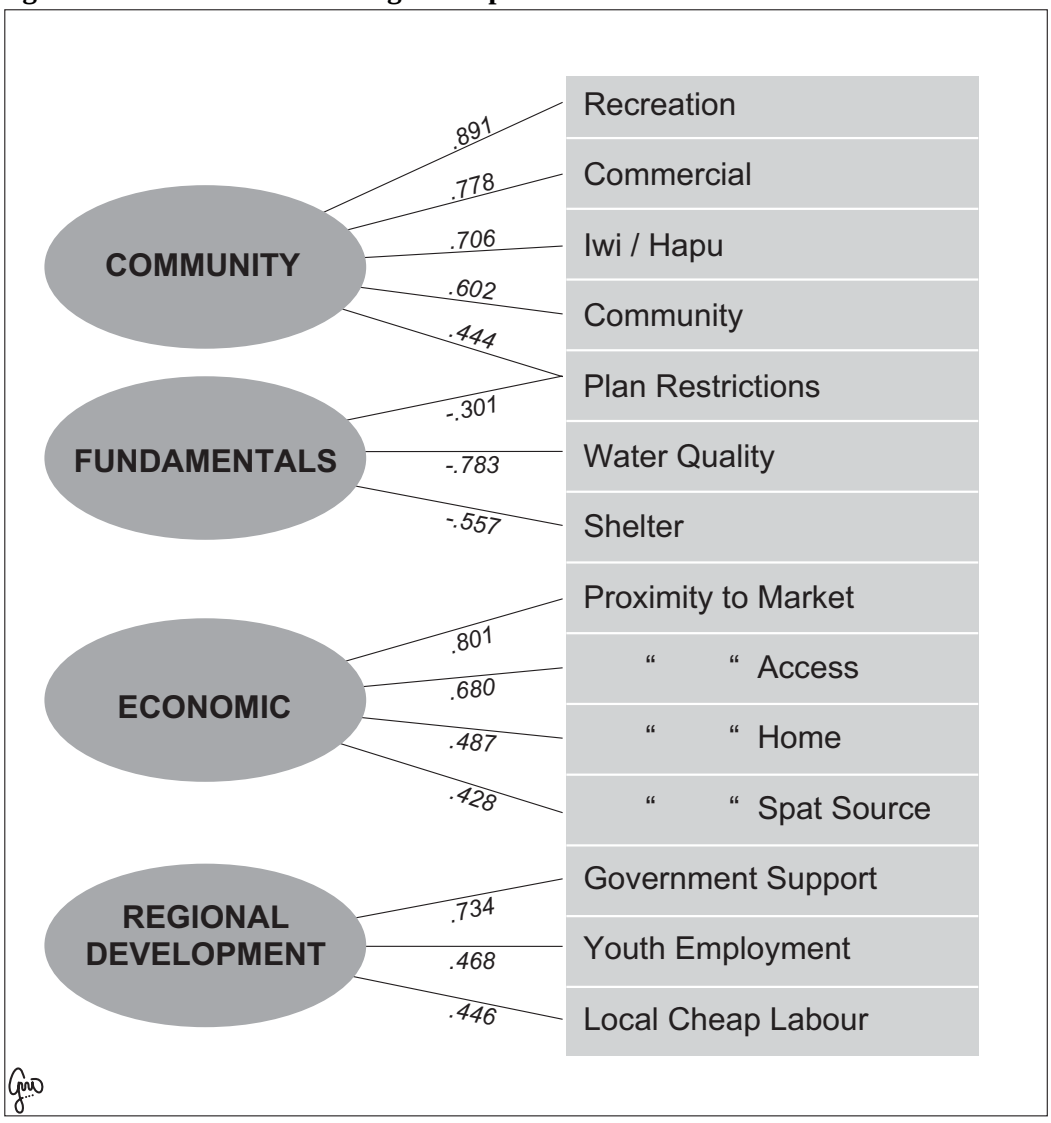
The clusters were relatively stable, but the movement of 'community support/opposition' into the same cluster as the other 'support/opposition' variables created an overall 'community' cluster in the year 2000. Shelter, water quality and planning restrictions comprised the 'fundamental' necessities for a viable marine farm. The remaining group could essentially be described as an 'economic' cluster, with Government support being seen in terms of cost-cutting.

11.3.3 Latent Factors Influencing Location

A principal axis factor analysis was carried out for the variables assumed to have some importance in location decisions. Rotations were employed to reveal two four-factor solutions accounting for 50% and 53% of the variance in the responses

relating to when the site was first obtained and those for the year 2000 respectively (Figures 11.13 and 11.14)[2].

Figure 11.13 Factors influencing the importance of location when site first obtained

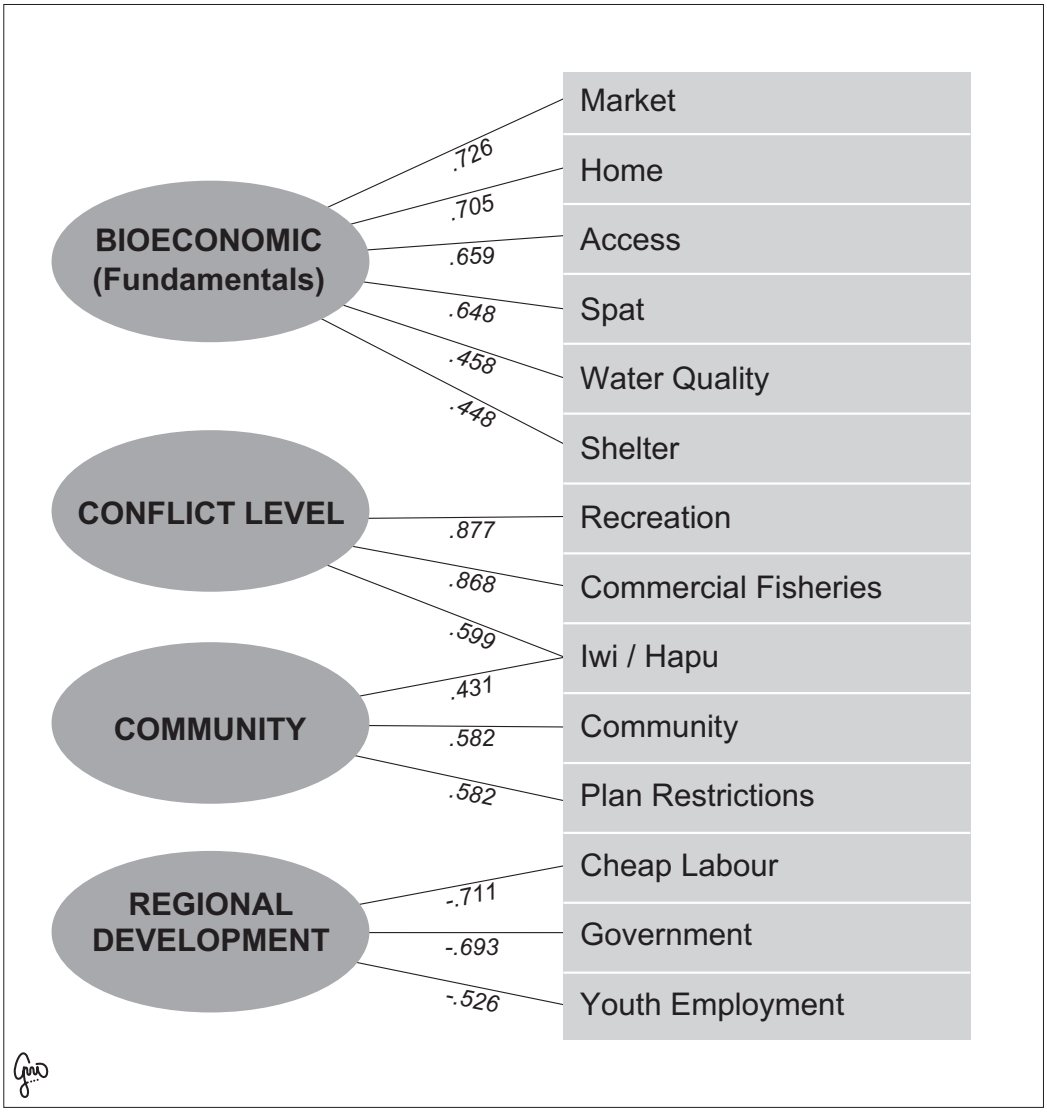


The results suggest a 'community' factor was present when the sites were first obtained and was positively correlated with five variables. These variables became split between two factors in 2000 and the second has been labeled 'conflict level' while the other three variables remain as 'community'. Iwi/hapu support or opposition is a complex variable in 2000, but is split between the conflict level and community factors. It may be that in 2000 the community factor relates to more formal control of the planning process, whereas the conflict

[2] Both varimax and oblimin rotations were performed with little difference between the results. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (0.8+) and the Bartlett Test of Sphericity (.000) were quite favourable for this and figure 11.14 (see Appendix 6).

level factor represents sub-community relationships. The variables are not truly independent in that the community variable could include elements of iwi/hapu, recreational and commercial fishers.

Figure 11.14 Factors influencing importance of locational variables in 2000



The factor loadings for variables relating to location at the time the farm was established support a factor being labelled 'fundamentals'. This appears similar to the 'fundamentals' cluster. There is also a separate economic factor that can be identified in Figure 11.13. In 2000, the 'fundamentals' factor and the 'economic' factor became less distinct and have been relabelled 'bioeconomic fundamentals'. This factor no longer correlates significantly with planning restrictions.

11.3.4 Site Desirability

There was little variation between farmers in the different regions in their responses regarding variables determining site desirability (the most extreme variations are presented in Figure 11.15a-f). There were, however, some distinct differences between the responses of single-owners and those of multi-owners. The latter's averaged rating of all features as desirable, contrasted markedly with the single-owners' averaged rating of most features as undesirable (Table 11.5).

Table 11.5 Average rating of desirability of variables for site selection

	When (first) site bought		In 2000	
Variable-Desirability of site being near:	Single site owned	2-10 sites owned	Single site owned	2-10 sites owned
Other marine farms	3.3	2.3	3.4	2.2
Area of high natural character	3.0	2.5	3.1	2.3
Terrestrial farms	2.9	2.3	2.9	2.2
Urban area	3.9	2.4	4.0	2.3
Forestry	3.6	2.4	3.7	2.3
River	3.5	2.2	3.7	2.0
Isolated or remote	2.6	2.2	2.6	2.2

Key: 1 = Very Desirable, 2 = Desirable, 3 = Neither Desirable Nor Undesirable, 4 = Undesirable, 5 = Very Undesirable

The two groups shared a desire for isolated rurality, but whereas being near a river was one of the most desirable site characteristics for multi-owners it was consistently among the least desirable for single-owners (Tables 11.6 and 11.7). There was no obvious reason for this dichotomy and interviews did not shed any light. Further exploration of this feature was beyond the scope of my research.

Figure 11.15a Desirability of farmland near site when first obtained, by region

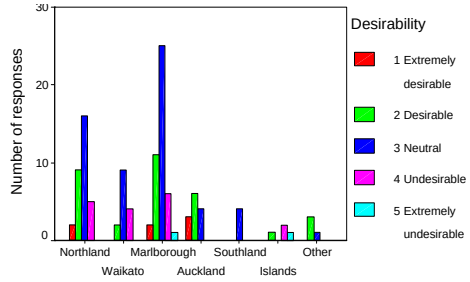


Figure 11.15d Desirability of farmland near site in 2000, by region

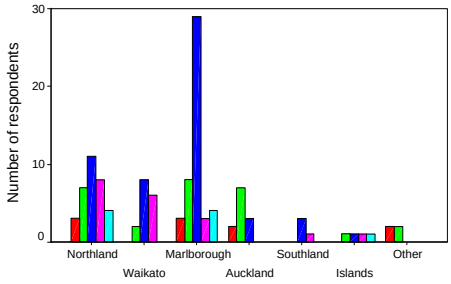


Figure 11.15b Desirability of urban areas near site when first obtained, by region

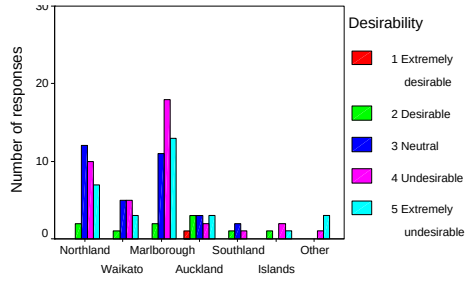


Figure 11.15e Desirability of urban areas near site in 2000, by region

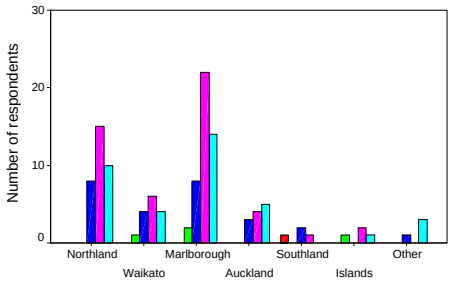


Figure 11.15c Desirability of a river near site when first obtained, by region

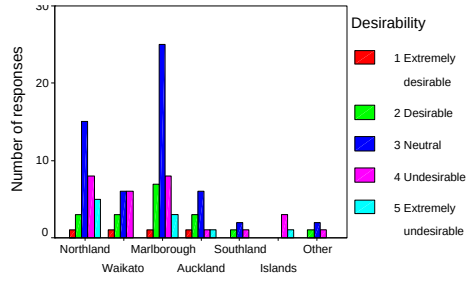


Figure 11.15f Desirability of a river near site in 2000, by region

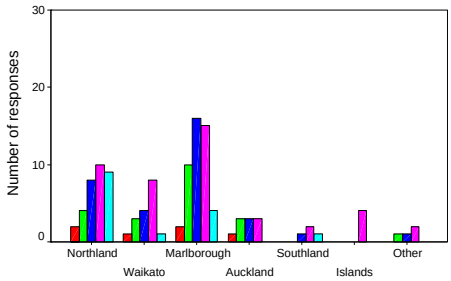


Table 11.6 Most desirable site characteristics (i.e., score at least less than 3)

When (first) site obtained		In 2000	
Single site owned	2-10 sites owned	Single site owned	2-10 sites owned
- Isolated/Remote - Near Terrestrial Farms	- Isolated/Remote - Near Terrestrial Farms - Near river	- Isolated/Remote - Near Terrestrial Farms	- River - Isolated/Remote - Near Terrestrial Farms - Near Other Marine Farms

Table 11.7 Least desirable site characteristics (i.e., score at least more than 3)

When (first) site obtained		In 2000	
Single site owned	2-10 sites owned*	Single site owned	2-10 sites owned*
- Near Urban Area - Near Forestry - Near River	Near Area of High Natural Character	- Near Urban Area - Near Forestry - Near River	- Near Area of High Natural Character - Near Urban Area - Near Forestry

* None of the characteristics was scored as undesirable. The ones listed are the lowest scoring of the desirable characteristics.

There was little or no change in the relative average ratings of desirability of the different site characteristics between first obtaining a site and choosing a site in 2000. All factors, except being isolated or near farmland (which did not change their rating), increased their level of undesirability for single-owners. In contrast, all factors, except avoiding urban areas, became relatively more desirable for the multi-owners. The low rating of high natural character was explained, in interviews with marine farmers, as reflecting that applications for these biophysically desirable sites received the most opposition from environmental organisations.

Hierarchical clustering of different variables in terms of the ratings given them for site desirability was problematic. Three clusters were apparent for the ratings given to the variables when the farms were first obtained (i.e., original classification), but the 2000 classification had one variable, 'being isolated', that did not combine with any other variable and is technically not a cluster. Being near urban areas also combined more distantly with the other variables. A two-cluster solution for the 'original' and '2000' classifications is illustrated by the shaded variables in Table 11.8.

Table 11.8 Clustering of desirable variables for farm sites

Original Classification		**2000 classification**	
Cluster One	Forest	Neutral	Forest
	River		River
	Urban		Farmland
Cluster Two	Other marine farms	Undesirable to neutral	Other marine farms
	High natural character		High natural character
Cluster Three	Farmland	Undesirable	Urban
	Isolated	Desirable	Isolated

Being near farmland and near urban areas swapped clusters between the two classifications. It appears being close to farmland and isolated had a similar degree of desirability when marine farms were first obtained. By 2000, farmland was no longer considered any more desirable than other forms of adjacent land use. Sites near urban areas were, however, less desirable by 2000, suggesting perhaps a greater concern with competition from urban water uses (e.g., recreation and waste disposal).

11.4 Allocating Marine Space

Despite general agreement among owners about the desirable features of sites, communities played a greater role in affecting the allocation of marine space for farms in 2000 than they had when sites were first obtained. In particular, the views of iwi and hapu have increased in importance. Respondents in the various regions, however, had different views of the importance of some of the variables in influencing their choice of locations. Moreover, the importance of the variables changed with time and the discussion has highlighted similarities and differences between single- and multi-farm owners. As indicated in Chapters Three, Four, and Nine the mechanisms for allocating marine space through plans (and other decision-making mechanisms), and the agencies with responsibility for administering these, have changed also over time. These changes appear likely to have facilitated the increased role of communities and iwi/hapu and may account for the increased importance placed on planning restrictions. Planning is a key allocation mechanism and a focus of the Ministry of Fisheries and Ministry for the Environment's (2000) discussion paper (and are summarised in Appendix Seven).

Both single and multi-owner respondents strongly preferred a 'first come, first served' approach for allocating sites for farms. The single-owners also rated 'tendering, but not necessarily to the highest bidder' more highly than other alternatives and differed from multi-owners only on this and balloting (Figures 11.16a, d). On average, however, the single owners rated most approaches as neutral or undesirable. The multi-owners, on the other hand, considered all methods on average were desirable, except for purchasing from the quota holder associations, on which they were neutral.

The preferences expressed by the multi-owners may reflect greater familiarity with the systems of allocating space and a degree of confidence in their financial resources and ability to negotiate the passage of their applications through whatever system was used. Indeed, some of the larger operators interviewed and certainly the 'farm development professionals' strongly expressed the view that the tendering mechanism was the preferred approach. Others were equally comfortable with first come, first served.

Familiarity may also explain some of the regional differences in responses. Marlborough had experienced high levels of competition for sites and respondents had been much more involved in submissions against other farms (Figure 11.17f). Interviewees in Marlborough recognised the funds that some companies had at their disposal. These respondents had had the opportunity to consider the alternative tendering approaches during the Marlborough moratorium and strongly opposed tendering to the highest bidder. In Northland, where Les Curtin has been the key MFish officer since the 1960s, respondents were more positive about MFish and relatively fewer respondents held positive views of their regional council as decision-maker (Figures 11.17a-f).

Respondents were given three types of planning to rank: progressive, effects-based, and activity-based (see Appendix Seven). Activity-based approaches enable marine farming zones to be specifically identified and this was the most preferred approach for both multi- and single-owners. Interviewees suggested that this approach reduced the level of uncertainty and associated risk in any application and did not require the same degree of environmental assessment by the applicant.

Figure 11.16a Multi- and single-owner preferences for ballot

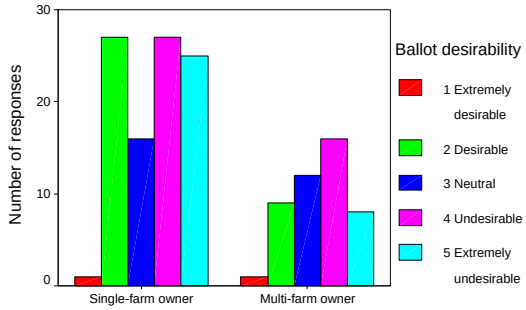


Figure 11.16b Multi- and single-owner preferences for MFish as decision-maker

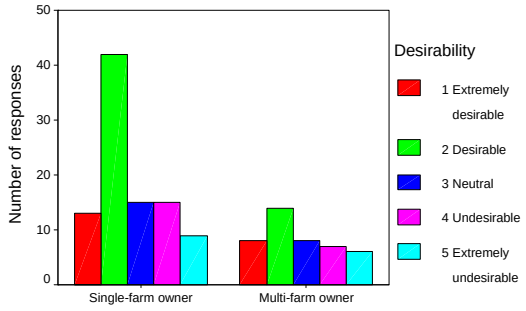


Figure 11.16c Multi- and single-owner preferences for fishing industry as decision-maker

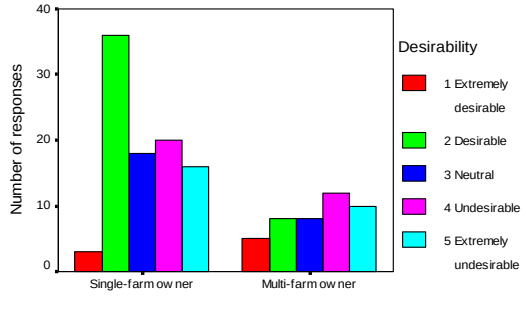


Figure 11.16d Multi- and single-owner preferences for tendering, but not to highest bid

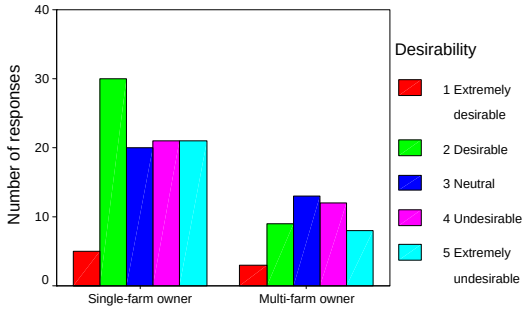


Figure 11.16e Multi- and single-owner preferences for regional council as decision-maker

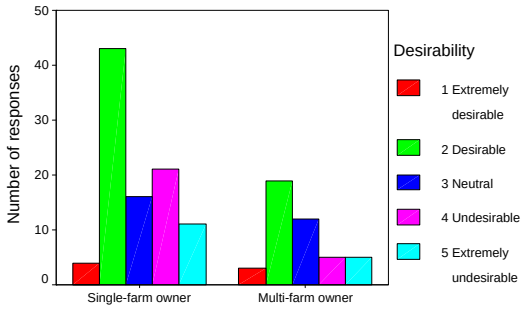


Figure 11.16f Multi- and single-owner preferences for locals to have precedence obtaining sites

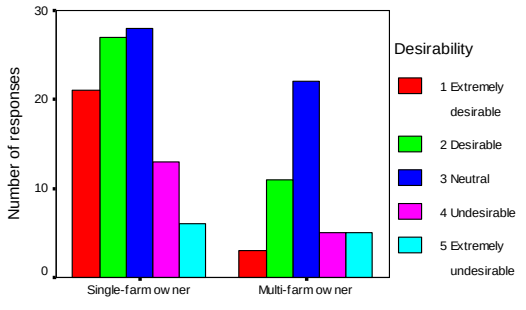


Figure 11.17a Preference for tendering, but not to highest bidder, by region

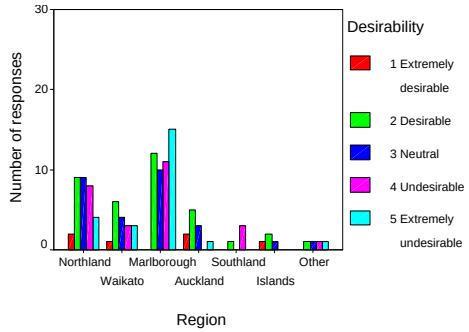


Figure 11.17b Preference for tendering to highest bidder, by region

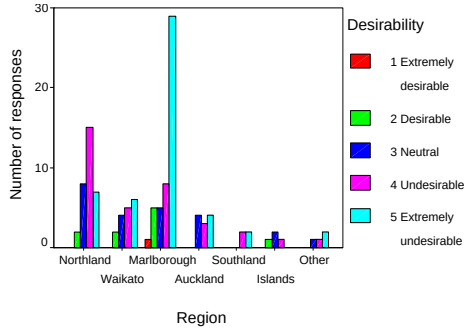


Figure 11.17c Preference for balloting, by region

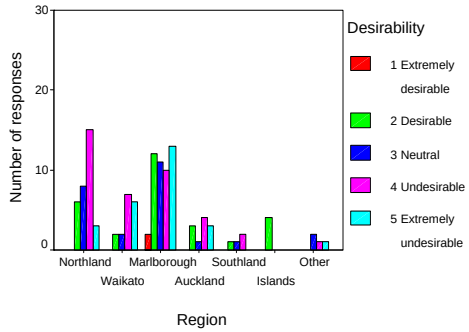


Figure 11.17d Preference for MFish as decision-maker, by region

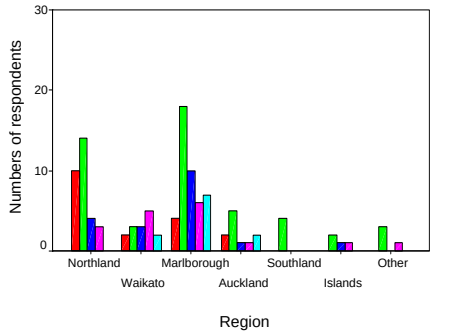


Figure 11.17e Preference for regional council as decision-maker, by region

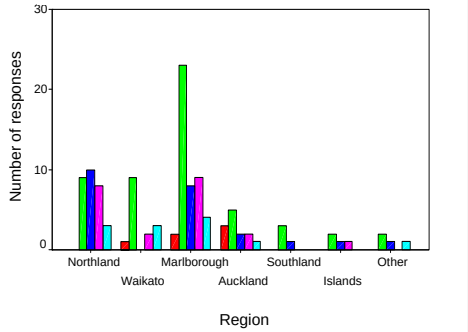
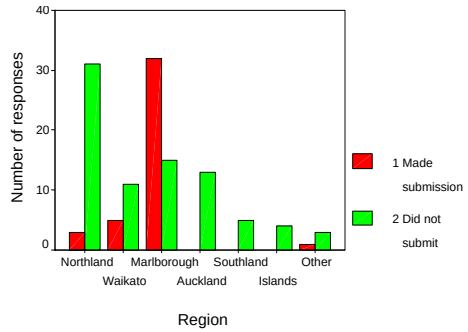


Figure 11.17f Respondents who made submissions on other applications, by region



The Ministry of Fisheries, councils, and fishers were all considered suitable decision-makers for allocating new sites although with some variation between the multi- and single-owner preferences (Figure 11.16b, c, e). There was little difference between multi- and single-owners' views in terms of precedence being given to certain types of applicants. Both groups indicated a strong preference for treating everyone equally, but single-owners were much more inclined to give precedence to locals than were the multi-owners (Figure 11.16f). There were also regional differences in the strength of feeling regarding giving precedence to different groups. Although the trends were generally consistent, Marlborough was relatively more opposed to fishers and Maori having precedence, and more in favour of preference being given to existing aquaculturists than was Northland (Figures 11.18a-d). Although planning restrictions were seen as one of the main variables affecting farm location in 2000 in every region, only in Northland and Waikato did those who had made submissions on plans exceed those who had not (Figures 11.18c, f).

Over eighty percent of the single- and multi-owners considered it was harder to obtain a marine farm site now than when they first got their site. The reasons most frequently given were the lack of space, the increased bureaucracy and the higher costs of obtaining an application. One interviewee indicated that it cost around $450,000 to establish a marine farm from a 'greenfields' situation in the Marlborough Sounds, but a farm could earn about $400,000/year, making it a worthwhile investment. Others advised that they put $250,000 aside just for the resource consent process in the Sounds region.

Plans were seen as more likely to be influential in the future development of marine farming than technology (Table 11.9). Perhaps this represented recognition of the enabling capacity of the new planning regime in that farms would be allowed where in the past they might not have been permitted.

Figure 11.18a Preferences for precedence to fishers for new sites, by region

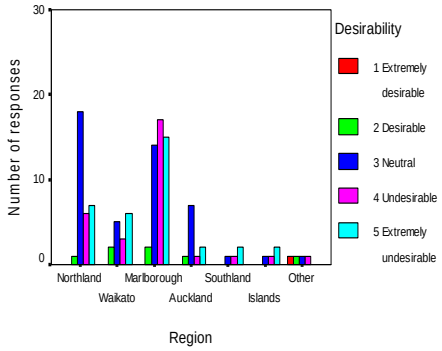


Figure 11.18b Preferences for precedence to existing aquaculturists for new sites, by region

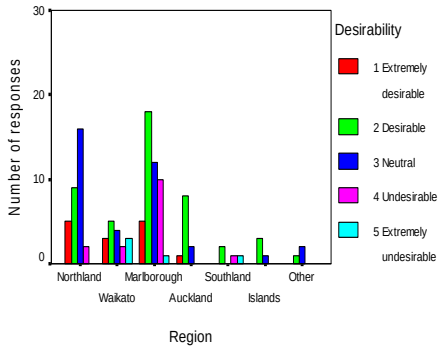


Figure 11.18c Importance of affect of planning restrictions on location in 2000, by region

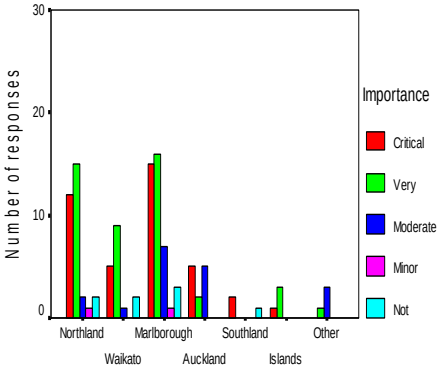


Figure 11.18d Preferences for precedence to locals for new sites, by region

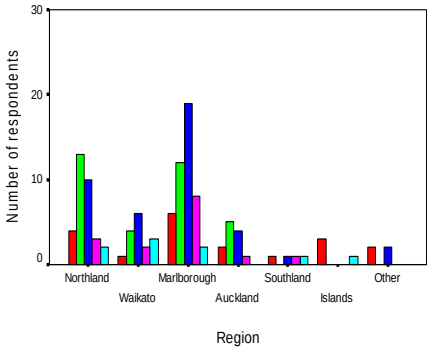


Figure 11.18e Preferences for precedence to Maori for new sites, by region

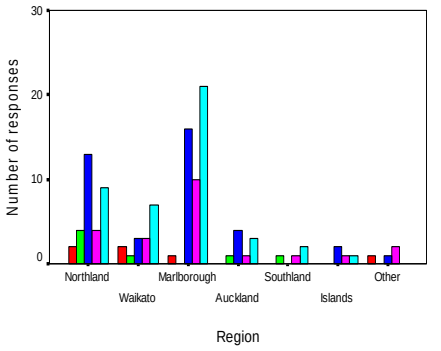


Figure 11.18f Respondents who submitted to regional coastal plans, by region

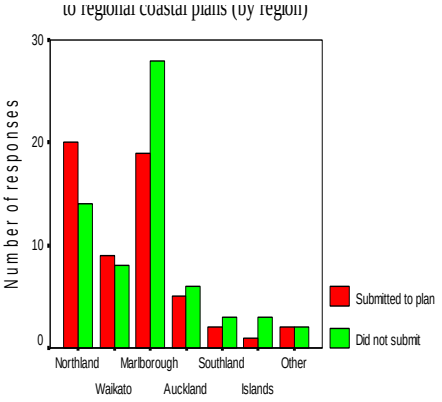


Table 11.9 Single- and multi-farm owners and planning

	Single-site owner responses (%)	2-10 sites owner responses (%)
Submitted to Regional Coastal Plan (RCP)	45	60
Prevented from having a wanted site by RCP	56	59
Submission successful	32	23
Submission unsuccessful	32	30
Had application declined	36	47
Submitted opposing someone else's application	35	35
Prefer pre-RMA regime	76	88
Plans more likely to affect future location of farms than technology	66	66
Future farms likely to be more isolated, less sheltered	80	85

Of the multi-owners the primary reasons given for expansion into the isolated, less sheltered bays was the lack of space elsewhere. Twenty percent specifically mentioned pressure from the RMA and or local opposition, and fifteen percent said that new technology would enable the seaward expansion of farming. The single owners shared similar reasons, but rather than naming the RMA specifically they tended to highlight changing values in society and the increase in recreational interests. Adjacent land development was also seen as a negative.

Some respondents commented that they did not apply for sites unless they knew they would get them. The primary reasons given for not gaining the sites were conservation/sustainability issues, local iwi opposition, or local opposition of some other type. The reasons most frequently given for preferring the pre-RMA regime were that the old system was simpler with less bureaucracy, cheaper, and had less inconsistency in decision-making. Those in favour of the RMA noted its open processes.

Although respondents were generally opposed to iwi/hapu being decision-makers on marine farm applications, those with only post-RMA experience were significantly more likely to find iwi/hapu more acceptable as decision-makers than were those who had only pre-RMA experience. This was the only statistically significant difference between those respondents with pre-RMA and those with only post-RMA experience. Despite the supposedly greater provisions

for Maori to exercise their rights under the RMA, fifteen of the sixteen Maori respondents to the survey considered that it was harder to get a farm now than when they first got theirs.

11.5 Decisions to Obtain More Space

As marine farming became more widespread some farmers expanded their operations to more than one site. The rationale for this expansion was expected to throw light on the nature of marine farm evolution.

Increasing production was the most highly rated reason for obtaining more sites and of all the variables analysed in this thesis, this was the closest to having an average rating of 'critically important'. It was very closely followed by 'space for future expansion'. These two production oriented variables were distinctly more highly ranked for importance than any other variable. 'Spreading risk' was also rated highly. All other variables were ranked as moderately important with production oriented farm practices appearing at the upper end (for instance, to enable rotation of fish to maximise growth, spat collection, diversification). Interestingly, 'anticipating changes in the legislation that would make it harder in future to get sites' ranked alongside these production-focussed variables.

More than 50 percent of multi-owner respondents intended to diversify when they obtained their first site. This contrasted with the single-owners, only a third of whom intended to diversify at the site they chose to farm. Two thirds of those single-owners who had not intended to diversify would have chosen a different site if they had been considering diversification. The difference in response is explained in part by the high presence of rock oyster leases among the single-owner category. More important, however, are the potential implications for future marine farm locations. Sites with potential for diversification appear likely to be more desired.

11.5.1 Typology of Variables Influencing Multi-Ownership

Quick clustering was used to identify clusters among the variables that led to multi-owner respondents obtaining more than one site (Table 11.10). These

clusters were named on the basis of my assessment of differences between their prototypical scores (i.e., the mean scores for each variable for each cluster).

Table 11.10 Clusters of prototypical ratings of importance of variables influencing decisions to obtain more space for farming

	Cluster					
	1	**2**	**3**	**4**	**5**	**6**
Reason for getting additional sites	**Industrial**	**Space-constrained traditional production**	**Traditional production expansionist**	**Traditional production risk reducers**	**Diversification oriented**	**Investment oriented**
Increased production	1	1	2	2	1	2
Expansion	5	1	2	2	2	1
Rotation	5	4	4	3	2	2
Fallow	5	5	4	5	3	2
Risk reduction	5	4	4	2	2	2
Human effects	5	5	5	5	2	2
Natural events	5	4	5	4	2	2
Obtain spat site	1	4	5	2	2	2
Technology enabled	1	5	4	4	3	1
Species diversification	1	3	5	4	1	2
Farm competitors	5	3	5	5	5	3
Other competitors	5	5	5	5	5	4
Anticipated legislation	1	2	4	3	5	2
New sites available	1	2	5	5	5	2
Plan rules change	1	2	5	4	5	2
Sell for profit	5	5	5	5	5	3
No choice, sites allocated	5	5	5	5	5	4
Number of cases in cluster	**1**	**7**	**14**	**8**	**2**	**3**

The first cluster (admittedly represented by only one case) appears to represent a biotechnology, production-focussed 'group' that responds to new technology and changes in plans to maximise its production potential. Essentially this 'group' represents an innovative 'industrial' cluster which might be more prevalent among the 'many–owner' category that was not surveyed by post. The second cluster is

differentiated from the first in that it is not focussed on technology and rates obtaining sites for future expansion as critically important whereas this was of no importance to the first group. It is also less influenced by the availability of new sites, but does have some response to potential diversification and competition for space from other farmers. This cluster (the second cluster) appears to represent a 'space-constrained traditional production' focus.

The third cluster, although similar to the second in that it emphasizes increased production and obtaining areas for future expansion ahead of other factors, does not consider any other factors important. The fourth cluster is very similar to the third, but has sought to reduce its exposure to risk from human events and to obtain spat sites. These two groups appear to be variants of production-oriented 'traditional farmers': the first variant is named 'expansionist' and the second, 'risk reducers'.

The fifth group appears characterised by a desire to diversify and increase production, while also practising risk reducing behaviour or using farming practices that enhance their capacity to diversify. This group is labeled 'diversification oriented'. The final group appears more holistic in outlook and perhaps more forward looking. It is the only group to label both 'obtaining areas for future expansion' and 'technology enabled' as critically important, and to rate obtaining areas to 'sell for profit' as anything more than of minor importance. This perhaps could be described as an 'investment oriented' cluster.

In summary, although every cluster included 'increased production' as either 'critically' or 'very' important in deciding to obtain additional sites, there are distinctly different clusters suggesting a typology of reasons for expanding. It is important to recognise that an assessment of the physical manifestations of the cases that fall within and helped define these 'types' might not exhibit characteristics one would expect of the 'type'. These are attitudinal rather than observable types and it may be that someone has an industrialist attitude to their acquisition of additional sites, but has been unable to achieve the increased productivity or other objectives that they recorded as motivating the expansion.

11.5.2 Latent Factors Influencing Multi-Ownership

A principal axis factor analysis was carried out for the variables identified as influencing the decision to obtain further farm sites and a four-factor solution accounting for 57 percent of the variance was selected[3] (Figure 11.19). The industrial and traditional farmer categories were named for the importance of the respective variables 'expand farm space' and 'increase production'. The factor analysis, however, revealed some interesting directional aspects in the correlations. The complex variables 'to prevent potential farming competitors from gaining space' and 'to prevent other non-farming competitors gaining the space' were each negatively correlated with the variable 'increase production'. Given the weak, but positive, relationship between the 'expand farm space' variable and the variable 'prevent potential farming competitors from gaining the same space' it appears that there is a clear distinction between the latent factors 'industrial' and 'traditional' farmer seeking space. That the two complex variables in the analysis are both space competition variables also suggests that the spatial contests occurring in the marine environment are important, but not readily amenable to this analysis technique.

Farm size variables were explored using quick clustering because the ratings provided by responses for each variable were generally low. This suggests that critical variables (e.g., technological limitations on size) had been omitted from my questionnaire. Clustering offered a means of seeking some form of pattern from the data, but the results must be treated with considerable caution. The five clusters are open to diverse interpretations (Table 11.11). I named the clusters on the basis of a combination of high and low ratings of variables and inferred reasons for the ratings. Consequently, the industrial cluster reflects the importance attached to financial constraints, nutrient availability and the desire for future expansion. The second cluster is constrained by existing farms, both in its initial purchase and in its capacity to expand, but had no financial constraints. This suggests a lack of interest in taking risks in developing sites and the owners are probably investors. The next three clusters seem more constraint oriented, with the largest number of cases falling within a group that rated navigation and

[3] An oblimin rotation resulted in a five factor solution accounting for 61% of the variance. One factor comprised a single outlier variable ('no choice') and was removed.

public access highest of the low-rating variables. It is named accordingly, but this also suggests that factors affecting size (e.g., available technology) might have been more fruitful to consider. The fourth group clearly saw the size of their farms as externally determined by limitations on space from many sources (especially navigation and public access), and the fifth cluster was labelled 'financially constrained' because it was the only cluster to combine restrictions on available space with financial constraints, and did not include nutrient availability as of moderate or greater importance.

Figure 11.19 Factors underlying motives for obtaining a second farm site

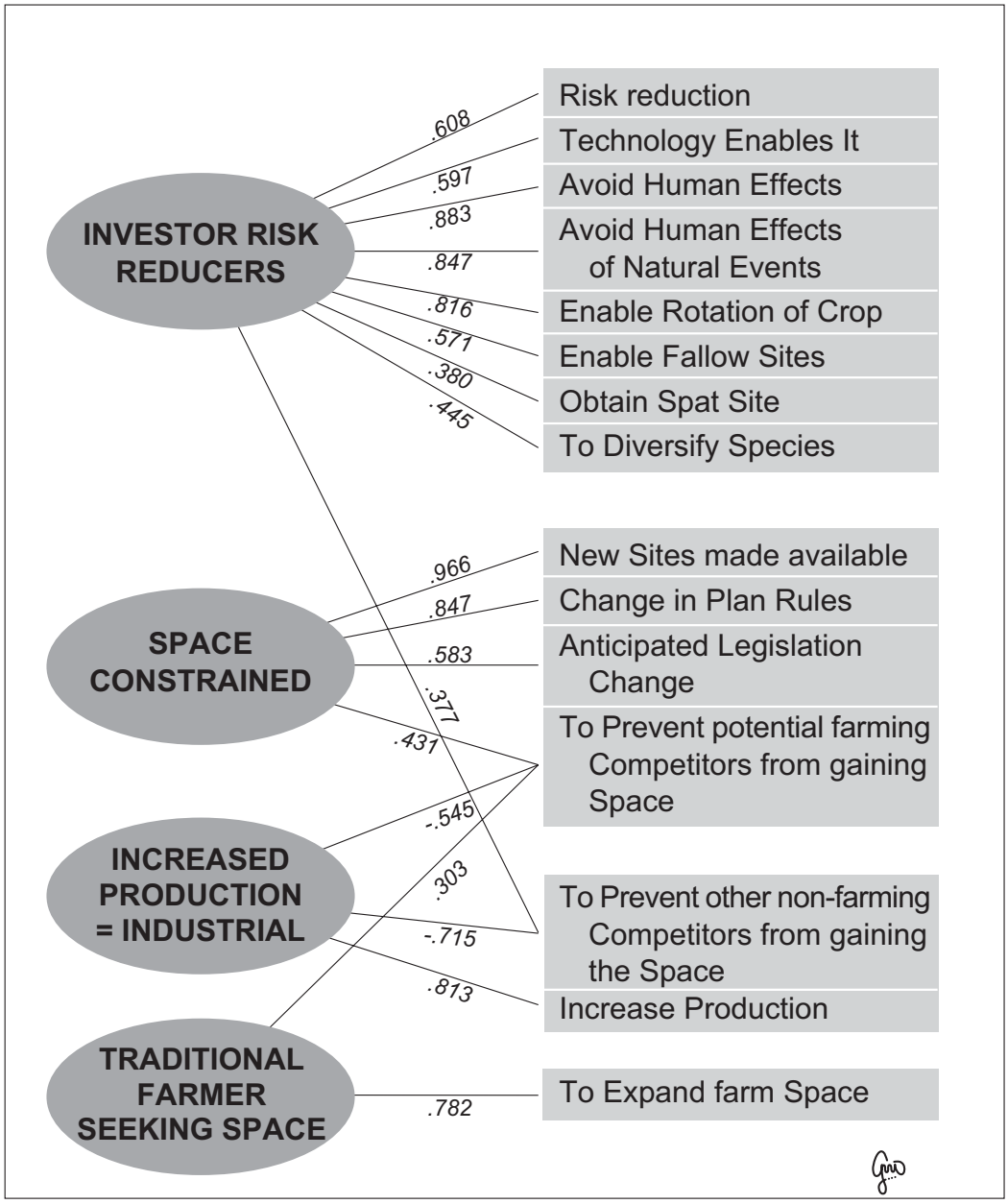


Table 11.11 Clusters of prototypical ratings of importance of variables influencing the size of farms

	Clusters				
	1	**2**	**3**	**4**	**5**
Reason for choosing size of site	**Industrial**	**Investment**	**Navigation and access constrained**	**Space constrained**	**Financially constrained**
Space limited by other farms	3	2	4	2	1
Future development space	2	4	4	2	2
Government decided size	3	3	4	2	5
Ballot luck	5	5	5	5	5
Availability of farms for purchase	4	2	4	5	2
Financial constraints	2	5	5	5	2
Nutrient availability	2	3	4	3	4
Navigational and public access	3	4	3	1	3
Number of cases in cluster	**10**	**4**	**11**	**5**	**2**

More research is required if the determinants of the size of future farms is to be better understood and assessed, but it is interesting to note the importance played in most categories by competition from other farms, navigation and public access.

11.6 Summary and Conclusions

The findings reported in this chapter support the view that most of the variables identified as important in the literature in influencing decisions on marine farm location (see Chapter Five) are important in influencing New Zealand farmers. There have been changes over time and while water quality remains fundamentally important, shelter has become less important. Community views, especially iwi/hapu views, and planning requirements have increased in importance and farmers prefer isolated or remote locations.

Changes in the planning regime for the marine farming industry over time have increased costs to farmers as they face more open and extensive consultation processes. The RMA has made the local communities (e.g., commercial fishing, recreational fishing/boating, and the local residential community) more transparently significant players in determining marine farming location. Marine farms have developed primarily in underdeveloped rural regions, but this does not appear to have been a result of marine farmers taking advantage of cheap labour and/or providing employment for youth and other members of the community.

The New Zealand industry shows evidence of regional differences, with Marlborough and Northland marine farmers especially tending to have quite different responses to the questionnaire. The Marlborough industry appeared more specialised with a larger proportion of investors, and this perhaps reflects the larger scale of the industry. The scale and their proximity to Golden Bay and knowledge of the legal battle between the fishers and farmers there, probably contributed to the negative view toward commercial fishers and the lower importance given to MFish as a decision-maker relative to Northland.

Despite these differences it is quite clear that the respondents generally considered planning would be more important than technology in determining where future farms are located. That farmers also thought that future farms would be in isolated locations suggests a lack of faith in the planning regime to fairly resolve conflicts between users to enable farmers to use areas that are not isolated. The challenge laid down by the RMA to develop technology to enable farming in places where it would otherwise not be allowed appears not to have had that effect. New technology, however, probably influenced the decline in the importance of shelter and to that extent has enabled farming more distant from the shore and may have been underrated by the respondents.

In this respect, the differences between the multi- and single-owner responses indicate that multi-owners may be better able to afford new technology and to overcome the obstacles to farming new locations. The multi-owners are less concerned over the obstacles to farming generally. The factor and cluster analyses also support non-regional differentiations within the industry. Among these differences, the constraints on obtaining more space as a consequence of other

users of space tends to support the emergence of conflict and community views as especially important and connects with the desire for isolation and the views on planning and spatial allocation mechanisms.

The next Chapter draws together these findings with those of the other empirical chapters in the context of the initial theoretical and historical chapters.

Chapter Twelve: Patterns of New Zealand Marine Farm Rights: Regulatory Signatures or Stochastic Artifacts?

In Part One of this thesis I outlined the historical development of marine farming and identified four different regulatory eras for marine farming in New Zealand: Pre-modern, Proto-modern, Modern, and Transitional. New aquaculture legislation passed in 2002, which included a moratorium on new applications, suggests a shift back to a modernist approach, but its full effect has yet to be felt. I argued in Chapter Six that the development of marine farming as an industry has occurred in three phases: early days, expansion and integrative. In that Chapter I also suggested that different regulatory regimes might lead to distinctively different spatial patterns of marine farms although I also cautioned that some patterns might result from different causes and that some regimes might produce more than one pattern.

The different types of plan present in New Zealand under different regulatory regimes were discussed in Chapter Nine, and the observational data examined in Chapter Ten identified a typology of patterns to describe the spatial distribution of New Zealand's marine farming. In this Chapter, I revisit those earlier findings in relation to the results of the survey data reported in Chapter Eleven and consider, especially, whether the spatial development of marine farming in New Zealand does support an argument that there are signature patterns representative of particular regulatory regimes and if so to what extent anomalies might be explained by other data collected. I also argue that understanding the process of acquiring marine farming rights is fundamental to understanding the influence of regulatory regimes on marine farmers' locational decisions.

This Chapter draws on survey data to develop a systemic expression of the industry and a descriptive model of variables important in the acquisition of marine farming space. This model is then placed within the context of the development phases of the industry and the regulatory regimes to help explain the spatial patterns observed. The resultant characteristic planning outcomes of the regulatory regimes are then summarized. In the process I argue that human agency introduces a stochastic element that creates superficially anomalous patterns of marine farm development.

12.1 Thinking Systemically About Marine Farming

Interviews and the planning documents and case law reviewed suggest that marine farming is generally seen as a primary production activity, an eco-commodity system, which has certain adverse environmental effects. Marine farming is not alone in having adverse effects on the marine environment, however, and the reason for it being treated as substantially different from capture fishing (whether commercial, subsistence or recreational) or other marine activities deserves closer analysis if the 2002 retreat from the enabling, neo-liberal approach of the Resource Management Act 1991 is to be understood. Thinking of the marine farming sector in systemic terms is especially useful here.

As indicated in Chapter Two, it is difficult to describe marine farming as either a fisheries or an agricultural eco-commodity system. The primary reason for this is that under marine farming there has not been a first order allocation of marine space for the industry. As noted in Chapter Seven, terrestrial farmers own parcels of land and there exists a terrestrial cadastre. Commercial fishing also has a marine cadastre of sorts. For each commercially fished species in New Zealand there exists one or more clearly defined Quota Management Area (QMA) within which *in perpetuity* rights have been allocated to a limited number of fishers to harvest their Individually Transferable Quota (ITQ). These QMA are effectively the basic units of a commercial fishing cadastre, but commercial fishing is generally not recognized as *occupying* marine space because the technology and practices usually employed by commercial fishers are of a transitory nature in terms of any one location. Consequently commercial fishing has escaped the attention of legislation designed to allocate marine space between different users (e.g., the Harbours Act 1950). The presence of inshore commercial fishing has also usually been accepted as pre-dating marine farming and therefore as having a prior right to use areas that marine farming might develop (e.g., Marine Farming Act 1971). This has left the harvesting of species using enhancement practices, such as scallop in Golden and Tasman Bays, outside the auspices and normal conception of marine farming in New Zealand law.

Yet the assumption that commercial fishing is of a transitory nature appears a matter of perception rather than reality. A lobster fisher's pots are moved around, but left stationary for periods of time, *within* a clearly bounded, large marine area (its QMA) in a manner analogous to grazing rangeland or a communally owned plot of land. The shared *area* to which the lobster fisher has a right to harvest is not ephemeral because the statutory process of changing the boundaries of a QMA is quite burdensome. Similarly, trawler scallop dredges use different parts of the QMA throughout the year to 'harvest' their *area*. The initial allocation of the rights (ITQ) to QMA involved lengthy and litigious battles between traditional commercial fishing operators and the Ministry of Agriculture and Fisheries, even without considering Maori claims.

Marine farming was well established before implementation of QMA and ITQ in the 1980s and, unlike the fishing industry, its adverse affects on the environment have always been considered as part of the approval and monitoring process. The failure to consider the spatial implications of ITQ on other users of the marine areas within each QMA exemplifies the narrow, single-sector approach to marine resources and the relatively low level of power enjoyed by marine farming officials within the Ministry of Agriculture and Fisheries at the time (see Chapter Four). ITQ are essentially an uncompensated taking of the rights of other (potential) users of marine space, including those of marine farmers. To some extent this oversight is a consequence of the inshore location of marine farms that, in the region of greatest marine farming expansion at that time (the Marlborough Sounds), had been limited to the ribbon of rocky reef margins not used by commercial fishing boats. The restrictive planning approach adopted for marine farming during this era had set the scene for such an outcome by limiting the extent to which marine farming could develop in areas of potential conflict with commercial fishers and recreational users. Under the enabling, effects-based approach of the Resource Management Act it is not surprising that contests should emerge for space that had traditionally been the prerogative of the commercial fisher and scallop enhancer.

This suggests that the single feature that perhaps most distinguishes marine farming in New Zealand from its terrestrial farming and commercial fish producing cousins is

that all the marine farming rights within the available space for the activity have not been allocated. Conceptualising marine farming as a traditional eco-commodity system has led to overlooking its (re)production of space in much the same way that the spatial component inherent in the quota management system was not fully considered. Marine farming is a "natural production system [that] … has a distinctive chain of physical production, carried out by a range of economic actors, operating in varied competitive and institutional settings" (Le Heron and Pawson 1996: 122-123), but it is also involved in the production of 'spatial rights' (Figure 12.1). The essential component of marine farming in New Zealand is its transformation of common space to private space (Figure 12.2).

Not all the transformed space is farmed beyond the level of development necessary to retain ownership rights, but the requirement to develop sites is an encumbrance on the flexibility dimension of the marine farming property right that is not shared by either holders of ITQ or terrestrial farmers (Chapters Three and Four). If landowners wish to prevent marine farming from occupying the space adjacent to their land, their surest means of achieving this is to obtain a site and develop it themselves to a minimal level to meet the requirements of the permit while maintaining an appearance of an absence of marine farming (perhaps by subsurface or seabed farming)[1]. The development requirements, intended to discourage speculation, reinforce the system's efficacy in privatizing marine space for production. This suggests a need to consider more carefully the process of acquiring spatial rights for marine farming.

12.2 A Descriptive Model of Key Variables for Acquiring Marine Farm Space

The survey data reported in Chapter Eleven supports the view that the most distinctive difference between marine farming and the other eco-commodity systems discussed is the allocation of spatial rights.

[1] In one Akaroa Harbour location, SeaRight effectively achieved this outcome by obtaining a certificate of compliance to undertake marine monitoring activities associated with potential and existing marine farming in a site that they wanted to prevent others from farming. This was successful and avoided all notification systems, but this is the only example of this that I found.

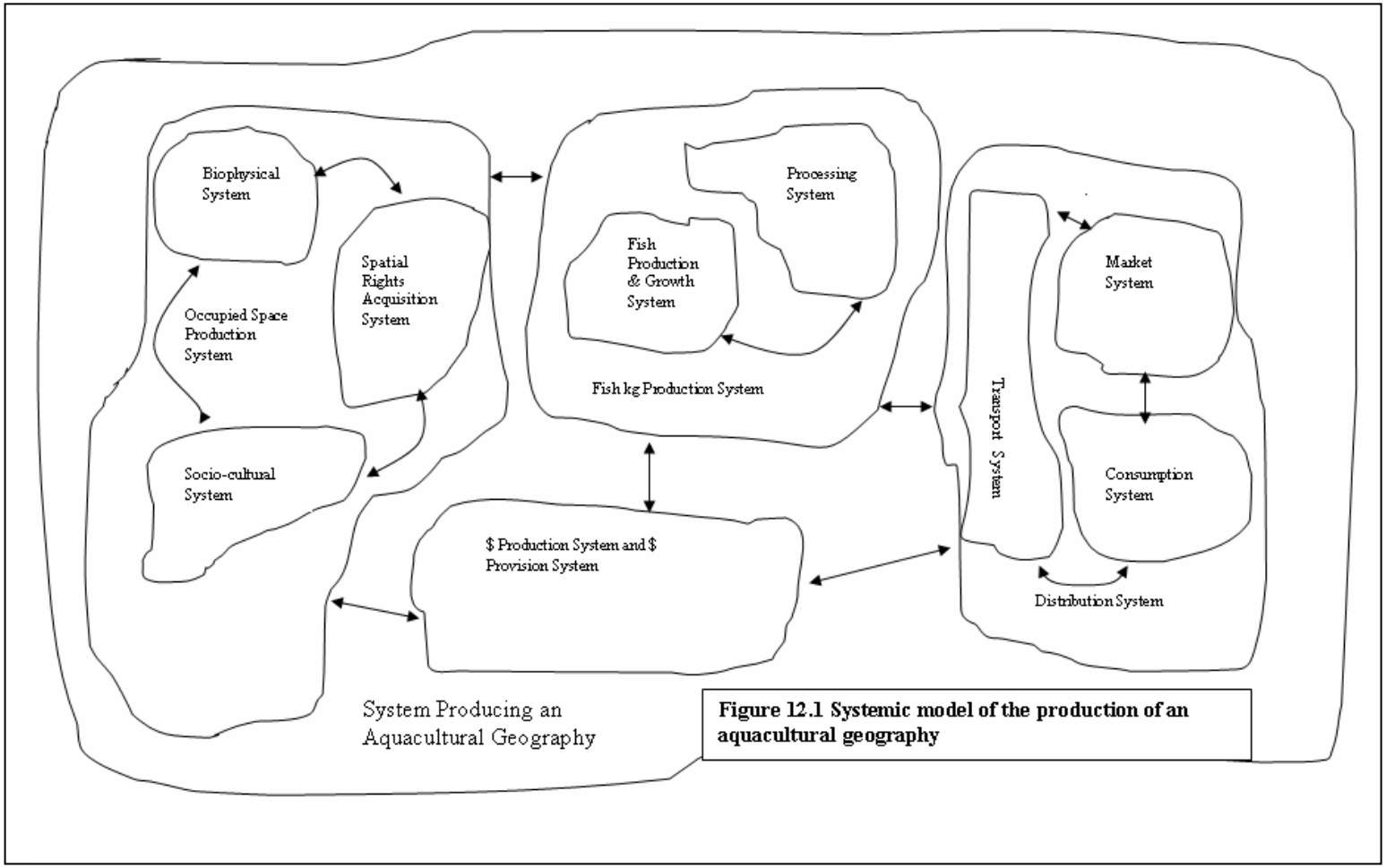


Figure 12.1 Systemic model of the production of an aquacultural geography

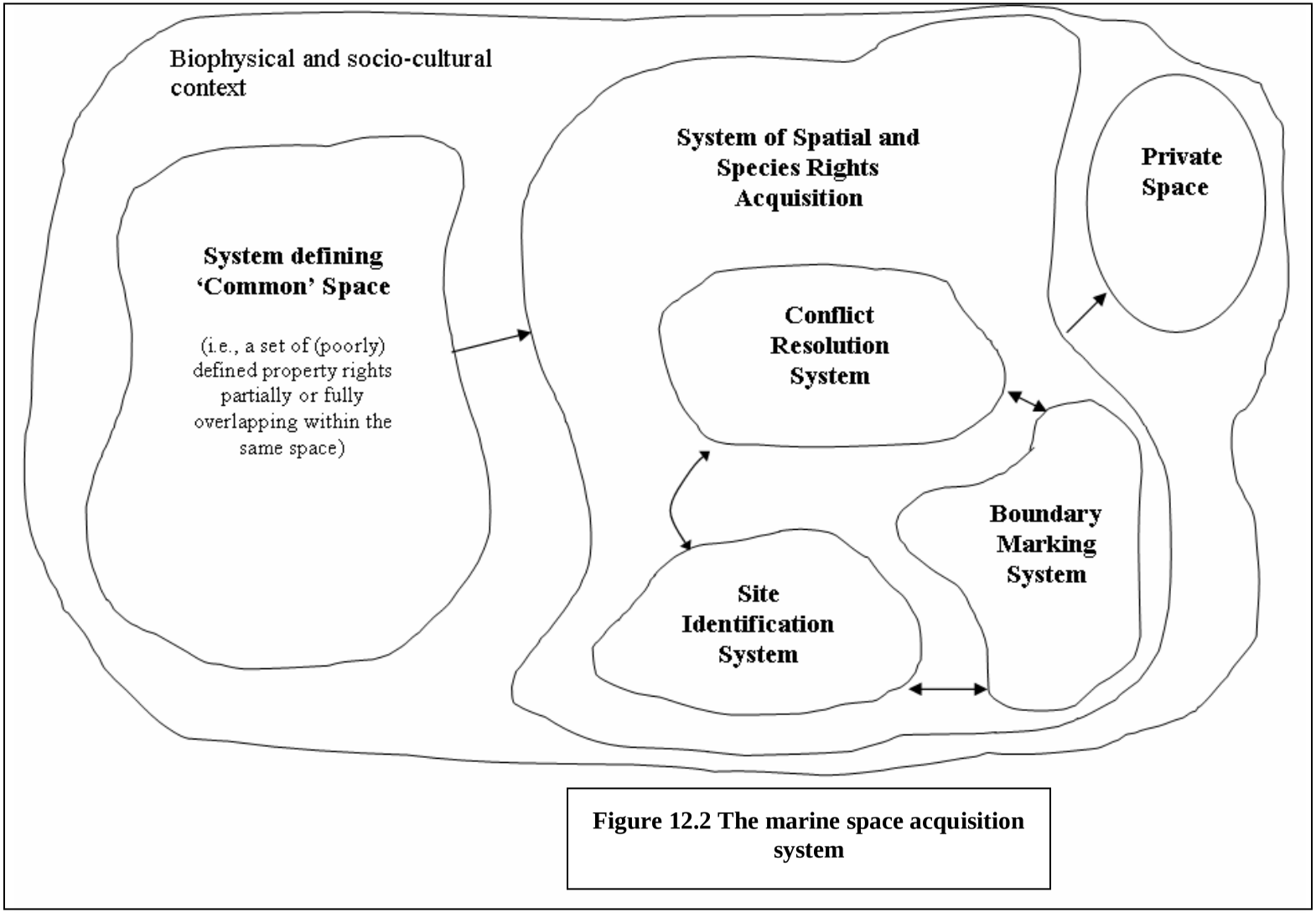


Figure 12.2 The marine space acquisition system

Some features are shared by marine farmers and other eco-commodity systems (e.g., the importance of water quality), but the prominence of 'community' and 'conflict' factors (suggested in the factor analyses) and the importance of planning restrictions, iwi and commercial fishers views suggests a descriptive model of acquisition of space that incorporates these concerns. A model similar to Scott's model of the dimensions of a property right (see Chapter Two) enables comparison of different regulatory regimes in terms of the acquisition of spatial rights. By basing the model on inferences drawn from the survey of marine farmers the dimensions are likely to more closely represent those of importance to the marine farmers.

The reason for dissatisfaction with a regime that was most often mentioned in the survey and interview responses was the complexity of the decision-making process. In addition, many of the respondents indicated dissatisfaction with the costliness of the process and appeared to lack confidence in the decision-makers for a variety of different reasons. Often the costliness was attributed to the number of decision-makers, or to the lengthy process, or the uncertainty in the process. This was exacerbated when different conclusions were reached with regard to a site by either different authorities or the same authority at different times. In their additional comments, the surveyed respondents often attributed this to a lack of knowledgeable or accessible decision-makers, with those making the decisions being seen as located 'somewhere else' and therefore having little understanding of the nature of the local situation. The potential for different decision-makers to give different weight to the same criteria was also noted as important in determining the size applied for in some cases. For example, some site developers indicated that the New Zealand Coastal Policy Statement produced under the Resource Management Act 1991 set a 50 hectare occupational threshold above which an application became automatically a 'restricted coastal activity' and for which the decision is made by the Minister of Conservation rather than a regional council. Consequently they would apply for a 49 hectare site to avoid the Minister.

The responses from the interviewees and surveyed farmers therefore indicated that the efficiency, efficacy, equity and predictability (certainty) of the process of obtaining sites were considered critical factors in their perception of the validity and

utility of a process for acquiring a right to a farm site. These are, however, very broad criteria and in developing a model of key characteristics of a system for acquiring marine farm sites I have sought more mutually exclusive characteristics. The resultant model might be hypothesized as comprising nine axes and associated expectations:

Speed of process – the length of time that it takes for an application for a permit to be finally decided on from the date of lodging it. This affects the amount of capital that is relatively unproductive and the level of personal stress that applicants' experience while waiting for a decision on their application. The modern era primarily relied on principles of natural justice to set its processing timeframe once the objections had been received, but the evidence suggests this resulted in considerable delays. The Resource Management Act set tighter timeframes for processing consents during the transitional era, but these could be extended by decision-makers seeking further information from applicants and the Environment Court and marine farming permit processes did not have timeframes;

Number of decision-makers involved – the more decision makers the greater the number of different decisions that might eventuate, leading to greater uncertainty of the outcome of the process and possibly greater expense in attempts to influence the outcome. There were only two primary decision-making authorities (regional councils *or* the Minister of Conservation, *and* the Director-General of Fisheries), but there was the potential for coastal permit applications to be appealed to *de novo* hearings of the Environment Court. Under the preceding regime there were similar numbers of decision-making authorities, but usually three Ministers (Fisheries, Works, and Transport), and possibly a water board, were involved, depending on the nature of the activity and associated requirements;

Process simplicity – the less complex the process and the more readily understandable it is, the easier it becomes to influence it favourably and to be able to predict its probable outcome with greater levels of certainty. The open, participatory processes introduced in the transitional era were more complex for the applicant than were the preceding systems where the Ministry

of Agriculture and Fisheries did much of the consulting and assessment of effects;

Confidence in decision-makers – the more accessible and/or knowledgeable the decision-makers the more/less easy they may be to influence and to anticipate, and the more/less confidence in which they may be held. This characteristic is related to the number of decision-makers involved – some may feel confidence in, for instance, the regional council or hapu to make a decision with regard to the coastal permit, but have no confidence in the Ministry of Fisheries or the Department of Conservation. Accessibility may be in terms of both physical and social accessibility. A decision-maker far removed from the geographic location of the applicant will be more difficult to meet in person, reducing the potential of coming to 'know' each other. A decision-maker made 'distant' by process requirements (i.e., to avoid 'capture' of the decision-maker by the applicant, or to avoid possible conflicts of interest), or by socio-economic or political 'class', similarly will be more difficult to influence or predict. It is difficult to argue whether there has been any significant change in this dimension during the transitional era compared with the modern era;

Cost sharing – the degree to which costs are borne by the applicant relative to others involved in the process will significantly affect its perceived equity. The more the costs are borne by the applicant, the less acceptable they might find it, especially if they consider that what they are doing is morally justifiable and to the benefit of the nation at large. The removal of (hidden) 'subsidies' with the advent of the cost-recovery practices of the neo-liberal late 1980s meant that the transitional era processes were more financially burdensome for applicants than were those of the modern era;

Flexibility – the degree to which the process provides scope for the applicant to determine what to apply for (e.g., location, size, shape, duration, species, technology) influences the ability of the applicant to obtain a desired location or employ appropriate technology and farming practices to make a site financially viable. It also influences the amount of repetition that might be required of the applicant in seeking suitable operational sizes and sites. The

effects-based approach of the transitional era provided much greater flexibility than did the modern era approach;

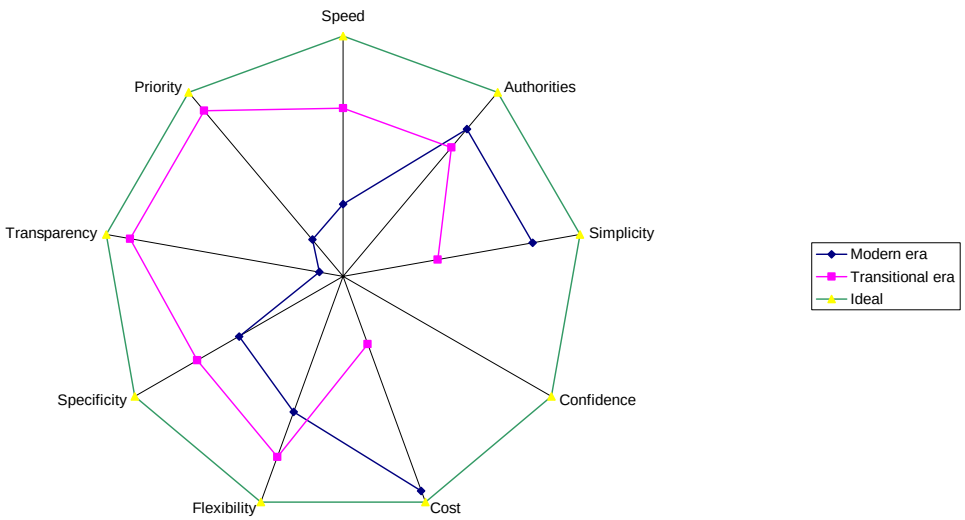
Specificity – the clarity of the criteria on which decision-makers may make their decisions will affect the certainty of the outcome and will enhance or reduce the wielding of influence in the process. Clearly specified criteria will assist cost-effective provision of appropriate information with the application and will enable the implementation of accountability measures (such as appeals to higher authorities). The transitional era provided more elaborations and indications of the weighting of criteria than the previous regime's concept of 'public interest';

Transparency – the degree to which the decision-making process is able to be monitored by the applicant is fundamentally important to the applicant's confidence that the decision is fair. It also helps decision-makers to be held accountable for their decisions. Statutory processes in the 1990s were generally more transparent than those of the preceding era;

Priority – the order in which the right of the applicant will be given precedence over the rights of others, including other potential applicants and others with potential rights claims over the site sought by the applicant – all of who may or may not be opposing the application. The transitional era adopted a simple 'first-come, first-served' approach and had provision for coastal tendering in specified circumstances. The preceding era provided a wider range of means of choosing between applicants and consequently applicants could not be certain what system would be used in any one instance.

The most ideal process for the applicant would have maximum scores on each of the axes. This is modeled from the perspective of the applicant, however, and may be less acceptable to opponents. Testing this model is beyond the scope of this thesis. It has been developed here as a means to usefully synthesize the findings of the surveys and analyses of the regulatory regimes. It enables the nature of the site acquisition processes of the different regulatory regimes to be easily compared (Figure 12.3).

Figure 12.3 Characteristics of marine farm right acquisition processes



Chapters Three and Four discussed decision-making processes and mechanisms available for allocating space between competing applicants under New Zealand's key marine farming legislation and the criteria required to be considered when granting space. These are summarized in Tables 12.1 and 12.2 and, when combined with the survey responses, the nine axis model enables a diagrammatic comparison of the Modern and Transitional regulatory era (Figure 12.3).

Table 12.1 Criteria specified in key marine farming legislation (or regulations) for allocating sites between competing applicants

	Rock Oyster Act 1964 Regulations	**Marine Farming Act 1968**		**Marine Farming Act 1971**		**Resource Management Act 1991**
		New site	Re-offered sites	New site	Re-offered sites	
Discretionary	Y	Y		Y		
Ballot/By lot	Y		Y	Y	Y	
Public auction			Y		Y	
Tendering			Y		Y	Y
Financial or other circumstances of applicants	Y					
Likelihood of applicant being able to successfully develop site	Y					
First come, first served						Y

Table 12.2 Criteria to be considered under different New Zealand Acts before approving marine farm proposals

Oyster Fisheries Act 1866	Harbours Act 1950	Rock Oyster Farming Act 1964	Marine Farming Act 1968	Marine Farming Act 1971	Resource Management Act 1991	Fisheries Act 1983 (as amended in 1993)
Must not be over an existing natural oyster bed Must have consent of occupier of adjacent lands Must not prevent the full and free exercise and enjoyment of any right whatsoever in or along the said shore or sea ground	*The structure or work:* Must not - be or tend to the injury of navigation - unduly interfere with or adversely affect the interest of the public *Leases:* Must not impede or disturb navigation or the public convenience *Licences:* Must not unduly interfere with or unduly restrict any public right of navigation or the public convenience *Authority:* Harbour boards grant approvals in harbours, otherwise the Minister of Transport and the Minister of Works and Development, (subsequently replaced by the Minister of Conservation)	Interfere with any existing right of navigation or Would not be in the public interest The Minister had discretion as to granting leases, but the harbour board and local authority required consent of the Minister first.	*If no objections:* The controlling authority had absolute discretion as to granting leases, but if not the then it required the prior consent of the Minister. *If Objections lodged:* Interfere unduly with any existing right of navigation; Substantially interfere with commercial fishing; Substantially affect any existing usage of the area for recreational purposes; Otherwise be contrary to the public interest.	*If no objections:* The controlling authority had absolute discretion as to granting leases, but if not the Minister then it required the prior consent of the Minister. *If Objections lodged:* Interfere unduly with any existing right of navigation: Interfere unduly with commercial fishing: Interfere unduly with any existing or proposed usage for recreational or scientific puposes of the foreshore or the sea in the vicinity: Otherwise be contrary to the public interest or Adversely affect unduly the use by the proprietor thereof of any land adjoining or in the vicinity of the area or the interests of the holder of any mining interest in any such land.	Consent authority must have regard to: - any actual and potential effects - any relevant policies, objectives and rules in national, regional or district policies or plans Consent authority must *not* take into account: - the effects of trade competition with competitions - any actual or potential effects on someone who has given written approval for the application *Consent authority:* usually the regional council unless the activity exceeds specified thresholds in which case it is the Minister of Conservation's decision	Unable to grant a marine farming permit unless relevant coastal permit or certificate of compliance already granted. Director-General of Fisheries may not issue permit if the activities contemplated by the application would: Have an undue adverse effect on fishing or the sustainability of any fisheries resource.

The diagram is prepared from the marine farming applicant's perspective in that cost is seen as closest to the ideal when the marine farmer's application costs are heavily (if indirectly) subsidized. The relative ratings of the Modern and Transitional era on each dimension are somewhat arbitrary (see Appendix Eight), but were suggested in the description of the nature of the dimensions discussed above. The axis showing 'confidence in the decision-makers' has no ratings recorded as this would vary depending on the context. The marine farmer may have confidence in the fisheries officials, but not the regional council officials and, as discussed in the next section, there may be regional differences. A more sophisticated model might attempt to 'unpack' this dimension into more variables, but that is beyond the scope of the current research

12.3 Implications of Differences Between the Modern and the Transitional Era

The importance of the diagrammatic representation of the acquisition dimensions lies in the relative ratings for regimes on individual axes and the implications that can be drawn from these. Examining the axes in this model, and bearing in mind the responses from the survey, it is apparent that the transitional era was founded on improved site acquisition processes for marine farmers on most dimensions (e.g., flexibility, transparency, priority). The general survey response, however, indicated a strong preference for the simpler, lower cost processes of the older regime. These two variables (simplicity and low cost) outweigh the advantages of the other dimensions.

A logical implication, therefore, is that those most likely to participate in the process of transforming common space to marine farm space during the transitional era were likely to be well-able to handle the complexity of the systems and to be able to arrange sufficient capital to withstand the costs. First Wave, for instance, epitomized entrepreneurial site developers in its combination of a marine biologist (able to address biophysical effects) and a lawyer (for complex regulatory matters). It could handle the complexity, but needed financial backing to address the costs. It consequently sought partnerships with a number of different financial backers in

different parts of the country. The model also helps explain the expanding presence of large fishing companies and iwi organizations during the transitional era.

Both the fishing companies and the iwi organizations had distinct advantages in the transitional era. The undue effect of marine farming on fishing remained a criterion for fisheries authorities to consider, but the major fishing companies (e.g., Sanfords, Skeggs and Sealords) were often applicants. These companies were also major quota owners and owned fish processing facilities. Consequently they were in a position to exercise influence over existing communities through their existing quota rights, economic role and, from my interviews, the prominence of their spokespeople within the industry and in the wider communities. They were unlikely to have the same difficulties in addressing the concerns of the owners of quota as might a traditional, small-scale oyster farmer who came from a land farming background. Notably, restrictions in New Zealand legislation on the aggregation and foreign ownership of quota may have tangentially constrained the level of involvement of overseas investors in ownership of marine farms.

The Resource Management Act also strengthened the role of iwi and the importance of Maori concerns. Some of my interviewees claimed that unless a local iwi or hapu financially benefited from a marine farm being approved it would not support the farming application. Some planners and non-Maori fishers and marine farmers openly talked with other non-Maori about this 'black' market, but were not prepared to go on the record for this research. They clearly enjoyed the prospect of watching hapu opposing each other's marine farm proposals.

It should be noted, however, that one marine farmer deliberately set out to challenge the perception held by a council that without iwi support an application would fail. In an area with high numbers of Maori he refused to involve Maori in his application and surprised the officials involved by succeeding (after Environment Court hearings). An influential Maori also told me that prior to the Resource Management Act there had been a systematic bias against Maori applicants in one region. Under the Resource Management Act, iwi organizations (such as the Hauraki Marine Development Trust) were likely to be better funded than individuals and to have

advantages in the consultation process. They were also likely to own quota and be involved in fishing ventures as a result of the settlement of Treaty claims. Unlike the large fishing companies, however, they may have lacked the expertise to acquire space. It is therefore not surprising to find 'specialist' entrepreneurs, such as First Wave and Peter Brierly, working with iwi and hapu to pursue major marine farming applications in several different parts of the country. Maori have also been prominent in taking advantage of Treaty settlement or iwi funded scholarship opportunities to study marine farming, including attending specialist aquaculture programmes at the University of Tasmania.

The battle over space in Golden Bay is also much more explicable when considered in the light of the regulatory regime. Not only did the enhancement fall outside traditional fishing and marine farming frames of reference, but the enhancement company was essentially a co-operative of commercially smaller-scale fishers. It was not large enough in itself and too specialized to be a major fisheries player elsewhere, but it was sufficiently large and profitable to pose a regional threat to other fishing companies with expanding marine farming ambitions. The resultant confused court battle perhaps owed as much to the industry's structure as to any other issues. The case was anomalous, but provided the basis for significant case law and for the subsequent decisions implemented by the Government's 2002 changes to the marine farming regime.

12.4 Stochastic Influences?

This leads to the one dimension in Figure 12.3 for which I have not attempted to record a comparative rating – confidence in the decision-makers. This is the dimension that appears most likely to vary from region to region because it depends on the individuals involved in the situation in each case. Where the applicants have considerable confidence in those involved in the decision-making process, and vice-versa, there are likely to be high ratings on this dimension. Where trust in the individuals is not present then the ratings are likely to be much lower.

My interviews suggested that during the modern era, applicants dealt primarily with the Ministry of Agriculture and Fisheries, but were aware of the role of officials in other organizations (e.g., DoC). The data also suggests that in at least one region fisheries officials were considered less appropriate decision-authorities than in others. Often interviewees and questionnaire respondents indicated that their concerns about the organisations related to people who no longer worked for them or to the high turnover of staff, but sometimes they reflected views about current people in the organizations. In many instances the views were held irrespective of the mandate of the organization and appeared entirely personal and to relate to perceived bias and/or inconsistency (as discussed above). The concerns also applied to Environment Court judges and the Court in general.

Such views confirm that, despite attempts to create processes that provide greater certainty and consistency through plans, policies or the statutes themselves, there remains scope for individuals to affect outcomes quite significantly. This dimension appears the most likely to introduce influences on the nature of the outcomes that can best be described as 'stochastic'.

12.5 Characteristic Planning Outcomes for New Zealand Marine Farming Under Different Regulatory Regimes

As discussed in Chapter Nine, planning for marine farms as a specific activity commenced in the proto-modern era as non-statutory farm plans and took the form of a concentrated large development block of farms in Whangaroa Harbour. During the 1970s, under the modernist planning era, statutory planning addressed marine farming as a response to conflict between and within local and central government agencies and the developing industry. The resultant plans were reactive attempts to control industry development. The subsequent 'transitional' era, ushered in by the Resource Management Act 1991, marked a quite different planning regime. It was transparently post-modern in its acceptance that every region should develop its own approach to meet the needs of its community. It was also modernist in the sense that it required all such plans to reflect an effects-based approach to activities. The Act enabled and encouraged investment in technology to address the effects of marine

farming activities and ostensibly enabled the opening of extensive new areas to marine farming. It has been followed, in 2002, by a move back to a more restrictive regime dominated by aquaculture management areas and prohibited zones. These regulatory regimes can be classified in terms of their underlying approach to marine farming as: exploratory, restrictive and enabling (Table 12.3).

Table 12.3 Characteristic signature patterns under different regulatory era and planning approaches

Era	Period	Approach to plans	Rule Tendency	Political ideology	Signature pattern
Pre-modern	1866-1964 (Oyster Fishing Act 1866)	Exploratory	None	State directed development	Sporadic, scattered separate
Proto-modern	1964-1971 (Rock Oyster Act 1964, Marine Farming Act 1968)	Development/ Exploratory-Restrictive	None	State directed development	Sporadic, some concentration
Modern	1971-1991 (Marine Farming Act 1971)	Restrictive	Prohibitive	Indicative planning by state, but tensions with local government, which lessened from 1984 when neo-liberalism was adopted	Concentration
Transitional	1991-2002 (Resource Management Act 1991)	Enabling	Discretionary	Neo-liberal, keep state out, devolve decisions to the affected community	Sporadic, scattered, diverse, showing examples of all types
?	2002 (Resource Management (Aquaculture Moratorium) Amendment Act 2002)	Restrictive	Prohibitive	Neo-liberal, but with central state direction	Concentration

The exploratory regimes recognized the experimental 'early days' phase of industry development and adopted a *laissez-faire* mode of operation in that specific plans did not exist for marine farming. This exploratory approach became conflated with a more development oriented approach that took on restrictive overtones as the industry grew and began to conflict with other activities. This led to concentrations of farms as a consequence of planned development sites (e.g., Whangaroa Harbour) within the more sporadic, state-directed development of a still predominantly exploratory mode of researching and developing sites.

The restrictive approach characteristic of the modern era is a traditional planning-control approach focused on particular activities. It is restrictive in the sense that it introduces planning rules that designate areas where the activities are allowed to occur and prevents them from developing in other locations. The resultant spatial pattern is one of increasing concentration as the industry expands within designated areas, such as the ribbons and concentrated areas of the Marlborough Sounds. Nascent ribbons will be infilled and feature blocks of double or triple arcs and subdivision within blocks. The pattern fits very well with concepts of central government control and/or guidance through indicative 'master' plans prepared or authorized by agencies of the central state. The restrictions may, however, be created by local authorities.

The enabling approach sought to free the allocation of space to activities by basing any restrictions on the effects of the activities. Unlike the restrictive approach, the enabling approach did not adopt any standardized expectation of types of activities (e.g., longline mussel farming) or assumptions of economic units/scales, but instead set particular environmental performance requirements. In periods of industry expansion it is likely to result in a post-modern diversity of forms of marine farming and associated patterns of development as it allows for individual communities and individual developers to 'express themselves' through the environmental requirements communities adopt and the productive systems farmers employ for their activities to proceed. The enabling approach is therefore emancipatory, reflecting a neo-liberal political ideological position. It also, however, has strong connections with capitalism and technical knowledge as indicated in the discussion of the model of acquisition systems.

In the New Zealand context, it is important to note that under the modern era, the terrestrially focused central state agencies (e.g., the Department of Lands and Survey and the Ministry of Works and Development) and local government bodies shared similar views regarding marine farming. These were often in conflict with those of the Ministry of Fisheries who had responsibility for promoting, controlling and planning for marine farming. Even within the Ministry of Agriculture and Fisheries,

the new and expanding marine farming sector was largely treated as secondary in importance to the expanding commercial capture fishing sector. Consequently the pattern of marine farming, especially during the modern era, is 'distorted' by the substantial role played by local government bodies through their Town and Country Planning Act (TCPA) planning schemes. Prior to these schemes the Ministry largely adopted a supportive-exploratory role, but once challenged by the other agencies the Ministry of Agriculture and Fisheries' marine farm plans effectively legitimized the goals of these (TCPA) and associated non-statutory plans. This meant that local community objectives were adopted within the spatial development pattern of the industry virtually from the moment it entered the 'expansion' phase in the 1970s and, as a result of its existing and potential expansion, considerable local restrictions were put in place.

The role of local authorities in New Zealand contrasts quite markedly with most of the experience reported internationally where the local authorities lacked an effective voice in planning for marine farm development, except in places such as the Shetland Islands. This perhaps also explains why planning restrictions have been seen by marine farmers as fundamentally important, alongside the biophysical variables, in influencing marine farm location. These restrictions probably account for the preference the industry has held for the Ministry of Fisheries as the decision-maker on marine farming in most parts of New Zealand. The Ministry, as well as being generally supportive, was somewhat removed from the local social milieu that dominated the local authorities. One experienced interviewee commented that the local politicians were dominated by people who lived off the land, not the sea, and consequently saw the sea only in terms of their recreational use in the weekend. He felt this left the marine farmers at a disadvantage and his view seemed widely shared. Others considered regional councils were too close to Maori and/or the Department of Conservation. In Marlborough, however, some of those involved in the Golden Bay battle argued that the Ministry of Fisheries was too supportive of a fishing industry that had no concern for its effects on the environment. Consequently they preferred the regional council as decision-maker as they considered it fairer in dealing with competitors for the same space. Some would apply for more space than they

expected to get so that they could participate in trade-offs by relinquishing their excess space.

12.6 Signature Patterns and Regional Anomalies

New Zealand has not experienced the same 'boom and bust' cycles of marine farm development felt in countries like Norway. It is therefore not possible to discuss the effects of decline on the spatial patterns that might occur within the industry. The industry has simply continued to expand throughout the period studied. The general spatial patterns signifying differences between restrictive and enabling regimes indicate that restrictive regimes will tend to concentrate development and enabling regimes will result in diverse patterns with a tendency to sporadic, exploratory developments of all shapes and sizes. There remain, however, some regional anomalies. For instance, development in Marlborough, the Waikato, Northland, and to a lesser extent Southland, occurred within the same era, but show some significant differences. Other places unrestrained by the regime simply did not develop. This suggests that it is oversimplistic to rely on the nature of the underlying regime to produce signature patterns.

The initial issue of why some places developed and others did not comes back to the historicity of the developments. The northland estuaries were topographically similar to those in Australia and an Australian oyster farmer was employed to promote the industry's development. Marlborough and the Firth of Thames reminded the initial proponents of rias where mussels were grown in Spain. Although the technology changed rapidly, from rafts to longlines (technology adopted from Japan), the collapse of the wild mussel and scallop fisheries meant the underlying infrastructure was present and this combined with the proximity of both sites to government, university and industry centres to enable the rapid adoption of the medium technology mussel farming systems. Big Glory Bay also represented a site chosen for its similarity to Scottish sites with which the consultants who initiated salmon farming in New Zealand were familiar. As a high technology, high value species, salmon did not need to be located close to markets or areas of technological expertise and the residents in the local Stewart Island community were keen for potential

employment (most of which subsequently went to Bluff). Northland, Marlborough and Stewart Island were all three seeking development industries and government policy supported regional development. The initial centres of marine farming in New Zealand therefore represented a combination of biophysical features, government policy, historical use, and the experiences of those individuals in positions to initiate the development.

The differences in the way in which the spatial development occurred within these regions may be more superficial than real, but the explanations for the observable differences also lie in the style of planning adopted by the relevant key figures. The various signature patterns and associated variables are summarized in Table 12.4.

Table 12.4 Signature patterns and associated key variables

Signature Pattern	Underlying regulatory regime: Restrictive (R) Enabling (E) Exploratory (X)	Industry phase: Early days (E) Expanding (X) Integrative (I)	Probable primary planning zones for marine farms	Forward-looking (F) or reactive (R)	Decision style: Innovative (I) or Conservative (C)	High (H), Medium (M), Low (L) priority to conflict resolution
Nascent ribbon	R	E/X	Discretionary	R	I	H
Ribbon	R	X	Designated area	F/R	C	H
Irregular Block (Oasis)	R	X	Discretionary	R	C	M
Regular Large Block of Small Farms	R	X	Designated area	F	C	L
Regular Blocks of Parallel Rows	R	X	Designated area	F	C	H
Single-Shift	R	X	Designated area	F	I	M
Sporadic (generally uniform type of farm)	X	E	Discretionary	R	I	L
Diverse (sizes and styles of farms vary with large single owner farms present)	E	X	Discretionary	F	I	H

As discussed in Chapters Nine and Ten the local communities were involved in planning in several areas, but the consequent plans sometimes included zones enclosing already established farms. This historical component needs to be recognized as an artifact of the pre-modern period. The areas that reflected forward planning show patterns that are distinguished both by the approach of the era, the knowledge available at the time, and characteristics of the decision-makers involved. The last is very important as knowledge of new technologies might be present, but the decision-makers may have been unprepared or unable to seek it out. Similarly, some decision-makers are more prone to being innovative than others, but the same decision-makers may make different decisions as their experience and knowledge accumulate.

In Chapter Six I speculated that ribbon development might align with key access routes or fairways as has happened in terrestrial settings. As noted in Chapter Ten, there have been areas of ribbon development, although rather than being to *enable ready access* to farms these developments have been created by combining *biophysical limitations* with *avoiding competition* from other uses, notably navigation, visual amenity, and recreation. This is usually associated with a form of restrictive modernist planning.

In some regions nascent ribbons represent conflict resolution patterns. They appear characteristic of expansion in areas of high competition, but in fact occur in zones where discretion is allowed to be exercised. Conflict-resolving forward-planning efforts have tended to result in odd shaped small or large blocks of parallel row farms in conflict situations, such as Waikato's Hauraki Gulf. In summary, the dominant-presence of nascent ribbons is a signature pattern for a regime characterized by a lack of forward-planning and considerable discretion operating within a restrictive regulatory regime. Regular-blocks, especially long narrow, parallel row blocks of farms are signature patterns of forward-planning, under a restrictive regime, using designated zones. They combine efficient design with avoidance of conflict with other uses.

Large concentrations of farms are signifiers of one of two types of development. If the large block is irregular in shape then it almost certainly reflects a restrictive regime with reactive decision-making within a discretionary area. They are also likely to develop around oasis sites and represent a homesteading effect such as that identified in Chapter Six under the rangelands model. The style of decision-making is probably conservative, favouring 'orderly sprawling' concentrations or clusters over seemingly chaotic sporadic development. Regular large blocks of several farms exemplify a conservative, modernist, restrictive style of forward-planning with a designated zone. It represents a response to conflict between an expanding industry demanding more space and community resistance. Aquaculture management areas exemplify this approach.

Many of the ribbon development approaches reflect migrating development, but as noted previously, that migration may be truncated and the end result might be more concentrated development. There has been an attempt by Tasman District Council to create a direct shift from inshore to offshore space for marine farms in Golden Bay, and despite the Environment Court ruling, its approach has largely been upheld. This represented an unusual attempt at innovative planning that was forward-looking and built on recognition of the experience form other areas.

Finally there is the diverse pattern, featuring sporadic developments of widely varying styles and size, and characteristic of the enabling planning regime of the transitional era. The decision-making style embraces innovation and has confidence in decision-makers' ability to assess the effects and to address the conflicts on a case-by-case basis. It is reactive and does not necessarily require marine farming to be treated as a special case. Consequently, the relevant zoning is usually discretionary. The primary difference between its signature pattern and that of others is the diversity of size and farm layout that it accepts. Under this style there can be very large blocks with a single owner who might sublease.

More subtle is the evidence for patterns that equate to more sophisticated models reminiscent of the rangelands model discussed in Chapter Six. These are somewhat masked by the temporal and spatial scale at which they have occurred and by the use

of two-dimensional Cartesian space to allocate spatial rights for three dimensional activities. They are somewhat anomalous and so deserve explication here.

On several occasions, coastal permits have been granted for ten or fewer years as a response to avoiding conflict with Maori who believe they may obtain ownership of areas of the foreshore and seabed as a result of challenges they have lodged in the Courts. Such approaches were seen as enabling the developments to proceed, while also providing for a change in 'landlords' from Crown to iwi. Similarly, a number of permits were being granted for new technological developments that provided trial periods with the effects being monitored and further expansion only permitted on the sites if the adverse effects were considered acceptable by the authorities. Within this framework regional councils, such as Waikato, were developing new ways of allocating space to farmers within new concentrated aquaculture management areas. These approaches indicate the unsoundness of traditional assumptions (e.g., Harte and Bess 2000) that property rights with long durations are required for the development of the industry. They are much more indicative of an innovative, if restrictively prescriptive, approach along the lines of the rangelands model discussed in Chapter Six.

It is also important to differentiate aquaculture management areas from the large farms with one owner who leases 'lots' within the farm to other marine farmers. This practice is already well established with individual mussel lines sometimes being owned by different people and the space to hang them being rented from a site owner, or with the site owners lines being leased. The new large farms, such as Cloudy Bay or the 6,000 hectare farm approximately six kilometers offshore from Opotiki that received its coastal permit in 2002 (Box 12.1) represent modernist industrial practices in the scale and style of their operations, but their arrival on the marine farming scene reflects the post-modern flavour of the planning regime. They have begun to be established because the regime allowed the community and the farmers to design their own approach.

Box 12.1 Opotiki marine farm – Rhetoric or reality?
(From: New Zealand Herald, 9 May 2002: A2**)**

Huge sea farm approved

Opotiki will gain 500 jobs once the country's biggest marine farm is under way.

by Jo-Marie Brown

Approval has been given for New Zealand's largest marine farm — 4km long by 9km wide — planned for the Opotiki coast.

The farm is predicted to eventually earn more than $35 million annually in exports.

A 4750ha greenshell mussel farm will be established 6km out to sea after Environment Bay of Plenty granted resource consent to Eastern Seafarms this week. Environment Minister Marian Hobbs was expected to give final written approval by the end of this month.

The multimillion-dollar farm would be restricted to 1900ha for the first five years but once expanded would more than double the area covered by marine farms in New Zealand.

Local community leaders say the development would create 500 jobs, throwing Opotiki an economic lifeline.

Its unemployment rate of 16 per cent is more than twice the national average.

Opotiki Mayor John Forbes yesterday praised the Whakatohea Maori Trust Board, which is 40 per cent shareholder in Eastern Seafarms, for its involvement.

"I think their kaumatua have demonstrated real vision, leadership and courage.

"We are the most-deprived district in the country.

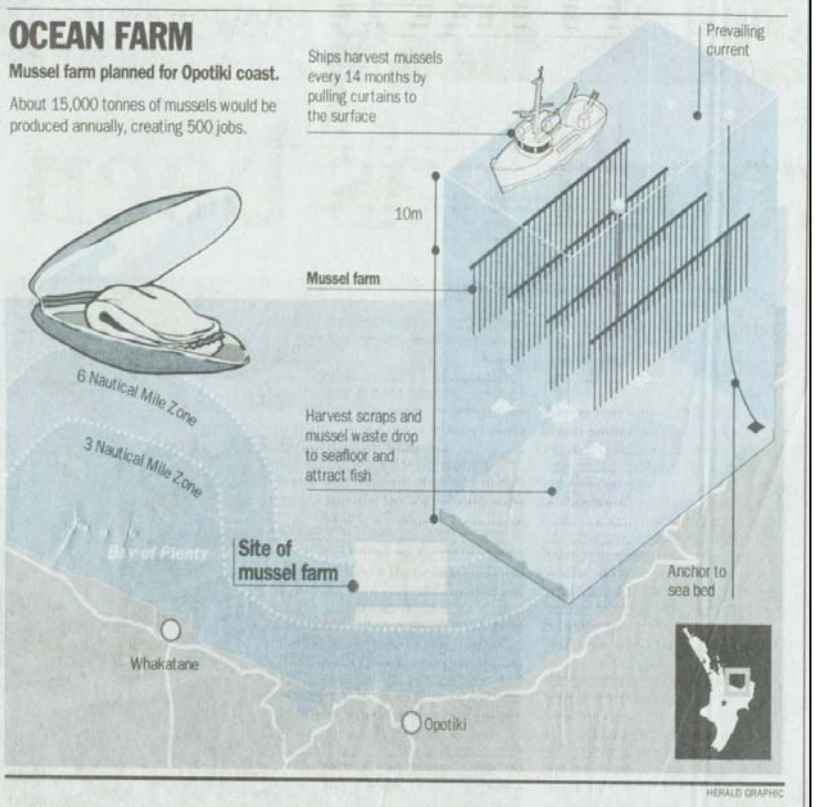
"The Index of Deprivation shows one home in five doesn't have a telephone," Mr Forbes said.

"We are the least well-off community in New Zealand and this is a major thing for us."

Trust board secretary Tahu Taia said the employment opportunities were a major reason the iwi teamed up with Tasman Mussels and New Zealand Seafarms for the project.

The farm would be set up over the next two years.

The trust board hoped to con-



would hopefully sway them, Mr Taia said.

"I believe that we can do this. We have a major kiwifruit packaging [plant] here ... so there's a degree of expertise."

At full capacity, the farm was expected to produce 15,000 tonnes of greenshell mussels annually. Based on present export prices, this would fetch $36.8 million.

Rows of mussel "curtains" would hang 10m below the sea sur-

be welcome to anchor within the farm to control numbers.

Mr Taia said Eastern Seafarms was relieved its application was not halted by the two-year moratorium announced by the Government last November to revamp the booming aquaculture industry.

The ban, which came into force in March, allowed 140 applications which had already been publicly notified to proceed.

Aquaculture Council executive

A report by the New Zealand Institute of Economic Research has estimated the two-year ban could cost up to $400 million in lost opportunities.

Mr Coates said the industry wanted the Government to pass its reforms quickly so regional councils could implement them and begin processing applications again. A reform package should be announced in July, he said.

"The potential of this industry

The largest approved farm in New Zealand, 4km by 9km, comprising 4750ha capable of producing 15,000t of green-lipped mussels (present worth $36.8 million) on a curtain of lines suspended 10m beneath the surface to avoid recreational boating and "shipping". The site would be developed in two stages. The first 1900ha stage will be established over two years and monitored for its effects before the remaining farm is developed. The Opotiki Mayor, "We are the most-deprived district in the country", points to potentially 500 jobs. Iwi representatives, the Whakatohea Maori Trust Board, a 40% shareholder, claims employment opportunities were a major reason the iwi teamed up with Tasman Mussels and New Zealand Seafarms for the project. It hoped that proximity to the farm and to an export port at Tauranga would convince its two partners to build a packaging and processing factory in Opotiki where a major kiwifruit packaging plant was seen as evidence of "a degree of expertise". The Aquaculture Council executive officer emphasizes the potential industry losses ($60-70 million/year) due to the moratorium.

The Opotiki approval also illustrates several other important points. The development had yet to receive its marine farming permit at the time of writing, but this requirement received virtually no media coverage. Instead the coverage emphasized the new technology (which Government policy supports) and the potential for regional development (which has been supported by Government policy since 1999) of the depressed Opotiki area. A local iwi was the minor share holder and the First Wave partnership (as New Zealand Seafarms) was also involved. The possibility of a large processing factory was highlighted in media coverage. That farm servicing and product processing and packaging most probably would build on existing infrastructure and export port facilities at nearby Port Tauranga was not mentioned. The ability of recreational fishers to move freely through the subsurface farm and to catch fish was important to gaining consent, but the potential adverse impact on existing kahawai purse seine commercial fishers in the region was not mentioned in the media. The media angle, emphasizing jobs and export dollars, was being approached in such a way as to place considerable pressure on the Ministry of Fisheries to approve the granting of a marine farming permit even if there was undue effect on existing commercial fishing. The rhetoric has shaped the perception of the activity as meeting the requirements of the local social milieu, presumably to gain its further acceptance and to influence the Ministry of Fisheries to approve the marine farming permit.

12.7 Summary and Conclusions

This Chapter has argued that there are signature patterns able to be associated with particular regulatory regimes, but that the patterns are more complex than the regimes themselves would be sufficient to explain. Additional variables must be considered, but different spatial patterns can be identified with particular combinations of these variables. Moreover, the argument suggests that the patterns must be considered within their historical context, the phase of industry development, and the style of planning adopted. Patterns do not need to be consistent across a region, but may vary within regions as a consequence of changes in these variables.

The model of the dimensions important to the acquisition of space provides a useful basis on which to assess different systems of acquiring marine space and highlights the importance of low cost simple systems in influencing the majority of marine farmers. It also indicates the importance complex high cost systems might play in the social structure of the industry. The model of acquisition and the synthesis of spatial and planning information make clear the importance of the human dimension within the various biophysical and regulatory systems. The human dimension represents a stochastic influence that may explain anomalous spatial development patterns.

Chapter Thirteen: Conclusion - Rubbing the Surface of the Sea

Sustainable development of global marine resources has been a focus of attention in various United Nations' agencies and coastal nations since World War II. Two main schools of thought have emerged to address marine resources: one is grounded in the rhetoric of the 'tragedy of the commons', the other in the concept of 'community management'. From these schools two key concepts have emerged for marine resource management: Individual Transferable Quota (ITQ) and Integrated Coastal Management (ICM). The first has been epitomized by New Zealand's quota management system for fisheries resources. It has also been suggested that New Zealand's effects-based Resource Management Act (RMA) regime is a model for an ICM approach with respect to marine farming (e.g., GESAMP 2001). Others have noted that the RMA has not achieved ICM because fisheries management has been left outside the Act's coverage (e.g., Rosier 1993, Rennie 1993b). There has also been some recent criticism of the appropriateness of ICM largely because it has been seen as aiding the penetration of neo-liberal capital into, and disrupting, local communities in developing countries (e.g., Nichols 1999).

My research has explored the development of marine farming in New Zealand in the context of these debates. The expansion of marine farming in developing countries has been well-addressed in the literature, but marine farming in developed countries has received less attention. The traditional biophysical requirements of marine farming (sheltered, clean water of appropriate depth) have led to conflicts with other users of the coastal environment. In the developed countries in particular, suitable sites are contested places of consumption (recreation, tourism) as well as production (capture fisheries). Moreover, the adjacent terrestrial land and water uses can significantly affect acceptability of marine farming. In New Zealand the regulatory regimes governing the development of marine farming reflect wider global changes in approaches to planning. Modernist, state-directed planning regimes sought rational, multi-use resource development in the public interest. These have been challenged by a post-modern recognition of a pluralist society. This challenge coincided with the

rise of neo-liberalism in many developed countries, including New Zealand. The RMA arose from a conjunction of these trends and liberalized marine farm planning.

In this concluding chapter, the first section summarises the work done and findings of much of the thesis. The second section addresses the extent to which the development of marine farming in New Zealand has followed the pattern of settlement of the North American West. I argue that the metaphor is inappropriate because the property rights regimes have given particular precedence to commercial fishers, recreational users, and Maori. Tiddens' (1990) views of the appropriateness of the metaphor are consequently refuted with respect to New Zealand.

I then consider the implications of this thesis for Nichol's (1999) critique of ICM, and argue that her critique has some validity, but that the way in which ICM is implemented is important in determining the effect on the social milieu. The discussion highlights the importance of a geography of property rights for understanding marine farming development which I address in the fourth section before moving to some concluding comments on future research priorities for aquacultural geography.

13.1 A Summary of Thesis Findings

This thesis has used the concept of property rights as a tool to explore New Zealand's regulatory regimes for marine farming. This resulted in four era being identified: Pre-modern (1866-1964), Proto-modern (1964-1971), Modern (1971-1991), and Transitional (1991-2001). The Transitional era is largely defined by the effects-based, enabling, community-based planning approach implemented through the RMA. The evolution of marine farming in New Zealand was shown largely to follow a generalized model of the industry in developed countries, but does not appear to have stopped expanding regardless of the regulatory regime. This suggests that government and fishing industry arguments (Ministry of Fisheries and Ministry for the Environment 2000, Harte and Bess 2000) that the existing regulatory regime is preventing the expansion of the industry are unfounded. In fact, the effects-based

RMA approach has successfully opened new areas for farming and has facilitated the development of new technology to address effects. It has 'worked'.

Ironically the Government became so concerned over the rapid expansion in marine farming and the scale of some of the newer developments that it implemented a two year national moratorium in 2001. It added provisions to the RMA that enable 'marine farming' to be addressed as a specific 'aquacultural activity' that can be treated separately from the effects-based approach adopted in the Act. The new provisions envisage the creation of aquaculture management areas within which marine farming will be permitted and the creation of areas where the activity is prohibited. In effect it appears to enable/direct planners to follow an approach adopted in the Golden Bay case analysed in Chapter Nine.

Although my research suggests that the regulatory regimes have had little overall impact on the rate of expansion of the industry it has shown that the plans developed under the regimes significantly affect the spatial pattern of development. An analysis of provisions for marine farms in various plans suggests quite different planning 'styles' and approaches have been adopted in different parts of the country at different times. A Geographic Information System covering most individual marine farms in New Zealand was developed to the stage where it could be combined with other data to investigate the spatial patterns that had evolved. A typology of patterns of farms was apparent from the resultant mapped information. These patterns were shown to represent the outcomes of a combination of competing rights and the responses of and to the contemporaneous planning regimes. The consequences of adopting different styles of planning were apparent and I have argued that some regimes leave 'signature' patterns when the planning and decision-makers' 'styles' are taken into account.

This macro-level research was extended to the micro-level by an exploration of variables affecting the individual farmer's locational decisions. This appears to have been the first rigorous attempt in the English-speaking developed world to obtain farmers' views on locational decisions. Analysis of the responses, combined with field observations and interviews and analysis of case-law and planning documents,

confirmed that community views, especially iwi, and the planning regime had become more important under the RMA. These results also enabled the development of a descriptive model for exploring and comparing the characteristics of different processes of acquiring marine space for marine farming.

The data also confirmed the heterogeneity of the marine farming 'community' and the analyses found significant changes were occurring within the structure of the industry. The major capture fishing companies are increasingly dominating the ownership of farms, both through acquisition of existing farms and partnerships in farms. This contrasted with the predominantly non-fishing background of most of the respondents to my questionnaires who held far fewer farms than those of the major players in the industry. There was also a notable presence of a category of 'entrepreneur site developers' exploiting the neo-liberal nature of the effects-based planning regimes of the 1990s to open up new areas for marine farming on unprecedented scales.

The RMA provided a simple 'first in, first served' rule to decide between competing applicants. Decision-makers had not implemented the alternative approach, coastal tendering, for sites of competition. As most councils had adopted a discretionary approach to their zoning of effects likely to be produced by marine farms, applications would generally be treated on a case-by-case assessment of their effects. The consequent 'race for space' met with initial stiff resistance from the capture fishing industry, iwi and the recreational sector.

The complexity of addressing allocation issues within a regime that recognizes a pluralistic society has led to significant transaction costs under the RMA. These are largely borne by the applicant for a site and the combination of complexity and costs have outweighed the seeming advantages of the RMA approach in the eyes of most marine farmers. There was an overwhelming preference for the modernist regime of the preceding legislation which was seen as simpler and under which central government bore many of the transactional costs of the decision-making process. The inescapable conclusion is that an effects-based, neo-liberal planning regime favours innovative, expertise-rich capitalists, just as was intended by the regime designers.

13.2 The 'Wild West' Metaphor

At the outset of this thesis I suggested that there may be parallels between the classical model of the development of rangelands in the North American West and the development of New Zealand's marine farms. During the course of the research programme, various media reports and political statements have referred to the race for marine farming space as a 'gold rush' akin to the 'wild west'. This suggests a simple race to stake claims. The classical model of development of North America's rangelands, however, was characterized as comprising the staking out of the *terra incogniti* of the western wilderness by ranchers who then found themselves challenged to hold their lands by sedentary settler 'squatters' using the Homestead Acts. This resulted in the enclosure of much of the rangelands in barbed wire and subsequent conflicts that continue to the modern day. A fundamental component of this classical model was that the homesteaders tended to stake their claims initially around water holes, the 'oases' of the rangelands. The potential for this model to apply in New Zealand was reinforced by the rangeland experience in the New Zealand high country.

The analogy suggested was that the 'wild fishers' (commercial fishers), especially once they gained ITQ rights, would act like ranchers and would resist the advent of 'settlers' (the marine farmers). The marine farmers could be expected to stake out the 'oases', the best growing areas in the marine environment. Some support for this was evident in the development of marine farming in the USA and Ireland (Tiddens 1990, Phyne 1999). Tiddens' noted, however, that the environmental movement and environmental awareness were such that marine farming had a much more difficult path to follow than did the original rancher and squatters. He argued that if the late-20th Century environmental attitudes were present in the 1700s then development of the western rangelands might never have been allowed. The emphasis in his analysis was on the nature of change in the biophysical environment as a consequence of the change from terrestrial hunting-gathering, and its analogous marine capture fishing, to (terrestrial/marine) farming. Indigenous peoples' issues were placed to one side in his analysis.

My research suggests that this model is not analogous to development in New Zealand. This is primarily because New Zealand's regulatory regimes favoured the concerns of commercial fishing during the thirty years of the expansion of the marine farming industry (1971-2001). The requirements that rights granted to farm fish should not interfere unduly with commercial fishing have placed capture fishers at an advantage. This is especially so where the farming technology proposed would conflict with commercial fishing techniques and the ITQ rights held. This has facilitated the capture fishers becoming major players as the industry expanded. Only where the new breed of marine farming entrepreneur works with iwi or local, non-fishing investors to propose very large farms in commercially fished areas is the fishing industry hegemony truly threatened. It has responded by further expanding its marine farming activities and opposing the new developments.

The Government's response to the Golden Bay case, for instance, involved placing a moratorium on the acquisition of space for marine farms. This has not been accompanied, however, by a freeze on introducing more commercially fished stocks to the quota management system and the Ministry of Fisheries continues to allocate *in perpetuity* spatial rights to quota management areas for commercial fishers. In addition, the Ministry of Fisheries, supported by the Ministry for the Environment, has promoted the possibility of having the spatial 'property rights' of quota holders compensated by the 'newer' marine farm settlers (Ministry of Fisheries and the Ministry for the Environment 2000). In other words, the commercial fishers are advantaged relative to the marine farmers and government policy appears directed toward continuing to provide this advantage. The 'ranchers' have precedence over the 'squatters', even although the quota management system post-dates, and arguably overrode, the rights of the existing marine farming industry.

Tiddens' views about the development of marine farming do have some validity with respect to environmental matters, but greater environmental awareness in New Zealand since the 1960s has not prevented the development of marine farming. Indeed, requirements on landowners to improve the quality of water may have assisted marine farming. The RMA regulatory regime has largely separated social and biophysical environmental variables in the regulatory process, enabling the

biophysical systems to be considered independently from social systems. The RMA has, however, retained some inter-linkages and overlaps of the social and biophysical, especially in respect to 'natural character' and 'amenity'. Fishers, on the other hand, are not subject to the same stringent environmental impact assessment processes that marine farmers meet. Consequently marine farmers are again disadvantaged relative to commercial (and other) fishers. In addition, attempts to preserve indigenous biodiversity to meet New Zealand's responsibilities to the global community, in accordance with the requirements of international conventions, have had and are likely to continue to have an impact on the species able to be farmed in various parts of the country. On balance, however, the effects-based approach has enabled farmers to develop new sites using technology and practices that address their effects.

The empowerment of New Zealand's existing 'nomads', the recreational and other users of navigable waters, renders Tiddens' comparison of the North American West and marine farming even more inapplicable in the New Zealand context. The New Zealand coastal marine area was not a *terra incogniti* when marine farming commenced. It was full of routes and ways that are not necessarily obvious on planning maps in the way that roads are present on contemporary land maps. From the outset, the regulatory processes of acquiring marine farm sites from New Zealand's seemingly 'open' marine commons have required these routes and recreational areas to be given similar or stronger consideration than even commercial fishers. In effect the regulatory processes have enabled recreational and other water users to 'stake out' paths, routes and 'ways' that are not otherwise visible on the seascape.

Moreover, in New Zealand adjacent land-owners initially had forms of riparian rights. Modern-day land-owners no longer have such strong rights, but through their ability to object to developments that would compromise their access to their land and the visual amenity from their land they retain a form of riparian right. These forms of empowering the existing users are further evidence that the 'wild west' metaphor is not applicable.

It is important to distinguish the interests of these recreational and public access users of the marine commons from Maori 'rights'. By-and-large Maori arguments relating to the development of marine farms do not recognise the 'right' of freedom of passage. Their arguments for restrictions are based on their customary usage, not on other peoples' 'rights' to freedom of the seas. Maori do not seem to see unfenced land, but sea-land that is as much part of their *rohe* (territory) as was the terrestrial land. Consequently they are in a position to swing their leverage behind developers without having to internally reconcile such developments with concepts of public access and freedom to wander. If Maori buy into the development, and the development is appropriate in terms of their customary responsibilities, then they may readily support marine farming that would encroach on navigation and recreational use by non-Maori. Understanding such positions facilitates entrepreneurial involvement with iwi and hapu. The recognition of Maori concerns adds another dimension to the existing 'users' that further undermines Tiddens' metaphor.

In summary, the existing coastal communities of users and the indigenous people had the ability to defend their marine space from marine farming development. The advent of the RMA adjusted the processes of acquiring that space, but still provided for the existing users to successfully object to such developments.

13.3 Acquisition Processes, Integrated Management and the Destruction of Social Milieux

In Chapter One I noted that among the arguments for integrated coastal management (ICM) was one that emphasised that ICM would enable rational multi-purpose use of the coastal marine environment. I also drew attention to Nichols' (1999) recent critique of ICM and her views that it had resulted in the penetration of capital into the coastal communities of developing countries to the disadvantage of those communities. This is an important assertion that my research calls into question, at least in a developed country context.

New Zealand coastal planning and management law has strong provisions protecting existing coastal communities and providing for community-based planning and

decision-making. These provisions have enabled the community to defend itself against the intrusion of outside capital. The fisheries legislation, however, favoured the development of individual quota that could be bought and sold (with some restrictions on foreign ownership and aggregation) relatively easily. There were no requirements on these owners to be part of the local community and the commercial fishers were considerably advantaged relative to the marine farmers. They had commenced purchasing farmers' spatial rights long before the advent of the RMA.

Despite its emphasis on biophysical effects, the RMA's greater specification of existing users' rights meant that locals were empowered relative to marine farmers. Conflicts between the mandates of different central government agencies also supported the local communities under both the pre- and post-RMA regimes. The RMA had enabled new areas to be farmed, but there were strong incentives for marine farmers to work with the local community, especially iwi/hapu. Only in the area of allocating quota did a central government agency enjoy hegemonic power and it was logical that the fishing industry should work closely with that agency rather than with local communities. Therefore, it was the single-sector, ITQ approach of the fisheries legislation that had exposed the local communities to the penetration of external capital. The major fishing companies had the natural synergies and the capital and property rights to steadily take control of the industry with the tacit support of the Ministry of Fisheries.

Contrary to Nichols' (1999) argument, it appears that the ICM approach of the RMA provided an incentive for entrepreneurial site developers to work with locals in obtaining space for marine farms that might otherwise have become owned by 'outsider' fishing companies. To the extent that the entrepreneurs control the local partnerships then the RMA has also encouraged capital penetration.

This is only part of the picture, however. The RMA had helped make manifest the competing claims of users of the commons. The additional complexity and related transactional costs of the processes to resolve these conflicts had advantaged those able to address the complexities and with the capital to participate effectively in the processes. To the extent that plans had adopted discretionary approaches to

addressing applications for marine farms, entrepreneurs gained some advantages. They have mobilized local capital to develop marine farming in new places and different forms, overturning the traditional expectations of where marine farms might develop.

Some planners and decision-makers were comfortable with discretionary approaches and were prepared to accept a quite different pattern of marine farming development than had previously existed. In so doing they may have overlooked expectations within the community that historical patterns of marine farming development would continue. Other decision-makers, concerned that the community might be ill-equipped to address sophisticated proposals developed by non-locals or concerned about the sporadic and sprawling spatial pattern that was emerging and the level of transactional costs involved, sought a more functionally ordered 'development control' style of planning. For this latter group, the moratorium was the most logical solution to provide time to amend plans to be more restrictive.

This does not necessarily mean that the outcome of the moratorium would be the creation of large aquaculture management areas and the prohibition of marine farming elsewhere, as happened in the Golden and Tasman Bays. Waikato had, for instance, adopted a different approach which still enabled marine farming to develop outside its aquaculture management area. More conservative planners and decision-makers, and the majority of respondents to my questionnaires, preferred such a traditional, activity-based approach with areas designated for marine farming and areas where it is prohibited.

The legislative outcome in 2002 has been a return to encouraging a modernist style of planning where one planning solution is encouraged as a panacea. Development of marine farms is to be (local) government-directed and to comprise standard practices and technology. The incentives in the RMA to invest in technology that enables new areas to be developed without unacceptable environmental effects will be greatly reduced. Moreover, marine farming is likely to develop large concentrated-block spatial patterns of industrialized production. These will be similar, but at a grander scale, to those implemented through the marine farming plans of the 1970s and

1980s. This approach does not, however, completely undermine the effects-based planning concepts of an enabling regulatory regime because the aquaculture management areas are likely to be developed on the basis of cumulative effects on the environment, including the effects on recreational space, navigation and public access.

It could be argued that this more traditional modernist approach to marine farming regulation and planning in New Zealand is more protective of community status quo and power than the RMA regime. Certainly the smaller local farmers appeared more secure in the industry under the Marine Farming Act 1971, but this appearance is a chimera. The Ministry of Fisheries predecessors sought to expand the industry through seeking economies of scale and involving more processors under that regime too. The process of expanding large fishing company involvement was well-established prior to the RMA.

My argument, therefore, is that ICM can result in both modern and post-modern outcomes depending on the design of the ICM. Post-modern outcomes are arguably more pluralist in nature and more accepting of differences within a community and therefore should make it more difficult for external capital to marginalize or co-opt groups into acceding to capitalist developments. Modernist regimes are anticipated to facilitate the penetration of capital as they provide greater certainty for investment and focus on the best use, usually determined by economic measures. My research suggests that ICM can both enhance and undermine the ability of the local community to resist external investment. To argue, as does Nichols, that it will necessarily do one or the other is to oversimplify the diversity of possibilities and the different character brought to regimes by those involved in implementing them. But by the same token, to argue that she is incorrect is also not tenable. My research was conducted in a developed country and hers was in a developing country context. This is an area requiring much more research in real-world situations.

13.4 Marine Farming Rights: A Challenge to Two-Dimensional Spatial Allocations

The way in which the marine farms have developed makes manifest the routes and other uses of the marine area by the non-marine farmers. Many of these uses are undocumented until the consents process begins. The RMA gives a more even weighting between such uses and enables them to become more apparent. Like rubbings over patterned blocks, the desire to place marine farm rights on maps of the sea has made manifest the underlying rights to the commons. In contrast to the enclosure that has occurred on rangeland and commons in New Zealand, the USA, Australia and the United Kingdom, the New Zealand marine environment has not been 'enclosed', but 'disclosed'.

This disclosure is reinforced in the controls on the layout of the New Zealand farms, especially through requiring accessways and the provisions for removal of farms. Coastal permits and marine farming licences have been designed and implemented because they support the commons' nature of the marine environment. Mussel farmers, for instance, own the rights to use the space occupied by their structures and the seabed on which the anchors rest, not the space between the lines or the water column. They cannot enforce trespassing rules. Although many farmers still retain lease rights in preference to the subsequent types of rights, a number have been replaced and, in the interests of integrated coastal management, the remaining leases are likely to eventually be replaced by coastal permits. Farming has and continues to be constrained to areas not well-used by boaters and must always give precedence to boating, which has encouraged subsurface farm developments. The basic concept of the freedom of the seas has held firm.

This is not always readily apparent from the mapping of marine farms. The use of two-dimensional spatial representations of planning zones and marine farming rights in New Zealand is quite inadequate. The large areas of space that are marked on maps as being the licenced areas, when mapped in two dimensions, can lead people to believe there has been a greater enclosure of their commons than has in fact occurred. When grouped together, as at Whangaroa or Big Glory Bay, they also invite

comparisons with terrestrial subdivisions of 'greenfield' space or industrial clusters. The actual space occupied within each permitted area is three dimensional and more appropriate comparisons would be enabled if the representation of the farming more clearly illustrated those dimensions. If two-dimensions are retained and new developments are seen as subdivision of the sea then the allocation tends toward an orderly functionality characteristic of modernist planning regimes. This ignores the social relationships, the meanings that people attach to places as 'play space' and the diversity of activities in which they engage. It also ignores the biophysical variations in the marine environment.

The marine environment needs to be perceived as a place of flux and fluidity; space filled with static, not static space; a topography with relief, not a relief without topography! By enabling social factors to come forward, as did earlier marine farm plans in places like the Hauraki Gulf, a post-modern variety of farming allocation is achievable. Social factors in combination with biophysical variables and new technology can result in 'odd' patterns. If a three-dimensional approach to the allocation of marine farming rights was adopted then a post-modern seascape might develop. This could comprise hamlet farms nestled on seafloors underneath navigational channels, while other farms might float on the water's surface or be suspended in mid-water relationships. These might be side-by-side or at great distances from single farms or 'industrial' conglomerates. Such a diversity of forms was beginning to be apparent under the RMA. The representation of marine farm rights in two-dimensional fashion will continue to overstate the surface reality of the occupied space.

13.5 Some Remarks on Future Research Priorities for Aquacultural Geography

As I argued in Chapter Six, researchers in the new field of aquacultural geography have largely ignored the value of mapping the 'places' of their objects. There has been an over-concentration on sustainability of the industry and investigation of global product and value chains without a concurrent commitment to regional geographies. Rather than focusing on normative goals of achieving sustainable aquaculture development I believe aquacultural geographers need to (re)turn to the

early traditions of agriculture and settlement geography, get their boots wet by finding the 'places' and 'peoples' of aquaculture and then return to their ivory towers and simply have a 'good old fashioned think' about their data. Aquacultural geographers need to recognize that it is simply fanciful to engage constructively in current policy or geographical debates without an adequate understanding of the historical spatial development and transformations of the geographies of aquaculture. This thesis has demonstrated the usefulness of such an approach and has started to fill some of the gaps in our knowledge of the sector and its spatial development.

My research provides a macro-scale understanding of New Zealand's marine farming and associated regulatory regimes, and has explored the responses of marine farmers to these. A significant next step for research in the New Zealand context would be to link existing national data on the property rights of marine farms into localized three-dimensional representations that incorporate knowledge of the other rights present and biophysical variables. This could be further augmented by exploring the socio-cultural contexts of communities adjacent to and using the area around marine farms and examining the social transformations that aquaculture has brought about.

Internationally, there is a need for similar studies in other countries so that we can develop comparative analyses that may be more fruitful in guiding future models and assessment of the probable outcomes of different policies and regulatory regimes. This might guide us in understanding how to develop approaches to integrated coastal management that incorporate multiple, overlapping uses and avoid uninformed reversions to modernist planning regimes. Until such a foundation is laid, aquacultural geography will remain more speculative than informative.

Postscript

When I was young I enjoyed a pastime where I would put a coin under a piece of paper, and then gently rub the paper with a pencil. The structure of the pattern carved on the face of the coin emerged as if by magic. This thesis is a gentle 'rubbing', revealing some of the patterns carved into the face of the sea.

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[1] The reference style used here does not strictly follow standard legal styles. The decision to deviate reflects my use of the case law cited as primary material and in almost all cases the original court decisions, usually obtained via Brookers online services (http://80-www.brookers.co.nz.ezproxy.waikato.ac.nz:2048/ as at 7 July 2002). Where I have used reported sources considered more authoritative by the legal profession, these have been listed. Undoubtedly some of the cases I have cited have reported versions, but the escalating number of media outlets which report case law in full or abbreviated form left me unable to say with certainty that a case had not been cited somewhere. In some authoritative sources (e.g., NZLR) the original decision is partly summarised and the sections relevant to my research are omitted. Accordingly I have not suggested that any of the cases cited is unreported, but as a social scientist have cited the document actually read.

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Appendix 1: Explanation of the assessments of marine farmers' property rights on each of the axes of Scott's model for the period 1866 to 1991

Oyster Fisheries Act 1866

	Ideal	Marine farmer	
Flexibility	1	0.1	Oysters only
Quality of Title	1	0.5	No registers and silent on all key items, but has no development requirement
Exclusivity	1	0.01	Only for the purpose of cultivating oysters, no other exclusivity of any sort
Transferability	1	0	None
Divisibility	1	0	None
Duration	1	0.14	14 years, no renewal provisions

Oyster Fisheries Act 1892

	Ideal	Marine farmer	
Flexibility	1	0.1	Oysters only, must develop in three years
Quality of Title	1	0.2	Revocable
Exclusivity	1	0.85	Specifically license, no exclusivity right of occupation, but as farm must have the space
Transferability	1	0	None
Divisibility	1	0	None
Duration	1	0.41	20yrs plus one 21 yr renewal

Sea-fisheries Act 1894

	Ideal	Marine farmer	
Flexibility	1	0.1	Fish, oysters, seals may be enabled by regulations, but not included in this rating
Quality of Title	1	0.25	3 month notice for revoking but can be revoked for bad management
Exclusivity	1	0.85	Specifically license, no exclusivity right of occupation, but as farm must have the space
Transferability	1	0	None
Divisibility	1	0	None
Duration	1	0.42	21 plus one 21 year renewal

Rock Oyster Farming Act 1964

	Ideal	Marine farmer	
Flexibility	1	0.1	ROY only, subject to wide ranging regulatory controls,
Quality of Title	1	0.25	Subject to loss with 3 months notice for other uses, forfeiture for bad management, local land register
Exclusivity	1	0.8	Exclusive lease, access way could be imposed
Transferability	1	0	None
Divisibility	1	0	None
Duration	1	0.28	14yrs, possible renewal (regulations allow one only), plus preferential application right

Marine Farming Act 1968

	Ideal	Marine farmer	
Flexibility	1	0.4	All species except ROY, SAM, TRO, still wide ranging regulatory powers, must develop in 2 yrs, joint ownership permitted
Quality of Title	1	0.4	Provisions for payment for improvements, not in harbour board or other vested area but still vulnerable
Exclusivity	1	0.85	Includes water column and exclusive lease, but still has access way plus mineral provisions
Transferability	1	0.05	Mentions ability to assign etc with prior permission of Minister
Divisibility	1	0.05	Subletting with Minister's approval
Duration	1	0.42	Increased, 14 year plus one or more renewals

Marine Farming Act 1971

	Ideal	Marine farmer	
Flexibility	1	0.6	All species except SAM, TRO, still wide ranging regulatory powers, must develop in 2 yrs and continue to develop, variations require Secretary's approval joint ownership permitted
Quality of Title	1	0.2	Provisions for payment for improvements, and improved registration requirements, but wider ability to revoke for 'any public purpose' more than counters these
Exclusivity	1	0.85	Includes water column and exclusive lease, but still has access way plus mineral provisions, prohibited anchorage provisions.
Transferability	1	0.05	Fully transferable, subject to Minister's approval
Divisibility	1	0.05	Subletting of whole or part, but subject to Minister's approval
Duration	1	0.42	14 year, but with optional inclusion of one or more renewals, a preference right, and ability to extend for up to 14 years if no right of renewal, and Property Act also applies, so at least 28 years, probably more

Marine Farming Act 1971 in 1991 (after amendments)

	Ideal	Marine farmer	
Flexibility	1	0.7	All species except trout (TRO), and provision for short term research and pilot commercial and spat catching, otherwise no change form 1971
Quality of Title	1	0.2	No change
Exclusivity	1	0.85	No change
Transferability	1	0.05	No change
Divisibility	1	0.05	No change
Duration	1	0.42	No change

Resource Management Act 1991 Coastal permit

	Ideal	Marine farmer	
Flexibility	1	0.8	All species except trout (TRO) and many provisions for conditions, but no limits on size etc
Quality of Title	1	0.8	Minimal provision for review
Exclusivity	1	1	Secure against all other potential occupiers of the space
Transferability	1	1	Complete transferability
Divisibility	1	0	No divisibility
Duration	1	0.35	No renewal provisions

Appendix 2: Postal survey questionnaire booklets

Appendix 2a: Single-farm owner questionnaire, August 2000
Appendix 2b: Multi-farm owner questionnaire, October 2000

Appendix 2a: Single-farm owner questionnaire, August 2000

Cover letter to recipients of questionnaire (enclosed will be a tea bag and a coffee bag)

Dear …

I know marine farmers are very busy people, but I hope you will 'take a break', have a cup of tea/coffee and fill in this 15 minute questionnaire. You have been identified from the public MFish database as having owned a marine farm in 1998. If you have received more than one of these questionnaires it means that the MFish database has recorded your farms as being under different owners (for instance you may own one yourself and have another in a family trust or other legal arrangement). Please complete each survey you receive answering in terms of the relevant farm for each.

The aim of the research is to help understand the patterns of development of marine farming in New Zealand. I am especially interested in the reasons why the industry has grown in the way it has and in the places it has, and the role of plans and resource management legislation in the choices made. I believe the research will be of practical use to members of the marine farming industry.

The research is part of my doctorate study into the processes of allocating space for marine farming in New Zealand. It is partly supported by the University of Waikato.

Your responses will be treated in complete confidence and will be destroyed on completion of the research. I will publish a summary of the results in Seafood NZ (keeping all respondents anonymous). I will also send copies of that summary to all those who respond to this survey. When completed my doctoral thesis will be placed in the University of Waikato's library. I will also write various academic articles to share the findings more broadly. In all cases respondents will be kept anonymous unless I have your written approval to use your name.

I might also approach you at some stage for clarification or further information, but you have the right to refuse to respond - in other words, by completing this survey you are making no commitments to me. You may withdraw from the research at any stage without recrimination.

All survey forms received by …. will go into a lucky draw. Two winners drawn from the returned and completed surveys will be given a choice of either the New Zealand Historical Atlas, or a years subscription to your choice of either the NZ Geographic, or Seafood NZ, or membership of the NZ Geographical Society.

If you have any questions or concerns regarding this questionnaire or my research please feel free to contact me or my supervisor (Professor Dick Bedford) at the University of Waikato, telephone (07) 856 2889

Yours sincerely

Hamish Rennie

Department of Geography

University of Waikato

Marine Farming Questionnaire

August 2000

Contact: Hamish Rennie, Department of Geography, University of Waikato, Private Bag 3105, Hamilton. Email: Hgrennie@waikato.ac.nz
Telephone: (07) 856 2889

Please read the following instructions carefully.

All information that you give me is confidential, and will be used only for the purposes of this study. It is assumed that by filling in the questionnaire you are consenting to taking part in this study.

It is important that you give your answers specifically for the marine farm licence/ lease/ permit specified in the covering letter.

When you have finished, please return the completed questionnaire to me using the stamped addressed envelope provided.

Your views and information are very important to the success of this study, and I would like to thank you for taking the time to participate.

Section A: You and your Site

Different owners have different reasons for purchasing their farms and these may influence their choice of site. The distance to and from home, land access points, markets and packaging/processing facilities may also be important, but new technology and more powerful boats have meant that time might sometimes be more important than distance. Relationships with the local community and other parts of the industry have also been found important in other studies. This section of the questionnaire seeks information on these factors.

1. What is your position in the organization that owns this farm?
   ……..

2. Are you male/female (Please tick appropriate box)
   □ Male □ Female

3. Into which of the following age ranges do you fit (please circle appropriate answer)
   (i) 15 - 29
   (ii) 30 - 49
   (iii) 50 or older

4. Approximately how long have you been marine farming (including labouring):
   …….(years/months)

5. Have you completed any specialized course of training or qualification directly relevant to marine farming? (Please tick appropriate box)
   □ Yes □ No

   If yes, please name the course/qualification……..

6. When you chose your marine farm site were you intending to diversify (i.e., to use the site for more than one marine species)? (Please tick appropriate box)
   □ Yes □ No

7. If you answered 'No' to question 6: If you had been thinking of farming more than one species on this site, would you still have chosen this place? (Please tick appropriate box)
   □ Yes □ No

8. Did you get your site from a ballot? (Please tick appropriate box)
   □ Yes □ No

9. Have you ever been in a ballot for any sites that you did not get? (Please tick appropriate box)
   □ Yes □ No

10. When you chose your site was it your intention to make marine farming your major source of business or personal income (Please tick appropriate box):
    □ Yes □ No

11. At the time of choosing your site, did your existing work *primarily* involve (please tick <u>most</u> accurate description):
    □ fishing □ processing fish
    □ farming on land (not aquaculture) □ marine farming
    □ aquaculture on land □ other (please specify)……..

12. Is your marine farm owned by the same people/company who (please tick all that apply):

i)	Process your product ……...	□ Yes	□ No
ii)	Market your product ……	□ Yes	□ No
iii)	Harvest your product ……...	□ Yes	□ No
iv)	Manage your farm ……	□ Yes	□ No

13. The following table seeks information on the distance and time it takes to get from your marine farm site to various key places at the time that you first obtained that marine farm site, and then later in 1998. It also seeks information on changes that might have occurred over time since you first obtained this marine farm site. Both distance and time are needed because they may have changed over the years. For instance a more powerful boat may mean that it takes you less time now to cover the same distance as it did when you first got the site. Alternatively the processor/packaging or market places for your product may have changed.

Please complete the following table by answering in the spaces ('…...') provided.

From marine farm site to:	**When you first got the site:**		**In 1998:**	
	Distance (km/miles/nm – please circle which you use)	Time (hrs)	Distance (km/miles/nm – please circle which you use)	Time (hrs)
Home	……km/miles/nm	….hrs….mins	……km/miles/nm	….hrs …mins
Business/workplace	……km/miles/nm	….hrs …mins	……km/miles/nm	….hrs …mins
Usual Land Access Place	……km/miles/nm	….hrs …mins	……km/miles/nm	….hrs …mins
Usual Market or Processing Place/facility	……km/miles/nm	….hrs …mins	……km/miles/nm	….hrs …mins

14 Approximately what proportion of your usual annual saleable production would be:

……%	……%	……%	……%
Sold directly to public/retailer /wholesaler	Sold to processor	Given away (e.g. to iwi, family, friends, employees, or eaten yourself)	Other (please specify)

15 Did you receive any form of direct government assistance to establish your site?

□ Yes □ No

16 Please circle the answer that best describes your marine farm:

(a) family owned business
(b) owner/operated business
(c) corporate investment
(d) family or personal hobby/lifestyle farm
(e) hapu/iwi owned
(f) primarily a research project/business
(g) other (please specify)……

17 (a) Have you ever been prevented from obtaining a permit for a site that you wanted to farm? (Please tick appropriate box)

□ Yes □ No

(b) If you were prevented from obtaining a permit for a site that you wanted please state the three main reasons that you did not obtain the permit for the site(s)?

……

……

……

18 Does the current legislation (The Resource Management Act and the Fisheries Act) make it easier or harder to get a marine farm site than the legislation did when you got this site? (Please tick appropriate box)

□ It is easier now □ It is harder now □ There is little difference

19 (a) Did you make any submissions on the Proposed Regional Coastal Plan for the area in which you farm? (Please tick appropriate box)

□ Yes □ No

(b) If yes, did you largely achieve the outcomes in the plan that you wanted?

□ Yes □ No

20 Have you made submissions opposing applications of other marine farmers for their marine farm site(s) under the current legislation? (Please tick appropriate box)

□ Yes □ No

21 Which will be ***more*** important in determining the location of marine farms over the next ten years? (Please tick only one box)

□ Rules in plans □ New technology

22 In the next ten years, will farms be **more likely** to be developed in outer bay, less sheltered and more isolated locations? (Please tick appropriate box)

□ Yes □ No

Why/why not?

.....
.....

23 (a) Are there areas where you would like to have a marine farm, but where marine farming is not allowed by a rule in a plan? (Please tick appropriate box)

□ Yes □ No

(b) If yes, within which regional council's boundaries does this happen?

.....

Section B: Reasons You Chose Your Site

Each of the following factors has been given at various times and places as reasons for the farms to be located where they are. I am interested in why you chose your site.

Physical Factors

24 When you first chose your site, how important in your decision was:

	Critically important	Very important	Moderately important	Minor importance	Not important
Water quality (including plankton availability)	☐	☐	☐	☐	☐
Shelter from wave action	☐	☐	☐	☐	☐
Farm was close to home	☐	☐	☐	☐	☐
It being close to a spat/seed/fingerling/smolt source:	☐	☐	☐	☐	☐

25 IF you chose your site NOW, how important in your decision would the following criteria be:

	Critically important	Very important	Moderately important	Minor importance	Not important
Water quality (including plankton availability)	☐	☐	☐	☐	☐
Shelter from wave action	☐	☐	☐	☐	☐
Farm was close to home	☐	☐	☐	☐	☐
Being close to a spat/seed/fingerling/smolt source	☐	☐	☐	☐	☐

6

Community Factors

26 When you first started farming this site, was there a community closer to the farm site than the community you lived in?

☐ Yes ☐ No

27 When you first chose the site for your farm, how important were the following factors:

	Critically important	Very important	Moderately important	Minor importance	Not important
Community support/opposition	☐	☐	☐	☐	☐
Farm was close to your market or to processing/packaging facilities	☐	☐	☐	☐	☐
Close to an easy landing access place	☐	☐	☐	☐	☐
(Proposed) planning restrictions (e.g. zones in plans)	☐	☐	☐	☐	☐

28 If you chose your site now, how important would those same factors be:

	Critically important	Very important	Moderately important	Minor importance	Not important
Community support/opposition	☐	☐	☐	☐	☐
Farm was close to your market or to processing/packaging facilities	☐	☐	☐	☐	☐
Close to an easy landing access place	☐	☐	☐	☐	☐
(Proposed) planning restrictions (e.g. zones)	☐	☐	☐	☐	☐

29 Are you:

☐ Maori ☐ Non-Maori

30 Is your farm regularly visited by tourists?

☐ Yes ☐ No

If yes, approximately how often in a year?……..

31 *When you first chose the site for your farm,* how important was:

	Critically important	Very important	Moderately important	Minor importance	Not important
Iwi/hapu Support/opposition	☐	☐	☐	☐	☐
Recreational fishing/boating support/opposition	☐	☐	☐	☐	☐
Commercial fisher support/opposition	☐	☐	☐	☐	☐

32 And NOW, how important would the following factors be:

	Critically important	Very important	Moderately important	Minor importance	Not important
Iwi/hapu Support/opposition	☐	☐	☐	☐	☐
Recreational fishing/boating support/opposition	☐	☐	☐	☐	☐
Commercial fisher support/opposition	☐	☐	☐	☐	☐

33 Were the following factors important, when you first chose your farm:

	Critically important	Very important	Moderately important	Minor importance	Not important
Local Cheap Labour	☐	☐	☐	☐	☐
Providing employment for community youth	☐	☐	☐	☐	☐
Government support/ encouragement	☐	☐	☐	☐	☐

34 How important would those factors be, <u>if you chose your farm now:</u>

	Critically important	Very important	Moderately important	Minor importance	Not important
Local Cheap Labour	☐	☐	☐	☐	☐
Providing employment for community youth	☐	☐	☐	☐	☐
Government support/ encouragement	☐	☐	☐	☐	☐

Site Desirability

35 Did you have any financial interest in, or were you working on any other marine farms near the site you chose? (please tick all those that apply)

☐ Had a financial interest in nearby farm ☐Worked on nearby farm

36 Please consider the following aspects of site selection, in terms of when you first chose the site for your farm:

	Extremely Desirable	Desirable	Neither desirable nor undesirable	Undesirable	Extremely Undesirable
That it be close to other marine farms	☐	☐	☐	☐	☐
That it be in an area of high natural character	☐	☐	☐	☐	☐
That the nearby land was essentially farmland	☐	☐	☐	☐	☐
That it be near a river	☐	☐	☐	☐	☐
That it be isolated, a long way from urban areas.	☐	☐	☐	☐	☐

37 Now consider those same aspects of site selection in terms of what you would look for if you were choosing your site now:

	Extremely Desirable	Desirable	Neither desirable nor undesirable	Undesirable	Extremely Undesirable
That it be close to other marine farms	☐	☐	☐	☐	☐
That it be in an area of high natural character	☐	☐	☐	☐	☐
That the nearby land was essentially farmland	☐	☐	☐	☐	☐
That it be near a river	☐	☐	☐	☐	☐
That it be isolated, a long way from urban areas.	☐	☐	☐	☐	☐

38 Please indicate your preferences (you may tick more than one ☐):
When I first chose my farm site, I wished to be:

- ☐ Near a river
- ☐ Near an urban area
- ☐ Near a rural area
- ☐ Isolated
- ☐ Near an area of high 'natural character

1998 – Present

39 (a) If you were to choose a farm site today, would you choose the same site as the one you had in 1998? (Please tick appropriate box)

☐ Yes ☐ No

40 (a) If you answered 'No' to question 17, is this because new technology enables you to farm different sites? (Please tick appropriate box)

□ Yes □ No

(b) What other reasons, instead of (or additional to) new technology, would make you choose a different site to the one you had in 1998?

.....
.....
.....
.....
.....
.....

[INSERT QUESTIONNAIRE COUNTER NUMBER]

Prize Draw

41. If this survey is returned by ….., you will be entered into the lucky draw. If you are drawn as one of the two lucky winners which of the following prizes would you most like to receive (please tick one box):

□ a copy of the New Zealand Historical Atlas, or
□ a year's subscription to the NZ Geographic, or
□ a year's subscription to Seafood NZ, or
□ a year's membership of the NZ Geographical Society, or
□ a copy of Bateman's Contemporary Atlas of New Zealand.

Thank you for completing this survey,

Yours truly,

Hamish Rennie
Geography Department

Appendix 2b: Multi-farm owner questionnaire, October 2000

University of Waikato

Dear …

I know marine farmers are very busy people, but I hope you will 'take a break', have a cup of tea/coffee and fill in this 15 minute questionnaire. You have been identified from the public MFish database as having owned a marine farm in 1998. *If you have received more than one of these questionnaires it means that the MFish database has recorded your farms as being under different owners (for instance you may own one yourself and have another in a family trust or other legal arrangement). Please choose one of the forms and answer in relation to that farm site only, and return the unaswered survey forms in the same envelope.*

The aim of the research is to help understand the patterns of development of marine farming in New Zealand. I am especially interested in the reasons why the industry has grown in the way it has and in the places it has, and the role of plans and resource management legislation in the choices made. I believe the research will be of practical use to members of the marine farming industry.

The research is part of my doctorate study into the processes of allocating space for marine farming in New Zealand. It is partly supported by the University of Waikato.

Responses to the survey will be aggregated so that individuals will not be able to be identified from any published results or data. Your survey form and all information that might be identifiably yours will be kept completely confidential to me and the forms will be destroyed on completion of the research. I will publish a summary of the results in Seafood NZ (keeping all respondents anonymous and unable to be identified). I will also send copies of that summary to all those who respond to this survey.

I might approach you at some stage for clarification or further information, but you have the right to refuse to respond - in other words, by completing this survey you are making no commitments to me. You may withdraw from the research at any stage without recrimination.

All survey forms received by 16 October 2000 will go into a lucky draw. Two winners drawn from the returned and completed surveys will be given a choice of either the New Zealand Historical Atlas, or Bateman's contemporary Atlas of New Zealand, or a years subscription to your choice of either the NZ Geographic, or Seafood NZ, or membership of the NZ Geographical Society.

If you have any questions or concerns regarding this questionnaire or my research please feel free to contact me at the University of Waikato, telephone (07) 856 2889

Yours sincerely

Hamish Rennie
Department of Geography

Marine Farming Questionnaire

October 2000

Contact: Hamish Rennie, Department of Geography, University of Waikato, Private Bag 3105, Hamilton. Email: hgrennie@waikato.ac.nz
Telephone: (07) 856 2889

Please read the following instructions carefully.

All information that you give me is confidential, and will be used only for the purposes of this study. It is assumed that by filling in the questionnaire you are consenting to taking part in this study.

It is important that you give your answers specifically for the marine farm licence/ lease/ permit specified in the covering letter.

When you have finished, please return the completed questionnaire to me using the stamped addressed envelope provided.

Your views and information are very important to the success of this study, and I would like to thank you for taking the time to participate.

Section A: You and your Sites (Number ……)

Different owners have different reasons for purchasing their farms and these may influence their choice of site(s). Farms may comprise more than one site and some farmers have several permits/licences/leases, but may operate them as 'one farm' or as a series of farms. **In this questionnaire a 'site' means the location of the individual areas you hold a permit/lease/license for, and a 'farm' refers to <u>all</u> your permits/licences/leases together as a whole (regardless of where they are located).**

Some farms may be in one bay or spread over several bays. The distance to and from home, land access points, markets and packaging/processing facilities may also be important, but new technology and more powerful boats have meant that time might sometimes be more important than distance. Relationships with the local community and other parts of the industry have also been found important in other studies. This section of the questionnaire seeks mainly information on these factors.

1. (I) What is your position in the organization that owns this farm?
   ……..
   (ii) Are you one of the (part-) owners of the farm?
   □ Yes □ No
   (iii) If you are not an owner, how long have you been working on this farm?……(years/months)

2. Are you male/female (Please tick appropriate box)
   □ Male □ Female

3. Into which of the following age ranges do you fit (please circle appropriate answer)
   (i) 15 - 29
   (ii) 30 - 49
   (iii) 50 or older

4. Approximately how long have you been marine farming (including labouring):
   …….(years/months)

5. Have you completed any specialized course of training or qualification directly relevant to marine farming? (Please tick appropriate box)
   □ Yes □ No

   If yes, please name the course/qualification……..

6. Are you:
   □ Maori □ Non-Maori

7. (i) Do you think of your farm as:
   □ one complete unit □separate units

   (ii) If you think of your farm as separate units, do you most usually refer to them as:
   □ in terms of the bay they are located in
   □ in terms of the individual permit (etc) sites
   □ other (please explain)……
   ……..

8. (i)Please circle the answer that best describes your marine farm now:
   (a) family owned business
   (b) owner/operated business
   (c) corporate/private investment
   (d) family or personal hobby/lifestyle farm
   (e) hapu/iwi owned
   (f) primarily a research project/business
   (g) other (please specify)……
   (ii) Which of the above categories best described it when it was obtained/established? (Write letter from above list here)……..

9. Is it easier or harder to get a farm site now, than it was to get the first site? (Please tick appropriate box)
   □ It is easier now □ It is harder now □ There is little difference

Please say why ……
……..

10. (a) Have the owners ever been prevented from obtaining a permit/licence/lease for a site that they wanted to farm? (Please tick appropriate box)

☐Yes ☐No ☐Don't know

(b) If the owners were prevented from obtaining a permit for a site that they wanted please state the three main reasons?

1. .....

2. .....

3. .....

11. (a) Did you make any submissions on the Proposed Regional Coastal Plan for the area in which you farm? (Please tick appropriate box)

☐ Yes ☐ No

(b) If yes, to date have you largely achieved the outcomes in the plan that you wanted?

☐ Yes ☐ No ☐ Plan not final yet

12. Have the owners of this farm owned sites that they no longer own?

☐ Yes ☐ No ☐ Don't know

If yes, approximately where were those site(s)?.....

13. When the owners obtained the first marine site of the existing farm were they intending to diversify (i.e., to use the site for more than one marine species)?

☐ Yes ☐ No ☐Don't know

14. If you answered 'No' to question 6: If the owners had been thinking of farming more than one species on this site, would they still have chosen this site? (Please tick appropriate box)

☐ Yes ☐ No ☐Don't know

15. How important were each of the following farming practices in deciding to get more than one site:

	Critically important	Very important	Moderately important	Minor importance	Not important
Increase production	☐	☐	☐	☐	☐
Obtain space for future expansion	☐	☐	☐	☐	☐
To enable rotation of fish to sites with environmental factors that suit their stage of development or market plans	☐	☐	☐	☐	☐
To enable some sites to be left 'fallow'	☐	☐	☐	☐	☐
To spread your risk	☐	☐	☐	☐	☐
To enable you to shift operations from sites that are affected by **human activities** (e.g. logging)	☐	☐	☐	☐	☐
To enable you to shift farm operations from sites that were threatened by **natural events** (blooms, floods, storms, etc)	☐	☐	☐	☐	☐
To obtain spat collection sites	☐	☐	☐	☐	☐
New technology enabled you to farm new sites	☐	☐	☐	☐	☐
To diversify to new species	☐	☐	☐	☐	☐

16. How important were each of the following farming practices in deciding to get more than one site:

	Critically important	Very important	Moderately important	Minor importance	Not important
Keep potential marine farm competitors from occupying the space	☐	☐	☐	☐	☐
Keep other activities (e.g. fishers, reserves) from claiming the space	☐	☐	☐	☐	☐
Anticipating changes in the legislation that would make it harder in future to get sites	☐	☐	☐	☐	☐
New sites were made available by authorities	☐	☐	☐	☐	☐
Rules changed in plans letting you apply for new places	☐	☐	☐	☐	☐
To sell the new site for profit when needed	☐	☐	☐	☐	☐
You had no choice, the sites were allocated by MAF/ Marine Department	☐	☐	☐	☐	☐

17. (a) When the owners obtained this farm was it their intention to make marine farming their major source of business or personal income (Please tick appropriate box):

☐ Yes ☐ No ☐ Don't know

(b) Have the owners ever contracted someone else to farm or manage their sites?

☐ Yes ☐ No ☐ Don't know

(c) Have the owners ever been contracted to farm or manage someone else's site?

☐ Yes ☐ No ☐ Don't know

18. At the time of obtaining the first site, did the owners' work *primarily* involve (please tick <u>most</u> accurate description):

☐ fishing ☐ processing fish

☐ farming on land (not aquaculture) ☐ marine farming

☐ aquaculture on land ☐ marine science research

☐ other (please specify).....

19. Have you ever been in a ballot and failed to get any sites? (Please tick appropriate box)

☐ Yes ☐ No

20. Is your marine farm owned by the same people/company who (please tick all that apply):

i) Process your product …….. ☐ Yes ☐ No

ii) Market your product …… ☐ Yes ☐ No

iii) Harvest your product …….. ☐ Yes ☐ No

iv) Manage your farm …… ☐ Yes ☐ No

21. On average how long does it take to get to the nearest site in your farm from the owners:

    i. Home……

    ii. Business/workplace……

    iii. Usual land access point……

    iv. Usual marketing/processing place……..

    v. The furthest site in your farm……

22. Approximately how far is it from the nearest site on your farm to:

    i. The furthest site ……

    ii. Usual land access point……

23. In the time since the first site of the farm was obtained by the current owners, have any of them moved their home:

    □ closer to the farm □ further away □ stayed the same □ do not know

24. Approximately what proportion of your farm's usual annual saleable production would be:

……%	……%	……%	……%
Sold directly to public/retailer /wholesaler	Sold to processor	Given away (e.g. to iwi, family, friends, employees, or eaten yourself)	Other (please specify)

25. Did the owners receive any form of direct government assistance/tax breaks to establish the first or any other site site(s)?

    □ Yes (first site) □Yes (other sites) □ No assistance at any time

    If yes, what type of assistance? …….

26. (I) Have you made submissions opposing applications of other marine farmers for their marine farm site(s) under the current legislation? (Please tick appropriate box)

□ Yes □ No

(ii) Which of the following regimes did you like the most:

□ Marine Farming Act □ The current dual permit RMA/ Fisheries Act

Why?.....

.....

27. Which will be ***more*** important in determining the location of marine farms over the next ten years? (Please tick only one box)

□ Rules in plans □ New technology

28. In the next ten years, will farms be **more likely** to be developed in outer bay, less sheltered and more isolated locations? (Please tick appropriate box)

□ Yes □ No

Why/why not?

.....
.....

29. (a) Are there areas where you would like to have a marine farm or more sites, but where marine farming is not allowed by a rule in a plan? (Please tick appropriate box)

□ Yes □ No

(b) If yes, within which regional council's boundaries does this happen?

.....

(c) If you have had an application(s) for a lease/licence/permit that was declined, which agency declined it, and in which year(s)? .....

Section B: Reasons Your Farm Is Where It Is

The following factors have been given as reasons for farms being located where they are. **I am interested in why your sites are where they are and have their shape and size.**

If the owners gained (some of) their sites by ballot please answer in terms of why they chose to enter the ballot for that particular area.

30. Did the owners gain any sites by ballot? ☐ Yes ☐ No

Physical Factors

31. (ii) When the owners obtained their first site on this farm, how important were the following in determining where to buy or establish that site:

	Critically important	Very important	Moderately important	Minor importance	Not important
Water quality (including plankton availability)	☐	☐	☐	☐	☐
Shelter from wave action	☐	☐	☐	☐	☐
Farm was close to home	☐	☐	☐	☐	☐
Being close to a spat/seed/fingerling/smolt source:	☐	☐	☐	☐	☐

32. If new sites were applied for (or bought) **now**, how important would those same criteria be in deciding where to have the sites:

	Critically important	Very important	Moderately important	Minor importance	Not important
Water quality (including plankton availability)	☐	☐	☐	☐	☐
Shelter from wave action	☐	☐	☐	☐	☐
Farm was close to home	☐	☐	☐	☐	☐
Being close to a spat/fingerling/etc source	☐	☐	☐	☐	☐

Community and accessibility Factors

33. When the owners obtained their first site on this farm, how important were the following in determining where to buy or establish that site:

	Critically important	Very important	Moderately important	Minor importance	Not important
Community support/opposition	☐	☐	☐	☐	☐
Farm was close to your market or to processing/packaging facilities	☐	☐	☐	☐	☐
Close to an easy landing access place	☐	☐	☐	☐	☐
(Proposed) planning restrictions (e.g. zones in plans)	☐	☐	☐	☐	☐

34. IF new sites were applied for (or bought) **now**, how important would those same criteria be in deciding where to have the sites:

	Critically important	Very important	Moderately important	Minor importance	Not important
Community support/opposition	☐	☐	☐	☐	☐
Farm was close to your market or to processing/packaging facilities	☐	☐	☐	☐	☐
Close to an easy landing access place	☐	☐	☐	☐	☐
(Proposed) planning restrictions (e.g. zones)	☐	☐	☐	☐	☐

35. When you first started farming this site was there a community closer to the farm site than the community you lived in?

☐ Yes ☐ No

36. (i) Is your farm regularly visited by tourists?

☐ Yes ☐ No

(ii) If yes, approximately how often in a year?

☐ Weekly ☐ Monthly ☐ Other (specify).. ……..

37. *When the owners obtained their first site on this farm, how important were the following in determining where to buy or establish that site:*:

	Critically important	Very important	Moderately important	Minor importance	Not important
Iwi/hapu Support/opposition	☐	☐	☐	☐	☐
Recreational fishing/boating support/opposition	☐	☐	☐	☐	☐
Commercial fisher support/opposition	☐	☐	☐	☐	☐

38. IF new sites were applied for (or bought) **now**, how important would those same'criteria be in deciding where to have the sites:

	Critically important	Very important	Moderately important	Minor importance	Not important
Iwi/hapu Support/opposition	☐	☐	☐	☐	☐
Recreational fishing/boating support/opposition	☐	☐	☐	☐	☐
Commercial fisher support/opposition	☐	☐	☐	☐	☐

39. When the owners obtained their first site on this farm, how important were the following in determining where to buy or establish that site:

	Critically important	Very important	Moderately important	Minor importance	Not important
Local Cheap Labour	☐	☐	☐	☐	☐
Providing employment for community youth	☐	☐	☐	☐	☐
Government support/ encouragement	☐	☐	☐	☐	☐

40. IF new sites were applied for (or bought) **now**, how important would those same criteria be in deciding where to have the sites:

	Critically important	Very important	Moderately important	Minor importance	Not important
Local Cheap Labour	☐	☐	☐	☐	☐
Providing employment for community youth	☐	☐	☐	☐	☐
Government support/ encouragement	☐	☐	☐	☐	☐

41. How important have the following factors been in determining the **shape** of your farm sites:

	Critically important	Very important	Moderately important	Minor importance	Not important
Limited available space due to other farms	☐	☐	☐	☐	☐
Depth of water	☐	☐	☐	☐	☐
Navigational and public access requirements	☐	☐	☐	☐	☐

42. How important have the following factors been in determining the **size** of your farm sites:

	Critically important	Very important	Moderately important	Minor importance	Not important
Limited available space due to other farms in area	☐	☐	☐	☐	☐
Desire for future development space	☐	☐	☐	☐	☐
Size determined by government department	☐	☐	☐	☐	☐
Luck in the ballot processes	☐	☐	☐	☐	☐
Size represents the availability of farms for purchase	☐	☐	☐	☐	☐
Financial constraints	☐	☐	☐	☐	☐
Nutrient availability	☐	☐	☐	☐	☐
Navigational and public access requirements	☐	☐	☐	☐	☐

Site Desirability

43. Before obtaining this farm, did the owners have any financial interest in, or were they working on any other marine farms near the site they now farm? (please tick all those that apply)

☐ Had a financial interest in nearby farm ☐Worked on nearby farm

44. Please consider the following aspects of site selection, in terms of when the first site on the farm was obtained:

	Extremely Desirable	Desirable	Neither desirable nor undesirable	Undesirable	Extremely Undesirable
That it be close to other marine farms	☐	☐	☐	☐	☐
That it be in an area of high natural character	☐	☐	☐	☐	☐
That the nearby land was essentially farmland	☐	☐	☐	☐	☐
That it be near an urban area	☐	☐	☐	☐	☐
That it be near forestry	☐	☐	☐	☐	☐
That it be near a river or stream	☐	☐	☐	☐	☐
That it be isolated, a long way from urban areas.	☐	☐	☐	☐	☐

45. Now consider those same aspects of site selection in terms of what you would look for if you were choosing a site now:

	Extremely Desirable	Desirable	Neither desirable nor undesirable	Undesirable	Extremely Undesirable
That it be close to other marine farms	☐	☐	☐	☐	☐
That it be in an area of high natural character	☐	☐	☐	☐	☐
That the nearby land was essentially farmland	☐	☐	☐	☐	☐
That it be near an urban area	☐	☐	☐	☐	☐
That it be near forestry	☐	☐	☐	☐	☐
That it be near a river	☐	☐	☐	☐	☐
That it be isolated, a long way from urban areas.	☐	☐	☐	☐	☐

46. Please rate the desirability of each of the following methods of allocating sites for marine farms:

	Extremely Desirable	Desirable	Neither desirable nor undesirable	Undesirable	Extremely Undesirable
First come first served	☐	☐	☐	☐	☐
An area identified as suitable for farming has sites allocated by random ballot	☐	☐	☐	☐	☐
An area identified as suitable for farming has sites tendered to highest bidder	☐	☐	☐	☐	☐
Tender, but not necessarily to highest bidder	☐	☐	☐	☐	☐
Rights to harvest in an area are bought from quota holder associations	☐	☐	☐	☐	☐
New areas are progressively opened for farming as existing ones become fully developed	☐	☐	☐	☐	☐
Plans describe the effects that are to be avoided in particular areas and people can then apply for sites	☐	☐	☐	☐	☐
Plans set some areas aside specifically for marine farming	☐	☐	☐	☐	☐

47. Please rate the desirability of giving each of the following a preference for any site or area:

	Extremely Desirable	Desirable	Neither desirable nor undesirable	Undesirable	Extremely Undesirable
Preference to local residents/community	☐	☐	☐	☐	☐
Preference to existing	☐	☐	☐	☐	☐

aquaculturists					
Preference to Maori	☐	☐	☐	☐	☐
Preference to fishers	☐	☐	☐	☐	☐
Everyone should be treated equally – no preferences to any particular sector/group	☐	☐	☐	☐	☐

48. Please rate the desirability of decisions on applications being made by:

	Extremely Desirable	Desirable	Neither desirable nor undesirable	Undesirable	Extremely Undesirable
Mfish	☐	☐	☐	☐	☐
DoC	☐	☐	☐	☐	☐
Local Iwi/hapu	☐	☐	☐	☐	☐
Local regional or district/unitary council	☐	☐	☐	☐	☐
Fishing industry	☐	☐	☐	☐	☐

1998 – Present

49. (a) If you were to choose a farm site today, would you choose the same sites as the ones you had in 1998? (Please tick appropriate box)

☐ Yes ☐ No

If 'no', why not? ……..
……
……

50. (a) If you answered 'No' to question 49, is this because new technology enables you to farm different sites? (Please tick appropriate box)

☐ Yes ☐ No

(b) What other reasons, instead of (or additional to) new technology, would make you choose a different site to the one you had in 1998?

……
……
……
……
……
……

Prize Draw

51. If this survey is returned (postmarked) by 1 November 2000 you will be entered into a lucky draw. If you are drawn as one of the **two** lucky winners which of the following prizes would you most like to receive (please tick one box):

☐ a copy of the New Zealand Historical Atlas, or
☐ a year's subscription to the NZ Geographic, or
☐ a year's subscription to Seafood NZ, or
☐ a year's membership of the NZ Geographical Society, or
☐ a copy of Bateman's Contemporary Atlas of New Zealand.

I would very much appreciate a name of a contact person and a telephone number I could contact them on if I need to clarify anything in this survey or follow- up further on related issues:

Name……..
Contact number……

Please make any additional comments regarding the survey or any other matters that you think may be useful on this page.

Thank you for completing this survey,

Yours truly,

Hamish Rennie

Geography Department
University of Waikato

Appendix 3: Summary of reviewed relevant post-Resource Management Act case law

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1993 Dec. 1	Occupation	Exclusion of others is legal right based rather than activity or physical exclusion.	N	A137/93(PT) Southern Scallop Fishery Quota Holders v. TDC. SSFQH appealed TDC decision to allow 412.3ha total for spat catching and cultivation (4 areas in Tasman Bay). Argue should have been a restricted coastal activity on occupation and restriction of public grounds. Case predates 1993 RMA amendment.	The exclusion of others created by s 12(2)(a) is of a kind that is available to the holder of a lease or licence, rather than activity which means that members of the public effectively will be excluded from occupying an area. It is the ability to exclude legally that is important, not the effective exclusion.	Sheppard
1994 Aug. 9	Plan purpose	Declined application as *ad hoc* planning	Y	NZRMA 472(PT) Jessep v. MDC appeal against MDC decision to decline farm which was discretionary activity in proposed MPS.	Contrary to proposed MPS's multiple use objective, and is a*d hoc* planning. Note accepts proposed MPS as a proposed RCP and considers decisive.	Treadwell
1994 Dec. 22	Plan weight and purpose	Grated application as 'wise use', effectively dismisses proposed maritime scheme as of minimal weight	N	PT, W130/94 Regular Developments Ltd. V. MDC appeal against MDC declining application for farm at Knobby's Reef, Port Underwood. Site is outside areas defined for marine farms in MPS, so questioned whether non-complying or innominate. Anticipated $150,000 per annum from 3ha farm, cf 2500/ha for land farm.	1980s provisions for marine farms may no longer be relevant, but proposed maritime planning scheme has status of proposed regional coastal plan but *has minimal weight.* Application 'non-complying' not innominate or discretionary. Headland not prominent for navigation. Farm will add to the economy as a 'wise use of a renewal resource' in accord with regional plan.	Willy

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1995 Feb. 21	Alienation of public space, conflict between navigation and deeper water farms	200m navigational limit still relevant. Cumulative effect	Y	PT, W16/95 Thomas v. MDC appealing MDC decision to decline application for mussel and dredge oyster farm in Kaikoura Bay, Port Underwood. Dredge oysters high value. Non-complying	Appeal dismissed as conflicts with public access requirements of proposed regional policy statement, NZCPS, and district and regional plans.	Willy
1995 Mar. 28	Priority of competing applications	Priority given to order of lodgement of appeal, not notification of application	N	NZRMA 314, W19/95 (PT) Aqua king v. MDC. Application for priority hearing by Fleetwing Farms who had appealed MDC decision to decline application for Jerdans Bay, Port Underwood site. Aqua King had also appealed MDC declining its application for the same site. Case was to decide whose appeal should be heard first.	Order of application and order of lodgement of appeal. Aqua King lodged its application for site first, but Fleetwing's was accepted as complete (due to having consulted iwi) first. Aqua King were first to lodge appeal and so gained priority in this decision. PT noted that initially MDC returned Fleetwing Farms application because of the prior competing application, but it was not clear it had mandate to do so. MDC procedures for competing applications were unclear and needed clarification.	Kenderdine

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1995 Mar. 6	Precautionary principle	Alien species, rarity of harbour without marine farms, *de facto* exclusion of public access	N	PT W17/95 Greensill v. WRC. Local iwi appealed decision of regional council to grant Pacific oyster farm permit in Raglan Harbour. Argued on rights under Treaty, precautionary principle, and effects on Maori and public use of area for food and recreation.	If eradication of alien Pacific oyster from harbour was possible it court would decline application, but it was not. Critical factor in decline was that this was one of only two western NI harbours without farm structures, visual amenity, and *de facto* exclusion of public access	Treadwell
1996 Mar. 27	Navigation and purpose of plans	Sustainable management, not balanced use is plan and RMA purpose.	Y	Sandford [sic] South Island Ltd. v MDC. PT, W30/96. appeal against decline of 3ha farm application in Nikau Bay, Pelorus Sd.. submitters chose house site because of clear water in front allowing access and views, Sanfords want to 'infill'. Council concerned about navigation.	Upheld appeal as area effectively a "working environment". Proposed RPS requires sustainable management NOT balanced use, so could have one use dominating an area as long as it is sustainable.	Kenderdine
1996 Jun. 12	Priority of competing applications	Upholds PT decision, first come first served must apply under RMA	N	High Court AP72/95 Fleetwing v. MDC. Appeal against PT decision to give priority to first lodged appeal.	Notes that changes in proposed plan rules means the formerly declined application is likely to be approved and so whichever gets priority of appeal will get the site.	Gallen

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1996 Aug. 14	Definitions of activities and national importance	Allowed subsurface sponge farming only to mitigate effects on visual amenity and shags.	Y	PT W103A/96 Trio Holdings v. MDC. Appeal against MDC declining application for 3ha site in Waitata reach to farm mussel, other shellfish and sponge. Area a king shag (threatened species) feeding ground. Marine farming prohibited in proposed RCP. Visual effects also significnat	Prohibition rule poorly drafted and activity discretionary. Proposal of national importance, without diversification industry could fail and the sponge had potential anti-cancer pharmaceutical possibilities important to well-being. Sponge farming on subsurface buoys only allowed on a site area modified to exclude shag feeding ground.	Skelton
1996 Aug 23	Bluewater title and Magna Carta rights	Bluewater title and Magna Carta rights not contested as not relevant to the key issues	N	HC Wellington, AP82/96 Riddiford v. South Wairarapa DC. Appeal against conviction for illegal excavation for aquaculture pond. Argued on grounds of 'bluewater title' and Magna Carta and jurisdiction.	Bluewater title not contested nor rights under Magna carta, but the timetable would have allowed exercise of rights as landowner without breach of RMA. Timetable and scale of excavation also clarified jurisdiction. Conviction upheld	Greig
1997 Mar. 10	Spat holding on unmodified coast	Overturns MDC decision to grant permit.	Y	EC W20/97 Browning v. MDC. Appeal against MDC consent to NZMFA for a spat holding site at south end of Annie Bay on eastern shore of Forsyth Island.	Cumulative effects of marine farms on the Island, effects of proposal on landscape, views, and a largely untouched coastal environment. An outstanding landscape and a national priority that this landscape/seascape be protected. Allowing one farm would open the door to others.	Kenderdine

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1997 Mar. 12	Consent conditions specificity	To be enforceable must be in conditions, even if clearly described in application documents.	N	EC W22/97 Marchant v. MDC. C.E. Marchant sought declaration regarding procedural matters of consents for submerged technology farms in Port Gore. If successful they would have lapsed or been declared to be using technology other than that authorised (i.e., surface lines). Court held consents had not lapsed and that the conditions were insufficiently specific to find activity in breach of consent.	Kiwi Marine Farms, Port Gore MF and Sandford SI (who bought consent from KMF) involved. Marchant aresident concerned with visual effects. Subsurface technology nature and type clearly specified in application, but not in consent or AEE's specific words. Technology unable to be commercially viable so obtained new, varied consent for surface which is under appeal.	Kenderdine
1997 Jul. 3	Priority of competing applications	Overturns HC and PT decision. Indicates preference for priority to first complete application accepted as such by MDC.	N	CA255/96 Fleetwing Farms v. MDC. Appeal against HC and PT decisions to accord priority to lodgement of appeal.	RMA specifically different from MFA71 in giving priority only on 'first come first served' basis. As PT was *de novo* hearing it must consider application in context of Act. Indicated preference for priority to be given to first application accepted as complete.	Richardson

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1997 May 15	Cumulative effects, recreation public space	Frequency of use for recreation is not necessarily indicative of lack of importance. PMSRMP rules create ribbon development may be creating sprawl.	Y	EC W46/97 First Wave Ltd. v. MDC. Appeal against refusal of two permits in outer Admiralty Bay. Appeal disallowed on grounds that it would have an adverse effect on the recreational value of the area and provides an unacceptable alienation of public space.	Communities expect the coastal marine area shall generally be available for public access, use and enjoyment. Cumulative effect of marine farms applied for would significantly affect this and precedent could be considered. Possible conflict between NZCPS and PMSRMP noted.	Kenderdine
1997 Nov. 26	Priority of competing applications	First application for site accepted as complete by council gets priority between competing applications.	N	EC W101/97 Fleetwing Farms v. MDC. As discussed above in HC decision of 3 July.	As EC sits in shoes of the Council it should take account of any earlier priority and so date when application accepted as complete gave priority, not date of appeal to EC.	Kenderdine
1998 Feb. 20	Kaitiaki, cumukative effects, recreation	How to address kaitiaki issues and cumulative effects on recreational space	Y	EC W12/98 Marlborough Seafoods Ltd. v. MDC. Appeal against MDC decision to refuse consent for marine farm in Kanae Bay, Port Underwood. The Knobbys seen as naturally demarking limit of marine farms. Recreation space rare due to cumulative effects of marine farms. Appeal declined.	Strong iwi representation about kaitiaki and consultation. Noted also 277 submittors to PMSRMP seeking prohibition of marine farms in bay, visual effects significant. Did not accept arguments of limited area of occupation limiting recreation impact.	Kenderdine

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1998	RMA and FA83/96 interface	If purpose for which control is sought is managed under Fisheries Act then is outside RMA.	N	NZRMA 342 Challenger Scallop Enhancement Co v. MDC. Challenger appealed MDC grant of a permit for a marine farm over a scallop bed. Loss of seabed for scallop dredging, excluding fisherpeople from the marine farm area, impact on other forms of fishery, and sustainability of the fishery resource is beyond RMA jurisdiction.	'Purposeful approach' adopted. Controlling effects for purpose. If purpose is managed under Fisheries Act then is outside RMA. RMA controls occupation of space on land that is seabed, the control of any actual and potential effects of the use and development of land, and the control of activities in relation to the surface of the water.	Kenderdine
1998 Jun. 23	Surface and subsurface marine farms	Cannot control controlled activities by using conditions to change nature of the activity controlled.	Y	[1998] 4 ELRNZ 385, EC W38/98 Aqua King Ltd v. MDC. AK sought conesnt for a surface farm in a site where it already held consent for a subsurface farm between Red Clay Point and Matarau Point in Squally Cove. The PMSRMP has the area zoned so as to make marine farms a controlled activity. The application for a surface farm was treated as controlled, but conditions required it to be subsurface. The appeal was upheld allowing surface farm structure.	The judge noted MDC was attempting to treat this in opposite way to its successful defence in Marchant v. MDC 1997. Conditions cannot be used to alter the nature of the method applied for. The definition of 'marine farms' in the PMSRMP used'suface and/or subsurface structures' and the application had been for surface as a method and could not therefore be forced to be subsurface. Noted that the decision had major impact on MDC approach to marine farms.	Kenderdine

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1998 Aug. 27	Occupy definition	Occupy includes water column, permanent berths need resource consents.	N	EC C104/98 Re Lyttleton Marina Ltd. Did marina berth holders require a coastal permit and did they hold prior deemed permits. Answered 'yes' to both on grounds they were fixed structures and included water column.	Whether 'fixed', cites Moulton, and whether occupation includes water column, and physical v. legal occupation. PT previously preferred 'legal'. 'Physical' inserted in 1997.	Jackson
1999 Jan. 29	Planning for marine farms in MDC regional coastal plan	Changes to zone boundaries and rules.	Y	EC W11/99 Treble Tree Ltd. v. Lambert. A record of consented agreements to references under Cl 14 of 1st Sched. RMA re Coastal Marine Zones 1 and 2 of proposed MSRMP. Includes changes to objectives rules and policies.	All changes were agreed by negotiation between parties.	Kenderdine
1999 Mar. 18	Alien species and precedence	Resource consent can be precedent setting, dredge oysters and scallops are alien to the area, duration limited to allow for future changes in use of area	Y	[1999] NZRMA 209 EC, C32/99 Pigeon Bay Aquaculture Ltd. V. CRC. First appeal of Banks Peninsula farms. 2 sites, one approved by CRC other declined. Applicant appeals decline and others appeal the granted application. Discretionary activity to farm mussels, dredge oysters and scallop. Landscape typical of bays of Peninsula.	Dredge oysters and scallop are alien to the ecosystem and only mussels approved. To decline applications would be to set precedent and say 'no more aquaculture' in Peninsula's bays. Should not be much if any more farms.Permit limited to 15 years to enable another assessment of recreational intensification at that time. No presumption that further consents would be granted when these expire.	Jackson

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1999 Apr. 28	Undue adverse effects on fishing or sustainability of any fisheries resource	Mfish approval of MF permit is consultative not adversarial process.	N	HC CP25/97 Tasman Bay Amateur Marine Fishers Assoc. Inc. v. Mfish *et al*. Appeal based on adequacy of the information before the Mfish Policy Manager when making decision. Concluded is at discretion of person making decision. Noted that matters relating to environmental effects on fisheries should be argued at EC to ensure applicant is aware of opposition before making investments.	Notes that although EC would not consider fishing matters, conceivable that some environmental aspects were involved that could have been appropriately argued before EC. Applicant was therefore allowed to incur expenditure unaware that opposition might be lodged to marine farming permit especially via review and would have disallowed appeal on this ground if necessary given state of development ($350,000).	Gallen
1999 May 3	Seabed claim	Condition included preserving position of iwi.	N	EC W56/99 Sanford South Island Ltd. v. MDC. Three appeals of marine farm applications at northwestern entry of Pelorus. So EC directed that consents be issued with the objection of DoC to the condition noted, but including the iwi condition for the three farms (the other five being withdrawn).	Reserving the positions of iwi and Crown by agreement. DoC and Te Tau Ihu Iwi agreed to consent to the three if Sanford withdrew five other appeals of decisions in the same area. But the iwi also sought a condition regarding the decisions being without prejudice to its sea bed claim, to which DoC could not agree.	Kenderdine

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
1999 Aug. 10	Coastal Tendering	Moratorium extension illegal and councils must accept applications even during moratorium.	N	HC CP177/99 Ngati Apa Ki Te Waipounamu Trust v. Attorney General. Application for judicial review of decision to continue the 1998 Marlborough moratorium order. The Court decided the order was not proper and had it been the revocation should stand. Also supported MDC view that it had no option but to accept and process applications even during the moratorium as that only applies to granting the permit.	Described tendering provisions as poorly written especially re-revocation criteria. Noted Cabinet had two year moratorium proposal, but chose to have one year, which was not provided for in RMA. If people applied for things that could not be granted then that was their risk, but councils have no option but to accept and process applications.	McGechan
2000 Aug. 4	RMA and FA83/96 interface	'marine farming is to be controlled under the FA, and not the RMA, the erection of structures in the CMA is under RMA control, and the occupation of space is under RMA, but limited by FA96 ss6(1)(b).	Y	EC A95/2000 Ngati Kahu Ki Whangaroa Co-operative Soc. Ltd. v. NRC. Appeal against a decision of NRC to permit structures for a Pacific oyster farm on 8ha in Whangaroa Harbour. The appeal was disallowed after detailed consideration of plans and policies and site criteria and evidence.	Cites Kenderdine 1998 Challenger case as support, but adopts an activity based interpretation to conclude that control of marine farming is for FA83/96, not councils. Provisions in act making it discretionary interpreted as 'generally appropriate' activity.	Sheppard

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
2000 Aug. 24	Public access to wharf and road reserve	Public access over private land cannot be made a condition of a consent if it requires the owners to take on significant part of local authority's duties.	N	EC W54/2000 Aqua King v. MDC. Appeal against consent conditions. The conditions for allowing occupation of road reserve for marine farm support facilities at Okiwi Wharf required a turnaround area to be provided using ann AK reclamation.	Supporters of conditions describe difficulties of accessing and servicing farms due to applicant's controls on land (a reclamation) and use of road reserve. Raised as public access issue.	Kenderdine
2001 Mar. 29	Concurrence role and Unduly interfere with commercial fishing.	Concurrence role requires a proper appraisal, not simply going along with another's decision. Undue implies 'without due cause or justification … more than is warranted'.	N	CA124/00 CRA3 Industry Assoc. Inc. v. Mfish. An appeal against McGechan decision to dismiss appeal by rock lobster fishers against Minister of fisheries decision to concur to creation of a marine reserve near Gisborne. Concurrence includes consideration, of grounds of objection, the wider picture, make any enquiries he considers appropriate, and make his own decision. 'Unduly interfere with commercial fishing' requires an assessment of all factors, including impact, balances effect against other values involved.	The criteria are very similar to those set out in MFA71 and earlier legislation regarding marine farming. Mfish clearly sought to avoid being seen to disagree with MoC and early consultation occurred to avoid this. Mfish had commissioned own report on impacts as well as having read extensive DoC assessment of undue impact. Mfish gave concurrence and reports and consultation indicated short term significant impact. Regarding 'undue', noted that a 'significant' impact may not mean something is an undue impact.	Thomas

DATE	TOPIC	RELEVANT ISSUE	PLAN RULES AN ISSUE	CASE DESCRIPTION	IMPORTANT CRITERIA	JUDGE
2001 Apr. 27	Planning for aquaculture, FA83/96 and RMA interface.	Created new Aquaculture Management Areas, clarified interface to enable purpose of controls to include sustainability issues (i.e., disagreed with Ngati Kahu decision on this).	Y	EC W42/2001 Golden Bay Marine Farmers and ors v. TDC. Interim report and findings on references relating to TDC provisions for aquaculture in proposed Tasman Resource Management Plan (Part III) (i.e., the regional coastal plan).	Approximately 3 month hearing. One suicide by witness. Integrated planning, purpose of RMA, shelter, navigation, whales, natural character, visual amenity, site suitability and ecological issues, economics, Treaty, alternatives, technology. Also addressed scallop enhancement and associated plans.	Kenderdine
2001 Nov. 2	Site criteria	Refused consent for farm on site criteria	Y	EC W81/01 King-Turner, JH v. MDC/ Appeal against refusal of consent for coastal permit (discretionary) for 2.91ha marine farm at Long Reef Point, Canoe Bay, Pelorus Sound	Cited proposed NZCPS and proposed plan provisions regarding natural character (sprawling, adjacent to scenic reserve and natural and outstanding landform feature and intrusive on landscape/ seascape interface) , visual effect (prominent from Fitzroy Bay and Tawhitinui Reach), point is part of 'gateway' to Fitzroy Bay and development would be 'inappropriate', favourable decision could set precedent for decision on nearby site also.	Kenderdine

Appendix 4: List of 'species' approved for aquaculture in New Zealand as at November 2000 (Source MFish)

Species Code*	Species Name
ATS	Atlantic Salmon
COC	Cockle
COS	Cockle Spat
CRA	Spiny Rock Lobster
DAN	Dosinia Anus
DOS	Oysters (Dredge) Sat
ECK	Ecklonia
GRA	Gracilaria
HOR	Horse Mussell
KBB	Macrocystis
KBL	Durvillea
KIN	Yellowtail Kingfish
LES	Lessonia
LIS	Lissodendoryx Secies
MBS	Blue Mussel Spat
MDI	Mactra Discors
MMI	Mactra Murchisoni
MSB	Blue Mussel
MSG	Green Mussel
MSP	Green Mussel Spat
OSP	Pacific Oyster Spat
OYS	Dredge Oyster
PAA	Haliotis Australis
PAI	Haliotis Iris
PAU	Paua
PAV	Haliotis Virginea
PDO	Paphies Donacina
PHC	Packhorse Rock Lobster
POY	Pacific Oyster
PPI	Pipi
PRP	P0rphyra
PTE	Pterocladia
PZL	King Clam
ROY	Rock Oyster
SAE	Spisula Aequilateral
SAM	Quinnat Salmon
SCA	Scallop
SHO	Seahorse
SNA	Snapper
SOS	Sockeye Salmon
SRF	Surf Clams
SSP	Scallop Spat
SUR	Sea Urchin/Kina/Seae
ULV	Ulva
UND	Undaria
VLA	Venerupis Largillier
WHE	Whelk

* 'Species code' is the code used by MFish on the National Aquaculture Database (NAD). Note that in several instances the 'species name' used is a local common name for the species approved (e.g., Yellowtail Kingfish) and in others it relates to the more generic latin name of the approved species (e.g., Lessonia). The names used vary between species, sub-species, and species at different stages of their lifecycles. This is a rather pragmatic approach as opposed to a systematic taxonomic categorisation. I have opted to reprint the list exactly as used by the Ministry to avoid errors that might be introduced through attempting to interpret the Ministry's use of the terminology. For the purposes of this thesis, any inconsistencies in the MFish categories are unimportant.

Appendix 5: Gazette notices of rock oyster leases granted, assigned, surrendered and cancelled under the Rock Oyster Farming Act 1964. (Source: *New Zealand Gazette* notices 1964 to 2001. "?" and "(…)" indicate doubt and interpolation respectively)

Gazette number	Page	Year of Gazette	LE date[i]	LE #	Size (acres, roods, perches)	LE location	Owner	Owner's home
82	2288	1967	8/12/67	? (7?)	5.5	Putiki Bay, Waiheke Is.	R.M. Martin	?
82	2288	1967	8/12/67	? (8?)	1 rood	Bon Accord Hbr, Kawau	R.M.Martin	?
82	2288	1967	8/12/67	? (5?)	5	Hargreaves Basin, Kaipara Hbr	L.A.Blackler	?
82	2288	1967	8/12/67	(3)	5	Tauhoa R., Kaipara	W.G. Morgan	?
82	2288	1967	8/12/67 (24/11/67)	?	4	Hokianga Hbr	A., D., & M. Auchinvole	?
82	2288	1967	8/12/67	?	5	Kerikeri Inlet	L.W.F.Lance	?
82	2288	1967	8/12/67	? (24)	5	Parekura Bay, Bay of Islands (BoI)	D.H. Kydd	?
24	687	1968	18/4/68		5	Coromandel Hbr.	B. Wells	?
24	687	1968	18/4/68		5	Te Matuku Bay, Waiheke	F.L. Davey	?
24	687	1968	18/4/68 (7/12/67)		2	Uruti Bay, BoI	C.M. Wilbraham	?
24	687	1968	18/4/68 (23/11/67)	15	2	Orongo Bay, BoI	A.Hayward	?
24	687	1968	18/4/68		5	Orongo Bay	Lens Oysters	?
24	687	1968	18/4/68		5	Kerikeri Inlet, BoI	H.Hay	?
24	687	1968	18/4/68		5	Kerikeri Inlet	J.W.F. Lance	?
24	687	1968	18/4/68 (9/12/67)	(23)	5	Orongo Bay	A.S. Grant & M.J. Lynch	?
24	687	1968	18/4/68		5	Ohiwa Hbr.	V.C. Flight	?
24	687	1968	18/4/68		5	Maketu Estuary	N.F. Koce	?
24	687	1968	18/4/68		5	Batley, Kaipara	H.S. & K.D. Roadley	?
24	687	1968	18/4/68		5	Maketu Est.	T.O. Williams	?
24	687	1968	18/4/68		5	Maketu Est.	D.J. Martell	?
24	687	1968	18/4/68		5	Maketu Est.	O.L. Brain	?
24	687	1968	18/4/68		5	Maketu Est.	I.E. Myrvang	?
24	687	1968	18/4/68		5	Maketu Est.	K.P.A. Myrvang	?
24	687	1968	18/4/68		5	Maketu Est.	C.H. Brain	?
57	1574	1968	2/9/68	?	5	Puhoi Bay, Whangaroa Hbr.	D.W.Gow	?
57	1574	1968	4/9/68	53	10	Waikare Inlet, BoI	M.W.Greenwood & A.G. Smart	Auckland

Gazette number	Page	Year of Gazette	LE date	LE #	Size (acres, roods, perches)	LE location	Owner	Owner's home
59	1654	1968	16/9/68	31	5	Puka Puka Inlet, Mahurangi Hbr.	Puka Puka Farms Ltd.	Auckland
2	88	1969	13/1/69	58	5	Gordon Browns Bay, Mahurangi	J.M. & N.P. Cherry	?
2	88	1969	13/1/69	19	2	Crowles Bay, BoI	G.F. Hansen	?
2	88	1969	13/1/69	62	5	Whakapirau R., Kaipara	A.J. Roderick	?
2	88	1969	13/1/69	56	5	Hargreaves Basin, Kaipara	Rock Oysters NZ Ltd.	?
2	88	1969	13/1/69	55	10	Orongo Bay	Rock Oysters NZ Ltd.	?
19	613	1969	21/2/69	(23?)	5	Orongo Bay on MD plan 12743	*Assignment* From A. Grant and M.J. Lynch to M.J. Lynch & R.F. Meynell	?
13	438	1969	6/3/69	46	5	G. Brown's Bay, Mahurangi	J.R. Buttle	Auckland
19	616	1969	28/3/69	75	10	Whakaki R., Kaipara	R.T.V. & V.F. Linnell	Kaiwaka
21	664	1969	2/4/69	64	5	Waikare Inlet, BoI	D.P.R. De Vantier	Russell
28	909	1969	30/4/69	60	5	Hunters Ck., Tauranga Hbr.	K.R. Brandon	Tauranga
28	907	1969	5/5/69 Granted 21/10/68	? (60?)	? (5?)	MD 13163 (Hunters Ck. Tauranga Hbr.?)	*Assignment* K.R. Brandon to Western Bay Oysters Ltd	?
28	906	1969	15/5/69	3	5	Tauhoa R., Kaipara	*Cancelled* W.G. Morgan	?
35	1087	1969	29/5/69	66	5	Point Curtis, Otamatea R., Kaipara	B.S. Cullen	Point Curtis, Maungaturoto
35	1088	1969	6/6/69	83	5	Whakaki R., Kaipara	H.P.T. Pihema & T. Nathan	Maungaturoto & Kaiwaka
36	1134	1969	13/6/69	74	4	Oruawharo R., Kaipara	K.N. &F.L. Bird	Wellsford
39	1223	1969	24/6/69	51	5	Maketu Est.	D. L. Pittar	Te Puke
41	1280	1969	26/6/69 Granted 21/10/68	?	?	?	*Assignment* D.L. Pittar to D.L. & M.P Pittar	(Te Puke?)

Gazette number	Page	Year of Gazette	LE date	LE #	Size (acres, roods, perches)	LE location	Owner	Owner's home
46	1430	1969	8/7/69	?	? (2?)	(Uruti Bay, BoI) MD 12724	*Assignment* C.M. Wilbraham to Taspac Oysters Ltd.	?
50	1527	1969	4/8/69	80	5	Whakapirau Ck., Kaipara	D.F. Powley	Auckland
50	1527	1969	5/8/69	? (71)	5	Matakohe R. and Paparoa Ck., Kaipara	R. Hunt & R.H. Robinson	Auckland & Paparoa
50	1526	1969	7/8/69	76	5	Waikare Inlet	A.R. Moody & D.B. Cuniffe	Opua & Russell
50	1527	1969	7/8/69	72	5	Gumstone Ck., Kaipara	P.& P.J. Barron	Whangarei & Wellsford
53	1672	1969	22/8/69	89	11.5	Mahurangi	R.J. Meldrum	?
53	1672	1969	22/8/69	90	7.5	Whangamata	R.M. MacGregor	?
53	1672	1969	22/8/69	91	7	Whangarei	A.M. Derwin	?
53	1672	1969	22/8/69	95	5	Kaipara	E.T. Aikin	?
53	1672	1969	22/8/69	96	30	Kaipara	K. Fergus	?
53	1672	1969	22/8/69	97	5	Kaipara	M.H. Aikin	?
57	1800	1969	9/9/69	82	30	Kaipara	T.M. Cullen	Matakohe
57	1799	1969	10/9/69	21	10	Dyers Ck., Mahurangi	H.J.S. Wilson	Auckland
57	1800	1969	10/9/69	94	20	Whakapirau Ck., Kaipara	W.H. Durbridge & W.M. Fowler	Auckland/ Bluff
59	1859	1969	16/9/69	107	4	Pahi R., Kaipara	K.G. & D.A. Quaife	Whakapirau
60	1910	1969	23/9/69	112	8.5	Kaipara	Kaipara Oyster Co.	Whangarei
62	2015	1969	30/9/69	81	2.5	Hauparua Inlet, BoI.	J. Francis	Kerikeri
62	2015	1969	30/9/69	97	5	Pahi R., Kaipara	M.H. Aikin	?
62	2015	1969	30/9/69	103	10	Oruawharo R., Kaipara	J. King & M.A. Keane	Auckland
62	2015	1969	3/10/69	106	5	Dyers Ck., Mahurangi	N.J. Treacy	Auckland
62	2015	1969	3/10/69	99	5	Dyers Ck., Mahurangi	S.W. Hicks	Auckland
62	2015	1969	3/10/69	88	10	Dyers Ck., Mahurangi	E.L. & F.C. Mason	Auckland
62	2015	1969	3/10/69	92	5	Youngs Bank, Kaipara	B.S. Stevens, D.J. Eyeles, J.M. Maynard	Auckland
62	2015	1969	3/10/69	116	20	Whakaki R., Kaipara	R.T.V. & V.F. Linnell	Kaiwaka
65	2085	1969	13/10/69	102	10	Dyers Ck., Mahurangi	Waiwera Concessions Ltd.	Waiwera
70	2174	1969	17/10/69	6	10.5	Mahurangi	J.F. Neary Ltd.	?

Gazette number	Page	Year of Gazette	LE date	LE #	Size (acres, roods, perches)	LE location	Owner	Owner's home
70	2173	1969	21/10/69	117	20	Arapaoa R., Kaipara	B.A. McKenzie	Pahi
72	2214	1969	23/10/69	113	10	Okarako Ck., Kaipara	A.G. & C.C. Devitt	Matakohe
75	2279	1969	4/11/69	111	10	Tauhaupo Ck, Kaipara	N.H. Chapman & M.J. O'Connor	Matakohe/ Maungaturoto
76	2339	1969	6/11/69	15	(2)	(Orongo Bay)	*Assignment* A. Hayward to Taspac Oysters Ltd.	?
76	2344	1969	10/11/69	85	5	Maketu Est.	R.S. Mancer	Tokoroa
79	2539	1969	12/11/69 Granted 24/11/67	?	? (4?)	MD 12674 (Hokianga Hbr.)	*Assignment* A., D. & M. Auchinvole to C.J. Auchinvole	?
76	2344	1969	13/11/69	118	10	McGregor Bay, Coromandel Hbr.	R.J. and R.G. Crawford	Coromandel
76	2344	1969	13/11/69	120	5	Te Taumataka Ck., Kaipara	H.M. Metcalfe	Matakohe
77	2376	1969	18/11/69	63	5	Te Kapa R., Mahurangi	B.J. Loos & H. Trebitsch	Auckland
77	2376	1969	18/11/69	121	5	Te Mate O Te Tawa Ck., Kaipara.	M.J. Patterson	Matakohe
77	2376	1969	18/11/69	131	5	Tauhoe R., Kaipara	L.A. Burrows	Papatoetoe
77	2376	1969	21/11/69	142	10	Whakaki R., Kaipara	I.D. Hanna & K. T. Byers, R.J. McKay, P.D. Hanna, W.C. Crump	Maungaturoto, Waipu, Auckland, Takapuna
79	2543	1969	24/11/69	136	2.5	Pahi R., Kaipara Hbr.	I.D. Hanna & K. T. Byers, R.J. McKay, P.D. Hanna, W.C. Crump	Maungaturoto, Waipu, Auckland, Takapuna
79	2543	1969	26/11/69	51	5	Maketu Estuary, Bay of Plenty	*Assignment* (From D. Pittar) to W.S. & G.E. Brittain	?
80	2589	1969	2/12/69	73	5	Grullers Bay, Hauparua Inlet, BoI.	L.R. Nilsen	Kerikeri

Gazette number	Page	Year of Gazette	LE date	LE #	Size (acres, roods, perches)	LE location	Owner	Owner's home
80	2589	1969	2/12/69	146	10	Arapaoa R., Kaipara	I.D. Hanna & K.T.Byers , R.J. McKay, P.D. L. Hanna, W.C. Crump	Maungaturoto, Waipu, Auckland, Takapuna
82	2646	1969	12/12/69	145	12	Whakapirau Ck., Kaipara	I.D. Hanna & K.T.Byers , R.J. McKay, P.D. L. Hanna, W.C. Crump	Maungaturoto, Waipu, Auckland, Takapuna
1	23	1970	16/12/69	114	20	Coates Bay, Kaipara.	G. Miru & N. Tana	Tinopai
1	23	1970	16/12/69	144	6	Whakapirau R., Kaipara	I.D. Hanna & K.T.Byers , R.J. McKay, P.D. L. Hanna, W.C. Crump	Maungaturoto, Waipu, Auckland, Takapuna
1	24	1970	22/12/69	149	10	Pahi R., Kaipara	L.T. Cawkwell & B.F. Sloane	Maungaturoto
1	23	1970	22/12/69	67	2.5	Grullers Bay, BoI	K. Saul	Whangarei
1	23	1970	22/12/69	137	10	Waikare Inlet, BoI	M.W. Greenwood & A.G. Smart	St Heliers, Auckland
1	23	1970	22/12/69	109	5	Te Kapa R., Mahurangi	J.R. Jones	Warkworth
1	24	1970	8/1/70	77	10	Touwai Bay, Whangaroa	R.L.Dobney	Pumanawa Bay
1	24	1970	8/1/70	79	5	Pumanawa Bay, Whangaroa	R.L. Dobney	Pumanawa Bay
1	24	1970	8/1/70	151	10	Waikare Inlet, BoI	H.E. & G.E. Hooper	Russell
1	24	1970	8/1/70	124	8	Waikare Inlet, BoI	P.F.M.& L.R. Lindauer	Russell
1	24	1970	8/1/70	126	20	Arapaoa R., Kaipara	Arapaoa Shellfish Co. Ltd.	Auckland
1	24	1970	8/1/70	115	5	Pahi R., Kaipara	G.J. Butterworth	Mangere
113	4	1970	20/1/70	110	25	Otamatea R., Kaipara	J.R.H. & O. Skelton	Kaiwaka
113	4	1970	20/1/70	139	15	Kerikeri Inlet, BoI	W.B. Christophers	Auckland
113	4	1970	22/1/70	123	110	Whakaki R., Kaipara	R.C. & J.M. Larsen	Kaiwaka

Gazette number	Page	Year of Gazette	LE date	LE #	Size (acres, roods, perches)	LE location	Owner	Owner's home
113	4	1970	22/1/70	143	5	Whakaki R., Kaipara	I.D. Hanna & K.T.Byers , R.J. McKay, P.D. L. Hanna, W.C. Crump	Maungaturoto, Waipu, Auckland, Takapuna
7	193	1970	29/1/70	135	5	Oruawharo R.	A.N. Barnett	Port Albert
28	847	1970	4/5/70	140	9	Waikare Inlet	J. Finnigan	Auckland
29	895	1970	7/5/70	179	3	Pataua Est.	R.A. Treanor	Whangarei
29	895	1970	7/5/70	212	10	Dyers Ck., Mahurangi	J.R. Buttle	Waiheke Is.
29	894	1970	12/5/70	152	4	Frenchman's Ck., Waikare Inlet	J.H. Evans	Russell
34	1039	1970	27/5/70	240	4	Pahi R., Whakapirau Wharf	K.D. & .A. Quaife	Whakapirau
34	1039	1970	27/5/70	230	10	Tauhoa R., Kaipara	N.A.& D.M.R. Adams & P.T. & P.M. Colson	Okahukura Peninsula
34	1039	1970	5/6/70	189	5	Te Kauri Pt., Tinopai, Kaipara	C.F. Warren	Tinopai
35	1068	1970	11/6/70	208	15	Whitianga Estuary	Taylor's Fisheries Ltd.	Thames
46	1382	1970	12/6/70	103	(10)	(Oruawharo R., Kaipara)	*Assignment* to M.A. Keane & C.A. Boyd (from J.King & M.A. Keane)	?
39	1156	1970	23/6/70	190	17	Tauhoa R. & Whanaki R. confluence	L.M. Blackburn	Wharehua, Wellsford
46	1382	1970	24/7/70	211	10	Parengarenga	G.F. Dalbeth	?
46	1382	1970	24/7/70	177	90	Tahuna Channel, btw. Te Toi and Ngatupai str., Parengarenga	G.F. Dalbeth	?
46	1382	1970	31/7/70	253	5	Te Kapa R., Mahurangi	T. Peters	?
46	1382	1970	31/7/70	133	20	Ngunguru R.	T.C. Muir & E.R.K. Wilkinson	?

Gazette number	Page	Year of Gazette	LE date	LE #	Size (acres, roods, perches)	LE location	Owner	Owner's home
70	2080	1970	13/8/70	185	15	Arapaoa R., Kaipara	Trimac Farms Ltd.	?
51	1522	1970	17/8/70	181	?	Te Toi Pt., Parengarenga	M. Sucich & R.L. Shepherd	Te Hapua
51	1522	1970	19/8/70	122	10	Hunters Ck., Tauranga Hbr	Western Bay Oysters Ltd.	?
51	1522	1970	19/8/70	224	10	Union Beach, Coromandel Hbr.	P. Wyborn	?
73	2147	1970	20/8/70	62	(5)	(Whakapirau R., Kaipara)	*Assignment* to Body & Leech Ltd. (from A.J. Roderick)	Whakapirau, Maungaturoto
17	368	1971	27/8/70	151	?	Waikare Inlet	*Assignment to* J.L.W. & V. Pollock (from H.E. & G.E. Hooper)	Auckland
27	667	1971	27/8/70	23	5		*Surrendered, cancelled* **Became 222 & 223**	?
27	667	1971	27/8/70	222	2a,3r, 38.2p		M.J. Lynch	?
27	667	1971	27/8/70	223	2a,3r, 38.2p		R.E. Meynell	?
56	1683	1970	8/9/70	227	5	Pahuapo Pt., Parengarenga	L. Brown	Te Hapua
67	1962	1970	15/9/70	123	? (110)	Whakaki R., Kaipara	*Assignment* to Northern Rock Oysters Ltd. (from R.C. & J.M. Larsen)	Auckland
60	1772	1970	24/9/70	130	5	Waikare Inlet	South Pacific Ocean Farms Ltd.	Paihia
61	1820	1970	29/9/70	129	5	Tangitu Bay, Waikare Inlet	South Pacific Ocean Farms Ltd.	Paihia
61	1820	1970	29/9/70	242	5	Opete Ck., Poukoura Inlet, BoI	South Pacific Ocean Farms Ltd.	Paihia
63	1882	1970	6/10/70	173	5	Te Kao Channel, Parengarenga	H., P., & P. Brown	Northland
65	1982	1970	20/10/70	225	5	Flat Point, Parengarenga	J. Brown	Te Hapua

Gazette number	Page	Year of Gazette	LE date	LE #	Size (acres, roods, perches)	LE location	Owner	Owner's home
67	1962	1970	22/10/70	176	15	Nga Motu Is., Whakaki R., Kaipara	Nga Motu Farm Ltd	Kaiwaka
68	207	1970	2/11/70	254	15	Te Kapa, Mahuranga	S.W. Hicks	Warkworth
34	913	1971	10/2/71	75	10	Whakaki R., Kaipara	*Assignment* (R.T.V & V.F. Linnell to) Whakaki Oysters Ltd	Whangarei
34	913	1971	10/2/71	116	(20)	Whakaki R., Kaipara	*Assignment* to Whakaki Oysters Ltd (from R.T.V. & V.F. Linnell)	Whangarei
31	815	1971	19/2/71	97	?	Pahi R.	R.G. Tasker	Aoroa
18	425	1971	9/3/71	204	58a,3r, 8p	Whangaroa Hbr.	J.F. Neary	?
18	425	1971	9/3/71	239	58a,3r, 8p	Whangaroa Hbr.	Roadley Bros. Ltd	?
18	425	1971	9/3/71	238	58a,3r, 8p	Whangaroa Hbr.	Rock Oysters NZ Ltd	?
18	425	1971	9/3/71	100	58a,3r, 8p	Whangaroa Hbr.	Taspac Oysters Ltd.	?
31	815	1971	19/3/71	103	(10)	(Touwai Bay, Whangaroa)	*Assignment* to C.A. Boyd (from M.A. Keane & C.A. Boyd)	Auckland
61	1648	1971	5/8/71	138	5	South of Otuihu Pt., near Opua	J.P. & D.G. McInnes	Waikiekie & Opua
98	2847	1971	24/11/71	85	5	Maketu Estuary	*Surrender, cancelled* R.S. Mancer	?
105	3039	1971	2/12/71	230	10	Tauhoa R., Kaipara	*Surrender, cancelled* N.A.& D.M.R. Adams and P.J. & P.M. Colson	?
30	749	1972	1/1/72	77	(10)	(Touwai Bay, Whangaroa)	*Assignment* to F.B. & K.V. Nicholson (from R.L. Dobney)	?
3	127	1972	20/1/72	74	4	Oruawharo R., Kaipara	*Cancelled* K. & F. Bird	?
29	696	1972	25/2/72	223	(2a, 3r, 38.2p)	(Orongo Bay)	*Assignment* to Orongo Oysters (from R.E.Meynell)	?

Gazette number	Page	Year of Gazette	LE date	LE #	Size (acres, roods, perches)	LE location	Owner	Owner's home
29	696	1972	20/3/72	71	(5)	Matakohe R. & Paparoa Ck., Kaipara	*Surrender, cancelled* R. Hunt & R. Robinson	?
55	1404	1972	26/4/72	136	2.5	Pahi R., Kaipara	*Surrender* J.& P. Hanna, K. Byres, G. McKay, W. Crump	?

[i] The date recorded is based on the date given in the notice or the date the notice was signed or the date of the notice, whichever is the earliest date. This is to try to achieve the earliest possible date for commencement of the lease. It is apparent from the notices that they are frequently published or signed some time after the lease was granted or reassigned, but the inconsistent format of the notices does not enable a more accurate assessment of the commencement of the lease.

Appendix 6: Comments on statistical validity of factor analysis samples

There is inevitably a concern when using arbitrarily chosen variables for analysis that the correlation matrices that result may not be appropriate for factor analysis. Studies have shown, for instance, that random variates may give rise to seemingly acceptable pattern and structure matrices (Dzuiban and Shirkey 1974). The *SPSS* software package used in my research includes Bartlett's test of sphericity (Bartlett 1950) and the Kaiser-Meyer-Olkin measure of sampling adequacy (Kaiser 1970) to assist users to assess the adequacy of their correlation matrices for factor analysis. For a large sample Bartlett's test approximates a chi-square distribution. Consequently it is usually assumed that the sample correlation came from a multivariate normal population with the variables being analysed being independent. If they are not, then the data are appropriate for analysis using factor analysis. The Bartlett test therefore forms something of a bottom line test for large samples, but is less reliable for small samples. Very small values of significance (below 0.05) indicate a high probability that there are significant relationships between the variables, whereas higher values (0.1 or above) indicate the data is inappropriate for factor analysis.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy provides an index (between 0 and 1) of the proportion of variance among the variables that might be common variance (i.e., that might be indicative of underlying or latent common factors). The *SPSS* software package suggests that a KMO near 1.0 supports a factor analysis and that anything less than 0.5 is probably not amenable to useful factor analysis (see also University of Newcastle-on-Tyne http://www.ncl.ac.uk/ucs/statistics (last visited 7July 2002)).

Kaiser (1974, cited in Dziuban and Shirkey 1974: 359) had refined the index further and suggested that anything in the .90s was 'marvelous', in the .80s 'meritorious', in the .70s 'middling', in the .60s 'mediocre', in the .50s 'miserable' and below .5 'unacceptable'. The following are the Bartlett and KMO statistics for a number of matrices which I considered using for factor analysis. Those above .5 KMO were analysed and the most insightful and with best KMO statistics have been reported in more detail in Chapter Eleven.

Variables on which factor analysis performed	Bartlett	KMO
Importance of variables in influencing locational choice in 2000	.000	.821
Importance of variables in influencing locational choice originally	.000	.813
Industry integration (contracting of activities and income reliance)	.000	.691
Method of allocation of space	.000	.622
Preferences accorded to different types of applicants (e.g., locals)	.000	.599
Reason for expansion	.000	.583
Variables of desirability of a site originally (e.g., near river)	.000	.582
Variables of desirability of a site in 2000 (e.g., near river)	.000	.579
Preferred decision-maker (e.g., DoC)	.000	.566
Variables affecting size	.001	.396

Appendix 7: Mechanisms for allocating marine space in New Zealand

Consent-based approaches

The consent process involves allocating farms on the basis of applications. Applications are assessed against predetermined criteria. If the farm meets the criteria, the application is granted. If it does not then it is declined. The major difficulty with such an approach is to resolve competing applications for the same site. The main methods have been:

- **First-in, first-served**. Although seemingly a simple criterion, this approach can result in a 'race' to apply for the space, rather than a more orderly development. Four difficulties that can emerge as a consequence are: determining which application arrived first, especially if electronic forms of application are accepted or if there are several offices at which applications can be lodged; rudimentary applications; speculation for space; and clogging of the processing of applications, especially if there are partly overlapping applications. Under the Resource Management Act councils decide when an application has sufficient information to be considered 'complete'. This places considerable burden on, and power in, the council. It also disadvantages the developer prepared to invest in exploring sites, developing means to address their effects, and/or consulting widely with the community and neighbours. The most appropriate uses of the space may not eventuate.
- **Balloting**. Simple random drawing of applications from a hat has been used in New Zealand. The primary disadvantage is that the best application may not be successful as rudimentary and detailed applications are treated equally. It therefore creates an incentive for speculation and to 'free-load' on the back of other applicants. Essentially, there would be advantages for an applicant waiting until other applicants have invested in determining the viability of a site. The applicant who has not investigated the site can apply for it and have an equal opportunity of gaining it.
- **Tendering**. Identifying a site and then calling for tenders has advantages of encouraging a market value return to the public (via the Crown) for the exclusive use of the public's common property. It also enables those seeking to lodge tenders for sites to investigate them and assess the costs and potential returns. A key disadvantage can lie in the implication that a site tendered is able to be sustainably farmed. This may assume that the agency offering a site for tender has done assessment work and has considered the potential impacts of different farming techniques. It may place liabilities on those who have offered the site for tender. The offer of a site for tender may specify that the highest bid will be accepted. This may lead to those with the most capital obtaining the sites. Alternatively, the offer may be done with certain conditions requiring, for instance, tenders to include local or iwi investment, or to provide certain community facilities or benefits. Such an approach would be tendering, but not necessarily to the highest bidder.
- **Purchasing.** Rights to an area may be purchased from existing right owners. For instance, the Fisheries Act requires the Ministry of Fisheries to be satisfied that the allocation of space (through a marine farming permit) will not have an undue adverse effect on fishing. This places the onus on the

Ministry to make this determination and, arguably, provides little incentive for the applicant to seek resolution with right holders (MFish and MfE 2000). The purchasing approach involves the compensation of existing quota holders and other fishery right holders directly by the applicant. This assumes that the right holders are readily identifiable, that an arbitration process can be implemented if the parties cannot agree, and that those with capital sufficient to compensate existing right holders are likely to be advantaged over others. It would largely reduce or remove government from the process. It could also be applied to other right claimants (iwi, adjacent landowners, etc).

The RMA has a particular variant on tendering available to the Minister of Conservation (Staines 1993, Department of Conservation 1996). The Minister may decide that an area is potentially subject to considerable competition, declare a moratorium and then offer for tender the 'right to apply for a coastal permit'. The successful tenderer has two years to lodge an application. This removes the race for space and provides the successful tenderer with some security while investigating the viability of the proposed site and consulting with others. There is no guarantee that the applicant will obtain the site for which they successfully tendered and this needs to be built into the original tender. The difficulties with the approach lie in deciding that an area is likely to be so subject to competition that a tendering process is appropriate and then determining the specific parameters of the areas to be tendered and what criteria to use for determining which tender to accept. Notably, if there is any indication that an area will be subject to a moratorium and tendering process, an incentive is created to lodge an application before the moratorium is imposed and this creates a race for space. Moreover it involves central government interfering with local government as there are no provisions for local government to use anything other than the first-in, first-served approach.

Planning mechanisms for allocating space

Primary planning approaches have been discussed in Chapter One. **Planning by activities**, involves identifying particular activities, for instance mussel farming, and deciding where the activities are or are not appropriate. This may or may not be based on the environmental effects associated with particular forms of mussel farming. Such an approach may, in the long term, prove problematic as it tends to determine the type of technology and constrain farms to that technology and the farming practice existing at the time.

The **effects-based planning** approach, by contrast, requires the community (or other authorities) to assess the nature of the effects that the environment can and cannot withstand and sets its plan rules on the basis of preventing, or limiting, those effects. The intention is to enable people to develop marine farms wherever they wish, provided that they are able to internalise the costs that would otherwise be incurred by the environment. It does not identify activities, but the effects that are or are not allowed.

Progressive or development planning may involve either one of the above types of planning, but its approach involves setting aside an area for development of the particular marine farming activity (based perhaps on an assessment of the cumulative

effects of the activity). This designated area approach has become known, during the course of this thesis research, as the 'aquaculture management area' (AMA) approach. Once the area has been set aside the space within it is allocated to would-be farmers using one of the several allocation mechanisms discussed above. Once one part of the farm area has been allocated and fully utilised, the decision-making authority then opens the next area for farming. This approach is usually accompanied by standard-sized farms being established and access requirements being set, resulting in a form of marine subdivision similar to that of land subdivision for urban allotments. The resulting patterns can be expected to be regular in shape and size. The allocation mechanisms are often by ballot, but could equally be in the form of tendering. The allocation by ballot has been used in New Zealand in the past and two of the respondents to my surveys had obtained their farms through ballots.

Appendix 8: Ratings of assessments of acquisition right dimensions used in Figure 12.3

Cells*	B	C	D	E
5		Modern era	Transitional era	Ideal
6		(1971-1991)	(1991-2001)	
7	Speed	0.3	0.7	1
8	Authorities	0.8	0.7	1
9	Simplicity	0.8	0.4	1
10	Confidence			1
11	Cost	0.95	0.3	1
12	Flexibility	0.6	0.8	1
13	Specificity	0.5	0.7	1
14	Transparency	0.1	0.9	1
15	Priority	0.2	0.9	1

*The cell coordinates are used for comments overleaf

Cell: C7
Comment: No time constraints at all after objections lodged, but some assumptions that natural justice will lead to progress

Cell: D7
Comment: Has several tight constraints on times under RMA, but ability of authorities to delay process through seeking additional information, if appealed . The Environment Court has not time constraints on its process, and the FA processes have no time constraints at all

Cell: C8
Comment: Applicant only applies to the Ministry of Agriculture and Fisheries, but the Minister must seek concurrence from other ministers and applicant aware o this

Cell: D8
Comment: Approvals needed separately under RMA and FA and applicant is required to deal with each authority personally

Cell: C9
Comment: Single application, no real appeal provisions and the bulk of the processing carried out separately from applicant

Cell: D9
Comment: Applicant must apply separately to two authorities and there are some complexities in timing of the applciations. Moreover the provisions for public participation, although relatively clear add considerably to the complexity of consultation, etc

Cell: C11
Comment: Largely borne by the government. Minimal cost to application

Cell: D11
Comment: Largely born by the applicant relevant to the amount of state funding. Objectors and other submittors must also bear costs of preparing and presenting their input, but the applicant pays substantial hearing costs, not the submittors

Cell: C12
Comment: Additional species need 'variations' to original permit and some species not allowed during the era. Can only apply for maximum of 14 year duration and restrictive plans based on activity

Cell: D12
Comment: Do not have to apply for each additional species as variation if effects are the same under RMA, can apply for anything up to 35 years duration, can theoretically farm anywhere providing technology addresses effects

Cell: C13
Comment: While some effects spelt out clearly, relies on vague terms like 'public interest'

Cell: D13
Comment: More matters clearly spelt out as needing to be considered.

Cell: C14
Comment: Very opaque and farmers indicated they often felt personal dislikes affected them

Cell: D14
Comment: Public processes except under FA and even then information may be officially requestedand required to be released

Cell: C15

Comment: Precedence of some users identifed, but considerable flexibnility available to aunthroites to determine which applciants for same use have priority or to use ballot.

Cell: D15

Comment: Clear priority for treating applications set out in the RMA, and used by fisheries authorities to prioritise competing applicants. Priority between different users less clear and open to contest which favorus the applicant who is able to challenge existing users