

A Regulatory History of New Zealand's Quota Management System

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Motu: Economic and Public Policy Research Trust

19 August 2002

DRAFT – COMMENTS WELCOME

This paper was funded by the New Zealand Ministry of Fisheries and Resources for the Future. All opinions expressed are those of the authors. We would like to thank Nick Wyatt, Bruce Shallard, Rebecca Perrott, Kim Duckworth, Jim Sanchirico, Richard Newell for assistance with queries and for comments. All errors and omissions that remain are our responsibility.

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PLEASE NOTE: This paper is an ongoing work in progress. We expect to add chapters covering the quota market, quota trading, and QMS funding in the near future.

Acronyms Used

| | |
|-------|---|
| QMS | – Quota Management System |
| QMA | – Quota Management Area |
| FMA | Fisheries Management Area |
| RMA | - Resource Management Act |
| EEZ | – Exclusive Economic Zone |
| ITQ | – Individual Transferable Quota |
| GMITQ | – Guaranteed Maximum Individual Transferable Quota |
| PMITQ | – Provisional Minimum Individual Transferable Quota |
| TAC | – Total Allowable Catch |
| TACC | – Total Allowable Commercial Catch |
| MSY | – Maximum Sustainable Yield |
| MAF | – Ministry of Agriculture and Fisheries |
| FAAQ | – Fishing Against Another’s Quota |

1 INTRODUCTION

The New Zealand fisheries management system was created in 1986. New Zealand was not the first country to introduce a quota-based system, but it was the first to use one on such a broad scale in a multi-species fishery. Most countries manage fisheries by controlling inputs, such as the number and size of boats and types of fishing equipment used. The main disadvantage with controlling inputs is that controls on one input can usually be avoided by substituting another input and overfishing isn't necessarily prevented. Input controls also tend to impede the development of more efficient technology and thus make the fishing industry less competitive.

Nearly every commercial fishery nation in the world is currently implementing or exploring Individual Transferable Quota (ITQ) based management systems.¹ This makes it critical to evaluate the effectiveness and efficiency of this form of regulation. Despite this there is very little empirical evaluation of quota systems. The New Zealand system offers an excellent opportunity for empirical work; we now have more than 15 years of experience in what by 1998/99 was 257 simultaneous markets involving 42 species.² The complexity of the systems and the frequent changes since their inception however requires clear understanding of the institutions involved before good empirical work can be done.

The purpose of this paper is to define the regulatory structure of the NZ Quota Management System (QMS) and to document key changes in its operation over time. This will provide researchers with a reference document on the New Zealand fisheries regulatory structure as a basis for future empirical work.

The paper documents the regulations that affect the quota market from 1986 forward with a brief history of the preceding period. The paper either directly describes the regulations or, for more detail, provides references to key resources.

1.1 STRUCTURE OF PAPER

This paper begins with a general discussion of Quota Management Systems around the world and in theory. It then gives a brief history of New Zealand Fisheries Management before 1983 to give the historical context for the system. After that the paper focuses on the New Zealand Quota Management system. We first describe the process for setting Total Allowable Commercial Catches. Then we discuss the definition of quota and the movement from fixed tonnage to a share of total allowable commercial catch (TACC). The fourth section describes the initial allocation of quota as new species are brought into the system. It has a particular focus on the allocation of quota to Maori. After the quota are allocated they can be traded. In the fifth section we discuss constraints on who can own and use quota, including limitations on foreign

¹ Kirkley et al. (1994:10).

² Clements (1998). For comparison, in 1990 there were 169 FMAs for 29 species groups (Sissenwine and Mace, 1992).

ownership and on concentration of quota holdings. In section 6 we discuss quota trading, with particular discussion of 'banking' provisions and the logistics of market function including leasing annual catch entitlements (ACE), and bycatch provisions. Section 7 deals with issues relating to how the system is funded. Section 8 concludes.

1.2 INTERNATIONAL CONTEXT

Iceland had the first ITQ system. Quota for herring were introduced in 1976 after severe depletion problems and poor experience with restrictions on the number of sea-days for trawlers. They were first made transferable in 1979. Since 1984 they have had individual transferable catch quota per vessel for the nine main commercial species.³ The system was made uniform across species in 1990. It is widely regarded as effective.

The Netherlands introduced ITQs for sole and plaice in the late 1970s.⁴ However in the early years the system was poorly enforced. In mid 1980s, they tightened control on landings which pressured more companies to comply by adjusting their quota to the catch. This created an active market in quota. They have now moved away from an ITQ-based system and have a system of collective management.⁵

The United States manages four small federal fisheries with ITQs: the East Coast surf clam/quahog fishery, the South Atlantic wreckfish fishery and the Alaskan halibut and sablefish fisheries.⁶ Some states also use ITQs. In particular, the Great Lakes fishery of Wisconsin and the herring roe fishery of California have a long history of ITQ management.⁷ Many other fisheries are still managed using input controls. This has led to acute problems in the Grand Banks cod fishery in New England and in the Pacific salmon fishery. The US fisheries have a long and often contentious history which makes reform difficult. East Coast fisheries are over 300 years old. In contrast, the two key commercial fisheries in New Zealand, orange roughy and hoki are only 30 years old. Many people in the US would like to consider broader use of ITQs but they are by no means widely accepted.

In the Southern bluefin tuna fishery of Australia, ITQs were responsible for reducing fleet size by more than 80%. Profits (net returns) increased by AU\$11m because fewer, but larger and more valuable fish were harvested. Under the ITQ system, the resource rents government received from fishers paid for almost half the cost of management, research and ITQ administration; prior to ITQs, bluefin tuna fishers paid nothing for the access to or management of the resource they were harvesting.⁸

Canada now uses ITQs to manage more than 23 fisheries, including Atlantic herring, halibut, Pacific salmon, and offshore lobster and scallop.⁹ Many quotas are linked with

³ Arnason (1992).

⁴ Harsma and Davidse (1992).

⁵ MAFF (2000).

⁶ The East Coast surf clam/quahog fishery was limited to 24 fishers daily. See works by Dr L Anderson.

⁷ Kirkley et al (1994).

⁸ Kirkley et al (1994).

⁹ Kirkley et al (1994); Grafton (1996).

vessels (Individual Vessel Quotas) and fishing licences, with some fisheries' quotas, such as BC sablefish and Lake Erie, allowing for greater transferability than others.¹⁰ South Africa manages its highly valuable abalone fishery with ITQs.¹¹

The United Kingdom uses a system that is almost a quota system.¹² It involves two layers of quota allocation, to producer organisations and then to individual fishers (connected to fishing licenses). Trading among fishers is possible but difficult and the legal basis of trades is not secure. Producer organisations maintain considerable control of the fisheries and the system aims to maintain the regional distribution of fishing and prevent concentration of quota.

In the late 1980s, the Chilean government began a process of reforming fisheries laws in an effort to enforce more stringent quota policies for common-pool fish stocks. After opposition and review of the proposed system, a Fisheries Law, with an improved regulatory framework was established. The system uses TACs and ITQs as policy tools for regulation but also incorporates some input controls such as seasonal closures, net restrictions and minimum catch sizes. Currently the ITQs are applied only to the cod and red shrimp fisheries and are yet to be extended to the exploited pelagic fisheries.¹³

Argentina established a Federal Fisheries Law in 1998; prior to this there was no comprehensive management regime, although an ad-hoc series of regulations and laws existed. Fishers required permits, although these did not have restrictions applied to them; the control was limited to the number of permits issued along with loose catch effort controls. The Fisheries Law mandate is to regulate fisheries through an ITQ system which will incorporate TACs, fleet quotas, and seasonal restrictions, especially in the hake and squid fisheries, however to date there has been limited progress in implementing the system.¹⁴

1.3 THE BASIC THEORY BEHIND QUOTA MANAGEMENT SYSTEMS

With absolutely no regulation, a fishery is an open access resource. If the group of people who can fish are limited to a discrete group, the resource becomes the common property of that group. In either case, with no further regulation or institutions each fisherman has no reason to take account of the effect of his actions on other fishers or on the future state of the fishing stock. The vast majority of future impacts will be felt by others. This problem can lead to the 'tragedy of the commons'. The risk is greatest for commercial species where the fish are valuable and the costs of extraction are reasonably low. Other species may be protected simply because they are economically unattractive to catch.

¹⁰ Grafton (1996).

¹¹ Kirkley et al. (1994).

¹² Ministry of Agriculture, Fisheries, and Food (UK) (2000).

¹³ McKee, C. (1999) "How successful has government regulation been in regulating Chilean fisheries?". See <http://www.colby.edu/personal/t/thtieten/ch-fish.html>

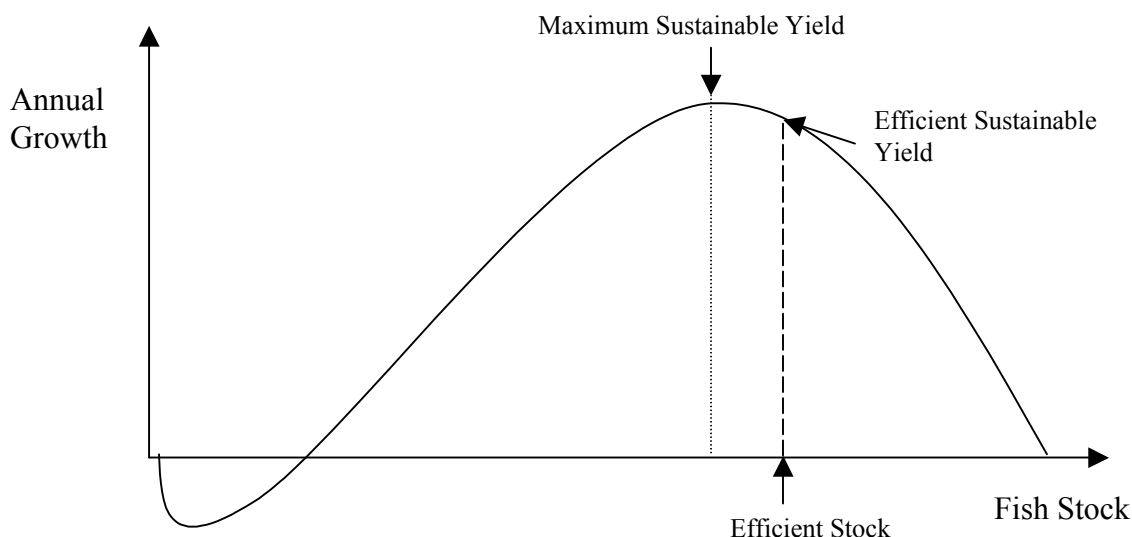
¹⁴ Cauhepe, M. E. (1999) "Management of Argentinean Hake". See: <http://www.unuftp.is/images/Maria99-lei%F0r1FF.pdf>

Optimal fishing regulation will limit annual harvest to a level that maximises the value of the resource. A common target is Maximum Sustainable Yield (MSY). This is the yield that can be sustained indefinitely because the harvest is equal to the growth rate of the stock. In fact it is usually more efficient to catch a slightly lower volume of fish and have a higher stock because it is cheaper to catch fish when they are more abundant.¹⁵ The loss of total catch is compensated by the lower costs of harvesting. The Efficient Sustainable Yield (ESY) is usually slightly lower than the MSY.¹⁶

Figure 1 shows the annual growth of the stock against the size of the stock. The annual growth indicates how much could be harvested without changing the size of the stock. Thus the MSY is the peak of the curve. ESY is to the right with a lower annual growth and higher stock.

There will be a different curve for each fish stock, that is, each fish species in each fishing area. The stocks may also interact.

Figure 1 Optimal Level of Total Catch



In reality, we do not know this curve and it is likely to be unstable because of changing environmental conditions. The MSY is easiest to assess for long-lived stable fish stocks. In addition we are likely to begin at a stock that is above or, more likely, below our optimal stock. This requires an adjustment period as we move toward the optimal stock.

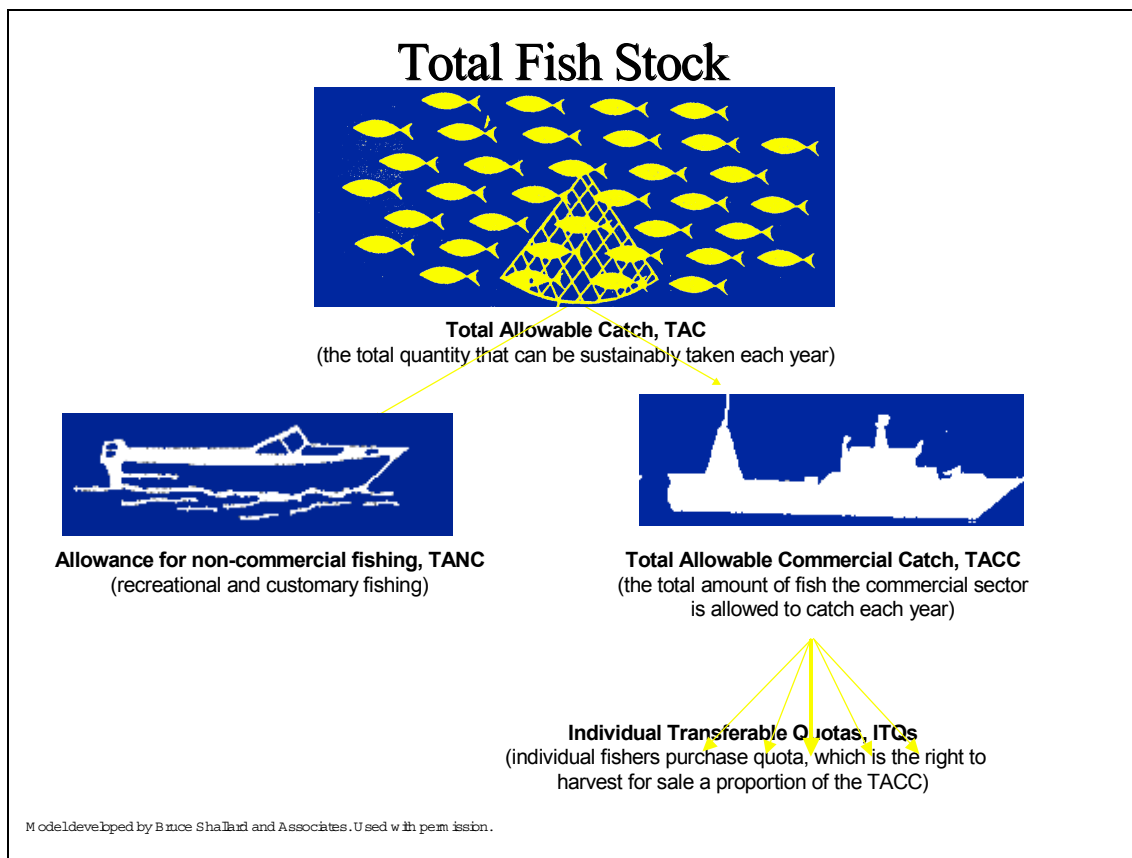
An Individual Transferable Quota (ITQ) system sets a total allowable catch (TAC) for each fish stock for each year. Regulators generally try to set TAC equal to MSY. Some of this may be allocated to recreational and/or indigenous fishers so that the total allowable commercial catch (TACC) is somewhat lower. Once the TACC has been set, the total catch needs to be allocated among the potential commercial fishers. Initially,

¹⁵ Sometimes it is most efficient to have a high catch and simply deplete the stock and then move on. Clearly this is not compatible with a sustainability goal.

¹⁶ The ESY is equivalent to the maximum economic yield (MEY).

this is generally done by allocating it to existing licensed fishers based on historical catches. The 'quota' allocated can be 'in perpetuity' in which case these fishers receive the right to fish that quantity forever. Alternatively it could be on a year-to-year basis or for some finite period of time. In addition, the quota could be in the form of a fixed number of tonnes of fish or as a percentage share of the TACC. In the latter case the volume of fish the quota entitles its bearer to catch varies from year to year. They can then sell these quota to other fishers or new entrants if they want. They could also buy more. These quota are called Individual Transferable Quota (ITQs).

Figure 2 Simplified Model of how Individual Fish Stocks are Managed



Once the TACC is allocated in the form of ITQs, all commercial fishers are required to monitor the volume of each species they catch from each fish stock and show that they own quota that match their catch. Fishers that do not have enough quota face penalties. External actors, either the government or the industry, need to monitor compliance and ensure that penalties are enforced.

The advantages of a well functioning ITQ system are that the harvest level is sustainable, the harvest is allocated efficiently across vessels so resources are not wasted and fishers have incentives to make good investment decisions (not to buy too many or the wrong sort of vessels). Fishers have an incentive to catch the fish at the times of year and in the form (e.g.: top quality that can be sold fresh rather than poorer quality that is used for fishmeal) that is most efficient based on fishing costs and market prices. They are not in competition with other fishers because they know the other

fishers' activities are limited so cannot affect them much.¹⁷ They can choose where to catch their fish more effectively; they are not racing to get the fish quickly before the season closes. An ITQ system can in theory maximise the rent from the resource for society as a whole. The government can claim some of this and the rest can be left for the industry. Because of this rent, fishers have a vested interest in maintaining and enforcing the system. Although it is not self-enforcing, enforcement authorities will have the support of the fishers.

Thus the ITQ system limits the total catch to a chosen level. This is an important component of ensuring sustainability of the stock. An ITQ system is not sufficient for optimal management however. It limits only total catch. Additional regulations may be needed to control the details of exactly where (not in breeding grounds), when (not during spawning), how (not using destructive techniques), and what (not too small) fish are caught. A Quota Management System (QMS) combines ITQs with a series of other regulations.

Of course, in reality ITQ systems are more complex than this. Few fisheries involve one homogenous stock over an area. New Zealand fisheries mostly involve multiple species with complex interrelationships. As discussed it can be very difficult to estimate the optimal fishing level both because the stocks are unstable and because there is often very little data. In addition TACCs tend to be influenced by political and sectoral considerations. Finally, just because an ITQ system can lead to efficient harvesting in theory doesn't mean that it does in reality. Many complexities can arise in the economic interactions among fishers and between fishers and the rest of the industry. More sophisticated theoretical modelling needs to be backed up with empirical analysis to determine how effective ITQs really can be.

1.4 REVIEW OF LITERATURE ON NEW ZEALAND FISHERIES MANAGEMENT

The New Zealand system has been assessed and studied many times over the last 15 years. Here we simply list the key papers and group them according to the subject they are most relevant to. This is not a comprehensive literature review. A notable gap in the literature arises from the paucity of empirical analysis that goes beyond simple description. The structure of the review roughly mimics that of the paper as a whole with some extra sections at the end for issues the paper does not address.

1.4.1 History / Overview

A series of papers provide background to the development of the QMS. Sandrey and O'Donnell (1984) provide a perspective into the debate surrounding NZ's inshore fishery and the management problems that initiated the introduction of the QMS. Duncan (1985) examines NZ's inshore fishery from an industry perspective prior to the introduction of the QMS. Cullen and Memon (1990) examine the history of NZ's fisheries policy for the 20 years from 1970 to 1990. They analyse the effects of policy changes, specifically the inception of the EEZ and foreign involvement, on NZ's fishing industry. Clark (1985) discusses the impacts of the declaration of the EEZ on NZ's deepwater fisheries and the policy changes it brought about. Clark (1993)

¹⁷ They will still compete for the best fishing grounds.

describes the developments in the NZ fisheries that lead up to the introduction of the QMS in 1986 and the experience since the introduction of quotas for commercial species. He compares the benefits of the QMS to traditional fisheries management methods. Crothers (1988) provides a concise description of NZ fisheries and the management issues before the introduction of the QMS in 1986 and an explanation of the operations of the quota system. Sharp (1997) presents empirical analysis of the events that led to NZ's introduction of the QMS. He also describes the problems encountered during the transitional phase when changing fisheries management regimes and summarises the institutional changes required.

1.4.1.a Implementation of QMS

Another group of papers outline the QMS and discuss key issues at the time of implementation. Clark et al (1988) provide a description and analysis of NZ's QMS: the trading and transferability of quota, information systems, key issues, and their enforcement at the time of the QMS introduction. They also provide background to NZ's economy and the contribution fisheries make to it. Shallard (1996) offers a clear overview of the concepts and key features of the ITQ system as a fisheries management tool. Batstone and Sharp (2000) describe the structure of the rights-based (ITQ) fishery market. They also provide a history of the NZ fishing sector, the QMS and how the quota market operates in NZ (1999a). They present a dynamic optimisation model (1999b), following on from the work of Anderson (1991).

1.4.2 Policy Reviews

A series of policy reviews have been carried out since 1986. Pearse (1991) offers the first key report with his independent review of NZ's state of fisheries management five years after the introduction of the QMS. He suggests opportunities for improving the system and how fisheries policies might progress; specifically Maori, conservation, and recreational issues. Sissenwine and Mace (1992) provide a comprehensive overview of the NZ QMS; the economic effects, management improvements, and problems encountered since its implementation. They discuss conservation, government's role, Maori issues, and QMS compliance issues and what can be learned from the NZ experience. Boyd and Dewiest (1992) provide background to the introduction and analysis of the first five years of the QMS in NZ. They discuss the positive effects and problems of the NZ experience with the ITQ management option. Annala (1996) critically examines NZ's QMS from 1986–1994. He discusses benefits such as secured resource access and improved industry efficiency, and costs, for example bycatch, quota busting and high grading. He comments on the future of the system along with issues such as indigenous claims, conflict resolution and administrative simplification. Grafton (1996) provides a comparative discussion of the QMS in NZ and ITQ systems in Canada, Australia, Iceland and the United States. Major (1999) looks at changes in the management of the QMS between 1986 and 1996 and their effects on biological and economic factors as well as conflict minimisation.

More recently, Clement (2000) discusses New Zealand's deep water fisheries and their management policies, specifically orange roughy. He discusses the economic benefits and responsibilities of ITQs and describes the stakeholder management groups that

have been established for commercial species in New Zealand. Gissurason (2000) presents fisheries problems faced by Iceland and resolutions; Arnason (1992) discusses their quota system. Neidlander and Sullivan (2000 a and b) compare and contrast the quota systems in New Zealand and the United States. They discuss the background of fisheries management in both countries and the situations which necessitated a QMS. They also discuss the issues that have arisen post introduction, for example, enforcement and compliance and reconciliation of catch records.

1.4.3 Setting Total Allowable Catch – Sustainability

Many scientific studies have been done to assess stocks and provide advice on appropriate levels of TAC.¹⁸ We will not summarise those here. Some policy and economics literature has also been written on the sustainability of fisheries, for example see Ludwig et al (1993).

Hawkey (1994) concludes that the QMS failed to ensure sustainable fishing practices in regional areas, for example, Northland. This may be due to the incentives for individuals to exploit the high-value species for short-term gain (such as snapper and rock-lobster), resentment by “part-timers” to being excluded from the initial ITQ allocations and the lack of efficient enforcement along the coastline. Wallace (1998a) details the inconsistencies in marine management in New Zealand and examines whether or not the QMS is the success story it is often described as being. She describes the impact of the QMS on non-commercial stakeholders and makes suggestions for management reforms. The Ministry of Fisheries (2001c) reviews the management controls and sustainability measures in New Zealand’s fisheries, while Meister and Sharp (1993) discuss the current and potential approaches to environmental management. Batstone and Sharp (1999b) present an alternative to the current biological method of determining maximum sustainable yield (MSY) to set the annual TAC: the minimum information system. This alternative system uses information contained in quota prices as a guide for setting commercial harvest limits.¹⁹ The model is tested using quota price data from NZ’s inshore snapper fishery.

Sharp (2000) presents a model for a single species commercial fishery with tradable rights, whereby a regulator sets a TACC and the “sustainable surplus” is allocated to both commercial and recreational fishing interests. He compares the results of the model with the process of arbitrary allocation of recreational fishing harvest quantities using NZ data and fisheries management experiences for his examples.

1.4.4 Allocation of Quota

Some general reviews touch on the social effects of the initial allocation and specifically of the exclusion of small fishers. Regional impact studies are reported by the McDermott Fairgray Group (2000). Among other issues, McClurg (1997) and

¹⁸ For example see: Annala et al (1999, 2000); Colman et al (1993); Hilborn (1997); Ministry of Agriculture & Fisheries (1984); Ministry of Fisheries (2002a).

¹⁹ See also Arnason (1993).

Hawkey (1994) discuss the impacts the insecurity of ITQ property rights has on the actual operation of the QMS.

1.4.4.a Recreational Fishers

The Total Allowable Commercial catch is lower than the TAC to allow for recreational fishing. Hetherington (1998 and 2000) discusses the policies affecting recreational fishers, resource ownership and management structure, and conflicts between recreational and commercial fishers. McMurrin (2000) discusses the property rights of recreational fishers in a New Zealand context. She compares the current recreational fishing management practices with those of the commercial stakeholders and Maori and offers alternative management options. There is an extensive literature on Maori issues.

1.4.5 Maori

Memon and Cullen (1996) describe the historic relationship between Maori and pakeha since New Zealand colonisation in 1860. They describe the traditional Maori management of fishery resources, present the conflicts arising from the QMS legislation. They outline the government's Treaty obligations, settlements and outstanding issues. Jones (1998) describes the position of Maori within the NZ fishing industry, the policy that has affected their integration into the QMS, and the conflict this poses to Maori traditional harvest and customary rights. Cassidy (2000) presents a customary fisher's perspective on fisheries management and how the introduction of the QMS has affected traditional management. Le Heron (1996) presents a case study that details the Maori fishing claim settlement, the Sealord deal. Te Ohu Kai Moana (2000) discuss options for the optimal allocation of pre-settlement fisheries assets to Maori. They provide a comprehensive background to the issues, present the legislation and discuss the effects of the QMS on indigenous fishers.

Hooper and Lynch (2000) discuss the current approach to indigenous peoples fishery property rights, government policy and the legal instruments that have been used in New Zealand to resolve outstanding issues. Boast (1999) reflects on the issues surrounding Maori fisheries since the QMS inception from a legal perspective..

1.4.6 Market Definition - Participants

The NZ Institute of Economic Research (1999) reviews the policy and analyses the options, for controlling foreign ownership of NZ fisheries' quota, with the view to maximising NZ's economic benefit from foreign involvement in our fisheries. They conclude that foreign ownership of quota should be treated the same as any other foreign investment in NZ.

New Zealand's QMS imposes limitations on concentration of quota. These are aimed at avoiding market dominance by one player. Connor (2000) presents preliminary analysis then discusses the changes in quota holdings concentration and fleet capacity since the introduction of the QMS in New Zealand.

1.4.7 Quota trading

1.4.7.a Market complexity

Two key issues arise here. The first is simply the complexity of the system which can make compliance difficult and hinder trading. Dewees (1989) critically assesses the implementation of the QMS in NZ, specifically the inshore fishery in the Auckland region. He presents results from surveys and interviews given to fishers and Ministry officials on the ease of adaptation to the QMS, the perceived positive effects, benefits and problems. He recommends improved education for both industry and staff and that quota trading should be simple, timely, and accessible by all holders, among other things. He follows this up in Dewees (1996) with the results of new interviews and an update of the survey with fishers based in the Auckland region. He focuses on the Ministry of Fisheries' communication efforts regarding regulation changes and details the government's response to problems encountered since the inception of the QMS.

1.4.7.b Bycatch

The second key issue that constrains trading is the problem of bycatch. Often related to this is the issue of 'banking' quota on over and under catch. Again there is an extensive scientific literature on bycatch. Here we focus on the policy literature.

Annala et al (1991) discuss the problem of bycatch in a multi-species trawl fishery and how the New Zealand QMS legislation and fisheries management approaches address these issues. They critically discuss TAC setting, by-catch of non-target species, TAC over and under catch, the 10% carry-forward policy, catch surrender and by-catch quota trade-off.

Squires et al (1996) extend this with a broader discussion of the management problems encountered in multispecies fisheries. They address the incidence of bycatch and the difficulties of implementing quota systems and other management options in mixed species fisheries around the world. They discuss the issues of discards, high grading within quota systems, the impacts of ITQs on non-ITQ fisheries as well with a vested interest in the sustainable management of their livelihood. Sharp (1996b) discusses the governments continuing policy, management and enforcement roles.

Donoghue (1998) focuses on bycatch of endangered species. He describes Population Management Plans as a tool for managing endangered species by-catch.

1.4.8 Funding

Lindner et al. (1989) examine the NZ government's cost recovery regime (specifically resource rentals) under a newly introduced QMS. They argue that government overvalued the resource and therefore industry is incurring an economic loss in the transitional period from open access to quota management. Donoghue (1998) and West et al (1999) describe the conservation services levy which provides funding to the Department of Conservation for programmes to protect species vulnerable to mortality through fishing operations.

More recently, Wyatt (2000) describes the types and objectives of different cost recovery regimes and reviews the NZ government's use of different approaches in recovering costs for fisheries management and fisher's access to the resource. He evaluates the merits of each approach and concludes that fishers have the ability to manage their rights efficiently (compared to government) and that this is the way NZ is heading.

1.4.9 Governance – Integration with other regulations applying to fisheries

Governance addresses two issues, first, the setting of appropriate TACs and second, non-ITQ controls. The ITQ system is not a complete system of fisheries management on its own. It controls only total catch of each species in each area. A series of other controls are needed to fine tune where, when, and how fish are harvested and to deal with aquaculture. These can be dealt with through separate regulations and legislation and / or through devolution of some management control to the industry itself.

The Parliamentary Commission for the Environment (1999) reports on NZ's marine environment; the agencies and systems for its management. They assess the various legislation and its effects on marine users, and the rights and responsibilities of commercial, recreational, and traditional users.

1.4.9.a Stakeholder governance

Recent papers have addressed the possibility of increased self-governance by industry. Yandle (2001) examines the choices NZ has made regarding the management of its fisheries resources and the effects those choices have had on stakeholders since the introduction of the QMS in 1986. She examines co-management options being considered and addresses the property rights issues. Harte (2000a and b) argues for greater stakeholder participation in fisheries management. He states that government management of fisheries resources has failed due to the denial of stakeholder property rights. A history is provided of the NZ commercial fisheries and the evolution to rights-based fishery management using stakeholder developed fisheries management plans. He presents the NZ southern scallop fishery (Challenger) as an example where property rights have provided an incentive for collective responsibility for the successful management and ultimate sustainability of this valuable fishery. Arbuckle and Drummond (2000) also discuss the possible development of fishers' self-governance in combination with government's ITQ management system. They use the same example as Harte (2000a), and conclude that "a complex set of biological, financial and institutional imperatives have driven increased self-governance by quota owners and other stakeholders in the Challenger area".

Earlier in the QMS, similar issues were raised. As early as 1990, Ackroyd, Hide and Sharp (1990) suggested that the problems in the QMS could be addressed and resolved through the evolution of sole-ownership fishing corporations. Groups of quota owners could develop corporations and take over responsibility for fisheries management from the government. The fishery would be managed by stakeholders. Hartevelt (1998) presents a comprehensive review of the Fisheries Act 1996, commissioned by the NZ

government, with the objective of examining the legislative framework and recommending possible changes, amendments, and reform. He recommended that government and stakeholders realign their roles, with stakeholders becoming more responsible for management of the fisheries resource and the streamlining of the FA96. Wallace (1998b) discusses involvement of industry in the management and decision making processes from a conservation perspective.

Other authors consider different stakeholder interests and sustainability aspects of governance. Bathgate and Memon (1998) argue that the focus of the QMS on production and economic goals precludes effective sustainable management of the fisheries resource. They recommend a more holistic approach to management with more integrated stakeholder and community involvement and a shift of focus from “single-species” to one that encompasses the whole ecosystem. already mentioned

1.4.9.b Aquaculture

The QMS does not address aquaculture at all.²⁰ It is emerging as a major industry with significant interactions with 'wild' fishing. Drummond et al (2000) present the challenges facing the marine farming industry in New Zealand and the issues of co-existence with the coastal community and other sectors in the commercial fishing industry as a whole. They present a summary of government policy and suggestions for improvements that would reduce conflict in the future. Harte and Bess (2000) discuss the performance and management of NZ's marine farming industry, highlighting the lack of clearly defined, secure property rights. They present suggestions to resolve inconsistencies between the rights of “wild” fishers and fish “farmers” to “strengthen the property rights basis for their economic and ecological success”.

1.4.10 Social Issues

Another issue that has attracted a lot of attention both within New Zealand and abroad are the social and socio-economic impacts of ITQ systems. Because the focus of this paper is on the regulations we will only touch on these briefly.

Deweese and Yandle have produced a series of papers (Yandle and Dewees 2000a & b), relating to a multi-year study of the inshore fishery in the Auckland region. They use a survey and interviews to assess the impacts of the QMS on local fishers.

Other literature looks specifically at the impacts of the QMS on communities. already mentioned Rennie (1998) discusses, within a geographical context the problems faced by communities when the QMS was implemented in NZ. He offers background, explanation of the system and issues for commercial, recreational, and indigenous fishers. He discusses some aspects of the planning legislation that affects fisheries in New Zealand, specifically the RMA (1991). McClintock et al (2000) examine the effect of the QMS on communities in NZ that have traditionally relied on the fishing industry for their economic development. They profile three communities through research case studies and examine the interconnections at the local and sub-regional levels.

²⁰ Aquaculture (marine farming) is controlled by a permit system and is governed by the Fisheries Amendment Act (1993).

Finally, O'Donovan (1992) reports on the availability of statistics regarding employment in NZ's fishing industry; Bevin et al (1989) review the industry in the early stages of the QMS. Statistics NZ (1990) provide information on fisheries as a primary industry, four years into the QMS; Sharp (1998) discusses the structure and dynamics of the industry as affected by the QMS and further examines (1999) the linkages between trade and the environment. CM Research (1998) report on levels of compliance within the QMS. Geographical industry data is also provided by Statistics NZ (2001a and b); while the NZ Fishing Industry Board (1991) provides a review of seafood product exports.

1.4.11 Efficiency Impacts

Several studies have addressed the efficiency effects of the move to the QMS with varying degrees of empirical analysis. The NZ Seafood Industry Council (2001) reviews the economic performance of the industry over the preceding four years. They present regional economic growth, overall sector growth, export data and list the current issues facing fisheries stakeholders. Akroyd et al (1999) describe performance indicators to monitor and evaluate the effectiveness and efficiency of NZ's commercial fisheries policy for all stakeholder groups. They surveyed and interviewed stakeholders and conclude that ITQ price information when applied to an econometric model provides suitable performance indicators regarding the impact and analysis of policy.

Covering a longer time period, Le Heron (1996) discusses possible reasons for the growth in New Zealand's fishing sector over the past 20 years and the corresponding growth in exports of fish products. Wallace (1998) examines whether the system has lived up to the expectations of economists and policy makers. Bess (2000) describes the role of property rights as provided by the QMS, in helping to sustain and improve NZ fishing firms' competitiveness. In natural resource based industries secure property rights can be a source of competitive advantage.

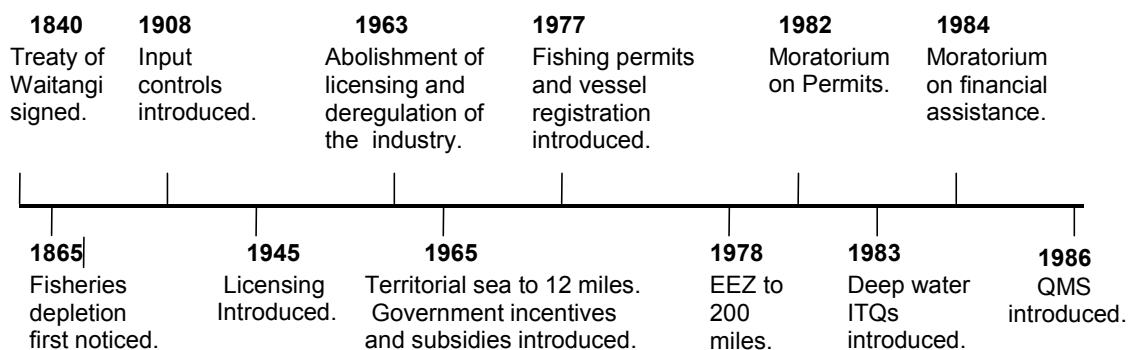
1.4.12 Empirical Analysis

Two completed studies use more detailed empirical analysis. Batstone and Sharp (2000) analyse the NZ QMS with an analytical economic model. They attempt to determine if the QMS is economically efficient using an analysis of the structure of property rights and a critical review of economic performance of the industry. Connor (2000) presents preliminary analysis of the changes in quota holdings concentration and fleet (vessel) capacity since the introduction of the QMS in New Zealand.

1.5 THE HISTORY OF COMMERCIAL FISHERIES IN NZ BEFORE THE QMS

Figure 3 gives some key dates in the history of New Zealand Fisheries Management before the introduction of the QMS. In this section we discuss the early history of fisheries management, a period where the industry was actively developed, and then the problems that led up to the creation of the QMS.

Figure 3 Key Dates in the Development of NZ Fisheries Management



1.5.1 Early History of New Zealand Fisheries Management

European settlers in NZ established a structure of free and open access to New Zealand’s coastal fisheries, a “public right of the commons” in the English tradition. Nightingale (1992) states that when Europeans arrived in NZ, the Crown took ownership of the fisheries, with a limited and ambiguous recognition given to Maori rights. The basic principle was that fish were seen as a public good to which the public and the industry had unrestricted access until the resource came under threat.²¹ Ackroyd et al (1990) state that by 1865 it was evident the fisheries resource was under pressure; attributable to overfishing as a result of non-exclusive rights. A series of legislation followed that addressed fisheries management issues as they arose, although there appeared to be two conflicting objectives: conservation *and* industry exploitation of the fisheries resource.²² The 1894 Sea-fisheries Act began a process of direct government involvement in the fishing industry by giving the Marine Department the power to license fishing boats. With the amendment of this Act in 1903, fishing boats and fish processors were required to supply the parameters for the Government’s long-term involvement in the industry; and the understanding of resource management was limited.

Comprehensive legislature for fisheries management was introduced with the Fisheries Act 1908, which consolidated the preceding Acts and established a Minister of Marine to manage, protect, and conserve the resource.²³ The Act formalised regulatory controls over fishing methods through input controls such as limited entry licensing, closed areas and seasons, controls on minimum fish size and requirements to land catch at specific ports.²⁴ The 1908 Act was operational until 1983, although it was amended

²¹ Nightingale (1992).

²² Oyster Fisheries Act (1866, 1869, 1892); Fish Protection Act 1877; Fisheries Conservation Act 1884; Fisheries Encouragement Act (1885; 1904; 1919); Sea-fisheries Act (1894; 1903; 1907): see Ackroyd et al. (1990) and Nightingale (1992) for further detail.

²³ Ackroyd et al. (1990).

²⁴ Sissenwine and Mace (1992).

to further resource conservation by limiting entry (through licensing) and implementing catch-effort controls.²⁵

In 1937 a *Sea Fisheries Investigation Committee* was established to deal with industry problems such as lack of cooperation between the sectors. They found that the high proportion of New Zealand fish exported resulted in the over-capitalisation and depletion of fisheries, lack of available domestic fish supply and low returns to fishers. The committee concluded that restrictive licensing of vessels, fishers, and exports would restrict exports, deter new entry into fisheries and encourage domestic market expansion.²⁶ The government heeded their recommendations and the Chief-Inspector of Fisheries imposed further input controls to conserve the resource.²⁷

The *Fisheries Amendment Act 1945* incorporated the Committee's recommendations. It established a Sea-fisheries Licensing Authority to regulate the licensing of vessels and fishers to 3 miles offshore.²⁸ Vessel licences provided a port-specific means for regulating catch, effort, and conservation of fish stocks. Improvements in technology (e.g. refrigeration, echo location, improved communication systems, and superior vessels) continued to improve the range, capacity, and efficiency of fishers.²⁹ Domestic and foreign fishers could (and did) avoid the licensing regulations by harvesting their catch beyond the offshore limit.³⁰

1.5.2 Development of the New Zealand Fishing Industry

In the late 1950s it was industry opinion that fishing had become over-regulated and did not require such stringent conservative management.³¹ Then in the early 1960's an excess supply of fish products in Australia (NZ's main seafood market), resulted in export restrictions. These events lead to the appointment of a Select Committee in 1961 to determine how to better utilise the fishery resource, address export market arrangements and increase the economic benefits to New Zealanders.³² They concluded that previous licensing policies had restricted the growth and expansion of the NZ fishing industry, had restricted diversification and competition within the industry, and were not effective in achieving their objective of the biological conservation of fishstocks.³³ The recommendations of the Select Committee resulted in the Fisheries Amendment Act 1963 which abolished twenty years of restrictive licensing, largely deregulated the industry and encouraged new entrants.³⁴ At the same time the Fishing Industry Advisory Council was replaced by the Fishing Industry Board. The Board's mandate was "to help promote and oversee the fishing industry"

²⁵ Fisheries Amendment Act (1945). Meister and Sharp (1993), Sissenwine and Mace (1992).

²⁶ Ackroyd et al (1990).

²⁷ A restrictive licensing policy was established under the Industrial Efficiency Act 1936 (Nightingale 1992).

²⁸ The limit of New Zealand's territorial sea until 1977 and the declaration of the EEZ.

²⁹ Ackroyd et al. (1990).

³⁰ Le Heron (1996); Sharp (1997). During this period Japanese trawlers were active in coastal waters beyond the 3-mile limit of New Zealand's jurisdiction.

³¹ Nightingale (1992).

³² Nightingale (1992), Sharp (1996b).

³³ Ackroyd et al. (1990).

³⁴ Nightingale (1992).

and to fully utilise the economic potential of the fisheries resource, and a Fisheries Research Division was also set up within the Marine Department.

Prior to the establishment of the Ministry of Fisheries, fisheries were first administered by the (former) Marine Department within the Ministry of Transport (Cullen and Memon 1990).³⁵ As part of a general restructuring of government departments in 1972, the Fisheries Management and Fisheries Research Divisions of the Marine Department were combined with the Department of Agriculture to form the Ministry of Agriculture and Fisheries.³⁶

In 1965 the *Territorial Sea and Fishing Zone Act* established an exclusive fishing zone, extending government regulation to 12 miles offshore. This Act consolidated property rights and limited foreign access to NZ's fisheries resources, prompted after an incursion into the inshore fisheries by Japanese. Government assisted the expansion of the domestic fishing industry by guaranteeing mortgages and loans for vessel and equipment purchases, which aided the formation of major fishing companies.³⁷ The objective was to increase the quantity and quality of fish for both the local and export markets through the development of fisheries further offshore. At that time a few high-value inshore species constituted the major exports.³⁸

In 1977 the *Fisheries Amendment Act (1977)* was passed. It aimed to preserve valuable inshore shellfish and crustacean fisheries.³⁹ This legislation authorized the Minister to declare a "controlled fishery" under which the size and species of fish harvested, methods used, areas that could be fished, and access to them were controlled.⁴⁰ Fishers were now required to obtain a permit and register their vessels.⁴¹ In addition, fishers in controlled fisheries needed a controlled fishery licence.⁴²

New Zealand established a 200-mile Exclusive Economic Zone (EEZ) in 1978 (April 1), after the *Territorial Sea and Exclusive Economic Zone Act 1977* was passed.⁴³ The EEZ extended NZ's commercial fishing area to 200 miles offshore, 188 miles beyond the conventional territorial sea.⁴⁴ The EEZ was now 15 times the size of New Zealand's land mass, the fourth-largest in the world.⁴⁵

³⁵ The Marine Department was established in 1866 and passed the 1877 Fish Protection Act.

³⁶ Nightingale (1992). Legislated by the Ministry of Agriculture & Fisheries Amendment Act 1972 (now repealed).

³⁷ Ackroyd et al. (1990), Nightingale (1992).

³⁸ Sharp (1996b, 1997).

³⁹ Ackroyd et al. (1990).

⁴⁰ Ackroyd et al. (1990).

⁴¹ Sharp (1996b).

⁴² Bruce Shallard, pers. comm.

⁴³ Clark (1985). This was initiated in response to UNCLOS III - the Third United Nations Law of the Sea Conference which proposed 200 mile EEZs for coastal nations to allow countries to manage the fisheries within their jurisdiction (Cullen and Memon 1990). See Helm (1998) for further details of policy implications.

⁴⁴ Statistics NZ (2001a).

⁴⁵ Le Heron (1996); Sharp (1997); Akroyd et al (1999). Various sources put the area at 1.3 million square nautical miles (SeaFIC Website – www.seafood.co.nz) or 4.1 million square kilometres (Akroyd et al 1999).

The EEZ Act was passed in response to the United Nations Convention on the Law of the Sea (UNCLOS), even though New Zealand did not actually ratify the convention until 1996, it was considered prudent to implement domestic policy consistent with it.⁴⁶ The Act required New Zealand to conserve and manage fish stocks to avoid over-exploitation but also required the optimum utilisation of the fish stocks within the EEZ and didn't confer ownership rights.⁴⁷ The New Zealand government agreed to comply with the provisions set out in the Convention, and therefore was obliged to allow foreign fishers to harvest the resource (to a reasonable level) if the domestic fleet was unable to do so.⁴⁸

TACCs were first used in New Zealand in 1977 to control the catch of overfished deepwater species and were set for each fisheries management zone.⁴⁹ Much of the surplus TACC was allocated as annual quota to foreign governments through bilateral trade licensing agreements and fishing off the continental shelf began in earnest.⁵⁰

The Government promoted the development of the domestic industry through co-operative deepwater fishing ventures with foreign companies in Japan, South Korea, Taiwan and the USSR.⁵¹ In 1978 bilateral (govt-govt) agreements were established with Japan, Korea, USSR, and Taiwan which lasted until the early 1980s. The deepwater trawl policy initiated joint ventures between New Zealand and overseas companies. The foreign fishers injected equity, capital, and knowledge into the domestic companies. This increased the domestic industry's technology and expertise (including vessel numbers and harvesting power), access to international markets, on-shore processing facilities, and deep-water fish stock exploration.⁵²

To further increase the deepwater harvest by domestic vessels (and thereby reduce foreign take), government financial aid to the fishing industry for stock research and capital investment continued through to the 1980s.⁵³ The assistance encouraged relatively unconstrained entry into the industry, long-term technology and processing development (larger more efficient trawlers) and production expansion. Prior to the establishment of the QMS in the late 1980s, charter agreements (covering boats and crew) were established with foreign companies. This arrangement had mutual benefits; it allowed the foreign partners access to low-cost fish (in 1977/78 Foreign Licensed Access fees were very high), and provided the NZ partners with vessels and labour that increased their fishing capacity, so they could fish the entirety of the TACs and would not be obliged to give it away to foreign fishers (as per UNCLOS regulations).⁵⁴ Thus the nature of fishing in the zone changed from foreign fishing under license to joint

⁴⁶ Bruce Shallard, pers. comm.

⁴⁷ Cullen and Memon (1990), Meister and Sharp (1993).

⁴⁸ Cullen and Memon (1990).

⁴⁹ Dewees (1996), Sharp (1996b).

⁵⁰ Nightingale (1992); Sharp (1997). This raised revenue and fulfilled New Zealand's responsibilities under the Law of the Sea (Nightingale 1992).

⁵¹ Clark (1985), Ackroyd et al (1990), Cullen and Memon (1990), Sharp (1997).

⁵² Sharp (1997).

⁵³ Loans for catching and processing facilities, duty-free imports, rural export suspensory loans, investment allowances, tax breaks and subsidies.

⁵⁴ Bruce Shallard, pers. comm.

ventures and vessels working under contract to NZ companies.⁵⁵ At the same time there was growth within the deep-sea export fisheries market for value-added, shore processed products.⁵⁶ The exports provided greater net economic returns to the New Zealand fishing industry, and further attracted small fisher participation in it.⁵⁷ The overall result of these events was dramatic increases in the catch of the main commercial deep water species, especially orange roughy (1980 nil catch; 1985 40,000t) and hoki (1980 2700t; 1985 46,000t).⁵⁸

1.5.3 Lead up to the Quota Management System

During the 1980's it became evident that the existing fisheries policy and management regime, which had encouraged over-capitalisation and over-harvesting within the industry, was not sustainable.⁵⁹ There were increased concerns about the imminent economic collapse of the major inshore fisheries, especially snapper which experienced declining catch levels during the late 1970s.⁶⁰ Increased harvest pressure resulted in subsequent stock depletion and reduced catch levels that required greater effort, decreasing economic returns to fishers.⁶¹ The failure of input controls was acknowledged and the government concentrated on developing a management system based on output controls.⁶² Policy changes were proposed sustainable harvest levels for deepwater species (especially orange roughy and hoki), large catch reductions for high-value inshore species, such as snapper and tarakihi, allocating harvest rights, and additional control measures in threatened fisheries (regulating size, species, methods and areas of harvest) in an effort to ensure long-term sustainability.⁶³ Quota were first used in 1981, when a species quota was set for orange roughy.⁶⁴

In 1982 the Minister of Fisheries declared a general moratorium on the issuing of fishing permits in an attempt to limit over-capitalisation and depletion of the inshore fishery resource. The Minister stated, *“the dramatic increase in the number of fishing permits issued over the last 10 years has meant there are too many fishermen competing for the available resource. This has led to fish populations coming under stress through heavy fishing pressure and fishermen receiving smaller returns as the resource has to be divided among a greater number”*.⁶⁵

New Zealand's deepwater trawl policy was reviewed in 1982 so that long term management strategies could be developed and applied to both deepwater and inshore

⁵⁵ Nightingale (1992).

⁵⁶ Clark (1985), Cullen and Memon (1990), Le Heron (1996), Ministry of Fisheries (1996), Sharp (1997).

⁵⁷ Le Heron (1996), Ministry of Fisheries (1996), Sharp (1996b).

⁵⁸ Ackroyd et al (1990).

⁵⁹ Ackroyd et al (1990), Ministry of Fisheries (1996), Le Heron (1996), Clement (1997), Sharp (1997).

⁶⁰ Clark (1985), Nightingale (1992).

⁶¹ Clark (1985), Sharp (1996b). Input controls such as closed areas meant that vessels simply moved to other grounds and increased fishing pressure over a greater area (Nightingale 1992).

⁶² Clark (1985).

⁶³ Sharp (1997).

⁶⁴ Nightingale (1992).

⁶⁵ Ackroyd et al (1990:18).

fisheries.⁶⁶ The Ministry concluded that a quota by area allocation system was the most appropriate way to regulate access.⁶⁷ The EEZ was divided into management areas, which were used to establish individual quotas by weight for the main commercial deepwater trawl species: hake, hoki, ling, oreos, orange roughy, squid, and silver warehou (barracouta was added in 1983).⁶⁸

The deepwater TACs for each management area were based on global estimates and current catch histories.⁶⁹ Their aim was to conserve fishstocks at their present levels and prevent overfishing and overcapitalisation in these fisheries (in 1983 overcapitalisation in commercial fisheries was approximately \$28m or 20% with onshore over-capitalisation estimated at \$4-5m).⁷⁰

Deepwater Enterprise Allocations of Annual Transferable Quota (ATQs) were made to nine qualifying companies already established in the deepwater fisheries, to a maximum aggregate of 35% of the total allocations.⁷¹ Allocation was based primarily on each fishing operation's catch history, but on-shore processing capacity, level of investment and vessel ownership were also factors.⁷² The deepwater ATQs became active in 1983, initially for a period of 10 years.⁷³

Transferability of the harvesting rights was restricted, with quota exchange between the deepwater enterprises limited to catch plans that required different combinations of quota than initially allocated.⁷⁴ All trades had to be reported to the government, but Sissenwine and Mace (1992) state there was considerable de facto trading and leasing of shares among the companies.

ATQs were seen as the forerunner to ITQs, allowing the Ministry to evaluate and develop the QMS policy.⁷⁵ They became permanent in 1985, to be consistent with the introduction of ITQs for the main inshore fisheries in 1986.⁷⁶

Inshore fishers' catch of traditionally high-volume commercial species such as snapper continued to decline. The decline was exacerbated by the use of larger, more efficient

⁶⁶ Cullen and Memon (1990), Nightingale (1992). The deepwater fisheries policy was set out in *Territorial Sea and Exclusive Economic Zone Act 1977* SII:11 was reviewed in the Fisheries Amendment Act 1982 (no. 72) – since repealed.

⁶⁷ Cullen and Memon (1990).

⁶⁸ Cullen and Memon (1990), Nightingale (1992), Sharp (1996b), Clement (1997). As provided for by the TSEEZ Act (1977).

⁶⁹ Cullen and Memon (1990).

⁷⁰ Sissenwine and Mace (1992), Ackroyd et al (1990:19). Overcapitalisation was concentrated mainly on the east coast of the North Island (Meister and Sharp 1993).

⁷¹ Clark (1985); Cullen and Memon (1990). Companies had to be at least 75.1% NZ owned, were required to process at least 35% of their catch onshore and pay royalties of \$3 per tonne of quota. See Clark (1985) and Sharp (1997) for further allocation details.

⁷² Sharp (1997), Major (1999).

⁷³ Sharp (1997).

⁷⁴ Clark (1985), Sharp (1996b).

⁷⁵ Cullen and Memon (1990).

⁷⁶ Meister and Sharp (1993:98), Sissenwine and Mace (1992).

vessels originally bought for use in the deepwater fisheries.⁷⁷ Fishers then turned their attention to other inshore species and began to deplete those stocks.⁷⁸

During the 1980s, the fishing industry had become dominated by a small number of large operators coupled with numerous small operators and part-time fishers, so that 90 percent of vessels caught less than 20 percent of the fish.⁷⁹ The 1982 Fisheries Amendment Act legislated that part-time fishers could be barred from the industry; in 1983/84 a number of part-time fishers had their licences revoked.⁸⁰

The Fisheries Act 1983 consolidated NZ's fisheries management and policy proposals, initiated the quota management system for the deepwater and inshore fisheries. The Act also introduced significant and comprehensive changes to fisheries resource management in NZ. It legislated for fisheries management plans as the way to conserve regional commercial inshore species' stocks (although these were never implemented), detailed commercial and foreign licensing, vessel and fishing restrictions, established a fisheries authority in 1978, which was to supersede the Fisheries Licensing Authority (est. 1908), and listed offences and their penalties.

A moratorium on financial assistance to the inshore fishery was implemented in April 1984.⁸¹ In August 1984, the Government funded a scheme to further reduce capital and fishing effort, subsidising NZ fishers that weren't substantially reliant on fishing for their livelihoods to exit the industry.⁸² The net impact of the entire reduction of effort was estimated at \$16-22m; the net benefit of maintaining effort at reduced levels permanently was estimated to be \$4-5m.⁸³

To improve management, provide for a sustainable harvest, and promote stability and efficiency within industry, the government proposed additional regulations in the Fisheries Amendment Act 1986. These included effort controls, competitive TACCs, (allowing for a proportion of the TAC to be allocated to non-commercial users) and transferable ITQs for all the main commercial fisheries, both inshore and deepwater. The Act incorporated the successful existing deepwater trawl policy and ITQ regime into its overall fisheries management framework. The Amendment allowed the deepwater quota to be allocated in perpetuity and become fully transferable so that companies could achieve a suitable mix of fish for their processing and marketing needs; the less significant commercial species continued to be managed by input controls.⁸⁴

Fishers supported the proposed QMS, hopeful that catch reductions would have long-term benefits and industry restructuring would provide them with sufficient returns

⁷⁷ Cullen and Memon (1990), Sharp (1996b).

⁷⁸ Sharp (1996b).

⁷⁹ Cullen and Memon (1990), Meister and Sharp (1993). From 1973-1982 the largest 50 boats landed 45% of the inshore fishery catch; the smallest 3 500 boats caught only 20% of the landed catch (Meister and Sharp 1993).

⁸⁰ Nightingale (1992).

⁸¹ Ackroyd et al (1990).

⁸² Ackroyd et al (1990).

⁸³ Meister and Sharp (1993).

⁸⁴ Ackroyd et al (1990), Nightingale (1992), Le Heron (1996), Clement (1997), Sharp (1997).

from lower harvest levels.⁸⁵ The QMS was viewed as being effective and economically efficient, total catch could be regulated and fishers could choose the most efficient combinations of fishing gear, season, and effort to harvest the fish at least cost.⁸⁶

New Zealand had thus initiated the Quota Management System, introducing transferable private property rights, known as Individual Transferable Quota (ITQ), to commercial catches across all NZs major fisheries.⁸⁷ New Zealand had developed the first comprehensive fisheries management system in the world; a quota system operating within the constraints of a total allowable catch based on the concept of maximum sustainable yield.⁸⁸

The remainder of this paper focuses on fisheries management since 1st October 1986 when the QMS system was introduced. It discusses how the system works and how it has changed over time.

⁸⁵ Clement (1997).

⁸⁶ Cullen and Memon (1990).

⁸⁷ Ministry of Fisheries (1996), Sharp (1996b), Clement (1997 and 1998), Memon and Cullen (1998).

⁸⁸ Cullen and Memon (1990); Meister and Sharp (1993); Clement (1997).

2 SETTING AGGREGATE TARGETS

The quota management system controls the total commercial catches from each fishstock within New Zealand's EEZ while allowing quota owners to buy, sell, and lease their catching rights and to choose the time of year they harvest their catches within these limits. It controls fisheries activity through output controls (setting catch limits).⁸⁹

The objectives of the QMS at introduction were:

- 1 **Sustainability**
 - Ensure that catches were limited to levels that could be sustained over the long term;
 - Rebuild inshore fish stocks where required;
- 2 **Efficiency**
 - Ensure that catches were harvested efficiently with maximum benefit to industry and New Zealand;
 - Provide financial assistance to facilitate restructuring of the fishing industry; and
 - Manage the fisheries so that industry retains maximum security of access and flexibility of harvesting.
- 3 **Equity and Administrative Efficiency**
 - Allocate catch entitlements equitably based on individual permit holders' prior commitment to the fishery;
 - Integrate the management of inshore and deep water fisheries; and
 - develop a management system which can be applied both nationally and regionally.⁹⁰

The first conceptual step in a property-rights based fishery is to define the total level of allowable catch to be allocated. The Total Allowable Catch (TAC) is defined in the Fisheries Act 1983 (FA 1983 S2(1)) as “the amount of fish, aquatic life or seaweed that will produce from that fishery the Maximum Sustainable Yield (MSY), as qualified by any relevant economic or environmental factors, fishing patterns, the interdependence of stocks of fish, and any generally recommended sub-regional or regional global standards”. It is the quantity of fish that can be taken for each fish stock by both commercial and non-commercial fishers (Maori, recreational, and other non-commercial parties) per fishing year. The Total Allowable Commercial Catch (TACC) is the tonnage portion of the TAC set aside for commercial quota once non-commercial interests have been considered, and it must be set for each species or group of species in each defined area.⁹¹

⁸⁹ Input controls (restrictions of fishing methods, timing, areas) were still provided for in the Act, as sustainability measures (allowed for in Fishery Management Plans in the FA83 *am.* 1986, and in the FA96 Part III).

⁹⁰ Clements (1997), Bruce Shallard pers. comm. (2001 & 2002).

⁹¹ The definition of TACC was added by the Fisheries Amendment Act 1990 (FA 1983 *am.* 1990 S28D). Prior to this TAC was equivalent to the TACC, although non-commercial catch was to be taken into account when setting the TAC (FA 1983 *am.* 1986 S28C). We will refer to the limit on commercial catches as TACC throughout.

Thus we need to define fisheries management areas and then have a process for setting TACCs within them.

2.1 FISH STOCKS & MANAGEMENT AREAS

Management zones were first established in 1977 upon declaration of the EEZ.⁹² The EEZ was divided into 10 regions (based on where the major fishstocks were).⁹³ Upon introduction of the QMS, the management “zones” became 10 Fisheries Management Areas (FMAs).

The *Fisheries Amendment Act 1986 (S28B:1,3)* provided for the Minister to specify Quota Management Areas (QMA) when establishing quota for each species.⁹⁴ In 1986, the Ministry of Agriculture and Fisheries undertook stock assessments (using research trawls) of all the 21 inshore and 8 deepwater commercial species that were to be managed under the QMS. This was to enable identification of separate fishstocks based on the known biological distribution of each commercial species, as well as to determine the quota management areas and their TACs.⁹⁵ Previously there had only been limited stock assessment research that gathered basic biological and distribution data on commercially viable species.⁹⁶

QMAs are based on geographically sensible management areas that take into account the biology and known distribution of fishstocks, traditional fishing regions (e.g. WCSI), as well as the cost of administration.⁹⁷ Where practical it is preferable for the same QMA to cover different species (FA83 s4).⁹⁸ This is for administrative convenience, and may be based on the regional distribution of stocks (as determined by habitat suitability) and/or traditional fishing patterns.⁹⁹

A QMA covers a major commercial fishstock in their major fishing grounds, generally each QMA is made up of one or more FMA. For a few species the QMAs are broken into subgroups, whereby there can be more than one subgroup in an FMA, (for example, with orange roughy, ORH 2A(Exp, Nth, Sth), ORH 2B and some of ORH 3A cover FMA 2). Some species have only one or two fishstocks covering the entire EEZ (for example, with hoki there is no discrete fishstock, therefore HOK1 covers FMA 1-9), while others have separate fishstocks in most FMAs.¹⁰⁰ The system of QMAs

⁹² Dewees (1996), Sharp (1996b).

⁹³ For a map of FMAs see Clement (1998).

⁹⁴ Ackroyd et al (1990).

⁹⁵ Sissenwine and Mace (1992). For information on how initial fish stocks were determined, and references to related research, see Colman et al. (1985). Historic research data is maintained by the MFish Data Custodian (currently NIWA).

⁹⁶ Annala (1996).

⁹⁷ Ministry of Fisheries (2001c). The overall cost of administration may increase if management areas are small. Managing a larger area such as an FMA may reduce the overall cost and assure the sustainability of the species overall but may not deal with local depletion issues.

⁹⁸ Ackroyd et al (1990), Clement (1997).

⁹⁹ Annala (1996).

¹⁰⁰ Clement (1997).

provides for more effective quota and fisheries management as the commercial catch allowance is area and stock specific.

In 1998/9 there were 257 fishstocks, composed of 42 species or species groups and 10 fisheries management areas.¹⁰¹ These QMAs are documented annually in an excellent publication by Clement and Associates, “The Atlas of Area Codes and TACCs”.¹⁰² It presents maps showing the QMAs by species as well as other information about the species. Each QMA needs to have a TAC and TACC set annually.

2.2 THE PROCESS FOR SETTING TACCs

In New Zealand, TACCs are reviewed and set annually by the Minister of Fisheries for each QMA. The TACC is based on the TAC after allowances have been made for non-commercial fishing (recreational and traditional).

The original estimates of the TACs used in 1986 were imprecise because abundance estimates were not available for most species (particularly inshore) due to insufficient data.¹⁰³ The lack of information made it difficult to determine if stocks would recover from over exploitation and move towards a sustainable population levels.¹⁰⁴ The commercial catch limits for the overexploited inshore species were set at levels from 25% to 75% of the pre-QMS levels depending on the biological status and management objectives for each fishstock.¹⁰⁵ Limits for the other species included in the QMS were set at levels equal to or greater than their pre-QMS levels. Natural variations in stock sizes and quota balancing problems (due to bycatch, mainly in the mixed inshore fishery) resulted in an imbalance in the catch mix relative to the available quota, causing catch over- and under- runs relative to the.¹⁰⁶

In 1984, continuing biological and economic problems surrounding the inshore fishery prompted the government to re-evaluate their management methods and examine alternatives.¹⁰⁷ The Fisheries Amendment Act (1986) allowed the previous catch limits to be reduced to a level where they could be sustained, to initiate stock level recovery (FA 1983 *am.* 1986 S28D).¹⁰⁸ However, the Act also provided for the newly established Quota Appeal Authority to be able to increase the TACCs if necessary, which lead to substantial increases for some species.¹⁰⁹

¹⁰¹ 47 of the fisheries management units are of minor importance (in terms of quota) with TACs established for administrative purposes only (Sissenwine & Mace 1992). FMA 10, surrounding the Kermadec Islands (in northern NZ waters) is currently a special area in which no commercial fishing is permitted (although nominal quota has been set aside for that area) (TOKM 4/2000 – quota allocation guide).

¹⁰² To contact them, their email is clement@fishinfo.co.nz and website is www.fishinfo.co.nz.

¹⁰³ Annala (1996).

¹⁰⁴ Of the 149 commercial fishstocks, only 13 (8.7%) were estimated to be below the MSY: 2 orange roughy, 3 snapper and 8 rock lobster stocks. Thirteen (8.7%) were estimated to be above and 48 (32.2%) at or near the MSY (Major 1999).

¹⁰⁵ These limits could be challenged by affected fishers going to the Quota Appeal Authority.

¹⁰⁶ Annala (1996).

¹⁰⁷ Clark et al. (1988). See Sharp (1996b).

¹⁰⁸ Clark et al. (1988), (Major 1999).

¹⁰⁹ See section 4.1.5 for more details.

The Fisheries Act 1996 (*S13-14C*) specified ministerial considerations to be taken into account when setting the TAC. The target level chosen must be appropriate to the nature of the stock or species and the harvesting method used. The aim is for stocks to be maintained at or above the level that can produce MSY; this can be achieved by the Minister adjusting the TAC conservatively to ensure sufficient breeding populations are maintained for the future. The primary fishstock management strategies identified in the Act are:

- A stock must be maintained at or above the level that can produce MSY;
- Interdependent fish stocks should not be reduced below the level that can produce MSY as a consequence of fishing another stock down to its MSY;
- For certain highly variable stocks – legislation allows in season changes to TAC to reflect stock abundance (FA96 S14(3)); and
- The Act also allows for: alternative TACs based on biological characteristics of certain stocks; catch limits set under international agreements; the use of rotational or enhanced management for certain stocks (FA96 S14(8)).

The Ministry of Fisheries is the body responsible for coordinating the process to set the TACC.

2.2.1 The Ministry of Fisheries

The Ministry of Agriculture and Fisheries managed the QMS system until fisheries issues such as cost recovery, resource rentals, Māori rights as well as public sector reform, and the subsequent division of operational and policy services in the early 1990s (devolution), prompted the government to establish a stand-alone Ministry of Fisheries in 1995.¹¹⁰

The Ministry of Fisheries (MFish) was established on 1 July 1995, and is responsible for the sustainable utilisation of fisheries. This means conserving, using, enhancing and developing New Zealand's fisheries resources to enable people to provide for their social, economic, and cultural well-being. The Ministry advises the government on the development of fisheries policies, develops laws to manage fisheries, purchases contestable services including research, administers the Quota Management System, which regulates New Zealand's commercial fishing activity, and gives effect to the principles of the Treaty of Waitangi as they relate to fisheries.¹¹¹

2.2.2 Ministerial TACC reviews & stock assessments

Every year the Minister sets the TACC for each fish stock based on recommendations from the Ministry of Fisheries and a review of current stock status and sustainability. Annual reviews of fish stocks have been carried since 1986.

Fisheries Assessment Working Groups conduct preliminary reviews of the status of all major commercial fish species' stocks and sustainable yields, based on stock assessments from the previous years research and fisher returns data. The Working Groups are made up of members from contracted research providers for the projects to

¹¹⁰ Major (1999).

¹¹¹ Statistics NZ (2001a).

be discussed, commercial fishers and processors as well as industry research consultants, and representatives of recreational fishers, Maori, and environmental group members. They produce draft Working Group Reports that recommend which fishstocks need further reviewing to the and specify research requirements and generic assessment issues for the following year to the Manager Science Policy.¹¹²

Generally, fishstock are selected for further reviewing if new information becomes available which altered previous biomass or yield estimates or other significant aspects of the assessment. This includes new or revised estimates of biomass, MSY, or long-term yield, the development of a major trend in the catch or catch per unit effort, any studies or data which extends understanding of stock structure, fishing patterns, or non-commercial activities and which significantly affect the stock assessment, and consistent over- or under- catching of the TAC.¹¹³ Eight fishstocks have been recommended by the Fishery Assessment Working Groups to be reviewed in 2002.¹¹⁴

The research programmes are coordinated by the Manager of Science Policy and a Research Coordinating Committee. Since the establishment of the Ministry in 1995, fisheries research has been contestable; tenders are accepted for stock-specific projects as well as more general population assessments. To date, the majority of the stock research has been undertaken either by the Ministry of Fisheries (using data supplied by fishers' returns) or by the National Institute of Water & Atmospheric Research (NIWA), a Crown Research Institute (CRI), with the resources and expertise required to undertake large scale population surveys (Annala 1996). This research is summarised in Fisheries Assessment Research Documents (FARDs).¹¹⁵

NIWA was established in 1992, out of the fisheries research division of MAF, as part of the public sector reforms of the 1990s.¹¹⁶ Its mandate is to provide a scientific basis for the sustainable management and the development of water, atmospheric, marine and freshwater systems and associated resources.¹¹⁷ So far, stock assessment using research trawls and acoustic surveys has only ever been contracted out to NIWA because they have proven to be the best tender in terms of quality and price. However, localised population surveys and other research on stock levels has been initiated by some Fisheries Management Groups, either by coordinating biological sampling of exploratory stocks or using QMS data provided by their members to determine stock statuses (e.g. CPUE).¹¹⁸

¹¹² Ministry of Fisheries (2002a).

¹¹³ Personal communication with John Annala (12 April 2002).

¹¹⁴ Hoki (eastern and western stocks), orange roughy (ORH 2A South, 2B, and 3A – Mid-East Coast stock), Oreo (OEO 3A black oreo), paua (PAU 5B and 5D), snapper (SNA 2).

¹¹⁵ FARDs can be found in the NIWA library.

¹¹⁶ NIWA also incorporated divisions from the New Zealand Meteorological Service.

¹¹⁷ See: www.niwa.co.nz/about. Major (1999) explains that the science division of MAF became a CRI with its shares owned entirely by the Crown. It has a responsibility to operate in a profitable manner, contracting out its services to the new Ministry and contracting for work in the private sector.

¹¹⁸ For example the NZ Rock Lobster Industry Council and Orange Roughy Management Co. See: Clement (2000); Arbuckle and Drummond (2000).

The fishing industry also undertakes specific research projects for some of the fishstocks.¹¹⁹ The “adaptive management” scheme was first implemented in the 1991/92 year. The Adaptive Management Programme (AMP) is allowing small and new fisheries to be developed while ensuring they remain sustainable. Industry stakeholder groups such as the NZ Rock Lobster Industry Council and the South East Finfish Management Company, propose TACC increases. The stakeholder groups must develop and implement proposals to gather data on the fishery and have it scientifically analysed to track the response of the fish stock to the increased catch level and the environmental impact. Fisheries enter the AMP at the request of industry stakeholder groups after a rigorous analysis by the Ministry. SeaFIC is contracted to analyse 13 fisheries (including elephant fish, stargazer, sea perch). The information will be reviewed annually as per other species / TACC reviews.

After the initial working group review, the same people meet again for the Stock Assessment Plenary meeting. They consider specific fishstocks where either: there has been a significant change to the stock assessment; there is new information available; or the fishstock is managed using an “Adaptive Management Plan”. The Plenary group review Working Group drafts, FARDs, and any additional data provided by MFish, NIWA or stakeholder groups. They produce a summary of stock assessments and yield estimates and include recommendations for catch levels for the next fishing year.¹²⁰

In 2000/2001, MFish updated stock assessments for oreo and ling, and major stock assessments were also completed on hoki, the major orange roughy fisheries in the Chatham Islands, key paua fisheries (how many), the main rock lobster fisheries (how many). Regular stock assessment information is available for 66-75% of NZ’s catch (by weight).

The Ministry then consults with stakeholders about the findings from the Plenary report. Anyone with an interest in fisheries can discuss the proposed management controls for the coming year. The 1986 Fisheries Act Amendment stated that before the TACC could be reduced the Minister must consult with the Fishing Industry Board (FA 1983 *am.* 1986 S28B). The 1990 amendment broadened this to include such other persons or organisations as the Minister considers are representative of persons having an interest in that fishery, when setting or varying any TACC for any stock, and allow for their interests in that stock (FA 1983 *am.* 1990 S28B(2)). In Pearce (1990) reviewed the Fisheries Act and concluded that there need to be more involvement of the fishing industry in fisheries management and further definition of stakeholders and community rights. These recommendations were incorporated into the 1996 Fisheries Act. The Ministry collates the reports with the concerns of stakeholders and make their Total Allowable Catch and Total Allowable Commercial Catch recommendations to the Minister.¹²¹

If after the review and consultation, the Minister is satisfied that the current catch level is appropriate, the TACC may remain the same as the previous year. If variation to the TACC is necessary, the Minister may increase or decrease the catch level accordingly,

¹¹⁹ Annala (1996).

¹²⁰ Fishery Assessment Plenary reports are available from MFish.

¹²¹ Clement (1997).

and / or make other decisions as deemed necessary to sustain the fisheries and aquatic environment.

For most stocks, variations in TACCs come into force on the first day of the next fishing year (October 1). The TACC is set in volume (tonnes) allowed to be caught each year.¹²² When Fisheries Plans are implemented, annual management decisions such as TAC and TACC levels will have to take those plans into account.¹²³

2.2.3 MSY – Maximum Sustainable Yield

Since 1983, MSY has been the primary gauge used by the Minister of Fisheries when setting the annual TACCs.¹²⁴ MSY is a long-run equilibrium concept – it is the maximum annual harvest level that can be sustained over time without reducing the stock’s productive potential.

The quantitative MSY is determined using the Schaefer Model. By estimating the relationship between the growth of fish stocks and their population size, one can estimate the size of the population needed to yield maximum growth.¹²⁵

In Figure 1, which maps the level of the fishstock against its growth rate, we see that a natural equilibrium point is reached at a high population when there is zero growth in the fish stock. At this point the population level is stable; any perturbation from this point will result in restoring forces returning it to that point. The minimum viable population also has zero population growth. However this point is not stable; any population level below this point will have a negative growth rate and will result in a decline to extinction. Population levels to the right of this point have a positive growth rate and will move towards the equilibrium.

A yield will be sustainable as long as it is no greater than the magnitude of the growth of fish stock. The Maximum Sustainable Yield is the point where the population curve “peaks”, i.e. the point of maximum population growth. If population size is kept at this level then population growth will be at its maximum. If only the additional growth is harvested by the fishers, they are ensured a relatively stable harvest.

The Maximum Sustainable Yield is not synonymous with efficiency as the efficient yield is obtained by maximizing the net benefit from use of the resource. Efficiency takes into account the costs of harvesting as well as size of the harvest. The *economically efficient* level of harvest is generally lower than the *biologically efficient* level. As the fish population grows, it is easier to catch the fish so there is a trade-off between higher harvests and lower costs of catching that harvest. If fisheries were regulated so they were harvested at the economically efficient level, they would

¹²² Clement (1998).

¹²³ Ministry of Fisheries (2001b).

¹²⁴ See FA83 S2(1) TACC definition. The Minister is also required to take into account “any relevant economic or environmental factors, fishing patterns and the interdependence of fishstocks” when setting the annual TACC.

¹²⁵ Tietenberg (1996).

generally have larger populations than the MSY level, and a lower level of catch but higher catch per unit effort.¹²⁶

Methods for estimating sustainable yields have been refined since 1985 when the initial TACCs were calculated.¹²⁷ New Zealand scientists calculate MSY by analysing the relationship between the fisheries Maximum Constant Yield (MCY) – a sustainable catch that can be taken from a fishery annually; the Current Annual Yield (CAY), the annual catch calculated by varying the current annual yield in response to fishing mortality; and Maximum Annual Yield (MAY), the long-term average annual catch.¹²⁸

The MSY is estimated using Catch Per Unit Effort (CPUE), observer data, and data from specific studies if available. Catch effort data is collected by the fishers themselves as they fish. They are required to report information such as weight of total catch, species greenweights, discard, and processing details for both target and bycatch species.¹²⁹ The required data varies by catch method and target species.¹³⁰ Observers are placed on commercial vessels to provide independent catch effort and biological data to verify the fishers' results. As well as the legally required catch data, studies that sample variables such as size, weight, and sex, are also carried out by scientific observers and sometimes fishers.

From 1983-1989 the catch effort data was collected by the Fisheries Statistics Unit (MAF). After 1989, the data was owned by MFish (enhanced by NIWA). There was a change in who collated data after 1989 that led to radical changes in data.¹³¹ Recent CPUE and observer data can be requested from the FishServe database; enquiries for earlier data can be made through MFish.¹³²

Specific studies are also carried out to contribute to fisheries stock assessment; the research projects are chosen based on recommendations by the Research Planning Groups to fit within Strategic Research Plans.¹³³ The Ministry of Fisheries contracts out about \$17million per year of research services augmenting the observer and CPUE data.¹³⁴ The MFish Research Data Manager is the custodian of this data; this role is currently carried out by NIWA. There are 30 major databases and a number of other datasets, managed by NIWA. Any data collected during research projects is stored in one of these databases.¹³⁵ The databases incorporate historic research data, more recent data collected by MAF Fisheries prior to 1995, and the data is currently collected by agencies contracted by MFish, such as NIWA. The databases cover individual topics

¹²⁶ Tietenberg (1996).

¹²⁷ Sissenwine and Mace (1992).

¹²⁸ Annala et al. (2000).

¹²⁹ Greenweight is defined as the weight of the fish prior to any processing or removal of any part of the fish (Clement 1998).

¹³⁰ See Clement (1997) for further details.

¹³¹ See Appendix 2 for a list of some datasets that have been used in previous studies.

¹³² FishServe's website is www.fishserve.co.nz.

¹³³ MFish (2002).

¹³⁴ MFish (2002).

¹³⁵ See <http://www.fish.govt.nz/sustainability/research/rdd/> for documentation about the main 30 databases.

so do not provide complete coverage of the commercial fisheries however where applicable can provide more detailed material than available from other sources.¹³⁶

2.2.3.a Problems with estimating MSY

Maximum Sustainable Yield is difficult to estimate. Fisheries researchers cannot measure the MSY directly but must discover it by seeing how a fishery responds to fishing pressure (which includes overfishing). Data on fish stocks responses are limited and modelling of population dynamics is complex so enormous uncertainty exists. Because of this, it is very important that the TAC, which is based on the MSY, be adjustable in light of experience.¹³⁷

For many fishstocks limited information is available on stock size and population dynamics that could be used to estimated yields to provide a basis for varying TACs, partly because of resource constraints. In the fishing year 1998/99 it was estimated that there was insufficient data to be able to assess the effects of harvesting on 58% of all fish stocks.¹³⁸ Where data is limited, the NZ approach has been to increase the TACs for certain fishstocks where anecdotal information suggests that increased catch levels are likely to be sustainable and then to monitor the effects. CPUE information is used to monitor the effects of TAC increases. MFish uses observer data to verify the CPUE data; large discrepancies are found between two sources.¹³⁹

With the original estimates of MSYs used in 1986, only 13 fish stocks (8.7%) were estimated to be below the MSY out of a total of 149; 2 orange roughy, 3 snapper and 8 rock lobster stocks. Thirteen (8.7%) were estimated to be above and 48 (32.2%) at or near the MSY. The status of the remaining 75 (50.3%) fish stocks relative to MSY was not known although according to industry reports they did not seem to be at a level below MSY. Unfortunately most of the inshore fish stocks that experienced large reductions in catch levels in 1986 were included in the latter category; it has not been possible to monitor the rate of rebuilding (if any). However a series of inshore trawl surveys initiated recently will hopefully provide more accurate estimates of the abundance of these species.¹⁴⁰

The EEZ is over 4 million square kilometres; the QMS covered 257 different stocks within that area in 1998/9. NIWA is the main provider of fisheries research in this area. In 2000/2001 NIWA received \$13.7 million from MFish for research. It owns and operates two research vessels; one designed for offshore and one for inshore research.¹⁴¹ During the financial year 2000/2001 MFish spent \$2.4 million on observer monitoring which equated to about 4,200 observer days¹⁴². It also spent \$800,000 on harvest levels monitoring and in environmental indicators.

¹³⁶ MFish (2002).

¹³⁷ Ackroyd et al. (1990).

¹³⁸ Annala et al. (1999). Eight percent of all stocks were known to be depleted below MSY.

¹³⁹ Parliamentary Commissioner for the Environment (1999).

¹⁴⁰ Major (1999).

¹⁴¹ These are a 70-m offshore vessel, RV *Tangaroa*, and a 28-m inshore vessel, RV *Kaharoa*, operated by [NIWA Vessel Management](#).

¹⁴² This includes 3,370 Ministry observer monitoring days and 833 Industry requested observer days. 1,358 additional observer days were carried out for the Department of Conservation.

Even with good data, prediction of the long-term sustainable yield is difficult as most natural and human systems are not well understood and complex natural systems are difficult to predict accurately. In general, single species models and approaches are used to deal with what are multi-species, multi-dimensional problems.¹⁴³

The MSY is unlikely to be a fixed quantity. It is more likely to be changing constantly in response to changing environmental conditions and changing patterns of predation and competition; estimates of MSY will probably need constant adjustment in light of changing ecological conditions.¹⁴⁴ There are too few natural control sites for testing scientific hypotheses (all of the oceans are in use, and to some degree subject to the effects of fishing).¹⁴⁵ This means that the MSY is often estimated by examining the response of a fish stock to over fishing. Many sources of uncertainties and time lags exist in these systems, some of which may mask the patterns of interest.¹⁴⁶

2.3 RECREATIONAL AND CUSTOMARY CATCH

Customary (non-commercial Maori) and recreational fishing are not directly governed by the QMS, but are regulated using input controls.¹⁴⁷ Both customary and recreational catch levels are estimated before setting the TACC for each quota species. The TACC is the remainder of the TAC after considerations are made for the predicted non-commercial catch ($TACC=TAC-TANC$).¹⁴⁸ Every year, Fishing Assessment Working Groups take into consideration customary and recreational catch information before making recommendations on which fishstocks TACs should be reviewed by the Plenary.¹⁴⁹

Maori, the indigenous people of New Zealand, were the first to harvest fish in New Zealand waters. Their cultural ties with fisheries were strong and often incorporated into their ancestral mythology. Coastal communities were reliant on inshore fisheries for *kai moana* (food from the sea), especially shellfish, for a substantial portion of their nutrition.

Ownership rights over the fisheries mostly rested with *hapu* (sub-tribes / clans) who occupied the adjacent coastal land.¹⁵⁰ Private property was recognised within early Maori society although the rights of individuals were attenuated in favour of the collective rights of the whole tribe (*iwi*) and were not alienable without collective consent.¹⁵¹ Authority and guardianship, including rights of access, regulation, and

¹⁴³ Ward (2001).

¹⁴⁴ Ackroyd et al. (1990).

¹⁴⁵ Ward (2001).

¹⁴⁶ Ward (2001).

¹⁴⁷ The controls used are bag limits (restricting the number of fish recreational fishers may catch), size limits (under-sized fish must be returned to the sea), closed areas, gear restrictions, prohibited species (such as *toheroa*) and closed seasons.

¹⁴⁸ Batstone & Sharp (1999)

¹⁴⁹ Ministry of Fisheries (2002a).

¹⁵⁰ Ackroyd et al (1990).

¹⁵¹ Sharp (1996b).

enforcement was vested in *tohanga* (tribal leaders/elders), with some marking the limits of fisheries with stakes driven into the water.¹⁵²

Today, customary catch refers to the traditional Maori right to harvest and gather seafood.¹⁵³ Customary fishing regulations, introduced in the Fisheries Act 1996 (s186), govern non-commercial customary fishing only and the harvest cannot be traded.¹⁵⁴ Traditional customary fishing areas are those of special significance to iwi or hapu as a source of food or for spiritual or cultural reasons. Provision for management of customary areas was first recognised by the Maori Fisheries Act (1989), then re-affirmed by the 1996 Act. *Taiapure* (local coastal or estuarine fisheries) can be formally declared by lodging a proposal to the Crown.¹⁵⁵

Larger areas important to customary food gathering (*mahinga maitaitai*) can be established (through the Crown) by iwi or trust groups, and commercial fishing is generally excluded.¹⁵⁶ The maitaitai is managed by a Tangata Kiaki/Kaitiaki (in the South Island), a Tangata Kaitiaki/Tiaki (in the North Island): iwi representatives nominated by the *tangata whenua* (local people) and appointed by the Minister. They authorise customary and/or commercial fishing within their maitaitai, but are under no obligation to do so if the proposal is inconsistent with the *tikanga* (protocol and practices) of that area. The Kaitiaki has the responsibility of reporting customary catch information to MFish quarterly and commercial catches within 5 days. This information includes: species harvested, quantities authorised and actually harvested and the location of harvesting, and is used to help predict future catch levels.¹⁵⁷

When knowledge of the past customary catch levels is limited and the species is of known importance to Maori, it is recommended that estimated catch levels be based on the recreational take of that species in that area. If the species is not of particular importance, estimates are recommended to be set at 50% of the recreational catch. For species and areas where it is unlikely that there is or has been customary Maori catch, it is set at zero.¹⁵⁸ Fisheries management plans may also specify recommendations for the customary take for certain stocks. For example, the South Island eel management plan recommends the customary catch to be set at 20% of the TAC (*Hi Ika* March 2001).

Fish and Game New Zealand conducts four-yearly surveys of recreational fishers, although the Minister would like to see them undertaken with greater frequency, consistency, and accuracy (MFish 2001 web). The survey data, along with information on population trends, is used to estimate the future recreational catch.¹⁵⁹ When recent

¹⁵² Ackroyd et al. (1990), Sharp (1996b).

¹⁵³ See Treaty of Waitangi and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992.

¹⁵⁴ Ministry of Fisheries (1999a).

¹⁵⁵ FA96 Part IX (s174 -186)

¹⁵⁶ To date only two maitaitai have been established: Koukourarata, December 2000 (for management of Banks Peninsula cockle beds); and Rapaki Maitaitai, December 1998 (Lyttelton Harbour). These maitaitai were established under the Fisheries (South Island Customary Fishing) Regulations (1999). Ministry of Fisheries (2001e)

¹⁵⁷ Ministry of Fisheries (2002b).

¹⁵⁸ Ministry of Fisheries (2000c).

¹⁵⁹ Personal communication with Sarah Morton, MFish communication officer (2001).

catch data is not available the estimates are based on the “best available” information (e.g. catch data for that species in another QMA).¹⁶⁰

2.4 FUTURE DEVELOPMENTS: FISHERIES PLANS

Fisheries Plans have been legislated for in the Fisheries Act 1996 (FA96 S13-14C), and are consistent with the Act’s sustainability measures and environmental principles (FA96 s8,9,15) but are yet to be used.¹⁶¹ The objective of the plans are to go beyond TACs to take into account the impacts of fishing on specific species or areas and identify additional actions that may need to be taken. While legislation does not specify who may develop a plan, the intention is that they be developed by commercial, recreational, and customary rights holders groups.¹⁶² Fisheries Plans may include restrictions relating to the size, sex or biological state of individuals from the stock that will be harvested; areas the stock may be taken from; fishing methods used; and fishing seasons for the stock, method or vessels. The Fisheries Plans may also be used to allocate catch and/or species between fishing sectors, achieve economic objectives or ensure the sustainability of a stock.¹⁶³

The Ministry hopes Fisheries Plans will provide further guidance for annual reviews and decisions on setting the TACs. The Minister will be required to take into account stock management strategies contained in Fisheries Plans, other population management plans as well as MSY information when setting TACs for each stock.¹⁶⁴

¹⁶⁰ Ministry of Fisheries (2001c). The most recent recreational allowances were gazetted to take effect from 1st October 2001, and were set for 10 stocks.

¹⁶¹ The Fisheries Plans detailed in the 1996 Act differ to the Fisheries Management Plans as outlined in the 1983 Fisheries.

¹⁶² Harte (2000b).

¹⁶³ Ministry of Fisheries (2001b).

¹⁶⁴ Ministry of Fisheries (2001b). (FA96 s15(1))

3 DEFINING QUOTA AND THEIR PROPERTIES: SETTING QUOTA CURRENCY

ITQ have been defined as the permanent right to access, catch and sell a specific proportion of the Total Allowable Commercial Catch (TACC) for a designated species in a specified area (Quota Management Area), each fishing year.¹⁶⁵

3.1 QUOTA AS TONNES OF FISH

When the QMS was introduced in 1986, quota was issued to fishers as a fixed tonnage portion of the annual TACC, based on their recent catch history. In cases where the total historical catch for a species or QMA exceeded the estimated maximum sustainable yield, the government bought back fishers potential allocation rights to quota (i.e. the government asked fishers to forgo their ITQ right (based on historic catch) in exchange for a generous cash payment). Initially the government funded buybacks for fish stocks that were deemed to be overfished and paid out NZ\$47 million for this purpose. It was anticipated that the return in terms of productivity of stocks would more than generate the recovery of the \$47m in the future.¹⁶⁶ Sissenwine and Mace (1992) note that fishers' catch histories were much larger than the actual catch just prior to the introduction of the QMS, possibly implying that catches were declining. Alternatively, catch histories may have been over inflated; the government may have bought back quota that would have never been caught.

Originally it was intended that the government would adjust the TACCs by buying and selling quota by tender.¹⁶⁷ With this system, the government would bear the risk for the commercial fishery. However, when the ITQ system was set up with the Fisheries Amendment Act 1986, there were provisions for proportionate reduction of all ITQ, with compensation for the quota holders for the "fair market value of the ITQ".¹⁶⁸ This meant that government could cut TACCs substantially without bidding up the quota price, reducing some of the risk.¹⁶⁹ Reduction of the TACC could be achieved by either reducing ITQ on a proportionate basis (market value compensation paid) or the Director-General of the Ministry could purchase or lease quota.¹⁷⁰

Government believed it could make a profit by selling the shortfall of stocks recovered (in 1986). Legislation also allowed for a revolving fund to be created (FA1983 S107H) which would be funded by a rental set on the industry. This rental could increase at a maximum of 20% per annum. A range of charges for fishing permits and the returns and sale of quota from the future increases in TACC (from stock recovery) would fund

¹⁶⁵ Clement (1997).

¹⁶⁶ Major (1999). See Chapter 4 for details about the initial allocation of quota.

¹⁶⁷ Ministry of Agriculture and Fisheries (1984).

¹⁶⁸ FA 1983 *am.* 1986 28D(4)(a).

¹⁶⁹ Ackroyd et al (1990).

¹⁷⁰ Meister and Sharp (1993).

the administration of the QMS and also the purchase of quota if a reduction for conservation reasons was necessary.¹⁷¹

Reducing TACCs became expensive. The resource rental per tonne was not necessarily equal to the services that were gained by the sums of money that were paid in each fish stock (Major 1999). After the initial buy-back, the Government showed reluctance to buy quota, especially where necessary cuts were large; it was thought that purchases of large amounts of quota would bid up their price, and the fund for buying up quota was never established. Government involvement in the quota trade market raised the possibility that biological and economic objectives (that should drive TACC adjustments) were compromised by political and fiscal constraints.¹⁷²

In 1989, major cuts in TACCs (mainly for orange roughy and hoki (1990/91)) were needed, amounting to 13% of the aggregate TACC for the entire NZ EEZ.¹⁷³ This situation was a result of initial TACCs being set too high for newly discovered deepwater fisheries whose populations were insufficiently researched to provide accurate gauges for MSY.¹⁷⁴

Sissenwine and Mace (1992) state that the ITQ system was initially profitable for the government. Revenue from sales or leases of quota was \$84.2m; exceeding the cost of the quota buy-back (\$42m) as well as research, management, and enforcement (\$30m per year). They state however, that if the government had entered the marketplace and purchased quota in 1989 to reduce the TACC to recommended levels, the cost would have far exceeded the revenue generated from the ITQ system.¹⁷⁵

3.1.1 Orange Roughy

A key example of over estimation of the MSY is the case of orange roughy (ORH). By 1989 it had become clear that several QMS species were overfished, most seriously orange roughy. Orange roughy is a valuable, deep-water fish that was caught in increasing numbers in the 1980s. It proved very difficult to assess fish stocks and hence set an appropriate TACC. New evidence suggested that large reductions in the Chatham Rise orange roughy TACC were needed (it was reduced from 38,300t in 1988/89 to 23,800t in 1990/91). The low productivity of orange roughy (a slow growing and slow maturing species) means that any accumulated biomass can be quickly fished down and will be very slow to recover.¹⁷⁶

It was estimated that it would have cost the government over \$100m to buy back sufficient quota to reduce the TACC to the estimated long-term sustainable level, and this was viewed as an unaffordable expense. The Government was unprepared to continue to take the risk of incurring losses of the fishery. It introduced legislation to shift the risk to the industry by redefining the ITQ as a percentage of the total catch

¹⁷¹ For more detail on resource rentals see chapter 7.

¹⁷² Ackroyd et al. (1990:30).

¹⁷³ Bevin et al. (1990).

¹⁷⁴ Dewees (1996:339).

¹⁷⁵ Sissenwine and Mace (1992).

¹⁷⁶ Sissenwine and Mace (1991).

rather than a tonnage.¹⁷⁷ This change meant that the government could adjust TACCs without having to pay any compensation.¹⁷⁸ The legislation changes were introduced in the Fisheries Amendment Act 1990.¹⁷⁹

The industry challenged the change in court and negotiations ensued that obliged the Government to pay compensation for any reductions in the value of orange roughy quotas over a period 1989 to 1994.¹⁸⁰

To avoid a repeat of the problem, industry spent almost NZ\$3 million on the collection of orange roughy stock data, in order to get a more reliable and accurate fix on its MSY so that catch levels could be more accurately assessed. This became a trend in a range of fisheries: rock lobster, scallop and eel fishers/industry organisations are among the leading groups who commission and pay for their own scientific research and advice – over and above what is commissioned by the government.¹⁸¹

Since 1991/92 the catch of the orange roughy stock ORH3b (Puysegur-Chatham rise; southern and eastern NZ) has been managed with a series of catch-limit agreements between industry and MFish. Reductions in TACs have continued, reducing the risk of localised over-fishing without additional statutory controls being required.¹⁸² In 1997/98 a zero catch limit was set for the Puysegur sub-region of ORH3b as recommended by industry, as the stock had not recovered as first thought.¹⁸³

3.1.2 Removal of compensation requirement: Change to percentage TACC from tonnage allocation

The crisis with orange roughy initiated the change to definition of quota in terms of a percentage share of the TACC. The Fisheries Amendment Act (1990) redefined quota rights from tonnage proportions to percentages of the TACC.¹⁸⁴ The government can now annually adjust the TACC without having to buy back (or sell) quota. Under the new system, fishers own a percentage share of the TACC rather than a specific quantity of fish. Each TACC (defined in tonnes) is allocated amongst quota owners as a proportion of their quota holding.¹⁸⁵ If someone holds quota for 6% of the TACC for a particular species in an area, they hold the right to harvest 6% of that area's TACC; the

¹⁷⁷ Major (1999).

¹⁷⁸ Ackroyd et al. (1990).

¹⁷⁹ See section 3.1.2.

¹⁸⁰ Nightingale (1992). FA1983 am. 1986 S28OG:5 “Any person who is entitled to compensation in respect of any reduction in quota for orange roughy may instead elect to receive from the Crown (for all or part of the tonnage reduction) quota for squid in the proportion of 5 tonnes SQU to 1 tonne ORH”.

¹⁸¹ Major (1999).

¹⁸² Ministry of Fisheries (2001b).

¹⁸³ The 500t Puysegur TACC was reallocated as exploratory quota in the sub-Antarctic region of ORH 3b. Te Ohu Kai Moana (2001).

¹⁸⁴ FA83 am. 1986 S15 inserted SS28OB-OF into the 1983 Act. The Fisheries Act 1996 (S42) further refines the definition of ITQ in New Zealand, stating that quota represents “shares” in the TACC for that fishery (like stock market shares – tradeable etc). FA96 S42. “Quota shall be expressed as shares. Quota for any stock shall be expressed as shares that are whole numbers, and a) The sum of that quota shall be 100,000,000 shares for each stock; and b) The value of 1 share is equal to one hundred millionth of the TACC for each stock.”

¹⁸⁵ Clement (1997).

tonnage amount harvested may change each year, although the percentage of TACC remains constant (unless additional quota is acquired). Quota holders can no longer be sure of the amount of fish they can legally catch in the future.¹⁸⁶ This affords greater protection to the fish stock, but increases the financial risk to the fishers, shifting it away from the government.¹⁸⁷ The policy changes were officially implemented on 1st April 1990.¹⁸⁸

To avoid further court action the government negotiated with industry to provide partial compensation to fishers for proportional reductions in ITQ from the government's resource rental fund.¹⁸⁹ The amount compensated was set equal to the market price on 1st October 1989. However, the total compensation amount available was limited to the amount of resource rentals paid during the transitional compensation period, which lasted from 1989 to 1994.¹⁹⁰ Resource rentals were also frozen for five years.¹⁹¹ Sissenwine and Mace (1992) state that fishers may have misjudged the amount of compensation due, since several major species (e.g. orange roughy, hoki, snapper, and squid) required large quota reductions, and the greater the reductions, the smaller the payout per tonne. As a result of the reduced compensation available, the fishing industry filed a \$150m lawsuit against the government, which was settled out of court.¹⁹²

In spite of the change from fixed to variable quota, most TACCs have remained unchanged from year to year, partly due to inadequate information for stock assessments. The main reductions were for orange roughy (stocks ORH3b and ORH7a) and hoki (HOK1). These are illustrated in Figure 4.

¹⁸⁶ Ackroyd et al. (1990).

¹⁸⁷ Tietenberg (1996).

¹⁸⁸ Annala (1996).

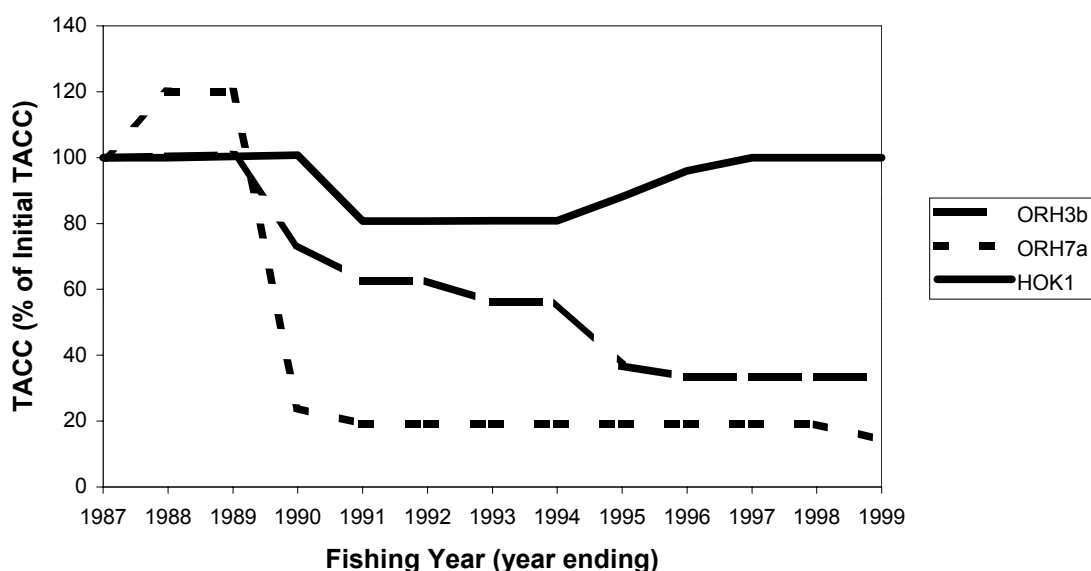
¹⁸⁹ Dewees (1996:339). FA83 *am.* 1990 S280 provides for the compensation of Quota holders over the 6 year period. The Quota value was set at its market price on 1st October 1989 but the total amount of compensation available was limited to the resource rentals paid during the transitional period 1989-1994.

¹⁹⁰ FA83 *am.* 1990S15 [all FA83/86 SOB-OO]

¹⁹¹ Major (1999).

¹⁹² Sissenwine and Mace (1992).

Figure 4 TACC over time for orange roughy (stocks 3b and 7a) and hoki (stock 1).



Although compensated proportionate TACC cuts reduced the total cost to government, they may have increased the total cost of achieving reductions. Proportionate cuts do not achieve TAC adjustments at least cost unless markets are completely liquid because the cuts are not necessarily borne by those who value the quota least.¹⁹³ The industry now bears considerably more risk.

3.2 FISHERIES ACT 1996: ANNUAL CATCH ENTITLEMENTS

The purpose of the 1996 Act was to consolidate changes to the 1983 legislation, necessary as problems with the original regulations became evident, and to simplify the QMS. The primary change that the 1996 Act introduced was ACE, (Annual Catch Entitlement) for commercial fishers targeting quota species which became operational on October 1, 2001. An Annual Catch Entitlement specifies how many tonnes of fish the person holding the entitlement can take in a particular year.¹⁹⁴

3.2.1 Objectives

The Fisheries Act 1996 main purpose was to provide for utilisation of the fisheries resource while maintaining sustainability.¹⁹⁵ The Act was also intended to simplify the QMS by separating ownership rights (ITQ) and the harvesting rights (ACE). It also allowed for government cost recovery of management, research, and enforcement and it provided for the participation of Tangata Whenua when making sustainability decisions.¹⁹⁶

¹⁹³ Ackroyd et al. (1990:32).

¹⁹⁴ Ministry of Fisheries (2001).

¹⁹⁵ FA 1996 S8.

¹⁹⁶ Ministry of Fisheries (2001d), Ministry of Fisheries (1999c). The Act also require decision to be consistent with the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992.

3.2.2 How ACE works

Under the 1996 Act, quota is still allocated in perpetuity and can be traded or used as security. At the beginning of each fishing year, each quota owner receives an annual catch entitlement (ACE) equal to their share of the TACC. ACEs are a right to harvest a quantity of a fish species in an area in that year.¹⁹⁷ Once allocated, the use of ACE is solely at the discretion of the fisher concerned – they can fish it, sell it, or hold it – in a similar way as any other property right may be used by the owner.¹⁹⁸ Trading ACE is theoretically equivalent to leasing quota for a year.

Commercial fishers must provide (monthly) reports of their catch for each fish stock, which is matched against their ACE holdings to ensure they do not overcatch their entitlement.¹⁹⁹ A public register shows each fisher's ACE holdings and catch to date.

If the TAC is increased during a fishing year, and the Minister believes that he or she would have also increased the TACC at the beginning of the fishing year, the Minister is obliged to allocate additional ACE to quota owners for the relevant stocks.²⁰⁰ This additional ACE is called 'TAC ACE' and is shown separately on the ACE Register.

The advantage of the new QMS post 1996 is that the administrative requirements associated with quota are simplified. This reduction in transactions costs should increase the liquidity of the quota market.

¹⁹⁷ FA96 S80.

¹⁹⁸ FA96 S133.

¹⁹⁹ Ministry of Fisheries (2001a).

²⁰⁰ FA96 s68(2)

4 ALLOCATION OF COMMERCIAL FISHING QUOTA

In general terms, when quota is allocated it gives commercial fishers the right to harvest a given amount of a fishstock. Ownership of quota equates to owning harvest rights to fish, as opposed to ownership of the fisheries *resource* (i.e. conveys imperfect property rights); fish are “owned” by the fisher only once they have been legally caught.²⁰¹

One of the initial problems the ITQ system encountered was the issue of who owned the rights to New Zealand’s fisheries resource; the establishment of tradable property rights created tension over the allocation of the resource, most notably with Maori and non-commercial users. It also created conflict between the demand for secure commercial harvest rights and the need to manage the resource sustainably.²⁰²

In a quota system the distribution of the value of the resource depends heavily on how the quota was initially allocated. The options for initial allocation are for government to auction quota and appropriate all the rent. The alternative is for the government to allocate quota to the fishers, e.g. allocate quota proportional to fishers’ historic catch, then allow trade until market equilibrium of quota distribution is reached. The value of the resource is retained by the initial generation of fishers and new entrants into the industry then purchase quota from existing fishers. Competition between potential purchasers would drive up the market price of transferable quotas until it reflected the market value of future rents, appropriately discounted. This occurs because the maximum bid any potential entrant would make is the value to be derived from owning that permit – and is equal to the present value of future rents, i.e. the difference between the sale price and marginal cost for each unit of fish sold.²⁰³

4.1 INITIAL ALLOCATION OF QUOTA IN 1986

4.1.1 Who was allocated quota?

The Fisheries Amendment Act 1986 (s280) legislated tradable quota rights, allocating them to those fishers holding permits as at 15th of May 1985; these permits had been allocated to commercial fishers under the Fisheries Act (1983).²⁰⁴ To obtain their permits under the QMS, each fisher (or company or partnership) had to show that they were wholly or substantially reliant on fishing for their income in the 1982/83 fishing year.²⁰⁵ As at October 1 1983, 46% (2260) of licence holders did not meet the stated criteria and were labelled “part-time” fishers. Part-timers did not have their permits renewed, therefore were excluded from the commercial fisheries, partly for

²⁰¹ Kirkley et al (1994:10).

²⁰² Ackroyd et al (1990:85).

²⁰³ For further discussion this see Tietenberg (1996).

²⁰⁴ Allocation of permits was legislated for under the FA83 S280. Sharp (1996b).

²⁰⁵ The criteria was that fishing provided a minimum 80% of their gross income, or \$10 000, whichever was less. Ackroyd et al (1990), Sharp (1996b).

administrative convenience but mainly because they had the greatest potential to increase their fishing effort.²⁰⁶

4.1.2 Provisional quota allocation

In 1986, fishing vessel owners were allocated provisional maximum quota (PMITQ) for each species based on their historic catch.²⁰⁷ Their provision was based on their average catch history for their best 2 fishing years out of 1982, 1983 and 1984.²⁰⁸ At this point, there was no finalised TACC for any stock, although approximate catch targets had been set by the Ministry.²⁰⁹

The government's intention to allocate quota based on historic catch was announced in 1982, but the details weren't announced until 1984. This meant that fishers had only one fishing year in which they could try to affect their allocation by ratcheting up their catch.²¹⁰ New entrants were excluded by the 1982 moratorium on new fishing permits.

Catch histories were collated from fisher returns data; fishers were informed of their Ministry-calculated catch histories in June 1985. After the historical catch details were collated by the Ministry, officials observed a marked increase in reported catch levels (which continued through later years). Previous catches were presumably under-reported, possibly as a way for fishers to reduce their declared gross income.²¹¹

Reviews of PMITQ allocations were then carried out by a national objection committee (through regional sub-committees) headed by an independent reviewer, along with a representative from the Ministry and one from industry.²¹² The committees considered the objections some fishers had against their recorded catch history based on inaccuracies in the data, then made recommendations to the Ministry of Fisheries.²¹³ Out of the 1800 fishers notified, 1400 appeals were lodged.²¹⁴

After the reviews were completed in mid 1986, the PMITQ were allocated to fishers.

4.1.3 Quota rights buyback

For 20 of the 29 original QMS species, the amount of PMITQ exceeded the TACCs; that is the "historical catch" PMITQ was determined to be unsustainable, indicating a mismatch in fleet capacity to available catch.²¹⁵ In order to reduce the PMITQ to the TACC level, the Ministry announced in 1984 that a provisional quota buy-back scheme would be implemented.²¹⁶

²⁰⁶ Sharp (1996b), Ackroyd et al (1990).

²⁰⁷ MFish web (2001), Sharp (1996b).

²⁰⁸ Dewees (1996).

²⁰⁹ Shallard, pers. comm.

²¹⁰ Sharp (1996b).

²¹¹ Shallard, pers. comm.

²¹² Independent reviewers (e.g. accountants and lawyers) were not from the fishing industry.

²¹³ Sharp (1996b), Shallard, pers. comm.

²¹⁴ Clark and Major (1988:25 draft).

²¹⁵ Clark and Major (1988).

²¹⁶ Sharp (1996b), Ackroyd et al (1990:24). Quota buybacks were in July/August 1986.

Permit holders were invited to competitively tender (by Oct 1986) all or part of their PMITQ (for as many species as they wished, except the 8 species that had been managed under the deep-water policy) to government.²¹⁷ This gave fishers the opportunity to voluntarily exit the industry by selling part or all of their future quota rights.²¹⁸

Two tender rounds were necessary. The first round was carried out by competitive tender; fishers made offers stating the lowest price they would accept for the portions of their PMITQ they were prepared to forfeit.²¹⁹ The government accepted bids in order of increasing value until either the desired TACCs were reached or the bids became unacceptably high. All the accepted bids were paid out at the same price per tonne per species, equal to the highest accepted tender in each region; the fishers were then paid the stipulated amounts and had their licenses retired.²²⁰

The first round was not taken seriously by many fishers and in many cases unacceptably high tenders were made, necessitating a second tender round.²²¹ This time, the price was capped at 80% of the price paid (for that particular PMITQ) in the first round. The second tender round was far more successful with many more fishers relinquishing their quota rights.²²² In 1986, MAF bought back 15,800 tonnes of quota from the inshore fishery at a cost of \$45m.²²³ A further \$1.4m was paid for paua quota purchased by the government in 1987.²²⁴ Sharp (1996b) compared the average payment per tonne of PMITQ with the average price of traded quota in the 1986/87 fishing year. His trade data analysis suggested that fishers who had tendered high-value PMITQ (e.g. snapper, hapuku, tarakihi) received payment equivalent to what they could have received if quota had been retained then traded within the year. This suggests that the government valuation of PMITQ was very close to the actual market value.

The quota buy-back was an integral part of the successful transition to a property rights based system of fisheries management.²²⁵ It was an efficient and effective way for the government to deal with the economic and biological legacy of their earlier property rights and fisheries development incentives.

4.1.4 ITQ allocation

For QMAs where insufficient quota was voluntarily tendered back, the government reduced the remaining provisional quota on a pro rata basis (without further

²¹⁷ Sharp (1996b), MFish web (2001).

²¹⁸ MFish web (2001). See FA 83 s28L.

²¹⁹ Meister and Sharp (1993:99).

²²⁰ Meister and Sharp (1993:99), Dewees (1996:334).

²²¹ Shallard, pers. comm.

²²² Shallard, pers. comm.

²²³ Dewees (1996:334). 58% of the (buy-back) funds were used to buy PMITQ of four species, mainly in QMA1; 50% of the total was used to buy back snapper (SNA1) quota (Sissenwine and Mace 1991; Sharp 1996).

²²⁴ Ackroyd et al (1990:24).

²²⁵ Sharp (1996b).

compensation to fishers) in order to reach the desired TACC levels.²²⁶ PMITQ could now become guaranteed minimum ITQ (GMITQ).²²⁷

Pro rated reduction occurred for a number of significant species.²²⁸ When the final tender round was complete, permit holders who hadn't sold their quota (package) were informed of their finalised PMITQ and assigned GMITQ on the 1st of October 1986 for that fishing year.²²⁹ The GMITQ allocation was equal to the fishers catch history minus a proportional cut-back, so that quota issued equalled the sustainable level needed to reach the desired TACC for each QMA.²³⁰ At this point fishers had 28 days to lodge an appeal against their PMITQ but all fishers could also begin to fish against their GMITQ.²³¹ On the 18th of October the ITQ were allocated (equal to the GMITQ).²³²

4.1.5 Legal Appeals – the Appeal Authority

An Appeal Authority was established in 1986 to hear appeals from fishers who had been adversely affected in building their catch history.²³³ Grounds for appeal included errors in statistics, changed fishing patterns, the effects of breakdowns in vessels, and ill-health that may have affected fishers' catch histories. Both fishers and the Ministry made appeals to the Authority. The Ministry appealed both to increase and decrease some allocations when they discovered they had made mistakes or been given false information. A total of 1,100 appeals were lodged.²³⁴

The Appeal Authority began hearing appeals early in 1987. However, the Appeal judge did not make any rulings until a year later, waiting to hear a significant number of cases before making any decisions.²³⁵ The appeal process continued for the best part of 10 years after the initial allocation (until 1996) as fishers tried to maximise the quota tonnage they acquired. The disputes were only brought to an end by legislation prohibiting the filing and serving of new cases with the Authority, however a few appeals are still pending in 2002.²³⁶

The appeal judge made his rulings on PMITQ allocations; any change in the PMITQ then led to a proportionate change in the GMITQ. The TACC was then recalculated to include the new GMITQ levels; the appeal court effectively had the power to increase the TACC (which had initially been set equal to the sum of the GMITQ). This resulted in appeal-granted quota increasing TACCs, some which had previously been reduced by the Ministry's quota buy-back policy (e.g. SNA1 where the increase was 25%) in an effort to reduce quota volumes to TACC levels. The finalised quantity of ITQ was set equal to the post-appeal GMITQ.

²²⁶ Dewees (1996:334), Sharp (1996b) (FA83 S28J-K).

²²⁷ Pro-rated cuts to 5,700 tonnes of quota without compensation (Dewees 1996:334).

²²⁸ Clark and Major (1998:27 draft).

²²⁹ Sharp (1996b:22).

²³⁰ Dewees (1996), Sharp (1996b). FA83 S28E-F.

²³¹ FA 1983 *am.* 1986 (S28).

²³² Shallard, pers. comm.

²³³ Major (1999).

²³⁴ Shallard, pers. comm., Clark, Major, Mollet (1988).

²³⁵ Shallard, pers. comm.

²³⁶ Major (1999), Shallard, pers. comm. Fisheries Regulations (Catch Against Quota) 1993.

Introduction of new species into the QMS was halted in 1987, because of a court injunction related to Maori ownership claims, and did not resume until 1996, unless Maori specifically granted permission.²³⁷

4.2 ALLOCATIONS UNDER THE 1996 ACT

Part IV of the Fisheries Act 1996 (s17-62), details the rules under which new species are added to the QMS. The Minister is at liberty to “declare any stock to be subject to the quota management system”.²³⁸ However, most stocks introduced to the QMS since 1986 were species that already had catch restrictions in place such as catch limits, individual catch entitlements (ICE) or other controls, and fishers were required to have a controlled fishery license or permit to harvest them. All new introductions to the QMS are commercially important species that have trends of increasing catch levels or that have had stock research that identified sustainability concerns.²³⁹

Prior to a species being introduced to the QMS, its MSY is estimated and translated into tonnage TAC. An allowance for recreational and traditional (Maori) catch is made and the remainder is retained for commercial fishers (as TACC). Under the 1996 Act, a Quota Weight Equivalent (QWE) is the weight tonnage of a share and is determined by dividing the TACC (expressed in tonnes) into one hundred million quota shares. Eighty million shares are divided among eligible commercial fishers, proportional to their catch history,²⁴⁰ twenty million shares are allocated to Maori.²⁴¹

The Ministry will notify eligible fishers of their provisional catch history (PCH) once the necessary processes are completed. If fishers disagree with their provisional allocation, they have 60 days in which to lodge their objections through appeal to the Catch History Review Committee for consideration.²⁴² If an agreeable resolution is not reached, the appellant can take their grievance to the High Court.

If the sum of all eligible fishers’ PCHs are greater than the QWE of 80 000 000 shares (equal to the TACC), then the fishers have the opportunity to sell their quota back to the

²³⁷ M Fraser, Clement & Assoc., pers. comm. This is discussed in detail in section 4.3.

²³⁸ s18 FA96.

²³⁹ Shallard, pers. comm.

²⁴⁰ To be eligible to receive provisional quota when new species are introduced into the QMS:

- fishers are required to hold a permit for that species when the introduction announcement is made and during the qualifying period;
- fishers must submit a catch history to the Ministry for their best catch over 12 consecutive months over a qualifying period as determined by the Ministry (for species listed in Schedule 4, this is 1990-1992);
- fishers must not have any outstanding levies or deemed value payments owing to the Crown (quota can be withheld until all dues are paid);
- quota aggregation and foreign ownership constraints still apply. Mark Edwards, pers. comm.

FA96 s33-35. This section of the Act became fully functional on Oct 1, 2001; prior to this date, the regulations under FA83 applied

²⁴¹ 20% of the shares (20,000,000) are allocated to Maori (through the Maori Fisheries Commission / *Te Ohu Kai Moana*) as legislated by the Deed of Settlement (1992) in relation to the Crown’s obligations under the Treaty of Waitangi. This is discussed further in section 4.3.

²⁴² This replaced the Quota Appeal Authority.

government through competitive tender. If, after the tender round, the sum of provisional quota still exceeds the TACC then fishers have their respective PCHs reduced pro-rata. Each eligible fisher retains the same number of shares, but the weight value of each share (their QWE) is reduced (shares x QWE = ACE). If a fisher's catch entitlement is reduced through this process, then they are entitled to receive compensation from the Crown for the reduction, at the specified rate per quota share only for the species in Schedule 4A of the 1996 Act.

Alternatively, if the fishery can support a TACC greater than the histories returned (plus 20% for Maori), fisher's provisional catch histories are not increased pro-rata. Rather, the remainder of the unallocated quota is held by the Crown. The Crown can auction the unencumbered excess quota by competitive or closed tender; encumbered quota must be retained for subsequent allocations as may be determined by the appeal process.

4.3 ALLOCATION OF COMMERCIAL QUOTA TO MAORI

4.3.1 History of Maori ownership of Fisheries (pre 1986)²⁴³

Since colonisation, Maori fishing rights have been recognised under the Treaty of Waitangi (1840).²⁴⁴ Article 2 of the Treaty guarantees Maori the full, exclusive and undisturbed possession of their lands, estates, forests, fisheries and other properties for so long as they might desire to retain their possession.²⁴⁵ However, all fisheries legislation since the Treaty was enacted under the assumption that the Crown had right of control over fisheries and therefore was designed without adequate consultation with Maori.²⁴⁶

The Fish Protection Act (1877) was the first general fisheries legislation in New Zealand.²⁴⁷ It explicitly recognised the provisions of the Treaty of Waitangi. Section 8 states:

“nothing in this Act 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 the thereunder”.

This Act was repealed by the Sea Fisheries Act (1894), which made no reference to indigenous rights. However, a modified version of section 8 was included in the Sea Fisheries Amendment Act (1903). Section 14 of the 1903 Act stated: “nothing in this Act shall affect any existing Maori fishing rights”, even though there were no explicit, legally recognised rights to indigenous fisheries at that time to support this legislation. The Fisheries Act (1908) retained this section with the exclusion of “existing”.²⁴⁸ This

²⁴³ Note: this is a simplified summary of Maori fisheries ownership. More comprehensive information can be sourced from *Te Ohu Kai Moana* (www.TOKM.co.nz)

²⁴⁴ MFish web (2001).

²⁴⁵ Ackroyd et al (1990).

²⁴⁶ Ngai Tahu Sea Fisheries Report (1992).

²⁴⁷ Ngai Tahu Sea Fisheries Report (1992).

²⁴⁸ This was included as section 77(2) of the 1908 Fisheries Act.

statement remained in replacement legislation, the Fisheries Act (1983).²³⁸ The section in itself did not guarantee Maori property rights to their fisheries; it was merely a clause that retained temporal consistency across the legislation, without addressing the issue.
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Full acknowledgement of Maori fisheries rights required legislation confirming them under the Treaty of Waitangi. A Supreme Court ruling in 1877 rejected the concept of legally enforceable Maori property rights, holding that the Crown was to be the sole arbiter of Maori fishing rights, as stated in the Treaty.²⁵⁰ This was followed by a ruling in 1914 that the Treaty was “merely a bargain binding upon the conscience of the Crown and is not a source of legal rights”.²⁵¹

In 1975, the Crown passed the Treaty of Waitangi Act (1975), which bound the Crown to provide for the observance and confirmation of the principles of the Treaty. A permanent Commission of Inquiry to hear Treaty claims was established under the Act; however, at the introduction of the QMS in 1986, indigenous rights to fisheries still had not been fully addressed.

4.3.2 Maori Issues with the QMS (1986)

Maori felt that the fisheries legislation in place at the time of the QMS introduction didn't recognise the *rangatiratanga* (ownership) they had over their fisheries.²⁵² Maori had a longstanding claim that offshore fisheries were never sold to the Crown under the Treaty of Waitangi.²⁵³ Quota allocated at the introduction of the QMS had considerable implications for Maori claims because it involved a perpetual property right.²⁵⁴

In 1985, the government extended the scope of the Waitangi Tribunal so that it could investigate all grievances dating back to 1840.²⁵⁵ Initial claims related to overfishing in, and denial of Maori access to, their traditional fisheries.²⁵⁶ When the QMS was in development, claims filed by the Muriwhenua (far north) and Ngai Tahu (south island) *iwi* were being heard by the Tribunal. The initial design of the QMS legislation did not take into account Maori fishing rights; indeed it was in direct conflict with evidence being presented at the Tribunal of pre-existing fishing rights of Maori.²⁵⁷ Maori regarded the quota system as alienating their fisheries. Furthermore the legal assumption that the Crown owned New Zealand's fishery resources contradicted Maori interpretation of their rights, contravened the principles of the Treaty and compromised claims already being made to the Waitangi Tribunal.²⁵⁸

²³⁸ FA83 s88(2).

²⁴⁹ Ngai Tahu Sea Fisheries Report (1992).

²⁵⁰ Ngai Tahu Sea Fisheries Report (1992).

²⁵¹ Ngai Tahu Sea Fisheries Report (1992).

²⁵² TOKM (April 2000).

²⁵³ Dewees (1996), Rennie (1998).

²⁵⁴ Nightingale (1992).

²⁵⁵ Nightingale (1992).

²⁵⁶ Ackroyd et al (1990), Memon and Cullen (1998).

²⁵⁷ TOKM (April 2000).

²⁵⁸ Ackroyd et al (1990), Memon and Cullen (1998).

A considerable proportion of the Maori population in northern New Zealand made a living from fishing, although most had part-time ventures restricted to inshore waters. These fishers were excluded from the initial allocation of commercial quota because of the 1983 moratorium that removed part-timers from the industry.²⁵⁹ However, rural Maori tended to be part-time land workers in order to retain their land and part-time fishers in order to supplement their income and food supply.²⁶⁰ Their exclusion removed many Maori from their fisheries, denying them access to food for their *whanau* (families) and *hapu*.

The New Zealand ITQ system offers a clear mechanism for recognising reinstating specific Maori rights to the resource. The difficulties that existed for the Crown when dealing with the Maori claims concerned how much quota to give Maori and to whom in Maoridom to allocate it.

4.3.3 Injunction on future allocations

In 1986, the Muriwhenua iwi began legal action against the Crown ignoring indigenous title and taking ownership of New Zealand's fisheries. This was prompted by the Crown's move to include jack mackerel and squid in the QMS.²⁶¹ In October 1987, a court injunction prevented the further inclusion of species into the QMS on the basis that Maori would lose their rights to harvest those species.²⁶² A joint working group consisting of Crown and Maori representatives was established in 1987 to try to resolve Maori issues regarding the QMS and fishing rights.²⁶³

The Muriwhenua claim covered most fisheries from the shore-line to the edge of Northland's continental shelf and was largely upheld by the rulings of the Waitangi Tribunal in 1988. The case of squid and jack mackerel was temporarily resolved by the Crown offering a "split allocation"; catch taken in the Muriwhenua area (north of 36°S) was not covered by QMS regulations.²⁶⁴ In its Muriwhenua Report the Tribunal stated that,

“... the Treaty guaranteed to Maori the full, exclusive and undisturbed possession of their fisheries for so long as they wished to keep them. Their fisheries means their business and activity in fishing, including the places where they fished and their property right in fishing.”²⁶⁵

In 1988, the working group reported back with the agreement that Maori would forgo future claims of sovereignty over fish in return for commercial access. They proposed to the Crown that fishing rights be granted to a corporation jointly owned by the Crown and Maori.²⁶⁶

²⁵⁹ Part-timers were defined as those earning less than \$10k/yr or 80% income from fishing.

²⁶⁰ Cullen and Memon (1998).

²⁶¹ Russell Burnard pers.comm.

²⁶² At this time 32 species were already in the QMS.

²⁶³ Nightingale (1992).

²⁶⁴ Russel Burnard, pers.comm.

²⁶⁵ WAI 22: Muriwhenua 11.3.7 (n) p 220.

²⁶⁶ Ackroyd et al (1990).

4.3.4 Maori Fisheries (Interim Settlement) Act, 1989

An interim settlement was reached between the Crown and Maori and was enacted as the Maori Fisheries (Interim Settlement) Act (1989). The settlement involved a two year adjournment of the fisheries litigation in return for the transfer of ITQs equivalent to 10% of existing TACC to Maori by the end of October 1992.²⁶⁷ Future allocations of ITQ would no longer occur in perpetuity and as a consequence all subsequent species introduced into the QMS had quota allocated for a 25 year period only.²⁶⁸ Maori saw this legislation as the first step towards them eventually receiving 50% or more of all ITQ.²⁶⁹

The Maori Fisheries Commission (MFC) was to be set up under the 1989 Act to deliver quota to Maori, develop an allocation scheme and create a commercial fisheries company. The Commission's mandate was to facilitate the development of Maori in the fishing industry and provide grant assistance for industry training and development.²⁷⁰ Where the Crown did not hold sufficient quota to allocate, the Act required that they transfer an equivalent amount of money to the MFC to make up for the deficiency.²⁷¹ The cash, quota, and other assets acquired were collectively known as the Pre-Settlement Assets (PRESA).²⁷² The first instalment of quota to the MFC was announced in early 1990, however provision for additional claims under the Treaty remained.²⁷³

Under the Settlement agreement, the MFC was also required to distribute at least 50% of the PRESA to Aotearoa Fisheries Ltd, a commercial company that was to be set up using a \$10m grant from the Crown.²⁷⁴ The remaining fisheries assets were to be held by the MFC until they could be permanently handed over to iwi, after a fair allocation scheme was developed. Settlement funds were also used in 1989 to buy a 74% share in Moana Pacific Fisheries Ltd, at the time the nation's largest specialist inshore fishing company.²⁷⁵

The Tribunal also acknowledged the “development” rights of Maori, or their right to use new technology in fishing.²⁷⁶ Much of Ngai Tahu’s case was also accepted by the Tribunal in 1992, prompting new legislation.²⁷⁷

²⁶⁷ Te Ohu Kai Moana (2000).

²⁶⁸ Boast (2000). The Act (S48-49), with the consent of Maori, included provision for the rock lobster and packhorse rock lobster fisheries (at the time a controlled outside the QMS) to be subject to the quota management system, with quota allocated as Transferable Term Quota (valid for 25 years); and to set up *taiapure* (see section 2.3), which were areas for special management consideration that would include Maori participation in the management committees.

²⁶⁹ Dewees (1996).

²⁷⁰ MFA89 S5. TOKM has a Trust that has given out \$1m p/a in scholarships since 1995.

²⁷¹ MFA89 S42.

²⁷² TOKM (2000).

²⁷³ Cullen & Memon (1998); Ackroyd et al (1990:56).

²⁷⁴ Boast (2000). See MFA89 s4. Aotearoa Fisheries Limited was wound up in 1993 after the Sealord deal was completed.

²⁷⁵ TOKM (1998), TOKM web.

²⁷⁶ TOKM (2000).

²⁷⁷ Nightingale (1992:228). See Section 4.3.5 for further discussion.

4.3.5 Treaty of Waitangi Settlement Act – (1992)

The 1992 Waitangi tribunal report on the Ngai Tahu fisheries claim led to the drafting of a Deed of Settlement (1992) (DoS92); commonly known as the *Sealord Deal*.²⁷⁸ Under the Settlement, the Crown provided the MFC with \$150m to buy 50% of Sealord Products Ltd, New Zealand's biggest fishing company.²⁷⁹ In addition, 20% of ITQ for all new species was to be allocated to Maori. The Deed also provided for the customary (traditional, non-commercial), fishing rights of Maori, separating them from commercial rights.²⁸⁰ In return, Maori agreed that all current and future claims with respect to commercial fishing rights had been fully satisfied and discharged.²⁸¹ This settlement was enacted in the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992.

The Act legislated that the MFC would be restructured and renamed the Treaty of Waitangi Fisheries Commission (*Te Ohu Kai Moana – TOKM*).²⁸² TOKM has wider ranging powers than the previous Commission and is required to be clearly accountable to Maori as well as to the Crown.²⁸³ TOKM's responsibilities include:

- developing an allocation scheme;
- organising quota leasing rounds to make quota available to *iwi* at a discounted rate until the allocation scheme is in place;
- ensuring widest possible *iwi* representation in the legislative process; and
- implementing a training and development strategy.²⁸⁴

The settlement of Maori claims opened up the opportunity to bring more species into the QMS and new QMS species additions were vigorously pursued by Maori through the courts.

After the settlement, Maori saw themselves as co-owners of the fisheries resource and not obliged to pay resource rentals to the Crown. Consequently, future legislation

²⁷⁸ A memorandum of understanding was signed on the 27th of August 1992 and the Deed of Settlement signed on the 23 of September 1992. See section --- for further discussion of the settlements.

²⁷⁹ TOKM (April 2000). This was a joint venture with Brierley Investments Ltd. At the time of the deal Sealord held 27%, by volume, of the NZ quota resource. In January 2001, the Government approved the sale of Brierley Investments Limited 50% shareholding in Sealord to TOKM and Japanese seafood company, Nissui (Nippon Suisan Kaisha). Under the deal, Nissui will own 50% of the Sealord operating company but their fisheries quota (almost ¼ of all NZ's total) will be retained by the Treaty of Waitangi Fisheries Commission (Cullen and Hodgson 2001).

²⁸⁰ Cullen and Memon (1998). For more discussion of customary rights see Section 2.3.

²⁸¹ DoS92, Clause 5.

²⁸² Stats NZ.

²⁸³ TOKM (2000).

²⁸⁴ Ackroyd et al (1990:56), Le Heron (1996), Boast (1999). TOKM set up a charitable trust for development and training purposes, aimed at ensuring Maori have the skills to match their fisheries assets. The Commission has put in place a \$5 million training and development strategy (in 1992), to help Maori acquire the skills to match their fisheries assets. To further encourage Maori into the business of fishing, undistributed quota held by TOKM has been preferentially leased to Maori (*iwi*) at a discounted rate of 60% below true market rates (see: TOKM Annual Report, 1994 for further information) (Boast 1999).

eliminated resource rentals although it provided for Crown fisheries management charges.²⁸⁵

4.3.5.a Allocation of quota among Maori

The 1992 Settlement satisfied the Crown's Treaty obligations to Maori relating to fishing resources. However, *iwi* property rights and the division of fisheries assets amongst *iwi* is yet to be resolved.²⁸⁶ The 1992 Act made it clear that there were to be two separate processes of allocation procedures for Maori fisheries assets: one for distribution of assets already held by TOKM (10 % of quota, cash and shares: PRESA), and a second for new assets acquired under the full and final settlement (20% of quota for new species added to the QMS), referred to as the Post-Settlement Assets (POSA).²⁸⁷ TOKM is required by law to examine all proposed methods of allocation, consult with *iwi* and prepare discussion material to facilitate agreement on the best method of distribution.²⁸⁸

Current debate over the allocation of assets has focused on 2 main models:

- The *mana whenua mana moana* model
 - *iwi* are entitled to all the quota off their coastline
- The population model
 - quota is distributed proportional to an *iwi*'s population, including inland and urban Maori.²⁸⁹

Cullen and Memon (1990) state, "The majority view is that fishing quota is an *iwi*-based right and not one for collective Maori ownership; pan-*iwi* ownership is difficult to justify in terms of the Treaty".

All South Island tribes and many in the lower North Island support the *mana moana* model, having long coastlines and consequently standing to gain the most money and assets.²⁹⁰ However, agreement has not been reached on some key issues including the treatment of cash and shares, and the division between the coastline and proportion population models that is to be applied to deepwater fishstock quota.

TOKM, including its subsidiary companies now holds around \$450 million of Maori quota and fisheries assets and receives a 20% allocation of all new quota on their behalf.²⁹¹ The commission has been able to extend the 10% quota it was allocated between 1990-94 into control over 55% of the total quota in NZ (Major 1999).

²⁸⁵ Major (1999).

²⁸⁶ Cullen and Memon (1998).

²⁸⁷ Stats NZ (2001), TOKM (2000).

²⁸⁸ TOKM (2000).

²⁸⁹ Cullen and Memon (1998).

²⁹⁰ Cullen and Memon (1998).

²⁹¹ Le Heron (1996).

5 BIBLIOGRAPHY

- Ackroyd, P., R. P. Hide, B. M. H. Sharp. (1990). *New Zealand's ITQ System: Prospects for the Evolution of Sole Ownership Corporations*. Report to MAFFish, Wellington.
- Akroyd, J. M., C. J. Batstone, B. M. H. Sharp, and K. A. R. Walshe. (1999). *Monitoring the performance of commercial fisheries policy*. Akroyd Walshe Ltd., Auckland.
- Anderson, L. G. (1991). A note on marker power in ITQ fisheries. *Journal of Environmental Economics and Management* 21: 291-296.
- Annala, J. H., K. J. Sullivan, A. J. Hore. (1991). Management of multispecies fisheries in New Zealand by individual transferable quotas. *ICES mar. Sci. Symp.* 193:321-329.
- Annala, J. H., (1996). New Zealand's ITQ system: have the first eight years been a success or a failure? *Reviews in Fish Biology and Fisheries* 6:43-62.
- Annala, J. H., Sullivan, K. J. and O'Brien, C. J., (1999). *Report from the Fishery Assessment Plenary, April 1999: stock assessments and yield estimates*. Science Policy Ministry of Fisheries, Wellington.
- Annala, J. H., Sullivan, K. J. and O'Brien, C. J. (2000). *Report from the Fishery Assessment Plenary, May 2000: stock assessments and yield estimates*. Ministry of Fisheries, Wellington.
- Arbuckle, M. and Drummond, K. (2000). Evolution of self-governance within a harvesting system governed by individual transferable quota. *In: Use of property rights in fisheries management. Proceedings of the FishRights99 Conference, Fremantle*. FAO Fisheries Technical Paper 404/2: 370-382. Food and Agriculture Organization of the United Nations, Rome.
- Arnason, R. (1992). Individual transferable quotas in the Icelandic fisheries. *Working Paper*. Department of Economics, University of Iceland, Reykjavik.
- Arnason, R. (1993). Minimum Information Management in Fisheries. *Canadian Journal of Economics* 23(3):630-53.
- Bathgate, M. and Memon, A. (1998). Towards a co-management approach to fisheries management in New Zealand. *In Wallace, C., Weeber, B. and Buchanan, S. (eds) Marine ecosystem management: obligations and opportunities. Proceedings of the SeaViews conference*. Environmental and Conservation Organisations of New Zealand, Wellington.
- Batstone, C. J. and B. M. H. Sharp (1999a). New Zealand's quota management system: the first ten years. *Marine Policy* 23(2): 177-190.
- Batstone, C. J. and B. M. H. Sharp. (1996b). Minimum Information Management Systems and Fisheries Management. *Presented at the New Zealand Association of Economists Conference*, Wellington.

- Batstone, C. J. and B. M. H. Sharp. (2000). Market structure in a rights-based fishery. *Proceedings of the 10th Annual Conference of the European Association of Resource & Environmental Economists*. Rethymnon, Crete, Greece.
- Bess, R. (2000). Property rights and their role in sustaining New Zealand seafood firms' competitiveness. *In: Use of property rights in fisheries management. Proceedings of the FishRights99 Conference, Fremantle*. FAO Fisheries Technical Paper 404/2: 390-401. Food and Agriculture Organization of the United Nations, Rome.
- Bevin, G., P. Maloney, and P. Roberts (1989). *Economic review of the New Zealand fishing industry 1987-88*. New Zealand Fishing Industry Board, Wellington, New Zealand.
- Boast, R. P. (1999). Maori Fisheries 1986-1998: a reflection. *Victoria University of Wellington Law Review* 30/1:111-134.
- Boyd, R. O. and C. M. Dewees. (1992). Putting theory into practice: individual transferable quotas in New Zealand's fisheries. *Society and Natural Resources* 5: 179-198.
- Cassidy, M. (2000) Ngai Tahu customary fisheries management: implementation of a common language. *In: Use of property rights in fisheries management. Proceedings of the FishRights99 Conference, Fremantle*. FAO Fisheries Technical Paper 404/1: 321-324. Food and Agriculture Organization of the United Nations, Rome.
- Clark, I. N. (1985). New Zealand's deepwater trawl policy. *In Clark (ed) Proceedings of the Second Conference of the International Institute of Fisheries Economics and Trade, Volume 1: Economic Recovery, Fisheries Economics and Seafood Trade*. Pp 347-349. Oregon State University, Corvallis.
- Clark, I. N., P. J. Major and N. Mollet (1998) Development and Implementation of New Zealand's ITQ Management System. *Marine Resource Economics* 5:325-49.
- Clark, I. N. (1993) Individual transferable quotas: the New Zealand experience. *Marine Policy* 17(5):340-352.
- 2x (Paulin)
- Clement & Associates.(1997). *New Zealand commercial fisheries: the guide to the Quota Management System*. Clement & Associates, Tauranga.
- Clement & Associates. (1998). *New Zealand commercial fisheries: the atlas of area codes and TACCs 1998/99*. Clement & Associates, Tauranga.
- Clement, G. (2000). The Orange Roughy Management Company Limited – a positive example of fish rights in action. *In: Use of property rights in fisheries management. Proceedings of the FishRights99 Conference, Fremantle*. FAO Fisheries Technical Paper 404/2:254-257. Food and Agriculture Organization of the United Nations, Rome.

Not mentioned in paper – should make mention of it in the data section perhaps.

- CMResearch (1998). *Compliance Survey Research Report (Executive Summary)*. Ministry of Fisheries, Wellington.
- Colman, J.A., McKoy, J.L., and Baird, G.G. (1985). *Background papers for the 1985 Total Allowable Catch recommendations*. Fisheries Research Division, NZ Ministry of Agriculture and Fisheries. 259p (Unpublished Report, held in Fisheries Research Division Library, Wellington.
- Connor, R. (2000). Trends in fishing capacity and aggregation of fishing rights in new Zealand under individual transferable quotas *In: Use of property rights in fisheries management. Proceedings of the FishRights99 Conference, Fremantle*. FAO Fisheries Technical Paper 404/2: 267-278. Food and Agriculture Organization of the United Nations, Rome.
- Crothers, S. (1988). Individual Transferable Quotas: The New Zealand Experience. *Fisheries* 13(1): 10-12.
- Cullen, R., Memon, P. A. (1990). Impact of the Exclusive Economic Zone on the management and utilisation of the New Zealand fishery resources. *Pacific Viewpoint* 31(1):44-62.
- Department of Statistics. (1990). *Fisheries: Primary Industry*. NZ Pocket Digest of Statistics: 122-127.
- Deweese, C. M. (1989). Assessment of the Implementation of Individual Transferable Quotas in New Zealand's Inshore Fishery. *North American Journal of Fisheries Management* 9(2): 139.
- Deweese, C. M. (1996). Industry and Government Negotiation: Communication and Change in New Zealand's Individual Transferable Quota System. Pages 333-341. *In Meyer, R. M., Zhang, C., Windsor, M. L., McKay, B. J., Hushak, L. J., Muth, R. M. and Wolotira, R. J. (eds), Fisheries resources utilization and policy. Proceedings of the World Fisheries Congress, Theme 2*. Oxford & IBH Publishing Co., New Delhi.
- Donoghue, M. (1998). Management of the by-catch of protected species in New Zealand: a government agency perspective. *In Wallace, C., Weeber, B. and Buchanan, S. (eds) Marine ecosystem management: obligations and opportunities. Proceedings of the SeaViews conference*. Environmental and Conservation Organisations of New Zealand, Wellington.
- Drummond, K., Kirk, P., Nelson, L. (2000). Challenges to the Co-existence of Marine Farming and Capture Fisheries in New Zealand. *In: Use of property rights in fisheries management. Proceedings of the FishRights99 Conference, Fremantle*. FAO Fisheries Technical Paper 404/2: 327-330. Food and Agriculture Organization of the United Nations, Rome.
- Duncan, A. J. (1985). New Zealand's inshore fishery: a summary of economic conclusions and management options. *In: Proceedings of the 2nd conference of the International Institute of Fish Economics & Trade*. Volume 1: 337-346.
- Fish Protection Act, (1877).
- Fisheries Amendment Act, (1903).

- Fisheries Act, (1908).
- Fisheries Act, (1983).
- Fisheries Amendment Act, (1986).
- Fisheries Amendment Act, (1990).
- Fisheries Amendment Act, (1991).
- Fisheries Amendment Act, (1992)2)).
- Fisheries Amendment Act, (1993).
- Fisheries Act, (1996).
- FishServe (2000). http://www.fishserve.co.nz/information/AU_InfoAboutUs.asp
- Gissurason, H. (2000). *Overfishing: the Icelandic solution*. Institute of Economic Affairs, West Sussex, Britain.
- Grafton, R. Q. (1996). Individual transferable quotas: theory and practice. *Reviews in Fish Biology and Fisheries* 6:5-20.
- Harte, M. (2000a). Fisher participation in rights-based fisheries management: the New Zealand experience. *In: Use of property rights in fisheries management*. Proceedings of the FishRights99 Conference, Fremantle. FAO Fisheries Technical Paper 404/1: 95-104. Food and Agriculture Organization of the United Nations, Rome.
- Harte, M. (2000b). Industry perspectives: taking the initiative for the management of New Zealand's Commercial Fisheries. *In: Use of property rights in fisheries management*. Proceedings of the FishRights99 Conference, Fremantle. FAO Fisheries Technical Paper 404/1: 270-274. Food and Agriculture Organization of the United Nations, Rome.
- Harte, M. and Bess, R. (2000). The role of property rights in the development of New Zealand's marine farming industry. *In: Use of property rights in fisheries management*. Proceedings of the FishRights99 Conference, Fremantle. FAO Fisheries Technical Paper 404/2: 331-342. Food and Agriculture Organization of the United Nations, Rome.
- Hartevelt, T. (1998). *Fishing for the Future: review of the Fisheries Act 1996*. Report of the Independent Reviewer of the Fisheries Act 1996 to the Minister of Food, Fibre, Biosecurity and Border Control.
- Hawkey, D. (1994). *Property Rights, ITQs, and the Slice of the Fish Pie: An Appraisal of Fishery Culture and Conflict in the Northland Region*. Working Papers in Economics, No. 17. Department of Economics, University of Auckland.
- Heatherington, M. J. (1998). Recreational fisheries. *In* Wallace, C., Weeber, B. and Buchanan, S. (eds) *Marine ecosystem management: obligations and opportunities*. Proceedings of the SeaViews conference. Environmental and Conservation Organisations of New Zealand, Wellington.
- Heatherington, M. J. (2000). Property rights and recreational fishing, a New Zealand perspective – past, present and future. *In: Use of property rights in fisheries management*. Proceedings of the FishRights99 Conference, Fremantle. FAO

- Fisheries Technical Paper 404/1:284-287. Food and Agriculture Organisation of the United Nations, Rome.
- Helm, P. (1998). *New Zealand's Ocean Future Opportunities and Responsibilities*. Proceedings of the February 1998 Sea Views conference. Environment & Conservation Organisation, Wellington
- Hilborn R. (1997). Uncertainty, risk and the precautionary principle. *American Fisheries Society Symposium 20:100-106*.
- Hooper, M. and Lynch, T. (2000). Recognition of and provision for indigenous and coastal community fishing rights using property rights instruments. *In: Use of property rights in fisheries management*. Proceedings of the FishRights99 Conference, Fremantle. FAO Fisheries Technical Paper 404/2:199-205. Food and Agriculture Organisation of the United Nations, Rome.
- Jones, S. (1998). Maori, the industry and fishing. *In Wallace, C., Weeber, B. and Buchanan, S. (eds) Marine ecosystem management: obligations and opportunities*. Proceedings of the SeaViews conference. Environmental and Conservation Organisations of New Zealand, Wellington.
- Kaufmann, B., G. Geen, S Sen. (1999). *Fish futures: individual transferable quotas in fisheries*. Fisheries Economics, Research and Management Pty Ltd, Kiama, NSW. pp 29, 86, 109-111, 136-139, 158-168, 216-217.
- Kirkley, J., DuPaul, W. and Oesterling, M., (1994). *Regulating the Blue Crab, Callinectes Sapidus, Fishery in Virginia: Biological and Economic Concerns*. Virginia Sea Grant's Marine Advisory Program Publications, VA.
- Le Heron, R. (1996). Farms, fisheries and forests. *In: Le Heron, R. and Pawson, E. (eds) Changing Places: New Zealand in the Nineties*. Longman Paul, Auckland. pp154 –160.
- Lindner, R. K., H. F. Cambell, et al. (1989). *Pricing the New Zealand fish stock under a quota management system*. New Zealand Fishing Industry Board, Wellington.
- Ludwig, D., R. Hilborn and K. Ridge (1993). Uncertainty, resource exploitation, and conservation. *Science 260: 17-18*.
- Major, P. (1999). The evolution of ITQs in the New Zealand fisheries. *In Arnason, R. and Gissurason, H. H. (eds) Individual Transferable Quotas in theory and practice*. University of Iceland Press, Reykjavik. Pp 81-102.
- Maori Fisheries Act (1989)
- McClintock, W. L., Baines, J. T., Taylor, C. N. (2000). *Retreat from the frontier: fishing communities in New Zealand*. Paper prepared for the 8th International Symposium on Society and Resource Management, Western Washington University, Bellingham, Washington.
- McClurg, T. (1997). "Bureaucratic Management versus Private Property: ITQs in New Zealand after Ten Years." *In: L. Jones and M. Walker, (eds.) Fish or Cut Bait! The Case for Individual Transferable Quotas in the Salmon Fishery of British Columbia*. Fraser Institute, Vancouver.

- McDermott Fairgray Group Ltd. (2000). *Economic Impact Assessment for New Zealand Regions*. Report prepared for the New Zealand Seafood Industry Council, Wellington.
- McMurrin, J. (2000). Property rights and recreational fishing: never the twain shall meet? *In: Use of property rights in fisheries management*. Proceedings of the FishRights99 Conference, Fremantle. FAO Fisheries Technical Paper 404/2:184-187. Food and Agriculture Organization of the United Nations, Rome.
- Meister, A and Sharp, B. (1993). *Current and potential uses of economic approaches to environmental management*. Discussion paper in natural resource economics, 17. Massey University, Palmerston North.
- Memon, P. A. and Cullen, R. C. (1996). Rehabilitation of Indigenous Fisheries in New Zealand. *In: Resources, nations and indigenous peoples: case studies from Australasia, Melanesia and Southeast Asia*. Oxford University Press, Melbourne. Pp252-264.
- Ministry of Agriculture and Fisheries (NZ). (1984). *Inshore Finfish Fisheries: Proposed Policy for Future Management 11*.
- Ministry of Agriculture, Fisheries and Food (UK). (1990). *Report of quota trading and related issues*. MAFF Fisheries Division, London.
- Ministry of Fisheries. (1996). *Changing course – towards fisheries 2010*. Ministry of Fisheries, Wellington.
- Ministry of Fisheries. (1999a). *Kaimoana Customary Fishing Regulations*. Information booklet. Ministry of Fisheries, Wellington.
- Ministry of Fisheries. (1999b). *Briefing for the Incoming Minister, December 1999*. Web, www.fish.govt.nz/information/briefing_99.
- Ministry of Fisheries. (1999c). *Quota Monitoring System: Report for May 1999*. Ministry of Fisheries, Wellington.
- Ministry of Fisheries. (2001a). New catch balancing regime explained. *Seafood New Zealand 9:4*. The NZ Seafood Industry Magazine Ltd, Wellington.
- Ministry of Fisheries. (2001b). *Framework for developing a plan. Fisheries Plans Part A..* Draft consultation document, Ministry of Fisheries, Wellington.
- Ministry of Fisheries. (2001c). *Review of Sustainability Measures and Other Management Controls for the 2001-02 Fishing Year*. Final Advice Paper, Ministry of Fisheries, Wellington.
- Ministry of Fisheries. (2001d). *Ringling in the Changes – Fisheries Act 1996*. Ministry of Fisheries, Wellington.
- Ministry of Fisheries. (2001e). *Hi Ika – current views on customary fishing*. Newsletter. Ministry of Fisheries, Wellington. Issue 9.
- Ministry of Fisheries. (2002a). *Fisheries Assessment Working Groups*. Web, www.fish.govt.nz/sustainability/research/assessment/groups.htm

- Ministry of Fisheries. (2002b). Customary Fishing. Web, <http://www.fish.govt.nz/customary/index.html>.
- Ministry of Fisheries. (2002c). *Rapaki Maitaitai Reserve*. Information booklet. Ministry of Fisheries, Wellington.
- Neidlander, W. J. and Sullivan, M. S. (2000a). ITQs – New Zealand and United States: Allocation formula and legal challenges. *In: Use of property rights in fisheries management*. Proceedings of the FishRights99 Conference, Fremantle. FAO Fisheries Technical Paper 404/2:59-71. Food and Agriculture Organisation of the United Nations, Rome.
- Neidlander, W. J. and Sullivan, M. S. (2000b). Enforcement and compliance of ITQs: New Zealand and the United States of America. *In: Use of property rights in fisheries management*. Proceedings of the FishRights99 Conference, Fremantle. FAO Fisheries Technical Paper 404/2:415-427. Food and Agriculture Organisation of the United Nations, Rome.
- New Zealand Fishing Industry Board. (1991). *Export of seafood products: Summary Report 1987-1999*. NZ Fishing Industry Board, Wellington.
- New Zealand Institute of Economic Research. (1999). *Review of controls governing foreign ownership of quota: how best to advance the national interest*. Report to Ministry of Fisheries, Wellington.
- New Zealand Seafood Industry Council. (1998). *New Zealand Seafood Industry Foresight Strategy*. New Zealand Seafood Industry Council, Wellington.
- New Zealand Seafood Industry Council. (2001). *The New Zealand Seafood Industry Economic Review*. New Zealand Seafood Industry Council, Wellington.
- New Zealand Seafood Industry Council. (2001b). *The Trumpeter*. SeaFIC Policy and Science Group Newsletter. April 2001.
- Nightingale, T. (1992). *White collars and gumboots: a history of the Ministry of Agriculture and Fisheries 1892-1992*. The Dunmore Press, Palmerston North. Pp212-229
- O'Donovan, B. (1992). *Fishing Industry Employment Statistics*. NZIER for Ministry of Agriculture and Fisheries, Wellington .
- Parliamentary Commissioner for the Environment. (1999). *Setting Course for a Sustainable Future: the management of New Zealand's marine environment*. Parliamentary Commission for the Environment, Wellington.
- Paulin, C. D., D. P. Boyle, and I. T. Clement. (1996). *New Zealand Commercial Fisheries: The Identification Guide to Quota Management Species*. Clement & Associates Limited, Tauranga.
- Pearse, P. H. (1991). *Building on Progress: Fisheries Policy Development in New Zealand*. Report prepared for the Ministry of Fisheries, Wellington.
- Rennie, H. G. (1998). *Geographical problems in implementing ITQ: New Zealand's Quota Management System*. Paper presented to the IASCP 98 Crossing Boundaries Conference, Vancouver.

- Sanchirico, J., R. Newell, and S. Kerr. (2000). *Economic Fishery Conservation through Individual Transferable Quota: Evidence from the New Zealand Experience*. SGS Proposal.
- Sandrey, R. A. and D. K. O'Donnell (1984). New Zealand's Inshore Fishery: A Perspective on the Current Debate. Economic Recovery, Fisheries Economics & Seafood Trade. In: *Proceedings of the 2nd conference of the International Institute of Fisheries Economics & Trade*, Christchurch. Dept of Agricultural & Resource Economics, Oregon State University. 1: 351-364.
- Sea Fisheries Act, (1908).
- Shallard, B. (1996). *The concepts & practice of individual transferable quotas for the management of fisheries – an overview*. Presentation for the Ministry of Food Processing Industries conference, New Delhi.
- Sharp, B. (1996a). *Transferable Harvesting Rights*. Draft Report (unpublished).
- Sharp, B. (1996b). *Introducing Transferable Rights*. Draft Chapter 3 (unpublished).
- Sharp, B. (1996c). Natural Resource Management. In: B. Silverstone, A. Bollard and R. Lattimore (ed.), *A Study of Economic Reform: The Case of New Zealand*, Amsterdam, North-Holland. 425-450.
- Sharp, B. (1997). From Regulated Access to Transferable Harvesting Rights: Policy Insights From New Zealand. *Marine Policy*, 21:501-517.
- Sharp, B. (1998). Fishing. In: M. Pickford and A. Bollard (ed.), *The Structure and Dynamics of New Zealand Industries*. , The Dunmore Press, Palmerston North. 53-85.
- Sharp, B. (1999). Trade and Environmental Linkages in New Zealand Fisheries. In: R. Ratnayake (ed.), *Trade and the Environment: A New Zealand Perspective*. Ashgate Publishing Ltd., Aldershot. 15(3): 129-148.
- Sharp, B. (2000). *Integrating Recreational Fisheries into Rights Based Management Systems*. Department of Economics, The University of Auckland.
- Sissenwine, M. P. and P. M. Mace. (1992). ITQs in New Zealand: the era of fixed quota in perpetuity. *Fishery Bulletin* 90(1): 147-160.
- B. Shallard, J. Kirkley, S. Pascoe, K. Salvanes, D. Squires, B. Turriss, H. Campbell, N. Vestergaard, S. Cunningham, C. Dewees, RQ. Grafton, S.F Jr Herrick. (1998). Individual transferable quotas in multispecies fisheries. *Marine Policy* [22 \(2\)](#):135-159.
- Statistics New Zealand. (2001a). *Fisheries. New Zealand Official Yearbook 2000:19.3*. Statistics New Zealand, Wellington.
- Statistics New Zealand. (2001b). *Seafood Trade. New Zealand Official Yearbook 2000:19.4*. Statistics New Zealand, Wellington.
- Te Ohu Kai Moana - Treaty of Waitangi Fisheries Commission. (2000). *Te Rourou Mo Tatou* (A guide to the allocation of the pre-settlement assets). Treaty of Waitangi Fisheries Commission, Wellington.

- Tietenberg, T. (1996). Renewable Common-property resources: fisheries and other species. *In: Environmental and natural resource economics*. (4th Ed.) HarperCollins, New York. Pp271-298.
- Treaty of Waitangi Act, (1975).
- Treaty of Waitangi (Fisheries Claims) Settlement Act, (1992).
- Tuck, W. (1997). *Towards Better Management of New Zealand's Commercial Fisheries: A Discussion Paper on Proposals to Reform Management of New Zealand's Commercial Fisheries*. Wellington, Ministry of Fisheries:19.
- Valentine, J. (2001). *The new Act is now reality*. CEO Comment in *Seafood New Zealand*, October 2001:9. SeaFIC, Wellington.
- Wallace, C. (1998a). Marine management and the quota management system: reform required. *In* Wallace, C., Weeber, B. and Buchanan, S. (eds) *Marine ecosystem management: obligations and opportunities*. Proceedings of the SeaViews conference. Environmental and Conservation Organisations of New Zealand, Wellington.
- Wallace, C. (1998b) *Tradeable Quota in Practice: Decision making, institutions and outcomes - the New Zealand experience over 11 years*. School of Business and Public Management, Victoria University of Wellington.
- Ward, T. (2001). *Scoping review; New Zealand Environmental Management Strategy*. Institute for Regional Development, University of Western Australia, Australia.
- Wyatt, N. (2000). Why recover costs? Cost recovery and property rights in New Zealand. *In: Use of property rights in fisheries management*. Proceedings of the FishRights99 Conference, Fremantle. FAO Fisheries Technical Paper 404/2: 402-404. Food and Agriculture Organization of the United Nations, Rome.
- Yandle, T. (2001). *Market-based natural resource management: an institutional analysis of individual tradeable quotas in New Zealand's commercial fisheries*. PhD dissertation, Indiana University.
- Yandle, T. and Dewees, C. M. (2000a). *Privatizing the Commons...Twelve Years Later: A Study of New Zealand's Market-Based Fisheries Management*. Draft presented at International Association for the Study of Common Property Resources Conference, Indiana, 2000.
- Yandle, T. and Dewees, C. M. (2000b). *New Zealand's Quota Management System: Changes in the Auckland Fishing Community Through the First 14 Years*. Presented at the IIFET conference, Oregon State University, 2000.

