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Editor

Fisheries, Quota Management and Quota Transfer

Rationalization through Bio-economics

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Cover illustration: 'Wild' Sockeye salmon, frozen-at-sea and ready for sale at a market in Vancouver, British Columbia, Canada (photo: G. Winder 2015). The sign speaks to the rationalization of salmon through the bio-economic project of a wild capture industrial fishery.

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List of Abbreviations

ADF&G	Alaska Department of Fish and Game (USA)
AERE	Association of Environmental and Resource Economists
ANT	actor-network theory
CFP	Common Fisheries Policy (European Union)
CPU	catch per unit effort
DAP	dedicated access privilege
DCF	data collection framework
DTS	demersal trawl segment
EEZ	exclusive economic zone (200 nautical miles)
FTE	full-time equivalent
GDP	gross domestic product
GQ	group quotas (Germany)
HMAP	History of Marine Animal Populations
ICES	International Council for the Exploration of the Sea
ICNAF	International Commission for the Northwest Atlantic Fisheries
IPHC	International Pacific Halibut Commission (Canada and USA)
IQ	individual quota
ITQ	individual transferable quota
IUU	illegal, unreported and unregulated fishing
IVQ	individual vessel quota system
LAP	limited access privilege
LAPP	limited access privilege programmes (Alaska)
MAFF	Ministry of Agriculture, Fisheries and Food (UK)
MPA	marine protected area
MSC	Marine Stewardship Council
MSP	marine spatial planning
MSY	maximum sustained yield
NFA	Norwegian Fishers' Association
NGO	non-governmental organization
nm	nautical miles

NOAA	National Oceanic and Atmospheric Administration (USA)
NPFMC	North Pacific Fishery Management Council (Alaska)
OECD	Organisation for Economic Co-operation and Development
PO	producer organization
QEM	quota exchange market (Iceland)
QMS	quota management system (official name for New Zealand's fish stock assessment programme)
RC	regulatory council (Norway)
SQS	structural quota system (Norway)
TACC	total allowable commercial catch
TOKM	Te Ohu Kaimoana (a Māori fisheries trust, New Zealand)
TQ	total quotas (Germany)
TURF	territorial use rights for fishing
UQ	unit quota (Norway)
VQ	vessel quota

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Part I
Bow Waves and Boat Wakes

Chapter 1
Introduction: Fisheries, Quota Management, Quota Transfer and Bio-economic Rationalization

Gordon M. Winder

Abstract Individual transferable quotas (ITQs) were heralded in the 1980s as a market-based solution to the problem of overfishing and were adopted around the world. These neoliberal market mechanisms combined with the fisheries science of stock assessments in diverse contexts to produce a new baseline in fisheries management, albeit one set out in a diverse array of related but not identical bio-economic projects. Appropriately, quota management, quota transfer and bio-economic rationalizations have received attention from social scientists, with some finding that ITQs have produced desirable and effective results while others note the (un)intended, negative social consequences of this private rights regime. Stock assessment has been critiqued for not paying enough attention to ecosystems and for providing insufficient insight into how many fish there are. Further, ITQs are associated with a growing focus on de-centered, self-organizing responses to what are perceived as crises in natural systems. The movement away from centralized state control, towards diffuse, client-centered managerial interventions and assessments has consequences for how fishing communities and property rights are understood, how fisheries investment functions, how enforcement and conservation are carried out, how fisheries are assessed, and what the characteristics of ecosystems are thought to be. Thus economic and policy attention is being shifted to aspects of fisheries besides allocation of access privileges as property among fishing companies, and particularly to new concerns emerging from the achievements, limitations and failures of ITQ regimes. How have fishing places and fishing people been reconfigured by the unique hybrid of science, capital and managerialism that has been ushered in alongside ITQs? This chapter sets out the scope of the field of inquiry.

Keywords Area-based management • Bio-economic project • Catch share • Fish stock assessment • Individual transferable quota

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1.1 In the Wake of Bio-economic Rationalization

Fisheries, Quota Management and Quota Transfer considers the impact of fish stock assessment and catch share arrangements in context through case studies and in terms of ecosystem, economy and society. It examines the rationalizing work of bio-economic projects, especially the institutionalization of individual transferable quota (ITQ) in the fisheries: what impact have they had on fisheries and fishers?

The contributing authors understand that diverse measures come together as linked bio-economic projects, that is, as widely deployed but locally constituted projects that combine biological and economic logics to rationalize production and, in this case, fish, ecosystems, labor, community and capital. Politicians and managers use these projects and the models that justify them to rationalize fisheries in favor of modern technology and for capital, fleet and species efficiency. We see fisheries management under these bio-economic projects set against indigenous, animal and landscape knowledge of fisher, fish and sea, and against older moral economies of the fishery evident in such institutions as traditional or customary fisheries, co-operatives, or boat shares, a perspective that is in keeping with much of the social sciences literature on fisheries management.

The metaphor of a boat's wake is used in this volume to evoke the effects on ecosystem, society and economy from diverse but related rationalizing projects (Mansfield 2004a). When a boat drives across the sea it displaces water, ideally in the form of V-shaped waterfronts, inside which the water surface is turbulent. The wake enjoys a group velocity but the ideal pattern dissipates as friction and dispersion reduce the wake. The wake can be amplified through constructive interference to form shock waves. As regulators drive the "boat" of rationalization through the "sea" of ecosystem and social arrangements of fishing, they cause displacements but the precise effects depend upon the context and perspective. Small boats can be swamped and coastal erosion can be induced by the wakes of large vessels travelling at speed through sensitive passages. Dolphins may enjoy their ride on a boat wake but the noise of the boat may disturb some creatures in the ecosystem. Who is steering the boat, with what skills, chart and direction matter to the wake form and its effects, as do the maneuverability and seaworthiness of the vessel and the wind and tide conditions. Some fisheries are more difficult to steer or manage than others. When the boat tows a trawl its wake effects are compounded by the rationalizing process its net produces: prized fish can be harvested, unwanted catch discarded, some livelihoods secured, others rationalized, while habitat is uprooted and transformed.

As a bio-economic project, ITQ necessarily combines fisheries stock assessments with catch share arrangements and expert systems to form a management regime. While ITQ architects certainly mean to lay the foundations for a long-term management regime with long-term benefits conferred on owners of fisheries access privileges, they simultaneously also mean to set in place ITQ as a short-lived project that will promote some actors at the expense of others, and around which other policies, institutions and regulations will be set to work. This is doubly important. ITQ

now has a 40-year history, for example in the Netherlands, but it is no longer the same bundle of regulations with the same effects as it was when it was first established there (Pinkerton 2015: 110). Equally, the fishery is no longer the same as it was 40 years ago: it has been rationalized by ITQ projects and has adapted and transformed. By emphasizing emerging, becoming, learning and transforming through knowledge, the book conceives technology as a field of power and choice, nevertheless dominated by managers and politicians through specific projects, none of which is ever complete let alone the same as related projects pursued elsewhere.

The authors are aware of the complex lexicon that has emerged around ITQ as a result of the diverse variants of the general management regime that have been trialed as well as the intellectual contestation of the term, its putative ideal form and the ways of knowing its effects. For example, debates over what constitutes the ideal model for allocation have helped to produce a long list of acronyms that classify the terms under which fisheries access privileges are allocated by governments: individual quota (IQ), vessel quota (VQ), territorial use rights for fishing (TURFs), limited access privileges (LAPs), dedicated access privileges (DAPs) and Individual Transferable Quota (ITQ). It is conventional in resource economics to distinguish between primarily quota-based and primarily area-based programs: such distinctions are important but potentially detract attention from both the rationalizing impulse behind the diverse management systems and their effects when combined with stock assessment in particular contexts.

Rather than become embroiled in these classificatory distinctions and debates we concentrate on case studies of specific bio-economic rationalization projects in fisheries. The book investigates the origins and diverse experiences of these types of project, including resistance to them, attempts to develop resilience around them, and experiences of the impacts that come from them. It does so in specific contexts. A final chapter discusses the extent to which the separate findings together indicate whether ITQs meet five general objectives: preventing overfishing, fair allocation, promoting responsible self-management, creating well-functioning markets, openness to new entrants and adaptation. This list of objectives is understood, from the start, as a limited sub-set of possible expectations and the last chapter is envisaged as an effort to draw tentative conclusions from among the case studies and perspectives brought together in this volume.

The authors of *Fisheries, Quota Management and Quota Transfer* are inspired by diverse theoretical perspectives including resource economics. However, in framing our understanding of ITQ and stock assessment we view technology as a calculus of how to make the world, or parts of it, governable, and rationality as a system for making, in this case, fish, fisheries and ecosystems into intelligible and translatable subjects. Chapters examine how resource economists developed ITQ, how governments set it in place, and how fishing enterprises responded.

Now around 40 years old, ITQ has never been subjected to the kind of comprehensive sustainability assessments advocated by Elinor Ostrom (2005), let alone the "full-cost accounting of the impacts of ITQs" at the national level that Evelyn Pinkerton (2015: 113) insists upon. Neither approach is pursued in full here. Instead, individual chapters relate bio-economic projects to separate theoretical literature, an

approach that facilitates multi-disciplinary dialog. Some authors challenge efficiency expectations from resource economics while others draw connections to the practices of accumulation by dispossession, to recent literature in the social sciences on territorial development of the oceans and fisheries, or to literature on consumer sovereignty and the certification of seafood. Another chapter considers the fairness of rationalization under two individual quota schemes. These perspectives, debates and controversies are outlined below and returned to in the conclusion.

This chapter first defines ITQ and then situates stock assessments and ITQ within not only the marine biology and common property resource literatures respectively, but also the wider and diverse literatures of fisheries management. Several conceptual frameworks have emerged around these fisheries management practices – area-based management of fisheries, assessments of company behavior and industry performance, critical research on varieties of neoliberalism at work in the fisheries, and hopes for a Blue Revolution and co-management – each of which has implications for how we should now assess quota management and quota transfer. These are considered in turn before the subsequent book chapters are introduced.

1.2 Individual Transferable Quota

In the late 1970s, resource economists heralded ITQs as a market-based solution to the problem of overfishing Subsequently, they have been adopted around the world, although one can hardly claim that they are a global phenomenon or that they are not surrounded by debate, conflict and contestation. These fishing permits parcel out the total allowable catch, apportioning individual responsibility for risk and uncertainty to owners. In combination with the fish stock assessments compiled by marine scientists using the concept of maximum sustained yield (MSY), ITQs secure stakeholder buy-in and responsibility, streamline fisheries management, stabilize fish populations and prices, and generate cost efficiencies for society generally. As market mechanisms, ITQs are simultaneously fisheries access privileges, (varying) quantities and qualities of fish, and commodities in their own right, since they are tradable. However, their precise status depends upon the regulations in force in the jurisdiction where the property entitlement is recognized. ITQs operate in conjunction with a fish stock assessment system that sets a cap on fish harvests. In this context, ITQs should end ‘the race for fish’: that is the trend for fishers to invest in more boats or fishing capacity in order to catch more fish, a situation understood as ‘overcapitalization’ or ‘uneconomic fishing’. However, it is sometimes claimed that ITQs help to end overfishing, though this is, properly, the expected outcome of effective fish stock assessment and its associated total allowable commercial catch (TACC), without which, ITQ cannot function.

ITQs bring with them an *apparent* de-politicization of fisheries management by legitimating practices through fisheries science and resource economics, but the management systems that result are, nonetheless, highly political and politicized. ITQs give power to particular groups, harden hierarchical structures, and legitimize

particular forms of expertize. They set a discursive framework for fisheries management in which politicians and policy makers, marine scientists and powerful fishers entrench their control over the fisheries, through the allocation of access rights to owners of capital and through an agenda of fisheries rationalization. Those with capital work to consolidate control over fish access rights, and the architects of the regime deem their efforts appropriate: they rationalize the industry. ITQs necessarily destabilize older discursive frameworks of fisheries industries – maintaining diverse regional economies, maintaining specialized fisheries communities or fishing places, or protecting indigenous or traditional fisheries. It becomes increasingly difficult for fishers without capital to access the fisheries. Consequently, the fisheries in fact become highly politicized: in particular, the bio-economic reorganization prioritized by ITQ, threatens to destroy land-based fishing communities and common property institutions. Not only have we seen the professionalization of fishers and the construction of the 'self-managing' stakeholder, but, in some communities, commentators find that the potential for adaptive management and experimental learning in fisheries is now at a limit.

Although many observers have noted the unintended, negative social consequences of this private rights regime the marriage of neo-liberal market mechanisms with fisheries science that underlies ITQs has not only endured, but has become naturalized as the new baseline in fisheries management. That ITQs have become "good to think with" in scientific circles is seen in the growing focus on de-centered, self-organizing responses to what are perceived as crises in natural systems. The movement away from centralized state control, towards diffuse, client-centered managerial interventions and assessments has consequences for how fishing communities and property rights are understood, how fisheries investment functions, how enforcement and conservation are carried out, how fisheries are assessed, and what the characteristics of ecosystems are thought to be.

Appropriately, ITQs have received a great deal of attention from social scientists, and so this book considers developments in fisheries policy in the wake of ITQs, that is with hindsight. There is now considerable scope for hindsight – four decades of policy work and experimentation – and also considerable diversity in experiences. This book is the product of a conference held in Munich in 2013 that brought together scholars from anthropology, economics, geography, marine environmental history, sociology, and the history of science, to discuss experiences from fisheries in eight industrialized countries. It adds to the recent study of IQ in the European Union by Schriewer and Høyrup (2012) by considering cases from outside as well as inside the EU, including ITQ pioneers, New Zealand and Iceland. Similarly, it adds to the collection of essays published in *Marine Policy* (Pinkerton and Davis 2015) on ITQ and neoliberalism in North America's small-scale fisheries. The combination allows for an unprecedented international perspective on ITQ.

In many jurisdictions economic and policy attention is being shifted to numerous aspects of fisheries besides allocation of harvest property rights among fishing companies, and particularly to new concerns emerging from the achievements, limitations and failures of ITQ and fisheries management. Other pressing issues are emerging in fisheries management, and consequently in many jurisdictions interest

is now less in examining how ITQs are performing, and more in how fishing places and fishing people have been reconfigured by the unique hybrid of science, capital and managerialism that has been ushered in alongside ITQs (for example see Høst 2015). There is an urgent need to consider a range of concerns that have emerged around the edges of the introduction of privatized fisheries property rights and quota systems: how are these changing the face of fisheries and fisheries management?

The contexts for thinking about ITQ are very different now than they were 40 years ago. The authors contributing to this book have each placed their enquiries into ITQ into what they see as these changing contexts, and, of course, these vary from jurisdiction to jurisdiction. Nevertheless, at core, they also each contend with the claims made for fish stock assessment in the marine biology literature and for ITQ in the common property resource literature. Following outlines of the literatures associated with each of these topics, this chapter briefly considers five other emerging sets of issues in fisheries management: the new priority being given to area-based management and territoriality; company behavior and industry performance; varieties of neoliberalism in fisheries; damaged ecosystems; and the potential of aquaculture.

1.3 Stock Assessments

The neoliberal policies that introduced ITQ property rights (see for example Shallard 1996) built upon the foundation of fish stock assessment laid down by a sub-discipline of biological science. Marine biologists who engaged in efforts to take stock of the biomass of fish formed one wing of the bio-economic project or alliance. The development and diffusion of stock assessment generally preceded ITQ. Jennifer Hubbard traces the origins of 'efficiency conservation' to eighteenth century Prussian forest management, the origins of fisheries statistical areas to the 1930s, the adoption of the Beverton-Holt stock equations to the late 1950s, and John Gullard's virtual population analysis to the 1960s (Hubbard 2013). In 1955 managing fisheries productivity for a maximum sustained yield (MSY) was declared to be the economic ideal of Cold War era scientists and policymakers and, thanks to US efforts, codified as such in an international treaty (Finley 2011; Hubbard 2013: 92). Significantly, administration support for the MSY concept also developed in Washington and became a cornerstone of US policy related to the Law of the Sea conventions (Hollick 1981).

By the 1970s, fish biomass accounting systems operated in support of governance of some, but by no means all, wild marine fisheries. They legitimated harvesting levels using modern equipment, simultaneously declaring them ecologically sustainable harvesting rates and economically efficient and rational resource use. For example, Canada was practicing and developing MSY as part of its post 1972 fisheries planning for Atlantic Canada (Barrett and Davis 1984). These practices predate the institutionalization of ITQ in Atlantic Canada and made ITQs possible in Canada.

In some instances, and spectacularly in the management of the harvest of cod in Canadian waters, stock assessment and quota management have proved inadequate for the task of sustainable management of fisheries (Ehrlich and Daily 1993; Finlayson 1994; Ludwig et al. 1994; Hutchings and Myers 1995; Harris 1998; Newell and Ommer 1999; Bavington 2010). Environmental historians (Finley 2011; Hubbard 2013; Schwach 2013) have been tracing the origins of fisheries science and policy, and they highlight Cold War geo-political priorities and misunderstandings produced around quantitative era biological modeling as central aspects of the subsequent problems of fisheries collapse.

Stock assessment practices did not in fact recognize the marine environments and ecosystems in which target species lived. This was partly because the statistical areas used for assessing fish stock populations were established to provide modeling consistency and homogeneity, and paid scant heed to ecosystems (Hubbard 2013). Further, in this context, fish stocks "remained ill defined: for biologists, these were self-sustaining natural populations of a species; but for managers, they were 'fish which happen to be within a defined management unit'" (Hubbard 2013: 94). Already in the 1960s, some of the implications of this confusing 'virtual' world of fisheries were recognized in the waters off Newfoundland by fisheries scientist Colin Story but were ignored (Hutchings and Myers 1995; Hubbard 2013: 95). Heroic assumptions used in the modeling of fish stocks, underreporting of catch, inadequate policing of catch, the lack of independence of the scientific institutions responsible for the assessments, political interference in the setting of harvest rates, and poor recognition of and inadequate response to problems of uncertainty, are now well documented in studies of the practices of some stock assessment systems (Bavington 2010).

To these issues we must also add poor knowledge of the ecological impacts of fishing methods (Turner et al. 1999; Law 2000; Dayton et al. 2002), and increasing concern from fish toxicology studies. Since the North Sea Herring and Peruvian anchoveta collapses of 1968–69 and 1972, respectively, marine biologists began to take "fisheries geography into consideration" (Hubbard 2013: 96 citing Seijo and Caddy 2008 and an earlier study by Gales and Caddy 1975). They have been investigating new methodologies, the concepts of fish assemblages and backcasting (Newell and Ommer 1999), the incorporation of fishers' and indigenous peoples' knowledge (Holm et al. 2000), and research into fish life cycles and ageing. Fisheries science is developing, but perhaps fastest in the area of cultured fish.

Environmental historians are answering Arthur McEvoy's (1990) call for a marine environmental history (Chiarappa and McKenzie 2013: 3–4). Embracing inter-disciplinarity and partly inspired by anthropologist Stefan Helmreich's book *Alien Ocean* (2009) and developments in the history of science, they are investigating the social construction of the oceans in the marine sciences (Smith 1994, Taylor 1999, 2013; Rozwadowski 2002, 2010; Roberts 2007; Finley 2011; Hubbard 2013; Schwach 2013). As we have already seen this means an analysis of 'spatial history' or, more precisely, the calculative practices of marine biology, and their reconfiguration during the Cold War (Finley 2011). In addition, environmental historians are researching the histories of fish farming, the role of fishermen in debates about

economic history and many other aspects of the ways that fisheries and the oceans intersect with social, economic and political history (Dobbs 2000; McKenzie 2010; McClenachan 2013; Payne 2013). So while the emergence of the calculative practices of modern marine biology are a main focus of inquiry, the positions of fishing communities in the history of fisheries are also clearly in sight.

In a parallel project, the History of Marine Animal Populations (HMAP), has, since 1999, been researching an historical reference point to the Census of Marine Life. Chief among the accomplishments of this group is the finding that a 'shifting baseline syndrome' has been at work in marine biology as "the current status of an ecosystem, species or fish stock, is assumed to be normal by contemporary observers unaware of its previous states" (Holm et al. 2013: 123). The work challenges the use of short-term data in steady-state modeling of marine ecosystems (Pauly 1995, 1996). The group points to an historical turn within marine biology (Holm et al. 2001; Jackson et al. 2001, 2011; Pinnegar and Engelhardt 2008; Holm et al. 2010). Marine historians, archaeologists and marine scientists have also been in dialogue for some time (Holm et al. 2013).

1.4 ITQ, Common Property Resources and Beyond

The case for government intervention to close open access in (apparently) unregulated fisheries by privatizing rights to fish is usually traced to the tragedy of the commons scenario (Hardin 1968). The case for using privatization to end the race for fish and overfishing was made by Scott Gordon (1954), A.D. Scott (1955) and Christy and Scott (1965). These foundational works played roles in economic thinking related to fisheries management during the years of Cold War and Keynesian policies, but were later invoked to legitimize ITQ. A.D. Scott (1986a, b, 1989, 1993) published a series of papers making the case for individual ownership in the fishery to prevent overfishing. In this volume, Jennifer Hubbard explores the ideas and roles of Canada's Keynesian economists in promoting bio-economic models and modernization (see also Mansfield 2004a).

In response to their work, Daniel Bromley (1991, 1992, 2006, 2008, 2011) outlined what he calls the 'conceptual confusion' in the fisheries resource economics literature. He argues that the justifications for ITQs show no clear understanding of resource rent. He concludes that privatization is not an answer to overfishing. In contrast, Alex Clapp (1998, 1999) argues that when an economic logic of efficiency is pursued then overexploitation of wild populations, their destruction and their subsequent replacement by farming systems is inevitable (see also Millar and Winder 1999). The implication of his 'resource cycle' concept is that ITQs can only delay the inevitable. Resource economics is a broad field in which the merits of privatization of common property resources have long been debated. The central contribution of the sub-discipline to fisheries management has been to frame "sustainability" in terms of an economic calculus of efficient use of resources (sustainable yield management with economic efficiency) combined with plans to make some fishers

responsible for the fisheries through direct ownership. Ultimately, fishing is treated as a second class of economic activity to aquaculture.

While the origins of ITQ lie in resource economics, the introduction of ITQ in the late 1980s and 1990s stems from a new conjuncture of policies that were neoliberal. ITQ became an instrument of fisheries management policy only when neoliberal economic policies took charge in some industrialized economies in the 1980s. Privatization of state assets, such as fisheries, gelled neatly with neoliberal agendas. As the cornerstones of Keynesian fisheries policies – planning for regional growth, belief in modernization and mass production for mass markets, and US Cold War policy for the high seas – eroded and tumbled, so interest in reregulating and restructuring fisheries increased. The transition to neoliberal policy frameworks for fisheries was not a smooth and synchronized development even among the industrialized countries most frequently associated with ITQ. Iceland and New Zealand were among the first to embrace the change. There are different situations in each of the Scandinavian countries. Canada has been dealing with the aftermath of its ambitious fisheries initiatives on the Atlantic coast, while on the Pacific coast the government contends with complex ecosystem interactions and legitimacy issues raised by First Nations claims and practices. In contrast, the USA (Mansfield 2004a, b, 2007b) and the EU have been much slower to embark on privatization and restructuring along ITQ lines.

In a fine collection of essays (Schriewer and Høyrup 2012) European social scientists recently reviewed the Common Fisheries Policy (CFP), the European fisheries, and the situations in a wide range of fishing communities based in European countries and active in Mediterranean, North Sea and Atlantic waters. Following years of discussion, the European Commission's new policy was launched in 2011. It diagnosed overfishing and excess fleet capacity as significant problems, and so committed the EU to reduce the number of vessels, and to promote stakeholder companies committed to an efficient and sustainable utilization of the fisheries through introduction of transferable fishing concessions (basically, ITQ). Schriewer and Høyrup (2012: 24) interpret the policy as an effort to alienate existing rights from small fishers and existing fishing harbors and communities, and to "concentrate fishing rights in the hands of a few large mass-producing vessels and plants". They argue that this focus, along with what they regard as an unenforceable and impractical split of rights between two vessel classes (under and over 12 meters) discriminates against "low-impact, eco-friendly, small-scale fisheries" (Schriewer and Høyrup 2012: 24). The volume signals that fears of new rounds of enclosure now grip Europe's fishing communities.

Fears of enclosure are, however, by no means a new theme in the fisheries literature. Anthropologists and sociologists responded to the tragedy of the commons scenario with a torrent of critical papers. They saw that this scenario legitimized the extinction of existing fisheries rights and management practices under first regional industrial policy and then neoliberal agendas (McCay and Acheson 1987; Feeney et al. 1990; Bromley 1992, 2011; Berkes 1989; Berkes et al. 1991; Brox 1990; McCay 1995; McCay et al. 1995; McCay and Jentoft 1998; Cullet 2001). They demonstrated that both open access resources and the common pool, resource

management practices that Hardin's scenario assumed were in fact rare or did not exist at all. They pinpointed the alienation of fisheries rights and protests from the disenfranchised, and researched alternative means of governing common property resources. They also identified the problems of overexploitation actually brought about by the state led modernization schemes that came with privatization of fisheries resources (for example Brox 1990).

Within economics, Elinor Ostrom (1990, 2005, 2009) clarified many of the dubious claims and misunderstandings that followed from Garret Hardin's argumentation and significantly developed common property theory within resource economics (van Laerhoven and Ostrom 2007; van Laerhoven and Berge 2011). She paid particular attention to the institutions governing the commons (Ostrom 1990, 2005) and to the sustainability of social-ecological systems in efforts to manage resource use under common property (Ostrom 2009). Her work eventually bridged between anthropology, sociology, resource economics and sustainability studies. By the early 2000's it was widely recognized that co-management in fisheries was desirable, and attention moved to issues in the governance of common property (Grafton 1998; Grafton et al. 2000; Hughey et al. 2000; St. Martin 2001).

Once touted as a possible remedy for reliance on fisheries scientists and economists, that is the bio-economic experts, real co-management – that is a sharing of power, knowledge and resources – is rare. Fisheries management tends to remain dominated by the experts of stock assessment and resource economics. Many indigenous peoples, "traditional" fishers and small-scale fishers view co-management as an invitation to participate in someone else's resource management regime, but not as partners. One anthropologist has therefore asked whether indigenous knowledge can survive in the face of the universalizing practice of fisheries co-management (Wiber 2000). In New Zealand, efforts are underway to infuse the fisheries management regime with indigenous Māori knowledge, Māori fisheries officers, and Māori fishing enterprises (Harmsworth and Awatere 2013). But, even there, it has long been understood that indigenous knowledge and co-management are late add-ons to the neoliberal fisheries management regime, and that Māori must continue to struggle for a fisheries management that actually recognizes their knowledge, goals and aspirations (De Alessi 2012). Similar or worse situations confront indigenous peoples in the USA and Canada seeking roles in fisheries management, whether through co-management or other appeals (see the chapter by Steve Langdon, this volume). Small-scale fishers have also organized at local and global levels to resist bio-economic rationalizations.

In the light of these struggles and the ongoing hegemonic power of bio-economic rationalization projects, the anthropologist Evelyn Pinkerton (2015: 120) has recently redefined "the ITQ problem":

> The overarching problem is that ITQs constitute the privatization of a public good that profoundly alters the social contract between fishing communities and the state, a contract that has been in place for centuries in many European countries. The subsequent societal transformation is very costly to the state and its citizens in the long term and remains largely unexamined in the literature.

Table 1.1 Evelyn Pinkerton's list of problems with ITQs

1.	Inequity of initial allocation raises the cost of entry for future generations.
2.	Concentration of quota ownership or control creates market power.
3.	Crew share is greatly reduced.
4.	Leasing arrangements, where allowed, create inequity.
5.	Inequity of free transferability of quota out of communities, out of regions, even out of countries.
6.	Quotas are overcapitalized instead of boats.
7.	Safety is not always improved.
8.	Small boats are forced out.
9.	Monitoring costs rise under ITQs.
10.	ITQs are not compatible with the precautionary approach and not easily adjusted in response to problems.
11.	ITQs alone are not effective and need to be accompanied by input controls and adequate enforcement.

Source: Pinkerton (2015: 114–118)

She identifies increased unemployment, health and welfare costs and reduced citizen well-being as costs of the transformation, and explains the failure to assess these costs as the result of too narrow a framework. The "issue has been treated as a fisheries management problem or a gross domestic product issue involving only part of fish production, not a problem of how entire communities have been removed from their traditional livelihoods…" (Pinkerton, 2015: 114). After all, neoliberal-inspired governments have little interest in regional economics or regional development initiatives. In this context, Evelyn Pinkerton elaborates a list of problems with ITQs (Table 1.1) that add specific dimensions to the assessment of their total cost. She offers a very challenging critique of ITQs: it is a neoliberal policy pursued for ideological reasons and with no attention to social, environmental or regional economic costs.

Thus, the common property resources literature, which legitimizes ITQ, is subject to a wide-ranging critical response from social scientists. This makes the scientific terrain of fisheries management a highly contested, multi-disciplinary field of study, with claims and counter claims challenged at every turn, and with no agreed upon framework for inquiry. In this situation, considerable hope has been expressed in some quarters for a move towards area-based management in the oceans. However, area-based management has also proved controversial.

1.5 Area-Based Management

Generally, ITQs are part of a governance framework backed by economic and biological modeling, and the bio-economic models rely upon spaces and territories for fish stocks each with clearly defined stakeholders. Nevertheless, the territories themselves tend to be large and only tentatively linked to actual rights and

behaviors. As diverse interests seek new resource rights in the sea, oceans and coasts are re-territorialized and the resource privileges of fishers, even those defined under ITQ, become blurred and contested. In this context, fisheries policy increasingly emphasizes area-based management. Resource economists view area-based management of fisheries as an alternative to quota-based fisheries management. While it has the merits of fore-fronting boat and gear controls, access constraints, and local monitoring systems, all thought to be useful in fisheries governance, it has tended to be counted as a set of expensive practices, largely unnecessary because of the much cheaper and more efficient fish stock assessment methods that legitimate quota-based management.

Nevertheless, many recent studies have highlighted new forms of spatiality and territoriality emerging in fisheries management. The new practices range from the tracking of fish and fishing vessels, through fish and lobster ranching, to the marking off of exclusive new territories for various fisheries, marine protected areas (MPAs) and other resource management practices (Christy 1975; Durrenberger and Palsson 1987; Brewer 2012; Sharp 1998; Constance and Bonanno 1999; Holm et al. 2000; Mansfield 2001a; Giordano 2003; Salthaug and Aanes 2003). Increasingly, place-based controls on fishing are advocated, and there is growing interest in area-based management.

Over the last decade, the EU (Winder and Le Heron 2017a, b) and China (Choi 2017), have sought to develop marine spatial planning (MSP) as the new basis for governance of seas, coasts and oceans. The EU has legislated for the development of a future ecosystem-based MSP for planning multi-use marine environments (Douvere and Ehler 2009; Ehler and Douvere 2009, Schaefer and Barale 2011; Drankier 2012; Kidd and Ellis 2012; Jones et al. 2016). This amounts to the extension of land-based planning practices, especially the partition of the exclusive economic zones (EEZ) into areas for particular uses, into the ocean. Both the EU and China explicitly link their aspirations for MSP to their commitments to enhancing their 'Blue Economies' through investments in shipping and port facilities, energy production, tourism and aquaculture: that is for more economically productive seas (Winder and Le Heron 2017a, b; Choi 2017). MSP is also a new governance system through which marine protected areas can be registered and developed. In both China and the EU, desires for marine health and ecosystem restoration, for reduced conflict among marine interests in multi-use marine areas, and for the extension of governance in new ocean territories motivate the development of MSP. The creation of responsible 'citizens of the ocean' is itself a new idea in marine science and marine management (Fletcher and Potts 2007), and one related to particular ideas about who constitutes a participating 'stakeholder' in MSP planning (Pomeroy and Douvere 2008).

Human geographers have begun to discuss the applicability of geographic approaches, metaphors and terms to ocean governance as territorial thinking reemerges in discourses about seas. New human geographies of the ocean have been called for (Peters 2010; Anderson and Peters 2014; Cardwell and Thornton 2015), but the challenges specific to oceans and water are acknowledged. Cartographic approaches to ocean governance need to be able to deal with wet ontologies and

fluid spaces, and with particular materialities, movement and regulatory practices in the sea (Bear and Eden 2008; St. Martin 2010; Bear 2012; Steinberg 2013; Steinberg and Peters 2015).

While much of this growing interest in the spatial practices of fisheries management has arisen from within research on fisheries and MSP, it would be a mistake not to draw the explicit connection between some of this literature and geographer David Harvey's writing on 'accumulation by dispossession' (Harvey 2006): the oceans, coasts, lakes and rivers are increasingly subject to diverse forms of 'land grabs' and these are now being referred to as 'ocean grabs' (Bennett et al. 2015). In a series of books and articles, David Harvey (2000, 2001, 2005, 2006, 2010) has laid bare the logics of capitalist accumulation as a series of spatial strategies. His work has been widely influential including within literature on fisheries (see for example Mansfield 2007b; Prudham 2007; Vasudevan et al. 2008; Liverman 2009; Bush et al. 2011). The conceptual framework supplied by 'spaces of enclosure' and 'accumulation by dispossession' are highly pertinent to any understanding of fisheries management, since they dovetail neatly with aspects of the new spatial history, and with the identification of calculative practices by the history and sociology of science. Bennett, Govan and Satterfield (2015) have proposed a framework for adjudicating when new rights distributions amount to an 'ocean grab.'

However, the making of new territories in ocean and coastal zones is difficult: obviously these 'territories' remain fluid. Jennifer Brewer (2012) recently argued that the setting and management of clear boundaries (whether social, material or socio-ecological system boundaries) within the fisheries is difficult, and often involves flexible, broadly negotiated and informal boundaries managed de facto by co-management under local institutions. Hers is a case study of resource conservation, but we can also assert that in fact the *extent* of property rights in the ITQ fishery tend to be vague. Increasingly, efforts to intensify and expand aquaculture or marine reserves in coastal zones mean that the ITQ property privileges must be territorialized so that the boundaries between spaces for aquaculture, conservation and fishing can be separated. This in itself will not be enough, since the boundaries between wild and farmed populations remain open in ecosystem terms. Diverse local solutions including informal practices will be required to effect a working separation of the wild and the farmed.

Increasingly, fisheries feel the weight of the political logics of ecosystem science and complexity theory. The world's oceans, coral reefs, mangrove ecosystems, rivers and fisheries are in deep crisis: climate change, acidification, pollution, land development, and over use of fish resources are damaging ecosystems, even as demand for food continues to rise. Thus, efforts are underway to reserve marine areas for biodiversity and ecosystem health and from fishing. Calls for ecosystem-based management of coastal areas using MSP accompany these efforts. Together, such initiatives compromise the bio-economic rationalization projects of ITQ and fisheries stock assessments. They constitute an approach that will empower a precautionary approach in fisheries management and build marine reserves. Simultaneously, that approach is a direct challenge to ITQ. It implies the empowering of ecosystem-based approaches to ocean and coastal governance, approaches

that have the potential to problematize and sideline the common property resources approach to fisheries management.

1.6 Company Behavior, Industry Performance

The behavior of fishing enterprises has been a further subject of social science inquiry for a very long time (Anderson 1976) but from competing perspectives. On one side of the ledger, Ottar Brox (1990) interpreted the 1880s invasion of the Lofoten Islands cod fishery by Norwegian fish companies using new steam boat technologies – a move effectively blocked by local fisher resistance – as 'vertical growth' in the fisheries industry. Similarly, commentators on the problems that emerged in Atlantic Canada's fisheries under Fordist policies cite the growth policies of governments and the effects of subsidies on fleet expansion as driving forces in the collapse of cod stocks (Williams 1987; Kimber 1989; Apostle and Barrett 1992). Such studies highlighted the potential for 'ocean grabs' on the basis of claims to more efficient harvesting and processing technologies.

In contrast, the literature justifying the rights based fishery makes the claims that the ITQ system should lead to a rationalization of catch effort, to signs of increased economic efficiency in processing, as well as to increased returns to the industry. ITQ should induce competitive and rational business behavior and thus better industry performance. It is precisely these issues that Katharina Jantzen et al. explore in Chap. 8 of this volume. However, these matters remain controversial in practice (Copes 1986, 2000; Hannesson 1991, 1993, 1996; Symes and Crean 1995; Squires et al. 1998; Shotton 2001a, b; Hackett et al. 2005), and in terms of how to measure and interpret efficiency in fleet operations and processing (Hundloe 2000). Further, Bromley (2011) argues that these expectations are based on confused thinking. Identifying the performance trends and teasing out the relationships between them and diverse potential drivers remains a difficult business (Mansfield 2001b; Rees 2003). This is partly because of the diverse industrial contexts for fisheries processing (Fløysand and Lindqkvist 2001; Matulich et al. 1996; Phyne and Mansilla 2003), diverse industrial policy contexts (Townsend 1998; Young 2001), and the globalizing tendencies inherent in the capture of fisheries within agro-food commodity chains (McMichael 1995). Product certification and standards are increasingly subject to globalizing forces which compromise distinctive local management practices (Constance and Bonanno 1999; Busch 2000; Roheim 2002, 2003; Mansfield 2003a, b; Vandergeest and Unno 2012). One recent study has focused attention on the ways in which the financialization of formerly local industry enterprises made Iceland's fisheries vulnerable, and now economically unsustainable in the context of the global financial crisis (Einarsson 2012). For all of these reasons the behavior and performance of fishing companies, co-operatives and other enterprises in the fisheries remain an important, if controversial focus of study.

However, it is increasingly evident that fishing companies are entities enmeshed in commodity chains, a lens that helps to focus attention on the connections between

fishing, processing and consumption. In line with developments in the agro-food literature (Goodman et al. 1987; Le Heron et al. 2016) fisheries are increasingly being studied in terms of their certification by non-governmental organizations (NGOs) within market-oriented framings (Vandergeest and Unno 2012), in terms of ideas about food security and environmental health (Mansfield 2012), and in terms of value adding processes or rationalization over the processing and market distribution segments of the commodity chain (Phyne and Mansilla 2003; Stringer et al. 2011, 2014). Understanding the pressures brought to bear on fishing communities by the rationalization of globalized commodity chains, the spatial strategies of processing firms and fisheries rights holders, the need to adopt certification in order to retain market access, and the desire to drive sustainable fisheries practices by enlisting consumer support, is vital to any attempt at sustainable fisheries management.

Property rights continue to be transformed, partly through wealth transfers – whether losses or gains – from the restructuring of fishing fleets and industries, and partly through the changing legal status of property rights under ITQs. Further pressures arise from new forms of industrial restructuring as companies try to realize value throughout the commodity chain, develop new fish processing practices, quota leasing and labor relations, and certify fisheries for sustainability, each of which carries implications for biologically-based privatization schemes.

1.7 Varieties of Neoliberalism in Fisheries

Some fisheries are now seen as caught up in neoliberal projects (McCarthy and Prudham 2004; Mansfield 2001b, 2004a, b, 2007a, b), but precisely which forms of neoliberal projects remains a matter of concern. Adam Tickell and Jamie Peck (2003) posited a phase model – proto-neoliberalism gave way to roll-back neoliberalism, which in turn was supplanted by roll-out neoliberalism – but this framework has encountered resistance from New Zealand geographers who seek to make room for other modes and understandings (Larner 2003, 2009; Larner et al. 2005; Le Heron 2007; Lewis 2009, 2012). They see neoliberalism as co-constituted locally, and therefore are loath to think of global phases. Instead, they encourage us to answer when and how and with which local coalition was neoliberalism brought to bear on fisheries management in each locality? Jamie Peck's *Constructions of Neoliberal Reason* (2010) is a further attempt to conceptualize the diverse forms of neoliberalism.

We must also note that in some fisheries management jurisdictions ITQ has not been introduced but that other neoliberal policies and practices have. In particular, there is a potential link between analyses of environmental crisis in the oceans and fisheries and neoliberal policies. These concerns are addressed by Pinkerton and Davis (2015) who choose to both acknowledge the country-specific manifestations of neoliberalism within North America, to broaden the practices relevant to the fisheries from ITQ and stock assessments to include ocean grabbing for energy and aquaculture production, as well as cuts to management agencies in practice crippling

their activities, and to cast neoliberalism in the fisheries back to the work of H. Scott Gordon. Further, James Maguire (2015: 124) has outlined the differences and similarities between 'fish' and 'virtual fish', the latter, traded in electronic markets, are to be found at "the intersection of scientific, financial and legal practices", and facilitated a financialization of the Iceland fisheries, with severe debt and crisis implications for them. Financialization and the creation of a rentier property interest in the fisheries can be understodd as neoliberal policies and outcomes.

There is considerable potential for understanding fisheries management regimes in terms of another neoliberal project: the development of expert systems, sometimes referred to as the emergence of a 'new managerialism'. This latter term refers to transformations in the public sector as bureaucrats and civil servants are replaced by 'managers' equipped with a managerialist ethos, language and practice. The transition is often achieved by consulting out governance and regulation as well as research, by the identification of stakeholders, by the development of self-regulation and by the restructuring of (fisheries) ministries. Compliance and policing have long been cited as an Achilles heel of fisheries management and neoliberal fisheries management seeks to avoid the costs of this by developing reliable partners in the industry. Another aspect of the managerialism in the fisheries is that the entire industry is meant to perform fisheries management together, and so regulations must be seen to be performative: to induce expected collective responses. Together, these aspects point to the need to identify other matters besides the introduction of ITQ as indicators of neoliberal fisheries management.

But, perhaps most important is the variety of policies, institutional arrangements and experiences of catch share allocations of assessed stocks and area defined fisheries. The European Commission is currently adopting its own version of ITQ, but ITQs have much longer histories in New Zealand and Iceland, and are also well developed in Scandinavian, North American and Australian fisheries. The fisheries literature is replete with fine studies from many industrialized fishing regions and these already make clear that there have been a variety of developments in a variety of contexts. It is therefore important to acknowledge that not only perspective but context matters. That is to say that ITQ and stock assessment are related, that they combine as specific projects in each specific jurisdiction, ecosystem, society and polity, and thus are not the same everywhere. Further, ITQ and stock assessment are simultaneously biological, social and economic projects, they are related to fisheries industries both existing and future, and they are performed in place, that is in specific markets, ecosystems and communities. Finally, as the above review of the state of literatures on common pool resources and beyond makes clear, the (intellectual) waters through which the boats of stock assessment and ITQ have been driven for the purposes of rationalization have not been quiet.

1.8 Aquaculture

There is increasing interest in further rationalizing fishing by developing fish farming and aquaculture. As wild harvests decline and as wild fish populations are increasingly reported as being overfished, aquaculture holds out the promise of intensified production with more reliable yields (Morrissey 2017). Among the concerns in fisheries management, the development of aquaculture and the domestication of fish tend to be high priorities. Both speak to efforts to make fish more economically and biologically reliable. Neither requires ITQ. In the last decades, investments in aquaculture have transformed the global map of seafood production (Fig. 1.1). As production from aquaculture dramatically increased, the wild harvest continued to decline, resulting in the rapid displacement of the USA, Japan and other traditionally important seafood industry national economies from the top ranks of the world's seafood production table. China, Vietnam and Indonesia now stand top of the table. As Blue Economy projects such as those of the European Union foster research and development related to fish farming, we can expect investment in aquaculture to be reinforced (Winder and Le Heron 2017a, b). What the implications of such investments will be on wild fisheries, or on coastal and ocean ecosystems remain unclear and controversial.

Intensification of aquaculture production is a logical culmination of bio-economic rationalization (Clapp 1998). However, the so-called Blue Revolution that it will

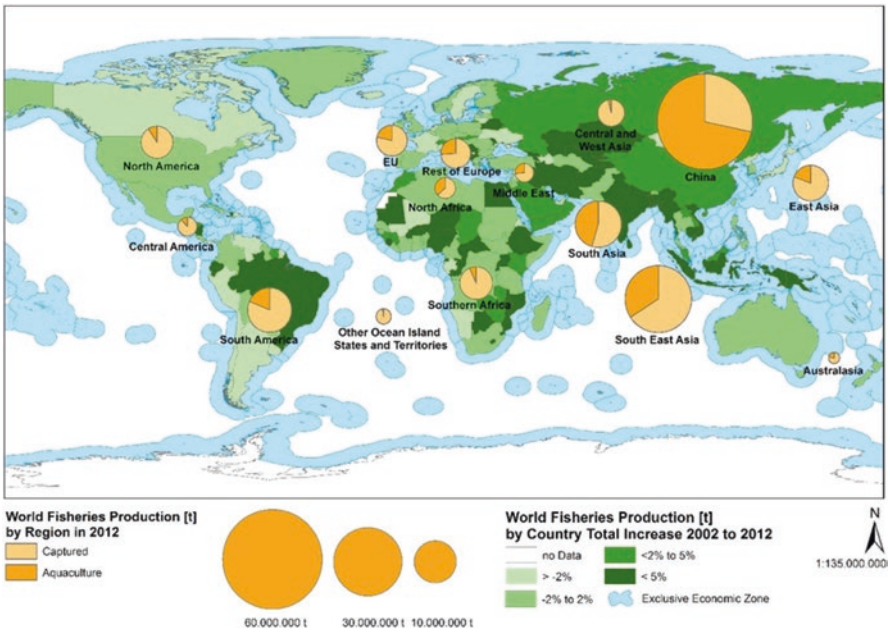

Fig. 1.1 World fisheries production by region in 2012 with total country increase 2002–2012

bring with it can be justified through reference to the failures of efforts to manage wild fisheries, including fisheries stock assessments and ITQ. Investment in aquaculture is widely advocated for food security reasons. It is justified by the apparent failures of fisheries management, which have produced overfishing and stock collapse. Studies of the superiority of its economic performance require only sketchy reference to the common property resource literature or the tragedy of the commons scenario. Thus, the Blue Revolution short-circuits old alliances and lines of contestation. Aquaculture's potential can be fostered through area-based management, especially given the weak state of ecosystem-based management in coastal and marine areas. In these ways, aquaculture is not only a logical culmination of bio-economic rationalization in the fisheries, but a distinct alternative to fisheries stock assessment and catch share arrangements in the wild fisheries. Aquaculture therefore poses a substantial challenge to thinking about fisheries.

1.9 The Book

By highlighting (above) the broad set of policy issues that have emerged around ITQ and bio-economic rationalization in the fisheries, this chapter aims to facilitate discussion on the resource management issues emerging around the edges of a policy framework that has become naturalized as the baseline in fisheries management. Other concerns are implied by the management logics that are inherent to ITQ: the professionalization of fishers and the construction of the self-managing stakeholder, as well as the development of adaptive management and experimental learning among fishers and fisheries managers. How are indigenous fishers and their knowledge resisting or being accommodated into the universalizing practice of fisheries co-management? What area-based management practices are being introduced alongside quota management and ITQ? While policies to protect biodiversity are leading to declarations of marine reserves as islands of certainty and as stores of biodiversity in some jurisdictions, potentially, such moves bring new issues related to area-based management of diverse coastal and marine resources within and outside the quota system. Social scientists need to pay further attention to the fate of land-based fishing communities and common property institutions in the face of further bio-economic rationalization. The political logics of ecosystem science, resilience thinking, and complexity theory are being brought to bear on fisheries management, at the same time that fisheries science is being de-politicized. Further scholarly attention is needed on the efforts to realize value throughout the commodity chain, and to the possibilities for and effects of certifying fisheries for sustainability. What can we learn from the food choice movement about different qualities of fish? Companies are pursuing diverse strategies in the fish commodity chains, and so developments in fish processing, quota leasing and labor relations warrant further research. Wealth transfers – whether losses or gains – from the restructuring of fishing fleets and industries are ongoing.

With both the apparent cohesion of ITQ and fisheries stock assessment practices and the diversity of contexts for its application in mind, this volume brings together

assessments of what comes in the wake of fisheries rationalization. It does so in order to identify when, where and under what circumstances ITQ and quota management have been effective, disastrous, enabling, or constraining. The authors adopt different perspectives and research in different contexts.

The chapters in the section *Still Waters?* remind us of the contested origins of quota management and some of the possible enterprise responses to the imposition of fisheries management. Chapter 2 traces the origins of quota management and argues that resource economists appropriated marine biology as a servant of rational exploitation for maximum sustainable yield. Chapter 3 demonstrates that fish processors and retailers in Cold War Germany remained unconcerned by the proliferation of fisheries management schemes: they had developed passive consumers and processing techniques adaptable to diverse fish species so that they could simply move on to other fisheries when one became regulated. Together, these chapters identify the general problems of fisheries management and highlight the contestation around such emerging projects as quota management and ITQ. They question just how tranquil the oceans were before the ITQ boat steamed through.

The two chapters in the section *Leading Edges and Ideal Wakes* trace the grafting of ITQ onto quota management in New Zealand and Iceland and how this combination developed as neoliberal projects but not according to the ideal forms predicted. ITQ is neoliberal: resources are owned by society, but the rights-based discourse of ITQ results in privileges and so the social is remade, with shareholder value prioritized as part of a general production-oriented policy. Both chapters emphasize the contradictions and tensions that have emerged from following the initial aim of efficient use of resources. In New Zealand, ITQ and quota management were developed in a very specific context and are now significantly challenged by other developments in society, while in Iceland efficient utilization is now out of step with the norms and expectations of society, especially after the finance crisis. In each case the wake of the ITQ boat has not taken the expected ideal form.

The section *Displacement, Dissipation and Turbulence* interrogates claims made about and for ITQ in other jurisdictions where variants were adopted later than in New Zealand or Iceland and in very different contexts. Here the issues are what are the underlying management goals and how are they contested? Initial goals tied to economic efficiency, growth, modernization and equilibrium, were supplanted by new ones related to promoting financialization, privatization, labor gains, sustainability and ecosystem health. As new issues emerge from the partially adopted ITQ systems, changes in aims and definitions signal that ITQ is compromised, open to challenge, and not forceful. Four chapters explore these matters using case studies from Norway, Sweden, Germany, Denmark and the USA in each of which ITQ has fallen short of wholesale application. The authors, several of whom make explicit reference to recent work on the EU Common Fisheries Reform, show that new legislation in some jurisdictions is locking-in IQ and quota management, even though ITQ will not lead to an increase in the number of fish and has already led to displacements of capital, boats and gear to other fisheries with disturbing effects. Finally, Chap. 10 introduces the hegemonic stern of the ITQ boat, and names it "Leviathan" – an alliance of managers, resource economists, marine biologists and

politicians who legitimize their governance, authority and power through ITQ, quota management and aquaculture. Chapter 10 demonstrates that this grouping is a hegemonic, expert force by observing the results when indigenous Alaskan fishers proposed an alternative entry to the fisheries. This chapter deals with efforts to reshape participation in the ITQ project and to speak back to the project managers.

The final chapter integrates findings from these studies by highlighting both the ways in which ITQ and quota management have reshaped fisheries around the industrialized world, and the extent to which their effects have dissipated and been displaced. Emerging issues are identified: how to get out of ITQ and quota management; how are seas and coasts being re-territorialized now that they have been 'emptied' to permit the free flow of capital; and what new ideas about productivity and efficiency are being promoted by Blue Revolutionaries and ecosystem biologists as they exploit or seek to remedy the limitations of earlier bio-economic models?

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Part II
Still Waters?

Chapter 2
Fisheries Biology and the Dismal Science: Economists and the Rational Exploitation of Fisheries for Social Progress

Jennifer Hubbard

Abstract In the mid-twentieth century, several economists –led by the Canadians Gordon Scott and Scott Anthony–introduced bio-economic analysis which founded the modern understanding of issues in managing common property resources. They focused on managing marine fisheries to improve their national economic profitability, but many economists, including Gordon Scott, advocated for intensifying industrialized technologies that soon exacerbated the need for catch limits, limited entry, ITQs and other conservation measures. Fisheries biologists have largely bought into these approaches and have been unable to critique the bio-economic understanding in part because economists successfully alienated them from an understanding of their own past by appropriating fisheries biologists' expertise over the economic dimensions of their scientific project. This chapter builds on my earlier findings that both Victorian-era economic ideas and nineteenth century German scientific forestry management ideals have powerfully influenced marine resource management to this day. The focus on 'rational' exploitation of fish and other marine species for maximum sustainable yield has been the result. The use of population models allowed the marine environment to become an abstraction, facilitated a limited understanding of fisheries science by economists, and mediated the focus on economic efficiency. Twentieth century fisheries management became further enmeshed in economic and social idealist constructions with the incursion of Keynesian economists such as Gordon Scott, and Canadian Deputy Minister of Fisheries Stewart Bates. By placing their contributions within the context of changing economic theory and mid-twentieth century Cold War issues affecting governments, scientists, and productivity in the North Atlantic region, and by analyzing the basic assumptions of Gordon Scott and his followers in the light of greater historical context, the fundamental irrationality and personal bias that form the basis of bio-economic models is exposed, as is the irrationality of mid-century fisheries management policy.

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2.1 Introduction

While it has been said that 'the past is another country', this should not be the case for fisheries management and its related science. Fisheries scientists' unfamiliarity with their own history, has, according to fisheries science historian Tim D. Smith, condemned them to rediscovering basic principles in the face of repeatedly collapsing fish stocks. He has recommended that fisheries policies be based on 'autopsies' of the fisheries (Smith and Link 2005: 73–87; Smith 1994: 2–3). In recent decades, fisheries biologists have recognized that fisheries biology and fisheries ecology must intertwine current science with history. Human interventions in the ocean environment, such as massive over-fishing and subsequent conservation attempts, have resulted in unforeseen chaos, not the mechanistic stability and control envisaged by early fisheries scientists (who believed that simply stopping fishing would restore fish stocks to pre-fished conditions). Projects such as HMAP (History of Marine Animal Populations) have made steps toward rectifying the missing historical dimension in fisheries science and management. Launched as one aspect of the Census of Marine Life (2000–2010), HMAP encouraged fisheries scientists and historians of science to cooperatively investigate old records to discover the historical conditions of commercial species' populations at different stages in the development of intensive marine fisheries, and led to such works as Jeffrey Bolster's award winning *The Mortal Sea* (Bolster 2012). This laudable project, however, has given scant regard to the intellectual history of fisheries science, fisheries management, and to the ideals driving government programs to assist fishermen, fishing communities, and the larger, fish-consuming public. Despite the growth of environmental awareness, there has been no critical investigation of their own ideological foundations by fisheries scientists and managers. As a result, their attempts to sustain marine resources remain operationally entangled in early twentieth century, progressive ideals based on a series of ecological and economic assumptions that were intensified when Keynesian economists also became involved in fisheries management issues.

This first section of this paper, "The eclipse of Investigatory Fisheries Science", explores the biological reasoning and the unfounded assumptions– especially those related to efficient exploitation and conservation of resources– that underlay the development of mathematical models in fisheries science. Early prominent fisheries biologists, such as the Englishman Michael Graham, and the Canadian Archibald Gowanlock Huntsman, clearly understood that fisheries biology primarily served

economic goals, and promoted fishing policies that reflected the classical economic understanding of the (supposedly) rational exploitation of commodities and resources that held sway into the 1930s. Scientists' mathematical models were used as tools for advising governments on measures that would enable a maximum sustained yield to be achieved, 'rationally' conserving the fisheries for future fishing efforts. After the Second World War governments demanded that scientists use mathematical models, which could substitute for expensive *in situ* fish population monitoring. Post-war fisheries scientists' use of mathematical models to analyse and predict the dynamics of fished populations allowed the marine environment to become an abstraction, facilitated understanding between economists and fisheries scientists, and mediated the focus on economic efficiency and growth. However, as revealed in the second section, the importance of economic ideas to explain environmental phenomena in ecology would also trip up later fisheries biologists. The wise use or efficiency ideal that underlay the emerging goal of maximum sustained yield meant it was easy for the economic and conservation goals of fisheries biology to become confounded. This problem would be worsened when economists trained in Keynesian economics entered the realm of fisheries management. The third section, "The New Experts: H. Scott Gordon and Anthony Scott, Bio-economics and Fisheries Management" describes the impact of the bio-economic models created by the Canadian founders of this new economic sub-discipline, Gordon and Anthony Scott. These formed the basis for later economic restructuring of fisheries management by limiting entry to the fisheries and setting quotas, and set the agenda for ITQ fisheries management. I argue here that Scott Gordon actually owed an unacknowledged intellectual debt to Graham and Huntsman; moreover, his analysis of, and advocacy of certain 'rational' fisheries policies was based on a faulty understanding of the historic nature of different nations' fisheries management schemes. Following Scott Gordon and Anthony Scott's pioneering work, many economists became involved in developing fisheries policies. I explore their lack of understanding of both the fisheries resource and the work of fisheries biologists in the fourth section: "Culture Clash: Differing World Views of Economists vs Fisheries Biologists". The last section, "Economists in Charge", describes the eclipse, by the early 1970s, of fishery biologists as governments' preferred expert advisors on fisheries management. Government economists' flawed understanding of the fisheries resource, and their activist social goals, shaped their bioeconomic models and analysis; fisheries biologists were expected to incorporate idealized economic models into their 'fishing equations' to maximize economic outcomes for fishing communities and the fishery. The consequence for the discipline of fisheries science–at least in Canada–was that its practice was distorted by the superimposition of irrational economic models on predictive population models already flawed by misleading assumptions about natural fish populations.

In Canada, economists' strong influence on fisheries policy from the 1960s onward occurred in an era already captive to larger Cold War agendas, as many governments sought ways to improve the economic yields of fisheries. In Canada these experts progressed beyond mere economic analysis; rather, their activist agenda to alleviate poverty reshaped Canadian fisheries policy. Their work amplified

the progressive ideals underlying resource management to generate wealth. Ironically, the Canadian government took much longer to adopt policies based on the central insight of bio-economics: the need to limit access to the fisheries. Together with quota management this measure promised rational and efficient methods to conserve resources and to generate wealth. Today, the intellectual attraction to ideals of efficiency in natural resources management – ultimately rooted in nineteenth century German scientific forestry ideals, now largely discredited (Scott 1998: 11–22) – remains enormous. Even recent attempts in fisheries science to introduce ecosystem management for sustainable fisheries remain enmeshed in the language and thinking of early scientific management with its focus on efficiency. Their conservation goals have had, at best, mixed success, with the not-unforeseen but perverse (given the original motivation) economic consequence of concentrating certain fisheries into the hands of a few successful entrepreneurs through tools such as individual transferrable quotas.

2.2 The Eclipse of Investigatory Fisheries Science

Fisheries biology emerged around 1900, in an era in which resource conservation was dominated by what economic historian Samuel Hays called the 'Gospel of Efficiency': nature should be conserved so as to be exploited to a maximum level to make similar quantities of resources available for future generations. I have elsewhere traced this understanding of resource conservation to its origins in German scientific forestry management, which I argue is the origin of the ideal of *maximum sustained yield* (MSY) in fisheries biology (Hubbard 2014: 364–378; Hubbard 2016: 78–117). The message of efficient resource use resonated during the Progressive Era in the United States, as the western frontier closed and America awakened to the limits on resources fuelling its economic expansion.

In contrast to concerns about territorial resources, the oceans were seen as a robust frontier. However, even here, evidence of depletion in inshore fisheries as early as the 1860s led to calls for fisheries restrictions in the United States and Great Britain. These fears were repudiated by followers of Thomas Henry Huxley (1825–1895), who served as a Fishery Inspector for England, and also oversaw two Royal Commissions inquiring into the effects of trawl fishing. Huxley saw most commercial fish species as being virtually unlimited, with no possibility of depletion even by the new steam trawler fishery (Hubbard 2014). Up until the Second World War a new cohort of scientists, specializing in fisheries science after the turn of the century, studied all aspects of fish life histories to understand how commercial fish, shellfish and crustacean species are affected by their environment, whether overfishing could be detected, and the causes of irregular and sometimes quite enormous population fluctuations. Early fisheries biology was highly exploratory as scientists confronted–and defended or rejected– Huxley's theory that the great sea fisheries were virtually inexhaustible. They divided on the question of overfishing; British biologists E. Ray Lankester and Sir William Herdman warned that the fisheries

were under stress from overfishing, while in Canada and Norway early fisheries biologists absorbed Huxley's dictum as gospel (Hubbard 2006b: 149–163).

In 1914 Johan Hjort (1869–1948), the Director of Fisheries for Norway, created a new theoretical paradigm for fisheries investigations. His work showed that sharp drops or increases in the East Atlantic herring catches were caused not by overfishing, but by natural population fluctuations due to as-yet-unexplained variations in reproductive success from year to year, creating both exceptionally huge and also worryingly tiny year-classes. Hjort's work served to attenuate fears of overfishing causing poor herring catches, since these could now be linked to weak year-classes arising from unexplained conditions relating to reproduction. What especially served to de-link fishing intensity and poor catches was Hjort's finding that no correlation existed between the size of the spawning fish stock and subsequent numbers of young fish successfully spawned and recruited as a year-class into the population (Hjort 1914).

Nobody agreed on what reduced catches represented, or even how overfishing should be defined. Nevertheless, certain experts in the 1930s warned about falling commercial fish stocks, including the American fisheries scientist who inaugurated the International Pacific Halibut Commission, W.F. Thompson (1888–1975), and Scottish fisheries expert scientist E.S. Russell (1887–1954), and his protégé Michael Graham (1898–1972). Graham was later director of the Fisheries Laboratory in Lowestoft, England. Many other fisheries biologists, however, especially in Canada and Norway, found evidence to brush these concerns away (Schwach and Hubbard 2010; Hubbard 2006b: 149–163). Even up to 1970, the dominant perception was of a robust ocean frontier for human exploitation.

Among the earliest efforts, in the 1930s, to model the population effects of commercial fishing were those by the same scientists–Russell and Graham in Britain, and Thompson in the US–who urged the need to conserve fish stocks. Their work ushered in the new mathematical fish population modelling which dominated fisheries biology in the post-war period. In the 1940s and 1950s fisheries biologists professed – correctly – an insufficient understanding of commercial fish species to explain natural population fluctuations. But this concern was down-played as scientists sought the best models and statistical data to create 'fishing equations' to determine the effects of fishing, predict stock sizes, and calculate what limits should be put on the fisheries. By the 1950s investigations to support population and fishing models had eclipsed basic fisheries biology, and were institutionalized in international bodies that coordinated national and cooperative international fisheries science and management efforts.

Mathematical population dynamics in post-war fisheries research was driven, first of all, by government demand for this style of science. This demand was remarked upon in 1947 by Canadian fisheries biologist Russell Earle (1899–1978), who also noted a new requirement for 'fisheries management' for a maximum sustained yield (MSY) (Foerster 1948). Both terms were recent introductions. American fisheries biologists Wilbert Chapman, William Herrington and Milner B. Schaefer piloted the demand for MSY-driven science to aid the United States' hegemonic Cold War ambitions; Carmel Finley elucidated their role in promoting American

international interests through MSY fisheries policies in *All the Fish in the Sea*, a superb exposition of the political context in which mid-century fisheries biology operated (Finley 2011: 117–167).

Furthermore, population modelling was endorsed by international bodies created to coordinate and direct fisheries research activities of member states. One such body was the International Commission for the Northwest Atlantic Fisheries (ICNAF), founded in 1949. ICNAF enshrined the principles of Raymond Beverton and Sidney Holt's *On the Dynamics of Exploited Fish Populations* (1957),[1] with its strong emphasis on 'stock equations' as the basis for research activities, purportedly to promote effective fisheries management.

Quantitative approaches were also fostered by population ecology and by conservation ideals that dominated fisheries biology from the early twentieth century to the 1980s (Kingsland 1985). In turn, the use of equations to model the effects of fishing on populations aroused the interest of several economists in the 1950s, since they also used mathematical models. These individuals had a slightly different interest: they wanted to determine how best to exploit fisheries so as to let a maximum number of fishermen obtain maximum 'rent' from the ocean's resources.[2] Whether these methods and goals were compatible with the conservation goals of fisheries biologists is highly questionable; however, in an era that still enshrined the 'Gospel of Efficiency' or wise use of resources, it is also doubtful that economists honoured fisheries biologists' attempts to grapple with MSY for the basic conservation of fisheries resources.[3]

2.3 Entangled Economic and Biological Ideas in Fisheries Biology

The efficient or wise use ideal for the fisheries not only implied resource conservation for future use, but also maximizing the efficiency of current exploitation. Such conservation is obviously a human economic activity, but because it focussed on wild marine species, this connection has often been blurred. As a case in point, the textbook used in my undergraduate fisheries biology course, Everhart and Young's *Principles of Fisheries Science,* discussed MSY and fisheries management without

[1] Although this tome was not published until 1957, from 1949 onward the content was widely promulgated through England and Europe in the form of mimeographs, presentations and courses taught at the Fisheries Laboratory at Lowestoft. Michael Graham was responsible for conceiving and fostering this work through his hire and support of Beverton and Holt. See Sidney Holt, 'Forward to the 2004 printing' (Beverton and Holt, 1957, 1993: ii).

[2] To understand the concept of rent, one must think like a landlord, not like a tenant (my own default way of thinking)! One must also adopt a rather strange world view in which the unowned and 'unimproved' ocean owes goods to fishers and other resource exploiters, because they have invested in capital goods and the time required to extract those resources.

[3] The seminal source on Gospel of Efficiency conservation is Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement* (1959).

ever once introducing the word 'economics' or hinting that MSY was an economic goal– a glaring omission for its undergraduate readers (Everhart and Young 1981). While economic theory lay at the heart of this conservation ideal, MSY was presented as the entirely biological problem of estimating the size of fish populations– governed by such factors as spawning success, survival, growth, reproduction, natural mortality through age, disease and predation, and finally fishing mortality. It was possible for biologists to focus only on the biological issues.

In a recent article in *Isis*, the journal of the History of Science Society, I attempted to clarify the muddied waters of the mid-century MSY fisheries management ideal (Hubbard 2014).[4] This economic ideal blends four completely disparate ideas and methods, and has historically been confused in people's minds with fishing equations. The two goals are: first for efficient or wise use of resources, to conserve these for future use; *and* second, for a democratized maximum efficiency of current exploitation (leaving no excess fish to go to waste). These are economic ideals, as well as biological ones,[5] but the biological and economic goals contradict each other. Maximized economic extraction of fish under the MSY paradigm means fishing up to, but not exceeding, a point of diminished future yield. This is impossible to achieve given limits to accurate prediction, unknown and unforeseeable contingencies in the physical and biological environments, *and* fluctuations in the markets in which fishers operate. Added to these joint ideals or goals are scientific problems: measuring and quantifying fish populations demographically; and modelling fishing effects (including quantifying fishing effort) to accurately estimate MSY. Here, practitioners, I would argue, confounded two related but different activities: 1) investigating fish population dynamics to calculate MSY; and 2) studying population dynamics for their own sake. The latter–carried out, for instance, by Charles S. Elton's Bureau of Animal Population in Oxford in the 1930s–emerged at the same time as scientists were developing fishing equations. Adept fisheries biologists were well aware of their discipline's economic dimensions, but I would argue that others focussed on biological challenges and ignored the economic dimensions of their work.

At a conference several years ago when I first suggested some biologists were blind to the economic underpinnings of their population modelling, Sidney Holt (1926–) – who with Ray Beverton (1992–1995) developed highly influential fishing equations, at the behest of Michael Graham – mildly reprimanded me: "Fisheries biology and economics have always been inseparable!" he stated.[6] This is indisputable, and I am grateful to Holt for making me ask myself if I was imagining things, and if not, how fisheries biologists could have lost sight of the economic point of population modelling. I still stand by my argument. Fisheries biologists' focus on

[4] The paper's title, 'In the Wake of Politics' owes everything to Gordon Winder's stimulating symposium 'In the Wake of ITQs'.

[5] Hence H. Scott Gordon's foundation of the new economic discipline of bio- economics around the analysis of these challenges.

[6] This exchange occurred at a conference hosted by the North Atlantic Fisheries History Association, at Hull, England, 9–12 November 2011.

studies of population demographics and size estimates of exploited fish stocks obscured their work's economic repercussions, because conservation was the goal. It became possible to see their enterprise as being for the benefit of fish and not human populations. They treated human agency in the fisheries as being external to the ecosystem. As will be seen, economists who began advising on fishery management also seem to have thought the same thing.

In deference to Holt, it must be affirmed that the fisheries biologists who developed the earliest fisheries population models (himself included) knew they were trying to solve an economic problem. The language of MSY, first used in the 1930s, emerged in response to two concerns: stock depletion and economic hardships. A declining whale catch led Hjort to introduce the *optimum catch* concept in a paper analysing the Norwegian whaling industry in southern oceans. He described mathematically at what level whaling could operate and still maintain future catches (Smith 1994: 214–229). Russell and Michael Graham developed mathematical models of fishing effects to respond to marked declines in the North Sea haddock fishery; their work culminated in Graham's Great Law of Fishing: unlimited fisheries become unprofitable. Graham noted that when the overall catch fell due to overfishing, fishermen had to expend more effort to find fewer fish. If their effort were reduced, they would spend less to catch those fish, waste less time, and their profits would increase. He referred to his ideal as a "maximum steady yield". Spurred by concerns about fishermen's falling earnings during the Great Depression, he advocated an overall reduction in fishing effort to allow North Sea fish populations to recover. He claimed this would not harm the yield (Smith 1994: 231–232; Graham 1935: 264–274), a vital consideration since fish provided cheap protein during the Dirty Thirties (and fish and chip shops were the only British restaurants not subject to rationing during the Second World War). When Graham later defended his calculations and ideas, he defended them on economic grounds (Graham 1943: 158–159; Graham, 13 September 1948, MS). As he told one critic, Archibald Gowanlock Huntsman (1883–1973) in a 1948 letter, fisheries restrictions might "be justifiable... when it can be shown... fishermen would make no important sacrifice by adopting them" (Graham 1948b).

Huntsman, the first full-time director (1919–1934) of the Atlantic Biological Station at St. Andrews, New Brunswick, also exemplifies the strong economic understanding of early fisheries scientists; as University of Toronto professor, he assisted his colleague, Harold Innis–then Canada's leading economic historian–when Innis was writing his magisterial history: *The Cod Fisheries* (1938). Huntsman also aided Innis' protégé, Ruth Fulton Grant, with her own comprehensive economic analysis: *The Canadian Atlantic Fishery* (1934).

It is important to note that economic theories influenced the ecological sciences from the start. Charles Darwin's discovery of the mechanism for evolution, natural selection, was inspired by reading Thomas Malthus's economic essay *On Population*, which highlighted human competition for scarce resources. His *Origin of Species* introduced the 'economy of nature'; his studies of species' relations to their environment pioneered the science of ecology. Indeed, ecology was consciously modelled on economics. In 1869, German biologist Ernst Haeckel (1834–1919), coined

and defined the term ‘ecology’ as “the body of knowledge concerning the economy of nature”, relating each species with its inorganic and organic environment (Marchant 2007: 177–178).

Economic ideas in ecology can be obvious or very subtle. For example, the ecological niche concept, introduced by British population biologist Charles Elton (1900–1991) in 1927, equated an organism’s ecological niche with a human profession and its role in a community, thus utilizing an economic definition (Golley 1993: 79). Oscar Elton Sette (1900–1972) of the US Bureau of Fisheries in 1943 described an unfished sardine population as filling an ‘ecological niche’ in which natural fluctuations from death on average equal births, and intra-population competition leave “the population...in equilibrium” (Smith 1994: 245). The idea that an environment’s populations naturally tend to a state of equilibrium echoes economic theories that dominated from 1870 to 1930.

The study of market equilibrium was pioneered by French economist Léon Walras (1837–1910), who investigated how shifting consumer preferences affected intricate relationships between prices and quantities. Walras believed suppliers made adjustments to meet increasing or lowered demands due to shifting consumer preferences, making markets tend toward a state of equilibrium. As shifts continue, new equilibria will develop in a balance of supply, demand, costs of production, and trends created by people’s attempts to maximize their own satisfaction. Walras developed “a complex mathematical model” to “specify the exact conditions under which” an equilibrium might be achieved (Fusfeld 1990: 83). One of Walras’s followers, Cambridge professor of political economy Alfred Marshall (1842–1924), elaborated this into a theory that economic forces such as supply and demand tended to a partial equilibrium (the equilibrium being dependent upon what conditions were present), referred to by American economists in the twentieth century as ‘Marshallian equilibrium’ (Hart 2014). Marshall was strongly influenced by Darwinian theory but also by progressive ideals, and hoped to make economics an instrument to assist the poor (Buchholz 1989: 149–52, 166–168). He became “the dominant figure in British and American economics” from around 1890 until 1925 (Staley 1989: 178). He used the fishing industry as a case study to argue that a system of free markets tended to maximize individual benefits: costs of production would be pushed to the lowest possible level, given the price of maintaining capital goods and other production factors, by the forces of competition, which would lead to the enlargement of some firms and the withering of others (Roncaglia 2005: 360–361; Buchholz 1989: 154–55).

Underlying Walras and Marshall’s economic theories was the idea that resources and commodities would be rationally exploited. Ever since Adam Smith, important economic theorists have assumed that economic behaviour is rational behaviour, since individuals seek to maximize their economic benefits (Lagueux 2004: 31–51, 2010: 32–36). Producers will produce goods at the lowest possible cost consistent with meeting levels desired by consumers. As individuals maximize their personal benefits, society as a whole will benefit. Yet the classical economists, in dealing with general principles, missed the contradictory evidence of history, because they ignored the particular and local changes that human activity wrought on the natural

environment. As Matthew McKenzie illustrates in his recent study on Cape Cod fisheries, *Clearing the Coastline*, fishers in competition in a capitalist system will capture and sell more fish than the market can bear, driving down prices and hurting their own bottom line. This happened in the weir or pound fisheries of Cape Cod in the nineteenth century. Because fishermen are competing, they will not restrict their catch. The consequences of flooded markets and poor prices are threefold: poorer, less-capitalized fishermen using older fishing techniques suffer materially; new markets have to be found; and fisheries depletion raises the cost of fishing. New markets open up because lower prices enable new uses. In Cape Cod, surplus fish were marketed to the reduction industry for agricultural fertilizers for the inland market (McKenzie 2010: 88–110). None of this contradicts Marshall's theories. The system was rational in that the weir owners– capitalist investors who never even had to set eyes on a weir– continued to make healthy profits, but in terms of fishermen's wages and the loss of future human sustenance from these fisheries, there was no rationality.

2.4 The new Experts: H. Scott Gordon and Anthony Scott, bio-Economics and Fisheries Management

Unable to see the slow long-term decline in the fisheries from their mid-century perspective, both Huntsman and Michael Graham incorporated a rational, Marshallian economic understanding into their analyses of fishing activity. Both assumed that if fish populations become too small to remain commercially viable, fishermen will stop fishing them because the cost of catching fish would be driven upward to the point of economic loss. Once fishermen abandoned the fishery, the populations, they believed, would rebound.

Neither scientist anticipated the economic theories of John Meynard Keynes (1852–1949), another Cambridge graduate and later professor, who was Marshall's most outstanding student. Keynes, inspired by the Great Depression's market failures and especially the problem of mass unemployment, became a great opponent of his teacher's free-market ideals. He advocated government intervention, subsidies, and managed markets to stabilize the aggregate economy (Gordon 1991: 579–588). In fisheries this translated to intensive subsidies to alleviate mass unemployment, through assisting in the purchase of capital goods (boats, nets, fish processing plants) that would drive up participation and thus employment in the fishing industry.

The prominent Canadian economist, H. Scott Gordon, whose ideas profoundly changed Canadian fisheries management from the late 1950s onward, was trained in Keynsian economics. Keynes's ideas also inspired Stewart Bates, an economist who became Deputy Minister of Fisheries in the Department of Marine and Fisheries from 1947–1954. Bates and Gordon jointly promoted the industrial development of Canada's Atlantic fisheries, government subsidies to the industry, and wealth

redistribution (Gough 2007: 223–225; Parsons 1998: 17–18). Their agenda was reinforced by policy emerging from the United Nations. There the Norwegian Ragnar Frisch– who founded the sub-discipline of econometrics, and in 1970 received the first Nobel Prize in Economics–had become in 1947 the chairman of the United Nations Economic and Employment Commission. He "used this position to promote his vision of economics: the aim of science should be to prevent unemployment and conflict and, consequently, to ensure a rational distribution of resources and wealth" (Louçã 2007: 18). This agenda had an enormous impact: in Canada and other North Atlantic nations, fishing boats and fleets received subsidies for conversions and larger vessel construction (Hubbard 2012: 145–7). The message to Canadian policy-makers from the UN (an entity to which they gave great credence), was echoed within Canadian bureaucracy and academia. Canadian fisheries biologists, as will be seen, were told to become part of this new sociological and economic programme even as they struggled with new environmental pollution issues and problems with resource management.

Gordon (1924-), despite the brevity of his involvement with Canadian fisheries issues, profoundly affected Canadian and international fisheries conservation policy and thus the policy goals for fisheries science. Born in Halifax, Nova Scotia, he graduated with a bachelor's degree from Dalhousie University in 1944 and studied Keynesian economics as a graduate student at Columbia University and at McGill University. After graduating in 1946, Scott Gordon worked in the Fisheries Prices Support Board established by the Deputy Minister of Fisheries, Stewart Bates, upon taking office (Bates 1944: 135). In 1948 he was hired as Assistant Professor of Economics and founded the Department of Economics at Carleton University in Ottawa; as its first Chair (at the age of twenty-four!), he built "a solid research-oriented academic unit".[7] He continued to consult for the Department of Fisheries after entering academia.

In 1951, Gordon began his economic study of Canada's Atlantic fisheries, and particularly addressed what he identified as the shortcomings of fisheries biologists' population models, and the trawler question. His interest was facilitated by the fact that both fields dealt in statistical models. In 1954 his highly influential "The Economic Theory of a Common-Property Resource: The Fishery" appeared in the *Journal of Political Economy*. This article was seminal to the field of renewable resource economics and served as a foundation for bio-economics.

In this paper Gordon asked why, in most 'mature' fisheries, fishermen tend to be poor, generating small or virtually no profits in return for their effort and investments. He defined this situation as the bionomic equilibrium, which occurs when total revenue equals total cost, and concluded "no sustainable economic rent will be generated in an open access fishery" (Reed 1991: 219). The solution was to move to a controlled-access fishery – in other words, one over which access to the fishery

[7] In 1966 Gordon became a professor of economics and the history and philosophy of science at Indiana University, where apparently as of 2015 he remained a professor emeritus. Biographical information available online is vague and does not specify his qualifications (eg. see Indiana University, University Honors and Awards, Honoree H. Scott Gordon entry online).

was controlled by some owner or authority.[8] If this did not occur, in an expanding fishery, more fishermen would enter the fishery so long as they could earn some cash surplus to their expenses and opportunity costs, until the bionomic equilibrium is reached.

Gordon's ideas did not go unchallenged. A year later, in the same journal, "The Fishery: The Objectives of Sole Ownership" was published by Anthony Scott (1923–2015) an Associate Professor of Economics at the University of British Columbia in Vancouver. Scott's epigrammatic critique situated him as the co-founder of bioeconomics (Anonymous 2015). He demonstrated that Scott Gordon's analysis of resource management had missed a vital feature: while "long run considerations of efficiency suggest that sole ownership is a much superior regime to competition ... in the short run...there is little difference between the efficiency of common and of private property" (Scott 1955: 117). If the sole owner took over an entire existing fishery fleet (and no technological upgrades) for only one season, he would run it exactly as open access competitors would, and generate a similar output, including the marginal product of labour equalling the price of labour (Scott 1955: 121). Ownership needed to be ensured over the long term, to enable planning how to maximize returns, treating fishery resources as assets to be managed both for the short-term ("to maximize the present value") (Scott 1955: 122) and for the benefit of the future (and of future generations) (Munroe 2004).

Gordon's and Scott's articles changed resource economics, forming "the foundation for the field of renewable resource economics" (Munroe 2004: 2). According to the Association of Environmental and Resources Economists (AERE), "Most environmental and resource economics textbooks today have a section based on these two articles. More than 50 years since their publication people still cite the papers"; indeed "their insights are now 'common knowledge'", "so fundamental that they become part of our daily thinking" (Cameron 2006: 1). I have little doubt, however, that many fishery managers' citations of Gordon's paper were rote and uncritical.[9] Nevertheless, Gordon's and Scott's papers were "the pioneering work on *socially efficient management of renewable resources* […]" (Cameron 2006: 1– my italics). My italics highlight the emphasis on – 'social' efficiency, which should be kept in mind in the following critique of the erroneous foundations of Gordon's reasoning.

Two fundamental problems undermine Gordon's understanding of fisheries economics, and created major problems for later Canadian fisheries management. The first problem was his belief in the robustness of fish stocks. He was not concerned that overfishing might reduce the number of fish spawned and recruited, and was unaware that continued intensive overfishing led fish stocks to collapse catastrophically. The second problem was his equating industrialized fishing with rational,

[8] Gordon's critic Anthony Scott clarifies that the discussion is not about monopoly, but rather the 'complete appropriation of all of a natural resource in a particular location' (Scott, 1955:117).

[9] For example, Robert Wieland's 2007 policy paper, 'Managing Oyster Harvests in Maryland's Chesapeake Bay', prepared for NOAA's 'Non-Native Oyster Research Program' explains that 'The economic model that best fits a renewable resource with this kind of harvest regime is the common property model, first proposed by Gordon' (p. 2).

efficient economics. He was deeply averse to restricting fishing technology, an approach that historically has assisted in sustaining fisheries for future exploitation.[10]

This aversion to restricting efficient technologies is expressed in "The Trawler Question in the United Kingdom and Canada", published in 1951 in *The Dalhousie Review,* which reflected insights from Gordon's year spent in the Fisheries Prices Support Board. He was perplexed by past Canadian fisheries policy. Increased demand for fish during the First World War had led to trawler construction in Canada in 1918. Yet the Canadian government had virtually outlawed steam trawling on Canada's Atlantic coast in the 1930s when traditional line and dory fishermen protested that the new steam trawlers would wipe out their fisheries. Why outlaw this efficient fishing technology, while Britain had refused a similar ban following vigorous protests by line fishermen? The Royal Commissions of 1863–66 and 1883–85 had investigated charges that trawling depleted the fisheries; Huxley, their chairman, famously found the trawl fisheries to have minimal effects on the fisheries. Huxley's findings were credited with preventing a British ban on trawlers, but Gordon argued that steam trawling really continued simply because British trawlers were competing in the international fisheries of the North Sea. It made no sense to restrict trawling given the British fishing resource was a "sea that was the common property of all the nations of Western Europe... [t]he folly of any action to restrict British fishing was therefore apparent. The palpable impossibility of getting international agreement for the prohibition of trawlers among so many nations was also clear" (Gordon 1951: 126). On the other hand, Canada's long coastline allowed the illusion that a trawler ban would prevent overfishing, despite foreign steam trawlers fishing extensively both outside and inside Canada's three mile limits. Thus the line fishermen won the ban they demanded. Gordon interpreted the line fishermen's quest for a trawling ban as being due to fears that steam trawlers would glut the market, leaving them unable to compete. Only during the Second World War did international demand for fish and growing prosperity finally end opposition to trawling.

Gordon had no knowledge, however, of the negotiations behind the British 'support' of steam trawling. In fact British scientists and technocrats who participated in the International Council for the Exploration of the Sea (ICES) desired general fishing restrictions for the plaice fishery, for example, but were ordered to oppose these owing to the political strength wielded by the trawler men, due in part to their importance to British naval policy (Rozwadowski 2002: 66–67). The opposite policies of the British and Canadians were both politically, not scientifically-rationally motivated; they were equally dictated by the goals of self-interested groups. Also, contrary to Gordon's beliefs, steam trawlers had also been restricted in another North Sea fishing country, namely Norway. In 1939 Norway only had 3 trawlers in

[10] For a finely textured analysis of the effectiveness of technological restrictions in conserving the Chesapeake Bay oyster fisheries in certain areas, see Christine Keiner's *The Oyster Question* (2010).

operation in its coastal fisheries, as did the Canadian Atlantic fisheries[11] Norwegian restrictions on steam trawling and landing steam trawlers' catches were due to the strong tradition of fishermen's collective control of fishing, rule through local fishing districts, and their opposition to steam trawling (Jónsson 2007, 2006). Norwegian fishing districts had an excellent record of local control to restrict effort and maintain the fishery at a healthy level. This was notably the case in the Lofoten region following an 1890 amendment of the Lofoten Act of 1816 (Pomeroy and Berkes 1997; Jentoft and Kristoffersen 1989). Ignorant of British motivations and Norwegian fisheries governance and restrictions, Gordon viewed the Canadian restriction as uniquely irrational. Given that both Britain's unrestricted steam trawl fishery and Canada's and Norway's trawler restrictions were due to political pressure, Gordon's assumption of a 'rational' British trawler policy is undermined. With no access to Norwegian and British policy documents, his 'rational' economic analysis was based on an imagined scenario.

He similarly dismissed fears of stock depletion as misdirection by selfishly motivated line fishermen – the 'irrational' (because technologically backward and inefficient) sector of the fishery. It bears mentioning that in the 1950s the prodigious Grand Banks groundfish fisheries were expanding on a breathtaking scale, with apparently no end in sight. "The weight of biological evidence having reduced the potency of some of the old arguments [by line fishermen] against overfishing, opposition has centred more and more on the claim that the grounds are overexploited and the trawler is accused of this" (Gordon 1951: 122). Gordon rather savagely argued that prohibiting steam trawling to prevent overfishing would stop "the operation of the more efficient catching units" which, while it would reduce the catch "is not a method that would have anything to recommend it. Economically it is similar to solving an unemployment problem to set men at digging holes and filling them up again" (Gordon 1951: 122).

What makes Gordon's paper of 1954, "Economic Theory of a Common Property Resource", remarkable was his willingness to engage leading theories and ideas in fisheries biology, especially Milner B. Schaefer's surplus production model (about which more later). With a mere year's experience in the Fisheries Prices Support Board, his consulting work for Bates, and his economics background, he deemed himself expert enough to admonish fisheries biologists for shortcomings in their work. He was critical of biologists' tendency "to treat the fisherman as an exogenous element in their analytical models" (Gordon 1954: 128). As Tim D. Smith notes, he complained that "the behavior of fishermen is not made into an integrated element of a general and systematic 'bionomic' theory" (Smith 1994: 335). But while he essentially criticized fisheries biologists for not being economists, he also failed to acknowledge their impressive economic understanding, and was quite happy later to champion economists' takeover of fisheries biologists' role in helping to formulate government fisheries policies. Perhaps it is true early fisheries biologists

[11] The Canadian restriction on east coast trawlers followed the 1928 publication of the findings of the Royal Commission Investigating the Fisheries of the Maritime Provinces and Magdalen Islands (the MacLean Commission). This commission received numerous complaints about the effects of trawling on local fisheries (Hubbard 2006a: 132–33).

did not flesh out economic insights in papers replete with economic jargon, but it was hard to pursue these in the face of multitudinous unresolved biological issues.

Looking at Michael Graham's paper on "Overfishing and Optimum Fishing", Gordon comments: "its emphatic recognition of the economic criterion, would lead one to think that the economic aspects of the question had been extensively examined during the last half-century". He concludes: "But such is not the case" (Gordon 1954: 125). Gordon failed to acknowledge that Graham's 'Great Law of Fishing', which stated "fisheries that are unlimited become unprofitable" (Graham 1943: 153), succinctly stated the fundamental basis of his entire bio-economics theory: that economic rents in an unrestricted fishery would be unsustainable.[12] Graham and Gordon differed in that Graham only attributed reduced revenues as being due to overfishing, leading fishermen to increase fishing power (invest in new equipment) or travel further to find fish. Gordon instead saw reduced revenues as arising from a number of economic factors, including wasteful fishing and glutted markets–like the situation described by Matthew McKenzie in his history of the weir fisheries of Cape Cod (see above).

Gordon acknowledged that both Graham and Huntsman recognized diminishing economic returns when fishermen had to invest more to catch fewer fish. He also acknowledged they both saw overfishing might have more than one cause: overfishing could be due to declining fish stocks, for example, or more fishermen chasing the same number of fish. He recognized that Huntsman even defined overfishing depletion in economic terms: "Where the take in proportion to the effort fails to yield a satisfactory living to the fishermen" (Gordon 1954: 125). Gordon then, condescendingly, and without evidence, alleged that when Huntsman argued "the highest take is not necessarily the best", he did not understand the significance of his own statement (Gordon 1954: 125). This is nonsense. Huntsman himself commented, in the sentence before the one quoted by Gordon: "The take should be increased only as long as the extra cost is offset by the added revenue from sales. Not only markets but possibility of other employment will determine when and how rapidly the accumulated stock of fish should be taken by industry" (Huntsman 1949: 170).

Gordon's article also engaged with a scientific debate earlier stoked by Huntsman, who demanded a watertight definition of, and methods for determining, overfishing. Scott Gordon must have read the influential proceedings of the 1947 "Symposium on Fish Populations" organized by Huntsman, published as a much-reprinted—and even profitable!—issue of the *Bulletin of the Bingham Oceanographic Collection*.[13] At this symposium, Martin D. Burkenroad, then chief biologist of the North Carolina Survey of Marine Fisheries, was goaded by Huntsman into firing the first salvo of the Thompson-Burkenroad debate. Burkenroad (and Huntsman) questioned

[12] Ray Beverton pointed this out to economist W.J. Reed, when reviewing Reed's discussion paper (Reed 1991: 227).

[13] Daniel Merriman, director of Yale's Bingham Oceanographic Laboratory, 'told Huntsman 'this laboratory has never been burdened with so many requests for reprints as it has since the publication of that issue of the Bulletin. The demand has been tremendous both here and abroad, and requests continue to arrive in almost every mail' (Merriman to Huntsman 1949).

W.F. Thompson's position that fisheries declines in the Pacific halibut fishery were due exclusively to over-fishing. Thompson, as director of the International Pacific Halibut Commission, defended the severe fishing restrictions he had imposed as being responsible for their recovery. Gordon took the Huntsman-Burkenroad side: that natural fluctuations instead may well have caused the Pacific halibut fisheries' improved state after fishing closures, resulting in an improved catch-per-unit of effort. Gordon argued that Huntsman's critique of other scientists' understanding of overfishing had not received the respect it deserved. He then used logical examples drawn from economics, equations and graphs to show why Huntsman, and earlier, H.M. Kyle, the German fishery biologist, were correct to argue that catch-per-unit effort indexes "are not adequate measures of population change" (Gordon 1954: 138).

Why did he enter this debate? The answer can be seen in his rejection of the problem of overfishing, following an elegantly succinct but thorough summary of the history of scientists' treatment of this question from Huxley onward. It turns out Gordon trusted the findings of several Royal Commissions on trawl fishing (chaired by Huxley) that found no evidence for overfishing. Recent investigations, however, render these commissions' findings suspect, contaminated by Huxley's disregard of or disdain for evidence of declining catches (Schwartz 2013, and personal communication; Hubbard 2014). Blithely unaware of these failings, and bolstered by Huntsman's skepticism,[14] Gordon treated the problem of fisheries depletion as a virtual non-sequitor: it was absurd to reduce the catch for conservation purposes since this would require introducing inefficiency (so irrational in the economic world view!) to do so. He cited Burkenroad's observation that "the purpose of practical policy is for man, not fish" with approval (Gordon 1954: 127).

2.5 Culture Clash: Differing World Views of Economists vs Fisheries Biologists

By challenging fisheries biologists on their own territory, Gordon had staked a claim for economists in fisheries issues. Resource economists took notice. This resulted in a roundtable discussion on fisheries economics in Rome under the auspices of the Food and Agriculture Organization (FAO) of the United Nations in 1956, attended by both Scott Gordon and Anthony Scott. They were joined by fifteen other economists and two observers from the United Kingdom, the United States, Canada, Sweden, Norway, the Netherlands, Italy (the FAO), and Hong Kong. Most were academics. Only three were employed by governments as fisheries economists, namely W.C. MacKenzie who served in Canada's Department of Fisheries (Gordon 2008);[15] and from the Hague, G.J. Linesch, director of Fisheries, Ministry of Agriculture,

[14] Gordon was influenced by Huntsman's 1944 paper which argued that the North American fisheries had yet to experience a documented case of 'under-replacedment' (See Tough, 1999: 114).

[15] MacKenzie was director of the Market and Economic Service established by Deputy Minister of Fisheries Stewart Bates, and had an agricultural economics background.

Fisheries and Food, and D.J. Van Dyk, director of the Marketing Board for Fishery Products. Also present was P.E. Popper, Chief of the Economics and Statistics Branch of the Fisheries Division of the FAO in Rome (Turvey and Wiseman 1957).

In subsequent years many more government economists would attend FAO fisheries economics meetings, but at the 1956 meeting, convened to design measures to improve fisheries economies, there were few such individuals. It is important to note that these new fisheries experts, who emerged in the wake of Gordon's virtuosic paper, had a quite different take on fisheries problems from fisheries biologists. So divergent were their perspectives that they had utterly disparate definitions of common terms. 'Overfishing', for example, for economists meant a state of affairs in which reduced profitability was occurring, while biologists understood it to mean, loosely, a substantial and harmful reduction in size of a fish population through fishing. This effected a culture clash which rendered their interests unintelligible to each other.

This culture clash was well illustrated during the 1956 economics round table. Even the economists themselves had dissimilar and even clashing goals–some wanted to improve the living standards of fishermen, whilst others were more concerned about how fisheries could boost the overall economy through improved products (eg. better refrigeration for fish stored for several weeks after capture in distant-water fisheries) and improving consumer prices. H. Zoeteweij of the Economics Division of the International Labour Office in Geneva, Switzerland was concerned that the already classic papers by Gordon and Anthony Scott ignored price fluctuations and engaged too much in the domain of fisheries biologists, viz. the economic effects of fish stock reductions (Turvey and Wiseman 1957: 3). The comment that best illuminates the cultural divide with fisheries biologists was Zoeteweij's observation:

> [t]he demand for a 'sustained maximum yield' from a given fish stock has been repeated ad absurdam. The term puts too much emphasis on the *naturalistic romantic approach* to the fisheries and it puts man and his needs too much in the background. If the purpose of our activities is to benefit man (i.e. producers and consumers) then a steady quantity is certainly not a realistic target. (Zoeteweij 1957: 2; my italics)

Gordon did not disagree: "In guiding government policy, the economist's objective must be to make society better off, not merely the fishermen. He must be an economist in respect of fisheries, not on behalf of them" (Turvey and Wiseman 1957: 61). As I have argued elsewhere (Hubbard 2014), MSY was not designed for the benefit of fish, but of man–even economists appear to have missed the economic basis of fisheries biology!

Gordon, however, was on the same page as Zoeteweij: "we must beware the romanticism that has coloured public discussion of this problem and the narrowness of view which, all too often, has characterized the approach of fisheries biologists in this matter. The task of the fisheries economist, like that of other economists, is to contribute to the general welfare of society" (Gordon 1957: 68). Their goal should be to remedy problems that had arisen through conservation measures such as those by W.H. Thompson's International Pacific Halibut Commission, which had led to a wildly inefficient fishery. While the fishery was closed most of the year, during its short season an increasing number of participants raced to catch halibut.

The expanded fleet "now catches in a few weeks a quota of halibut that formerly took several months. The industry is heavily over-capitalized and its potential net returns are dissipated by higher costs" (Gordon 1957: 69). Only G.M. Gerhardsen– a professor at the Norwegian School of Economics and Business– objected: "It was necessary to understand the fishery, the nature of the sea, inability to see the resource, and so on. Co-operation with biologists and others was more profitable than isolation" (Turvey and Wiseman 1957: 13).

As for fish populations, Gordon said "the essential biological fact about the effects of fishing on stock numbers was that the reproductive capacity of fish was very, very high"; moreover, statistics showed that "the size of a fish population was not related to the number of potential spawners. The effect of fishing was not on spawning but on average age" (Gerhardson 1957; Turvey and Wiseman 1957: 77). These remarks indicate the deep direct influence of Huxley, reinforced through Huntsman. Huntsman, a strong 'Huxleyite' (Hubbard 2006b: 149–63), was among the first fisheries biologists to analyse the effects of fishing on fish populations, and concluded that the main effect was removal of older fish, which he assumed would improve growing conditions for younger fish (Hubbard, 2016: 102, 106–9). Gordon here echoes Huntsman's conclusions, and betrays his conviction that since the fisheries were inexhaustible, economists could treat the problem of generating wealth, employment and other benefits from the fisheries without concern for the fish populations themselves.

Anthony Scott, who was acquainted with fisheries biologist Milner B. Schaefer (1912–1970), had a more nuanced understanding of the effects of fishing on fish populations. Before the conference he and Schaefer met to discuss an as-yet-unpublished paper by Schaefer. He accepted Schaeffer's argument that "a rate of landings...in equilibrium with a certain population is the same as the natural [growth] of that population in the absence of fishing effort" (Scott 1957: 48, footnote 5).[16] Scott agreed that "if more effort is applied to a fishery" this might cause greater expense or inconvenience to every member of the fishery and a reduced fish stock or 'population effect' (Scott 1957: 47). However, like Schaefer he dismissed the long-term effects of overfishing:

> A forest....is replaced slowly by nature, so that forest owners can decide upon a rate of cutting that will give them the best combination of timber, cost and timing....So it is with the fishery.[17] The stock of fish at any time is in the process of growing. Its growth (caused by its own reproductive force, which exceeds its natural death rate) would be indefinite if it were not that food shortages, physical habitat limitations and predators slow down the absolute time rate of growth as total population increases: eventually they prevent further growth. If any of these limiting factors increases in intensity, the population is depleted, then begins to grow more vigorously toward its previous size (Scott 1957: 47).

[16] Instead of 'growth' Scott used the eye-straining phrase 'time rate of increase'. Presumably these two states of equilibrium resemble Marshallian partial equilibria.

[17] His use of a forestry analogy is interesting because he likely got it from Scheafer, whom I argue elsewhere developed his "surplus production model' for fisheries exploitation after being influenced by Huntsman's introduction of this analogy at the Toronto Symposium on Fish Populations in 1947. See Hubbard, 'The Gospel of Efficiency and the Origins of Maximum Sustainable Yield', in *A Century of Maritime Science*, University of Toronto Press, forthcoming.

J.A. Crutchfield raised an objection. An Assistant Professor of Economics at the University of Washington in Seattle–notable for its School of Fisheries Science–he argued that overfishing's effect in shrinking a fish population "might disturb the ecological balance so that it might not be possible [for the population] to return to the original position on the ogival [population] curve" (Turvey and Wiseman 1957: 60). But this comment got little regard–except, presumably, from Gerhardson, who did not speak up.

Scott's real interest was fluctuations in demands for labour and fish or fish products. It is worth mentioning here that while Gordon moved to Indiana University and eventually switched his focus to the history of economics and science, Anthony Scott contributed to fisheries economics almost to the end of his life. From 1968 to 1972 he served as Canadian Commissioner of the International Joint Commission, which manages fisheries and other resources under the U.S.-Canada Boundary Water Treaty; and from 1971 to 1975 he served as Advisor to the Environment Directorate of the OECD in Paris. ("In memory of Professor Emeritus Tony Scott", 2015). In 2010 he contributed a chapter, "New Directions in Fishery Management", for a World Bank publication: *The Political Economy of Natural Resource Use: Lessons for Fishery Reform*. (Scott 2010: 1–17).

Generally, the economists at the 1956 round table sought 'rational' solutions for problems like market fluctuations, the condition in which commodities arrived at the market, capitalization costs, the cost of actual fishing, and the cost in time of fishing. They endorsed factory ships which could adequately freeze fish at sea, recently introduced by the British and USSR, although it was felt that the public response to frozen fish needed study. (Turvey and Wiseman 1957: 16–17). What is remarkable about this meeting is their huge lacuna in understanding of the very nature of MSY as an economic objective, however it was arrived at. By arguing this goal was in place for the benefit of fish, they missed the fact that fish in fact do not benefit at all from being fished. MSY is an economic construction. Yet this misunderstanding was to reverberate through the fisheries policies of governments in the decades thereafter.

2.6 Economists in Charge

Scott Gordon's incursion into fisheries economics and the interest it raised was soon followed by government fisheries divisions' hires of economists in Canada, the United Kingdom, and elsewhere. But economists' roles varied in these fisheries administrations. In England, the Whitefish Authority under the Ministry of Agriculture, Food and Fisheries (MAFF) had hired two economists by the 1960s. Their role was simply to provide sound economic analysis for different fisheries management scenarios. For example, Mr. C.I. Meek prepared an economic justification for the UK's policy to support ICNAF's proposed introduction of a 'total allowable catch' (TAC) in the northwest Atlantic. By 1965 researchers in ICNAF's Norwestlant programme, led by Beverton, realized that nets with a minimum mesh

size could not prevent overfishing and stock depletion. Great Britain, Canada and a few other ICNAF member countries called for a TAC to be allocated to each country. Meek's report, "Economic Effects of Conservation", advised that in addition to fish population fluctuations, "[t]he 'common property nature of the resource, in itself, causes both inefficient exploitation and, in most cases, excessive effects" (Meek 1966). Meek admitted that given the "present state of the biological and economic arts, and the complications caused by mixtures of species and different gears and methods' it was impossible to assess how effective TAC measures would be; results would 'depend upon negotiation between national interests" (Meek 1966).

One economic insight Meek shared with the MAFF bureaucracy was that "any restriction of effort below the equilibrium point will cause operators to have excess earnings, in some cases very substantially so" (Meek 1966). The fisheries resources available would increase, allowing an increased catch per unit of effort, and greater economic efficiency. But his concern–and it was shared by Canadian economists–was that licensed fishermen exploiting fisheries at levels less than MSY would reap disproportionate rewards, or "excessive earnings", as Meek put it[18] This was a motive to keep the fisheries at MSY. Beyond that disquieting insight, it is perhaps telling that in another context, the outcomes he predicted for a restriction of access to the fisheries took Australian fisheries biologist Anthony Harrison by surprise. Harrison was responsible for figuring out how to rescue Australia's failing abalone fisheries in the late 1960s. He introduced licenses in the early 1970s, and then reduced the number of licenses year-by-year. He failed to foresee the inevitable effect. With fewer fishermen, each fisherman enjoyed a greater catch than before, although the overall catch was markedly reduced. Profits soared. The remaining fishermen were willing to pay progressively larger license fees. License-holders then sold their ownership to retire in wealth. By the 1990s abalone licenses cost in excess of a million dollars each and were owned by Japanese consortia; the actual Australian abalone fishermen were mere employees (Harrison, personal communication). Mid-twentieth century fisheries biologists were naive as to the effects of limiting entry, but economists were not.

Meek advocated a limited number of short-term licenses to allow fisheries managers to adjust the fishing effort to fisheries conditions. He also advocated "by means of fiscal provisions" (Meek 1966), removing "from the industry substantial excess earnings and if this is done by means of licenses, will imply an official view about the proper rate of return on capital in the industry" (Meek 1966). G. Campleman, the White Fish Authority's principal economist, also condemned potential excess earnings. "Any successful attempt to restrict the fishing below present levels should result in increased and excess earnings to operators". Indeed "o*perators will continue to enjoy excess earnings which, in itself, is a bad thing...*

[18]The argument against short-term licenses is that these punish fishers who invest capital into acquiring the technologies required to hunt and harvest oceanic species. It makes no sense to buy and maintain expensive equipment if one will lose one's license after a specified restrictive period; this would also restrict entry into the fisheries by potential licensees only to those who were already wealthy and could afford to buy the equipment outright, let alone afford the cost of the license.

any successful system of regulation must involve a firm control over the effort and some form of mopping up excess earnings, either by the issue of expensive licences to fish, or by a form of levy" (Campleman 1965; my italics).

Unlike Campleman and Meek, Canadian fisheries economists were not appointed to offer economic analysis; they were economic activists. Both Gordon and the Deputy Minister of Fisheries Stewart Bates strongly favoured industrial development. They saw the Canadian Atlantic as having missed the industrial revolution in the fisheries, begun in the nineteenth century British steam trawler fishery.[19] The Canadian Atlantic fisheries were underdeveloped, inefficient, and profoundly irrational. During the 1950s, sail-powered boats and dories from the Maritimes and Newfoundland were attempting to compete on the Grand Banks alongside British, Soviet and Spanish factory trawlers. Bates had earlier chaired a commission examining the state of the Canadian Atlantic fisheries. When Bates became the Deputy Minister of Fisheries in 1947 he used the information published in his *Report on the Canadian Atlantic Sea Fishery* (1944), to back his initiatives for fisheries development and modernization policies. Both Bates and Scott Gordon emphatically favoured government intervention to subsidize fisheries development, and both preferred large, established fishing firms over independent small enterprises. Bates' programme directed the industry towards the frozen fish trade for domestic and US consumption, and subsidized the creation of large firms and centralized frozen seafood processing and production (Wright 2001: 43–47). Gordon's work economically justified this programme. Bates also demanded the mathematical population dynamics and scientific 'fisheries management' fisheries biologist that R.E. Foerster noted as a new objective in the Canadian fisheries (see above).

Governments wished in part to bring their fisheries into the twentieth century; traditional fisheries reflected centuries-old practices, not modern, industrial states (Barrett 1984: 81). Similarly, in the US Deep South, modernization to separate agriculture from remaining peasant practices was also occurring (Daniel 2005: 7). The need to compete internationally, however, was the main driver of government intervention: fish captured by traditional fisheries was too expensive to market in competition with the products of industrialised fishing. The implications of industrial fishing for fish stock collapses went largely ignored by governments, economists, and most scientists in the North Atlantic. Paul A. Hirt, in his history of US forestry policy, *A Conspiracy of Optimism*, explained how American resource management policy had been warped by Cold War objectives. In an effort to outshine the Soviet Union and impress Third World client states, US policy pulled out all the stops in resource development and industrial productivity, to show the enormous advantages of a free-market democracy for individual well-being (Hirt 1996). Carmel Finley has documented the effects of US government subsidies for constructing industrial fishing fleets in the US, Japan, and elsewhere (Finley 2011: 73–5, 107–9; Finley 2017). This had knock on effects in other countries. In Norway, Hjort, following the Second World War, was able to set Norway on track to rebuild

[19] The industrializing fisheries had formed an important component of Alfred Marshall's economic analysis in his most important work, the *Principles of Economics*.

and modernize its fleet, to increase efficiency (See Schwach 2004). In Europe the quest for efficiency was also due to the needs of post-war reconstruction and the challenges it faced in rebuilding its food supplies.

By the 1960s, for the first time, Canadian scientists in the Fisheries Research Board referred to Canada as underdeveloped. Peter Larkin described Canada as "not one of the world's most developed countries'" (Larkin 1975) in a letter to Fisheries Research Board Chairman J.R. Weir in 1975 and urged Canadian development of its own fisheries resources. One does not see this kind of economic labelling in reports and correspondence prior to 1960, not even during the Great Depression. What changed was the new social, economic and political reality of the Cold War, and in Canada's case, enormous self-doubt following Prime Minister John Diefenbaker's order in 1959 to cancel the Avro Canada CF–105 Arrow programme, a project that had produced the world's then-most advanced fighter jet.[20] Not only was the programme cancelled, but all prototypes were destroyed. Wracked by an inferiority complex with regard to the United States, Canadians also experienced identity issues, and worried about their post-colonial status and largely resource-based economy. These general and specific trends pushed Canada, like Norway, to begin an industrial revolution in the Atlantic fisheries just as the groundfish fisheries peaked in productivity and began their steep and thus far lasting decline.

To forward this industrial revolution, Canadian fisheries biologists were admonished by administrators within the Department of Fisheries to take account of economic issues and political trends in their science. This did not mean classic Marshallian analytical economics, but rather interventionist, neo-Keynesian economics. Neo-Keynesian policy insisted that governments should intervene to improve employment and industry. In Canada the crisis that justified policy changes was a high unemployment rate. In response to nine per cent unemployment rates in 1959, and ten per cent unemployment rates in 1961, Canada changed its fisheries policies to turn the fisheries into a 'make-work' project. Under reformed economic ideals, seasonal fishermen could fish for fifteen weeks and receive unemployment benefits the rest of the year. Federal economists wrote papers supporting and justifying social engineering experiments. Families were subsidized to leave the fishing outports through the Newfoundland Fisheries Household Resettlement Program of 1965. Economists and planners "envisioned several thriving communities...that would stimulate economic activity in surrounding areas"–but unfortunately "the anticipated spin-off jobs never materialized, and unemployment in the so-called growth centres hovered around 20%" (Candow 1997: 150).

In the late 1960s and early 1970s, scientists working for the Fisheries Research Board of Canada were ordered to embrace both economic and social considerations in their work. In 1973 the Board's scientists were ordered by upper level bureaucrats to pay attention to "the economic and political trends in the international sphere that impinge on the management and development of the renewable and non-renewable resources for both commercial and recreational use in Canada" (Fisheries Research Board 1973: 5). They were also urged to engage an "emerging consensus... for

[20] I wish to thank my colleague Dr. Ron Stagg for this insight.

'rational' resource management, i.e. controlling intensity of fishing on a socially optimal basis" (Fisheries Research Board 1973: 6) Their strategic planning was also to incorporate business organization, market diversification, and "regional disparities, i.e. variations in economic stress, in degree of dependence on fishery resource use, in economic efficiency and the like" (Fisheries Research Board 1973: 7). To strengthen Canada's scientific position at the UN Convention on the Law of the Sea, which was then considering extending national waters to 200 nautical miles, the Fisheries Research Board was ordered to put a greater emphasis "on social sciences and economics. As fisheries resources are more heavily exploited, management will lean more heavily on social and economic analysis [including]... employment problems [...]" (Fisheries Research Board 1973: 7). Scientists acknowledged ruefully that "In essence, the days of cowboys and Indians are soon to be over in the world's oceans, and only those who are organized to harvest fishes will achieve economic rationalization" (Fisheries Research Board 1975).

It must here be emphasized that these new marching orders were given at the time the federal government, dissatisfied with the research output of Canadian fisheries biologists, was dismantling the Fisheries Research Board and concentrating control of the research stations into the hands of upper level bureaucrats in the shifting configurations of central government. This era also marked a backlash against scientific technocrats – area specialists serving as life-long civil servants, who were seen as usurping the power of elected government representatives. A policy was put in place to switch senior managers to fresh portfolios every five years (Gough 2007: 290). Reflecting these changes, the Department of Fisheries was transformed into the Department of Fisheries and Forestry, then shifted under the portfolio of Energy, Mines and Resources, briefly emerging as Fisheries and Environment Canada, and finally re-emerging as the newly configured Department of Fisheries and Oceans, all between 1968 and 1977. The focus at the federal level was developing a scientific policy for Canada, one that fit into its larger national policy, which for fisheries was summarized by the Fisheries Research Board as "to make fisheries as economically rewarding as possible as rapidly as socially possible within the restraints of ecological prudence" (Fisheries Research Board 1975).

At one meeting of the Fisheries Research Board of Canada in 1974, scientists were told that Canada's political requirements for the upcoming Law of the Sea conventions were not being met: one criticism was that the Board's "social and economic research" was "generally weak and characteristically ad hoc"; social science research was needed to evaluate "changing lifestyles and their impact on employment in fisheries...with a view to suggesting techniques of ensuring manpower requirements [including]...problems of retraining for older fishermen". The Board statistics were inadequate "for this kind of research...Opinion and sentiment should be augmented by information and analysis". (Fisheries Research Board 1974a: 2–3). The Board's chairman's 1975 annual report stated:

> Dramatic changes were...taking place in the approach to fisheries and aquatic sciences. In the search for new practical knowledge, attention was shifting from studies of single species to ecosystems, from descriptive mapping to dynamic modeling... from natural science to fulfilment of societal needs, from unidisciplinary to interdisciplinary approaches (Weir 1975: 1–2).

Economists' contempt for the basic biological focus of fisheries science and the role of MSY was reflected in these changes; they were designing centralized Canadian fisheries science policies to emphasize "a socially-defined optimum sustainable yield as a more appropriate concept' that would be 'in harmony with science policy shifts and shifts in perceptions of resource management problems [...]" (Fletcher 1976: 27; also Fletcher 1977).

While fisheries biologists were excoriated for not being economists or sociologists, fisheries economists were given a free ride despite not understanding the challenges faced by fisheries biologists. Government economist C.L. Mitchell's 1974 economic report "Canada's Fisheries at the Crossroads: Some Policy Issues" was prepared to assist forecasts of Canadian fisheries management policies requirements within the future 200 mile EEZ regime. In this report he lamented "a lack of rationalization throughout the industry: in most cases, there has been a misallocation of the factors of production, a lack of progressive and competitive attitudes, and an over-abundance of marginal fishing and processing operations". He pontificated: "Surely fisheries are managed not for fish but for people, not just fishermen and fish processors but for Canadians...?... [but] maximum sustainable physical yields ignore the wants, needs and welfare of Canadians — *only the fish benefit"* (my italics). In consequence, he argued that "resource and industrial development policy must... bring about a more rational exploitation of Canada's fisheries...to develop a better and more efficient industry" (Mitchell 1974: 5–6). His comments echo the beliefs expounded by the economists at the FAO round-table meeting eighteen years earlier.

On the Atlantic coast fisheries biologists' responses were muted: they did not have the insights into their own history to argue that their pursuits had been in aid of economic goals all along. While food production for the world's growing populations had been the "main objective of science in the harvest management system", now—in light of an emerging glut in North American food production (Hayes 1973: 142)—the new goal was to become "an optimum sustainable yield". This concept included "a social objective of enhancing the lives of fishermen and of preserving cultural identity", and implied "the need to extend the food objective to include a socio-cultural objective" (Fletcher 1976: 27). Canadian fisheries science, then, had to add socio-cultural and economic objectives to their environmental objectives. However, they were out of their depth; senior scientists used to applying the biological, biochemical, and oceanographic sciences were unable to grapple with this brave new world of social engineering It is not to be expected that biologists or oceanographers tasked with monitoring the Grand Banks fisheries, then under the combined onslaught of the world's fishing superpowers (Japan and the USSR, to name but two), were happy with this state of affairs. One complained:

> ...senior managers and policy makers recite... the doctrine of ocean management and its benefits to Canada... The research scientist is cognizant of the costs and responsibilities involved, and he sees also that the positions being postulated are far in advance of the capability of the Canadian ocean research community and their science and technology. He can visualize the role he must play as the scientists and resource manager; but he does not see the necessary man-years for the preparatory work or the research (Fisheries Research Board 1974b: 36).

These scientists also were unhappy that they had no "voice in the deliberations" (Fisheries Research Board 1974b: 36). This is the context in which Peter Larkin (1924–1966), the provocative former director of the Pacific Biological Laboratory (1963–66), whose dissertation was supervised by population ecologist Charles Elton, and who understood acutely the economic goals of MSY, penned his famous "An Epitaph for the Concept of Maximum Sustained Yield". The 'epitaph' itself reads:

> Here lies the concept, MSY,
> It advocated yields too high,
> And didn't spell out how to slice the pie,
> We bury it with the best of wishes,
> Especially on behalf of fishes,
> We don't know yet what will take its place,
> But we hope it's as good for the human race (Larkin 1977: 11).

Contrary to some interpretations of Larkin's article, Larkin did not intend it to be a (premature) obituary of classic MSY. As Kevin M. Bailey, author of *Billion Dollar Fish*, observes, MSY has been resurrected in US fisheries policy, as it has elsewhere (Bailey, 2013: p. 145). Larkin instead was responding to policies that saw fish as serving economic ends and economics serving social ends, "and therefore the objective should be to get a maximum sustained yield of social benefits" (Larkin 1977: 7). In recent years, economists had been "trying to put dollar signs on all sorts of social activities and, in some instances, they have even deluded themselves into thinking they have succeeded" (Larkin 1977: 7) a reference to economists' habit of referring to fish as capital. He continued: "From all this sugary murk there crystallized, like fudge, the concept of optimum yield, in which optimum is whatever you wish to call it" (Larkin 1977: 8). He observed, moreover, the nebulous definition of optimum sustained yield "doesn't say anything about sustaining anything" (Larkin 1977: 8). Clearly not a fan of MSY, Larkin realized that swirling economists and their preferred social optima into the recipe for fisheries management – whether through total allowable catches, individual transferrable quotas, or other methods of 'slicing the pie'– would neither further the goals of sustaining the fisheries nor of maximizing social benefits.

Larkin was not, of course, alone in recognizing that economists were just adding to the confusion of fisheries management. In 1976, well after economists had consolidated their position in government resource departments, Colin W. Clark, a professor of mathematics at the University of British Columbia, published *Mathematical Bioeconomics: The Optimal Management of Renewable Resources* (Clark 1976). He argued that economic models are worthless if the underlying biological models were wrong: economists had to pay attention to the resource's uncertain nature. Clark's insights no doubt reflected the massive shift in *weltanschauung* of the 1970s, resonating the message of Rachel Carson's *Silent Spring* (1962). The fragility of the earth in the face of the human technological onslaught, be it by polluting chemicals, the testing of nuclear bombs, soil erosion, expanding urban centres, or overfishing, had finally penetrated the technological and economic certitude of industrial nations, although it would take decades for resource policies to reflect this shift. In the

meantime, however, government policies diluted any effective fisheries management for any form of sustainability. In Canada, as elsewhere, scientists were just another policy voice, now much lower on the policy ladder to economists and social scientists, tasked with preparing for the conservation of fisheries resources post-1980 in the new 200 mile EEZ, but with insufficient funding for their enormous task.

2.7 Conclusion

It took a decade or so, and the catastrophic collapse of the Grand Banks groundfish stocks in 1992 – ending what had been historically one of the world's greatest fisheries – for fisheries policies to finally reflect, to a limited extent, the real vicissitudes of nature under human exploitation. The demand that Canadian fisheries biologists engage in solving social issues has shifted, in the wake of the still-ongoing groundfish fishing moratorium (first imposed in 1992), to a still-challenging, but more science-appropriate agenda: working together with fishers and their traditional ecological knowledge, to try to co-manage the fisheries for optimal environmental as well as economic outcomes. Unlike economists, fisheries biologists' main professional focus from the outset had been striving to understand the status of commercial fish populations and to predict future trends in the context of global concerns about world hunger. However, early fisheries biologists– whether they were concerned about overfishing, like Russell, Thompson, Graham, Holt and Beverton, or concerned about improving the fisheries, like Huntsman and Burkenroad, or using them to support wider national geopolitical ends, like Chapman and Schaefer– had some view of the economic as well as biological goals they were serving; unlike later fisheries biologists, they had the 'luxury' of being involved in developing fisheries policies. This changed in the 1960s, when some western governments sought to consolidate control over the fisheries and to use them to promote welfare and other progressive social agendas, offering an opening for new experts to help shape fisheries policies, such as the resource economists who emerged following Scott Gordon and Anthony Scott's pioneering foray into bio-economics. Fisheries biologists in this era were pro-industrial development but did not share the specific socially progressive agenda of the economists who dominated the fisheries policy considerations of Canada and some other nations in the 1960s, 1970s, and 1980s.

The similarities between the fisheries biologists and economists was a shared dedication to creating a rational and efficient fishing industry–goals that remain in place to this day, even in the new context of ecosystem-based management– without, however, consideration (until after the 1992 collapse of the Grand Banks cod stocks) of the true ecological and even economic dimensions of what a rational fishery should be. The circumstances of Cold War-related expectations of progress and growth by Western governments and society reinforced fisheries scientists' and economists' dedication to the ideals of an efficient and industrialized economy, regardless of their opinions regarding the Cold War itself. When their combined sciences formed the base of government policies the ineluctable results were a

centralized, streamlined, industrialized fishery run by a small cadre of firms supporting only a tiny population of fishers (Wright 2001) – and in the end, in many cases, only a tiny population of fish also. The shared use of models and numbers to represent fish, populations, markets, demand and performance erased both the fish and the people whose lives were at stake, and the result was that in the period between 1945 and 1992, few, if any, experts were in fact speaking for either the fish or the fishers.

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Chapter 3
There's Always another Fish Available – Why Bother about Quotas at All?

Ingo Heidbrink

Abstract The introduction of fisheries management schemes always included unintended side effects and the development of strategies to avoid or circumnavigate regulatory systems. Using the case of the German market for fish products during the twentieth century this chapter demonstrates how the fish processing industry and the distant water fishing industry avoided the effects from the introduction of fisheries management schemes. Together, they simply targeted a new species every time a management scheme restricted access to a species. The consumer plays a key role in the success of any such scheme. Poor consumer knowledge about marine species combined with sophisticated advertising and marketing enabled German fish processing companies and distant water fisheries to avoid or minimize the effects of fisheries management on their respective businesses. Overall the chapter demonstrates that any analytical approach of fisheries management schemes will remain incomplete if the role of the final consumer is not considered.

Keywords Certification • Consumer sovereignty • Fish fingers • Fish processing • Fishing frontier • Overfishing • Substitution

3.1 Introduction

Whenever talking with consumers, even well educated, eco-minded and responsible consumers, in a country like Germany, it is easy to identify a broad consensus within society. Today, overfishing of global fish stocks is, without any doubt, a serious problem so any attempt to return to sustainable fisheries must be welcomed. Consumers tend to be indifferent or undecided over how to achieve this. The introduction of ITQs or fish stock assessments, catch moratoriums, or other fisheries management schemes might all seem appropriate to end overfishing. However, one trip to the local grocery store and, in particular, to the various and highly popular

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bargain supermarkets like Aldi, Lidl, Netto or their competitors, reveals that there are still many fish-products where the consumer cannot identify the actual fish species by reading the package. When looking at the menu of a restaurant, a diner may find an entry like 'fried fish' without any further information on whether it is fried cod, haddock, or herring, even though this is not strictly legal in Germany. More important, there will be customers ordering the dish without asking about the species or complaining about the lack of information. Thus, it might be asked, whether the broad consensus mentioned really provides any support for fisheries management systems or are the industries' marketing strategies still the most dominant factor when it comes to selling fish in a nation like Germany?

There is a historical dimension to this question. This dimension is not universal, but specific to each country and society, its fishing and fish processing industry, and its history of food and consumption. Similarly, the problem of overfishing also has a historical dimension that reaches back at least to the introduction of steam trawlers and otterboard trawls during the last decades of the nineteenth century. Individual fisheries developed their own approaches for dealing with overfishing. There is a rich historiography available on how individual nations have dealt with overfishing through the development of all kinds of fisheries management systems, and there is a substantial amount of research into the pros and cons of specific management systems. However, there is still very little literature available on the question how individual fisheries or individual fishing and fish processing companies have tackled the problem. In addition, the role of the consumer within the historical development of fisheries management systems is up to now more or less a complete desideratum. This paper analyzes how various fishing companies in Germany approached the overfishing issue during the twentieth century, and, more important, what role consumers had when it came to the issue of overfishing. Were the fishing and fish-processing companies really interested in solving the overfishing issue or was there a much simpler solution available to them when a particular species needed to be considered overfished?

3.2 Fish Fingers and Fish Markets

A characteristic feature of the German market for fish and fish products needs to be introduced. Unlike many other European markets, like for example the Scandinavian or the British markets, the German market for fish has always been characterized by a certain ignorance about the product itself. Around 1900, the knowledge of the average German consumer about fish remained limited at best. Germans living away from the coast had very little knowledge about fish or about how to prepare fish. Knowledge about individual species was extremely limited even nonexistent. The majority of consumers asked for 'fish', and principally fish suitable for frying or boiling, not cod, haddock, Pollock, or herring (Heidbrink et al. 2003). Outside the immediate coastal areas fish was often recognized only as a surrogate for pork, beef or poultry (Heidbrink et al. 2003). Acceptance of fish as protein supply largely

depended on the availability, or better, the non-availability of other sources of protein. Fish became popular only if there were shortages of other protein sources or in the growing industrial regions and large cities where large groups of the society could not afford beef or pork and were looking for cheap alternatives. In most parts of Germany then, fish was merely a surrogate for meat products with no demand in its own right, knowledge about fish was limited, and it was therefore impossible for consumers to make a responsible decision when purchasing fish. Shortages of beef and other protein supplies during periods like World War I or the hunger-years of the immediate post WW I period, prompted increased fish consumption per capita in Germany. As soon as beef and pork were available again, the figures for fish consumption returned to levels comparable to the pre-war period (Anton and Zentral-Einkaufsgesellschaft-Berlin 1918).

The introduction of the fish filet to the trade in Germany during the interwar period transformed this situation. With fish filets, consumers no longer needed to deal with the whole fish, and were able to purchase a product that could easily be prepared in the kitchen. They were convenient and enabled many families to integrate fish into their diet despite having only limited knowledge about fish and preparation of fish-dishes. The introduction of the fish filet resulted in an increasing demand for fish. They became an immediate success in Germany and this success was intensified when the *Winterhilfswerk*, a public welfare program of the Nazi period, decided to distribute fish and fish filets as direct food aid to the poor instead of providing financial support (Heidbrink et al. 2003). The trend towards fish filets continued throughout World War II and the immediate post war period, and reached its climax with the introduction of pre-processed frozen fish products, most notably fish-fingers, in the late 1950s and during the 1960s (Hilck and Auf dem Hövel 1979).

Thus, a situation emerged that would determine the subsequent development of the branch. Filets no longer automatically revealed the actual fish species sold to the consumers. Recognizing if a filet is a cod filet or a whiting filet is a critical and challenging task even for the specialist. For an average consumer with limited knowledge about fish and fisheries it was an impossible task. In any case, consumers did not care too much about the actual species they bought as long as it was a fish filet suitable for easy preparation of a tasty and nutritious meal.

3.3 Supplying Fish Finger Processors

Although fisheries management schemes like fish stock assessments, quota management or ITQs did not exist prior to the post WW II period, the main target species of the German fishing industry had already changed several times since the first steam trawlers set sail from fishing ports at the German Bight. When German steam-trawlers began to trawl in the North Sea their main target species were cod and haddock so that there was no difference from other national fisheries around the North Sea (Baartz 1991). Of course, herring was an important species for German fisheries too, but the herring fisheries were more or less completely separated from the

distant water fisheries for bottom fish and other pelagic species, with different types of fishing vessels, different landing ports, and different companies being active in the processing industry. A typical saying of the German fish branch stated that 'there was herring, and then there was fish', indicating that herring operations were not an integrated element of the fish industry, but a separate enterprise field.

This situation changed during the interwar period, when German trawlers operating off Iceland began to develop a red-fish (sebastes spp.) fishery as a reaction to decreasing catches of the traditional species cod and haddock in the North Sea. While most other nations involved in the North Sea fisheries reacted to decreasing catch per unit effort (CPU) by increasing their fishing effort, German fishing companies tried to develop new fishing grounds on which they could continue with high CPUs (Janssen 1939). During the interwar period, the German food market frequently faced supply shortages. These became particularly severe once the import limitations for South American beef went into force in the context of the Nazi-autarky policy. One policy to deal with this situation was "harvesting without sowing", in short, a policy to increase protein supply for the German market by developing new distant-water fisheries (Anonymus 1939). Such an increase of protein supply to the German market required new fishing technology, in particular factory freezer trawlers (Heidbrink 2008b), and the introduction of new species to the market. Unused to the consumption of fish but desperate for protein, German consumers accepted any fish species rather than have no protein at all: it was an easy choice. Consequently, the German consumers became accustomed to a number of species widely unknown to other European markets while the fishing companies learned not to worry too much about the availability of any particular species.

While this behavior was initially a unique response to the Nazi period and the autarky-policy, it became a pattern of behavior when, in an only slightly modified version, it was repeated after the end of World War II. During the immediate reconstruction period after the end of the war, consumers opted again mainly for beef and pork when it came to protein supplies and the annual fish consumption per capita decreased substantially. However, following reconstruction of the German distant-water fisheries during the 1950s annual fish consumption per capita increased again and fish was no longer seen as a surrogate for other protein supplies, but gained a market of its own (Dierks 1961). The introduction of deep-frozen fish products, most notably fish fingers in the West German market in the late 1950s, supported this process. Fish fingers gained an immediate popularity in West Germany (Hilck and Auf dem Hövel 1979).

Fish fingers changed the landscape of the German fish processing industry dramatically. The most important companies with fish finger manufacturing plants also operated distant-water fishing fleets, and thus integrated the entire production chain from the actual catch of the fish via the landing and processing of the fish up to the distribution of fish fingers throughout the country and finally to the consumer. Only a few companies were active in the German fish finger market due to the large, up-front investments required for fish finger production. Consequently, in short order, a small number of companies came to dominate what had traditionally been an industry characterized by a large number of competitors.

Sea-frozen cod filets supplied most of the fish for the first generation of fish fingers. Thus, the German markets quickly became not only one of the most relevant markets for fish fingers, but a market with an increasing demand for cod. However, this was a species subject to increasing availability problems. Severe conflicts ensued over the extension of Iceland's fishing boundaries (Johannesson 2007), which might be understood as an early unilateral approach to develop a fisheries management system but was mainly a nationalist attempt to exclude foreign trawlers from fisheries off Iceland. When Iceland decided to extend its national fisheries jurisdiction in a multi-step process up to a 200 nautical mile fishing zone the German distant-water fisheries lost access to their most relevant operational areas.

As prices for frozen cod filet blocks increased, and fleet operational costs mounted while fishing fleets faced restricted operational access to the most relevant fishing grounds during the so-called 'cod wars' (Þor 1992), German companies rethought the concept of fish-finger production. If the companies that had supplied their fish finger manufacturing plants with raw material caught by their own fleets wanted to continue with fish finger production or even to increase the annual production figures for fish fingers then they needed to revise their business model more or less completely. German companies moved to separate catch-related activities from the processing of fish fingers. Fishing and the manufacture of fish fingers became separate profit centers, with the processing plants either buying their raw material from their own fleet or on the global market for frozen filet blocks. Since the frozen fish-filet blocks were highly standardized and available from trawler operations all over the globe, there was no real reason why the fish finger processing companies should continue to process only the catch of the fleet of their own group. From the point of view of the processing plants, all that mattered was whether the technical specifications and quality standards for the frozen filet blocks were met (Heidbrink 2008b).

With fishing separated from processing, firm strategists began to experiment with using other frozen fish filets to substitute for cod in fish finger production. While company and, later on, national standards defined more or less every technical detail of a fish finger such as dimensions, weight, and minimum content of fish-filet, one central element was not regulated, the actual species utilized for fish finger production. Of course, there was a consensus among the German manufacturers that fish fingers should be made from cod, but, in the circumstances, it was an easy decision to look for opportunities to replace the cod with other species. Companies turned to species that were easily available and not yet affected by the extension of national fishing limits or other kinds of fisheries management schemes (Heidbrink 2008a).

Interestingly enough one of the first ideas to change the raw material base for fish finger production in Germany did not even include another salt-water species, but a fresh-water species as these species could be farmed thus ending the need to maintain a fishing fleet. Experiments with farmed fresh-water catfish proved particularly successful when it came to fish finger production and when the first catfish fish fingers reached the test kitchens of the fish finger manufacturers, even highly specialized testers could not distinguish catfish fish fingers from fish fingers based on

traditional, frozen cod filet block materials. The processing companies realized that the actual species used for fish finger production was largely irrelevant because the ingredients of the batter and the crust mainly determined the taste of the fish finger. Substitutions for cod were straightforward as long as the substitute species met criteria like fat-content, structure and flakiness of the fish filet, and color of the flesh.

When the economists of the processing companies evaluated the experiments with fish fingers made from frozen filet-blocks of farmed fresh-water catfish, the results of the economic analysis were completely discouraging. While it was true that the processing costs for the catfish-filet blocks were basically the same as for any other frozen fish filet block, the production costs for the filet blocks themselves were much higher than for blocks made of fish caught in the oceans. Even taking into account that the oil-price crisis of the 1970s and the access limitations to traditional fishing grounds for European trawlers due to the widening of national fisheries limits up to 200 nautical miles, fish farming or aquaculture still resulted in higher costs per block largely due to feed, water quality and other operational costs. Companies abandoned their experiments with farmed fresh-water catfish before catfish fish fingers entered the market.

Consequently, fish processors and trawler fleets each chased fish all around the globe, but separately, and there was no need for a processing company to maintain its own fleet. The fishing fleets flying the West-German flag quickly became obsolete (Baartz 1991). A number of attempts were made to continue the operations of the fleet after the closure of the traditional North-Atlantic fishing grounds for most European trawlers, but in the end none of these attempts worked out and the companies sold or scrapped most of their fishing vessels (Heidbrink 2004 and 2011).

3.4 Implications for Fisheries Management

But what were the meanings of this whole story for fisheries management and the question of quotas at large or, more particularly, the development of quota management and ITQs? While in the first years of fish finger production in West Germany the total annual volume of fish fingers manufactured and brought into the market was less than 1000 tons, fish finger output grew rapidly, increasing market shares within the next decades, and reaching a total production of nearly 500,000 tons per year around the year 2000 (Heidbrink et al. 2003). Thus, fish fingers were by no means any longer a niche product in the market, but the single most relevant fish product within the German market and a product that was vital for the success or failure of the companies involved.

As such, they became at the same time a highly regulated product, with basic product characteristics defined by the *Deutsches Lebensmittelbuch*, an annex to the German Law on Groceries and Feedstuff (*Lebensmittel- und Futtermittelgesetzbuch, LFGB*). As has already been made noted, the *Lebensmittelbuch* defines, in detail, the standards (30 g total weight, with at least 65 percent thereof fish-filet) for fish fingers but does not stipulate which species are acceptable for fish-finger production.

Thus, the processing companies could and can choose whatever species fits best for their production process and, more important, is available on the global market.

The first species that gained the attention of the German fish finger processing companies was Pollock or saithe (*Pollachius virens* and/or *Pollachius pollachius*). Like cod (*Gadus morhua*), Pollock was easily available on the traditional North Atlantic fishing grounds and could be processed to filet blocks on board the trawlers with the same equipment as cod (Baader 1961). Frozen Pollock filet blocks were available on the global market but, as long as there were quotas available for German trawlers, the remaining fleet of factory-freezer trawlers owned by the processing plant companies landed blocks in Germany. Pollock, like cod, is a species of the Gadidae family so it has very similar characteristics when it comes to the production of either the frozen filet-blocks or fish fingers.

While the shift from Cod to Pollock nevertheless required some efforts by the processing companies, the consumers did not really notice the change, in particular as the advertising for and packaging of fish fingers in Germany normally did not reveal the species outside the small-print list of ingredients. The main print on the packages labeled for the German market simply used the term 'fish fingers'. Television commercials and all kinds of print advertisements simply did not mention the species at all. Note that fish finger packages labeled by the German manufacturers for other markets were often more specific and provided the information on the species in the main print.

With Pollock now the main species used in fish finger manufacturing in Germany it became almost inevitable that this species became heavily overfished or at least so heavily utilized that the market price for frozen filet-blocks increased substantially. Fortunately for the fish finger manufacturers, another species became available on the global market at the same time as the situation for Pollock became critical. *Theragra chalcogramma*, known in the market as Walleye Pollock or, later on, Alaska Pollock, is a species of the Gadidae-family living in the North Pacific Bering Strait area and, again, a species with characteristics close to those of cod or Pollock. While the fisheries for Alaska Pollock remained modest up to the end of the 1960s catches increased rapidly in the following decades and reached an all-time high in the mid-1980s with an annual catch of around 7,000,000 tons (Bailey 2013). For the German fish finger manufacturers, Alaska Pollock was an obvious choice and they shifted the raw material base for their fish-finger production for a second time.

Alaska Pollock was the first Pacific Ocean species introduced to the German fish industry in large quantities. Since the fish finger producers had eliminated their fleets, distance between fishing ground and processing plant was not a factor of any importance in their cost calculations. While operating a factory-freezer trawler far away from its homeport automatically results in substantial logistical challenges and an increase in operational costs, and there was a price difference between shipping frozen filet-blocks to Bremerhaven by reefer ships from fishing ports in the North Pacific and from ports on Greenland or Newfoundland, such costs were minor in the context of the whole operation.

In other words, and with relevance to any analysis of fisheries management systems including quota management and ITQ, the German fish finger processing

industries had circumnavigated the consequences of overfishing and the related introduction of fisheries management instruments for the species most relevant to them as raw material, by simply replacing the species with another species that was still easily available. This amounted to a policy of seeking and driving an expanding fishing frontier with the risks of overfishing passed to fishers and communities distanced from the processing companies themselves. As long as certain criteria were met, the actual species used for manufacturing fish fingers was not the main concern of the industry. The consumers did not care at all about the species processed to fish fingers.

To some extent, the German authorities supported the species hopping of the fish finger manufacturers. Not only did they continue with lax rules on labelling that meant that it was not required to print the actual species prominently on the packages and in large print but, perhaps more importantly, they accepted the development of trade names for species for which there was no common German name (Heidbrink 2004). Of course, it has been a major concern for the fish finger industry that changing the species might result in changes to the actual processing, logistical requirements for the final product, or even preparation of the fish finger by the final consumer. However, an astonishing range of species can be processed to fish fingers without major differences to the final product (Schubring 2008). It seems that the fish finger manufacturers learned from the history of fish consumption in Germany since the introduction of the first steam trawlers. They realized that the average German consumer had so little knowledge of fish that one species could be substituted for another without causing them any concerns. In a country where consumers were still willing to order fried fish in a restaurant without knowing what species was actually prepared by the chef, buying fish fingers without knowing the species processed was nothing out of the ordinary. Consequently, the fish finger manufacturers did not need to worry too much about the introduction of all kind of fisheries management schemes like quota management or ITQs. As long as there were other species available on the global markets that could be processed to fish fingers and were not yet subject of fisheries management schemes they would continue to make and sell large quantities of fish fingers.

The raw material shifts from cod to Pollock and then Alaska Pollock proved to be effective for the fish finger industry in Germany and recent evidence suggests that this strategy continues. At least some fish finger manufacturers used the same scheme to circumnavigate global or regional fisheries management schemes in recent years. While Alaska Pollock is still the main raw material base for fish-finger production in Germany, at least one of the processing companies has begun to use hake (*Merluccius merluccius*) as its raw material. Whether the other processing companies will follow this trend is not yet clear. In any case, consumers have not complained about the shift, but, instead, continued to buy fish fingers regardless of the species. In turn, this has important consequences for the continued expansion of the fishing frontier with its attendant risks of overfishing for fishers and communities distanced from the processing companies themselves.

3.5 Conclusion

In summary, it needs to be asked whether the German fish finger processing companies really care about sustainable fisheries, quota management or ITQs at all, or whether they are only one element in a much more complex decision-making process centered on the availability and price of frozen filet blocks as raw material. Generally, the fish-finger processing companies circumvented all efforts to introduce effective ITQs and other management systems by simply fishing down the line. Once they encountered the first difficulties with their raw material supplies, they more or less immediately gave up the species and shifted to other species still available. As this happened not only once, but at least three times we must conclude that this pattern is well established within the community of companies manufacturing fish fingers for the German market. It needs to be assumed that German fish finger processing companies will not care about ITQs and other management schemes as long as there are other species available.

> "Only after the last tree has been cut down,only after the last river has been poisoned,only after the last fish has been caught.only then will you find - that money cannot be eaten"
> Chief Seattle

The German fish-finger processing companies might be a prime example that Chief Seattle's vision about the white men's relation to nature was correct, but it will take another decade or two before they will finally realize that he was right.

However, this pessimistic result from historical analysis of the relation of German fish finger manufacturers to the development of fisheries management systems, must be qualified by reference to some more positive recent signs of learning. Fisheries economists have become aware of the schemes utilized by German fish finger manufacturers and have analyzed the effects of species hopping. Not surprisingly, the conclusions of some of these studies show that the development of single species fisheries management schemes has resulted in effects on the non-managed species that are worse than the effects on all species of fishing under the so-called 'traditional, open access' fisheries (Quass and Requate 2012). Further, it might be true that the average German consumer still has only very limited knowledge about fish, overfishing and fisheries management, but it is also true that German consumers are increasingly interested in eco-friendly food production and that organic food is a booming branch in Germany. Consequently, the German fish finger manufacturers have realized that reliable eco-labels for fish products can help them to reach larger market shares. Today, the Marine Stewardship Council's (MSC) label is the best-known of several fish-related eco-labels in Germany – a sign that certification practices are transforming the packaging behavior of processing companies (Marine Stewardship 2009). While the MSC-label cannot solve all problems related to the adverse effects of German consumers on fisheries management, not least because there are still many problems with eco-labeling of fish and fish products (Ward and Phillips 2008), it needs to be recognized that MSC-labeling has at least counteracted one of the main problems of generating acceptance and support for fisheries management schemes in Germany.

It may still be true that consumers in Germany at the beginning of the twenty-first century are as poorly informed about global fisheries, fish species and overfishing as their ancestors of a hundred years ago. But they are, at least, interested in an eco-friendly behavior and are using labels like the MSC to compensate for this lack of knowledge. They might still not care about what species was used in manufacturing the fish fingers they purchase, but they do care about whether the fish was caught by a fishery that is certified by an organization like the MSC. So, while the fish finger manufacturers can still, technically, substitute one species for another, certification processes like those of the MSC have imposed new constraints on their ability to effect this strategy.

As this example demonstrates, any kind of fisheries management system needs the consumer if it is to be effective, and needs to be backed by comprehensive management of all species, globally. Fisheries management systems tend to be highly complex and hard to understand for average consumers, but eco-labels have simplified knowledge acquisition for consumers. As long as consumers were not taken into account and fisheries management was not global and effective, the fish processing industry could hop from one species to another. Together, a lack of knowledge about fish among German consumers combined with the normalization of a mass produced, standardized, pre-processed, frozen fish product, the acceptance of lax packaging standards regarding the actual ingredients, and the agonizingly slow extension of effective management practices from fishery to fishery, from territory to territory, and from stock to stock, enabled German manufacturers of frozen convenience products like fish fingers to circumvent the partial and geographically limited introduction of quota management, ITQs and other fisheries management schemes for most of the second half of the twentieth century. The overall effect, intended or unintended, was that the processors helped to drive a boom and bust cycle of overfishing from one species and fishery to the next. If one species became subject to management schemes, the companies simply substituted it with another that was still ‘open access,’ and, thus, continued large-scale production without being constrained by fisheries management efforts.

We may hope that the era when simply buying a package of fish fingers was the standard in Germany will end soon. Buying a package of fish fingers that shows an eco-label is definitely a step forward when it comes to the development and acceptance of fisheries management schemes, but, in the end, it is still a long way short of the preferred situation in which consumers no longer shop for ‘fish fingers’, but for ‘cod-,’ ‘Pollock-,’ ‘Alaska Pollock-’ or ‘hake-fish fingers’. If consumers are to become part of the efforts to establish successful fisheries management for sustainability, the species used for manufacturing as well as other kinds of production chain transparency will be required.

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Part III
Leading Edges and Ideal Wakes?

Chapter 4
Context and Challenges: The Limited 'Success' of the Aotearoa/New Zealand Fisheries Experiment, 1986–2016

Gordon M. Winder

Abstract New Zealand's quota management system (QMS) and ITQ system is now 30 years old and has its own highly developed literature. During the 1980s and 1990s this literature generally interpreted the ITQ experiment in positive terms: issues of allocation, equity and industrial performance were effectively addressed through the QMS/ITQ regime; the fisheries were well managed; and the policies resulted in economic growth. But since 2000 the literature has moved on from these issues of the past. Increasingly the regime is seen as being challenged by other developments, and no longer delivering expected economic results. QMS and ITQ are now regarded as useful and effective instruments of past policies but insufficient on their own for future fisheries management: they need to be buttressed by other fisheries management policies if environmental and economic expectations are to be met; and they need effective policing since the track record of enterprise behavior reveals that the firms are not committed to sustainable development of the fisheries but to obtaining rentier profits from their quota. New Zealand is understood as a special context with special challenges for fisheries management.

Keywords Aquaculture • Ecosystem • Governance • Legitimation • Indigenous rights • Neoliberalism • Overfishing

4.1 Introduction: Context and Challenges

Context matters in fisheries management (Steelman and Wallace 2001) and Aotearoa/New Zealand – the name reflects an aspiration for an inclusive and post-colonial society embracing indigenous visions – constitutes a distinctive context for fisheries management and the implementation of individual transferable quota (ITQ). This is not only because of the special situation of indigenous groups within the fisheries

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and society (De Alessi 2012) but also because of the country's geography of fisheries and its specific history of fisheries management and fishing industry development (Winder 1998; Straker et al. 2002; Salmon et al. 2005), because of the character and effects of neoliberalism in New Zealand (Larner 2003; Larner et al. 2005; Le Heron 2007; Campbell et al. 2009, 2012; Lewis 2009, 2012), and because of recent patterns of globalization in New Zealand. In Aoteoroa/New Zealand, ITQs were designed and introduced as only one set of reforms among many other neoliberal initiatives, and it is fair to say that they were of relatively minor significance in the society as a whole. Crucially, fish stock assessments under what is known in New Zealand as the quota management system (QMS) and ITQs were introduced at about the same time, and were introduced to stimulate investment in the fishing industry at a time when the national industry was still in its infancy, had realized opportunities in the inshore fisheries and were beginning to develop offshore capacity and export success (Straker et al. 2002). QMS and ITQ were meant to provide the foundation for a round of investment and restructuring, including the removal of some vessels from the inshore fishery. Equity and sustainability were watchwords of the time.

Thirty years on the sector now faces very different challenges than those of the 1980s. The fisheries, aquaculture and seafood sector is now assessed as showing lackluster performance, compromised by lack of attention to value added and marketing, changed currency relativities, and an inability to source more and higher quality resources (Norman 2016). Companies use foreign vessels and processing facilities which have reduced costs but compromised regional economic goals. Over the decades, the QMS/ITQ regime has been augmented by more and more management practices – place-based controls on fishing, planning for environmental effects, and marine protected areas – that hark back to practices in place when QMS/ITQ was introduced but which were thought to be unimportant at that time. Indeed, these new practices are themselves partly the result of critiques of QMS/ITQ from marine ecosystem science and New Zealand's environmental lobby. Māori fisheries interests constitute an important group whose status as Treaty of Waitangi partners rather than simply as stakeholders complicates and potentially destabilizes the legitimacy and goals of the government's QMS/ITQ regime. All of these aspects, and not least the special character of the neoliberal reforms involved, mean that this has been a unique fisheries experiment and, despite promising results in the short term, one that has not performed to initial expectations in the longer term. Instead, it can now be seen to have fulfilled many of the expectations that Evelyn Pinkerton (2015a) has for an ITQ regime.

This chapter first outlines important aspects of the fisheries context in New Zealand, that is the factors that set the New Zealand scene apart in international comparisons. It then sketches in the ITQ 'success story' that has been written into international fisheries literature from New Zealand before noting that critical attention to the industrial and environmental performance under the regime has mounted in the last decade. The chapter then highlights the challenges that have emerged and that compromise the effects attributed to 'ITQ'. New Zealand's QMS/ITQ management regime is now under threat from unexpected and new developments. QMS and ITQ, have been made into hybrid entities in order to cope with the practical demands

of fisheries management. They are now being sidelined by competing resource appraisals of coastal and marine resources. In these ways this chapter signals the conditionality of the 'success' of ITQ and confirms that, having successfully promoted a highly capitalized fishery, the resource allocation and property rights regime is now beset by difficult problems of managing resources and harvests, including a crisis of legitimacy.

4.2 Context Matters

The New Zealand government oversees an enormous EEZ of four million square kilometres, the fourth largest in the world, but this asset does not have high average biological productivity by world standards because of sea temperature and nutrient supply (Rennie 1998). Commercially useful species are widely dispersed and co-located, and many of the few hot spots of biological activity are located in coastal areas where they are subject to competing stakeholder interests. Approximately 60% of the commercial fish harvest comes from fishing the Chatham Rise and Subantarctic areas, with another 30% caught off the country's west coast (Brake and Peart 2015: 171). Together these deep water fisheries are readily accessible from the ports in Cook Strait or the South Island's Pacific coast, and are now mainly fished from Nelson, Christchurch and Timaru. In addition, most of New Zealand's coastal waters are fished by commercial fishers. However, the Tasman Sea coasts of both islands have remarkably few ports and these feature dangerous port entry and exit conditions due to treacherously shifting bars and a dynamic longshore drift. The Pacific coasts offer more suitable port facilities and the best fishing bases are therefore located where both coasts are easily accessible, and especially in Nelson. In turn this means that there were and are few single industry resource towns dependent upon fisheries (but see Duncan 1982). Rather, fisheries activities nestle among the array of processing, warehouse and transit facilities on the busy wharves of diverse urban economies (Winder 1998).

Fishing enterprises have adapted to the geography of the fisheries through diversification strategies (Winder 1998). Rather than specialize into specific types of fish they tend to capture and process a variety of species and several key players have also invested in aquaculture operations in order to maximize factory throughput and spread this out over the seasons. Their waterfront freezer facilities can be rented to fruit, meat or milk product exporters. There are in fact many diversification strategies at work in the industry (Rees 2006) and these have decisive impacts on the profitability of companies, even their willingness to abandon the industry.

Settler governments systematically removed Māori from their traditional fisheries while promoting privileged access for settlers to 'new' commercial fisheries. This involved ecological imperialism, including settling Canadian trout into rivers and streams, as well as dispossession, such as the clearing of nets, weirs and property markers from coasts and banks. While the process was never fully completed, Maori traditional fisheries were suppressed.

The Treaty of Waitangi (1840) is New Zealand's founding document and it guarantees to Māori their traditional and customary resource rights, including ownership of land and resources. From the late 1960s, Māori have sought to gain redress for more than a century of unequal treatment, land alienation and rights losses through reference to their rights under the Treaty. This became possible in 1975 when the Waitangi Tribunal, a permanent commission of inquiry, was established to research and suggest redress for breaches of the Treaty committed by the British Crown and its agents. The process, still ongoing, has resulted in the government offering apologies, substantial reparations and the specification of rights. De Alessi (2012) finds that Government has coupled the redress of grievances not only with transfers of fisheries assets and capital to Māori, but also with requirements under the QMS/ITQ property-based fisheries management regime that have forced iwi (tribal units) to focus on capital-asset management rather than transferring wealth to Māori. Undoubtedly, Māori interests have been empowered through the Treaty settlement process, but, for many Māori, the results are disappointing. Fisheries are an important aspect of not only their grievances and the process of Treaty settlement but also Māori aspirations for fishery management rights. Consequently, the process of defining Māori interests, management and *rights* (as opposed to *privileges*), has posed serious issues for fisheries management throughout the 30-year history of the QMS/ITQ regime.

Despite Government promotion, New Zealand's commercial fisheries cannot be said to have featured tens of thousands of fisheries-dependent petty commodity producers in 1980 (Winder 1998) and this means that the QMS/ITQ regime cannot be accused of rationalizing them out of existence. Most controversy focused on the initial removal of up to 1800 part-time commercial fishers, mostly operating in the inshore fisheries, without compensation. Small boat fishermen continue to be forced out of the ownership of access rights (Stewart and Callagher 2011), but there has been no further dramatic rationalization of small-scale commercial fisher rights.

There are, however, an estimated 900,000 recreational fishers (up from the estimate of 500,000 made in the 1990s), who, from a fleet of around 420,000 vessels, compete for coastal fisheries (Hersoug 2002a; Nelson 2016). Such estimates are highly contested since there is no licensing system to provide reliable figures. Integration of recreational fishers into the QMS has thus far proved an intractable political issue since recreational fishers refuse to accept a share of TAC, to discuss licensing or to contribute to the administrative costs of the QMS system, while simultaneously demanding increased participation in management. Recreational fishing also has a distinct geography: while somewhere between 16 and 25% of New Zealanders participate in recreational fishing, 80% of this activity occurs in the northern half of the North Island (Winder and Rees 2010: 159–161). This in itself is a major set of economic activity comprising not only boat building and repair, coastal land development including marina and second home construction as well as restaurant and tourist accommodation, but also annual fishing contests. Note that in February 2006 the Lion Red Snapper Classic on Ninety Mile Beach attracted almost 1000 surfcasters and handed out $250,000 in prizes. While the fishing industry's

annual export tally of around $1.5 billion is important to the New Zealand economy, domestic tourism, coastal land development and boating are also important.

Despite changes in institutional structures over the last 30 years, the fisheries have enjoyed relatively stable administrative conditions. Responsibility for managing New Zealand's fisheries has been exercised through successive administrative units. A Ministry of Fisheries was broken out of the Ministry of Agriculture and Fisheries only to be subsumed more recently into a 'super ministry' called the Ministry of Primary Industries. Nevertheless, QMS and ITQ have been cornerstones of each ministry's governance. It is therefore useful here to simply refer to 'the Ministry'. Government officers are aided in the governance of the fisheries by government owned research institutions, notably the National Institute for Water and Atmosphere, and by a sector organization, recently renamed SeafoodNZ.

There is a specific history of industry development in New Zealand. With the Fisheries Amendment Act (1963), which established a Fisheries Industry Board and declared the 12-mile limit, the government set about an expansion of the commercial fishery. Between 1963 and 1983, the fleet grew from 1727 to 5178 vessels, and landings increased 6–7% per annum, in part fueled by $67 million of loans and export subsidies (Rees 2006: 79). The industry profited from joint ventures in the 1970s and capture and processing technology was significantly upgraded. The declaration of the EEZ in 1977 was seen as an opportunity to once again grow the industry by gaining access to deep sea fisheries previously fished by foreign trawlers. The industry invested $47 million in vessels and up to $30 million in processing facilities 1978–1982 (Sharp 1997).

This government-sponsored expansion took its toll: by the late 1970s the industry was again marked by overcapitalization, inshore stocks were under threat, catches were declining and a number of fishers were in arrears on state loans (Rees 2006: 79). Government intervened through moratoriums on new fishing permits (1982) and on lending for inshore fishery projects (1984), and by giving the Minister of Fisheries broad new management powers. He exercised these by first introducing annual transferable quota based on catch history in deep water fisheries (1983), then by removing the commercial rights of part-time fishers without compensation (1984), and then by introducing the QMS and extending ITQ to cover most commercial fisheries (1986) (Rees 2006: 83–85).

The QMS and ITQ were introduced at about the same time and, despite complaints over the initial rationalization of inshore fishers, and ongoing controversies over the behaviour of some fishing enterprises they have, together, proved to be durable institutions. In 1986 the New Zealand government established not the first but the world's largest ITQ system under a catch share system: by 2005 it covered 257 fish stocks involving 93 species (up from just 27 in 1986) and located in 1.2 million square nautical miles of EEZ (Rees 2006: 8). The system is quite comprehensive in scope but imposes a high administrative burden.

QMS was adopted to address mounting concerns in the late 1970s over an underpressure inshore fishery, and to prevent overexploitation of the deep sea fisheries. In this context, the new Total Allowable Catch was set lower than previous harvest totals, thus forcing rationalization of fishermen (Pinkerton 2015a: 112). ITQ was

introduced because the government did not intend to pursue a subsidy programme to grow the national fishing industry, planning instead to use the market of ITQ rights to promote private investment to build a domestic industry capable of capturing rents in the deep sea fisheries. The short-term effect of the ITQs was meant to be the consolidation of control over quota in the hands of those with access to capital. This neoliberal policy was the result of the New Zealand government's dire financial plight at the time, itself the result of pursuing state-led development initiatives through subsidy programs through the 1970s in the face of inflationary times and high cost credit, and the political response at the time. Caught in these specific circumstances, New Zealand governments set about a sweeping restructuring of state sector activities during the second half of the 1980s, and, at the time, the fisheries were a minor consideration in their efforts. Nonetheless, the QMS/ITQ regime was a *compromise*: neoliberal attributes (notably the market in ITQ and the idea of the responsible private property owner) were combined with a coherent industry policy, which later took the form of a cluster initiative but already in the 1980s featured clearly productionist values and goals. Additionally, the regime was harnessed to the Treaty of Waitangi settlements process which would eventually involve justice and political redress for the colonial appropriation of Māori fisheries rights, even though it was not at all clear at the time what form this would take.

4.3 The 'Success' Story

Initially, the introduction of the QMS/ITQ regime in New Zealand was backed by favourable scientific reports, especially from economists (Clark et al. 1988; Sissenwine and Mace 1992; Clark 1993; Sharp 1997; Batstone and Sharp 1999) whose research showed improvements in productivity and production as a result of the reforms to resource management and allocation. Economists linked resource management in the fisheries to industrial policies framed in terms of Michael Porter's ideas about competitive advantage and cluster building and designed to further develop the competitiveness of the New Zealand seafood industry (Crocombe et al. 1991). The hallmarks of success were clear to see: there was economic growth with increased industry efficiency; the fisheries were apparently well managed with few signs of overfishing; the costs of fisheries management were small and companies were expected to pay for these costs; this occurred alongside inclusion of indigenous people in the fisheries; and all of this is apparently the result of QMS and ITQ.

Analysts have confirmed the positive achievements of this experiment, with most attention first being devoted to the ITQ allocation system (Shallard 1996; Sharp 1997, 1998; Batston and Sharp 1999; Clark et al. 1988; Russell and Campbell 1999; Sissenwine and Mace 1992; Straker et al. 2002). It is generally agreed that, under the QMS/ITQ regime introduced in the 1980s, quota ownership and fishing effort were rationalized, and a larger catch was achieved with fewer vessels (Hersoug

2002a). These were expected performances (Symes and Crean 1995; Grafton 1998; Grafton et al. 2000).

As the industry restructured following the introduction of ITQ, critical voices were heard over issues related to the allocation of rights (Wallace 1988a, b; Cochrane 2000). Notably, Hawkey (1994) highlighted the effects of the rationalization of rights on fishers and fishing communities in Northland. In addition, there was a protracted debate among Māori over the distribution of rights allocated to them collectively. However, the issues raised since then increasingly have nothing to do with the allocation of fishing rights under ITQ or the effects of this system on the race to fish. For example, researchers have addressed issues such as how to manage harvesting when the catch is multi-species but the company responsible for the catch only has rights for one or two of the species caught (Peacey 2002). Also, the extent to which QMS/ITQ promoted 'New Zealandization' of the EEZ fisheries has been questioned (Rees 2006; Simmons 2014).

By the early 2000s it was clear that research in New Zealand had left the issue of the race to fish and the allocation of rights far behind (Hersoug 2002a; Yandle and Dewees 2003). Researchers turned to issues of stakeholder organization (Hughey et al. 2000; Yandle 2003; Massey and Rees 2004a), what the limits to prospects for co-management were (Hersoug 2002b), assessing prospects for self-governance in the industry (Yang et al. 2010), and whether the industry should be required to pay for research into the resource (Harte 2001), which it still is. The economic performance indicators for the fisheries (Rees 2003) and the knowledge cluster developments in the industry (Rees 2006) have been reviewed. The performance was poorer than expected, but this did not seriously disturb either the rhetoric surrounding ITQ or the status of QMS: both remained cornerstones of fisheries management.

Around 2010 the industry exported over $1.4 billion worth of fisheries products, up from $168 million in 1981. It employed 5680 full-time equivalent workers, about the same as in 1981. It operated 1278 commercial vessels compared to 2375 in 1984 and held quota worth $4 billion (Ministry for Primary Industries http://www.mpi.govt.nz/). New Zealand companies now claim to use a sustainably managed resource, to produce seafood products for export certified by international NGOs including the Marine Stewardship Council (MSC).

With a full-time staff of just 453 backed by 208 honorary fish officers and 51 observers, and with a budget of a mere $103 million, the government manages a vast EEZ, with bottom trawling banned from 31% of this area. The QMS programme now covers 97 species and 633 individual stocks, and commercial fishers pay for a part of the necessary fisheries science. The actual catch of 409,126 tonnes is substantially smaller than the TACC of 599,126 tonnes, a fact hinting at selective company and quota owner behaviours, a matter to which we must, in due course, return. Nevertheless, the Ministry claims that the fisheries are generally well managed. The Ministry reports that 67% of the assessed stocks are at or near target levels. Recreational fishers catch a further 25,000 tonnes and Māori customary fisheries, now recognized, legal and managed, harvest a further 4813 tonnes. Investments in aquaculture have occurred so that fish farming was responsible for exports of $279 million of product in 2010 compared with none in 1981.

These results cannot simply speak for themselves, however, and have been the subject of ongoing debates over industry performance (Connor 2001; Hersoug 2002a; Rees 2003, 2006). The efficiency gains in fleet use and industry production are not quite as positive as first thought. Connor (2001: 165) showed that total domestic fishing capacity actually increased by 43% between 1987 and 1998 because of investments in larger vessels and despite a reduction in the number of vessels largely through a rationalization of smaller vessels. Direct employment certainly grew from 5670 in 1981 to 8130 in 1996, but then stagnated (8151 in 2001) before declining to 5680 in 2009 (Rees 2006: 126). There has been a substantial restructuring of the workforce, with a spatial localization of employment in a few regions, principally Nelson, Tasman and Christchurch, and declines elsewhere, with a long-term decline in the number of workers employed in fishing and with growth in part-time processing work. So export success is accompanied by casualization of the workforce. Further, throughout the period 1960–2010, 43% of all commercial catch was caught by foreign flagged vessels (Simmons et al. 2015). Large quantities of New Zealand fish are now processed in China (Stringer et al. 2011). In these ways, the long-term, ITQ-induced problem, recognized by Evelyn Pinkerton (2015a: 116), of ease of transfer of quota and jobs out of communities and out of countries has certainly become manifest in New Zealand.

The quantity of seafood exports rose from 120,000 tonnes in 1981 to 350,000 in 1998, before declining and stagnating. Moreover, the return per tonne of exports in constant 2002 dollars peaked at $8139 per tonne in 1984 but ranged from a low of $3637 to a high of only $5400 per tonne between 1988 and 2002 (Rees 2006: 106). The value and volume of seafood exports has certainly increased, but this has occurred along with a shift away from high value inshore species to lower value, high-volume deep-water species, and to aquaculture products. Eugene Rees (2006: 143–145) concluded that the variability of returns to fishing, the changing fleet structure combined with increasing overcapacity in the fleet, increasing costs of fishing, changes in the composition of exports to more low-value fish, and currency fluctuations all cut across productivity gains through to 2002.

Indeed, a recent assessment of the fishing, aquaculture and seafood sector noted “falling employment” and “lackluster long-term export revenue growth” but saw opportunities for “strong growth” (Norman 2016: 2). In 2015, employment was down 26% on 2001, with only “modest gains in production per worker” (Norman 2016: 2). While aquaculture employment has been stagnant since 2000 at 600–700 full-time equivalents (FTEs), and fishing employment fell from 2000 to 1800 FTEs, 2100 FTEs were cut from seafood processing through plant closures and automation (Norman 2016: 4). These developments would not be of concern to economists if the sector was increasing its returns and productivity. Despite its important role in merchandise export receipts (equal to the wine industry), the sector is responsible for only 0.3% of all value added in New Zealand (Norman 2016: 3). According to David Norman (2016: 11), the entire sector now worries about finding appropriately skilled labour and the urgent need for recapitalization and investment.

From a longer term perspective, initial increases in profitability proved unsustainable largely because the factors influencing these have little to do with the QMS

or ITQ: cost structures and currency fluctuations are much more important. But David Norman (2016) additionally worries about the need to grow value in the sector and that means: (1) more product (especially aquaculture products); (2) fresher and better quality fish and that means a shift away from generic frozen or filleted whitefish which attract low prices; (3) a coherent New Zealand seafood brand and label; and (4) more precision in harvesting. Thus, the sector is seen to be underperforming and in need of investment and restructuring. In short, a new industry policy is required.

The high initial expectations of the QMS/ITQ regime – increased productivity and performance for commercial interests, better returns on capital, rationalization of fishing effort, marketization of property rights and sustainable management of stocks – have not been achieved over the longer-term, and the resulting mixed performance is alarming in specific ways. I see David Norman's report as damming evidence of the Government's neglect of a coherent national, let alone regional, industry policy for the New Zealand seafood industry. The issue is now whether his report can mobilize support for a concerted industry policy. His report is also evidence for the triumph of rentier practices among the quota owners, who have clearly moved from investment in productive enterprises to capturing rents from their market power in quota (Pinkerton 2015a: 115).

While the ITQ has seemingly curbed 'the race to fish', the QMS has been sorely tested in several important commercial fisheries through serious overfishing of hoki and snapper, the outright stock collapse of orange roughy, and the displacement of New Zealand 'racing' to other jurisdictions, such as Chile (Rees 2006: 147–194). Māori rights in the fisheries should not be construed as the outcome of QMS or ITQ but of political and justice movements within New Zealand society. Despite the recognition of Māori rights in the fisheries, through a protracted, ongoing and controversial process, issues of social equity in the fisheries have not otherwise been addressed. Indeed, De Alessi (2012) interprets iwi management of quota as increasingly complying with asset-based management principles rather than community-based management principles. All of this suggests that the neoliberal rhetoric of 'ITQ' 'success' masks serious issues in the New Zealand fisheries and society.

4.4 Emerging Challenges

The agreed neoliberal agenda ran into unexpected challenges, each of which is setting new spatial constraints on where the QMS and ITQ regime is actually allowed to operate. Far from being simply co-opted into the neoliberal fisheries regime Māori pose significant challenges to it because of their assertion of customary fishing rights in coastal areas, and their assertion of treaty partner rather than stakeholder status. An emerging critique of biological stock assessments has combined with conservation movements to challenge the QMS practices and to conserve areas from fisheries exploitation. Long seen as the solution to the lack of growth in the fishing industry, aquaculture developments have been engulfed in controversy,

stymieing industry hopes of evading the QMS and ITQ constraints on their growth. In turn this has made 'fragmented governance' in coastal areas a pivotal political issue. Finally, due to their blemished record as environmental users, the fishing companies found themselves the focus of intense scrutiny with more observers now seeing them as having betrayed not only the environmental stewardship aspirations of the regime but also its national and regional economy objectives.

4.4.1 Māori Rights

In interesting ways, Māori pose significant challenges to the neoliberal regime. The government's transfer of a major fishery company, Sealord, into Māori ownership simultaneously went some way toward compensating Māori for past abuses of Māori interests in the fisheries (Walker 1992), prompted a major dispute among Māori over how the assets were to be distributed, and co-opted them into the QMS and ITQ system (Winder and Rees 2010). Despite this early sign of integration of Māori interests into the QMS and ITQ system, negotiations between Māori and the government over rights in the fisheries have proved protracted (Mccormack 2012a, b). This is because Māori rights are located in marine and coastal space and involve the need to recognize Māori authority over and ownership of resources, as well as the simultaneous curtailment of rights granted to other New Zealanders. The process of establishing Māori permitting of customary fisheries is well under way. In 2010 there were 10 Mātaitai reserves covering 185.4 km^2 and 36 more were proposed. A total of 346 Māori fisheries guardians had been registered. Other developments include the Ministry of Research, Science and Technology's Vision Mātauranga 2007 policy framework for acknowledging, harnessing and developing Māori knowledge. Iwi, who are now important commercial stakeholders in their own right, are prioritizing local development and aquaculture in their future investment strategies, and there were signs in the early 2000s that they would look to develop inshore fishing operations using set nets and small boats in what would be a return to earlier patterns of commercial harvesting. But the main commercial activity of their businesses remains managing quota and leasing ACE holdings, so the extent to which they will break from the sector mould has yet to be seen.

As the government begins to constrain rights allocated under the QMS/ITQ regime, Māori are contesting its new measures. For example, in early 2016, following the government's proposal to establish the Kermadec Ocean Sanctuary by 1 November 2016, Māori fisheries trust Te Ohu Kaimoana (TOKM) filed proceedings against the government in the High Court in March 2016 (Davison 2016a). It argues that the proposed 620,000 km^2 no take zone would extinguish customary and commercial fishing rights. They object to what they see as unsatisfactory consultation with Treaty partners over the new statutes, in effect with 2 iwi and not all 58 iwi whose commercial interests are represented by TOKM. At stake is a catch of only 20 tonnes of fish, but mostly highly migratory species such as tuna (so these could be caught outside the sanctuary) valued at around $162,000. The action by TOKM

is therefore more about participatory governance in the fisheries than about opposition to declaration of a marine protected area (MPA). It highlights the issues of contested legitimacy that now surround government policy.

4.4.2 Critique of QMS Practices

Biological stock assessments were critiqued (Wallace 1988a; Copes 2000; Dayton et al. 2002) and attention was drawn to the ecological impacts of trawling (Turner et al. 1999). Scientific warnings over the seeming lack of concern for ecosystems in QMS management gained weight from the dramatic discovery and subsequent collapse of orange roughy stocks (Clark 2001) and the difficulties firms encountered in maintaining MSC certification of another species, hoki, due to their postharvest practices. New Zealand fisheries policy came under attack for not paying enough attention to ecological sustainability (Stewart and Callagher 2003). A dialogue between fisheries science and ecosystem science was called for since only one of these was actually enrolled in support of the ITQ/QMS framework for commercial fisheries (Le Heron et al. 2004; Massey and Rees 2004a, b). Recently, Cryer, Mace and Sullivan (2016: 2) interpret the Ministry's augmentation of its directed fish stock management with measures to combat incidental capture of protected species, benthic effects from trawling, changes to marine biodiversity and the protection of habitats as signs of a "first-level ecosystem approach to fisheries management", but it is important to understand these measures as the result of a decade and a half of scientific contestation and environmental movement action. The fisheries have yet to witness 'second-level' ecosystem management.

From the fishing industry's perspective 'operational challenges' have emerged. In early 2016 fishers were reported to be complaining of inaccuracies in TACC setting and of being incentivized to dispose of bycatch at sea since it is illegal to land it without quota rights (Norman 2016). But the issues are far more wide ranging and significant than this plea for clarity implies. In their recently published reconstruction of New Zealand's catch record, Simmons et al. (2015) find that, for the entire period 1950–2010, the actual catch in New Zealand waters was 2.7 times what the Ministry reported to the FAO, and, for the period since the introduction of the QMS, 2.1 times. The difference, they argue, is a matter of misreported catches and underreported industrial catch and discards. In turn, this continual under-reporting has potentially damaging effects on the ability of the QMS scientists to deliver 'accurate' assessments of fish stocks, since catch records are inputs into the stock assessment process (Maguire 2015: 124–125). Their research contests the positive tone of other assessments of the QMS (Mace et al. 2014). In recent months, scandals have reverberated through the Ministry as, first an independent inquiry into fish dumping revealed its systematic failure to bring prosecutions against offenders despite its efforts to assemble evidence (Davison 2016b, Taylor 2016). Then camera footage from Ministry files was released showing dolphin bycatch, again, evidence which

the Ministry had not used to lay charges against the company (Davison 2016c). Not surprisingly, accusations of industry capture of the regulators flew.

Researchers have pointed to the hollowing out of public sector expertise, and reliance on experts who have developed their careers by working for more than one of the key science and policy information providers. This means a situation in which the available independent experts either share detailed insider knowledge of apparently competing approaches from competing service providers or share the same perspective even though working for apparently independent institutions, neither of which may foster development of ecosystem-based management (Massey and Rees 2004a, b; Bess 2012). Thus, aspects of the expertise behind and around the QMS/ITQ regime remain controversial and contested.

In response the Ministry has endeavored to better regulate harvesting practices and fishing places, especially through the development of fisheries plans but also through the declaration of more marine reserves safe from harvesters (Drummond and Wyatt 2002; Winder and Rees 2010; Yang et al. 2010). Recently commercial vessels have been prohibited from harvesting in large areas of the EEZ, though these areas were not that important to the commercial catch. The Ministry set about developing co-management by promoting consultation around local fisheries plans and local conservation plans, but these efforts have been protracted and marked by both some apparent successes, such as in Fiordland, and some frightening incidents, notably a few violent clashes over management of fisheries on the Kaipara Harbour, north of Auckland. Māori film director Barry Barclay's documentary *The Kaipara Affair* (2005) made the cultural dimensions of the disputes explicit. To date, these remain minor, ancillary projects to the intact QMS/ITQ regime.

Conservation directly challenges the neoliberal fisheries regime. To argue that MPAs are required to conserve biodiversity or species is to argue that the fisheries areas of the QMS are not functioning properly: that they do not deliver sustainable utilization and that an alternative regime is required if biodiversity is to be delivered. It is cautionary here to note that under the QMS/ITQ regime the conservation lobby is not framed as a stakeholder. The New Zealand Government set itself a target of placing 10% of its marine area into some form of protection, so as to provide a store of genetic diversity, to maintain the health of the wider marine ecosystems, to provide opportunities for recreation, marine tourism, scientific research and education, and to enhance New Zealand's environmental performance. To date a number of new reserves have been gazetted but the target has not been reached. Both recreational and commercial fishers see the strategy as squeezing them out of marine areas. Proposals for marine reserves tend to focus on waters adjacent to headlands and off-shore islands with deep water, or, in other words, prime fishing areas. Thus, the campaign to identify new marine reserves pits New Zealand's conservation lobby against its fishing lobby, in a way not seen during the first decades of the QMS/ITQ, when conservationists hoped to work through the regime to discipline the fishing industry.

4.4.3 Aquaculture Contested

Conflicts over aquaculture developments rank prominently among the new issues. Investments in aquaculture promise future economic growth (Winder and Rees 2010: 158) unconstrained by the QMS, but these prospects were frustrated, most clearly by the moratorium on aquaculture licenses imposed by the New Zealand Government in November 2001. The moratorium was imposed because of unfair allocations of marine and coastal space by regional councils. It was followed by reforms to aquaculture licensing in 2004 but these stalled over the government's obligation to transfer to Māori 20% of aquaculture space created between 1992 and 2004, a target which proved difficult to achieve. A series of regional agreements were eventually negotiated, the first in 2009, so that only in the last five years has the allocation of new rights been possible. Even so little new space was generated.

Future investment in aquaculture will nonetheless remain difficult, in part, because aquaculture developments fall under multiple regulations and agencies including both local and national governance. The reform process not only closed avenues for new marine farm ventures for a decade, but delegated the right to identify coastal areas for fish farms to regional councils, thus obstructing Māori rights to negotiate such matters with the Crown as Treaty of Waitangi partners. Further, many interests are involved with considerable potential for conflict. For example, the Northland Regional Council, which administers the region located to the north of Auckland, initially declared 125 marine areas in the coastal zone to be suitable for fish farming, but settled on only 19 of these as worthy of an aquaculture management area status, only to subsequently abandon this plan too. New Zealand's coasts are contested spaces and this dramatic contraction of available areas appeased many groups, including recreational fishers, boat owners, coastal residents and property developers but constrained aquaculture development. Māori, fisheries companies, residents, conservationists and recreational fishers are locked in battles for control of marine resources. Māori incorporations have been dismayed by the process: a series of expensive, failed or blocked commercial aquaculture projects have collectively eroded their capital resources. Meanwhile, all aquaculture interests voice concerns over sedimentation and polluting run-off degrading coastal waters, and over future production uncertainties due to a likely more volatile climate (Norman 2016).

4.4.4 Confronting Fragmented Coastal Governance

Together, these emerging issues forced the Ministry to confront the fragmented governance of New Zealand's coastal waters. Hersoug (2002a) noted that the then Ministry of Fisheries acknowledged 37 government agencies and stakeholders in addition to Māori, who, as Treaty partners, exercise guardianship of resources, and must be *partners* in resource management, not simply stakeholders to be consulted. Many developments in the EEZ and coastal waters lie outside the jurisdiction of the

Minister altogether but impact on fisheries management. Chief among these matters are the planning for aquaculture in coastal areas, planning for land-based coastal developments including marinas and boat harbours, management of marine reserves, and the regulation of mineral exploration in the EEZ (Rennie 1998, 2000; Gregory 2008; Hart and Bryan 2008; Winder and Rees 2010). Not one of these matters was even hinted at in justifications for ITQ or QMS. The answer to '*where* are the fisheries?' is increasingly important in the context of competing claims to use the EEZ and coastal waters. Under ITQ, companies have rights to fish for stocks in particular areas, but increasingly these rights are compromised by other, new rights holders in mining, oil and gas, conservation, aquaculture, even defense.

Perhaps the best evidence of the increasingly complex web of marine related management engulfing the fisheries interests is the Environmental Defence Society's recently published guide to managing marine environments (Brake and Peart 2015). The Society is an advocacy group and so its guide to New Zealanders on what constitutes best practice in marine management, in fact endorsed by the Minister of Conservation, situates fisheries management as but one aspect of the multiple layers of New Zealand marine management. Brake and Peart (2015) are at pains to guide environmentally conscious New Zealanders through the maze of marine management legislation, regulations and management practices. These are addressed through separate chapters on EEZ management, marine biosecurity, MPAs, MSP, major marine developments such as marinas, vessel management, marine recreation and tourism, as well as management of catchment-based activities, sand-mining, aquaculture, and exploration for and mining of minerals, oil and gas. Attention is also given to Māori and recreational participation in fisheries management. The effect is to insist on biodiversity and ecosystem health as the corner stones of marine environment management, a direct challenge to the sustainable utilization goal of fisheries management.

With respect to the fisheries the authors contend that "There has been a growing awareness that fishing activity needs to be managed by an approach which considers the ecosystems within which the fisheries are located." (Brake and Peart 2015: 188). They note that increasing critical attention is being given to the assumptions of QMS and especially to the idea that 'fishing down' a stock will improve fish reproduction. In addition to the stock assessments of its National Fisheries Plans the Ministry has been producing a series of new standards, such as the Harvest Strategy Standard (2008) and the Research and Science Information Standard (2011) each of which codifies acceptable scientific and business practice in the fisheries. The Ministry has an observer programme to monitor fisher behavior and to collect fisheries data. The Ministry's efforts have shifted towards advancing precision seafood harvesting using less intrusive gear (Brake and Peart 2015: 190–196). The industry is now being forced to come to terms with benthic impacts from fishing methods and with bycatch issues related to non-target fish, seabirds and marine mammals. At issue is the social license to operate. Solutions include innovation, such as a plastic liner to be used in trawls, and modification of trawl nets to allow sea lion escape. This means that new gear, as well as new season and place-based constraints on fishing are being added to the QMS/ITQ system, some of which are being

implemented voluntarily by the sector. Not only do these trends confirm Evelyn Pinkerton's (2015a: 118) diagnosis that ITQs are ineffective on their own and must be buttressed by input controls and effective enforcement, but whether such measures will satisfy the environmental lobby intent on reducing impacts on non-targeted species, impacts on seabed habitat, and the disruption of marine ecosystems remains to be seen.

It is increasingly clear that the EEZ is not simply an ocean space reserved for fishers who are no longer even prioritized in many marine areas. Like the European Commission and the Chinese administration, New Zealand's government is increasingly interested in developing its blue economy in which tourism, mining, energy, transport and aquaculture are all likely to be more commercially attractive than fishing (Winder and Le Heron 2017). Work has begun to pave the way for investments in such a future economy. The EEZ and Continental Shelf (Environmental Effects) Act 2012 provided a framework for identifying and managing environmental effects from the development of aquaculture, mineral and energy production in marine and coastal areas. The need for a framework to facilitate integrated management of especially coastal environments and science-policy dialogue has been signaled by several recent efforts to establish priorities for New Zealand marine science (Bremer and Glavovic 2013; Brake and Peart 2015; Lundquist et al. 2016). Government has dedicated some of the country's scarce research and development funds to a Sustainable Seas National Science Challenge meant to address precisely these issues (Le Heron et al. 2016). This means an opportunity to outline a fundamentally different approach to fisheries management than that developed under the QMS/ITQ framework. Following international precedents, themselves in early stages of development, New Zealand social and marine scientists are currently working on ecosystem-based approaches to fisheries and marine management, using ecosystem services concepts and a natural capital approach to link the functioning of ecosystems with human well-being (Díaz et al. 2015). How much transparency and participation the planning for this new ocean future will have remain to be seen. It is not at all clear that a new mainstream expert management system will replace QMS/ITQ. It may be that the old neoliberal experiments of QMS and ITQ will be compromised by the new, for example, through newly declared MPAs colonizing fishing areas but leaving the QMS/ITQ intact, but operating elsewhere.

4.4.5 Fishing Companies Under Scrutiny

The activities of New Zealand companies have been subjected to intense scrutiny. Eugene Rees (2006: 147–194) noted the unsustainable behavior of some New Zealand companies when operating outside New Zealand waters, most notably their destructive exploitation of Chilean fisheries. There have been scandals at home: a few firms were caught in illegal fishing, others have been implicated in the foreign charter vessel inquiry into the dubious labor practices on these vessels (Stringer et al. 2014), still others have been caught trucking and high-grading fish. When

added to the overexploitation of hoki and the race to fish orange roughy in New Zealand waters it became clear that companies themselves could not be expected to fish responsibly on their own. And yet, as we have seen, Ministry oversight of the companies has again been found wanting in 2016, this time over discards, bycatch and underreporting of catch.

Yet fishing firms argue that their poor behaviour is the result of market failure and an inability of government to effectively manage markets. Constraints on growth at home due to the QMS and ITQ system, and the moratorium on aquaculture development, prompted some companies to seek out new opportunities to 'race for fish' either in jurisdictions with less restrictive fishing regulations than those enforced in home waters or by 'discovering' new stocks at home. The lesson learned was that constant vigilance would be required if the tendency to race for fish is to be avoided. Quite simply, companies desired growth rather than sustainability. So, while the recent rapid expansion of crayfish/rock lobster exports, rising from 11 to 22% of all seafood exports by value 2000–2015, and with 91% of these shipped to China (Norman 2016: 6), is gratifying for companies as they seek to bolster their bottom lines, this development has produced alarm among marine environment observers, who have apparently noticed worrying declines in the presence of this species even inside marine reserves (Raewyn Peart 2016, personal communication). A disconnect remains between company behaviour, QMS science and marine environmental science under the QMS/ITQ regime.

Most recently, New Zealand companies have been in the spot light over the terrible labour conditions on board foreign owned trawlers fishing for them in New Zealand waters (Stringer et al. 2014) and the relocation of their filleting operations from New Zealand processing facilities to China (Stringer et al. 2011). Such research can be read in various ways: as evidence of continued exploitative behaviour of labour in the industry, which has everything to do with the moral economy of exploitation in the neoliberal fisheries (Pinkerton 2015b); as evidence of the commitment of researchers to contribute towards critical social science; and/or as evidence of the new management imperatives at work in the fisheries administration. As they wrestle with shifting exchange rates and lower prices for white fish, New Zealand companies have turned to lobster, mussels and oysters, which together now account for 41% of export values, to licensing foreign trawlers and to overseas processing to eliminate costs from their balance sheets on the 45% of export value derived from frozen fish and fish fillet sales (Norman 2016: 6). In turn these developments expose the unsustainability of the company strategies at work behind the QMS/ITQ regime, strategies that compromise or conflict with the regime's environmental management goals and practices.

4.5 Conclusion

In the New Zealand fisheries literature ITQ, the race for fish, the QMS and the tragedy of the commons now play much reduced roles, even though they have an ominous presence in the sector's rhetoric. This reflects the state of knowledge on and the patterns of inquiry and critique emerging around ITQ, QMS and fisheries management generally. Attention has shifted to planning for aquaculture, conservation of inshore species through marine reserves, the development of additional place-based controls on fishing, registration of recreational fishers, and re-regulating EEZs for mineral extraction among other new uses. At the same time the managerialism that came with the neo-liberal policy framework of ITQ is at work. The movement away from centralized state control, towards diffuse, client-centered managerial interventions and assessments has consequences for how fishing communities and property rights are understood, how fisheries investment functions, how enforcement and conservation are carried out, how fisheries are assessed, and what the characteristics of ecosystems are thought to be. And on all of these matters New Zealand's QMS/ITQ regime now has questionable legitimacy. The long-term effects of ITQs are therefore broader in scope than the sustainability of particular fish stocks or whether expected economic growth and efficiency have been achieved. The point is that ITQs in New Zealand were only the bow wave and in the wake of that neoliberal boat came many other vessels. It is the identity, dynamics and effects of these other boat wakes that are crucial in the New Zealand scene and its futures.

Under the current fisheries regime in New Zealand the fishing industry claims a high standard of professionalism and has effective representation through the seafood cluster initiative in Nelson and through SeafoodNZ, its industry organization. Companies perceive the industry as the primary stakeholder in marine planning, a status legitimated through three decades of legislation and regulation, and by the value of quota. At work here are the neoliberal projects beyond ITQ and QMS that frame the fisheries (Pinkerton 2015b; Pinkerton and Davis 2015), in this case not the defunding of agencies responsible for environmental management but the consolidation of a fisheries regime based on a core group of stakeholders who were deliberately allocated the fisheries at the expense of small-scale fishers, and, later, labour rights and regional economies, and were aided by the government in their efforts to achieve agreed goals: economic growth, exports, 'efficiency', increased capitalization of the fisheries, and higher returns. These aspects of the broader neoliberal project became increasingly legible. There was, first and foremost, an economic understanding of the fishing industry and how it was to be managed.

However, the fisheries sector is now underperforming in economic terms and this threatens the political legitimacy of the QMS/ITQ regime. Now this is a new situation: the regime and the industry have usually been reported as having been 'successful'. On its own terms, the *initial* relative 'success' of the New Zealand experiment with ITQs – establishment of a new property regime, an end to subsidies in the fisheries, reduced fishing in the inshore fisheries, effective enforcement of the QMS, establishment of a professional and adaptive fisheries management system

backed by stock assessment science, and fisheries managed well for sustainability within the constraints of commercial imperatives – cannot be seriously doubted, but it is vital to understand the limits to this 'success'.

First, New Zealand's neoliberal fisheries project has had to be adapted to meet other pressing political realities, especially the need to negotiate Māori rights, but also the need for conservation policies, place-based controls on fishing, and input controls in the fishery. Alongside 'ITQ' there now stands a formidable array of other fisheries management practices that are vital to the management 'success'. And those practices, including Māori guardianship of resources and ownership of assets, make the QMS/ITQ regime a profoundly hybrid management system. This means that 'successes' cannot simply be attributed to QMS and ITQ. Equally, the need to develop additional fisheries management measures attests to the inadequacies of the QMS (Pinkerton 2015a), even though the elaboration of new Zealand's fisheries management as a place-specific management system has not displaced the QMS/ITQ regime. Together, marine ecosystem science and the environmental lobby have effectively critiqued the QMS and worked to hedge it in with new expectations, practices and constraints.

Second, guaranteeing and limiting privileges to the fishery so as to promote recapitalization of the fisheries for economic growth proved to be an effective short-term industry policy, but has not been followed up with commitment to a long-term industry policy. Resource allocation is only one component of industry performance. New Zealand fisheries companies now face constrained opportunities, have demonstrated unsustainable behavior in the face of resource constraints, and are now under pressure to add value and grow volume to meet government expectations. As they respond, they are less likely to question the rules of the QMS/ITQ regime, than to worry about the combination of apparently low returns on the high value of the quota assets they possess, a problem that shapes their behaviour: they have already become quota rentiers as Evelyn Pinkerton (2015a) expects. Norman (2016) foresees consolidation, elimination of mid-sized companies, increasing use of joint venture processing facilities, and increased market concentration which will bring with it heightened risks and market dependencies. He further finds that the sector's contribution to New Zealand GDP peaked at $940 million in 2003 and since then has fallen 16%. Given this unwanted performance what form will the future economic trajectory of the sector take and under what policy? The economic sustainability of fisheries management in New Zealand is seriously in question.

Third, the system cannot simply be transferred to other jurisdictions by importing the model of actually transferable, individually owned quota. No, the grounds for this policy 'success' lie in both a broad range of neoliberal experiments within New Zealand that legitimated and buttressed the policy and its effects, the absence and, where necessary, elimination of any serious opposition to the project, and the unique situation of a small and underdeveloped industry which could be directed into growth paths in particular ways by the government. ITQ rewrote the 'social contract' in New Zealand with, in the long-term, profound implications for fishing communities, as well as costly social transformations (Pinkerton 2015a: 120). Moreover, the framing of 'success' in QMS terms was initially possible because of

the weak voices of ecosystems science and the environmental lobby, a situation that no longer holds in New Zealand. Such conditions would also need to be exported with the ITQ model if it is to be 'successful' in the ways that it was in New Zealand.

Finally, now 30 years old, the QMS/ITQ project is being hedged in by growing interest in ecosystem-based integrative planning for marine and coastal areas. Whether a more prominent role for ecosystem science than before will improve environmental outcomes – and it may be that it does not – is one issue, but it is alarming that this new project shows distinctive neoliberal tendencies and is envisioned by government as a vehicle to be used to increase exploitation of marine and coastal resources (Winder and Le Heron 2017). At least the domestic politics over coastal developments and marine uses is now far more prominent, intense and contested than in the early 1980s when a shell-shocked public was amazed by the audacity of its neoliberal policy writers. In future New Zealand's QMS/ITQ regime will be subject to intense contestation, both direct and indirect, as the politics of managing New Zealand's seas and coasts sustainably are played out.

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Chapter 5
In the Wake of ITQs in Iceland, 1991–2011: A Dynamic Approach to Marine Resource Management Policies

Emilie Mariat-Roy

Abstract In this chapter, the author studies and analyzes the Icelandic ITQ system as a work in *process* and *progress*. In Iceland, ITQ policies for commercial fisheries have, from the very beginning, been mixed up in an unstable play of demersal harvest rights allocations and reallocations by the State. The numerous reallocation policies that have successively reshaped rights distributions since 1991 are a very stimulating object for anyone interested in the study of marine resource management in theory *and* practice. The ethnographic study of such an unstable resource management system is very challenging: a methodology had to be elaborated which would suit the study of an object which involved a number of different parameters and kept evolving very quickly. Far from having being adapted from theory, Iceland's ITQ system must be understood as a 100% homemade system constantly adapted to social demand. The aim of this chapter will be not to establish whether ITQs in Iceland have been a success or not but rather to point out *how* public authorities and stakeholders interacted and coped with the ITQ system to reshape and redefine it in various contexts.

Keywords Area-based management • Coastal jigging system • Fish processing • Fishing communities • Individualization • Labor relations • Longline concession • Privatization • Professionalization • Quota leasing • Reallocation • Regional quota system • Resilience • Self-management • Unstable resource management system

In Iceland, the ITQ system, implemented in the Fisheries Management Act, celebrated its 20th birthday in 2010. ITQ not only changed a field of activity, it wholly changed the Icelandic society and the representations of how society functions, on local and national levels. This chapter reports findings from dynamic, multi-case and multi-scale Social Anthropology research conducted in 2005 and 2006 and later, after the financial collapse of 2008, which compared the evolution and

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situation of seven fishing harbors in the West fjords, Western and Eastern region. The chapter analyses *how* ITQ functioned in different local socio-economic systems. Villages were impacted by the ITQ system but, individually and/or collectively, they impacted the ITQ system – the ITQ effects have been corrected in order to protect coastal settlements and their populations. The study of processes has been the methodological cornerstone of research because of the volatility of ITQ. The chapter highlights the main features of an individualization process resulting from the introduction of ITQ and identifies and analyzes its consequences and meanings. Many new or original things emerged within the ITQ policy on a local level: new practices at sea and on land, new kinds of seasonality, new social and economic status and skills for ITQ owners, new strategic partners and local actors, original forms of inter-professional mobilization, new social-economic bounds and forms of dependence, new forms of local mobilization, and new representations of social and labor relations. Beyond the various consequences of the ITQ system from one village to another, the analysis affirms that the socio-economic organization of fishing villages has been re-configured by both State policies and by local strategies. Attention is focused on four aspects of change: the professionalization of fishers and the construction of the self-managing stakeholder; the fate of land-based fishing communities and common property institution in the face of bio-economic reorganization; fish-processing, quota leasing and labor relations in biologically-based privatization schemes; and area-based management of diverse coastal and marine resources within and outside the quota system.

5.1 Introduction: The Metamorphoses of Fishing Activities and Policies

In Iceland, ITQ policies for demersal or groundfish commercial fisheries have, from the very beginning, been mixed up in a complicated and unstable play of demersal harvest rights allocations and reallocations by the State. For that reason, Iceland is a wonderful 'laboratory' for the study of the effects of ITQ, and, above all, for the study, at a local and national level, of a highly flexible society. Furthermore, far from having being adapted from theory, Iceland's ITQ system must be understood as a 100% homemade system: it has been constantly adapted to stakeholder needs and even to social demand. According to Helgi Grétarsson (2010), more than forty amendments were made to the Act before the legislation was re-enacted as Act No. 116/2006. The numerous reallocation policies that have successively reshaped rights distributions since 1991 are a very stimulating object for anyone interested in the study of marine resource management in theory *and* practice.

The study of such an unstable resource management system is very challenging and a methodology had to be elaborated which would suit the study of an object which involved a number of different parameters and kept evolving very quickly. It seemed essential to describe "how" the situation was "before" and "after" the implementation of ITQs, to identify the different types of changes which happened in

various fields, and eventually to take into account the internal policies which were carried out within the ITQ system. As the lawyer Helgi Grétarsson wrote:

> In fact since 1984 the Icelandic system has evolved more by trial-and-error than by design, and a substantial portion of the demersal quota shares have been reallocated. These reallocations should influence how the system is judged and evaluated. (Grétarsson 2010: 299)

Studying ITQ in theory is one thing, and studying ITQ effects at a macro level from different social science perspectives is quite another. Studying step by step *how* ITQ evolved at local and national scales through a comparative approach is yet another. The scientific literature on ITQ from the social sciences is voluminous, but I am convinced that a very bound-to-earth ethnographic study of ITQ effects has been lacking. Last but not least, while in social anthropology, Einar Eythorsson's synthetic article published in the anthology *The Commons in the New Millenium* (Eythorsson 2003) called for an articulation between the different levels and proposed a methodology to enable this, no such articulation has been achieved in Iceland. The time has come in 2015, especially after the financial crisis of 2008, to take a fresh look at the problem. Even basic propositions, such as the challenging one "the Icelandic fishery management system has by no means been a 100% ITQ system since 1984" (Grétarsson 2010: 299) needs attention: this is a highly relevant proposition but one that has not yet been clearly and objectively thought through as a relevant topic from an anthropological point of view.

This chapter summarizes some key facts and methodological approaches that should be taken into account in an evaluation of ITQ policy effects in a long-term perspective. It is based upon research conducted as part of the scientific program "DRISCLA-Nord" (Dynamics, Resources, Innovations and Strategies of Coastal Communities in the North-Atlantic Area) and supported by the French Polar Institute Paul-Emile Victor. The research was conducted in two phases of field research in Iceland using an ethnographic methodology. During 2005 and 2006, I lived in Iceland and conducted fieldwork for the PhD in social anthropology which I completed in 2011. Entitled "Of Quotas and Men: The Economic and Social Consequences of the Icelandic Policy on the Management of Marine Resources/An Ethnology of Coastal Communities", my PhD set out to acquire a comprehensive understanding of the Icelandic fisheries by establishing detailed studies of seven Icelandic fishing harbors. It thus involved study of an occupational group scattered over a wide geographical area and through a long period of time. The aim was to capture, on the one hand, the diversity and fullness of meaning which fishing, as both an industry and a way of life, embodies, while on the other hand charting how it was, is and will be transformed, from both material as well as ideal perspectives. This anthropological research developed along three main axes: fishermen and fishing practices; the socio-economic organization of coastal communities; and national policies in marine resource management. I returned to Iceland in 2010 to carry out postdoctoral research which addressed the consequences of the financial collapse on fishing practices, especially on small-scale fisheries, coastal communities and harvest rights reallocation policies. It is important to mention precisely when the research was conducted, since these periods allow different contexts – local,

regional, national and international ones – to be taken into account even though throughout the research the fisheries, coastal communities and harvest rights allocation policies have been apprehended as whole systems through time and space. Together, this fieldwork-based research highlights the need to understand original practices resulting from interactions between different partners and demonstrates the value-added contribution of ethnography for the study of any marine resource management system involving local and global perspectives.

The chapter proceeds by first outlining the changing status of the fisheries within Icelandic politics and society from the end of World War II through to the financial collapse of 2008. At first the focal point of national economic aspirations, during this long period, fisheries became overshadowed by other industries and prospects so that the fisheries and fish processing were subject to policies of expansion followed by policies of withdrawal. The methodology for the research in Iceland is then summarized before the policies developed by the government are explained and the reactive and adaptive efforts of fishers and processors are discussed.

5.2 From Expansion to Withdrawal

The dramatic development of fishing and fish processing activities in Iceland has first of all to be evaluated and understood in the international context of intensive development due to technical progress in fishing and fish processing and to the beginning of a strong commercial competition over access to marine resources on an international scale. As the economist Paul Adam observed on a global scale, fisheries became an industry of major interest on a superior level for many countries whether traditionally specialized in fishing activities or not (Adam 1987). Icelandic policies during more than a half century are representative of these periods of expansion and withdrawal in fisheries.

After the Second World War, Iceland became a very prosperous and newly independent country. The Icelandic economy flourished when Iceland became a "specialized-fish-exporting country" (Magnusson 1985). The development of the fishing industry served the quest for sovereignty on which the people and the public authorities embarked together. The exploitation, processing and later preservation of fish and fish products became an affair of State, a superior goal and a matter of common interest for the whole nation.

The fast development of the Icelandic fishing industry was directly linked to the gradual expansion of its maritime territory up to the 200 nautical-mile limit of its Exclusive Economic Zone (EEZ) (1975–1976). EEZ matters in Iceland became a national priority because nations were now responsible for the management of the marine resources within these new and wide limits. Between 1945 and the beginning of the 1980s, the national fleet capacity increased by 380% and the catch's real value by 590%. Thirty-five fish species were exploited: cod, which represented 45% of the total export value; then haddock (*Melanogrammus aeglefinus),* golden redfish (*Sebastes Marinus),* Atlantic wolfish (*Anarhichas lupus*) and saithe (*Pollachius*

virens). Lumpfish, which is caught between March and June, is landed by small-scale fishermen. Over the period to the beginning of the 1980s, the halieutic production was both intensified and diversified: this led to a threat, for pelagic and demersal population stocks.

Fishing activities had a determining impact on the territorial, economic and social organization of the country. In addition, the territorial development of the country depended on the development of fishing activities. The coastal communities, whether they were already or only recently specialized in fisheries, were therefore equipped to become the lynchpin of a nation entirely involved in and revolving around fishing and fish-processing activities.

Over that period of great expansion, the appropriation and exploitation of marine resources became an economic, social and symbolic process. This phenomenon became concomitant with the building up of an economic patrimony. This point is a particularly weighty one when the aim is to understand political decisions over harvesting rights and, more generally, over employment in fisheries. In the Icelandic Fisheries Management Laws – *Fiskveiðistjórnun Íslands* – and later in the Constitution, the status of marine resources can be seen as a legacy of the Icelandic social and economic history: marine resources, which are inalienable, are the property of the Nation and their management must ensure that they are protected and must guarantee the economic balance of coastal communities.

During the 1980s and 1990s, in a global context of implementation of new marine resources management governance, a new chapter in the history of national policies began. Time had come to manage marine resources from a clearly long-term perspective since reports of marine biologists of the national agency *Hafrannsoknarstofnun* warned that some fish stocks were greatly endangered. In the 1990s, experts supported the idea to develop other industries in the country, especially in the fields of geothermal energy and electricity. Fisheries and fishing activities no longer dominated the social and economic life of the country. Instead, they were set in the background and competed with other industries, especially the transformation of bauxite into aluminum, which could generate substantial revenues.

Step by step, successive governments transformed the access to marine resources, thereby indirectly re-shaping the entire Icelandic society. First, by an officially short-term, 1-year policy of enclosure, non-tradable quotas were implemented (1984). These were subsequently made permanent. Then, in 1991, with the creation of the Fisheries Management Act (FMA), the well-known ITQ system was implemented. Public authorities then, by reforming access to marine resources, challenged their legal and symbolic status. New policies consequently challenged the protection of coastal villages and of the general common interest: they put an end to an era of *expansion* and launched an era of *withdrawal*. By reforming the rights of use of marine resources, they went against a national consensus and broke a social contract formally established in the Fisheries Management Laws *Fiskveidistjornun Islands*.

During the 1990s, the construction of dams and aluminum plants preoccupied the interests of economists, politicians and public opinion, though some projects were criticized for their environmental impact. The strength of the Icelandic kroner

due to foreign investments threatened fish-product exports: land-projects had to advance, a new era had begun. Fish remained the main source of economic prosperity and the basis for investments in other industries or fields of activity but, at the same time, fisheries matters, though hardly debated, were overshadowed by new, ambitious visions for the future of Iceland. In public discourses, fishing and fisheries became "insignificant", "old fashioned" or "archaic": if some experts said it before the financial crash, thousands of Icelanders still "lived on fishing".

After the financial collapse in October 2008, fisheries not only continued but became a symbol of stability in a context where financial products were demonized. In 2008, 3.1% of the working population were employed in fishing and a further 2.9% in fish-processing, so, together 6% of the working population, that is to say 4200 individuals (Hagstofa Islands 2008), were still employed in fishing and fish-processing activities. This did not include indirect jobs related to the fishing industry, but here the common ratio is one job at sea for three jobs on land. Amid the dark days of financial crisis many advertisements used images related to fishing activities as symbols of trust, know-how and stability through times, revealing and waking up their cultural dimension. Even the ex-First Minister, Geir Haarde, in his memorable speech about the crash made an allusion to marine resources as a surety to endure dark days to come. Fisheries came again in the foreground and became more than ever the backbone of the Icelandic economy and a guarantee of trust but its image in the public opinion had definitively changed.

5.3 A Framework for Studying ITQ and Marine Resource Management Dynamics

First of all, it is imperative to underline that if ITQ are at stake and if the attention is focused on them, marine resource management policies have to be apprehended in a broader perspective and in their *totality* since they are directly or indirectly related to ITQ measures. It was necessary to elaborate a methodology suited to the empirical study of an object which involved a number of different parameters and kept evolving. If the aim was to "represent complexity" (Barth 1978), it was necessary to "delimit a 'convenient area' as an object of study without isolating it from all those events and circumstances outside the area which are major determinants of life within it" (Barth 1978: introduction).

A synchronic study and comparative approach are needed. My fieldwork, which included an ethnographic survey, lasted for more than 1 year. Since "the typical fishing village doesn't exist" (Skaptadottir 1995: 165), I compared the situations of seven fishing harbours. I stayed in Bolungarvik and Patreksfjördur, in the Westfjords, in Rif and Grundarfjördur, in the Western region, and in Reydarfjördur, Neskaupsstadur and Eskifjördur, in the eastern region (2005–2006). After the financial crash, I stayed for a long time in Grindavik, a prosperous fishing village very strategically situated regarding the fish export market (2010). Within each harbor, I

compared the situations of stakeholders in small-scale fisheries with those involved in the industrial sector to underline the unity and diversity of social and technical systems responding to national policies on the management of marine resources. Men and social relationships matter: it was essential to identify leaders. Places matter. In today's circumstances, due to financial reasons related to the export market for fish and fish-products, one place, in terms of its function and its localization in the country, is not equivalent to another. When places are far from strategic exportation localities in the south western region of Reykjavik/Keflavik, sale operations can be more complicated during wintertime, more expensive for producers and buyers and, in effect, worthless. These last two aspects matter a lot. The financial organization of entrepreneurs when combined with technical specialities in fisheries can be so different that communities' profiles will, in turn, be different. The business of pelagic fishes is more related to vertically-integrated firms since demersal fishing and/or processing activities allow for more diversity: they are observed on a wider range of entrepreneurial formulas from small-scale fisheries to a vertically integrated, industrial sector.

The gathering of empirical data was necessary to bring to light original individual and collective practices, that is social, technical and economic processes. To complete this research successfully, I started my fieldwork with the observation and analysis of the individual and collective forms of mobilizations and strategies of coastal communities facing national marine resource policies. I focused my attention on how vessel owners used their fishing rights, that is to say, I identified their different tactics in relation to harvest rights leasing or purchase. This immediately warns us to identify "new" actors playing a key role and deeply involved in ITQ management at a local scale. This study led me to analyze what was at stake from an individual and collective interest when *ITQ*s were exploited and transferred: social and economic matters were obviously embedded and, precisely, their *desembeddedment*, to use Polanyi's concepts (Polanyi 1944) were perceived as a threat for some and as liberation for others.

The aim was to shed light on the diversity in time and space and in practices and discourses of the responses of vessel owners and local populations to national policies and then to analyze and interpret this diversity. Due emphasis was given to the variations in fish-processing practices within fishing practices, which vary from one region to the next. I also tried to make sense of the evolution of legal practices in the regulation of the industry following the implementation of the ITQs, especially concerning the endless policies of reallocation of harvesting or fishing rights. The process of *individualisation* we observed was the result of the commoditization of harvest rights and of the liberalization on fish prices due to the creation of fresh fish markets in the end of the 1980s and early 1990s. I met numerous people who followed a wide range of occupations, including people who were related to the fisheries sectors, people from institutions, as well as scientists, politicians and village inhabitants who worked directly or indirectly for fisheries.

Intensive and extensive surveys were a key approach to study ITQs effects at different levels – local, regional, national and international. I conducted an intensive fieldwork in a village of the Icelandic Westfjords. As I stayed in the same village

during almost 1 year, I could study the fluctuations of activity within the so-called "quota year" (*kvótaárið*) and the seasonal variations in the relationships between members of the fisheries sector – boat owners, fish-processing company directors, fresh-fish market directors and employees – and local public authorities. This allowed identification of "critical periods", for instance summer, a period of harvest rights scarcity. During that period, fishing and fish-processing activities are at their lowest level. Small-scale fishermen and fish-processors are engaged in a hard battle with local public authorities in order to get the "regional quota" or *byggðarkvóti* originally created in the early 1990s to support employment in coastal villages that had lost important harvesting rights. Situated at the end of the quota year, summer is a season of harsh quota scarcity. The tensions opposing small-scale fishermen and fish-processors on the one hand, with local public authorities who reallocate these special quotas on the other hand, are related to the fact that boat-owners in small-scale fisheries estimate that public authorities pressure them to sell their fish at the lowest price to fish-processors if they want to get these quotas. Local public authorities decide which boat-owners are eligible according to their good business attitude: who sells fish *at home* for *our* fish-processing workers? Who sells fish *out* unprocessed on the market for local prejudices? This conflict is cyclical.

We tried to study and analyze limited periods of time exhaustively in order to follow *processes* – activities, employment, evolution of the fleet, ITQs transfers – in different places by comparing a wide range of data. We studied the fishing years 2004–2005 and 2005–2006 bearing in mind the method of an archaeologist who systematically analyzes each stratigraphic layer according to the method of horizontal analysis in order to link different components – social, technical, economic, juridical and political ones. We went back to the same places in 2010, after the financial collapse.

Since marine resource management policies are unstable and are linked to numerous parameters, it is necessary on the one hand to use a systemic approach to study them because they form a whole whose biological, economic, legal, political and social aspects are intermingled, and, on the other hand, to examine them from a diachronic and dynamic point of view because the measures changed several times between 1984 and 2011. The successive governments permanently interacted with stakeholders and constantly readjusted/adapted the system on purpose to become more and more implicated. Boat owners had to regularly modify their strategies and expect new tactics and the government had to concurrently respond or anticipate the strategies of boat owners and implement new measures in order to correct or check new tendencies they had not foreseen.

Policies had both expected and unexpected effects. It was essential to compare policy theories or spirit – expected effects – to practices – that is, responses to policies – in order to understand the evolution of measures and their various goals – ecological, economic, and social. *Laisser-faire* didn't function for ITQ since public authorities had constantly reallocated harvest rights to protect employment and to gain credibility from public opinion. It was essential to link current phenomenon to the national history of Iceland during the twentieth century in order to get a comprehensive insight into State policies.

5.4 Marine Resource Management as a Work in Progress: "Top-Down" Policies

With its more than 20-year-old ITQ system, Iceland appears to be a very stimulating case study, but studying its evolutions presents a formidable challenge since knowledge of each step in national policy is required for an understanding of the issues which determine national public marine resource policies. In retrospect, when I finished this research and analyzed further State decisions, I established a typology of the jurisdictions – "innovation", "neutralization" and, over the last years in particular, "reparation". From 1984 to 2004, State policies have mostly been of "innovation" and "neutralization": public authorities initiated an enclosure policy by setting non-tradable quotas, then, they implemented ITQs and at almost the same time tried to prevent phenomenon such as the concentration of ITQ into the hands of fewer vertically-integrated enterprises and, later, quota leasing, which was disastrous for producers and scorned as immoral by critical opinion as one of the darkest sides of ITQ. If the government did not at first anticipate stakeholder strategies (1984–2004), then, after 2004, it engaged in ambitious, long-term, "reparation" measures in order to strengthen employment in regions where local harvesting rights had been sold out. Policy entered into a new era: public authorities somehow took the power again to reintroduce social politics into policies, against neoliberal theoretical principles.

In 1984, the Minister of Fisheries innovated and established a system of fishing for non-tradable quota for boats over 6 tons engaged in the catch of the most valuable demersal species, such as cod, haddock, saithe, redfish, Greenland halibut and Atlantic wolfish. After numerous warnings from marine biologists, this new system of management corresponded to the coming on stage of "experts" (biologists, later economists). It aimed at preserving demersal stocks, reducing a fishing fleet that was too numerous and restructuring fisheries that were indebted. At that time, shares or amounts of the national Total Allowable Catch (TAC) were allocated to individual operators of vessels on the legal basis of their calculated "catch history" or *veiðireynsla*, which amounted to their average annual catch during the 3 years preceding 1984. Before each September the 1st, at the beginning of a new "fishing year", the Minister of Fisheries officially declared the TAC for each demersal species. At the beginning of September then, a vessel owner received the individual ITQ share he had to live on and to manage efficiently over the following 12 months. These measures were not entirely without precedent. The Icelandic authorities tried to manage the cod fisheries with a system based on day limitations in the period 1977–1983 but this fisheries management system failed and fish stocks remained in a very poor state. Catch quotas had been used before for pelagic stocks, mainly in the capelin and herring fisheries.

On the 1st of January 1991, the Fisheries Management Act took effect. To accelerate a rationalization process for better efficiency in fisheries, quotas became individual, divisible and transferable for boats over 6 tons. Fishermen used to say that

"the ball" or *kvótaballið* began, meaning that harvest rights started to be bought and sold out in an endless business.

> The legal concept of a quota share was established for the first time. In essence quota share means a long-term percentage of the TAC, while the catch quota means the exact figure in tons that a vessel is entitled to catch for a particular fishing year or a season. (Grétarsson 2010)

Fishermen became stakeholders. New laws and rules were implemented in order to make quota transfers and movements easier from one boat to another. In theory, this innovative model was supposed to encourage competitive stakeholders and eliminate less efficient ones who were offered some financial support as a compensation and counterpart for the sale of their ITQ. The losers in the system would naturally help the latter to operate, but things did not work out as planned. Above all, the practical problems that arose on economic, social, legal and territorial levels, meant that ITQs had to be constantly re-designed: if the reality had to adapt to ITQ, ITQ had also to be adapted or effect-limited. That is what makes sense for our purpose. Territorial consequences of the ITQ system quickly appeared and the merging of ITQs became a problem: competitive companies bought out the ITQs of weaker companies and ITQ sales caused the ruin of some coastal communities overnight. Then the size of the small-boat fleet (boats under 6 tons) registered out of the ITQ system increased dramatically because operating a small boat was the only way to enter the system and live on fishing. In the scheme of ITQs, the allocation of harvest rights violated principles of equality and freedom of occupation, and both of these principles are protected by the Icelandic Constitution. ITQs started to be sold again and again and their price increased rapidly, making the market in harvest rights accessible to fewer and fewer stakeholders. Public authorities had to combine *flexibility* for quota transfers with requirements to prevent the development of new relations of exploitation that would question the legitimacy and morality of ITQs.

From 1992 to 1993 onwards, the Icelandic government increasingly intervened to set some limits and control the effects of national policies. The consolidation of ITQs into the hands of fewer companies led to a kind of *métayage* practice where ITQ owners rent a capital they did not personally exploit anymore. This hardly debated aspect led to the denunciation of the so-called "quota kings" or *kvótakongar*, a phenomenon that has been further analyzed by social anthropologists Gisli Palsson and Agnar Helgason. (Helgason and Palsson 1994, 1998; Helgason 1995). To limit and prevent this merging process, the Ministry defined a ceiling for ITQ shares of the national TAC and created what was called the "exploitation duties" in order to compel ITQ owners to exploit an amount of ITQs by themselves using the boat the ITQ was registered on. Then the government created a special quota fund called "regional quota system" or *byggðarkvóti* to help coastal communities suffering from diminishing quotas as a result of sales to other companies who moved the rights away from their village.

In 1995 and again in 2001, in order to limit the number of small boats that were out of the ITQ system, the Ministry attached ITQs to small boats, first on cod (1995), and later on haddock and Atlantic wolfish (2001). These "new" quotas had been

taken out of the national TAC to create a "new pot" for small boats. Public authorities intervene more and more.

The year 2004 can be considered as a turning point. After 2004 one enters the "reparation era" characterized by a stronger control from public authorities on stakeholders with more determination in territorial and social issues in national policies. From 2004 onwards, the Icelandic government strengthened and consolidated its efforts to secure employment in coastal communities. In 2004, it created a special system for hook fisheries within the ITQ system. It separated the "Big" classical from a new "Small" ITQ system called "Jig and Line system" or *krókaaflamarkskerfið* for boats less than 15 m long and under 30 gross tonnage in size. Thus the State reallocated an ITQ share from the national TAC and created a special quota fund for small boats. In 2012, 551 boats operated within the "Jig and Line system" (Þórðarson and Viðarson 2014: 7).

Public authorities boosted long-line fishing and created the "Longline Concession" or *linuívilnun* in order to strengthen employment in coastal communities and support boat owners using hand-baited lines. Under this concession longliners delivering daily landings and using land-based manual baiting are allowed to land an extra 20% surplus over their quota. This surplus was a new reallocation of harvest rights taken again from the national TAC.

All in all, these measures were taken officially at the national level, and were intended to serve the original goals of Icelandic marine resource management policies: protecting rural areas, providing employment and securing settlements all around the island. "The coastal fleet has a significant role in the Icelandic economy landing more than 17% of the total demersal catch, at the value of 170 million Euros in the fishing year 2012/2013 (Þórðarson and Viðarson 2014: report summary).

After 2008, the coalition government tried even more to "solve" the fisheries management problems related to the allocation of harvesting rights. As they had been seriously compromised, public authorities did this for social, economic and moral purposes and to recover the trust of the public. For stakeholders they aimed to demonstrate concretely that (1) fisheries could still be a matter of social justice and (2) that "the system" (ITQ system) wasn't completely locked as it was often said to be by stakeholders or in newspapers.

With the creation of the "Coastal Jigging System" or *strandveidikerfi*, in 2009, the government took a chance to clean and promote the image of fisheries and business in fisheries. The aim of this new system was first of all to support coastal fisheries during the summer time – a period of hard ITQ scarcity and unemployment in coastal villages – and to help young fishermen to "enter the system" without being obliged to incur huge debts. Again, a new "pot" was created: the so-called "coastal jigging fisheries" allow fishing 8600 tons of demersal species by jigging (Directorate of Fisheries 2014). A part of the national TAC was devoted to this special fund and a maximal quota was established for each month between May and August for four different areas (A-B-C-D). When the catch amount was reached, fishing activities were stopped and only started again the following month, and that is why these fisheries have been called an "Olympic system" (Þórðarson and Viðarson 2014). After a very few days' fishing the amount is reached. The way this system was

designed clearly showed a will from public authorities to develop a non-mercantile system within the ITQ system so as to counterbalance some of its worst effects. In 2012 a total of 569 boats were operated within the Coastal Jigging system (Þórðarson and Viðarson 2014: 7). This new post-crisis measure has helped the part-time, small fleet to take a deep breath and expand again.

5.5 From Local Strategies to National Policies: Bottom-Up Responses and Victories

The various policies outlined above had consequences in villages, and these are discussed before turning first, to what people did, either individually or collectively, to cope with the Fisheries Management Act, and then to how local reactions and economic practices impacted on national policies. Right from 1991, in many coastal communities, inhabitants working directly or even indirectly for fisheries started to feel unsafe since a lower amount of harvest rights or quotas meant scarcity both in the short term of a "quota year" and in the long term. Getting enough harvest rights to be able to work on a year-round basis challenged the future of local fisheries. A lower amount of harvest rights has numerous consequences. It means less work at sea and on land, fewer quantities of fish on which to base work in fish plants, and thus lower wages for employees and lower incomes for households and villages. Job losses or increasing part-time jobs sooner or later meant migration. In many places, especially in the North-western region, after the shock of the bankruptcies of companies and the sales of harvest rights, came the time of unemployment and emigration to the south-west of Iceland.

Lower amounts of harvest rights also meant less autonomy and independence for both vessel operators, who became increasingly dependent on national policies, and for town councils that were in financial recovery. In each case they were threatened by a situation of high debt which dramatically ended after the financial crash of 2008. At a certain point, the breakup of the local economic, professional and familial networks and bonds could become unavoidable. The sale of harvest rights considered as the result of collective efforts heavily impacted the local entrepreneurial diversity and was felt as morally unbearable for many inhabitants even those not employed in fisheries.

In the 1990s, a series of systemic changes took place in the villages that were hit the hardest by the loss of harvest rights (Mariat-Roy 2011). The most significant were the following. A re-composition process took place within the local groups of fishermen, with "new" and "older" stakeholders participating. It provoked a re-composition process in the local fishing fleet especially after the decline in the number of the bigger boats and the increase in the number of small boats under 15 tons. In this process, the "new" stakeholders came from the industrial sector and were used to work on bigger boats except in summer time when some of them operated or were employed on seasonal open vessels.

A professional and technical decline has been identified: fishermen became more mono-specified and used almost the same gear all the year round. The lack of job security among fishermen and workers increased. Being able to live from fishing all the year round cost much to vessel operators who became indebted when quota prices started to increase. Independent small vessel operators were hit the hardest compared to vessel-operators processing fish.

Debt was a chain for coastal communities: that is why small boat owners and their baiters declared that reduced wages was the price to pay to boost the local economy. In a context where companies were high in debt, fishing had to be profitable whatever the social consequences: the need to sell fish at the highest price was detrimental to the local cooperation between producers and fish processors workers in the fish plant and local authorities criticized. The sale on the fresh fish market of fresh fish that has not been processed "at home" (*heima*) aroused conflicts among boat owners, local authorities and fish-plant employees. Within intensive vertical integration, fewer entrepreneurs in the fisheries sector co-operated even on a seasonal basis. Processing fish on an independent basis could not be an independent business anymore. As a result, there was much less place for entrepreneurial diversity in the ITQ system.

Through a time-scale of one "quota year", the ITQ system did not stabilize the fisheries sectors. On the contrary, its instability represented a threat for local communities. For vessel operators the threat was from getting heavily in-debt from purchasing more harvesting rights. For employers in the fishing sector and for local authorities the threat was from vessel owners, both weakened and ambitious ones, each of whom might prefer to sell harvesting rights, give up and emigrate. The threat of the harvest rights sale was a psychological burden for coastal village inhabitants.

Being a matter of community survival, ITQ matters are of high political interest. For instance, the end of the "quota year" was a period of harvest right scarcity which caused serious tensions among producers, fresh-fish market directors, town councils, workers and boat owners. People blamed boat owners because they did not sell their fish to the local fish-plant to support local employment – *heimavinna*. Each summer has now become the scene of cyclic conflicts opposing the same characters: harvest right scarcity arouses among village inhabitants the same question of legitimacy of vessel owner's working methods. Vessel owners who sell fish to the local fish plant are the "good" and "fair" ones "fishing for others" and strengthening employment, while the others, selling out unprocessed fish on the market are perceived as threats "fishing for themselves" and "acting like if they were alone".

At the same time, the dynamics of the ITQ system stirred individual and collective mobilization, phenomenon that are of particular interest for a social scientist paying attention to ethnographical materials. Policies toward marine resource management gave birth to original, local and unexpected resilience strategies (Mariat-Roy 2014) in ITQ management and fishing practices on a local scale. New forms of partnership and cooperation were developed in the context of the boosting of local fishing activities after the mid-1990s. Resilience strategies could be individual or collective but quickly became the latter. Since fishing activities and business were a

matter of local common interest many other economic and politic actors were involved in the local economy. The loss of individual autonomy for producers was therefore offset by the growing implications of new investors: the local bankers and the chartered accountants supported by town councilors. The local bank director who had worked for decades in the biggest local company best knew how to find interesting loans in foreign currency. The local chartered accountant who knew each boat owner's situation started a new business and lent or sold ITQs to his customers. These new forced or unforced alliances led resilience to be a co-construction process. From individual strategies, resilience quickly became collectively orchestrated.

Specific management skills were required to protect and strengthen the situation of boat companies. As vessel operators had become stakeholders who needed to sell, buy or rent ITQs, they had to acquire new skills. In an era of growing commoditization of harvest rights, they became closer than they had ever been to chartered accountants and bankers as they sought to optimize their business strategies and make the best choices to stabilize or even extend their exploitation pattern. "All together", "complementary", as they usually said, these actors gathered their skills and capacities "in the general interest". They decided to re-build the local community and to "play the game" in a new partnership where vessel-owners exploited harvest rights whose charter accountant and bank director helped to purchase, conserve, circulate and keep "home": "we buy harvest rights, they fish", as the bank director formulated it. They thus worked together to gain and, above all, keep marine resources under the form of harvest rights or fresh fish "at home" – *heima*. Things went on a superior scale when, at the end of the 1990s, the local bank director bought an important amount of quotas from the "Jig and Line system" in foreign currencies and retailed them to local vessel operators to extend fishing activities.

It was then essential to keep ITQs at home because their prices had dramatically risen. For example, the price of cod quota increased fifteen-fold between 1995 and 2008. Technically it was possible to buy them on the Quota Exchange Market (QEM) which was created at the end of the nineties to control leasing transactions. Apart from exchanges of species and transactions between vessels held by the same owner, all quota leasing transactions had to take place anonymously at the QEM. But if, once repurchased, they were sold out "again" it would then be impossible to reach them again on the Quota Exchange Market or *Kvótaþing* (QEM) because they had become too expensive: they would be definitively lost. Keeping fishing quotas in the village *heima* or, at worst, in the nearby villages where the local banker had customers, was a priority. To do so, he designed an intercommunity "low cost" ITQ exchange market involving three towns and offering fishing rights at prices under the QEM prices.

On the national scale, in 2004, the creation of the "Jig and Line system" and of the "Longline Concession" were the result of a compromise between the National Association of Small Boat Owners (*Landssamband Smábátaeigenda*) and public authorities, after a 20-year struggle for the sake of small boat owners and coastal communities, which are closely intertwined according to the leaders of *Landssamband Smábátaeigenda*. For public, local authorities, public and private

actors – local bank directors, chartered accountants, fishing business families – it meant a return to basics: more than being the result of an endless business, *fishing is work*.

5.6 The Geographical Diversity of ITQ Effects: A Mosaic of Practices

This space-analysis related section is intended to emphasize the fact that there is neither technical nor economic determinism in fisheries matters. In Iceland, the consequences of the ITQ system and national policies vary from one place to another and I observed that the situation of coastal communities depended on socio-economic factors, on their geographical location and, historically, on the age of fishermen groups and local fisheries organizations.

The existing variety of small boat fishing practices in Iceland does not confirm the hypothesis of economic determinism often claimed by scholars, and certainly by Ragnar Arnason (1995), who think that the ITQ system will help to keep "only the best and get rid of the rest": such assertions are meaningless in practice.

The example of the development of small-scale fishing in the Westfjords in a context of harvest right scarcity is a relevant one. In some places, small but powerful and efficient longliners are not fully automated and not equipped with baiting machines: this is a compromise small-vessel operators had to accept from local investors. It seems however a peculiar result in a context of policies that have always supported the idea of economic efficiency. This detail proves that stakeholder logic is neither 100% rational from an economic point of view nor optimal from a technical one but that it is social since in those places that have lost harvest rights, fishing activities preserve viability and means for living. That is also why the "Longline Concession" became a success: non-automated longline fishing is an expensive method but it contributes to the revitalization of coastal villages.

Longline fishing from non-automated boats temporarily helped to boost local activity and create employment. It became the fishing method of last resort and made it possible to rebuild social ties in coastal villages where unemployment created *anomie*. Stakeholders described in the previous section participated in the revival of the local economy and played a major role in the re-creation of ties of solidarity and cooperation. In such a local context, automated longline fisheries would be perceived as nonsense from a social point of view.

The western part of Iceland, which is specialized in the exploitation of demersal species and in the export of high-value fishing products including long-line fish, remains competitive. In contrast, the northwest suffered from quota loss and isolation from export centers. In a context where small vessel operators intend to intensify their fresh fish market production, the distance from export or fresh fish market centers makes the difference.

In the West, small-vessel operators are engaged in longline fishing and sell their fish at the highest price on the fresh-fish market. Their boats are fully automated and they do not subscribe to the Longline Concession. Since unemployment is not a major problem in this area, hiring baiters to create employment is not perceived as a necessity. On the contrary, baiting is perceived as old-fashioned and "disgusting". Vessel operators in the West have an advantage over their colleagues from the Westfjords because they are closer to the Central fresh-fish market based in Reykjavik and to export sites. The price of fish from the West, carried to Reykjavik several times per day, is more competitive than the price of fish carried once a day, and sometimes less in wintertime, from the Westfjords, over long distances, and sometimes by lorry, then ferry and then lorry again.

In the eastern part of Iceland, the scheme is also different. Independent vessel operators are less involved in the "Jig and Line System". Instead they are the very few (Þórðarson and Viðarson 2014), perhaps the last, independent coastal fishermen working in the classical ITQ system created in 1990 and called *aflamarkskerfið*. They are members of a vanishing professional group since fishing quotas belonging to the so-called "Big system" are more expensive and are mostly bought by operators from the industrial sector. Locally, the discrepancy between small-vessel operators and giant vertically-concentrated enterprises is so huge that interdependence between actors from the fisheries doesn't exist anymore. Moreover, in the Eastern region, the labor market offers other professional opportunities.

As new commercial and sales matters play a decisive role for vessel-operators dependent from fresh fish sale, the localization of communities, as far as the market is concerned, is a critical point. As it has always been the case in fisheries production, it is important to be at the right moment at the right place but fish does not command anymore: it is rather the market and the proximity of sale and fish-processing sites that matters. That is why Southwest Iceland has become the most competitive and attractive region for fresh fish sale and small-scale fishing after the financial crisis of 2008. Assuredly, there are trends and there are communities where quotas are gathered on the one hand and deserted communities on the other hand. However, since ITQs are characterized by their volatility and since the system remains unstable, for environmental, economic and political reasons, things can change.

5.7 Conclusion: Will Politicians Hold the Line?

The aim of this chapter was not to establish whether ITQs in Iceland have been a success or not but rather to point out how public authorities and stakeholders – whether *direct*, expectant or latent to use concepts from Mikalsen and Jentoft to define fisheries stakeholders in Norway (Mikalsen and Jentoft 2001) – interacted and coped with the ITQ system to reshape and re-define it in conformity with the Icelandic Fisheries Management Laws (*Fiskveiðistjórnun Íslands*), especially after 2008. Social scientist Einar Eythorsson wrote in 2003: "In retrospect, it can be

argued that fisheries management has evolved from being an issue of great consensus and national unity during the 1970s to becoming the most divisive and conflict-laden issue in Icelandic politics and public debates in the 1990s" (Eythorsson 2003: 133). However, from 1991 to 2011, I conclude that public authorities went from disembeddedment to re-embeddedment, from so-called rationalization financial policies to more and more integrated management policies taking into account social and moral matters; from an untamed theoretical model of *laisser-faire* ideals to voluntary, intrusive and more "interventionist" policies. Public authorities adopted and adapted a market-based approach that has evolved to become a kind of State-based management: policy making had definitely changed. State interventions were intended to coastal communities and public opinion at large. That is the reason why, in answer to Eythorsson, this paper asserts that fisheries management after the financial crises of 2008 is even more *intended* than ever before to become again an "issue of consensus and national unity" (Eythorsson 2003: 133). This does not mean that fisheries management has this effect, but, in reference to its glorious historical past, that it is intended to have this effect by politicians who purpose a "reconciliation" *sátt* of the nation.

Many people, especially in bigger towns, considered that the ITQ system, by prioritizing financial matters and economic competitiveness to the detriment of social matters, led to moral impoverishment. Public authorities worked to repair ITQs prejudices and to break this image. On the national scale, the creation of the "Jig and Line System" in 2004 reaffirmed the political will to reassert a value of work that had been demolished by the omnipotence of financial transactions, which the people harshly condemned. By promoting economic, social, and intergenerational interdependence and cooperation in order to strengthen local economies and hold back people who wanted to leave, long-line fishing offered some job opportunities for a while and became, on a national scale, an emblem for local resilience.

In 2008, the political aim was more than ever to restore dialogue with the public at large in a context of general distrust of politicians. After the financial collapse, on a national level, fishing activities and fisheries developed once again. Since 2008, sales revenues have stepped up while catch levels have decreased year after year. In comparison to 2004, the 2010 year resulted in half the catch volume but double the sales revenues. Catches decreased from 1.5 million tons in 2004 to 760,000 tons. Sales revenues went from ISK 63 billion up to ISK 117 billion in 2010. In the same time, for small-scale fisheries especially, the burden of debt in foreign currencies reached dramatic highs, thereby hurting the artisanal sector and weakening small communities dependent on that activity. In this context, profits from commons exploitation in such a critical period were not acceptable. Created in 2009, the "Coastal Jigging System" was part of the reaction of the public authorities who were eager once again to show that marine resources were an accessible common property in a context where social justice was at stake. It was designed in order to create social peace at a local and a national level. For the first time since 1991, reallocated harvest rights were not tradable.

At the same time, State interventionism and redistribution or reallocation policies threatened coastal fisheries. Coastal fisheries, which play an important role in

regional economies and contribute to the diversity of entrepreneurship in fisheries, depend more and more on political decisions. That is why, in the long term, the impossibility for new generations to inherit fishing skills could have a dramatic impact in some cases, leading to "technical regression and to the extinction of a profession" (Geistdoerfer 1982: 97).

In a context of serious social conflict, small-scale fisheries became a safety valve of the Icelandic society, on a local and a national scale. They were given a new role in the political arena: supporting it meant investing in low-impact fisheries and confirmed the will to design a system of fair redistribution of a common property whose exploitation benefited the whole nation. At that point of the redistribution of harvest rights and sales revenues, the reform of the national marine resource management policies that the coalition government intended to carry out was made up of two complementary parts: the Little Bill, a tax on marine resources to be paid by quota holders, which was passed by the Parliament in March 2012, and the Big Bill, the cornerstone of the ITQ reform, which planned a process of partial re-nationalization of fishing rights – an ultimo step in State intervention – which was later abandoned by the new government elected in 2013. What will happen next?

Acknowledgments This article is dedicated to Aliette Geistdoerfer (1943–2015), pioneer in the field of maritime anthropology in France.

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Part IV
Displacement, Dissipation and Turbulence

Chapter 6
Transferable Quotas in Norwegian Fisheries

Jahn Petter Johnsen and Svein Jentoft

Abstract Since 1990, the Norwegian fisheries management system has gradually moved towards a market mode where quotas are bought and sold. The end goal of the system was unclear at the outset and developed incrementally in a way that the fish as opposed to the fisher was of key focus and concern, thus transforming previously open access groundfish fisheries into a closed rights-based system. Norwegian authorities were, however, not willing or able to move fully to a privatized ITQ system. The opposition to such a system was too strong and support for it reluctant at best. Instead, fisheries authorities played a balancing act between resource conservation, economic efficiency and regional distribution. This explains the outcome: an extremely complex system with numerous checks and balances in order to keep the market mechanism under control. How successful has this system been in riding these three horses? How much failure can this system handle before major reforms are necessary?

Keywords Individual Transferable Quotas • Norway • Fisheries Governance • Regional distribution • Relational Networks

6.1 Introduction

The concept of total allowable catches (TACs) has been introduced so as to reduce fishing pressure globally. Likewise, free and open access to fisheries resources have come to an end, often resulting in common pool fisheries being closed. While these restrictions may have reduced fishing effort and hence pressure on the resources, additional measures such as buy-back programs, gear restrictions and initiatives to combat IUU (Illegal, Unreported and Unregulated) fishing have been necessary to ensure cost-efficient fisheries. Distributional concerns have been addressed in the form of quota arrangements portioning TACs to fishing participants, one of them in the form of individual transferable quotas (ITQs), thus replacing political- or

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administrative-driven allocation of quotas and fishing rights, moving the fisheries governance system instead towards privatization and market control.

This development has placed more importance on economic efficiency and cost-reduction at the expense of the overall well-being of local communities (Ban et al. 2009; Smith et al. 2009; Bromley 2009; Ostrom 1990). Private property rights regimes have also transformed social relations within the fishing population, for example replacing a traditional share system with a capital ownership and wage-labour system (Cardwell and Gear 2013; Høst 2015). Thus, quota management mechanisms are not merely technical instruments but have social and political implications that have not gone unnoticed.

The controversies related to ITQs illustrate the multi-dimensionality of fisheries governance and management and the complex goal structure usually associated with it (Bromley 2009; Pauly 2008). ITQs have become a matter of dispute and perceived by many to be a "neoliberal approach" to fisheries management and governance. Debates around transferable quotas are "often polarized and fuelled more by ideology than reality" (Ecotrust Canada 2009). The debate is as much about the goals of fisheries management and governance as it is about their means. The recent move towards a human rights approach to fisheries management (Allison et al. 2012) involves a broader perspective on fisheries rights and suggests that there are other relevant concerns besides those for biological sustainability and economic efficiency, and that certain market-based quota arrangements may undermine these other rights.

While advocates admit that ITQs are not applicable to all situations and contexts (Lynham et al. 2009), they are being adopted throughout the world and in settings that one would think are not amenable to privatization and marketization of fishing rights. This suggest that ITQs are part of a larger trend that is occurring globally (the penetration of neo-liberalism) where markets and market thinking is seeping into both national and local discourses as to how best to handle problems such as overfishing, resource degradation, and economic inefficiency. But they are also illustrative of the general tendency to frame and define the problems of fisheries in light of preconceived ideas about what the solution is (Jentoft and Chuenpagdee 2009).

Essentially, fisheries governance is a social mechanism involving the configuration of a set of relationships between natural resources, people, communities, states, and markets. It requires institutionalisation of nature-people-society relations that are partly legal, partly organisational, partly cultural, and partly economic. In democratic settings effective fisheries governance must also be fair, legitimate, and work within administrative structures that are inclusive and transparent.

From a theoretical standpoint, fisheries governance arrangements can be seen as sub- optimal because they will always be modified by a material and political reality in a particular context, namely that of a fishery or a country (Jentoft 2007; Jentoft and Chuenpagdee 2009). This given material and political reality is our starting point for this paper. We analyse how particular market devices, in this case transferable fishing quotas, social processes within the fishing industry, and governance mechanisms such as stakeholder involvement arrangements affect each other. We are particularly interested in the conflict between market and society and whether

market instruments such as transferable fishing quotas have to be antagonistic to communities.

The rest of the paper examines in detail the quota system in Norwegian fisheries management. We ask how the system is designed to secure a broader set of political goals than usually are associated with ITQs. How does the system mitigate the potential conflict between market and society? It should be noted that fisheries management in Norway has its own special history and must be understood within its particular institutional context. This is also how people within the industry always saw it. Quota systems were never perceived as merely a technical instrument. In fact, what characterises the Norwegian quota system is its deliberate effort to cushion some of the negative social impacts, and specifically those regarding regional and social distribution and community well-being. This paper details how this quota system was developed, how it is currently constructed, what steering mechanisms have been put in place, and how successful they have been.

The paper is structured as follows: in the next section, we present the theoretical and methodological framework through which we analyse the Norwegian quota management system; section three highlights the main features of the Norwegian quota system and is followed by an overview of the organizational, technological and managerial development in the Norwegian fishing fleet. In section five, we discuss the possible lessons to be learned from the Norwegian experience.

6.2 Theoretical Perspective

Quotas are common in fisheries, agriculture, and in pollution and climate control policy. Transferable Fishing Quotas, which may or may not be allocated to individuals as a property right, and quota markets are seen by economists in particular as the most effective form of adapting fish capture capacity to available resources (Arnason 2008; Hannesson 2004; Gallic 2004). Many scholars use Hardin's (1968) famous theory pertaining to the 'Tragedy of the Commons' as a guiding metaphor for human – resource relationship, and hence conclude that Individual Transferable fishing quotas (ITQs) are necessary tools for an efficient institutional reorganisation aimed at more sustainable resource exploitation. For them, moreover, the solution is the privatization of common resources through use of quotas as devices for creating markets (Callon et al. 2007), which in turn will work to rationalize/optimize the fishing effort used in the fishery.

Others, like Gallic (2004), point out that instruments such as quotas are impacted by the particular organisational frameworks they are embedded in and that outcomes may vary accordingly. Thus, it is only in an imagined world that theories and models can be assumed to work perfectly. In the real world policies based on them can in fact do a lot of harm if they are not sufficiently contextualised, that is adapted to the particular ecological, political, social and cultural environment within which they are supposed to operate. Idealized models and metaphors can be no blueprint for action (Ostrom 1990) but can still be performative. Quota systems cannot just

aim at cautiously changing these particular environments, but most also somehow mirror them while considering their diversities, complexities and dynamics (Kooiman et al. 2005; Bavinck et al. 2013).

In reality, fisheries systems are more or less firmly organized social relationships and activities responding to their social and natural environment. Inevitably, new elements such as quota regulations will interfere with the established order that exists within this network, and consolidate, modify, or radically transform it. The established order will also impact on the nature of the regulatory framework. As within actor-network theory (ANT), fisheries systems are viewed as relational networks between objects without fixed properties, but where the attributes are outcomes of the interactions between the objects (Latour 2005; Holm 2001; Johnsen 2005). Fisheries are neither an empty institutional space, nor a fixed structure immune to agency and change (Ostrom 1990; Jentoft and Mikalsen 2004). Rather, they are a tangle of relationships shaped by institutions such as organizations, laws and regulations that are works in progress but that nonetheless work as instruments for socialization and adaptation. Together fisheries networks form a space where economization tools, socialization instruments and governance modes exist side by side and respond to each other, creating a dynamic process with often unpredictable outcomes. Fisheries management can therefore be seen as a process of cyborgization where natural resources, humans and technology are more or less deliberately woven together in a 'cybernetic' organization (Brattland 2014; Johnsen et al. 2009a, b, 2011), that makes governability possible (Bavinck et al. 2013). The cybernetic character of the fisheries is partly visible in the development of fishing vessels into technologically sophisticated harvesting machines. But cybernetic relationships are more than just technology, they are also characterized by new, formalized and feedback oriented social relations such as quota systems. Quota systems are in this respect instruments that contribute to shaping these relationships and the interactions that they give rise to, but quotas are also impacted by these relationships, institutional frameworks and interactions (Johnsen et al. 2009b; Johnsen 2014). Consequently, although transferable quotas are market devices "cooked up after a certain recipe" (Holm and Nielsen 2007) with a specific agency (Callon et al. 2007), they are not necessarily clearly defined objects with a priori properties. ITQs, like most objects within fisheries, take up forms, with variable ontologies, which mean that they get their ontology through continuous interactive and dialectic production of relations, realities and representations of these realities (Mol 2002; Latour 2005).

ITQs, consistent with ANT, are seen as constructed within a network of relationships. While ITQs have an impact on network relations, the network also gives content, shape and direction to the quota system (Holm and Nielsen 2007). The aim here is to identify what kind of properties the ITQs have assumed within the institutional framework of Norwegian fisheries, and how they have been affected by socialization and cybernetic mechanisms for governance. How have ITQs interacted with, or changed, these mechanisms and does the ITQ system work in the way it is intended to do? We examine the situation when the system was introduced, describe how it was designed and works, and how it interacts with the existing order.

The information used for analysis has been obtained from central government policy documents and through a review of research literature. Other written materials used were newspaper articles, chronicles, and letters to the editors. Official reports and news updates from the Norwegian Parliament and Government and from the Norwegian Fishers' Association were also important sources of information.

6.3 Paradigm Shift

Traditionally, a mix of law and the presence of formal organizations have existed so as regulate the influence of market forces in Norwegian fisheries (Hallenstvedt 1982; Holm 1995). Except for deep sea trawling, which has been a licensed fishery since the 1930s, other fisheries were open access until the collapse of the herring fishery in the mid-1960s. From 1964 onwards, declining returns for fishing fleets were countered with subsidies that made it possible for continued open access entry into fisheries and resulted in overcapacity in the fleet. However, restrictions on trawling were introduced based on the idea that capital investments in the fishing fleet, especially by interests outside the fishing sector, had to be limited (Hersoug 2005). The collapse of the herring fishery led to the first general closure of a major Norwegian fishery (Johnsen 2014). While the restrictions on trawling were aimed at protecting coastal fishers against capitalists, the restrictions on purse seining tried to protect the fish from the fishers.

Participation in commercial fishing has been, and still is, free for all Norwegian citizens,[1] but commercial fishing has to be undertaken from a fishing vessel registered in the fishing vessel registry.[2] In addition, the owner has to hold a permit to undertake commercial fishing with a particular vessel. The permit for commercial

[1] Recreational and subsistence fishing and small scale fishing for sales up to a certain value limit and with a maximum quantity for arctic cod of 1000 kg, are free for all Norwegian citizens/residents who are not registered as professional fishers. Only passive gear can be used and there are limitations on the amount of gear that can be used by a person. Moreover, there might be regulations on different species, seasonal or area regulations that have to be followed. You can also work as a crewmember without being registered in the fishers' register, but will then not earn rights to participate in closed fisheries.

[2] Registered fishers are regarded as self-employed in Norway, which means that they fall under a different tax, pension and social security regime than people who are not self-employed, in addition to their privileges to qualify for access to closed fisheries. While anyone can register at any time, an evaluation takes place at the end of each year to exclude those who have not fulfilled the requirement to be treated as fishers the current year. Those who meet the criteria remain in the register, while persons without fishing activity or with income over a certain level from other sources than fishing, will be excluded from the register and cannot claim to be taxed as a fisher, to have earned pension rights as a fisher or other social benefits for fishers. However, they can re-register if they plan to fish the following year. Persons over the general pension age (67 years) have to register as part-time fishers, due to the fact that their main income (the pension) will be higher than the maximum income allowed for full-time fishers.

fishing with a vessel over 15 m can be issued to any registered fisher who can document that they have fished for at least 3 years. There is no minimum fishing requirement for fishing with a vessel under 15 m. The idea behind the commercial permit is to ensure that the owners of larger fishing vessels are active fishers. This rule was put forward by the Norwegian Fishers' Association during World War II in order to prevent capitalists from buying fishing vessels (Finstad 2014). It was stipulated that fishing vessels should be owned by active fishers in order to secure the latter's independence and control of the means of production. This became a permanent requirement in 1972 with the passing of the so-called Participation Act. Until 1990, all groundfish fisheries in Norway were open access, where each and every person with a registered vessel and a commercial permit could participate. Until the 1990s, the regulatory framework rested on two very different pillars: fishers' freedom, and protection of fishers against capital interests. With the 1990 reform the protection of resources against fishers came in as a third pillar.

In Norway the first measure aimed at general limited access and Individual Vessel Quotas (IVQs) was the license system, which was introduced in 1973 for the herring fisheries (Gullestad et al. 2014). By then, the herring stock had nearly been decimated and rarely migrated beyond the 12 mile (22.2 km) national fisheries zone, and hence remained under the jurisdiction of the national government (Hersoug 2005). However, the herring fishery was still seen as an exception to the rule, and open access principles still dominated Norwegian fisheries (Holm et al. 2000). Apart from the herring stock, all other fisheries resources exploited by Norwegian fishers were beyond the territorial boundaries of the nation and could be fished by anyone. In 1976, the joint Norwegian – Soviet fisheries commission for management of shared resources was established, and from 1977 the 200 nm EEZ came into effect. Hence, from 1977, the Norwegian fish resources came under national jurisdiction or joint jurisdiction with our neighbours, making it possible to establish a more effective governance regime. Most of the resources are in fact under joint jurisdiction. However, the real change came after the collapse of the north-east arctic cod stock (*Gadus morhua*) at the end of the 1980s. This collapse brought to an end both the open access regime and the subsidy scheme in Norwegian fisheries (Gullestad et al. 2014).

6.4 The Quota System: Basic Principles

On April 18, 1989, the Norwegian Fisheries Directorate decided to close the Northeast Arctic cod fishery due to the alarmingly poor condition of the cod stock as reported by the Institute of Marine Research. The Directorate's decision took people in the fishing industry by surprise (Jentoft 1993). For 2 years, cod had not been as abundant as usual along the Norwegian coast, and many small-scale coastal vessels were unable to benefit from this commercially important stock. The Directorate's action, well-intended or not, was, in fact, too late (Holm and Nielsen 2007; Finstad et al. 2012). Fishers raged. While few questioned the need for regulation of the

following year's fishery, the question was how it should be done? In the debate that followed, time closures, closed seasons, gear restrictions and gear quotas, regional quotas, maximum quotas and individual vessel quotas (IVQs) were proposed. These alternatives were presented to the Regulatory Council (RC), an advisory committee chaired by the Fisheries Director with representatives from industry and the authorities (Mikalsen and Jentoft 2003). Regional quotas were seen as inconsistent with common ownership of resources, while gear quotas were seen as adverse for the coastal fleet, which traditionally had switched between different gear types from one season to the next (Reguleringsrådet (RC) 1989). The solution proposed by the RC involved a mix between use of vessel- and group quotas, with other measures like closed seasons, technical regulations and time closures suggested as more flexible instruments that could be used in particular situations. Over the next couple of decades, the system was amended several times. Today the regulation system rests on the following main pillars.

The need for allocating the Total Allowable Catch (TAC) between trawlers and conventional[3] vessels. Since the 1930s, trawlers have been the licensed group in cod fisheries, with a privileged right to fish cod[4], haddock and saithe with trawl nets, but with no right to shift to other gears. Since 1976, trawlers have been limited by IVQs for the different species (White Paper (St.meld.) nr. 93 (1982–83)). Although in the past and more recently during the 1990 crisis, many coastal fishermen wanted to ban trawling altogether, the government and the processing industry viewed trawlers as an important part of the fishing fleet that could compensate for the fluctuating landings of the coastal fleet. In addition, in some fisheries dependent areas in Norway such as Finnmark County, the processing industry depended primarily on trawler landings. This later became the rationale behind the significant allocation of quotas to trawlers, popularly known as "the Trawl Ladder" (Hersoug 2005; Standal and Hersoug 2015), which was determined in negotiations between the Norwegian Fishermen's Association, representatives from the trawling industry, and conventional gear fishers. The fisheries in Norway are mostly targeted towards single species and bycatch is not a big problem. When there is bycatch is a problem, bycatch either has to be covered for through the vessels ordinary quotas or through a system with allowed percentages of bycatch. Discards are banned and selection devices are mandatory. A system for real time closures are in place. The skipper is responsible for following the bycatch regulations in the different fisheries (for more about bycatch and discard see Johnsen and Eliasen 2011). A guaranteed IVQ for coastal vessels that had caught more than a prescribed minimum of cod, in one of the 3 years immediately prior to 1989, thus indicating a dependency on cod. Annual

[3] In the Norwegian fishing regulations, all kinds of fishing gear except trawl and purse seine are regarded as conventional fishing gear. Purse seine is banned in Norwegian cod and haddock fisheries.

[4] The Norwegian society owns the living marine resources in Norway and the Parliament has given the State the responsibility to manage the marine resources for the benefit of the Society. The Marine Resources Act states that commercial fishing is illegal without a licence or a permit. Thus, a fishing right in Norway is not a property right, but a limited privilege given on certain conditions for commercial exploitation of fish resources. See also footnote 9.

permits are given for the right to fish, tied to a particular vessel. The quota allocated to that vessel is based on the vessel length. The permit holder has to be a full-time fisher, or a legal entity like a company. In practice, a permit and participation in the fishery for a year qualifies a fisher to get a new permit and quota the next year as long as the holder meets the criteria and the resource situation allows for it (Standal and Hersoug 2014).

A limited maximum (competition) quota for fishers who do not qualify for a participation permit in the closed group. This is in principle open for all registered fishers with registered fishing vessels under 11 m of length who do not have an IVQ (Jentoft and Johnsen 2015).

In 2003 the Parliament approved a new structural policy to reduce fishing capacity. This policy was revised in 2008 when the government changed. The structural policy institutionalised regional markets for fish quotas.

Hence, in principle fishing rights (in form of licences and permits) have not been tradable commodities in Norway. They have been transferred through administrative decisions by the fisheries authorities in accordance with formal rules strongly supported by the Norwegian Fishers' Association (NFA). However, in practice, the system worked different. Because the rights would be reissued as long as the new owner was qualified, the price of the boat would be lower if the seller chose to keep the rights. Thus, in practice, the rights were traded when vessels were bought and sold, thus inflating the price of the vessel to the extent that the real value shifting hands is related to the fishing rights and not the vessel. The market forces played a role. Moreover, the NFA has changed its official view in line with this evolving practice and is now in favour of a bounded transferability of quotas related to fishing vessel transactions. Thus the structural policy introduced in 2008 formally institutionalised the previously informal use of market forces as a capacity reduction measure. This can be seen as a break with the administrative and institutional perspective that had dominated Norwegian fisheries policy in the past. The following section takes a closer look at how this became possible.

6.5 Quota Transactions

When a vessel is replaced, it is usually sold or decommissioned. The owner(s) applies to the authorities to transfer the licence (and fishing rights) to a new vessel, which can be purchased or built anew. The old vessel must then be moved out of the fishery while the new one enters, all within a defined period of time varying from case to case. Additionally, the owner must apply for a new permit for commercial fishing for the replacement vessel, a permit that is mandatory for all types of fishing regardless of the particular fishery. Issuing of the permit is an administrative routine and the permit will normally be given without any objection if the owner and the vessel fulfil some standard criteria, for instance regarding participation and capability. Fishing licences, on the other hand, regulate access to particular fisheries. In

closed fisheries they are normally only available when fishers decide to sell and exit the fisheries.

6.5.1 Off-shore Fishing

In the licensed off-shore fisheries (trawling and purse seining), it became standard practice that vessels could be sold with the licence (and the corresponding IVQ). Formally, the licence was revoked by the fisheries authorities and reissued to the new owner, who both had to apply for a new commercial permit and reregister the vessel and apply for the new licence in the closed fishery. In practice, as long as the new owner met the criteria for participation in the particular fishery, he would not be denied a license in the closed fishery. Even if the licence formally was withdrawn and reissued, it was in practice a transfer of the right to a new owner. This system, however, could not control fishing capacity, but only ownership transfer and, therefore, other measures were needed. Due to a rather limited market[5] in the purse seining sector, the transfer of licenses resulted in the spatial concentration of vessels in two Norwegian counties (Hersoug 1985). Moreover, after the licensing of the off-shore purse seining fleet in 1973, and as a measure to reduce the capacity of this fleet, owners with two vessels were allowed to merge licences on a permanent basis, on the condition that they decommissioned one of their vessels. Consequently, a market for merged licenses and fishing vessels emerged, and as a consequence the number of active units decreased.

In off-shore trawling, merging of licences was allowed only in prawn trawling. However, in 1990, due to the collapse of the cod fishery a limited unit quota system (UQ) was established as a capacity reducing measure for the fresh and frozen/factory offshore cod trawlers. The UQ system divided the trawler TAC into a number of quota factors based on the number of trawlers in the group that had quotas the previous year.[6] The quota factor of a vessel is the vessel's share of the total group of vessel's share of the TAC. The system allowed the transfer of quota factors from one vessel to another, as along they belonged to the same owner and the same vessel group. Vessels without quotas had to be removed from the fishery and the owner could keep the transferred quota factor for 13 years before they were redistributed to all the vessels in the group. If a vessel was decommissioned, the owner could keep the transferred quota for 18 years. To avoid over-concentration of quotas, an upper limit was set on the number of quota factors that each vessel could hold (1.5

[5] One of the reasons that the markets for trawlers and purse seiners were limited was that the buyers had to be fishers and that only a small number of fishers actually had the necessary financial strength to buy a vessel and to pay for the licence in addition.

[6] Quota factors are today a cornerstone in the Norwegian management system that rests on long term allocation keys. Each vessel group in closed fisheries has a limited number of quota factors that are distributed to the vessels based on length. Thus the individual vessel does not have a quota, but a quota factor that gives a specific quota at certain TAC-levels. The basic quota factors the vessels are given on basis of length (and gear) is in practice a permanent right.

for a small trawler and 2.0 for larger trawlers). Quotas could not be traded from small trawlers to factory trawlers and vice versa: trades had to take place in the same vessel group.

The system was extended gradually to include all trawlers. A similar system was also introduced in off-shore purse seining. The purse seining fisheries had one market and also limits on the number of quota factor that one vessel could hold. Compared to the earlier practice in which licenses could be traded, now quota factors could be traded. Although the UQ system reduced the number of vessels, technological changes contributed to an increase in the actual capture capacity because the quota factors usually were transferred from older and less effective to newer and more effective vessels (Standal and Aarset 2008).[7] In principle and in practice, trawlers and purse seiners now had an ITQ system.

6.5.2 Inshore Fisheries

In 1991, based on the need for further capacity reduction in the cod sector, the Fisheries Ministry proposed an ITQ system as the basic model for rights allocation in Norway. With the negative Icelandic ITQ experience fresh in their mind, a huge majority among the fishers and their organisations, however, rejected ITQs for the coastal fleet. Instead, as mentioned above, a non-transferable IVQ system was established with support from NFA. In practice, the coastal fleet adopted similar principles to those that the off-shore fleet had institutionalized: quotas could not be sold directly but could be sold indirectly by way of selling the vessel. Consequently, in the 1990s a market for quotas developed in the coastal fleet segment.

6.5.3 The Structural Quota System

In 2003, the Ministry proposed the "Structural Quota System" (SQS) as a legal framework for formalising ITQs in the coastal groundfish fisheries. This time the NFA was in favour of the change. The SQS entered into force in 2004, and from 2005 the UQ system in the offshore fleet was replaced by a new SQS. In the new SQS, the offshore fleet were permitted to keep their structure quotas. When the government changed, the whole system was revised and legally amended in 2007 by the Parliament (NOU/Offcial Norwegian reports 2006: 16; White Paper (St. meld) nr. 21 (2006–2007)).

In short, an offshore fleet owner of a licensed vessel can buy another vessel, transfer the quota factors from one vessel to the other, decommission the second vessel and keep the transferred quota factors for 20 years in addition to the basic

[7] The system is even more detailed than we have described, merging of licences have been allowed for some vessel groups in period, in combination with the UQ system.

quota factors the vessel holds. If the transaction took place before 2007, the quota facto can be kept for 25 years. The vessel owner can buy and transfer quota factors only up to a certain limit (in 2015 the limit was four quota factors). If an owner has more quota factors than he can fish with his active vessels, he can apply for a permit to split the factors so as to sell them to others. Once the 20 year period is over, the quota factors go back to the group and are redistributed on a permanent basis to the remaining vessels in the group. All vessels in the group will get more quota factors. The same can in principle happen if an owner goes bankrupt or if a vessel sinks and the owner is not able to replace the vessel.

In the licensed offshore fleet there is one national market with regional boundaries and restrictions (Standal and Hersoug 2014). Quota factors cannot be transferred from a trawler registered in the three northernmost counties to a trawler registered in southern Norway. Likewise, in purse seining there will always be a certain curtailment of the quota factors depending upon which county they are transferred to. This measure is intended to limit regional concentration of fishing capacity and operations.

For Coastal Vessels (With a Hold Capacity Under 500 GT) participation permits and quota factors are distributed to groups based on the length of the vessels, starting with 11 m vessel groups and ranging up to vessels with a holding capacity of 500 tons. Each group has a certain number of quota factors that are distributed between the vessels. To avoid large vessels from outcompeting smaller vessels, the SQ can only be transferred between vessels in the same length group. Vessels might be longer or shorter than the actual length group they belong to because the length group is defined on the basis of the public warranted length (in Norwegian *hjemmelslengde*) that the vessel had on a certain cut-off date. Prior to 2007 it was possible to increase a vessel's quota by increasing the length of the vessel before a specified cut off day (usually November 1). The groups are based on authorized lengths (the quota factors were fixed for the groups). For vessels longer than15 m and beyond the following rules apply. When a vessel is bought the buyer can keep 80% of the quota factors as SQ that can be fished in addition to the basic quota. The remaining 20% goes back to the group so that all vessels in that group benefit from the restructuring. The SQs can be kept for 20 years. The Norwegian Parliament will in the fall 2017 decide what will happen with the SQs after 20 years.

Quota factors in the pelagic fisheries (herring, mackerel) can be transferred across county borders, while factors in the groundfish sector cannot be transferred from the three nothernmost counties in Norway to the south and vice versa. Vessels that are longer than15 m can have a maximum of two SQS in addition to their basic quota factor in a fishery. For vessels under 15 m in length, the system is basically the same, but with a maximum of one SQ in each fishery in addition to the basic quote factor.[8]

[8] Until 2015, quota transfer has only been allowed between vessels owned by the same owner. Consequently, if a vessel holds licences in different fisheries and the owner wants to sell out from one fishery, but to continue in the other fisheries, a complicated procedure involving applications for permits for sale, quota transfer and resale must be conducted. From 2015 it will not any longer

6.6 Discussion

The starting points of our analysis are the fundamental changes that the Norwegian fishing industry and governance system have gone through since the first serious resource collapse of a fish stock in the late 1960s when the Atlanto-Scandic herring stock (*Clupea harengus*) collapsed and the subsequent collapse of cod stocks in late 1980. The changes that took place after the collapse, such as closures, introduction of quotas, and so on, signalled the beginning of a partly "invisible" resource management revolution that contributed to a restructuring and reorganization of technical, political, social and cultural relationships of the Norwegian fisheries sector (Holm 2001; Johnsen et al. 2009a; Johnsen 2005).

As we have illustrated in earlier sections, the Norwegian quota management system is complex and intricate, and requires a highly technically competent bureaucracy to monitor, manage, and amend. A common witticism in fisheries circles goes as follows: "Rumours say that only two persons, the Fisheries Director (in Bergen) and God (in Heaven), know all the details about the quota system but that God is now giving up!" The reason that the quota system is so complex is because it was not established with defined goals and procedures at a specific point of time, but rather developed gradually and incrementally, often in response to crisis, and legitimized as a much needed and rational reform. There was at the outset strong resistance, even within the Norwegian Fishers' Association, to adopting an Icelandic type model. When the quota system was introduced in 1990, it was perceived as a preliminary arrangement that would be abolished when the crisis subsided. By the time the crisis subsided, people within the industry had changed their mind about the system.

The system therefore remained and matured through a process of path dependency. Learning by feedback through broad participation of fisher stakeholders, most prominently the Norwegian Fishers' Association, led to further fine-tuning. However, fundamental change and redistribution of quotas between different user groups was difficult. Thus, the principles that were laid down in 1990 are basically still intact after more than 20 years. It took a while for the government to admit (which happened around 2008) that the system was indeed an ITQ system. Quotas became the real commodity, not vessels, as the changes in the participation act actually suggest. The use of the market made it possible to reduce fishing overcapacity, but there has been an attempt to regulate market forces in such a way that there are several markets based on region, vessel size and gear and license type. Moreover, there are limits to how many quota factors can be merged on one vessel.

The system has now been consolidated and institutionally entrenched, and is therefore unlikely to undergo radical change in the near future. Managers and fish-

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be required that the vessels have the same owner. Two individual owners can together own a vessel after one of them applies to the authorities to be allowed to form an agreement about quota transfer without selling vessels.

ermen have been disciplined to act as co-producers and be responsible, and mutually committed to the present quota system (Johnsen and Vik 2013). The system by and large enjoys support of the Norwegian Fishers' Association, and the general public because it is perceived as having "saved" the cod stock from collapsing. Critical but scattered voices are heard in the media and academic community, largely because the system is seen to have led to geographical concentration of fishing capacity or the de facto privatisation of quota rights. This is seen subsequently to lead to wealth accumulation within a dwindling fishing population. These voices of protest, however, have found it difficult to convince others that the system is in pressing need of reform.

The incremental development of the quota system has meant that market forces have been gradually released in Norwegian fisheries. Nonetheless, there was a need also to curb these forces in order to secure certain regional demands and to maintain a small-scale livelihoods fishery. However, there is continuous pressure to free the market and remove restrictions in the way of creating a one quota market. This may favour the financially strongest companies, but also, according to conventional resource economics, may produce the foundations of a resource tax system (NOU (Green Paper) 2014:16).

For this to happen, the Norwegian system will have to be redesigned as it will compromise regional allocations. One important aim should be to secure the public ownership of fisheries resources, which is stated to be a basic principle of the 2008 Ocean Resources Act. It is for this reason that the time limit on quotas is instituted as part of the regulatory system. Quota rights in Norway are not allocated as private property but as a privileged entitlement of individual vessel owners.[9] Thus, the quota system is the result of a balancing act between different but conflicting concerns: resource utilization and conservation, economic efficiency and individual user-profitability through capacity reduction, and regional distribution by means of restrictions on transactions. The system seems to have succeeded in terms of resources management as most Norwegian resources are in a good shape. In terms of profitability the system has also been successful as profit margins have increased on average while the capture capacity has been reduced. Whether increased profitability is also due to other factors, such as an increasing TAC, is another matter.

Fleet distribution between counties has been relatively stable despite the reduction in the numbers of vessels, while the increased concentration of quotas within counties has meant that some fishing municipalities have benefited at the expense of others in accordance with quota system limitations that allow transactions to occur within but not between counties. However, the system has led to a significant decrease in numbers employed in the industry. In fact, since 2000, the number of

[9] In a verdict of 23.October 2013, The Supreme Court of Norway ruled that fish resources are publicly owned and that fishing permits and quotas are not perpetual. Consequently, holders of fishing rights have to accept that, after proper procedures, political organs have competence to change the rules of the game. (http://www.domstol.no/upload/HRET/saknr2012-1548 (plenum) pdf. Accessed 8.2.2015.

fishers in Norway has been halved (Johnsen et al. 2013). Some might consider this as collateral damage, unfortunate but unavoidable, and that the alternative would have been worse, namely a bankrupt fishing industry. Whether that would have been the case, however, is a matter of dispute and frequently debated within the media. It is for instance often argued that the path dependency of adapting this system has left Norway with fewer options than would have been available if it had followed a different route. However, given technological capacity development and fishers' eagerness to invest, there was a fear that an open access system would have ruined the resource base, while a completely unregulated market based system would have privatized resources and concentrated wealth in a few regions. Thus, the system has tried to navigate between two "evils". The outcome is a new system in which the social and cultural constitution of fisheries employment systems has changed from being intimately connected to local communities to one of professional sector networks extending far beyond them (Vik et al. 2011; Sønvisen et al. 2011). Crew used to be recruited locally, and were typically family and kin. Now, particularly in the large-scale sector, crew come from distant regions both within and outside Norway (Sønvisen et al. 2011), as is also the case in other Scandinavian countries such as Denmark (Høst 2015). Vessel size has increased and gear and other fish-finding technology is as modern as can be. Fisheries in Norway are highly organized with the Norwegian Fishermens' Association playing a new professional (as opposed to informal) role aimed primarily at looking out for the economic interests of its fishers (Mikalsen et al. 2007). Indeed, the "disenchantment of the world" that Max Weber wrote about and feared has arrived in Norwegian fisheries (cf. Linke and Jentoft 2013).

This brief explanation of the Norwegian fisheries quota system illustrates that the government and industry saw it as a collaborative way to tame and control market forces. How successful it has been depends on whose perspective one emphasizes and what and whose concerns are given priority. Compared to most other countries that have walked this razor edge, Norway has done well. Norwegian fisheries are not in a resource and economic crisis, and government is largely living up to its international commitments vis-à-vis FAO's Conduct for Responsible Fisheries (Pitcher et al. 2009). But the system has its winners and losers, and the future of scattered coastal communities remains uncertain. Young people are migrating out, something that is likely to continue. However, the quota system cannot take the blame for all that is happening to these communities. The quota system has no doubt made entry into the fisheries more cumbersome and expensive, as quotas come at a high price. But the industry has in periods faced a fierce competition from a booming offshore oil industry and a related maritime service sector whose salaries far outweigh those in fisheries (Johnsen and Vik 2013). For the moment (2015), the competition is quite low because the unemployment in the oil- and gas related industries are now increasing, due to lower oil prices. Oil and gas exploration, aquaculture and other types of industries that permanently occupy ocean space also compete with the fishing industry about ocean space, but so far this have not constrained the Norwegian fishing industry too much. Nonetheless, for those who remain in the

fisheries, the situation is quite lucrative (Johnsen and Vik 2013). The challenge these fishers face is finding young recruits.

The Norwegian fisheries industry and its governance structure looks better from afar than from close up. There are negative social and cultural impacts that are not visible unless one goes into these communities and studies how they have tried to adapt. Such impacts are usually not factored into profit-loss calculations. The real costs that the fisheries sector worries about are those related to financing an increasing debt-burden that the quota system has led to, which has made the fleet more vulnerable to market price fluctuations for the export of fish products (Trondsen 2013).

Some critics claim that the Norwegian system is a mix of the worst of the market system and the worst of a planned system (cf. Hersoug 2005). Others take the opposite view, namely that a mixed market-based quota system helps society and made Norwegian fisheries a lucrative industry for Norway as a whole, ridding it of the previously heavily subsidized industry. Norway has avoided what both parties see as the worst scenario: the Icelandic and EU experience.

The pressure to continuously reform the system will remain given the importance of Norwegian fisheries to the nation and local communities. Currently, there is pressure to abolish the restriction on vessels under 11 m from participating in the TQ system. On the other hand, in the last Seafood report presented by the Ministry to Parliament, the idea of reversing the quota right (reversionary right) is mentioned (in Norwegian: *hjemfallsrett*) (White Paper (Meld. St.) 22 (2012–2013)). This would mean that one could once again dispose of one's right when the allotted time is up. A reversionary right emphasizes the collective nature of fisheries resources as opposed to rights being fully privatized. If such a revisionary right is introduced again, it would also be aimed at regional dispersion. Any reconsideration of vessel size restrictions or reversionary rights would require radical change.

Major institutional reform in Norwegian fisheries has always been triggered by some crisis that delegitimizes the current order and begs for a new one. Currently, no such crisis exists and hence there is no demand for reform in the industry. Since 1990 when the principles for the current quota system were laid down, the Norwegian fisheries management system has been adaptive in nature. As long as the state of the resource and the economic situation in the industry remain relatively healthy, as now, and the people leaving the fishing industry and their home communities have alternative employment or the welfare state to rely on, there is little reason to expect any major overhaul to the system unless the politics of a new government necessitates it.

6.7 Conclusion

The more or less continuous and incremental evolution of the Norwegian fisheries quota system over several decades reflects a political process where multiple stakeholders and shifting governments all leave their marks. It is hard to predict

what direction this process will take even if the general trend is clear. Different instruments such as technical regulations, quotas and market mechanisms have been introduced as means to fine-tune the system in order to improve governability within a given overall TAC that has clearly defined economic and social goals. However, over time these instruments have structured, disciplined and regulated the actors within the system, namely the fish, fishers and managers, towards certain actions and outcomes (Johnsen et al. 2009a). System relations have become increasingly cybernetic, with feedback and response mechanisms structuring interactions in accordance with what the governing system defines as rational, efficient and economic (Johnsen 2014). This has led to the closure of the political process, where certain solutions become institutionalized and locked into the governance system. This then develops into a machine-like system – a cyborg – isolated from open political debate. In this sense, cyborgisation also becomes a process of de-politicisation, where fisheries governance is left to market instruments to structure social interactions. Ironically, cyborgisation is compatible with, and indeed reflective of, a neoliberal ideology, namely the conviction that markets are more efficient for allocation than the political process, even if markets themselves need government regulation. Notably, the institutionalization of the quota system where rights to fish have become tradable would not have developed without the authorization of the government. As Robbins (1965) noted, the invisible hand is the government.

When market instruments such as ITQs gain momentum in fisheries and become the system, they change social relations and interactions. Even if it is stated that the ownership to the resources are with the people of Norway, the transformation of fish from a free-for-all good to a limited fishing right, may change the fishers' image of fish from a common good to something individual fishers have a special "ownership" to. This is a feature many right based approaches to some extent share (Allison et al. 2012; Ruddle and Davies 2013). In addition, transferability turns the right into a tradable good, from which some individuals can benefit more than others can. Establishment of ITQs may under certain conditions detach economic value from the fish as a physical object, and turn fishing rights from being an instrument for combining control of fishing effort with economic security for fishers, into a financial derivative. Market instruments are therefore not neutral and non-political; they are introduced and maintained as a political act, and thus a matter of dispute within Norwegian fisheries as elsewhere. Markets perform an ideology that is converted into policy, which over time shapes the governance system in a way that creates the impression that its design is non-political. Markets are then no longer perceived as a social product and therefore a political formation, but as an "objective reality" (to paraphrase Berger and Luckmann 1967), which humans take for granted as the only rational type of system.

While market instruments can be useful for allocative purposes and reducing capacity (not necessarily effort), they come with costs. Instruments such as ITQs tend to concentrate rights in certain regions at the expense of other regions. Hence, if we use them, we need to control them. Therefore, policy makers must acknowledge that neither market instruments nor other instruments that contribute in config-

uring the cybernetic fisheries governance system are neutral. As one problem is solved (like over-capacity), another is created. Neither do markets replace politics. Moreover, the success of market instruments must be empirically evaluated. Otherwise, they risk bringing permanent harm to those values that are traditionally associated with fisheries and are still considered worthwhile. The fisheries governance system, therefore, still needs a political process where basic principles and mechanisms can be subject to public scrutiny and debate.

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Chapter 7
Swedish Fishing in the Wake of ITQ

Madeleine Bonow

Abstract In recent years, Sweden has managed its fisheries in line with the analysis made by the European Commission: overcapacity is persistent and only a few fleet segments have a level of income that can provide acceptable wages and scope for investment. An ITQ system was put in place in pelagic fisheries in the autumn of 2009. The chapter analyses the effects of the introduction of ITQ in Sweden. The introduction of the ITQs in the pelagic fishery led to a rationalization of the fleet, which, at first glance, has meant a more profitable pelagic fishery, with less black money (Wramner, Professor emeritus environmental science and former director of the Swedish Agency for Marine and Water Management. Interview, 2013 09 02, 2013) in the fishery. However, not all of the catch fisheries have been placed under ITQ, and this has produced unintended effects. First mover advantages and forms of concentration and expansion have been stimulated in a skewed fashion. The system is inflexible when it comes to making markets for by-catch, and hinders the recruitment of young fishers into the industry. It has also led to displacement of Swedish pelagic fishers into coastal demersal fishing or overseas fisheries, and to the sale of boats to owners who are now active in cod fishing or in the shrimp fishery. As a result, there is now overcapacity, poor profitability, and catch dumping in the Swedish shrimp fisheries and perhaps in Sweden's Baltic Sea cod fishery.

Keywords • Sweden • ITQ • Pelagic fisheries

7.1 Introduction: How to Reduce Overcapacity?

Almost 90% of the fish stocks in the EU are overfished with 30% so strongly that they are outside safe biological limits (European Commission 2009a). That overfishing and stock depletion have direct economic implications is obvious: the output from fishing at the global level is estimated to be worth 83 billion dollars a year less than what it could have been (World Bank 2017). A massive overcapacity is seen as

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a major problem in both the European and Swedish fisheries: too many boats seek too few fish (Havs och vattenmyndigheten 2014). Conversely, poor economic conditions hamper the introduction of regulations to promote environmental sustainability (European Commission 2009). Excess fleet capacity contributes to inefficient fleet utilization and poor profitability. To remedy this situation requires substantial government intervention, largely to reduce the number of vessels, but at the same time this will lead to complex regulatory systems in fisheries, which in turn make it difficult for the fishing industry to evolve and meet the demand for new products from consumers.

Thus fisheries management using individual transferable quotas (ITQs) is on the political agenda in both the EU and in Sweden. In line with the system of transferable fishing concessions (TFCs) proposed by the Commission, Sweden began to introduce policies to effect a rationalization of the fishing fleet, beginning with the pelagic fisheries in 2009. This chapter analyses and discusses the results of this set of policies. The analysis is built on information compiled from secondary sources such as, governmental documents, plus ship records, and an interview. The following sections outline the policies that the European Commission has proposed and that the Swedish government has used to reduce fleet over capacity, and the responses to them among the fishers.

The main research question is what is the outcome of Sweden's introduction of the ITQ system? There certainly has been a rationalization of the fleet previously engaged in Sweden's pelagic fisheries, and the amount of black money circulating in Sweden's fisheries has fallen. At the same time, there are increasing barriers to entry for young fishers as well as declining sales for smaller companies. Small-scale fishers complain of a bureaucratic system that leaves them vulnerable to price fluctuations and rule changes. There are continued reports of fish dumping. Swedish fish companies have responded to the new system by internationalizing, either by purchasing vessels and quota in other fisheries, by flagging their boats abroad, or by engaging in the fishery off the Western Sahara. This internationalization means the displacement of the Swedish fishing capacity to other fisheries. Finally, the official assessment of the introduction of ITQ (Havs och vattenmyndigheten 2014), which finds that there has been a reduction in fleet capacity but no effects on fish stocks, is open to critique: it is impossible to tell precisely what the effects of the system were, largely because of inadequate data. Before elaborating these responses, I first outline the issues surrounding the EU policy framework for ITQ in Sweden.

7.2 Setting the Right Policy in the EU and Sweden

In its efforts to resolve the dilemmas of overfishing, the European Commission proposed introduction of a system of TFCs, and indeed this is the only mechanism proposed by the Commission to reduce fleet capacity. The quota allocation system is based on the catch quotas determined within the EU's common fisheries policy each year. In a transferable fishing concession system, rights to use a given

percentage of the total allowable catch (TAC) each year are allocated among fishing companies on a long term basis (Waldo and Paulrud 2013). These fishing rights can be resold and are the basis for a market in quota. The ideas behind the system are that the companies that use the resource must have access to quota, and that those operating in a cost efficient manner will choose to stay in the industry and acquire additional quota, while unprofitable companies will choose to exit the system. In this way, not only will the fleet be reduced but unprofitable fishers will be rationalized from the fleet. As smaller and less efficient units exit, not only the fishery but also resource management becomes more efficient and effective since fishermen can themselves regulate their catches in relation to their access to quota. Note that the goal has been to limit the TAC to a level low enough to ensure that the fish stock survives but this goal has not been reached.

The Commission bases its call for ITQ upon a critique of individual quota. The individual quota system forms unfortunate economic drivers, both in the short and long term. In the short term, it will be attractive for the individual fishers to fish intensively in the beginning of the fishing season, so that their own company get the largest possible part of the overall catch. An indirect effect of such a capture system is also that fishers making catches of other species for which the aggregate catch ceiling has already been reached must throw injured or dead fish from these species back into the sea. Even in the short term, it undermines thereby the second fish stock survival. In the long term, a further effect is that it will be profitable for the individual fishers to invest in increased fishing capacity in order to capture a greater share of the overall catch, because other fishers face the same incentives and they too will invest in increased capacity resulting in overcapacity fishing. Another long-term effect is that if the scheme succeeds in limiting the overall fishing to a level where the shared profits rise the individual fisher's share of the future profits remain uncertain and partly conditioned by the need to continue to fish. This will encourage fishers to remain in fishing, despite the overall over-capacity, and to argue for increased fishing quotas, because they would rather take some of the profits now than safeguard future profits that may go to other fishers.

Despite these problems with individual quota, there has been considerable debate over the ITQ approach. ITQs have, in some cases but not always, proven to be an effective way to address overcapacity in fisheries and thus get a more efficient fleet that is in balance with the available fish resource (Andersen et al. 2010; Arnason 2005, 2008; Costello et al. 2008; Chu 2009; Gibbs 2010). The Commission's impact assessment has shown that such a system could have positive effects to eliminate excess capacity and improve the fishing industry's financial results (COM 2007: 136 final; SEC 2007: 381). But other research shows that how fishing capacity develops in an ITQ system depends on whether there is excess capacity or not (Andersen et al. 2010; Costello et al. 2008; Chu 2009; Arnason 2005, 2008).

However, a number of issues and interests emerge in any European discussion. First, quota trade in a situation where trawling is 'more efficient' than, for example, gillnets might imply that the small-scale coastal fisheries based on gillnets will be bought out from the fishery so as to add quota to the trawl sector. This outcome is contrary to the political intentions, certainly in Sweden. Second, one of the risks

with this system is that the boats that exit the quota fisheries will not be scrapped but moved to other fishing activities either in EU fisheries not regulated by quota or in fisheries outside the EU regulatory system. Third, a further risk is that society loses control over who uses the resource and how. If citizens and authorities want to see small-scale fisheries and vibrant fishing communities, they need to establish regulations that will protect them. And if authorities want to favour the fishermen involved in non-destructive and selective fisheries they will also need benefits. Several models for the functioning of such markets have emerged around the world, including markets for quota per se and markets for vessels with quota attached. Various regulations have emerged as each government works to manage unwanted tendencies in such markets, and this has been discussed with respect to New Zealand, Iceland and Norway in previous chapters. Increased profitability, sustainable fishing and more viable fish stocks appear to be the result when introducing ITQ, but not always (Gibbs 2010). Faroe Islands, have a different system that focuses on days at sea, that is the number of days that a boat is allowed to fish. The combination of these two systems is probably best if both dumping of fish caught and profitability could be achieved. The concentration of fishing activities into fewer companies is a clear and expected result of ITQ. It is also expected that capacity will be reduced without government subsidies since companies that want to expand will buy quota from companies that want to stop fishing (Turris 2010). This process, for example, has produced the situation in Denmark, where only a very few companies hold the majority of fishing quotas (Højrup 2012: 236).

Following heated discussions over these and other issues, transferable quotas were not put into effect at the EU level. Neither the Council of Ministers nor the European Parliament's Fisheries Committee in its vote on Dec. 18, 2012 supported this method to reduce fleet size. Nevertheless, the proposed EU fisheries policy reform has triggered Sweden to begin an adaptation of the Swedish fleet using transferable fishing rights. According to the officials responsible for Rural Affairs, Sweden still intends to push through a reform of transferable fishing rights with a view to concentrating fisheries in fewer fishing businesses despite the lack of agreement at the EU (written question 2012/13:224 Swedish parliament).

The Swedish Government believes that it is necessary to adapt the EU fleet capacity to available resources. It has been in favor of a system of national TFCs provided that the small-scale and coastal fisheries will be protected. Primarily it is about reducing fishing capacity, and thus the number of fishing vessels, in order to get a balanced vessel structure in the Swedish fishing fleet. This is seen as a prerequisite for a sustainable fishery (Waldo and Paulrud 2013).

In Sweden, the fishing industry and the fishermen have had financial problems for a long time. The government estimates that profitability in fishing is low and that only a few vessel groups have a profitability that allows for reasonable wages and opportunities for investment (Government Communication 2009/10: 187, Waldo and Paulrud 2013). Poor profitability in fishing makes it politically difficult to reduce quotas because this means weakening the economy in an already tight pressed profession. Often, it is among the small-scale fishers that the risks of exit from the fishery are highest.

Further, the Swedish government believes that a TFC system will also help to achieve a discard ban that is another priority for the government under the Fisheries Reform. TFCs are welcomed because they are seen as a means to implement a discard ban, which could be achieved through an appropriate quota allocation in which each vessel has the right catch composition (Regeringskansliet 2009).

Finally, Sweden has some experience of TFCs. When the system was introduced to Sweden's pelagic fisheries in 2009, each vessel owner was given a percentage share of the total national pelagic fishing quota free of charge as an individual fishing quota that could be sold on or bought off others. The size of the initial share was determined by how much the owner had previously caught during a given period (Isakson et al. 2013). Today, quotas are tradeable within the fisheries sector, which is a significant difference from the former management regime, in which catch shares were only usable by the owner and were not tradeable. Nevertheless, the Swedish system is an ITQ system in the making and one enmeshed in debate over precisely what the rules should be.

7.3 Sweden's Experience with Fleet Capacity Reduction

Both the Swedish fish harvest and the Swedish fishing fleet have been greatly reduced since Sweden joined the EU and today's operations bear no comparison to the situation in the 1960s. When Sweden joined the EU in 1995 there were licenses for 2884 Swedish fishing vessels totalling 57,147 gross tons (Swedish Agency for Marine and Water Management 2012). The number of vessels in the Swedish fishing fleet has decreased from 1597 ships in 2004 to 1299 registered vessels in 2013, with a combined gross tonnage of 32,000 gross tons, and a total power of 171,000 KW (Paulrud et al. 2014). The largest decline occurred before 2010. After that the fleet remained at a relatively constant level (JO 55 SM 1501).

During the period 1995–2012 the total number of fishermen in Sweden decreased by 47%. The greatest decline was among the younger fishermen, of whom 65% have stopped fishing since 1995. Correspondingly, the proportion of fishermen over 50 years has also increased by 21%. Out of 1620 fishermen remaining in 2012, 20% were women and 61% of the fishermen were over 50 years old. This means that the development of the profession has weakened (Swedish Agency for Marine and Water Management 2012). The total number of days at sea decreased by around 24% between 2008 and 2013, so that the Swedish fleet spent a total of around 78,000 days at sea in 2013. Despite lower TAC, the fleet reduction has been accompanied by increasing catch per unit effort (Paulrud et al. 2014).

The most significant Swedish fleet segment in terms of capacity, volume and value of landings is the pelagic segment. Species like herring, sprat, mackerel, sand eel and blue whiting are primarily targeted. The segment is defined as vessels that are of at least 24 m in length. Vessels in the segment primarily use trawls, but purse seines also feature. Fishing takes place in the Baltic Sea, the North Sea, the North Atlantic, the Skagerrack and the Kattegatt. Information on the landing of fish caught

by Swedish vessels in 2014 indicates a total quantity landed of 137 200 tonnes, a decrease of 19% compared to 2013. The catch value at the first stage amounted to about SEK 700 million, which means that the value has decreased by 23% compared to 2013. Decreased catches are noted for pelagic species. (JO 55 SM 1501 2014) due to decreases in quotas for pelagic species (most importantly for herring and sprat) and increases in fuel prices (Paulrud et al. 2014). Overall, fleet capacity has generally decreased during the past years whether measured in terms of the number of vessels, gross tonnage or kilowatts. However, the decrease has been more marked in some segments than others. The aggregate power of the pelagic fishery has declined from 67,200 kilowatts in 2009 to 35,800 kilowatts in 2013, equivalent to 47%. The corresponding reduction of the Swedish fishing fleet has been 18% (Havs och vattenmyndigheten 2014).

The scrapping of vessels has played a prominent role in fleet capacity reduction. Two scrapping campaigns, one for the Baltic Sea and one for the North Sea, Skagerrak and Kattegat, were carried out with aid from the European Fisheries Fund (EFF), one in 2009 and one in 2010. Both campaigns targeted cod trawlers. In the campaigns 30 trawlers were granted 10,573 (EFF) funds (DG MARE Lot 2 2013). The scrapped vessels represented a total of 2466 GT and 9590 kW, equivalent to about a quarter of the total gross tonnage of the segment and 19% of the total kilowatts. During the Baltic Sea campaign 1040 GT and 3306 kW were scrapped, while 1426 GT and 6284 kW were scrapped as part of the bottom trawler campaign in the North Sea, Skagerrak and Kattegat (DG MARE Lot 2 2013; JO 55 SM 1501 2014).

A second contributing policy has been the multi-annual management and recovery plans introduced for a number of stocks in the North Sea, Skagerrak, Kattegat and the Baltic Sea, under which TAC and fishing effort levels have been gradually reduced. Rules for the establishment of TAC and fishing effort levels are set out in the long-term plans. TAC for the pelagic segment (seiners and pelagic trawlers) decreased, especially between 2009 and 2010, while the result for bottom trawlers shows a steady downward trend for 2008–2010 (Curtis and Carvalho 2012). While the values still indicate that fishing mortality exceeds the desirable catch rate for the sustainable exploitation of the stock, the trend is moving in the right direction. In this context the plans to limit TAC for cod stocks in the Baltic Sea (Council Regulation (EC) No 1098/2007) and for cod stocks in the North Sea, Skagerrak and Kattegat (Council Regulation (EC) No 1342/2008) are of principal interest.

Under the national system for the entry and exit of vessels the fleet is divided into five segments (Annual report on the Swedish fishing fleet 2012). The entry of new capacity into the fleet is always offset by the withdrawal of at least the same amount of capacity. Withdrawal is a condition for fishermen to be granted a vessel licence. Vessels may only be used for commercial sea fishing if they have a licence. Vessel licences cease to be valid in the event of conversions affecting length, breadth, tonnage, or engine power. Entry-exit conditions for vessel capacity are regulated by fleet segment. For the pelagic segment (segment 3), the capacity withdrawal requirement is 110% for the west and south coasts and 100% for the east coast. The 110% capacity withdrawal requirement also applies to the entry of other types of trawlers and vessels over 12 m on the west and south coasts. For regional reasons a lower

withdrawal rate of 100% is applied to vessels which fish only in the Baltic Sea. For vessels under 12 m using passive gear, the withdrawal requirement is 100% in all coastal areas. The different withdrawal requirements were intended to benefit regions where fishing is in decline but where the fishing sector is of local or regional significance (Annual report on the Swedish fishing fleet 2012).

The bulk of the Swedish fleet has always belonged on the West Coast, mainly in Bohuslän and Gothenburg but also to some extent in Halland. Today, it is mainly in Gothenburg, and the Gothenburg archipelago that fishing remains significant. In terms of tonnage (total tonnage of fishing vessels over 100 tons) the largest fishing communities in 2013 were; Fiskebäck (11 vessels totalling 4839 tons), Styrsö (4 vessels, 925 tons) and Rörö (3 vessels, 1008 tons the largest of which is 705 tons), Träslövsläge (3 vessels, 777 tons), Hönö (3 vessels, 763 tons) and Fotö (2 vessels, 1422 tons) (European ship register 2014; Annual report on the Swedish fishing fleet 2012). This image of the fishing communities does not give the whole picture however. Rörö for example, has greater importance than the number of registered boats shows. The island's main fishing companies Astrid Fiske AB and its members own boats in many other places, for example in Fiskebäck and Esbjerg (Swedish ship register, European ship register). Large fishing companies and fish groups with many boats also exist in Fiskebäck. Among them are Toron Country HB and Fisheries AB Ginneton.

The number of fishermen in Västra Götaland and Halland has declined from over 7000 in the early 1950s to about 1000 today. Some of these are coastal fishermen with small boats fishing with nets, traps and pots. Some are fishing (demersal fisheries) from small and medium-sized trawlers often using bottom trawls and nets and longline boats. And finally there is the pelagic fishery with larger boats for sprat, herring, sand eel and mackerel. It is this last fishery that totally dominates the fleet and has the largest fishing vessel tonnage (European ship register 2014).

In summary, since joining the EU, the combination of a fisheries stock assessment system that has steadily reduced the available TAC across multiple species and EU interventions in the form of scrapping has affected a substantial capacity reduction in Sweden's fishing fleets. In 2013 there were 57% fewer vessels in the fleet than in 1995, there was 44% less total tonnage, and there were 47% fewer fishermen. The Common Fisheries Policy has resulted in small-scale fishers leaving the business at a steady rate, both on the west and east coasts. The most important Swedish fishing harbours are still located on the west coast but there is a general downward trend in all the Swedish fishing ports in terms of the number of vessels and their total capacity.

7.4 ITQ in the Swedish Fishing Industry

Sweden is moving, one step at a time, towards ITQ, in which the individual fisher receives a fixed percentage of future catches of some fish stocks and this share can then be transferred to other fishermen by sale or gift. The initial aim was to

restructure the pelagic fisheries by reducing overcapacity and improving profitability. According to the initial regulation, the law on transferable fishing rights, the system was further to provide good conditions for achieving "economically, environmentally and socially sustainable" fisheries by "Changing the ship structure of the Swedish fishing fleet, so that it will help to preserve fish stocks". ITQ are frequently cited as an effective instrument to manage the overcapacity in fishing in public waters, to increase fishing industry profitability and to promote sustainable fisheries management. Positive effects on performance, profitability and fish stocks are expected when ships with different marginal costs can begin buying and selling quotas. The new system gives somewhat better incentives and when fishermen no longer need to fish intensively at the start of the season they can go fishing at the time of the year when it is most profitable to do so.

Hoping to achieve these outcomes in Sweden, the Board of Fisheries proposed a system of transferable fishing quotas for the pelagic fisheries in 2005. Two years later, the government gave the Agency for Fisheries the mandate to develop and implement the proposal (Fiskeriverket 2007; Fiskeriverkets Dnr 10-957-07). In 2008 they presented a memorandum to the Ministry of Agriculture, which led to a proposal for a new law on negotiable fishing rights (Ds 2008:45; proposition 2008/09:169). On August 1, 2009, the new Act (2009: 866) on transferable fishing rights came in force. In October 2014 the government decided that other species should be covered as well (HVMFS 2014:19).

The EU sets the TAC for Sweden. Quota are allocated as a fixed percentage of the changing total Swedish quota. Initial allocations were based on information on vessel catches over a period of years. Individual quotas cannot be changed by administrative decisions during the year. This is an important difference from the former system, where the allocation can increase or decrease during the year depending on how much other fishers choose to fish.

However, the Swedish system falls short of a complete ITQ system in several ways. First, transferable fishing rights are not granted in perpetuity but for 10 years from the date when the Marine and Water Authority decided to award the rights. A fishing right which has been transferred will be valid during the time that remains of the original duration. Second, to be able to fish in the pelagic fisheries the vessel owner needs both a fishing license and a special permit but exceptions apply to vessels less than 12 m fishing in the Baltic Sea and for herring and sprat fishing in the Sea of Bothnia and the Gulf of Bothnia (HVMFS 2014: 19). A number of pelagic species in Swedish waters are outside the system of transferable fishing rights (2009:866). Third, to prevent excessive concentration of ownership several further limitations have been introduced. For instance, an owner can only hold a license for fishing rights for a maximum of two ships simultaneously. Furthermore, the total holding of such rights are not allowed to represent more than 10% of the national quota. Finally, the Marine and Water Authority may decide that a right is temporarily withdrawn if the fishing license has been revoked or limited. In summary, then, a transferable fishing right is an individual right to be allocated a fishing license. Although the aim was to create well-defined rights, these are compromised in numerous ways.

7.5 The Rationalisation of the Swedish Pelagic Scene

Sweden introduced individual quotas in 2007, before the introduction of ITQs in the pelagic fishery in 2009, but it was not possible to trade these rights (Ds 2008:45; 2008/09:169; act 2009: 866). When the full ITQ system was introduced, during autumn 2009, 82 vessels were given pelagic licences to fish for species such as herring, sprat, mackerel, sand eel and blue whiting (kolmule). On 1 November 2014, only 35 vessels had pelagic licences. This means that vessel capacity in that part of the fleet that has pelagic fishing rights decreased by 55% in terms of both gross tonnage and engine power. In Gothenburg there were 48 vessels in the pelagic fisheries in 2009 and today only 20 remain in the same area. There has been a minor trend toward concentration on the west coast. Most of the vessels that no longer have pelagic fishing rights have been withdrawn from the fishing fleet, while others remain in it but are inactive, and a few are used in other types of fishing. Fleet rationalization has taken place, so that, at a first glance, the introduction of the ITQ in Sweden has led to a more profitable and more ecologically sustainable pelagic fishery.

Most likely, it has also meant that the proportion of black money in the fishery declined or disappeared completely in the pelagic fishery in Sweden. Before 2007, there was a lot of black money circulating in the Swedish fisheries (Wramner 2013). To prevent this, Sweden has introduced a rule that no fishing company may hold more than 10% of the allowable Swedish quota for a particular fish. Sweden's larger fishing companies quickly reached this limit.

But a system of ITQs in the way that it is organized in Sweden has some problems. Since the first quotas were given for free in Sweden, the first quota holders made profits, giving them a first mover advantage through a windfall (Eliasen et al. 2009). In turn, this has made it hard to recruit new blood to the fishing business. Young or new fishermen are not able to buy quota to start their own fishery because the established firms have the financial muscles and can pay higher prices than newcomers can (Højrup 2012; Eliasen et al. 2009). Those who profit from the introduction of ITQ in the first phase, can use the revenues to invest in other fisheries, and thus stump out other fishermen from the fishery (Grafton and McIlgorm 2009; Gross 2010). This seems partly to have happened in the Swedish fisheries where fishing enterprises mainly engaged in pelagic fishing have now invested in boats in the demersal (cod fish, flatfish and Nephrops) fisheries. These include the Fisheries Ltd Ginneton (Claesson). One company, Bryngeld Fisheries Ltd., has left the pelagic sector in Sweden entirely to focus instead on demersal fishing. If all fisheries were under ITQ, this problem would be less likely to occur. Today the largest fishing companies have increased their sales over a number of years, while smaller companies, with some exceptions, remained constant or decreased. Further, the system becomes inflexible. Catching the wrong fish in your net became a problem when dumping was prohibited, making it a criminal act either to keep the fish or to get rid of it. Denmark and other countries have solved this by making landing rights tradable and providing some quota available for hire, but so far that has not happened in Sweden.

7.6 ITQ and the Small-Scale Fisheries

In Sweden it was thought that it would be important for an ITQ system's efficiency that small fishery entrepreneurs be kept outside the system and in a separate closed system. This has meant that the small scale Swedish pelagic fishery was allocated a certain proportion of the total quota in a special coastal quota. The quota is determined as a percentage of the total quota and can thus vary from year to year but the important controls are on gear type. In the Skagerrak and the Kattegat, for example, fishing is not conducted by vessel trawls, regardless of vessel size. Only fishing with hook and line to a depth of less than 45 m and with a circumference of less than 360 m is permitted, regardless of vessel size. For fishing the coast quota for mackerel in the North Sea, Skagerrak and Kattegat, vessels may land or tranship a maximum of 2000 kg of mackerel per calendar week. Further, the yarn length of fishing is limited to 2500 m (Kvarnbäck and Johansson 2013).

Few studies have been done of the effects on the small scale fisheries in Sweden after the ITQ system was introduced but Waldo et al. (2013) provided insights into the topic based on a study of the Swedish small-scale herring fishery in the western Baltic Sea. They argue that even if the small-scale fishery has an exemption from the system with tradable fishing concessions it did not solve the problems facing the small-scale fleet. The main reason for the fleet being exempted from tradable concessions is to protect values other than the strictly economic (Waldo et al. 2013). Crucial for fishers is to have an institutional setting and a management that can deal with the problems of accessing the quota.

The small scale fishery has been profitable since the system was introduced but still an interview study among costal fishermen in Bohuslän on the west coast of Sweden gives us a bleak picture (Kvarnbäck and Johansson 2013). Bureaucracy is considered rigid and demanding. Many fishers believe that there is a lack of knowledge among politicians and officials of the conditions and needs in coastal fishing. Fishermen feel that there is much that has changed during a relatively short time since the introduction of ITQ. The rules have become more numerous and more extensive in order to reduce fleet capacity and ensure sustainability of stocks. Opinions like "They starve us out" or "Sweden does not want coastal fishing", are common. Several fishermen believe that the transition to a new Common Fisheries Policy in the EU 2014 (GFP) and the forthcoming system of transferable fishing concessions, will determine whether their business can survive and develop or diminish. A dominant share of the fishermen express strong concern for individual quotas and they find the unpredictability of the regulatory framework immense with consequences for their finances. They feel that they are left in very difficult circumstances when the quota can be fished up, commodity prices fluctuate, fuel prices increase and new rules can be introduced, each of which can drastically change the revenue potential for the company (Kvarnbäck and Johansson 2013).

7.7 ITQ and the Internationalisation of the Swedish Fisheries

As early as the end of 2009, observers noticed an immediate removal of 20 vessels from the Swedish fleet register. By early 2012 the capacity in the pelagic fleet had declined to about 13,000 GT (Isakson et al. 2013). This apparent achievement raised the question where had the pelagic fleet gone: were they scrapped, were they now active in other fisheries, or what happened? Generally, the answer is that the Swedish industry has internationalized in three different ways. Some Swedish companies are purchasing fishing boats in other countries and starting new fishing companies elsewhere (Højrup sid 2012: 236, The Swedish fishing fleet 2012 skeppsregistret). Many are flagging Swedish fishing boats in other countries, and others are engaged in the fishery off the coast of Western Sahara (Isakson et al. 2013).

7.7.1 Swedish Boats Displaced to Other Fisheries

A dozen boats were scrapped or otherwise removed, but more commonly, the boats were sold, some to other fishermen in Sweden, and some to other countries. Five vessels were exported to Morocco and others ended up in Belize. Over 20 major pelagic trawlers have been sold abroad. Around 15 of them were sold to countries in our immediate surroundings, like Norway, Denmark, Finland, Germany and Poland, which means that they are now fishing in much the same waters as when they were Swedish registered (Swedish ship register 2012, 2013; Isakson et al. 2013). Most of these are still owned by Swedish interests, but they are now operated out of Denmark, Germany and Finland. Denmark and Norway have ITQ where the former Swedish boats replaced other boats so that, at least in terms of the number of vessels, there has been some reduction in fishing capacity in Nordic waters in terms of pelagic fishing boats (Swedish ship register 2012, 2013; Fleet Register On The Net; Isakson et al. 2013).

Some of the boats sold in Sweden are now found in cod fishing, others in the shrimp fishery. Overall, this is about a dozen boats. Today, the largest shrimp boats are all vessels previously engaged in the pelagic fisheries (Isakson et al. 2013). This transfer has probably led to an oversupply and overcapacity in the Swedish shrimp fisheries, which amplified the problems of poor profitability and dumping of shrimp. Possibly it is the same with the cod fishery which takes place mainly in the Baltic Sea.

Under ITQ and EU fishing rules and reregulation there has been strong concentration of effort in the hands of a few fishing companies in Sweden. The Swedish restriction on the proportion of the quotas that can be owned led to many of the wealthy pelagic fishing companies expanding abroad, or investing in more coastal demersal fishing for flatfish, cod, shrimp and crayfish. There are three or four major fishing companies that benefited from this quota system and their owners now own

a growing number of fishing boats. The company Torönland HB, owns the two largest fishing boats in Sweden. Astrid Fiske AB, Fisheries Ltd Ginneton and Bryngeld Fisheries AB have bought the 10% of the quotas that they are allowed to in Sweden and to expand more they need to get quotas in other countries. This has also been the case for the three largest companies, which, together, are larger than all other Swedish fishing companies combined.

Other Swedish fishing companies have used their profits from the pelagic fisheries to invest in boats and quotas in other countries. The Donso families, who own Kristin and Nicklasson on Öckerö, also own Victoria and are active in Germany (Swedish ship register 2012, 2013; Fleet Register On The Net). Family Bryngeld and Bryngeld Fisheries Ltd. started fishing companies in Finland (Kotka Fisheries Ltd, perhaps taken together with other Fiskebäck Fishermen). Family Claesson owns the company Claesson Gifico ApS in Denmark, which in turn owns the fishing boat S 202 *Nimber*. The Claesson family also owns several fishing boats in Sweden through Fisheries Ltd Ginneton.

More impressive still is the Johansson family at Rörö who own Astrid Fishery A / S, a firm registered in Denmark. By merging its business in Denmark with Danish partners Søren Christian Espersen, Hans Espersen, Villy and Jean Christensen they were able to buy Danish boats and TFCs (FiskeForum.com 2012; Højrup 2012: 242). Some of the boats were scrapped shortly after the purchases and quotas have been transferred to the remaining boats. The Astrid Fishery A / S is about to become one of Denmark's major fishing companies and it has ordered a new boat, *Astrid,* of about 2,400 tons. The *Astrid* will work alongside its other Danish fishing boats *Rockall* E 352 and L 525 *Holt.* Through their investments in Denmark the Johansson family has created a fishing company that is significantly larger than the existing Swedish operations. The family still owns, through its companies, primarily Astrid Pelagic AB, several Swedish fishing boats, but most are reported to be for sale. The family has brought all its major Swedish boats to the new company Astrid Pelagic AB. Johansson ordered the largest fishing boat a Swedish fishing company ever owned, a boat of 2500 tonnes, when the next largest vessel in Sweden is a bit over 800 tonnes. The Johansson family and their Astrid Fishing is also active in Germany.

7.7.2 Quasi-Flag of Convenience

As a consequence of its transferable quota system, the old Swedish pelagic fleet is today widely active under other flags. Vessels are being flagged out to countries like Morocco, Comoros, Cook Islands and Belize and are being used in the dubious fishing off the coast of Western Sahara. Ownership often continues to be Swedish (Isakson et al. 2013). Other vessels are flagged out to neighbouring countries like Denmark, Norway, Finland, Germany and Poland, but also remain owned by the Swedish fisheries interests. The owners are still resident in Fiskebäck, on Rörö and Donso (Laurin and Schmitdt 2013).

The 10-percent rule is likely to be a contributing factor to the quasi-flag of convenience used by the Swedish fishing boats. Other things that can matter are a sluggish and slow fisheries bureaucracy and lower wages through international ship registers in other countries (Isakson et al. 2013). Note that the Campaign Against Flags of Convenience was inaugurated by the International Transport Workers' Federation (ITF) at its 1948 World Congress in Oslo. The actual term 'Flag of Convenience' (FOC) was not utilised until the early 1950s, and in 1974 the ITF defined an FOC quite simply as being: "where beneficial ownership and control of a vessel is found to be elsewhere than in the country of the flag the vessel is flying" (ITF 1999 13:1; Ministry of Agriculture 2009). By 1998, the United Nations Convention on the Law of the Sea (UNCLOS), established in 1982, observed that 51.3% of the world's total gross tonnage was registered to FOC fleets (Alderton and Winchester 2002). So this is not a purely Swedish phenomenon. Nevertheless, Swedish trawler owners have responded to ITQ in Sweden's pelagic fisheries by moving their vessels to other jurisdictions partly through FOC.

7.7.3 ITQ and the Swedish Fishing West Off the Sahara

Another imminent risk to the Swedish government's approach to reducing fishing capacity is that several fishing companies have sold their rights to fish in Sweden and moved operations to the Moroccan-occupied Western Sahara (Isakson et al. 2013). Several Swedish fishing companies are deeply involved in exploiting west Sahrawian natural resources (Laurin and Schmitdt 2013). That redundant Swedish fishing vessels are likely to shift their operations to these waters – in violation of international law – is only part of the problem. Excessive fishing capacity is a global problem, and there are almost no stocks left that can handle the increased fishing. In this context, the current Swedish model for capacity reduction only moves the problem to another part of the world (Isakson et al. 2013).

Some fishing companies that have benefited from gains in the pelagic fishery have invested in other fisheries. For example, Fisheries Ltd Ginneton (Claesson) but also Bryngeld Fisheries Ltd, left the pelagic fisheries in Sweden completely and instead engaged in fishing outside west Sahara. Bryngelds' pelagic trawler *Polar* is one of those found fishing off Western Sahara today. Other Swedish fisher families who sold their pelagic quotas in Sweden and now fish in Western Saharan waters include the Donsö family, Lennart and Christer Johansson, and the Families from Fiskebäck Lennart Kjellberg and Ove Ahlström (Fisheries Ltd Ganthi). Their boats have different names, ownership and flags today, but they all have Swedish origin and are still controlled by these families (Laurin and Schmitdt 2013; Isakson et al. 2013).

7.8 The Marine and Water Authority's Assessment, 2014

During 2014, the Swedish system's impact on capacity and profitability was evaluated by the Marine and Water Authority, in consultation with the Swedish Board of Agriculture. In summary, this report concluded that the system was effective in reducing the number of vessels and engine power, and in increasing profitability in the system, although this finding applies primarily to large vessels over 24 m. The report states that this structural change has been greater than in other parts of the Swedish fisheries. It also pointed out that the system was deemed not to have had any negative impact on the small-scale coastal fishery, or the number of landing ports, and neither had it increased the already high concentration of ships at the west coast. Fifty-three boat license holders (now called fishing license owners) sold all of their pelagic fishing rights permanently and of these 29 were still active in the fishery in 2014. Two of these 53 have acquired new vessels to fish lobster on the west coast as well as pelagic species on the coast of the Baltic Sea. The structural changes in the pelagic fishery have been greater than in other Swedish fishing in the past years. The total Swedish fishing fleet has diminished by 12% in the last couple of years, compared with 55% in the pelagic fishery. But the report does not discuss the consequences of fishermen moving capacity to other fisheries and thus contributing to the possible overcapacity and over-fishing there.

Some analysis of the economic conditions in the fishery were made. The report notes that profitability (measured as gross and net value added, but with caveats about the unreliability of the economic statistics that are the basis for the latter) improved for the larger vessels that remain in the industry. Low profitability mainly remains the situation for the smaller vessels and the vessels included in the regional allocation systems rather than in a system of transferable fishing rights. The report also notes that prices have risen more on pelagic species than other commercially fished species.

In response, Stage et al. (2015) argue that, the limited financial statistics available make it difficult to distinguish whether the effects attributed to the system are due to profitability or restructuring. The official evaluation of the system of transferable fishing rights can therefore not strictly explain what effect the system actually had on the restructuring that it was intended to accelerate. That the system should encourage structural change was foreseeable even before the system was introduced and, it seems, from the descriptive statistics, that this also has been the case. However, it will likely never be possible to say for sure how large the effect of the system actually has been, let alone how big ,the impact of constraints on the system have been, for structural changes in the pelagic fishery (Stage et al. 2015).

It is lamentable that no assessment was performed in the preparatory work on the impact of what this structural change actually could lead to. Anyone wishing to evaluate the effect of the policy instrument must in principle compare what actually happened with what would have happened if the control agent had not been introduced. This can be done even with aggregated profitability data and the shipping and fishing day statistics (see Andersen et al. 2010) but requires, in this case, that it

has a credible theoretical model of how profitability and other indicators would have developed if the control was not implemented. With more detailed statistics on income and expenses for individual fishing vessels, one can analyse empirically how the activity of fishing developed before and after the ITQ regime implementation and model how the activity would have developed if the ITQ scheme was not introduced. In Sweden no such statistics are available. What actually happened was that the authorities did not collect any price statistics, and continued to collect only the relatively limited economic statistics collected from the Swedish fishermen in general. This means that already in 2009 one could foresee that it would be difficult to assess the economic effects of the new system.

Thus the official review of the Swedish ITQ system finds that it led to moderate structural changes in the pelagic fishery, which can be taken as positive effects after a review of the number of vessels in the fleet. But by focusing on this apparent achievement, the report remains largely silent on the important issues. There is little sign of problems for small-scale fisheries in the report: apparently, the separate regulations and institutional settings for the small-scale fisheries have been effective. Improved stocks were one of the objectives of the new system and so the report shows how the stock situation for the species is today and whether, and, if so, how it has changed since the introduction of the system, since preserving fish stocks is one of the purposes of the legislation. The report shows that the system has not had any effect on this and argues that it could not be expected to have had any effect.

7.9 Conclusion

On its own terms – a reduction in fleet capacity to better align capacity to fish stocks – the Swedish ITQ for the pelagic fisheries has been reasonably effective. However, the limitations of the Swedish system discussed above have counteracted these effects and produced new problems that will need to be addressed. The Swedish system involves several important departures from the basic model for the ITQ system, and each of these deviations seems to have produced deleterious effects: deteriorating economic profitability, and reduced incentives for structural change. The rights limiting the duration to ten years meant that a fish right became less profitable than the unlimited valid fishing rights had been, and this will depress the price of fishing rights. The new rights will be distributed after ten years, reasonably, among the fishers who then remain in the system. The system makes it more attractive for fishermen with low profitability to remain in the fishery, in the hope that they may take part in future profits in the next distribution of rights. More seriously, the system has encouraged the internationalisation of the fishing fleet. This has involved different strategies some of which are illegal, but even those that are legal do not really solve the problem of overcapacity, but just move the problem somewhere else, and make it no longer a Swedish problem. The real problems of overfishing and illegal fishing are not solved on a global scale.

To summarise, the system of ITQ in the Swedish pelagic fishery has both positive and negative outcomes and these are not all visible from a review of the situation inside one fishery. A main effect has been to spread unintended effects into other fisheries. In order to be able to get rid of some of the interlocking problems, one solution would be to expand the ITQ. First it could be expanded to the Swedish demersal fishery, and then by adding landing rights that are tradable and quotas available for hire it would become more flexible. But to follow this path is to continue the ITQ experiment, and, as we have learned, that can be dangerous if the outcomes of the new policies are not assessed in advance, and not in terms that go beyond the stated effect of rationalizing the fleet in a fishery.

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Chapter 8
Individual Vessel Quotas in Germany and Denmark: A Fair Distribution Process?

Katharina Jantzen, Ralf Döring, Leyre Goti, and Lorena Fricke

Abstract Sustainability is one of the main focuses of the European Common Fisheries Policy (CFP). Drawing on the definition of Brundtland (Our common future: world commission on environment and development, Oxford University Press, Oxford, 1987) the evaluation of a fishery management regime calls for the investigation of its impact on sustainability of the fishery. An important aspect of that is inter- and intra-generational fairness in the distribution of access rights. Individual Transferable Quota (ITQ) schemes are widely discussed management systems that allow for economic rationalization and are expected to entail increased economic efficiency in the fishery. In order to analyze the impacts of ITQs on sustainability, we focus on three major concerns of inter- and intra-generational fairness connected to ITQs, using the examples of the German and Danish quota systems: the initial allocation of quota shares, changes in the fleet structure, and the implications for newcomers in the fishing industry. In this chapter, we investigate the just use of quota management exemplified by ITQ systems in Germany and Denmark. The methodology of investigating intra- and intergenerational fairness is first explained before this approach is applied to the German and Danish fisheries quota management systems. The last section discusses the results and examines whether ITQs can be classified as a sustainable and thus inter- and intra-generationally just management tool.

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8.1 Introduction

In this chapter, we investigate fairness aspects in allocation of tradable vessel quota fisheries exemplified by assessing the access rights systems in Germany and Denmark. In Denmark, tradable vessel quota rights were introduced in some fisheries while in Germany fishers still receive only non-transferable vessel quota. Tradable quotas, whether tied to vessels or traded separately as quota in an ITQ, are introduced in more and more countries as a management approach designed to make a more efficient use of resources (catch the quota with least costs) and to help to guarantee a sustainable exploitation over the long run. They are thought to be effective measures to counteract the problems facing many European fisheries: too many overharvested and biologically at risk fish stocks, and overcapacity in the fishing fleets.[1]

Drawing on Baumgärtner and Quaas (2010: 3) "sustainability aims at fairness in the domain of human-nature-relationships and in view of the long-term and inherently uncertain future". Baumgärtner and Quaas write of 'justice' and not 'fairness'. However, we see the distribution of access rights in fisheries not as an overall justice but as an economic fairness issue and analyze aspects regarding a fair distribution of access rights. Investigating the sustainability in terms of the fairness of tradable quota systems thus calls for consideration of the impact of the access rights system on the present generation (intra-generational aspects), between humans of different generations (intergenerational aspects) and between humans and nature (Becker 2009; Baumgärtner and Quaas 2010). We will focus on the notion of fairness as economic-oriented distributive fairness among humans, considering the initial allocation and future distribution of quota shares, and the associated distribution of wealth and labour. Particularly we investigate the German and Danish handling of initial allocations of quota shares, the development of the fleet structure with its linked effects on market power and employment, and criteria that are widely used to determine social and economic effects of fishery management regimes. Additionally, we study the prospects for newcomers to enter the fishing industry.

This chapter is organized as follows. The methodology of investigating intra- and intergenerational fairness aspects is explained at first before this approach is applied to the German and Danish fisheries quota management systems. The last section discusses the results and examines whether, on the basis of these findings, ITQs can be classified as a sustainable and thus inter- and intra-generational fair management tool.[2]

[1] In the meantime, however, the number of stocks at risk decreased substantially and also the number of vessels decreased. The main reason for that was the introduction of long-term management plans and not so much the changes in access rights systems (Cardinale et al. 2013).

[2] The theoretical framework of justice and its application to the ITQ system is further explained in the paper on 'Equity and ITQs' (Doering et al. 2016) In this paper we refer to the instruments of

8.2 Criteria for Fairness in Tradable Quota Systems

Tradable quota schemes are widely discussed management systems that allow for economic rationalization and are expected to contribute to increased efficiency in a fishery. Resistance to such schemes originates mostly in distributional conflicts that arise from implementing the regimes as an existing group of fishers receive the access rights at a certain point of time. The distributional effects are often not considered by economists at the time of introduction as pure ITQ allocation regimes are, indeed, solely concerned with efficiency, and even tradable quota systems that tie quota to vessels are implemented to effect a rationalization of the fleet.

Tradable quota systems are being implemented or are being contemplated in more and more countries around the world. In 2008, approximately 10% of the global harvest was retrieved in ITQ systems (Chu 2008). As a result, more information has become available on the success and failures of these systems (e.g. Sumaila 2010; Hilborn et al. 2005). Many quota management systems worldwide do not simply provide fishers a share of the overall TAC but also include regulations to anticipate expected problems resulting from implementation of the system. Some of these expected problems have normative implications, including the method of the initial distribution of quota shares, the disappearance of small coastal fisheries, the treatment of newcomers to the fishery, and the use of fishing methods which cause external effects (for example bycatch of non-target species or destruction of bottom habitats). Tradable quota are instruments by which the resource owner distributes access rights to fishers/fishing companies but in only a few cases do the recipients pay fees for access or for services related to the fishery.[3]

The tradable quota systems enlist the assistance of the market to reduce fleet capacity. The quota right owner is expected to be aware of the risk of quota fluctuations and to behave accordingly (Hatcher et al. 2002). Further, because quota can be traded, fishing capacity can be adjusted by the industry. A quota rights owner will increase or decrease his quota holdings depending on the revenue/cost structure of the vessels at his disposal, thus more appropriately aligning fleet capacity to the available resources.[4] This behavior will produce a general tendency in the fishing fleet, where owners of vessels with high capacity will seek to increase the amount of quota in their hands and thus the efficiency of their vessels, while owners of inefficient vessels will tend to exit the fishery and to compensate losses by selling their quota (Hatcher et al. 2002).

In order to elaborate the intra- and intergenerational fair distribution of individual transferable quotas, we analyse the Danish and German quota system with the

fairness, concentrating on the initial allocation of quota shares, market inrferences, and newcomers to a fishery.

[3] For example in New Zealand (Mace et al. 2014), and Nova Scotia (Townsend et al. 2008) where the fishing sector pays for monitoring fishing activities and partly for the assessment of fish stocks.

[4] See for example Copes and Charles (2004) for an overview over criticism of ITQs. Other concerns regarding quota regimes are the incentives for highgrading, discarding and quota busting (Copes 1986).

Economic Efficiency and Fleet Capacity
Defining and measuring fleet and vessel efficiency are not simple tasks. The two should not be confused and it is generally assumed for the purposes of economic analysis of fleet efficiency that vessels are perfect substitutes for one another: regardless of equipment, gear, size, crew, or age, a vessel is a vessel, regardless of its operating environment, whether conceived of in institutional, social, geographic or biological terms. With this assumption in hand, it is logical to declare that the fewer the number of vessels employed in catching the (set quantity of) fish the more efficient the fleet is. Subsequent attention, as is given here, to the distribution of vessels over size or gear classes to some extent compensates for the potential issues arising from this necessary assumption. Attention to fleet composition under conditions of declining or increasing TAC are also helpful.

However, an approach based on vessel numbers, however straightforward and appropriate given the patchy data available on the fishing fleets, does not in itself provide a comprehensive assessment of fleet efficiency. Many other characteristics of the fleet besides the number of vessels in relation to the TAC are potentially relevant to understanding the changing efficiency of the fleet (e.g. gear technology, type and state of stocks, distribution of the stock in the sea). This multitude of other considerations challenge any assumption that fewer vessels, or a shift from small to larger boats are positive signs of fleet efficiency, even in terms of reduced overcapacity.

following criteria: the initial allocation of quota shares, the beneficiaries of 'windfall' gains, and on changes in the market structure, focusing on changes in the labor market. We ask: (A) How is the initial allocation of quota shares made? Who earns the 'windfall' gains? (B) What are the consequences of quota trade on the fleet structure? It is our intention to examine the effect in the fleet structure as small scale fishers tend more readily to sell their quota share than fishers with larger vessels.[5] (C) How does the management regime deal with newcomers to the fishery?

(A) The Initial Allocation of Quota Shares Copes (1986) summarizes market principles of initial allocation of quota shares: (i) giving away freely, (ii) selling at a fixed price, (iii) auctioning off. The first two possibilities require the decision about how much of a quota each entity may receive. Principles for that decision could be (a) grandfathering, (b) distribution based on vessel characteristics, (c) equal distribution. If quota is given away for free one would additionally have to decide who is eligible to receive quota shares: vessel owners, crew members, people employed in the fishery, or all citizens of the relevant jurisdiction.

[5] Basically due to a more vulnerable economic position (low profits and low possibilities for renewal of the capital stock, see Lucchetti et al. 2014).

Auctioning of quotas by the government would be the market-efficient tool (Matthiasson 1992). It not only implies that fish stocks are a property of the people as with the other two market principles, but might actually raise revenues from auctioning that could be used to pay for fishery management and/or distributed to the people of the relevant jurisdiction. The socially unwanted, but possibly economically efficient, result of an auction is that established fishers may lose their access to the fishery, with potentially negative effects to the economy and increased demands for public welfare provision.

Selling quota at a fixed price again yields returns that may be redistributed to the people. By initially imposing a maximum acquisition quantity, one could oppose initial dropping out of some established fishers. However, in presence of economies of scale, large firms may be advantaged by buying at a relatively lower price than small scale firms due to their otherwise lower unit costs. Of course, this will not be the case in the absence of economies of scale in such enterprises, or in the case of the presence of economies of scope in small enterprises.

Giving away quotas for free imposes an intergenerational as well as intra-generational conflict since particular present entities, by chance, receive the 'windfall gains' of their quota share, while future generations and present disregarded fishers will have to pay for their access to the quota.

The question about who is eligible to receive an initial quota share is a concern of intra-generational justice. The resource manager would have to decide if the resource is solely property of the fisher/vessel owners, all people employed in a fishery, or all people in the relevant jurisdiction. Again, it is a question of equity who among the present generation receives the economic windfall gains of a quota share.

However, in practice auctioning off quotas is politically not easily accomplishable since current licensed vessel owners would hardly accept paying for something they got for free for decades. The same holds for selling quota at a fixed price. In most applied ITQ management regimes, the quota is initially allocated for free among vessel owners, which poses the above mentioned serious conflicts with inter- and intra-generational justice.[6]

(B) Effects on the Fleet Structure Tradable fisheries quota systems are economic management tools, designed to increase efficiency of the fleet by decreasing overcapacity of fishing fleets, and, more precisely, by removing vessels which do not have sufficient quota to allow them to operate efficiently, profitably or optimally. Concerns are that, by reducing the number of active vessels, a tradable quota regime may lead to oligopolistic or monopolistic market forms, where only few large firms remain and the small scale fishery is wiped out[7] or becomes increasingly dependent

[6] Denmark distributed the majority of quota shares for free (see Sect. 8.3.2.). See Shotton (2001) for an overview over initial distributions of tradable quota shares in fisheries.

[7] There are empirical studies about the effect of ITQs on the market structure. Adelaja et al. (1998) investigate the mid-Atlantic surf clam and quahog fisheries for signs of monopoly power after implementation of an ITQ regime. They find a strong reduction in fishing vessels but do not find evidence for monopoly power in the industry. Brandt (2005) showed for the mid-Atlantic clam fishery that small scale fishers were not disproportionately affected by the introduction of ITQs.

on larger firms for leased quotas.[8] This market power of the largest firms might then lead to lack of competition and following lack of socially desirable outcomes. In the presence of economies of scale, however, these market forms may even be efficient despite the associated regional economic impacts.[9] The corporate concentration of ownership might lead to a spatial concentration of the fishing fleet in large or specialized ports where quota owners have their main facilities and enjoy economies of scale (Copes and Charles 2004), while at the same time stripping the fleet and related employment from other ports where the effect is to produce social and economic problems.

Naturally, monopolistic or oligopolistic market structures resulting from implementing a tradable quota regime are not only a concern of efficiency considerations but also are socially and politically unwanted. If important objectives of fishery policy are the maintenance of owner operated fisheries and fishery-dependent communities, measures such as setting upper limits on accumulation of quota shares (as in New Zealand) and/or compensation of disadvantaged communities may be necessary[10] (National Research Council 1999). Indeed, such measures feature in the regimes developed in Norway, Iceland, Sweden and Denmark.

The reduction of capacity by implementing ITQ schemes would also naturally reduce employment in the fishery.[11] A decreasing number of vessels goes along not only with a diminishing demand for employment in the harvesting sector but also affects demand for maintenance, baiting and other fishery related activities (Copes and Charles 2004). Where there are sufficient alternative earning opportunities, this is not an issue, per se, but for fishery dependent communities, where employment alternatives are rare, the employment effect of ITQ schemes becomes an important issue of equity concerned policy.

While the total number of people working in the fishery might be reduced, the amount of hours worked per crew member who remain in the industry may rise. This is because "a decrease in the race for fish can mean vessel owners are able to substitute labour for extra time spent at sea" (Grafton 1996: 14). Grafton (1996) also points out that employment in the fish processing sector might actually increase since fishing activity and likewise landings may spread over a longer period. Note that these outcomes are, in each case, tied to the special situation in which the TAC has been dramatically reduced due to overfishing to a mere fraction of the available fleet capacity, with harvest closure as soon as the TAC is caught inducing a frenetic 'race to fish'.

[8] See Olson (2011) for an overview.

[9] There is evidence for economies of scale for Norwegian cod and pelagic fisheries (Nøstbakken 2006; Sandberg 2006).

[10] Many applied ITQ regimes use such measures to address equity concerns and prevent the development of excessive market power of large firms. (See for example Asche et al. 2008).

[11] There is evidence for a short term sharp reduction of employment from various fisheries (Geen and Nayar 1989; Casey et al. 1995; Wang 1995). See Olson (2011) for an overview over empirical evidence of employment reduction in fisheries as a result of the adoption of ITQ regimes.

(C) Newcomers to the Fishery The implication for newcomers is an important issue of intergenerational justice. "In practice, therefore, for any given area and for one or more particular species, the number of entitled fishermen is both limited and known. In effect, the appropriation of fish from these areas and the species fished are specially reserved for designated fishermen" (Morin 1999: 174). This is important for two reasons: At first access to fisheries has been tightly controlled through licenses, fishing permits or in community based management systems access was limited by social rules. Secondly, whereas it is difficult to enter an existing fishery whether one controlled by quota management and/or other fisheries management practices, established fishers in Europe are usually allowed to stay in a fishery, getting annual quotas according to the principle of relative stability. When a fisher leaves, he is allowed to sell the quotas even though he did not have to pay for them. On the other hand, younger fishers have to buy quotas on a market if they want to enter the fishery. These aspects have to be analysed in the context of fairness.

In the next section we will briefly describe the German and Danish quota allocation regimes, and discuss how these applied regimes deal with the concerns identified above.

8.3 Case Studies

Both, Germany and Denmark, as EU member countries, fall under the framework of the Common Fisheries Policy (CFP). The responsibility for decisions on the allocation of fishing rights, such as Individual Transferable Quotas, lies with the member states. The EU uses a Maximum Sustainable Yield (MSY) management framework. The International Commission for the Exploration of the Sea (ICES) is responsible for assessing the stocks' status and for giving scientific advice on management and the level of the TAC. ICES developed an assessment framework to translate MSY into a certain TAC for a given fish stock. With the scientific advice the EU Commission prepares a regulation for the Council of Ministers and the Council then adopts the actual TAC levels for the upcoming year. This is an international best practice but, as Jennifer Hubbard documents in chapter two of this volume, the history of this set of practices is by no means uncontroversial, unproblematic or without intended and unintended effects.

The allocation of the TAC is stated in Article 4 (1) of the Council Regulation (EEC) No 170/83: 1 (Council Regulation 1983) "The volume of the catches available to the community referred to in Article 3 shall be distributed between the member states in a manner which assures each member state relative stability of fishing activities for each of the stocks considered". The principle of relative stability means that each member state's share of each Community quota should remain constant over time. This country shares are based on historic catches of the respective member state for a certain species, the Resolutions of The Hague which set out to consider nations whose economy is dependent on fisheries while implementing the CFP, and the compensation for jurisdictional losses when non-member states

extended their exclusive economic zones (EEZs) into areas already fished by the fleets of EU member states.

Most important are the basic elements for the utilisation of the allocated quotas as regulated in Article 5 (1, 2) of the Council Regulation: "1. Member states may exchange all or part of the quotas in respect of a species or group of species allocated to them under Article 4 provided that prior notice is given to the Commission. 2. Member States shall determine, in accordance with the applicable community provisions, the detailed rules for the utilisation of the quotas allocated to them. […]". The responsibility for the quota utilisation lies with the respective member state. In general, the member states are allowed to swap quotas. However, quotas are not tradable within the EU between countries. The proposal of the European Commission for EU-wide tradable quotas was not adopted in the new basic regulation from January 1st 2014 (EU Regulation 1380/ 2013).

8.3.1 The German Quota System[12]

The German system is an Individual Quota (IQ) system where the quotas are attached to the vessels and thus their respective owners. This system was implemented after the CFP had been introduced (beginning January 1st 1983). The vessel owners received quotas following records for landings of a certain reference period (end of 1970s). The basic elements of this system have also been introduced in the Mecklenburg-Western Pomerania area (former East Germany) after 1990. There has been no basic change in the quota allocation since its introduction but many vessels were scrapped or bought by other fishers who sought to be able to fish on additional quota.

Basic principles of the German fisheries management in marine waters are regulated in the *Seefischereigesetz* (Anonymus 1984). In §1 SeeFischG we read that the aim of fishery regulations are the protection of fish stocks and biodiversity as well as the implementation of the European structural and regional policy. §3 SeeFischG states that fishing licenses are bound to fishers, which can have one or more fishing vessels.[13] It also states that the allocation of fishing rights should be based on economic factors, such as efficiency and sufficient market supply, as well as social factors such as previous employment in the fishery. §3 SeeFishG also determines the responsibility of the *Federal Office for Agriculture and Food (Bundesanstalt für Landwirtschaft und Ernährung (BLE))* for the management of the national quota, set by the European Council. Quota may be allocated individually to fishers/vessels or collectively to so-called producer organizations (POs) that may distribute the

[12] Information for this part is also taken from an interview with Marina Lapetina and Sybille Möller (Federal Office for Agriculture and Food, BLE, Department for Fisheries, Hamburg) which took place in January 2012. We would like to thank both experts for the kind support.

[13] Generally, this was a fishing vessel that was employed in the fishery by someone in 1986/1987. If such a vessel suffered a total loss, it may be replaced by a 'smaller' vessel. Also, a new vessel may be licensed if it replaces one or more licensed vessels.

quota among their members autonomously. Among POs quota may be exchanged internally but not traded.

Basic distribution principles of the national quota are not stated in the SeeFischG but can be identified from the BLE's yearly *Announcements about the German Fishery (Bekanntmachung über den Fischfang durch deutsche Fischereibetriebe, e.g.* BLE 2012*).* Generally, the German share of the EU-TAC is distributed more or less by the same principles as under the CFP, with relative stability based on historical catch shares. The basic management systems employed are individual quotas (IQs), group quotas (GQs) and total quotas (TQs), and, for some fisheries, effort regulations. Individual full-time fishers usually receive IQs for their vessels, while POs receive a collective quota that they distribute among their members autonomously. These quota pools can be a very good instrument for an efficient allocation of fishing opportunities between the members as they can be distributed taking account of e.g. vessel characteristics. Part-time fishers usually receive a TQ or a GQ that is a total quota with individual maximum landing levels.[14]

(A) The Initial Allocation of Quota Shares When the member states of the EU decided to implement the CFP, Germany decided to implement the IQ system by allocating individual quota to vessel owners or POs. The government followed the same rule as within the EU and allocated the quota shares following a reference period at the end of the 1970s. That means that in Germany a 'grandfathering' system was chosen. Owners of fishing vessels employed to fish on a certain stock during the reference period received a quota share comparable to their part in the fishery at that time. The quota shares were given away for free but were bound to the vessel. Therefore, this group of owners of vessels received windfall gains. Note that no payments were introduced afterwards. However, the relationship between 'owners' and 'vessels' has not remained constant since this allocation – some owners have left and others joined the system, while some vessels have been traded among owners, and others have been scrapped or replaced.

(B) Effects on the Fleet Structure Figure 8.1 depicts the development of the German fishing fleet in the period 2002–2014. As mentioned above, quotas are attached to the vessels and their respective owners. The binding of quotas to vessels, in theory, should stabilize employment in the fishery. In practice, many old vessels remain inactive, while other vessels fish their quota share. In Fig. 8.1 we see that while employment in the fishery sank about 20% since 2002, the total number of vessels decreased about 30%, and the total machine capacity and tonnage of the German fleet also shows this decreasing trend.

The German quota system does not allow for quota trade. Increasing one's quota, beyond the exchange possibilities among POs, is solely possible by buying fishing vessels bound to a quota share. Quotas from scrapped vessels are reallocated to fishers remaining in the respective fisheries. Fishers who have bought the vessels get the quota of the vessel for themselves. These fishers are then able to use the quota with

[14] This is true for Baltic cod, North Sea cod, Saithe, plaice and Baltic herring. For Baltic sprat, individual full-time and part-time fishers receive each a total quota.

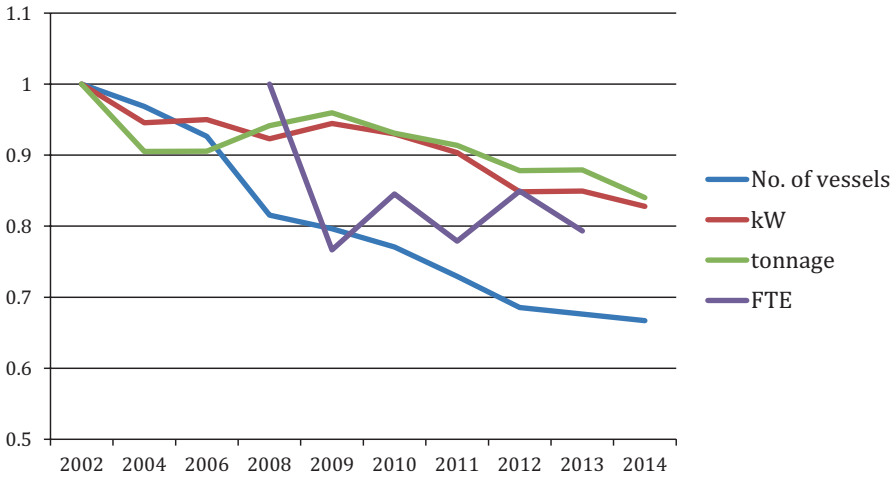

Fig. 8.1 Development of the German fishing fleet (STECF 2014)

their former vessels albeit the bought vessel must stay active. It was not until 2011 that this regulation was changed and then for only one single year these inactive vessels (because the attached quota to these vessels was fished by another vessel of the owner) could be scrapped. Since then this has not been allowed again.

(C) Specialties for Newcomers Newcomers to the German fishery need to inherit or receive a vessel from an outgoing fisher, and in many cases they have to buy a vessel with the attached quota on it. As the vessels are often quite old it is clear that the attached quota basically determines the value of the vessel. In 2011 the government decided to allow scrapping of inactive vessels that fishers had bought before in order to use the quota on another vessel. This reduced costs for companies. Because of that the government requested that 5% of the quota should be put into a fund. The government then distributed these quotas to young fishers who were able to get quota without actually buying an old vessel. However, the amount of quota an individual fisherman was able to receive under this reallocation was not very high.

8.3.2 The Danish System[15]

In 1976 Denmark introduced an access system to the fisheries by issuing fishing licenses to fishers. Before that the number of vessels or employed people had not changed much but due to technical improvements and state support to construct new

[15] This chapter is based in part on information from Mogens Schou (at that time in the Danish Ministry for Fisheries) given in an interview in January 2012. We thank Mogens for the possibility to talk with him.

vessels the overall landings increased substantially (Host 2015: 30). There were no other restrictions at least for the larger vessels and fishers were able to fish as much as possible everywhere outside the national waters. Inside national waters there were some restrictions but not many. Newcomers had to earn 60% of their income from fishing in a given year to be allowed to buy a vessel and receive a license. As a consequence of entering of new fishers with their modernized vessels the landings grew further. The government had to intervene in order to reduce overcapacities and introduced a more restricted system for licenses. But still, owners of licenses were able to fish as much as they wanted.

With the first basic regulation for a CFP in 1983, Denmark had to stay within its share of the Total Allowable Catch (TAC) of a given species. The government decided to limit the landings per vessel for species with a landings quota in a monthly or 14-day rhythm. As the quotas decreased it was harder and harder for some segments of the fleet to stay profitable and fishers protested against the restrictions. The government then issued scrapping programs (Host 2015: 35). Nevertheless, the overall Danish fleet was still too big and the system was very inflexible as quotas were not exchangeable or tradable. Overall, as the fleet was far away from gaining profits fishers were very much against the system.

This system lasted until 2003. As more and more stocks were regulated under the framework of the CFP, the number of species that were within the 14-day system increased substantially. In 2000 a discussion started about changing the existing system into an ITQ system. The main criticism to that was that rights would now be capitalized and that the small-scale sector would suffer.

Beginning with the herring fishery in the North Sea, which served as a test case, Denmark introduced ITQs in 2003. Based on a historical reference period of a vessel, fishing rights were given as private property to the owners with allowance to sell and buy (Host 2015 37). After its introduction, the number of vessels decreased and the economic situation of the fleet improved a lot. In November 2005 the political decision was finally made to introduce ITQs for all fisheries. The official starting date for all commercially valuable species was then January 1st 2007 (Andersen et al. 2010).

In summary, the Danish government first introduced a license system with some restrictions on the amount of overall catch in 14-Day periods. Subsequently, to limit capacity the overall number of licenses was limited to those working at the start of the CFP and newcomers had to buy a vessel to get a permit. This meant an 'entry fee' for fishing access rights, and this was reflected in very high costs for vessels as in the German case. The later introduction of ITQs was specifically designed to reduce fleet capacity but was, as we will see, a quota attached to at least two separate groups (large and smaller vessels) and the tradability, therefore, a bit more restricted compared to, for example, in New Zealand.

(A) The Initial Allocation of Quota Shares The Danish system is based on five criteria: The allocation of fishing rights, the definition of who is embedded in the system, and additional regulations aiming at avoiding undesirable effects.

Criteria 1: The initial allocation of rights was based on historical landings per vessel between 2003 and 2005. The average of reported landings over a time frame of 3 years set the share of the overall quota a vessel got under the new system (to obtain additional quota the fisher had to buy the vessel to allocate the quota to the original vessel (Host 2015: 61)). As small vessels had often unclear catch records (there was no obligation for a logbook with landings data at that time) they were combined and summarized in an own group to avoid the allocation of individual rights following from those unclear catch records. A part of the overall quota was then set-aside for this group following the previously set overall share. This quota is not allocated to individual vessels.

Criteria 2: The separation of two groups of fishing vessels was not only applied by taking catch records into account. All vessels with a gross income below €35,000 were able to opt for the group of 'small scale vessels' with, more or less, the old system and an overall quota for that group. Vessels with incomes over € 35,000 had to be in the group with vessel quotas. Quota holders (owners of boats which have more than € 35,000 income and are part of the tradable quota system) are able to lease or sell quotas to vessel owners of the same segment but not to owners of larger vessels of another segment. On the other side, the purchase of quotas from larger vessels is possible.

Criteria 3: Due to this regulation there are now three segments: large vessels with a length over 17 m, vessels under 17 m which belong to the coastal small scale fleet and even smaller vessels that are not part of the coastal small scale fleet. In order to avoid the concentration of fishing rights in the hands of a few owners, it is only allowed to own the rights for up to four vessels.

Criteria 4: Fishers are allowed to lease 25% of their rights without being considered inactive. It is also possible to create a pool within which more rights can be swapped. However, still 60% of the income must come from fishing and not from leasing quotas (Andersen 2012).

Criteria 5: Fishing rights can be called back within a time frame of 8 years. Additionally, the government keeps a part of the total quota in a fisheries fund.

(B) Effects on the Fleet Structure The main effect was the reduction of vessels, after the ITQ system had been introduced. In 2010, 716 vessels were in the Danish fleet compared to 1097 vessels in 2005. In the segment 24–40 m the register shows in 2010 44 vessels less than 2006 (Andersen 2012: 3).

Especially in the pelagic fleet vessels were scrapped and the quota was transferred to the remaining vessels/owners. Also the demersal fleet showed a reduction of 20–30%. This effect was also detectable in the coastal fleet. It has to be noted that this part of the fleet appears to lease most of the rights but still, the fisher needs to have a minimum of 60% gross income from fishing otherwise losing it status as active fishers.

It may be the case that more fishers created pools and thus it could be stated that municipalities have bought rights in order to keep the fleet. There is one example for

community-based-management for fishing (with approximately 35 vessels[16]) and one where 20 fishing families founded a cooperative who owns the rights (Andersen and Højrup 2008). A community purchased a vessel and its associated quotas and thus created a common pool. Members of this pool were given the rights to fish. In this case the pool manager does not have that much influence on the quota allocation. In other pools the pool manager decides on the quota allocation and, therefore, these pools are normally not named community-based-management. There is a substantial change in the number of harbours which lost vessels between 2005 and 2012 (Host 2015: 74). However, for the coastal fleet overall, counting about 1000 vessels, there have only been a few changes made concerning the allocation of fishing rights.

In general, the introduction of the Danish quota system appears to have improved the sector. All vessels seem to be competitive, either vessels over 17 m length or for smaller vessels (Andersen 2012). But it has to be mentioned that fishers running the latter vessel types will probably be more and more dependent on additional income in the future as costs increase (e.g. fuel costs, limits to fish in certain areas due to closed seasons or areas) while revenues may not be increasing. It must be additionally mentioned that many owners sold their quota and fishers who does not owned a vessel or a share of a vessel are left without any compensation although there status as full-time fishers lead to part of the historical fishing rights of the vessel (Andersen and Højrup 2008: 33).

(C) Specialties for Newcomers For newcomers, in principle, there is no change in the rules (they still need a license and a vessel). There is some kind of apprenticeship for fishers but this is not a requirement for the participation in a fishery. Naturally young fishers must get quotas now. The government is supporting this approach by holding back a part of the quotas for a fishery fund. Young fishers get their quotas from this fund to be able to start fishing without the necessity to buy the quota in the first place.

8.3.3 The Danish Specialty: The Fisheries Fund

The Danish Government keeps a part of the Danish total allowable quota in order to allocate it according to its own criteria. This fund is up to 20% of the total quota. There are different options for fishers to participate in this system. Fishers can support the collection of biological data on stock compositions or purchase fishing rights by auction. After the introduction of the system in 2007, fishers had to pay a lot for the vessels and fishing rights. Therefore, it is planned that only a very limited part of the rights will be auctioned to not further increase costs. The auctioning is done in order to at least be able to cover some of the management costs. One part of this fund is also used to issue rights to young fishers.

[16] Personal interview Mogens Schou.

8.4 The German and Danish Quota Management Systems: A Comparative Analysis

The analysis that follows compares the Danish and German quota management systems in terms of the aspects of fairness referred to above. While the Danish system has a 'formal' market system and therefore a more complete specification of market rules and exceptions than the German quota system, the comparative effects on fairness of both types of management can be studied by looking at fleet data from the German fisheries on a 'what if' basis. This can be done by comparing, when possible, the status quo of the German fleets and an estimation of the hypothetical effect that equivalent measures to those in the Danish system could have had if applied to the German fleets.

The equivalent Danish measures to which we will attempt to examine a hypothetical effect in the German fisheries are, with respect to intergenerational justice, the measures to facilitate entrance of newcomers and, regarding intra-generational justice, a series of measures such as limits to quota exchange among vessels of different sizes, upper bounds to the ownership of vessels by the same company and incentives to vessels participating in programs to improve the state of the fishery.

The data employed has been obtained mainly from the German data collection program under the Data Collection Framework (DCF) and the Annual Economic Report (STECF 2014) as well as additional data from the German Ministry among other institutions. Different data categories are used in the German and Danish fisheries and this restricts the potential for comparison.

8.4.1 Comparison of the Initial Allocation of Quota Shares

The initial allocation of quota shares in Germany was based on previous participation in the fishery, as in the Danish system. The granted exceptions in the German system were given for extraordinary happenings to the vessels. The Danish system also granted exceptions for temporary absence from the fishery during the reference period, this time of a personal character, such as illness of the owner. The Danish system has brought about more opportunities to grant access to quota besides buying it through programs for newcomers or participation in pilot studies.

8.4.2 Comparison of Effects on the Fleet Structure

Concentration of ownership in German fleets has not been regulated, as in the Danish system, by a 'maximum four vessels per owner' rule. If this Danish regulation were implemented in Germany, less than 2% of ship owners, as shown in Fig. 8.2 (19 out of 1136, with most of them having five or six vessels and, with only a very few owning more, and in the extreme cases, owning up to a maximum of 24), would be affected.

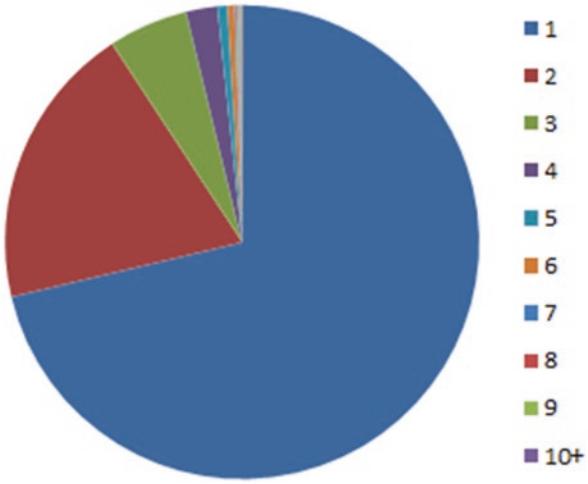

Fig. 8.2 Proportion of shipowners of the German fleets by number of vessels owned (DCF Database 2012)

Therefore, we can say that the system in Germany has not lead to undesired concentration of property in the sense that it has not promoted excessive (or unjust) market power. This can be interpreted from both the fishing vessels market and the goods market. In the fishing vessels market, the ownership and use of the vessels and their corresponding allocated quotas are not unjustly concentrated in the sense that owners with more investing capability (indicated by ownership of more vessels) do not seem to be hindering other fishers from acquiring vessels. From the consumer's point of view there does not seem to be a clear monopolistic power withdrawing consumers' surplus. There seem to be plenty of firms competing in the market to guarantee that consumers have a choice of suppliers and can take advantage of it to obtain a good price.

In terms of standard equity measures, a Lorenz curve for the ownership concentration of the German fishing vessels can be observed in Fig. 8.3 below, where, as conventionally represented, the diagonal would show perfectly equal distribution of ownership.

There was no access to Danish primary data so as to perform a similar analysis for the Danish fleet. The effect on the market structure of the system in Denmark can be approximated by the distribution of quota shares.

In the Danish fisheries on demersal species the evolution since the introduction of the system in 2007 shows a decrease in the amount of quota owned by the smaller vessels (<15 m) and an increase in the ownership of quota by the larger vessels (see Fig. 8.4 below).

The pelagic sector shows a much higher concentration of rights, with the largest vessels owning just under half of the rights in 2006. By 2010 they had increased their share by 43%, while some of the smaller vessel segments, and notably the 15–18 m class, decreased their shares of rights in the same proportion between 2007 and 2008. Although there are restrictions on selling quota from the segment of smaller vessels to the larger one, owners/fishers found a way to get around this regulation a bit (Host

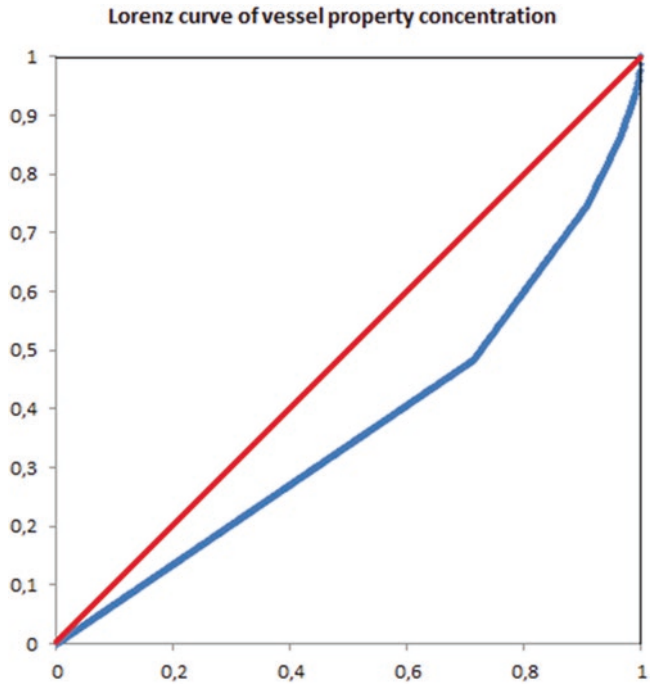

Fig. 8.3 Diagram of concentration in ownership of German fishing vessels (DCF Database 2012)

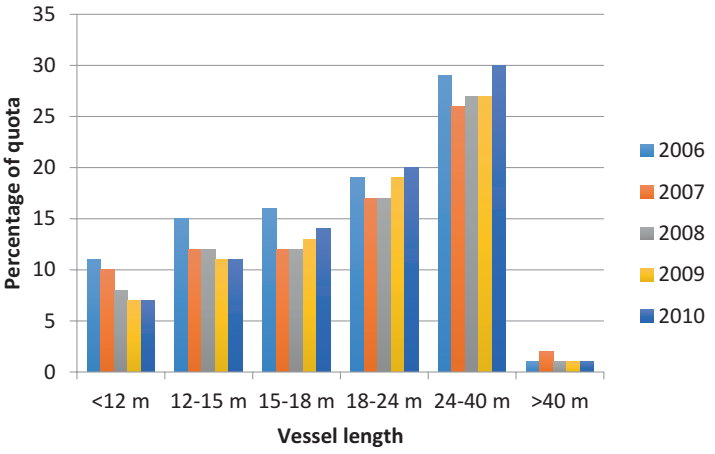

Fig. 8.4 Evolution of the distribution of quota rights for demersal species (Andersen 2012 (quota ownership at 31st December except for 2006, which corresponds to 1.1.2007))

2015: 60ff.). Therefore, quota moved from smaller (<12 m) to larger vessels. The evolution of the concentration of rights can be seen in Fig. 8.5 below.

As mentioned above (see Fig. 8.1) the labor intensity (employment compared with available quotas) of German vessels has decreased continuously as employment has decreased and quotas have remained fairly constant. Reasons for this include technical efficiency improvements among others. Nevertheless, the importance of the small-scale sector remains as can be seen in the great size of the segment. Further, the estimation of the employment in larger vessels has to be taken with caution as current estimation methods used under the Data Collection Framework do not accurately reflect the phenomenon of vessels switching from the North Sea to the Baltic Sea and that may lead to double counting.

This contrasts with the increased attractiveness of joining the group of small-scale fisheries in Denmark (joining the quota pool instead of getting an individual quota) thanks to the measures that make it easier for newcomers to enter the fishery and to measures designed to protect ownership of quota associated with small vessels. The measures that aim at protecting the small-scale fisheries include both limitations on trading and on the initial allocation of (and capacity to hold) the fishing rights. Trading of rights is limited by prohibiting the sale of quota from firms in the small-scale sector to those in the industrial fisheries sector and also by limiting the amount of individual quota that can be traded (even if it did not always function). Measures affecting the allocation of rights include limiting the capacity to own quota to people obtaining more than 60% of their income from fisheries (Andersen 2012) and thus benefitting the dedicated fishers over the speculators.

Other more recent measures such as the promotion of training in fisheries for unemployed people undertaken in Denmark have been reported to have had a certain degree of success in bringing in and creating incentives for employment in

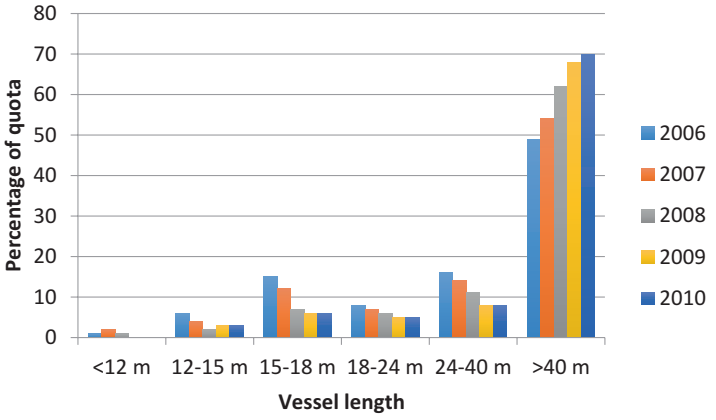

Fig. 8.5 Evolution of the distribution of quota rights for pelagic species (Andersen 2012 (quota ownership at 31st December except for 2006, which corresponds to 1.1.2007))

fisheries (see www.fishermannow.com), especially since currently employment in other sectors on proximate geographical areas is declining.

8.4.3 Comparison of Specialties for Newcomers

In 2011 a scheme to promote the entrance of newcomers in the fisheries was issued in Germany for 2012. The scheme amounted to removing the requirement to keep vessels in active conditions in order to be able to use their quotas and to grant a temporary (only in 2012) allowance to scrap inactive vessels, thus removing the maintenance burden. The aim of this scrapping scheme was mainly to derive a small percentage of the quota (around 5–10%) to newcomers. Therefore, vessels inactive in 2011 could be scrapped in 2012.

In order to study the effect of this measure in practice the evolution of data regarding the German fleet segments previous to the new comers´ scheme has been tabulated (see figures of active and inactive vessels in Table 8.1 below). In contrast to the reported success of the Danish measures to promote the entrance of newcomers (see section on labour market) it is difficult to observe any such development in the German data. The main phenomenon that can be noticed is the decrease in the number of inactive demersal trawlers that under this scheme would correspond to a scrapping of those vessels. However, it could be expected from the aims of the policy measure that a percentage of this quota would end in some new active vessels, for which there is no evidence in 2012. Therefore, quota was already allocated

Table 8.1 Evolution of active and inactive vessels in the German fleet before and at the time of the newcomers´ scheme (end of 2011 scrapping allowed under certain conditions as a unique exception) (STECF 2014)

Active vessels	2008	2009	2010	2011	2012
Drift and/or fixed netters	23	23	19	16	14
Dredgers	7	5	9	12	12
Demersal trawlers and/or demersal seiners	108	106	107	99	87
Vessels using pots and/or traps	2	3	2	3	3
Vessels using passive gears <12 m	960	937	902	883	875
Beam trawlers	245	232	221	216	215
Pelagic trawlers	12	6	9	10	9
Sum active	1357	1312	1269	1239	1215
Inactive vessels	2008	2009	2010	2011	2012
DFN	2	2	5	6	1
DRB	5	9	5	2	2
DTS	4	8	13	22	4
PG	479	462	451	386	350
TBB	23	24	23	22	13
Total inactive	513	505	497	438	370

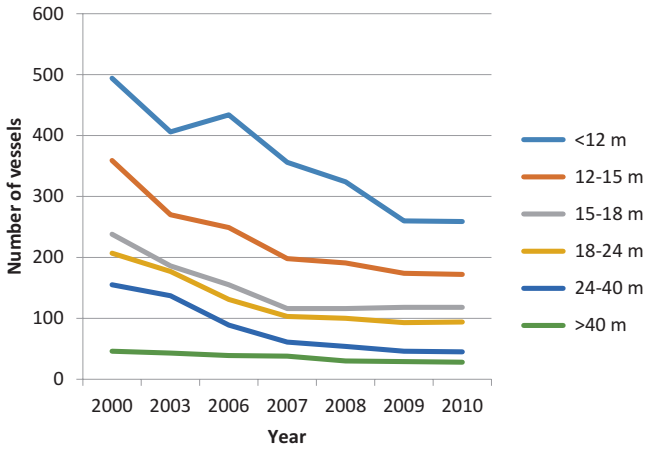

Fig. 8.6 Number of vessels by length category 2000–2010 (Andersen 2012)

to existing vessels and no new vessels built. There were no payments for scrapping vessels, as it was already a huge incentive to scrap the vessel, which had to be kept in good condition before without any activity. In addition to this data, the impact of the scheme has also been very low, because a substantial number of vessels were only scrapped in the demersal trawl segment (DTS) (12, but also 8 in 2011).

The Danish data shows an increase in the number of inactive vessels and no increase in active vessels occurs that might point towards newcomers being incorporated into the fleet. The only exception would be an increase in the active vessels in the smallest length category, belonging to the coastal vessels segment, in 2006, prior to the introduction of individual quotas for that segment in 2007 (Andersen 2012). The evolution of the net entry/exit of the different length categories can be seen in Fig. 8.6.

8.5 Concluding Remarks

There are many studies on the implementation and potential outcome of ITQ systems. ITQs are expected to be one of the most efficient regulatory systems concerning sustainable fisheries management. A few parameters that were revealed in this study may indicate that the German and Danish systems follow this approach. What made this study different from others was the investigation of the impact of ITQs on inter- and intra-generational fairness.

From the intra-generational point of view, in Denmark, the initial allocation of quota shares was designed to establish separate fleet segments each of which would be managed separately, with incentives given to fishers to self-regulate within limits. The ITQ system has had positive effects on stabilizing the fisheries labour force

and supporting the small scale fisheries sector. From the intergenerational point of view, the Danish system has included special mechanisms to recruit young fishers and to prevent the potential overallocation of quota shares.

Thus, based on the examination of the instruments of justice, it can be concluded that the Danish quota management system can be characterised as including some restrictions and tools, which we may call elements for a just and economic efficient regulatory system for sustainable fisheries. Fishers moved from open access and licenses with no catch limitations to a system with quota limitations and individual quotas (Andersen et al. 2010).

There are no indications that the German system shows undesired quota concentration or unjustly concentrated quota pools. From the perspective of intragenerational justice, the German vessel quota management system also appears to show elements of a just allocation system. Concerning the criteria of intergenerational justice, identified through the instrument of specialties for newcomers into a fishery, this system does not seem to have the same level of just elements as the Danish one. Each newcomer has to buy a vessel and is not allowed to trade the quota share. Newcomers have to take into account that they may bear a high level of investment risk.

Finally, it can be stated that, under the analyzed criteria for fairness, the analysed ITQ, IQ or vessel quota systems are considered to be a management tool with a basically fair distribution process. However, this is probably only the case for these two examples and may not be stated in general.

For future research two other aspects have to be taken into consideration which might bring into question whether the distribution of ITQs as such is a fair process. In some of the ITQ systems quota holders are allowed to lease their quotas to other fishers for a given year (e.g. British Columbia Halibut fishery; Pinkerton and Edwards 2009). This would mean that fishers who may have received the initial quota for free could lease out the quota to other fishers. Analysis of existing systems shows that this may lead to high lease prices and that there is not an automatic buy out of the least efficient vessels (Pinkerton and Edwards 2009: 712).

Secondly, a general criticism of ITQ systems with the rationalization of quotas to the most efficient vessels is that small scale fishers sell their quota to the larger ones which have a better capital basis and can fish with lower costs. Therefore, in order for the small scale fishing sector to be preserved, countries need to take action to avoid their disappearance. Whether these criteria are applied to other ITQ systems needs to be investigated in further studies.

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Chapter 9
"Free Enterprise" and the Failure of American ITQ Management

Carmel Finley

Abstract Open access to fishing has always been politically useful to policy makers as a strategy of imperialism. The Faustian bargain between the US government and its fishermen has been that in return for free access, fishermen would put up with government-imposed inefficiencies to blunt the impact of excessive fishing pressure on fish stocks. These inefficiencies increase the cost of fishing. Too many boats make it impossible for fishermen to operate economically, or for management to move beyond allocation battles. In the bio-economic models developed during the 1960s, fisheries did not pay economic rent, nor did they cover their administrative costs. Fishers freely entered the fisheries, accepting the risks of competition and the challenge of controlling operating costs; efforts to cap entry into most American fisheries were delayed until the early 1990s. This legacy has created a system with artificially high administrative costs that will not be recovered under individual transferable quota (ITQ) schemes. Lack of fish has led to successive rounds of subsidies, which offer short-term fixes but do not address the overcapacity problems or the tension among the competing goals within fisheries management. These issues will be examined in the context of the West Coast halibut fishery, which has moved to an ITQ system at the same time as the stocks are declining. This chapter argues that the imposition of ITQs will be ineffectual in overcoming the legacy of decades of free enterprise, over-capitalization, and the historical reluctance of American government to make fisheries pay the costs of their administration.

Keywords Overfishing • Overcapitalization • Neoliberalism • Fisheries management • Fisheries science • Halibut • William F. Thompson • History of Science • Subsidies

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9.1 Introduction

Open access to fishing has always been politically useful to policy makers, for both domestic and foreign policy reasons. Expanding fisheries has been a way to stimulate employment in coastal communities, where opportunities are sometimes limited. Fish can be exported, helping the country's trade balance. After the 1880s, when steam engines were installed into boats, fishing became a proxy for territorial claims. Large steam engines exhausted the home grounds in Great Britain and the North Sea, and boats moved to new water, off Iceland and Newfoundland. The Japanese government introduced Western fisheries technology after the Meiji Restoration in the 1880s. As the bigger boats exhausted the home grounds, the new fleet was sent to fish throughout Southeast Asian waters (Butcher 2004). Fish belonged to the nation of the fishermen who caught them. As governments expanded fishing, their policies over the last century turned fishing from a coastal, in-shore activity to a global enterprise, one that has been so technologically successful there is literally no place left in the oceans for fish to hide.

Fishing is an activity that is embedded within other policy considerations, or within strategic political, economic, and social goals. There has been little scholarly attention to how fisheries are shaped by wider political forces (McEvoy 1986; Lichatowich 1999; Finley 2011; Dorsey 2013). This paper contends that the relationship between the US and its fishing industry has traditionally been based on a tacit understanding that anybody could go fishing and the resulting overcapitalization was (mis)managed by regulations that increased the inefficiency of the fleet. Fishermen freely entered the fisheries, accepting the risks of competition and the challenge of controlling operating costs. But when catches dropped, they petitioned for and received subsidies, with most of the money going to upgrade gear and electronics to make the vessel more 'efficient.' This situation was not unique to the USA. Globally, countries spend $80 billion buying fish that cost $105 billion dollars to catch (World Bank – Sunken Billions 2008). The fishing power of fleets worldwide may be as much as 250 per cent higher than what would be needed to fish at sustainable levels (Von Moltke 2011). The total catch of marine fisheries is on the decline, from 86.4 million tonnes in 1996, to 74.4 million tons in 2010 (Pauly 2012). Continued industrial fishing places more pressure on stocks at the same time as they now contend with warmer and more acidic environments.

At the same time, traditional fisheries are being stressed by the introduction of privatization of the resource through the imposition of Individual Transferable Quotas ITQs). Privatizing the catch has been a foundational component of economic thinking on fisheries management since 1954 and the publication of H. Scott Gordon's paper recommending that privatizing would lead to efficiency in the fisheries. As Jennifer Hubbard points out in the paper in this volume, the 1950s marked the ascent of economists within state, provincial, and especially federal governments. Gordon's assertion that privatization would lead to efficiency has been repeated so often that it is accepted as a solution. But what if Gordon was wrong about one of his central assumptions, that human interactions with the ocean cannot

be governed by efficiency? Perhaps it is simply not possible to make fishing 'efficient', because fishing is only one of the factors in play. The ocean ecosystem is inherently unstable, disturbance is the norm, not equilibrium (Longhurst 2010). Fishing also takes place at the mercy of another inherently unstable force, weather. This inherent instability confounds efforts to be efficient, yet Gordon's paper laid the intellectual foundation for the imposition of neoliberal privatization in four Alaskan fisheries.

Proponents of using catch shares under a Quota Management System (QMS), and especially of using Individual Transferable Quota (ITQ) in conjunction with QMS, promise they will lower management costs by passing them on to the industry, as has been done successfully in Iceland, Australia, and New Zealand. Under the implementation of neoliberal economic ideas, catch shares spread to some US fisheries. ITQs have been lauded by economists, pushed by environmental groups such as the Environmental Defense Fund, and eagerly embraced by politicians anxious to be seen as successfully managing the resource. "Catch shares is a tool that can help us realize the full economic and biological benefits of rebuilt fisheries", Commerce Secretary Gary Locke said in a 2009 NOAA news release (NOAA NOAA 2009: 1).

This paper argues that the recent imposition of ITQs in four American fisheries, for Northwest halibut and sablefish, Alaskan king crab, and Alaskan pollock, will be ineffectual in overcoming the legacy of decades of free enterprise, over-capitalization, and the reluctance of the US government to make fisheries pay the costs of their administration. This historical legacy has created a system with artificially high administrative costs. While catch shares was sold as a way of having the market reward efficient fishermen who could lower their costs, the federal government continues to subsidize the building of new boats for the Northwest halibut and sablefish, the Alaskan crab fisheries, and for economic development opportunities for Western Alaska Communities. These sweeping changes come at a time of great uncertainty about one of the Pacific Northwest's oldest and most important fisheries, Pacific halibut (*Hippoglossus stenolepis*).

Since the 1950s, fisheries management has been dominated by bio-economic models, integrating biological and population dynamic models with economic models that attempt to predict the optimal level of effort, determined not only by the biology of the stock, but by the cost structure of the fishery and the value of the harvest. The early models showed that open access fishing was not economic (Larkin et al. 2011). The financial advantage of free use of the oceans was offset by increased competition, leading to higher costs (Regier 1997). Managers ignoring the government role in causing the inefficiencies focusing on controlling inputs, size limits on boats and gear restrictions. The American share of the global fish catch fell drastically during the 1960s. But a decade later, with the adoption of expanded territorial seas to 200 miles, and policies to subsidize the building of boats and processing plants, entry into American fisheries grew rapidly (Weber 2002). Catch shares are designed to correct some of the problems bio-economic models created.

9.2 Neoliberalism and Fishing

The imposition of neoliberalism into fisheries is part of a much deeper and broader adoption of these ideas. Neoliberalism is a political economic theory that supposes that human well-being can best be achieved by maximizing entrepreneurial freedoms within a framework of private property rights, individual liberty, unencumbered markets and free trade. It has been applied broadly in many countries, both in the West, China, and the emerging former Soviet republics. "Neoliberalism has, in short, become hegemonic as a mode of discourse and has pervasive effects on ways of thought and political-economic practices to the point where it has become incorporated into the commonsense way we interpret, live in, and understand the world", writes David Harvey. "Neoliberalization has in effect swept across the world like a vast tidal wave of institutional reform and discursive adjustment" (Harvey 2007: 8).

The preferred neoliberalism option within fishing nations has been systems of catch shares, where individual fishermen or other groups are given rights to a certain percentage of the total catch. Catch shares, under the commonly used acronym, individual transferable quotas (ITQ) have increasingly been implemented in Norway, Iceland, New Zealand, and Australia. The Canadian halibut fishery switched to an ITQ management in 1991. After a long history of strenuous objections, a system of catch shares was implemented in several American fisheries, starting in the 1990s.

Geographer Becky Mansfield argues that privatizing the ocean means creating "distinctive forms of neoliberal practice". While the state is usually seen as having a 'hands off' approach, in the case of fisheries, state involvement is central to the implementation of the program. Neoliberal ideas will be "a highly variant outcome of conflict and the political process," (Mansfield 2004: 556). Will those changes be enough to make the fishery, once and for all, efficient? And how will the changes alter the social fabric in Alaskan communities, dependent on the way the halibut fishery has been managed for almost a hundred years? Mansfield suggests there will be losses at both the individual and the community levels.

The language of neoliberalism is often presented as universal and value neutral when in fact the silence around this economic framework is invisible within the political, economic, and social implications of such a fundamental change in fishery relationships (Low and Carothers 2008: 22). There is an extensive literature on the use of neoliberal market based methods on commodities such as rocks or minerals, but there is far less evidence about the impact on a highly variable, renewable resource such as fish. Biological resources have their own dynamics, as Pacific halibut are making clear, and this makes them difficult to privatize (Pinkerton and Edwards 2009).

The imposition of catch shares has been promoted as a way to make fishing efficient, by allowing the market to control how many boats can make a living off the resource. Fishing has been inefficient because there are too many boats, which has been the result of deliberate government policies, aimed at achieving certain political, social, or economic goals. Once created, the over-capitalized fleets have turned

to governments for subsidies; the subsidies contribute to the creation of another round of technological fixes designed to overcome the inefficiencies of having too many boats—the government’s price tag for open access (Ludwig and Walters 1993). When there are too many boats, the competition can be intense, with boats fishing in unsafe conditions to get a share of the quota. One of the prime motivations in moving to catch shares in the Pacific halibut fishery was to reduce the danger from extremely short seasons that forced fishermen to fish despite the danger from weather. American fishermen themselves, while recognizing that increasing numbers of boats made competition more difficult, were slow to support the imposition of license moratoriums. Most fishermen saw the paradox but they tended to depend on their own fishing prowess to equalize the threat of competition from new entrants.

According to economists, the bonus with catch shares is that fishermen “start acting as stakeholders of the resource, perceiving how more detrimental actions can impact their revenues”, write Andrea Dell-Apa, Lisa Schiavinato, Roger A. Rulifson (Dell-Apa et al. 2012: 677). Catch shares are valuable property rights that can be sold or transferred. ITQs are an improvement over what managers call output controls, which they define as regulating fleet capacity, days at sea, etc.), which deliberately cause economic inefficiency. The objectives of ITQs were not only to increase the length of the fishing season and promote economic efficiency and safety, but also to preserve the fishery’s traditional, small-vessel character and to create better opportunities for Alaska’s native fishing communities.

But while the language privileges the idea that the market will regulate the fishery, rewarding the most efficient fishermen, in these four fisheries, the government has also imposed new social goals, expressed through the creation of Community Quotas and co-operatives, creating a new group of stakeholders dependent on revenues from a fluctuating resource. The new groups were created to protect coastal communities from the shifts that would occur in the sablefish and halibut fisheries as catch shares were implemented. Some ports had reduced landings, with subsequent community impacts.

While Commerce Secretary Locke contended that ITQs will function in rebuilt fisheries, the evidence suggests that the creation of these new stakeholders will add to the already formidable pressure from the industry to keep catch quotas high. This increasing complexity increases costs and the risk of small inaccuracies in the data having the potential to cause significant errors in the assessments. Such intense management also increases costs (Healey and Hennessey 1998).

If anything, the imposition of ITQ fisheries has increased federal management costs, a trend that is likely to continue. The 1970 Fishing Vessel Capital Construction Fund Program allowed tax deferments that let fishermen set aside money for future vessel upgrades or new construction. The Fishing Vessel Obligation Guarantee Program passed in 1973, guaranteed loans for up 87.5% of the cost of reconditioning an existing vessel or constructing a new one. As the National Oceanic and Atmospheric Administration (NOAA) web pages point out, the Capital Construction Fund program allows fishermen to acquire boats with before-tax, rather than after-tax dollars, and allows them to defer tax on income from fishing, creating, “in effect, an interest free loan from the Government”, (NOAA Fisheries NOAA 2016).

The creation of catch shares has also acted to infuse an enormous amount of money—whether real or virtual—into the always rapidly fluctuating world of commercial fishing. The rhetoric around catch shares is all focused on the idea that markets will regulate fishing, so the fishermen with the most efficient operations will be rewarded. Fisheries have been transformed into a series of fisheries with new property rights, but the distortions in the previous system have not all been corrected. This government money will continue to distort how the market should work.

The implementation of ITQs should mean that restrictions on boat size and gear, for example, could be relaxed or eliminated. But fisheries are still being managed with time and area closures, as well as gear limits and size limits. Rather than reducing regulation, catch shares are adding to regulation (Mansfield 2004). There are new costs as well. At the start of 2013, the commercial halibut fishery off Alaska was subject to some new fishery monitoring requirements. The redesigned North Pacific Observer Program covers all groundfish fisheries, including the halibut fishery (Alaska Fisherman). Alaska fishermen who hold Individual Fishing Quotas of halibut, sablefish (black cod) and Bering Sea crab pay an annual fee to the federal government to cover the management and enforcement costs for those fisheries. The coverage fee, which is capped at 3%, is based on dock prices and averaged across the state. Fishermen determine how much they owe by multiplying the annual fee by the dockside value of all their landings. The percentage is slightly higher this year at 2.1%, compared to 1.6% last year. These are initial steps in trying to recover management costs, a widely held social goal, but the impact will fall most heavily on the fishermen, who have little ability to pass the increased costs upwards to their buyers and processors.

9.3 The Halibut Problem

The Pacific halibut fishery grew rapidly after the 1880s, and catches crashed, stimulating one of the first conservation treaties between Canada and the United States. Since 1923, fishing has been managed by the International Pacific Halibut Commission (IPHC). The Commission made its scientific reputation in 1935 by boldly declaring that it had found the key to manage fish stocks-- and to reverse the declines.

Over the next seven decades, fishermen in IPHC waters increased their harvest. Halibut got steadily larger: the average female doubled in weight, growing to around almost 50 pounds. The Commission was lauded for its science—but at the same time, the number of fishermen had grown to the point where seasons were brutally short. The imposition of a catch share system was widely seen as correcting this economic flaw, making the fishery safer for fishermen, and bringing higher quality fish to consumers. The Commission remains the gold standard for US fisheries management (Gates 2005).

But for the last decade, catches have been dropping and predictions of strong year classes have failed to materialize. "This scientific error now results in a $60 million reduction to the fishermen in lost wages; a $250 million loss in asset value of ITQs; and puts the industry with a greater burden of rebuilding the resource", Bob Alverson, manager of the Fishing Vessels Owners Association in Seattle wrote in the group's January, 2013 monthly newsletter (FVOA 2013). The group represents the largest and oldest group of halibut fishermen, who use long line technology to harvest the fish.

Halibut have been declining over the last decade, with a 50% decrease in the harvestable biomass (NPFMC 2011). The stock is thought to be stable but there is no sign of strong recruitment. For the last 7 years, the Commission's estimates of how many fish would be caught each year have been woefully inadequate:

> Despite reductions in harvest levels in 2011 and 2012, the assessment estimates that, in retrospect, harvest rates have been well above the coast wide targets implied by the current harvest policy. The 2013 estimate of exploitable biomass is 186.49 million pounds, significantly smaller than the 2011 estimate of 260 million Pounds (IPHC 2012).

The 2014 biomass estimate increased to 209 million pounds, even with the reduced weight of the fish.

More troubling is that the fish are smaller and not growing as quickly. A sexually mature female halibut now weighs between 15 and 20 pounds, just as they did during the 1920s. Male halibut are mature at 8 years, when growth slows markedly, so markedly that scientists and fishermen are concerned they may not grow large enough to be legally caught (Jensen 2012). This confounds the assumptions in the rebuilding plan, since spawning-age females will make up a larger share of the harvest. Biologists are perplexed at why halibut grew so much larger for most of the last century, and why the fish are now as small as there were in the 1920s when the IPHC was first created.

There are plenty of hypotheses about the situation. There is evidence that a growing population of arrowtooth flounder (*Atheresthes stomias)*, also found near the ocean floor, may out compete halibut for food. There are additional questions about the availability of food for young halibut (IPHC 2011). There is concern about the impact of fishing gear on the fish over time—is the fishery forcing the fish to evolve in a way that is not at all understood? Is the decline cyclical, indicative of a long pattern? Is it linked to changes in the ocean itself, with the Pacific being seen as not as productive as it used to be? What will be the impact of changing ocean conditions?

The success of the catch shares program will depend on the health of the halibut resource, and how the international Commission responds to lowered harvest at a time of heightened pressure for every pound of fish that can be caught. It is doubtful the many proponents of ITQs over the years could have imagined what could happen at a time of heightened financial and biological crises. Natural resources fluctuate, and a species recovery plan may have been adopted, but that is no guarantee that fish prices, share prices, and total value will increase. If anything, the confluence of factors calls into question whether a fishery on a fluctuating resource can be at all

'efficient.' With this in mind, perhaps the goal of efficiency is not only impossible to achieve, it should be eliminated as a social goal. Natural resources fluctuate, and, as such, fishing as a factor in management has to be prepared to suffer losses.

9.4 The History of the Fishery

A brief historical review of the Pacific halibut fishery reveals that there has always been controversy about how successful its management has been, and whether the IPHC's founding scientist, William F. Thomspon, overstated the data for his 1935 report, the one that established the commission's scientific reputation.

Pacific halibut are among the largest fish in the sea. Most are between 25 and 35 pounds, but they can grow much larger and the historical record is full of landings of fish weighing several hundred pounds. Halibut are found on the Continental Shelf of the North Pacific Ocean and the Bering Sea, from mid-California to Alaska. On the Asiatic side, they are found from Russia south to Hokkaido. The largest concentrations are on the northwest coast of North America, in the international waters between Canada and the United States (Thistle 2004). Halibut can grow to 500 pounds and 8 ft in length and live to be 40 years old. The fish mature slowly and the females are larger than the males. It is a demersal species, living on the bottom, in mud, sand, and gravel banks. They migrate to deeper water in winter and after they spawn, they return to shallower coastal waters to feed for the summer (Gates 2005). They are hardy fish; studies show that greater than 80% of fish that are hooked and released survive (Pinkerton and Edwards 2009).

Two developments stimulated the establishment of the Pacific halibut fishery. Atlantic halibut stocks had collapsed in 1880s, creating a market for Pacific halibut. It took the completion of the transnational railroads to bring the fish to eastern consumers. First shipments to the east coast began in 1888. Fishing expanded rapidly and within a decade, there were complaints about the fish being depleted.

The Province of British Columbia, convinced by 1913 that Seattle fishermen were destroying its halibut stocks, launched a scientific investigation into why the massive fish had gotten so much smaller and so hard for Canadian fishermen to find. After a decade spent arguing over whose fishermen had caught all the fish, the Canadian and American governments signed a conservation treaty and created the International Pacific Fisheries Commission (later the International Pacific Halibut Commission, or IPHC).

Initial landings were astoundingly high. Early halibut fishing was by large vessels called steamers, financed by fish companies. Each carried between eight and 14 dories (Bell 1981). The steamers could deploy large amounts of gear where there were heavy concentrations of fish, and they were large enough to maneuver in winter seas, since halibut fetched its best price in the eastern markets during winter months. The steamer *New England* alone landed 1.6 million pounds of halibut during 6 months of the season 1898–1899. The expansion of ice facilities in the 1890s and early 1900s provided ice, frozen bait, and space for the fish to be held before

being shipped by rail to eastern markets (Cushing 1988). By 1895, the halibut fishermen in Gloucester were complaining about competition from the West.

The fishery developed quickly. Between 1902 and 1909, fishermen found halibut in 80 meters of water throughout the year. Between 1910 and 1915, the average depth of capture was more than 160 meters and as great as 260 meters. By 1900, as concerns grew about the pelagic harvest of fur seals (*Callorhinus ursinus)*, sealers began moving into the halibut fishery (Dorsey 1998). After 1915, boats installed 16 V generating systems, allowing deck lights and night fishing. Power-driven winches allowed small dories to be hauled on board the schooners by power, and holds were insulated, so the boats could stay at sea longer. Diesel engines were introduced by 1921. A new cold storage plant at Prince Rupert, subsidized by the Canadian government, with a capacity of 14 million pounds and ice storage for 2000 tons played a critical role in developing the fishery off Alaska.

The signs that too many halibut might be harvested appeared by 1899, when biologists warned that the near-shore banks were being depleted and recommended a limit on the number of fish caught. The Canadian and American fishermen began quarrelling over which group was to blame (Thistle 2004). By 1910, the catch rate and average size of the fish had declined so seriously the two countries began negotiations on a formal agreement to control the fishery (Smith 1994). The first thing to do was to discover some basic information about the life-history of the fish (Dunn 2002).

The Province turned to Stanford University and the zoology program established by the eminent Charles Gilbert. Gilbert began studying salmon in B.C. in 1912 and the investigation was expanded in 1914 to include the halibut fishery. Gilbert hired a promising young student, William F. Thompson (1888–1965) as his assistant. Thompson had graduated from Stanford in 1911 with a B.A. degree in zoology. He began graduate work at Stanford under Gilbert, including work in British Columbia on halibut, the start of laying a scientific foundation for the subsequent management of the resource by the International Fisheries Commission in the 1930s, and the start of a 50-year career in which he became the most widely known fishery scientist and educator in the Pacific Northwest (Dunn 2002).

When the halibut investigation wound down in 1917, Thompson was hired by the California Fish and Game Commission as director of research, with the responsibility for overseeing the sardine fishery. When Canada and the United States signed the world’s first international agreement designed to conserve a depleted deep-sea fishery in 1923, Thompson was the obvious choice for director.

The Convention for the Preservation of the Halibut Fishery of the Northern Pacific Ocean was signed on March 2, 1923, after 4 years of negotiations and bitter accusations over whether Canadians or American fishermen were responsible for the decline. It was ratified by both countries in 1924. The Commission was charged with studying the life history of halibut and with recommending regulations for the preservation and development of the fishery. Thompson was hired in 1925 and he set up a tagging program to study halibut migration (Smith 1994).

His close study of the fish and the fishery showed that high catches were being maintained only because fishermen were increasing the territory they fished. To

Thompson, this meant that fishermen were systematically depleting grounds close to their home ports, forcing them to travel greater distances at higher costs. "The result was a maintained total catch, hiding successive depletions of bank after bank, until the yield that came originally from an area of 500 miles was stretched over 2000 miles of coast from Oregon to Bering Sea", Thompson wrote (Thompson 1936).

As more fishermen and gear entered a fishery, the amount of fish each fisherman caught declined. As the number of fishermen increased, the total catch would increase, but each fisherman was getting a smaller slice of the profits. In short, the Catch per Unit effort (CPU) was falling (Smith 1994). If fishing was unrestricted, soon there would be no profits at all.

Thompson and the Commission issued "Report No. 8" in 1934, proving that fishing successively depleted fish stocks—but that declines could be reversed by scientific management (Thompson 1936). The banks that had been fished first, in Puget Sound, were more depleted than those in Hecate Strait—which, in turn, were more depleted than the most recently fished banks in the Gulf of Alaska (Thistle 2004). The pattern of progressive decline was clear. And so was the pattern of recovery once regulations were put in place: individual catches were higher and the catch had stopped declining (Skud 1975).

The report showed that fishing caused major changes in the halibut stocks. A female halibut did not mature sexually until age 12–15 years. When fishing was intense, too many immature fish were killed before they could spawn. If fishing could be regulated, the small, immature fish could grow; fishermen would ultimately land more pounds—and make more money. Not to regulate the fishery is "sheer economic waste", the Commissions' board of directors stoutly noted in their forward to the report.

The publication of "Report No. 8" made the scientific reputation of both Thompson and the Commission. Just a decade after its formation, the Commission had found the key to managing fish and fishing. It was the first time an international agency had voted to restrict fishing and the data proved it was successful (Cushing 1977). The Smithsonian published a paper by Thompson the following year, summarizing the Commission's findings. There was a favorable review on "Report No. 8" in the international ICES journal. Thompson became one of the most widely known and respected fishery scientists in North America (Dunn 2002).

The recognition of the Commission's work by European scientists was extremely gratifying. Thompson wrote to his commissioners in 1936, pointing out that British scientists thought that the conclusions of "Report No. 8" were applicable to the North Sea. This acceptance by British scientists "places beyond any doubt the soundness of our scientific procedure," (IPHC 1936: 271).

But at least one scientist doubted Thompson's work. At a 1947 meeting in Toronto, Martin Burkenroad sharply challenged Thompson by arguing the fishery was going through natural changes unrelated to fishing. This may seem like an obscure disagreement, but it is at the heart of all fishery management decisions—how to interpret what is going on in the oceans, with the fish, and with their interactions with fishing gear.

The Burkenroad-Thompson dispute was thoroughly investigated by the Commission itself in 1975, part of a reanalysis of the early data. Bernard Skud wrote:

> The results indicate that the original calculations by W. F. Thompson and his colleagues underestimated fishing effort and overestimated the catch per unit effort during the early years of the halibut fishery. Reanalysis of the data provides a more accurate estimate of stock abundance in the early years of the halibut fishery and shows that the decline in abundance prior to 1930 was not as precipitous as originally portrayed (Skud 1975: 27).

If the decline was not as precipitous as Thompson thought, then the recovery under the Commission’s management was not the success that many thought. Halibut is among the most studied fish in the sea, yet there is no scientific agreement over how to interpret the events between 1915 and 1930—as the fish grew smaller and fewer. Nor is there agreement that the implementation of regulations under the new Commission was responsible for the increase in size and number of fish after 1935. Time has not brought clarity to the dispute. In a fisheries textbook published in 1992, Ray Hilborn and Carl Walters wrote that one could "explain the history of the halibut stock equally well as changes due to the environment or as changes due to fishing” (Walters and Hilborn 1992).

What is not disputed is that the open access nature of the fishery drew fishermen from both countries. Despite restrictions on the issuance of new licenses in 1973, more effort continued to pour into the fishery, eventually resulting in seasons that lasted from a few days to a few hours. The tight time frames placed enormous pressure on fishermen to fish, regardless of weather. And most of the fish went into cold storage, to be doled out by processors to consumers as the year went on. As the fishery developed, it became the poster child for economists, anxious to implement what they saw as a solution to the problem of too many boats: ownership of the resource.

During the 1970s, as prices for Pacific halibut reached new levels, more people entered the fishery. The Canadians acted in 1979 to limit the number of boats in the fishery. The fleet grew from 497 vessels in 1975, almost tripling to 1204 in just 2 years. As managers talked about limiting the number of licenses, fishermen scrambled to take out halibut permits, hoping they could be grandfathered into the fishery—or at least bought out to cover the costs of the permit (Pinkerton 2013). By the early 1990s, there were so many boats, opening lasted for hours. “Fishing was permitted during just a few 24-hour windows”, wrote Sharon Levy.

> Two thousand boats might race to sea at once, each crew working madly to land a full year’s catch in a day. Boats were overloaded with fish, and lives were lost: Nine workers drowned during derby fishing in Alaska during 1991 and 1992. In their hurry, fishers damaged creatures they were not targeting and lost much of their long-line gear, leaving thousands of baited hooks on the seafloor that imperiled halibut and other fish after the season had ended. When the catch was landed, the market was flooded with a year’s worth of halibut at once, reducing its value (Levy 2010).

After the Canadians introduced a share system into their fishery in 1992, the Canadian fleet had an eight-month season and was making considerably more money than their American counterparts. The Americans, seeing the cost of ignor-

ing reality, reluctantly followed. The price of quota has steadily increased, and so has demand for halibut.

The Alaska halibut fishery consists of fishermen with ITQ shares, but also a large and growing sport fishery that utilizes charter boats to access fish. Starting in the 2014 season, charter operators were able to lease quota from fishermen. The charter fleet industry is seeking a "permanent solution" to increase predictability of management and be able to satisfy customer desire to catch halibut. This means buying commercial quota from commercial longliners (Davis 2013).

At the same time, a substantial quantity of halibut is caught and discarded by the at-sea trawl fleet. The Bering Sea trawlers were allowed roughly six million pounds of bycatch for the 2015 season (Harrell and Zuke 2015). The trawl bycatch is largely juveniles and both sportsmen and longliners have called on management agencies to reduce the waste. The at-sea trawlers are not allowed to land bycatch, so the fish are wasted. The allocation battle is bitter. "Public testimony stretched over three days, as longliners from Southeast asked the council to save the halibut stock; crewmembers on Bering Sea trawlers asked the council to save their livelihoods; and residents of St. Paul, in the Pribilof Islands, asked council members to save their community", an Alaskan radio station wrote about a recent meeting of the North Pacific Fisheries Council meeting. "Reductions in overall catches have resulted in some fishermen seeing their catches cut by as much as 70 percent over previous years" (KCAW News 2015).

It would appear that controls on gear – possibly an abandonment of trawling or certainly new trawl gear designed to substantially reduce bycatch – or on commercial fishing generally are long overdue.

9.5 Conclusions

This paper has argued that after managing for more than 100 years by inefficiencies, ITQs will not be able to overcome this historical legacy, at least in the Northwest halibut fishery, because there is still too much fishing capacity to catch the available fish. This is exacerbated by federal loans to build new, more efficient vessels to enter the halibut and sablefish fisheries. The federal subsidies mark a recognition that fishermen would not be able to build the boats themselves; costs have increased as profits have fallen. For many of those who actually catch the fish, there is a substantial new bill to pay, the lease on the license.

There is limited information on how ITQs are working in this fishery. There is no doubt the catch shares system has made halibut fishing safer. The US Coast Guard has reported a dramatic decrease in search and rescue missions, as well as fatalities, since the system was put into place (Barlow and Bakke 2013). The safer fishing conditions paved the way for the reality television series, *Deadliest Catch,* about the Alaskan king crab fishery, billed as the most dangerous fishery in the world. The reality is that the television program can only be made because ITQs have made the Alaska king crab fishery far less dangerous than it was in the past, by allowing fish-

ermen to fish when they chose, instead of being forced to participate in ever-smaller openings.

The imposition of ITQs might not result in any improvement in fish for harvest, according to a study by the Lenfest Ocean Program Study. An evaluation of 15 fisheries with ITQs showed that catch share can make a fishery more stable, but will not necessarily result in larger fish populations (Barlow and Bakke 2013). Recent reviews of the longest-established ITQ fisheries in New Zealand show significant inequity features which are remarkably similar to those in BC halibut ITQs. ITQ schemes have real impacts on real people, Courtney Carothers and Marie Lowe argue. "While these effects are not entirely predictable, certain patterns of outcomes tend to reinforce historical inequities based on class, gender, and ethnicity" (Lowe and Carothers 2008).

In B.C., many quota holders have retired from fishing and lease out their quota. "Working fishermen have effectively become tenants, obligated to pay exorbitant rents for quota. In this situation, it's difficult to imagine how quota rights could inspire good stewardship since few quota holders are actually on the water" (Levy 2010). Lease fees take an increasing share of costs, leaving little money to invest in gear and boats.

Another uncertainty is the exact legal status of ITQ shares. While proponents emphasize that catch shares are not property rights, but only a right to a share of the catch, it remains to be seen how this will be interpreted by the courts. With the creation of Native corporations, dependent on revenue from ITQs, there is substantial pressure to find ways to create alternative funding streams to keep programs solvent.

Also uncertain is the long overdue but politically difficult controls on gear, possibly an abandonment of trawling or certainly new trawl gear designed to substantially reduce bycatch. This is being driven by sports fishermen, who want the option of being able to buy quota.

Perhaps the most compelling argument for catch shares was that its proponents predicted that ownership of the resource would lead to better stewardship. It appears that ITQs follow the path of many other neoliberal programs that have led to the creation of large companies. For corporations with many employees to pay, a more profitable use for the halibut shares might be to treat the fish as non-renewable resource, mine them, then move the capital to an area where there are higher potential profits. After all, it required legislation demanding that forest companies reforest after trees had been cut before such practices were phased out in state-owned Northwest Pacific forestry. Economists showed that the reforestation costs could be more profitably invested elsewhere.

If the US Congress wants its new corporations and entities to accomplish the social goals that have been established for them, then it is probable that new rounds of successive funding will be needed to protect fish stocks from corporations acting in their short-term best interests to maximize profits. While there is enormous rhetoric about making fishing sustainable, it will be hard to do when there are still too many vessels, new government subsidies to build more, and more people dependent on a dwindling number of fish, with everybody hoping for recovery of the halibut fishery.

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Chapter 10
Approaching Leviathan: Efforts to Establish Small-Scale, Community Based Commercial Salmon Fisheries in Southeast Alaskan Indigenous Communities

Steve J. Langdon

Abstract In the wake of neoliberal reworking of Alaskan fisheries beginning in the 1970s, Tlingit and Haida village residents in southeast Alaska rapidly lost rights to commercial salmon and halibut fisheries, primarily through the sale of the property rights awarded to them when the programs were initiated. At the same time, the lack of capital, financial qualifications (collateral, credit history), and basic knowledge about the operation of bureaucratic systems of finance and property rights, prevented young village residents from purchasing the state-created permits needed for commercial fishing. While commercial fishing as an economic foundation of village life has virtually disappeared, nevertheless village residents maintain strong ties to the customary and traditional salmon systems which have sustained their communities – culturally and nutritionally – for thousands of years. Villagers acquire salmon using small-scale technologies consisting of open skiffs and nets pulled by hand, operated typically by crews of two or three men. While conducting their subsistence fisheries, they have identified numerous cases of unharvested surplus salmon at stream mouths which the permitted commercial purse seine fishery directed by the biological managers have failed to capture. They have perceived and advanced the possibility of developing local, community based small-scale fisheries to make use of the foregone harvests. The neoliberal regime has tightly aligned six sectors – legal practitioners (politicians and lawyers), resource managers (biologists), commercial fishing permit holders (producers), processing firms (capitalists), financiers (bankers) and policing agents (enforcement personnel) – into an assemblage I refer to as "Leviathan". This hybrid alignment presents itself and acts as an impregnable entity protecting the interests of its collaborators from the establishment of new fisheries or the entrance of new practices into its alignment. This paper will (1) describe the components and construction of "Leviathan" as it operates to protect itself, (2) dem-

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onstrate how an "optimizing" logic of cost minimization in management results in underutilization of salmon available for harvest and (3) present two case studies of salmon stocks that are presently not being utilized that could become community-based, small scale commercial fisheries that would be of substantial economic benefit to village residents for whom "Leviathan" makes no provision.

Keywords Limited access fisheries • Indigenous Alaskan coastal communities • State management • Neoliberal policies

10.1 Introduction

In the wake of the creation of permits and ITQs being applied to Alaskan fisheries beginning in the 1970s, Tlingit and Haida village residents in southeast Alaska rapidly lost rights to commercial salmon and halibut fisheries, primarily through the sale of the property rights awarded to them when the programs were initiated. At the same time, the lack of capital, financial qualifications (collateral, credit history), and basic knowledge about the operation of bureaucratic systems of finance and property rights, prevented young village residents from purchasing the permits needed for commercial fishing. While commercial fishing as an economic foundation of village life has virtually disappeared, nevertheless village residents maintain strong ties to the customary and traditional salmon systems which have sustained their communities – culturally and nutritionally – for thousands of years. Villagers acquire salmon using small-scale technologies consisting of open 16–20 foot skiffs and nets pulled by hand operated typically by crews of two or three men. The small-scale subsistence fishermen of the villages travel widely throughout their traditional homeland and observe the returns of large numbers of salmon to the mouths of various streams. These salmon, having passed through and escaped the gauntlet of the larger permitted 60-foot purse seine vessels, are at times and places in such abundance beyond the numbers needed for escapement and reproduction that local elders and experts perceive the possibility of creating limited, commercial opportunities for their small scale technologies to harvest the surpluses to escapement.

The foregoing commentary is based on observations beside and conversations with Haida elders and mature village males from the village of Hydaburg in southern southeast Alaska who are intimately familiar with salmon (and other fisheries) resources of their traditional territory. Virtually all of them fished on larger purse seine vessels when the village fleet was comprised of 12–15 such vessels. Most adult men grew up operating or crewing in their own waters and elsewhere in southeast Alaska and many continue to live in the villages they grew up in. They are painfully aware not only of the loss of their commercial fisheries livelihoods but of the stress of poverty and unemployment on the younger people of the village, their children and grandchildren, many of whom have left the village. The men continue

their direct engagement with their lands, waters and deeply value their cultural heritage linking them to their homeland. The leadership seeks to create opportunities for young people to live in the village with a decent quality of life and for new families to be formed. To that end, a wide variety of strategies and efforts are underway, one of which has been to seek research funds to document the presence of abundances and evaluate the possibility of such a fishery.

This paper explores the effort to obtain research funding to undertake assessment of the possibilities for such a fishery and the manner in which the research proposal was received by the scientific community, the state biological regulatory agency and the state legal authority. The examination of the fate of this proposal will demonstrate the characteristics of an intertwined assemblage or actor-network of articulated concepts, persona and institutions that has been constructed to "manage" certain access points to governmentally permitted fisheries and the types of instrumentalities that have been created to deflect new forms of commercial salmon fisheries in Alaska. This conjunction has the appearance and menace of a formidable inchoate entity, an "assemblage" which I have termed "Leviathan". The title of the paper, "Approaching Leviathan" is used to direct attention to two aspects of the situation. The first is to convey the notion that Leviathan, although never fully and completely constructed or closed, is purposively seeking impenetrability; a discussion of how it might be successfully approached is beyond the scope of the paper but some observations on that topic will be offered in the conclusion. The second meaning conveyed by "Approaching Leviathan" is the recounting of an attempt to conduct research in order to develop information for the establishment of a new, small-scale salmon fishery that would target presently unutilized or underutilized stocks. The analysis will examine the manner in which a research proposal was received by particular segments and actors that are part of "Leviathan". Concluding remarks will note the relationship of this case to the emergence of the discourse of "hegemonic bureaucracy science" more broadly.

10.2 Leviathan – Conceptual Antecedents

Leviathan is a trope advanced here to characterize two different faces of the current arrangement of institutions and regulatory practices that confront the residents of indigenous villages who wish to establish new commercial uses of the salmon resources located within and utilized by themselves and their ancestors. The first face is that of a monstrous form of enormous and irresistible power that threatens the existence of humans. The original form of this concept is traceable to Biblical constructs with subsequent revivals during the European middle age. The concept was recently called upon in the following quote: "That heartless leviathan we call History swallowed that event whole, erasing it from the national memory" (Abdul–Jabbar 2014). The use of "heartless" implying lack of conscience and

caring and "swallowed" indicating total engulfment and disappearance comport well with the articulation of Leviathan developed in this paper. The second face is the sense of supreme sovereign power, the human institution known as the state as constituted in one of the original political treatises of modern Western civilization by Thomas Hobbes. The sense of Leviathan derived from Hobbes is that of a necessary political institution that claims and seeks to implement total control over all human actions that occur within its domain – typically as defined by geography. Hobbes made the case for the superiority of monarchy, the single solitary sovereign controlling all power and decisions over population and territory. Leviathan has typically been seen as an expression and representation of the need for a unified, omnipotent sovereign to govern a violent humanity incapable of self-governance.

The Enlightenment movement toward liberal democracy, constituted as representative institutions based on the will of the people governed, sought to repudiate and replace the solitary omnipotent monarch with democratically elected representative institutions. The construction of liberal democracies, despite their claims to openness to competing interests and claims, developed trajectories toward the totality of an unquestioned form of sovereignty that become known as the state. This unquestionable status of "stateness" is especially present in international relations as both the actual practices of state interactions and treaties regarding international relations among states (such as the law of the sea) assert the ***inviolability of a state with regard to its internal actions vis a vis other states.*** It was the backdrop of Leviathan that was likely the archetype for the monolithic notion of state that was developed in Marxian thought. While Marx saw the state mostly as a creation and functionary of the capitalist class, later thinkers, such as the structural Marxist Louis Althusser viewed the state as a more detached and totalizing force with the duty of directing and maintaining the social formation. The definition of state advanced by Max Weber, and often quoted, strongly conveys a notion of the unquestionable authority of the state as that entity which "upholds the claim to the monopoly of the legitimate use of physical force in the enforcement of its order" (Weber 1994). In Weber's view "the modern state is a compulsory association which organizes domination" (Weber 1994). The central question that can be posed to Weber is what constitutes "legitimate" in the justification for a monopoly on the use of force. Notably the concept of justice and equal treatment of citizens is not advanced as criteria to apply to the concept of "legitimate".

For Michel Foucault (1991, 2010), the state concept is treated as a somewhat taken-for-granted form as the mechanism which activates two essential practices which he conceptually advanced to characterize the channeling of human behaviors – governmentality and biopower. Foucault's governmentality is interested in the mechanics and practices of power (the state is but one location of power) and seeks to examine and describe both how mentalities are governed (possibly through

actions of the state) and how governments construct mechanisms to control their subjects. Biopower, even more directly depends upon the notion of state, as it is the central site of investigation into the regulation of bodies (reproduction, labor, movement) in a manner beneficial to the goals of those who are able to exercise power (Lemke 2001). Thus for both concepts, Foucault also depends upon a centralized vision from a state but does not contemplate how the directions for governmentality or biopower might be modified and by what means that might occur.

The investigation of the actual manner in which state practices are constructed and carried out by bureaucracies is now being given more detailed attention through investigations of actual practices and daily activities of bureaucrats as they behave towards constituents, superiors, and the procedures they are asked to carry out (Agamben 1998, 2005; Das 2004; Gupta 2012). These approaches portray a far more nuanced, partially random and often arbitrary picture of state practices seemingly at substantial odds with Foucauldian senses of authoritative direction or previous notions of state totality. Das (2004: 249) has observed "that it is part of the logic of the state that it constructs itself as an incomplete project, because there are always margins on which people have to be educated to become proper subjects of the state". But it is also evident from the materials that will be presented, that such "incompleteness" allows those who wield state authority and power to construct defensive responses when functioning is challenged. The nature of those responses will depend on the characteristics of the challenge that appear. Given these new characterizations and findings, the challenge becomes how to methodologically bring them into encounter to see in motion both the practice of the state and the construction of the state practices aimed at actualizing its ends.

A perspective to consider in conceptualizing the complexity of intertwined entities is that of Latour's actor-network theory (Latour 2005). Rather than the unified, coherent and self-interested entity or battlefield of competing interests where opposing groups and forces struggle for control of resources and power, ANT proposes a perspective and research strategy for the identification of non-causal connections that result from linkages between actors and actants which stand in a variety of undetermined relations potentially available for intervention (Latour 2005). Such loosely organized 'hybrid collectives' capable of constant reconfiguration and expansion have been termed assemblages. Fortun and Bernstein (1998: 110) created an image of the "Darwin-assemblage" with the form of a "living, moving, grasping lobster" (Fig. 10.1) to demonstrate how actor-network theory establishes linkages of vastly dissimilar phenomenon all traceable in some fashion to Darwin.

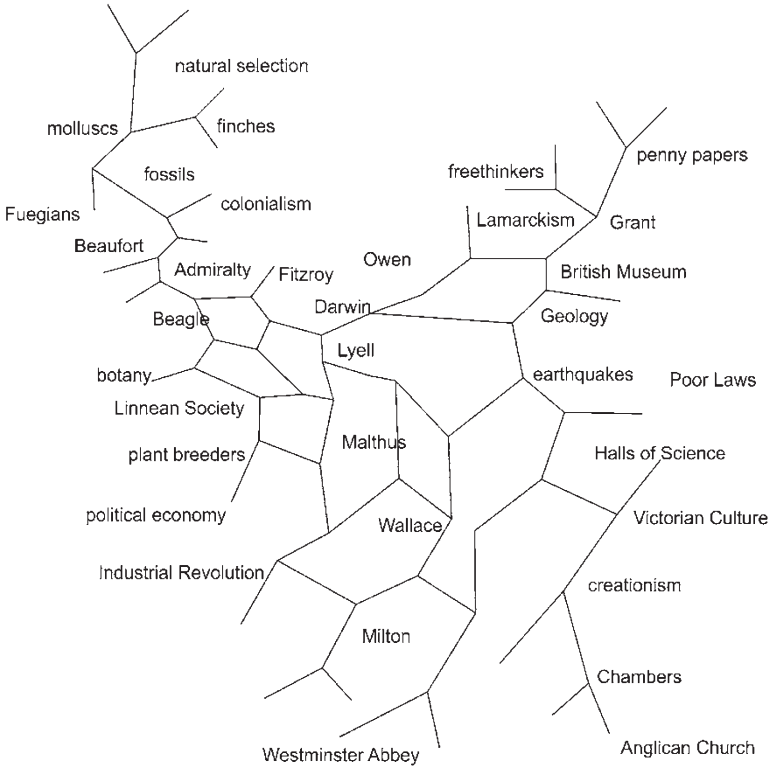

Fig. 10.1 The Darwin Assemblage (Source: Fortun and Bernstein 1998)

10.3 Approaching Leviathan – Constructing an Apparatus of Oceanic Control

The perspective advanced here builds on the more recent conceptualizations about the character of the state, the manner in which it functions and the phenomena that it gives rise to. First, it suggests that there are states (as political governments – Alaska, United States) who do assert the inviobility of their authority but they do not do so without justifications and claims of legitimacy. That is, there are state authorities who use state institutions to engage in governmentality (in both senses) and exercises in biopower – the enabling and disabling of specific members of their societies which can be aptly characterized as a form of "structural violence" (Farmer 2004, 2005). In addition, there are also a continuing stream of daily activities, mobilization of concepts, data, opinions and actions through which the state carries out its actions. At the same time, these phenomena take place in relation to discrete

people, in identifiable places and through discernible means. In this way the actor-network theory perspective is important as it offers a technique that can trace and link unexpected relationships (that may or may not be causal or significant) and bring to light salient connections that may have been overlooked. It is the view taken here that both aspects of Leviathan, as governance apparatus (governmentality) and as population impacts (biopower), need to be identified and described both to comprehend what is occurring and to potentially identify where the cracks for potential penetration might be positioned.

The creation of a hybrid Leviathan of propertied fishery rights along Neoliberal principles includes a networked assemblage of relationships between the following elements each of which operate to keep Leviathan functional. The assemblage consists of relationships among the following elements:

- Political and legal practitioners (politicians, bureaucrats, lawyers) – using the framework of constitution, enacting defensible laws, developing regulations, implementing procedures for practices and monitoring impacts;
- Resource managers (scientists and biologists) – marshalling the canons of science to establish and defend sources of data and their interpretation, mostly at the direction of state agents;
- Permitted fishermen (persons) – awarded parties who meet the qualifying criteria or acquire a fishing permit either by transfer or purchase;
- Processors (business owners) – large corporate firms who purchase catches from the permitted fishermen and transform them into commodities for sale to consumers;
- Banks and financial institutions (capitalists) – mobilizing capital and offering it to fishermen who wish to purchase permits or quotas on which they are able to charge interest and make earnings;
- Policing agents (enforcement personnel) – authorized state personnel who arrest fishermen who do not have permits or ITQs but are actively catching species and attempting to sell them.

It appears that the establishment of rights of property through permits or quotas is of overriding consequence to the process of merging the powerful financial sector into the oceanic Leviathan. Once the combination of property rights, and most especially provisions allowing leasing of permits or quotas, become fused with the banking sector, Leviathan's power will no doubt increase enormously. Pinkerton and Edwards (2009) have shown how leases of halibut quota in British Columbia have led to enormous deflection of earnings from actual fishermen and resulted in substantial transaction costs that compromise the efficiency claims for the system. Similarly, Edwards' (2013) analysis of the British Columbia groundfish quota program found that a monstrous 64% of catch value went to lease fees with the effect of greatly reducing the earnings of the fishermen who actually caught the fish.

Financial concerns have become strongly interested in the halibut and sablefish quota system because of the ability to make substantial profits from participants

through loans of various kinds. In a recent blog, an officer of a major bank extolled the glory of ITQs with the following praise:

> […] from a lender's perspective, transferrable and assignable fishing rights have provided tremendous economic benefits to fishermen and the industry. The fishing rights are recognized as valuable assets by lenders in Alaska and worldwide. From this lender's perspective, fishery rationalization, including transferrable fishing rights, has added tremendous economic value to the Alaska fishing industry. (Mazzeo 2012)

When this message is realized on Wall Street and translated to Congress, the current impasse on extending property principles to other US fisheries may be short lived.

10.4 Context: Communities, Environments and Foregone Harvests

Indigenous communities located on the shores of the Gulf of Alaska region of the north Pacific Ocean depended upon and sustained themselves on fish and other marine resources from nearby waters for many millennia prior to the arrival of Russian and American colonialists in the eighteenth and nineteenth centuries. In the southeastern Alaska area of the region, these patterns of utilization can be traced back over 8000 years with the historic Tlingit and Haida populations encountered by the first European explorers providing salmon and halibut products in exchange for metals and other manufactures (Moss 2011; Olson 2002). Sophisticated and sustainable systems of salmon harvesting were displaced and outlawed by US laws in the late 19th when communal fisheries of the indigenous people were penetrated by commercial salmon canning industries that entered under the policies of the United States without regard to the rights and uses of indigenous residents. Similar practices and outcomes characterized the experiences of coastal Native peoples in British Columbia as well during this period (Harris 2004). Indigenous residents found various ways of participating in some of the commercial fishing industries which became the monetary foundations for their emergent mixed economies (Langdon 1990). By the 1970s, the introduced "open access" principles of access to salmon and halibut resources proved problematic to sustaining resources and fishermen's livelihoods. A literature derived from resource economics developed in the 1960s argued that effort limitation (now termed limited access privilege programs – LAPP) was necessary for ecological (stock protection) and economic (rent dissipation) reasons (Crutchfield and Pontecorvo 1969). The notion of entry limitation in commercial fisheries does not necessarily implicate transferable property rights but the ideological preference for such systems, without regard to fundamental structural characteristics, and impacts on the diverse range of communities and fishermen, were strongly pushed by the resource economists.

The first LAPPs for salmon in Alaska were implemented in 1975 with the allocation of permits to qualifying individuals who met certain participatory and eco-

nomic criteria (Shriver et al. 2014). Upon award, the permits became available for transfer (with or without charge) but could not be used as collateral or foreclosed upon. They were conceived of as "privileges" created by the State of Alaska which undertook the development of loan programs for Alaska residents to assist in the sale/purchase of the permits. By 1985, less than 5 years after limitation, two studies demonstrated that in virtually all of the salmon permitted fisheries in the Gulf of Alaska and Bristol Bay regions, where Native fishermen live primarily in rural communities, a significant number of permits had left Native hands primarily due to sales to non-Native fishermen (Kamali 1984; Langdon 1980).

Following federal creation and award of halibut and sablefish ITQs in 1995, a similar pattern to that of Alaskan salmon limited entry permits took place. Alaska Native fishermen in rural villages quickly sold their shares, typically to non-Native fishermen in larger Alaskan fishing communities or to Seattle-based fishermen. This "permit drain" bled the communities of further employment and income earning opportunities such that by 2001, nearly a 30% decline in the holdings of rural Native fishermen's initial ITQs had occurred (Carothers et al. 2010). In 2000, Leviathan was approached about the problems of impact and equity of halibut and sablefish ITQs in regard to rural Alaskan fishermen. The failure of the program to comply with national standard 8 added to Magnuson Stevens Fishery Management Act in 1998 that required management measures insure "sustained participation of" fishing communities and "[…] minimize adverse economic impacts on such communities" was cited as a basis for making significant changes in the program to address the serious inequities that were apparent. What such changes might be was a matter for considerable debate among the affected parties but eventually a proposal for the creation of a community-based program for acquiring and fishing ITQs for the rural villages was sent to the North Pacific Fishery Management Council (NPFMC). Details of the outcome of that initiative and its subsequent development can be found in Langdon (2008) and Carothers (2011).

The recent history of the impacts of creating property rights-based access to commercial fishing on the small, rural, indigenous villages of Alaska has resulted in serious problems. The approach to the federal Leviathan resulted in programmatic change but the results have been minimal. What follows is an account of an effort to find an interstice into which a small program, of little consequence financially or biologically, might be able to find a place.

10.5 Approaching Leviathan – Proposing to Investigate the Possibility of a Small-Scale Salmon Fishery

In 2009, with the support of the city councils and tribes of the village of Hydaburg and the city council of the village of Hoonah, a proposal was developed to conduct research on the possibility of small-scale salmon beach seine fisheries that would harvest available surpluses (numbers in substantial excess of escapement goals) of

specific stocks from stream mouths near to the home communities. The proposal was submitted to the Alaska Sea Grant Program, a federally sponsored research program of the National Oceanic and Atmospheric Agency (NOAA) run by the University of Alaska, whose mission included the support of research to assist in the promotion of sustainable coastal development. The criteria used to evaluate and rate Sea Grant proposals were as follows:

> **EVALUATION CRITERIA:**
> **SCIENTIFIC/INTELLECTUAL MERIT**
> Is the proposal scientifically or intellectually sound? Does it address a scientifically viable problem? Is the proposed methodology sound and likely to lead to a well-supported conclusion?
> Is the proposal creative and/or innovative?
> Does it focus on the ***environmental and economic viability of Alaska's coastal communities?*** (Emphasis mine)
> How well does the proposal address one of the following themes?
> *1. Impacts on and adaptation strategies for coastal ecosystems and/or coastal communities from environmental change, especially in relation to climate change or human activity on various scales.*
> *2. Improvements to the economic viability of Alaskan coastal communities through innovation in marketing, processing, safety or other means of adding to the value of local resources.*

The proposal was crafted to be creative, innovative, focus on the economic conditions of Alaska's small, coastal communities and identify "improvements to the economic viability of Alaskan coastal communities through innovation in…other means of adding to the value of local resources". The research proposal addressed the clear need for income earnings opportunities in the small, predominantly Alaska Native villages of southeast Alaska, clearly a contribution to "economic viability". The communities of Hoonah and Hydaburg were chosen due to my close working relationships with community governance institutions, elders and local experts in each community resulting from studies of salmon traditional ecological knowledge (Langdon 2006, 2009). Elders and experts hold substantial working knowledge of local salmon streams and salmon behavior patterns in their traditional tribal areas as well as acquired principles of traditional ecological knowledge concerning utilization of salmon. Indigenous fishery experts have maintained ongoing working knowledge of the streams of their respective areas through sustained subsistence salmon harvesting, deer hunting and other activities that regularly take them to various parts of their traditional territories. In the course of these activities, they have observed that contemporary salmon management practices of Alaska Department of Fish and Game (ADF&G) often result in large surpluses of salmon returning to streams as the result of the timing and location of the directed commercial harvests of salmon by commercial purse seine vessels. Runs to certain streams are not harvested and constitute foregone harvests when substantial surpluses materialize at certain streams.

Hoonah is the primary village of the traditional tribal grouping of the Tlingit of the Icy Strait region of northern southeast Alaska. The traditional territory of the

Hoonah Tlingit, known as *Huna Kaawu* (local terminology for regional designation of *kwaan*), encompasses waters and lands from the Gulf of Alaska to Chatham Strait, including the waters of Cross Sound, Icy Strait, Glacier Bay, Port Frederick, Excursion Inlet and smaller bays (Goldschmidt and Haas 1998). The traditional territory is approximately 100 km east to west and between 120 and 150 km from north to south. This traditional territory corresponds to a substantial degree with current ADF&G salmon biological management areas 114 and 116 (Davidson et al. 2013). Contemporary Huna Tlingit commercial and subsistence fishermen are intimately familiar with the salmon streams of Icy Strait, Glacier Bay and Excursion Inlet due to harvesting activities in these areas throughout their lives. The designated area of ADF&G management of northern southeastern stocks has closed Icy Strait to virtually all commercial purse seine fishing west of Hoonah in order to allow stocks headed for streams to the east to move closer to their spawning streams (Davidson et al. 2013). This has resulted in little or no commercial harvesting of salmon that spawn in the streams to the west of Port Frederick.

ADF&G anadromous stream inventories indicate there are, in total, approximately 155 streams of various sizes supporting salmon systems with pink and chum as well as other species mixes in districts 114 and 116 (Johnson et al. 2004). ADF&G has established only one index stream to provide an assessment of run strength for the entirety of the 130 streams in the area of district 114 corresponding to traditional *Huna kaawu* territory (Johnson et al. 2004).The target range of escapement for the stream is 30–70,000 salmon, and the annual estimate is based on a flyover observation of a "peak count" (Davidson et al. 2013). Over the 10-year period from 2003 to 2012, the target range for this stream was met in 5 years and exceeded in 7 years (Davidson et al. 2013). The target range for pink salmon escapement for all of the streams of the northern southeast Pacific coast sub-region from 1995 to 2012 was met in 11 years, exceeded in 5 years and never not achieved (Davidson et al. 2013). In one year, the estimated escapement was more than double the upper limit of the target range (Davidson et al. 2013).

These two factors, escapements levels regularly exceeding target ranges and no commercial harvests occurring, provides clear evidence for the possibility for the development of a small-scale, skiff-based commercial beach seine fishery in the waters of the Icy Strait region in proximity to Hoonah.

Hydaburg is the sole village of the *K'iis Xaadas.* The traditional territory of the Hydaburg Haida *K'iis Xaadas* lies on the southwest side of the Prince of Wales Archipelago extending from Dixon Entrance to Tlevak Narrows, including the west coast of Dall Island and Forrester Island, in the Gulf of Alaska (Langdon 2009). The traditional territory is approximately 80 km north to south and 53 km east to west. K'iis Xaadas traditional territory corresponds to a substantial degree with current ADF&G salmon biological management subareas a, b, and c of district 103 and the portion of district 104 corresponding to the outer coast of Dall Island (Edgington et al. 1981).

District 103 can be characterized as a combination of a complex, insular topography of bays and inlets which shelters numerous small to medium producing sys-

tems from proximate harvest. Shallow waters in the proximity of major producing systems (notably Nutkwa and Hydaburg Creek) result in substantial under harvesting of these streams on years when returns are high. Hydaburg subsistence fishermen actively purse sockeye salmon in such streams as Hetta, Eek and Hunter's Bay. In conducting those fisheries, Hydaburg residents regularly observe streams where large surpluses of pink and chum salmon that have escaped harvest by the larger purse seine vessels occur which result in foregone harvests.

The opening of district 3 for commercial purse seine harvests is intermittent but regular and is based on an apparent ADF&G management principle of allowing stocks to build up and pass through followed by another pulse of concentration, harvest and pass through. This pattern of regular and intermittent fishing leaves large sections of the district without fishing effort. These harvest management practices pay no attention to variations in run timing and concentrations, thus making possible the pass through of large surpluses for certain streams during the season and after the cessation of commercial harvests by the permitted purse seine fleet.

ADF&G salmon management has established two streams as indices for district escapements one of which, Hetta, has a weir that is operated by the Haida tribe, the Hydaburg Cooperative Association (Davidson et al. 2013). Hetta is the most important stream for subsistence harvests of sockeye salmon for the community and is well-monitored by Hydaburg subsistence fishermen. The target range for escapement combined for the two streams is 430,000 to 1.15 million fish (Davidson et al. 2013). Over the 10-year period from 2003 to 2012, the escapement target range was never missed for both stream and was exceeded on three occasions for Hetta and two occasions for the other stream (Davidson et al. 2013). The target range for pink salmon escapement for all of the streams of district 103 and for the southern southeast sub-region from 1995 to 2012 was met in 11 years, exceeded in 6 years and never not achieved (Davidson et al. 2013). In one year, the estimated escapement was more than 50% greater than the upper limit of the target range (Davidson et al. 2013).

These two factors, escapements levels regularly exceeding target ranges and the temporal and spatial gaps in commercial harvest periods, provide clear evidence for the possibility for the development of a small-scale, skiff-based commercial beach seine fishery in the waters of the southwestern Prince of Wales Archipelago in proximity to Hydaburg.

On the basis of the foregoing information a research proposal was drafted with the following objectives:

1. Evaluate ADF&G management literature on stream escapements in the traditional territories of the Huna Tlingit and Kaigani Haida to identify streams with foregone harvests in the past 20 years.
2. Obtain information from knowledgeable local experts about recent observations of surpluses resulting in foregone harvests in streams in the traditional territory.

3. Conduct field investigations of identified streams during the identified period of annual salmon return and record conditions using digital video technology.
4. Identify possible harvest locations in the vicinity of streams that could be used by small scale technologies.
5. Examine lower portions of productive stream to determine locations of "ish" (large deep pools) which can be used as index sites based on traditional ecological principles to allow for harvests.
6. Integrate information into databases developed for streams that will allow for summative presentation of information on possible harvest levels and values from these fisheries.
7. Conduct interviews with ADF&G salmon management personnel concerning their observations and the findings of the field investigations.
8. Interview local processors concerning the possible purchase of salmon from these areas and possible small scale fisheries developed to harvest them.
9. Prepare annual research summaries and a final report on research findings that will be presented to local governmental organizations and to regional organizations if findings warrant such dissemination.
10. Work with Alaska Sea Grant agents to disseminate research findings to appropriate regional bodies (such as Central Council of Tlingit and Haida Indian Tribes of Alaska and the Gulf of Alaska Coastal Communities Coalition) if so warranted and desired by Sea Grant.

In addition, the following set of hypotheses were offered:

The basic hypotheses to be evaluated (as opposed to tested) in the proposed research are:
1. that there are foregone harvests of surplus salmon in a number of streams in the traditional territories of the Huna Tlingit and Kaigani Haida of Hydaburg that are the result of ADF&G management practices;
2. that there are sufficient units of small scale subsistence technologies and personnel available to harvest these foregone surpluses;
3. that such harvests can be undertaken using traditional principles of ecological knowledge to determine when such harvests are possible, and
4. that such harvests can either be sold to local processors or other uses including local consumption developed for salmon taken by such fisheries.

The proposal was not funded in 2009 and the Sea Grant Director provided me with the following review panel commentary: "The panel felt that to be successful it should incorporate available information from ADF&G. It was also recommended that a working partnership be established with a biologist from ADF&G" (Director to Langdon 4/27/2009 – accessed 7/7/2013).

The next round of proposals for Sea Grant was solicited in late 2010 and a new proposal was begun. As part of the proposal development, I approached the Deputy Director of the commercial fisheries division of the Alaska Department of Fish and Game requesting ADF&G staff involvement in the proposal. My intent was (1) to meet the Sea Grant recommendation if possible and, if not possible, (2) to be able to get them to go on record with a letter in order to document their unwillingness to participate in the research project. The Sea Grant proposal from the previous round

was sent to the Deputy Director who looked at the proposal and replied with the following message:

> **From:** Deputy Director (ADF&G)
> **Sent:** Monday, January 17, 2011 3:02 PM
> **To:** Langdon, Stephen J.
> **Subject:** RE: Request for involvement in Sea Grant proposal
> Steve, we appreciate the opportunity to review your proposal to Sea Grant. If I understand you correctly, the proposal seems to assess feasibility for commercial salmon fisheries to occur outside of the current limited entry fishery and would rely on anecdotal information, not actual or indexed counts of fish, a much more developed proposal than that provided here, to say nothing of an evaluation of the legal ramifications of even attempting such a fishery.
> We currently just don't have the resources to do all the work we feel would be beneficial and appropriate for the fisheries we already manage. It would be very difficult for me to justify asking staff to spend time of en [sic] effort that may well never pass legal muster, much less be biologically defensible.
> Please don't hesitate to contact me if I can be of further assistance.
>
> Deputy Director
> Division of Commercial Fisheries
> Alaska Department of Fish and Game
> PO Box 115526
> Juneau, AK 99811-5526

I will not undertake a close reading deconstruction of this response. Instead, I note the Deputy Director's failure to recognize that the proposal was (1) for exploratory, pilot research about potentially unharvested stocks (2) was not a full proposal for establishment of a new fishery "outside the current limited entry fishery" and (3) closed with total rejection of any possible involvement by ADF&G in the research. Note as well the classic use of "anecdotal" as a characterization to dismiss local expertise as to be without scientific reliability or validity and therefore not credible.

In response to this message, I sent her the following reply:

> **From:** Langdon, Stephen J.
> **Sent:** Tuesday, January 18, 2011 5:37 AM
> **To:** Deputy Director (DFG)
> **Subject:** RE: Request for involvement in Sea Grant proposal
> Dear Deputy Director,
> Thank you for taking the time to consider the proposed research. While I understand your point about the lack of staff, I would note that this is an assessment, a pilot project, the findings from which may make it possible to address your two issues: 1) "indexed counts" (implying a methodology) and 2) legal fishery. I don't regard observational data of salmon abundance in streams and waters near the mouths as "anecdotal." If that were the case, anything other than a weir count would be anecdotal and certainly aerial observations are considerably less accurate. Test fishing can also be considered anecdotal and a similar type of testing using beach seines could be developed as a methodology.
> Would you be amenable to writing a letter indicating that you have reviewed the concept and have no staff time or funds to apply to it? It would be appropriate to add that you understand that it is a feasibility study, findings from which would determine if further consideration was warranted. I would hope that ADF&G would be open enough to the consideration of new salmon fisheries where there were foregone harvests that could benefit local communities...

In response to my reply, the Deputy Director informed me that as a "courtesy" she had forwarded my request for comment and a letter to the Commissioner's office. The Commissioner's office (under the Deputy Director's signature) replied to my inquiry and request as follows:

> **From:** Deputy Director (ADF&G)
> **Sent:** Sunday, January 30, 2011 2:43 PM
> **To:** Langdon, Stephen J.
> **Cc:** Commissioner (ADF&G)
> **Subject:** RE: Request for involvement in Sea Grant proposal
> Steve, the following are issues identified by the commissioner's office relative to the proposal you sent seeking department support of. Considering the following in such a proposal is appropriate, even for a feasibility project.

- It is not clear what might be intended by a "community fishery". What privileges would be created and who would qualify for the class that might exercise those privileges? If residents of a community are intended class of beneficiaries, then the holding in McDowell that the Alaska Constitution does not allow subsistence harvest privileges to be based on place of residence may apply.
- Establishing a new commercial salmon fishery may require action by the Board of Fisheries, Commercial Fisheries Entry Commission, or perhaps the Alaska Legislature.
- Precision: observation as a basis for enumerating salmon is very subjective. Where the department uses this method either by foot survey or aerial counts, we seek an independent means of verifying and standardizing the counts including controlling for individual observer bias.
- The need for precision and accuracy for a population survey is compounded for a terminal commercial fishery due to the potential for overharvest.
- We note that surveying escapement near the mouth of a stream is further complicated by the tendency of salmon from varied populations to travel together, going as far, in some cases, as to probe a stream other than the natal watercourse. How would the researcher propose to distinguish actual from apparent escapement using visual observation at the mouth of a steam? Parallel mark recapture? Weir?

> It should be noted that the department is neutral on questions regarding the allocation of fishery resources. Creation of a new commercial fishery likely has implications for allocation. As such, it is not appropriate for the department to advocate either for or against it. As noted above, it may be necessary to pursue the matter with the Board of Fisheries or the Commercial Fisheries Entry Commission.

Finally, in response to my request for a letter stipulating reasons for ADF&G's refusal to participate in the research, the Deputy Director stated that she "wanted to let you know now that a letter will not be forthcoming from the department" (Deputy Director to Langdon, email, January 23, 2011).

It is evident in these exchanges that the regulatory bureaucrats, of biological and legal backgrounds, chose to read and construe the proposal in concepts and language which they were then able to reject based on operating principles of their agency practices. For example, it is asserted that my request was for "support" of the proposal when in fact it was only a request for their participation in a coopera-

tive partner fashion. Another device, the inclusion of a non-sequitur, that is "neutrality" on issues of allocation of fishery resources is not germane as the proposal in no way suggests that ADF&G become an "advocate" for a new fishery.

In the five bullets and closing paragraph, two forms of reconstruing of the contents of the proposal are apparent. In bullets one and two and the closing paragraph, the department's comments focus on the potential nature of such a fishery in a political/legal context even though no fishery proposal was offered and any such proposal for a new fishery would have to come after conducting the research, meeting the objectives laid out and evaluating the hypotheses advanced. Thus, rejection of involvement is precluded because the proposal is construed as stipulating legally objectionable institutions, such as "communities" and could eventually require that requests be made before the Board of Fish, the Commercial Fisheries Entry Commission and the Legislature although none of these actions are even discussed in the proposal.

In bullets three through five, comments focus on the biological issues associated with salmon behavior and accuracy of assessment methods. There is a taken-for-granted-ness that ADF&G's methods of biological stock assessment cannot be replicated and that other methods are not worthy of exploration. Even when the question is broached about possible techniques for assessing stock abundance, the methods proposed – mark recapture or weir counts – have their own substantial problems but, more importantly, are financially prohibitive thereby nullifying the possibility of participation in the project.

This engagement and exchange of emails is an example of the interface of two elements of the contemporary Leviathan of commercial fisheries in Alaska – the biological and the legal both housed in the regulatory sector of the State of Alaska which provides key parameters under which the bureaucrats are expected to operate. There is no suggestion of any form of cooperation or further exploration of ideas. There is instead blanket refusal to participate. The argumentation also rests on the scientific research element's declared need for the blessing of the regulatory sector and this demonstrates the alignment and intertwining of these interests. Following the email from the Commissioner's Office, I decided further discussion would be unproductive and that submission of a revised Sea Grant proposal without even a letter from ADF&G stipulating reasons for their non-participation would be a waste of time.

10.6 Conclusion

The Neoliberal Leviathan assemblage of state (meaning state and federal) control over fisheries management through the creation of private property rights which limit access, is capable of being and eventually driven by the financial sector and is still under construction. This paper has presented an outline of the composition and construction of the integrated elements of an apparatus, an assemblage of actors, concepts, practice, and connections that are approaching Leviathan. An

examination of the concepts, the form of their logic and their application by a scientific administrator (Director, Sea Grant), a research bureaucrat (Deputy Director, ADF&G) and a lawyer (Commissioner, ADF&G) provided a case study of the outcome of approaching Leviathan from an external location associated with little power or leverage with the intent of creating a new space for a rural, small-scale community based, commercial fishery for indigenous villagers deeply harmed by Neoliberal fisheries policies. Despite this specific failure, there have been other approaches that have had some limited success, as was discussed earlier. The construction of Leviathan has not ended but the indicators are not promising that the gross inequalities and inequities created will be addressed and remedied in any serious fashion. This is especially true for the indigenous inhabitants of small villages on the Gulf of Alaska who face Leviathan.

This case study highlights a special instance of application of Neoliberal fisheries rights policies within a discrete marine space where resource rights are narrowly limited and apportioned to be managed by an elite scientific bureaucracy utilizing statistical models.

It is an example of what Johnsen and Jentoft (2017) note is an emergent "hegemonic-bureaucracy science" – a discourse limited only to its components and methods thereby rendering itself impervious to legal challenge and distributional or equity claims.

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Part V
Group Velocity

Chapter 11
Conclusion: Surveying the Wake

Gordon M. Winder

Abstract This chapter summarizes the findings of our studies of bio-economic rationalizations that have occurred in the wake of the individual transferable quota (ITQ) regimes. It argues that despite the different approaches and perspectives used to understand regimes based on fish stock assessments and catch share arrangements, and despite the diverse contexts for such regimes, some general findings are possible. These are discussed in terms of key issues in assessments of ITQ regimes, namely the prevention of overfishing, the fair allocation of fishing rights, making fishers into responsible, self-managing actors, the creation of well-functioning markets, and whether the ITQ regimes were social or environmental projects. It concludes with comments about future directions for research.

Keywords Environmental project • Fair allocation • Functioning markets • Overfishing • Responsible fishers • Social project

11.1 Group Velocity?

Group velocity refers to the fact that the wake of a vessel travels through the water at a consistent speed. Here the term is used to raise the question of whether the study of fish stock assessments and catch shares from diverse perspectives and in diverse contexts can show consistent or general findings. I argue that despite the different approaches and perspectives used by the authors of the previous chapters to understand quota management and ITQ, and despite the diverse contexts in which such schemes have been studied some general findings are possible. The chapter discusses collective findings related to key issues in assessments of fish stock assessments and catch share regimes, namely the prevention of overfishing, the fair allocation of fishing privileges, making fishers into responsible, self-managing actors, the creation of well-functioning markets, the openness of the regime to new entrants, and unresolved or unexpected outcomes. These issues are discussed but

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under the general questioning of whether ITQ can be understood as an effective industrial, social, political, environmental or management project. First the matters of how we have dealt with multiple perspectives and diverse contexts are discussed: what are the limitations and achievements of this book?

11.2 Diverse Contexts, Multiple Perspectives

It was a premise of this book that ITQ regimes backed by fisheries stock assessments are not the same everywhere: they have specific histories and content in each context, and that context matters in each case. This idea is substantiated in each of the contributions. For example, where Iceland's stock assessment program covers five species, New Zealand's covers over 90. Where Norway's system works to safeguard regional fisheries economies New Zealand's does not. Where New Zealand's ITQ system does not segment the fleet into small and large vessel classes, the Icelandic, Danish, German, Swedish and Norwegian systems do, and moreover, in some of these jurisdictions further constraints on the tradability of quota are imposed by insisting that quota is tied to a vessel or that quota and vessels remain tied to a particular region. Whereas in Iceland and Norway there has been contestation and politics over the need to prevent the rationalization of large numbers of small-scale fishers, in New Zealand such a rationalization of the few small-scale commercial fishers was rapidly achieved but the regime is now locked into contestation and politics concerning the rationalization of recreational fishers. Where Emilie Mariat-Roy finds that in Iceland the ITQ system constitutes a homemade and unstable resource management system constantly adapted to social demand, I describe the QMS/ITQ regime in New Zealand as not only stable over time, but stable despite changing social expectations since Māori rights have wherever possible been granted within the system rather than outside it. I further argued that this stable regime has been gradually augmented by additional fisheries regulations. In contrast, Madeleine Bonow notes that Swedish fisheries management is moving toward an ITQ regime as a result of the Swedish government and the European Commission both finding evidence of persistent overcapacity in the fleet and that few fleet segments have a level of income that can provide acceptable wages and scope for investment. However, this project remains a work in progress in Sweden. Each jurisdiction must therefore be seen as a special context for ITQ development, each has not only special challenges for fisheries management but also its own politics and social issues. This is not the same regime everywhere.

The book's contributing authors hail from different disciplines and this shows through in their different perspectives, methodologies and approaches. Where the economists asked about the intergenerational fairness of ITQ allocation systems, the anthropologist Steve Langdon questioned the fairness of the regime towards outsider knowledge and expertise. Emilie Mariat-Roy's interest is in how public authorities and stakeholders interacted over Iceland's ITQ system as they worked to reshape and re-define it in various contexts. She notes the efforts in Iceland to

rebuild coastal communities and to produce consensus and national unity. As an economic geographer I placed New Zealand's QMS/ITQ in geographic perspective and considered its environmental and economic claims from a political economy perspective. My colleagues from Sweden and Norway conducted analyses of policy effects in geographic, social, political economy and political ecology terms. Thus Jahn Petter Johnsen and Svein Jentoft view the Norwegian fisheries quota system as marked by evolution driven by multiple stakeholders and shifting governments in a highly political process. One historian researched and interpreted the origins and development of fisheries stock assessments, another the historical experience of quota management in a regional fishery, and the third interpreted firm behavior in part of the German seafood industry. Together we bring a range of perspectives to bear on the problem of assessing ITQ regimes 40 years on.

11.3 Assessing ITQ Regimes

Independently, the contributing authors found that ITQ regimes are neoliberal projects and are designed to effect rationalizations of the fisheries. Contributors to this book show that, in each case, the ITQ project had at its core a rationalization project, and this resonates with proponents of ITQ who proclaim a model market, in fisheries quota. However, it is well to be aware that this is not the same model everywhere. Each ITQ system is nested within a broader regime of regulation so it is proper to think of each as only one facet of an ITQ regime, and an ITQ regime related to industrial, regional, cultural, and social policies, rather than simply as example of an ITQ market model. Each project has been limited and constrained by other government planning priorities. Thus, when considering market fairness and market effects, our contributors have paid careful attention to contending policy priorities in limiting the rationalization that is expected from establishing a "free" market in ITQ. The need to protect small-scale fisheries, regional economies, and indigenous peoples from market concentration and rationalization effects are concerns that have led to the modification of ITQ systems. We choose different ways to express this and in doing so reveal further insights and issues related to the regimes.

Generally, we agree that these regimes are powerful: they enable a narrowly constructed protocol for how to register and measure the efficiencies and benefits of the fisheries stock assessment system, and legitimate a range of rationalization projects at work on fisheries. Some of us have opted to engage facets of the regimes in particular jurisdictions on their own terms. Others engage ITQ on terms alien to the regime, as for instance Steve Langdon did when he considered an approach from outside the system to secure new rights. Far from producing disparate accounts, such perspectives allow us to triangulate our combined inquiries. In turn, they converge and diverge over interpretation of five aspects of the regimes: effects on industry efficiency; in what sense they are political projects; how these are social projects; how can we assess them as management systems; in what sense are these successful environmental projects.

11.4 Efficiency

For economists well-functioning markets should induce capital-intensification, which should result in increased efficiency in the fleet, higher profitability and efficiency in the industry, increased value added, and so on. Now, this may seem surprising, since resource economists have long argued that ITQ is necessary in order to end the race for fish, that is overcapitalization in the fishery in the form of investment in too many boats. However, ITQ is meant to encourage owners of quota access privileges to realize profits on their assets. This means that they are expected to reduce fishing and processing costs, to increase efficiency in harvesting, and therefore to reduce the size of the fleet. They are likely to seek out cheap labor, and to invest in mechanization, automation and in larger and more efficient boats and processing plants. As owners of fisheries access privileges they will seek out the best returns on their investments, and this can and should mean the sale of inefficient vessels and the dismantling of inefficient processing facilities, if less costly, more profitable alternatives are available.

The contributing authors find that the projects have had mixed results in terms of improved "efficiency". ITQ regimes have not simply produced the expected results of fleet capacity reduction, efficiency gains in the industry, and more competitive fisheries industries. When they have, these have often been only short-term gains, or have involved reductions in the number of fishing vessels but, because of other factors, poor efficiency gains in the seafood industry as a whole. Financial crisis, changing exchange rates, indebtedness, and fish stock collapses have cut across the prospects for efficiency gains in some of our cases. In other cases, authors point to political priorities that frustrate reduction in fleet capacity. Several authors offer critiques of or warnings about what measures are used to know "efficiency" and how these can mask other tendencies in the industry. Catching the same number of fish with fewer vessels is only 'efficient' under particular assumptions write Katharina Jantzen, Ralf Döring, Layre Goti and Lorena Fricke. Examples are presented of firms apparently reducing fleet capacity but in fact transferring their operations to other jurisdictions, or to newly "discovered" fish species within the national fisheries. Firms expect to grow and work hard to overcome market constraints. While the limitation of catch and the allocation of quota rights may be important steps in making fisheries more sustainable, other measures will be required, along with vigilance and monitoring, if seafood industries are to be developed and grown while keeping the harvest at sustainable levels. For firms and governments, ITQs do not automatically dissolve the tensions between the imposition of catch limits on the one hand and the desire for economic growth, profitability and efficiency on the other. Critically, Carmel Finley doubts whether a fishery, which is necessarily based on a fluctuating resource, can be at all 'efficient' and so questions efficiency as a social goal in fisheries.

Ingo Heidbrink reminds us of the important roles that consumers and the processing industry can play in fisheries management schemes. In his specific case of German Cold War fish processing companies, he shows how poor consumer

knowledge about marine species combined with sophisticated advertising and marketing to enable firms to avoid or minimize the effects of fisheries management on their businesses. German fish-finger processing companies circumvented the introduction of effective fisheries management systems by simply fishing down the line, shifting from species to species and from sea to sea. In other words, for sustainable fisheries management, consumer awareness and action plus production chain transparency are needed. The importance of certification schemes and of careful regulation and policing of consumption is an important ancillary facet of fisheries management.

Madeleine Bonow reports that ITQ induced a sharp reduction of Sweden's pelagic fleet between 2009 and 2014. It appears that this pelagic fishery is now more profitable than before, employs a reduced amount of black money and is perhaps fishing in a more environmentally sustainable manner. Spatial and corporate concentration are occurring within the Swedish pelagic fishery. However, she also identifies problems. Fishers complain of having no options to deal with by-catch, a problem exacerbated by the failure to organize all of the catch fisheries under ITQ, and by the first mover advantages and forms of concentration and expansion that it stimulated in the pelagic fisheries. Recruitment of young fishers into the industry has been hindered. Here the issues seem to stem from the compartmentalized approach to fish stocks and fisheries industry segments taken in Sweden and from the piece-meal and recent introduction of these regulations.

Katharina Jantzen, Ralf Döring, Leyre Goti and Lorena Fricke assess inter- and intra-generational fairness in the distribution of access rights under two IQ regimes, those of Germany and Denmark, each of which runs a system of vessel quotas with the fleet separated into segments to be managed separately. In each jurisdiction quota have been introduced to effect a transition from open access and licenses with no catch limitations to a system with quota limitations and individual quotas. From their analysis of the initial allocation of quota shares, changes in fleet structure and the implications for newcomers in the fishing industry they find that the Danish system has helped to stabilize the fisheries labour force and to support the small scale fisheries sector, and includes special mechanisms to recruit young fishers and to prevent the potential over allocation of quota shares. They conclude that the Danish quota management system has elements for a just and economic efficient regulatory system for sustainable fisheries. In contrast, the German vessel quota management system shows elements of a just allocation system from the perspective of intra-generational justice, along with no signs of undesired quota concentration or unjustly concentrated quota pools. However, the German system compels newcomers to buy vessels and they are not allowed to trade the quota share, thus forcing them to accept a high level of investment risk. They therefore find that both systems show signs of a fair distribution process, but offer two cautionary notes. When quota owners are allowed to lease quota, high lease prices may result and there is no automatic buy out of the least efficient vessels (Pinkerton and Edwards 2009: 712). Action will be needed to ensure the survival of the small scale fishing sector since this will be threatened by the rationalization of quotas to the most efficient vessels and those with more capital.

Both in Sweden and New Zealand some fishing companies have transferred their fishing capabilities to other jurisdictions where they face fewer constraints. Fishing companies have continued to demonstrate unsustainable behavior in the face of resource constraints. Madeleine Bonow reports that fishers displaced from Sweden's pelagic fisheries have shifted their efforts into coastal demersal fishing or overseas fisheries, or have sold boats to owners who are now active in cod fishing or in the shrimp fishery. As a result, there is now overcapacity, poor profitability, and catch dumping in the Swedish shrimp and Baltic Sea cod fisheries. Worse, Swedish fishing effort is being displaced internationally into fishing off the coast of Western Sahara, or by establishing fishing companies or operating Swedish vessels under foreign flags or purchasing boats in such countries as Morocco, Comoros, the Cook Islands or Belize. In these ways, the as yet partial introduction of ITQ has actually prolonged and redistributed the effects of decades of subsidies to grow the fleet capacity in Sweden. Hers is a story of limited gains and unintended effects.

In New Zealand assessments of the QMS/ITQ regime have switched from largely positive – the regime had effectively dealt with issues of allocation, equity and industrial performance, the fisheries were well managed, and the policies resulted in economic growth – to more skeptical reports. In particular, the regime is seen to be no longer delivering expected economic results. The fisheries sector has fallen into stagnation and is now underperforming in economic terms. Companies now face constrained opportunities and are under pressure to add value and grow volume to meet government expectations. Other factors, including exchange rate issues and the profitability of renting fisheries rights, have helped to produce unwanted behaviours by fisheries companies. Thus the economic project of QMS/ITQ is in question there, and further government intervention is likely.

11.5 Political Project

In each case studied here ITQ is decidedly a political project, and, in most cases this manifests as competing priorities in the fisheries. Jahn Petter Johnsen and Svein Jentoft argue that market instruments are a political act: they change social relations and interactions and are a matter of dispute within Norwegian fisheries. Norwegian governments have been neither willing nor able to fully introduce a privatized ITQ system. Instead, their efforts to balance resource conservation, economic efficiency and regional distribution have produced a complex system with numerous checks to keep the market mechanism under control, and especially to prevent unwanted regional and social distribution impacts while fostering community well-being. The stock assessment regime thus has clearly defined economic and social goals. They see ITQ as potentially useful to govern allocation of rights and for reducing fleet capacity but not necessarily effort, and express concern over the need to guard against associated regional concentration effects, the need for evaluations of ITQ effects, and for a political process in which basic principles, mechanisms and institutions are open to public scrutiny and debate.

Emilie Mariat-Roy notes that between 1991 and 2011, and especially after the financial crisis of 2008, fisheries management in Iceland has come to feature efforts to rebuild coastal communities and to produce consensus and national unity, as a result of a moral critique of the ITQ. When Iceland's public authorities moved to re-embed finance- and economic performance-oriented policies for fisheries in policies for integrated fisheries management, through for example the "Jig and Line System" introduced in 2004, or the "Coastal Jigging System" created in 2009, the results were mixed. Sales revenues have increased since 2008 despite falling catch levels, but small-scale fisheries have been hurt by heavy debt burdens denominated in foreign currencies. More importantly, in 2013 the new government abandoned the planned partial re-nationalization of fishing rights and thus reform of ITQ, indicating a step back from the politics of dismantling the ITQ. Emilie Mariat-Roy demonstrates the reflexivity in the Iceland fisheries: fishers react to policy, politics reacts to fishers, so that they are locked in unpredictable relations to one another.

Carmel Finlay investigates the effects of ITQ in the USA's West Coast halibut fishery, which established an ITQ system when stocks were in decline. She argues that, in the bio-economic models developed during the 1960s, fisheries did not pay economic rent, nor did they cover their administrative costs, and fishers freely entered the fisheries, accepting the risks of competition and the challenge of controlling operating costs. For the federal government open access to fishing has been politically useful in asserting imperialist policies and therefore there were few efforts to restrict entry into most US fisheries. So US fisheries were characterized by overcapacity and higher costs of fishing, with management pre-occupied with allocation issues. Subsidies have exacerbated the overcapacity problems and left unresolved the tensions among competing fisheries management goals.

In contrast, I identified a changing political scene in New Zealand around QMS/ITQ. At first neoliberal ideologues were able to implement a comprehensive QMS/ITQ regime very quickly and with no opposition. The early results were rated 'successes' and so localized opposition to the rationalization of small-scale fishers was able to be swept aside. Subsequently, the legitimacy of the regime has been tested first by the need to address the issue of Māori Treaty rights in the fisheries and then the tide of environmental concern that has swept through the country. While accommodations have thus far been found for Māori rights that leave the QMS/ITQ regime intact, the regime's legitimacy remains in question. It is further threatened by calls for marine reserves, ecosystems-based marine planning, and government desires for development of mining, land development, aquaculture and other activities that will potentially conflict with the fisheries.

In these diverse ways, *Fisheries, Quota Management and Quota Transfer* demonstrates that ITQ is everywhere enmeshed in politics. Not only does the politics vary from place to place but in each place politics constrains the ways in which the regulatory regime is set up, its functioning, and its effects. They also influence the path dependency of each regime as it is set up as well as the subsequent patterns of modification and adaptation of the regime. Finding a "pure" ITQ regime is impossible so that the rationalization projects are always works in progress.

11.6 Social Project

ITQ regimes are undoubtedly social projects, even though this is seldom made explicit in the justifications for these neoliberal projects, which tend to be made in biological or economic terms. Together, fisheries stock assessments and ITQ were meant to produce social rationalization. They were meant to create modern fisheries workers, communities, firms and relationships. They were meant to exclude small scale, "inefficient", and indigenous fishers from what should be a rationalized modern fishery. These aspects of the projects stimulated protests and political action against the regimes.

Thus Steve Langdon examines how neoliberal policy frameworks work to exclude Tlingit and Haida village residents in southeast Alaska from commercial salmon and halibut fisheries. He notes that commercial fishing has virtually disappeared from Tlingit and Haida villages. Residents rapidly lost rights to the commercial fisheries in the 1970s through the sale of the property rights awarded to them. Insufficient capital, collateral, credit history, and knowledge of bureaucratic systems of finance and property rights have worked against succeeding generations seeking to purchase commercial fishing permits. Steve Langdon demonstrates that these losses are now difficult to recoup.

The situation is different in New Zealand, but this is really a matter of politics and not of the idealized model of QMS/ITQ. Māori rights have been extended within the regime as a result of the Treaty of Waitangi process, and, as a result, the potential for an alternative model for fisheries development remains at best latent within New Zealand society. The regional development aspirations of Māori have not been realized.

The efforts made to restrict rationalization effects within Iceland, Norway, Denmark, Germany and Sweden can be said to have been only partially successful. Declarations of separate classes of small-boat fisheries each subject to separate quota regulations, have gone some way to ensure survival of small-scale fisheries, but the results and experiences are divergent. In Iceland, Emilie Mariat-Roy finds that, confronted with the moral bankruptcy of the project of rationalization towards a capital-intensive fleet and seafood industry, the government launched a new project aimed at reviving the national fisheries by rebuilding coastal communities and the small-scale fisheries, a project aimed at reviving profitability and securing national unity. But this project has produced only mixed results and was stalled in 2013 with a change in government.

The safeguards for small-scale and regional fisheries built into the Norwegian regime have been effective thus far, but Jahn Petter Johnsen and Svein Jentoft warn that the safeguards could be at risk within a depoliticized fisheries management. The situations of small-scale fisheries in Denmark and Germany would seem to be in good shape from Katharina Jantzen, Ralf Döring, Leyre Goti and Lorena Fricke's analysis of fleet capacity, and fairness of allocation under the relatively new ITQ systems there. However, they warn that the small-scale fisheries sectors will be threatened by the rationalization of quotas to the most efficient vessels and those with

more capital, particularly if quota owners are allowed to lease quota, a tendency observed in North Pacific fisheries by Pinkerton and Davis (2015), and one likely compounded in these European fisheries by restrictions that prevent the automatic buy out of the least efficient vessels. I would add that their analysis, while neatly couched in the terms of the resource economists' appraisals of fleet rationalizations, misses the effects of the ITQ regimes on the boat-share system which has been a key institution facilitating flexibility and fairness within the Danish small-scale fisheries and which is now being dismantled by the Danish regime (Høst 2015). Jeppe Høst's analysis reveals dramatic rationalizations in Denmark's coastal communities.

The situation for small-scale fisheries in Sweden is also precarious, not least because the European Commission has found that the fisheries are inefficient and need to be rationalized. Further, Madeleine Bonow reports that the new regulations have led to displacements: fishers have shifted from Sweden's pelagic fisheries into coastal demersal fishing or overseas fisheries, or have sold boats to owners who are now active in cod fishing or in the shrimp fishery, in turn producing overcapacity, poor profitability, and catch dumping in the Swedish shrimp and Baltic Sea cod fisheries. Here the issue can be seen as one of only partial introduction of ITQ which has actually prolonged and redistributed the effects of decades of subsidies to grow the fleet capacity in Sweden. It can also be seen as a warning: the full effects of fleet rationalization are yet to come in Sweden, and in this rationalization small-scale fisheries and coastal communities will be hard hit.

The ITQ regimes are meant to extinguish open access to the commons, but also to sideline and discredit other modes of fisheries allocation and rights, such as boat catch-shares or indigenous access to the fisheries, none of which are considered in the framing of quota institutions or assessments of "efficiency". In these terms, the projects studied here are each incomplete. We learn that in Iceland the ITQ regime has even been set back as challenges to the morality of such rationalization mounted. The stripped down rhetoric of neoliberal marketization has, over the course of 40 years in diverse jurisdictions, run into contestation. Especially in European countries, it has been politicized on social terms. Nevertheless, as Evelyn Pinkerton (2015) reminds us, there has not been a full cost accounting of ITQs, and especially their social effects, anywhere to date.

11.7 Management

ITQ regimes come with models of management even if these were not so prominently scripted in the justifications of the neoliberal call for ITQ regimes. Perhaps because of this apparent absence, the authors assembled here have assessed this management using several ideas. The management edifice that emerged from an alliance of biologists and economists, is understood as Leviathan, as involving cyborgisation, and also, through its ascription of fishers as responsible, self-organized actors in the co-management of the fisheries, as a de-centred management system. Each of these terms implies its own set of tendencies, and together they constitute management as a formidable aspect of the regimes put in place.

The creation of an alliance of biologists and economists is documented by Jennifer Hubbard, who makes it clear that this emergent expertise was contested at the time. She also critiques some of the research and analytical methods put in place. But she also makes clear the venues – FAO and so on – in which the alliance was inscribed and fostered. This has been a powerful scientific alignment able to legitimate the scientific practices that have been inscribed in the fisheries stock assessment practices. Together the allies installed an early liberal management system that later morphed into a full-blown neoliberal regime in particular jurisdictions.

Steve Langdon identifies the neoliberal regime in Alaska as an assemblage of politicians and lawyers, resource managers, commercial fishing permit holders, processing firms and bankers which he refers to as "Leviathan", a term meant to convey the monstrosity of this powerful governance system. This assemblage works together to protect a set of interests from the establishment of new fisheries or the development of new practices. He also demonstrates how fisheries management in Alaska makes no provision for community-based, small scale commercial fisheries: this prospect is rendered invalid, a non sequitur, in the neoliberal logic of Alaskan fisheries management. Steve Langdon discusses attempts by Haida and Tlingit to develop village-based small scale fisheries to make use of foregone harvests. These efforts have been rebuffed and the manner in which this was done allows him to identify both the logics and practices of the ITQ system that prevent any such development.

In a similar vein, but with the emphasis on orchestration within fisheries rather than policing boundaries, Jahn Petter Johnsen and Svein Jentoft show that since 1990, the Norwegian fisheries management system has gradually moved towards a market mode where quotas are bought and sold, and in which its practices discipline actors so that system relations become cybernetic, with certain solutions locked into the governance system. They see this cyborgisation as de-politicising fisheries governance while introducing neoliberal practices. They worry about transparency in fisheries management and the capture of fisheries management by bio-economic experts.

Carmel Finley's historical analysis of the USA's West Coast halibut fishery identifies repeated failures by fisheries managers to permanently reduce overcapacity in the fishery, to regulate gear type, location of fishing, or other aspects of fisheries management. She argues that, in this US case, ITQs cannot overcome the legacy of decades of free enterprise and over-capitalization in the fisheries, or the historical reluctance of the US government to make fisheries pay the costs of their administration. For Carmel Finley this is a matter of management failure as well as politics. She diagnoses US fisheries management as a problem: underfunded, inadequate and not up to the task of management.

In contrast, I argued that the initial 'success' of New Zealand's QMS/ITQ regime must be understood and tempered by acknowledging the many adjustments that have been made to cope with its failures and unwanted tendencies, which I interpret as signs of effective and adaptive management. In this case I assert that changed politics has caught up with the regime, threatening its legitimacy. In these circumstances

the onus is on the government to respond to the new politics. It is doing so by calling for renewed assessments of marine and coastal planning a move that will enroll new experts and new planning criteria into marine and fisheries management. In the meantime, it has once again restructured the ministry responsible for the fisheries but kept its QMS/ITQ regime intact, embellishing it with diverse new regulations. But, it has conspicuously directed attention to ecosystems-based management, to conservation measures, to new catch technologies to reduce bycatch, and to aquaculture development, all of which have been sidelined under New Zealand's QMS/ITQ regime until now. Perhaps most galling, is the repeated discovery that the responsible, self-managing fisher expected to be produced by the ITQ regime is a myth. Mounting evidence of under-reporting of catch and fish dumping, combined with government inaction against such irresponsible behavior has seriously discredited New Zealand's QMS/ITQ regime.

Taken together, these different perspectives reveal that the roll out of neoliberal policies in the fisheries involves: a working bio-economic alliance; a Leviathan impervious to outsiders; a diffuse but coherent management system characterized by apparently responsible actors, co-management, and hollowed-out state institutions nevertheless showing cyborg tendencies to work together; or weak management that is not up to the tasks of managing a reduction in fleet capacity let alone policing irresponsible fishing behavior. These faces of fisheries management suggest differences in management should continue to be a factor influencing the effects of ITQ policies in different ways in different jurisdictions.

11.8 Environmental Project

In confronting the issue of whether ITQ is an environmental project, Jennifer Hubbard found that it was better described as a project of bio-economic rationalization. She sees it as an expert system combining resource economics with stock assessment science to form the basis of government policies designed to centralize, streamline and industrialize fisheries. The result was intended to be a rationalized fishery run by a small number of firms, employing only a very few fishers and workers, and relying on only a tiny population of fish. She sees the practices of this scientific approach as erasing fish and people through the superimposition of models to represent fish, populations, markets, demand and performance. In the process the true ecological dimensions of what a rational fishery should be are lost.

Nevertheless, I argued that in New Zealand, marine ecosystem science and the environmental lobby have effectively critiqued the QMS and worked to hedge it in with new expectations, practices and constraints, even though this remains a work in progress. The negotiation of Māori rights in fisheries has further compromised the legitimacy of the government to set a pure QMS/ITQ fisheries regime. Today the regime is augmented by an array of other fisheries management practices backed by burgeoning interest in ecosystem-based integrative planning for marine and coastal areas. Not only has the New Zealand QMS system been extended to cover more

than 90 species compared with Iceland's five, but research and development funds are being invested in new gear to reduce bycatch, there are new place-based controls on fishing, and proposals for new no-catch marine reserves. These are signs that QMS, while useful and in this case stable, is not sufficient for good fisheries management. The QMS frames the environmental and ecological issues at stake only in particular ways, and these have been found wanting by critics. Moreover, the irresponsible behaviors of quota owners and fishers have discredited the ITQ regime as a responsible environmental manager.

The other chapters in *Fisheries, Quota Management and Quota Trade* are less vocal on environmental matters, but this should not be taken as an absence of problems. On the contrary, by adopting the perspective of the German fish finger processor, Ingo Heidbrink reveals the potential consequences of the invisibility of such environmental transformations. Carmel Finley also stresses the invisibility of environments in the handling and management of the USA's West Coast halibut fishery. In other chapters, authors implicitly acknowledge that stock assessments, despite their intrinsic problems, have helped to secure stable fisheries. Consequently, their attention is directed elsewhere, and particularly to social, political and economic aspects of the rationalizing projects where problems are visible or issues deserve attention.

Environmental rationalization is at work under ITQ regimes. Marine and coastal ecosystems were constituted as systems for rational harvesting, with marine biologists and their statistical models of stock dynamics legitimized as the authoritative experts on marine and coastal environments. As the environmental results of rationing stocks to fleets have become more visible, including repeated cases of overfishing, some stock collapses, and transformed – especially simplified and thinned out – ecosystems, challenges to their legitimacy as the sole expert voices have mounted. In response we can see an emerging re-territorialisation of marine and coastal environments into spaces for conservation and/or recreation, spaces for wild harvest, and spaces for farming. We can also see efforts to delegitimize particular catch technologies. These can be regarded as efforts to overcome the limitations of the efficient rationalization model that was instituted as fisheries stock assessment and ITQ. Finally, it is worth noting that Elinor Ostrom's (2005, 2009) call for a full sustainability assessment of ITQs and fisheries management remains unanswered, despite the alarming warnings of overfishing and fish stocks in peril. ITQ remains an aspiration for environmental rationalization and one not subject to rigorous environmental assessment from outside fisheries stock assessment practices.

11.9 Rationalizations in Question

This volume shows that the many national variants of fish stock assessment and catch share schemes in fisheries are neoliberal projects, that they share faulty assumptions, that it is a mistake to assess the regimes simply on their own terms, and that in any assessment of them, context matters. The contributors to this volume

acknowledge that these rationalization projects are social, political, economic and environmental in scope (Mansfield 2004). They are powerful projects, which, even when only half-heartedly put in place, have long-term effects. They are perhaps best understood as discrete projects, each of which harnesses capital, reconfigures access rights, constructs political alignments, and transforms ecosystems, communities, and economies. In the terms of the metaphor used to frame this volume, they are separate boats, each producing their own boat wakes as they are driven through particular water bodies. Further, because context matters, the rationalizations wrought by each boat were never quite what was expected, and were contested in diverse ways. This conceptual framework has implications for further research.

Fisheries, Quota Management and Quota Transfer directs future social science and humanities research on ITQ regimes in three main directions. First it calls for further assessments of these neoliberal rationalization projects through questioning of the assumptions that lie behind them and through the use of an array of assessment measures. The projects are based on assumptions of efficiency gains from rationalization which are to be assessed in specific economic and environmental terms: fleet capacity, industry efficiency, and overharvesting, and related terms such as fairness in quota allocation. *Fisheries, Quota Management and Quota Transfer* confirms the need for additional assessments of social, economic and environmental rationalizations of the fisheries, and calls for assessments of cumulative effects, and effects at diverse scales. Assessments need to be made using a variety of measures including ones related to communities, institutions, groups and individuals, enterprises, and ecosystems. Assessments that use only the categories of the fisheries economy, fleet structure and stock assessments will not easily identify displaced effects from policies promoting rationalization. Nor will they help to make sense of the contestation around these projects.

Second, the contributing authors to this volume have each framed their inquiry in terms of whether ITQ constitutes good fisheries management. To answer this question requires attention not only to the efficiency claims of ITQ but also to other questions. Is rational utilization of the fisheries good fisheries management? Does it secure healthy marine and coastal ecosystems, coastal communities, regional economies and enterprises? Is it a stable regime promoting sustainable development? Does it produce an authoritative, legitimate and effective fisheries management that is appropriately responsive to the social, ecological, environmental and economic values and interests bound up in a fishery? The answers advanced in this volume give cause for serious concern.

Finally, *Fisheries, Quota Management and Quota Transfer* directs attention to the re-territorialisation of oceans, seas and coasts (Winder and Le Heron 2017). Competing resource projects are emerging and so both “no-wake zones” and “new shock waves”, to return to this book’s boat wakes metaphor, can be anticipated responses. Conservation efforts are resulting in declarations of Marine Protected Areas in which fisheries stock assessments and ITQ will play no role. This is a direct challenge to the ITQ regime, since it involves the prohibition of fishing legitimated by a logic of biodiversity rather than economic efficiency. To date, the proliferation, location and extent of such “no-wake zones” has been modest, but future

developments on these lines must be understood as a discrediting of ITQ and fisheries stocks assessments: on their own they have not delivered desired environmental outcomes. Simultaneously, some scientists and investors, particularly those related to the Blue Revolution and biodiversity management, now operate at an unprecedented scale (Choi 2014) and present the prospect, as it were, of "new shock waves" from enormous "boats". They are competing for marine space and legitimacy with other expert and managerial systems from conservation, provisioning, community development, food certification and animal health. Such projects threaten to reshape fisheries networks and rescale resources in the EEZ and in coastal areas, so much so that Bennett et al. (2015) warn of "ocean grabs". Nevertheless, it is hard to see aquaculture as a challenge to the hegemony of ITQ because advocates of the Blue Revolution have the advantage of being squarely situated inside the resource economics-marine biology nexus, whose efficiency paradigm insists on the superiority of cultivation over wild harvest. Future assessments of ITQ will need to pay attention to these kinds of projects, since one denies the logic of efficient rationalization while the other completes it.

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