

Fisheries self-governance: new directions in fisheries management

R. Townsend

Ministry of Fisheries

PO Box 1020

Wellington 6140, New Zealand

Ralph.Townsend@fish.govt.nz

R. Shotton¹

Fisheries and Aquaculture Department

Food and Agriculture Organization

Rome, Italy

1. INTRODUCTION

This volume brings together 32 case studies of industry self-governance of their fisheries. These cases occur within the context of very different national governance structures for fisheries, types of fisheries and geographical areas. That self-governance has appeared widely across the world suggests some powerful common underlying forces. We hope that presenting these experiences in a single volume will increase the visibility of this important (and perhaps under-appreciated) institutional option for fisheries management and assist in identifying what these forces are.

The widespread emergence of self-governance raises interesting and important questions. Most of the self-governance cases in this volume are of relatively recent development. Have there been policy or institutional changes that have enabled or empowered industry self-governance on this global basis? Although this volume describes some remarkable successes of self-governance, self-governance has emerged in relatively few of the world's fisheries. Are there factors that are limiting the development of fisheries self-governance? If governments wish to promote self-governance, what steps might they take? We hope that this volume will prompt fisheries managers and researchers to explore why governance of the fisheries described here has been so successful and what are the institutional characteristics that have enabled it to happen.

2. DEFINING SELF-GOVERNANCE

The institutions that we call "self-governance" here are often subsumed within the broader category of "co-management". The term "co-management" has been used to describe essentially any governance alternative to centralized command-and-control regulation. We distinguish self-governance here as the delegation of important aspects of management decision-making responsibility to the domain of fishing industry participants: i.e. self-governance is about the fishery participants themselves making governance decisions. The relevant economic concept is that the fishing industry has incentives to increase the value derived from the resource. The objective of self-governance is to empower the industry to operationalize these incentives.

¹ Current address: Ministry of Fishwealth, Box 19007, Sana'a, Yemen. E-mail: r_shotton@hotmail.com.

This definition of self-governance excludes a variety of institutions that are often considered co-management. Notably, self-governance is more than a consultative process, however well-developed. And while reliance on private decision-making is accommodated within the most common definitions of co-management, the focus of co-management is more commonly on creating new governance institutions, especially at the community-level. Self-governance uses existing or new private institutions, rather than creating new political or government institutions or delegating authority to existing lower levels of government. Co-management is often positioned as an alternative to rights-based management such as individual transferable quotas (ITQs). Self-governance, in contrast, expands upon rights-based management by increasing the scope of decisions that are assumed by industry.

Various fishing industries, in embracing self-governance, have assumed *de jure* or *de facto* control of many fisheries management functions that are traditionally the domain of government. The case studies documented here describe situations where the industry: determines seasons; manages closed areas and marine protected areas; administers catch monitoring programmes; fixes daily and seasonal catch limits; rotates fleets; manages research; imposes penalties for violation of rules; implements individual quotas/individual transferable quotas; rationalizes fleets; manages product quality; and manages competing demands for the resource between commercial and non-commercial users – an astonishing range of activities reflecting laudable self-responsibility.

3. AN OVERVIEW OF THE CASES

3.1 National context of self-governance

Self-governance of fisheries occurs within the context of legal, political, economic and cultural institutions that shape the opportunities for such self-governance. Consequently, self-governance of fisheries often has characteristics that are particular to a country. The cases described here are therefore organized by country or region, with introductory chapters for four of these countries (New Zealand, Canada, the United States of America and Japan).

3.2 New Zealand

New Zealand's path-breaking commitment to a comprehensive ITQ programme under its Quota Management System (QMS) is widely known. Perhaps less well known is that New Zealand has also made significant steps in the devolution of management responsibilities to the fishing industry. Administration of the day-to-day accounting for the QMS is now provided by an industry-owned company, **FishServe**, under a combination of devolved responsibility for some functions to industry and contracted provision of other administrative services on behalf of the Ministry of Fisheries (Harte²). Scientific research is provided through contestable tender and the responsibility to provide research is devolved to some industry groups.

In the 1990s, New Zealand actively promoted the devolution of responsibility for management services to industry, even though the industry interest in assuming greater responsibility was initially limited. The Orange Roughy Management Company (recently merged into the Deepwater Group) was among the first to develop cooperation among its members, not least prompted by a new industry facing the large costs of developing a new national offshore deepwater fishery. This cooperation has led to management of several sub-quotas within quota management areas (QMAs) to prevent localised depletion (Clement, Wells and Gallagher). The Orange Roughy Management Company has also become active in developing research, including deepwater acoustic surveys and their design, due in part to industry dissatisfaction with the results of traditional stock assessment methods. The Challenger Scallop Enhancement Company

² Author citations without dates here are to chapters in this volume.

has made the most comprehensive efforts to embrace self-management (Mincher). This effort was motivated by an opportunity to enhance scallop recruitment by seeding and to optimize catches by spatial rotation of harvesting. Although initial suspicions regarding rights-based management meant that crayfish fisheries joined the QMS after it had become established, various crayfish management organizations (CRAMACs) have now become deeply involved in the delivery of research and management advice (Yandle). There were also limited efforts to self-managed aspects of crayfish management, including one case of voluntary quota-shelving by the industry. Deep-sea crab quota was recently sold by tender, and the winning bidders have joined together in **Crabco** to undertake both the research needed to underpin the fishery and also its future exploitation (Sobol and Craig). The unitisation of the deep-sea crab quota holders into **Crabco** is a path-breaking implementation of Scott's (1955) sole owner concept. A similar company, **Surfco**, has been created for exploitation of part of New Zealand's surf clam resources. While not described in this volume, a number of other industry organizations in New Zealand have undertaken self-governance initiatives, including those for hoki, squid, paua (abalone) and Foveaux Strait oysters.

The high level of government interest in devolution of management responsibilities prior to 2000 has since shifted towards a more traditional government-led co-management approach (Harte). And, cost recovery, an explicit national policy, remains a contentious issue. But the industry role in QMS administration through **FishServe**, by itself, places New Zealand in a unique position of fisheries self-governance, and the ongoing **Crabco** and **Surfco** initiatives are potentially revolutionary developments in fisheries governance.

3.3 Canada

Canada has been innovative and flexible in its implementation of approaches to fisheries self-governance. The Canadian system is officially “co-management” and industry groups are generally careful to use that term rather than self-governance. Under this co-management regime, Canada often devolved substantial authority to industry via contractual joint project agreements (JPAs).

The cases in this volume reflect the diversity of the Canadian approach to co-management/self-governance. For British Columbia geoduck, the Underwater Harvesters Association is broadly responsible under a JPA for implementing an ITQ programme, finances most research, monitors biotoxins, manages marketing and has recently moved to re-seed its stocks (James). A similar administrative programme by industry has been established for red sea urchins (Featherstone and Rogers). Remarkably, the group of 100 red sea urchin harvesters negotiated and implemented a voluntary individual quota programme for two years when government had been reluctant to impose the programme. After government approved a formal ITQ programme, the Pacific Urchin Harvesters Association remained responsible for administrative of the landings validation programme. In British Columbia sablefish, an individual vessel quota (IVQ) programme initially propelled an industry-run dockside monitoring programme (Sporer). Subsequently, the Canadian Sablefish Association has expanded its responsibilities to include contracting for at-sea monitoring, biological sampling, logbook management and stock assessment.

In the Nova Scotia sea urchin fishery, the government allocated individual areas for harvesters to self-manage (Miller). In the complicated inshore groundfish industry, the Department of Fisheries and Oceans (DFO) required inshore harvesters to form “community” associations to manage total allowable catch (TAC) allocations (Peacock and Annand). The form of those associations was left to the participants to determine and the nature of the organizations has varied widely. At least one of these organizations uses an informal ITQ arrangement. In the Nova Scotia snow-crab fishery, the DFO introduced an innovative approach to allow the benefits of an expanding

fishery to be widely shared without creating overcapitalisation. In issuing new permits, the DFO required that new entrants join in groups of 10 to 20 ‘qualifiers’ as companies that would exercise the newly allocated fishing rights (Peacock and Eagles). In the Atlantic scallop industry, the DFO has allowed a well-organized industry to lead the direction of both research and management (Stevens *et al.*). This scallop industry has a successful voluntary programme to maximize yield per recruit. The industry has recently invested heavily in sonar mapping of the entire fishery habitat area to provide the seven companies with information to significantly reduce fishing costs. The scallop industry is deeply involved in research design to the point that the industry has funded “succession planning” in anticipation of retirement of the DFO scientist responsible for scallop research. Examples of fisheries self-governance in Canada that are not represented in this volume include the Bay of Fundy herring (Stephenson and Lane, 1993), Cape Breton Area 19 crab (Loucks, 2005), and Pacific groundfish (Turris, 2000). Blewett (2002) provides a comprehensive listing of fisheries co-management initiatives in British Columbia, some of which have aspects of self-governance.

Government and industry in Canada have developed a generally pragmatic, and thus adaptive, approach to co-management/self-governance. Greater industry responsibility is typically developed incrementally, as government gains confidence in the capacity of individual industry groups. The Government has not insisted upon a “one size fits all” approach to self-governance, but rather has supported implementation of different approaches that individual industries support. The Government has allowed industry to demonstrate the feasibility of management options as in the implementation of ITQs for geoducks on the condition that industry develops an effective monitoring programme (James).

The efforts by the DFO to help (or even to force) industry to overcome barriers to self-management have been especially notable. Government apparently has an informal rule that if two-thirds of an industry supports a co-management approach, they will support the efforts of that majority (Wilson). JPAs have used a number of interesting devices to encourage cooperation. For example, the DFO has required the use of association-provided monitoring and reporting mechanisms in both geoducks (James) and red urchins (Featherstone and Rogers). The DFO has allocated part of the TAC to industry associations as “use of fish” allocations to support industry research in several Pacific fisheries, including sablefish, groundfish and halibut (Blewett, 2002). The result is often that harvesters must join the relevant association (and hence pay dues) to participate in the industry, though some of practices have been subjected to court challenge, and government may face future restrictions on its activities in this area. In Atlantic Canada, the DFO has forced the creation of governance organizations in groundfish (Peacock and Annand) and snow crabs (Peacock and Eagles).

Canada has implemented cost recovery throughout its fisheries. All harvesters are required to purchase third-party dockside monitoring services. Other services may be funded through direct industry provision or by government levies. Exactly what costs are recovered varies across fisheries and is arguably arbitrary (Wilson). Canada also uses its licence fees to extract rents from the fisheries. Licence fees are based on 3 percent of landed value in less valuable fisheries and 5 percent of landed value in more valuable fisheries.

Canada can exercise flexibility in co-management in part because the Minister with responsibility for fisheries has wide discretion (often described as “absolute discretion”) to manage fisheries. The DFO has used this power to implement the range of management approaches described in this volume. But this absolute discretion has brought an inherent limitation to the evolution of fisheries governance. While almost all Canadian fisheries have limited entry and many fisheries have individual quotas, these programmes do not create permanent rights. Any future Minister can revoke

existing use rights or issue more rights to new users. It is a common theme in industry discussions that this impermanence of rights needs to be addressed (see Wilson, James, and Featherstone and Rogers).

The challenges of managing the Pacific salmon fisheries and the Atlantic groundfish stocks are widely known, and these difficulties may overshadow the remarkable successes of co-management/self-governance in Canada. The significant economic benefits achieved in the British Columbia geoduck fishery and the Atlantic scallop fishery, in particular, offer unequivocal evidence of the potential for self-governance to increase economic rents—even in fisheries that already have IQs.

3.4 Australia

The three case studies presented for Australia arise in State fisheries. In the Queensland stout whiting fishery, the five permit holders implemented a voluntary TAC in conjunction with government (Thwaites and Andersen). In the western king prawn fishery in Spencer Gulf of South Australia, the Prawn Fishery Management Committee designs a system of spatial and seasonal closures that target larger, more valuable prawns and increases catch per unit effort (Zacharin, Dixon and Smallridge.) A “Committee at Sea”, in a remarkable display of industry responsibility, manages the fishing activities of the 39 vessels to implement this plan. In the Exmouth Gulf prawn fishery of Western Australia, where one company owns 15 of the 16 permits, the industry association works with the Department of Fisheries to implement seasonal, spatial and time-of-day fishing closures to achieve both biological and economic objectives (Kangas *et al.*). Economic objectives include reducing harvest costs and increasing the average size (and hence value) of prawns. A similar programme, but with more limited self-governance, operates in the Shark Bay prawn fishery of Western Australia (Kangas *et al.*)

These self-governance experiences reflect the broader Australian approach to fisheries management. Industry and government have often successfully developed collaborative approaches based upon input controls whereas elsewhere in the world, input controls often fall into a downward regulatory spiral where government regulates some inputs, industry innovates to counter the regulations, government imposes more onerous input regulations, and so on. With industry involved in the design and implementation of input controls, Australian managers have achieved some remarkable successes with this approach. For fisheries such as prawns, input controls may have advantages over output (quota) systems. In prawn fisheries, annual recruitment is often highly variable, difficult to estimate in advance of the fishing season and may be only weakly correlated with spawning stocks. Economic efficiency may require adaptive management to minimize harvest costs and to maximize yield per recruit. Larger prawns often command substantial premiums, so the return to efficient seasonal management may be large. This has been a common objective of both prawn fisheries described in this volume.

3.5 United States

In the United States, self-governance has emerged in both state and federally managed fisheries. Self-governance is often organized via cooperatives, because fisheries cooperatives enjoy limited antitrust exemptions. However, these cooperatives should not be confused with more traditional cooperatives: they are usually single-purpose fishery management organizations. With the exception of the Chignik salmon cooperative, none of the US cooperatives described here provide the traditional functions of supplying inputs, processing and marketing.

In US federal fisheries, several cases of self-governance were organized to achieve ITQ-like management during the ban on new ITQ programmes during 1996–2002 and within the context of general scepticism about the potential benefits of ITQs in US

fisheries. Here, the efforts at self-governance activity by industry are largely to achieve the fisheries management results that have been delivered by governments in many other countries.

Much of the US self-governance is in the Pacific – and in Alaska in particular – the most fisheries-dependent American state. The Pacific whiting cooperative divided the quota for catcher-processors among four firms (Sylvia, Munro Mann and Pugmire). The Pacific whiting cooperative was the first of the west coast cooperatives and provided the model for most subsequent Alaskan cooperatives. Efforts to create a similar cooperative for the Alaska pollock catcher-processor fleet were initially stymied by decisions by the North Pacific Fishery Management Council. Authorisation terms for Alaska pollock cooperatives were subsequently specified in the *American Fisheries Act* (Wilen and Richardson). The pollock cooperatives essentially negotiated individual transferable allocations in each of four separate sectors of the fleet (catch-processors and three catching sectors that delivered to onshore processors, to catcher-processors and to motherships.) For both the Pacific whiting and the Alaskan pollock cooperatives, much of the benefit of self-governance came in the form of getting greater value from landings as fishing slowed under individual allocations. Product recovery increased from 17 to 24 percent in the Pacific whiting catcher-processor fleet and from 19 to 30 percent in the Alaskan pollock catcher-processor fleet. This result is consistent with the argument of Homans and Wilen (2005) that increasing catch value may be at least as important as reducing costs as fisheries are rationalized. The weathervane scallop cooperative established individual transferable allocations in a fishery that is managed under a joint state-federal regime (Brawn and Scheirer.) In an interesting innovation, the scallop cooperative allocated the crab bycatch (which is entirely discarded but can result in closure of the fishery when bycatch limits are exceeded) as well as the target scallop species. The result was a dramatic reduction in the ratio of bycatch to target catch.

The Chignik salmon cooperative was an interesting effort to respond to declining salmon prices by reducing the fishing costs through coordinated fishing (Knapp). The Alaska Board of Fisheries established an allocation that divided the fishery between a cooperative with about 80 percent of the harvesters and an open access fishery for the 20 percent who declined to join the cooperative. This allocation of a share of a fishery to a self-governance organization may provide an important model for other governments trying to promote or to allow self-governance in fisheries that cannot achieve unanimous agreement. Ultimately, in what many believe to have been a backward step, a state court declared the Chignik cooperative illegal.

In the United States, there are also small-scale, informal, almost hidden examples of fisheries self-governance. Given the common US antipathy towards ITQs, industries may have good reason to be quiet about their cooperative management efforts. Further, the informality of these regimes is also a way to reduce transactions costs. The Yaquina Bay roe herring fishery is a small state fishery with only ten permits (Leal.) The permit holders negotiated an equal sharing of the TAC, which reduced fishing costs and allowed the fleet to increase product quality by fishing when roe content was optimal. Nine of the permit holders formed a non-profit corporation to buy out the tenth permit. The agreement also allows the members to coordinate their fishing in this short, but highly valuable, fishery with other fishing activities. In a similar manner, one sector of the federal tilefish fleet, based in Montauk, New York, negotiated an agreement among its four members to share the sector TAC (Rountree, Kitts and Pinto da Silva.) The agreement reduced costs, increased quality and coordinated delivery of a steady stream of product to the market to maximize value. Another example of a small, albeit short-lived, self-governance agreement arose in the Northwestern Hawaiian Islands lobster fishery (Townsend, Pooley and Clarke, 2003). These small self-governance cases raise the interesting possibility that there may be other cases of “niche” self-governance in the United States (and perhaps elsewhere) that are largely hidden.

3.6 Japan

A number of previous studies have discussed the important role of local fishery cooperative associations (FCAs) in fisheries management in Japan (e.g, Asada, Hirasawa and Nagasaki, 1983; Ruddle, 1987; and Makino and Matsuda, 2005.). As Uchida and Makino explain, management is implemented by fisheries management organizations (FMOs), most of which are derivative of FCAs. The FCAs are allocated collective fishing rights, often in the form of territorial use rights. While these rights are nominally bestowed by prefectural or national governments, they have long historical roots. An FCA may itself function as an FMO; multiple FCAs may be represented in an FMO for stocks that span multiple FCAs; or a sub-group of harvesters within an FCA may form an FMO to manage a specific fishery under the jurisdiction of the FCA.

The 13 FCAs in the Ise Bay sandeel industry use a combination of seasonal closures and variable marine protected areas to insure adequate spawning stocks (Tomiyama, Komatsu and Makino). The process to determine the season opening date considers how the size of harvested sandeels will affect price. The sakuraebi (shrimp) fishery in Suruga Bay is managed by two FCAs (Uchida and Baba). A “Fishing Committee” coordinates the fishing activities of all 60 licence holders. Revenues from fishing are shared among all harvesters from the same port. The primary effect of the coordination is to maximize the value of landings. In the sandfish fishery of Akita Prefecture, the Akita Federation of FCAs implemented a three-year fishing moratorium to rebuild stocks (Suenaga). During the moratorium, the prefecture government bought back licences. After the moratorium, the representative organization agreed to a government-set TAC that is divided among twelve FCAs, which manage the allocated TACs. Eight FCAs allow competitive fishing of the allocated quota, three FCAs use non-transferable individual quotas and one FCA fishes its quota collectively. In the walleye pollack fishery in the Hiyama region, fishing of the grounds is rotated to avoid vessel congestion (Uchida and Watanobe). Within the Nishi section of the Hiyama region, a system of pooling revenues is used to further increase incentives to cooperate to reduce costs and thus increase profits.

The Kyoto Bottom Trawlers Union implemented permanent marine protected areas to rebuild snow crab stocks (Makino). Seasonal closed areas are used to reduce bycatch of snow crabs in the brown-sole trawl fishery. Mesh size of trawls were increased and crab exclusion devices were added; minimum sizes were increased for soft-shelled crabs. These changes resulted in a five-fold increase in catch per unit effort and an eight-fold increase in economic yield per unit effort.

There are 1 600 FMOs in Japan, so these five cases can hardly represent the full range of experience. But the cases in this volume show that cooperatives continue to evolve. Both the national and prefectural governments have shown interest in encouraging these cooperatives to develop into more capable fisheries management institutions. This requires careful intervention by government to avoid local harvesters rejecting central government directives as initially happened in the case of sandfish (Suenaga). These case studies also show a concerted effort to deliver more useful and understandable science to FCAs. Scientific studies were important in designing the seasonal closures in the Ise Bay sandeel fishery (Tomiyama, Komatsu and Makino), the marine protected areas in the Kyoto snow crab fishery (Makino) and the stock rebuilding closure in the sandfish fishery (Suenaga).

The Japanese cooperatives often function to reduce short-run costs of harvesting and to coordinate deliveries in order to improve prices. The latter function at times includes some exercise of market power over prices. The cooperatives have been much less active in reducing overcapitalisation within their sectors. As Uchida and Makino suggest for the sakuraebi fishery, the system may function to maximize short-run profits under a constraint that the number of harvesters is fixed. While governments

sometimes engage in licence buy-backs to reduce effort, the FMOs covered in this volume do not have strategies to match fishing effort to the stock.

3.7 Europe

The European Union (EU) has struggled to define a Common Fisheries Policy that balances the principles of equal treatment of fleets in all EU waters with the need to restrict fishing activity to achieve management goals. In several countries, producer organizations (POs) have emerged as institutions able to coordinate the competing demands of management and allocation. Two of the European cases in this volume involve producer organizations that have developed such programmes.

In the Spanish fleet that harvests in the Celtic Sea, seven producer organizations are each allocated a portion of the national TAC (Garza-Gil and Varela-Lafuente). These producer organizations then allocate harvesting rights to individual vessels, which can reallocate the rights among themselves. The result is essentially a PO-run individual quota programme.

In the Shetland Islands, the industry and the local community used two strategies to maintain local control of its whitefish industry (Anderson). In 1993, the Shetlands Fish Producer Organization (SFPO) purchased vessels to acquire 2 386 tonnes of landings history (fixed quota allocations, or FQAs) for use by its members. Because this vessel history was available only to vessels within the SFPO, any ‘quota history’ sold outside the Shetlands lost its access to this purchased history. As the quota history was more valuable in the Shetlands, a strong incentive was created to keep quota in the Shetlands. In 1998 and 1999, the Shetlands Islands Council financed the purchase of an additional 4445 tonnes of ‘catch history’ to insure that the quota remained within the Shetlands. That quota was to be used in part to assist new Shetlands entrants into fishing. The European Commission has since ruled that the catch history purchased with assistance from the Shetlands Islands Council violates EU rules about subsidies, although the original SFPO purchases did not. Alas, this decision strikes down an innovative effort to use market-based tools to pursue local social objectives.

A fleet of vessels from Denmark, Norway and Sweden have traditionally harvested Matjes herring under a set of voluntary rules established by the Danish “Matjes Committee” during 1992–1997 (Raakjær and Olesen) and the Norwegian and Swedish harvester organizations voluntarily agreed to the rules imposed by the Committee. The purpose of this coordination was to maximize landed product quality and hence price. When external factors caused the Danish industry to largely withdraw from the fishery, the voluntary coordination ended. This is one of the few failures of industry self-governance and the lessons it offers are salutary.

Six vessels were granted permits to fish in the shrimp fishery in Gullmar Fjord of Sweden for 2004–2006 (Eggert and Ulmestrand). Because this area is a marine reserve, the number of total fishing vessel-days is restricted to 100, which are shared equally among the vessels. The vessels also agreed to a larger mesh size to increase the average size of shrimp harvested and so allow the six vessels to earn higher prices both because they could fish later in the season when prices were higher and because larger shrimp bring a price premium.

In the French Bay of Brest scallop fishery, harvesters formed a cooperative to manage a juvenile seeding and spatial rotation programme (Alban and Boncoeur). Financing of this programme was changed from a public subsidy to licence fees in 2001. When higher licence fees were implemented, harvesters were allocated individual catch quotas.

3.8 Chile and Mexico

Here, self-governance has usually arisen within a restricted pool of resource users. Under past open-access practices, any benefits of self-governance were rapidly eroded

by unrestricted entry. In this context, the governments of developing countries face an especially difficult task in trying to limit access to fisheries. Often, high unemployment makes limiting access politically difficult, if not impossible – despite the counter-productive consequences. Even if a government formally limits access, its ability to enforce those limits may be weak or non-existent. For these reasons, devolved governance in developing countries often takes the form of local co-management with significant community involvement. But, the two cases in Mexico and Chile indicate that the institutional framework for self-governance is emerging in at least some developing countries. Moreover, limited access and self-governance seem to mutually reinforcing institutions in these cases.

In the Punta Allen lobster fishery, cooperatives manage exclusive fishing concessions (Sosa-Cordero, Liceaga-Correa and Seijo). The cooperatives partition these areas into individual “campos” or marine plots. Harvesters erect and maintain artificial habitats (“casitas”) that are used to harvest lobsters. The effect is to create individual territorial use rights within a higher-level system of territorial rights allocated to cooperatives.

Since 1992, exclusive harvest rights for benthic resources in Chile can be allocated to artisanal fishing associations as Management and Exploitation Areas for Benthic Resources (MEABRs). Management of the loco (abalone) fishery, which was closed between 1989 and 1992 due to overharvesting, was a primary objective in establishing the MEABRs (Castilla and Gelcich). The government has made establishment of a benthic resource management plan a precondition for local harvest of benthic resources. This strongly encourages creation of MBEARs. Since implementation of the MEABRs, landings have increased fivefold, average size of harvested loco has increased and catch per unit effort has increased.

4. ECONOMIC THEORY AND FISHERIES SELF-GOVERNANCE

4.1 Limited entry and ITQs

Economists have long been interested in better governance institutions for fisheries (Gordon, 1954; Scott, 1955). This interest led economists to propose first limited entry and later ITQs. It is rather easy to trace the economic analysis of those two institutions but much more difficult to trace the emergence of fisheries self-governance.

Gordon (1954) explained that the divergence between marginal revenue to the harvester and marginal revenue for an industry attracted too much fishing effort. Fishing effort was typically conceived as the number of fishing vessels, so economists proposed limited entry (also called licence limitation) as a solution to the overfishing problem (Sinclair, 1961; Crutchfield and Zellner, 1962). But as eventually learned, simple equating of fishing effort to the number of vessels was problematic. When the fleet size was fixed, incentives were created to increase the fishing power of individual vessels, often known as “capital stuffing”. By the late 1980s, economists had documented these practical problems (e.g. Townsend, 1990; Wilen, 1989) and the enthusiasm for limited entry among economists waned, though their popularity with fishery managers remained in areas where they may still represent the first step towards more effective management.

The idea of individual transferable quotas (ITQs) was first identified by Christy (1973) and Moloney and Pearse (1979) provided a more detailed theoretical basis. Because ITQs regulate outputs rather than inputs, the incentives for capital-stuffing are eliminated. ITQ holders have incentives to maximize the net value of fish landed under the quota (through improving catch quality) while being able to reduce fishing costs by having more control over their fishing activity. ITQs remain the pre-eminent policy choice among fisheries economists and where they have been introduced we are unaware of any cases where the policy has been reversed. (The Russian Federation may be the exception, but for institutional reasons that are not related to the policy effectiveness of this form of management.) In fact, economists often present ITQs as

‘the solution’ to fisheries exploitation, while failing to stress their variety of applications and the ‘tool box’ nature by which managers can adapt the policy to their particular legal, social, biological and economic circumstances.

4.2 ITQs: regulatory rights versus property rights

ITQs provide for regulation by cap-and-trade and are analogous to cap-and-trade programmes for regulation of pollutants, such as atmospheric sulphur emission trading in the United States. ITQs create regulatory rights to catch a share of the TAC. Their input-control equivalent may determine that number of days of fishing or units of gear permitted in a fishery. By creating regulatory rights, managers (whether of air pollution or fish harvests) create incentives to minimize the cost of complying with the regulated cap. But the economic incentives created by regulatory rights depend on the nature of the regulations. Thus, ITQs create an incentive to maximize the net value of the quota, but do not, e.g., completely eliminate the incentive to high-grade. Nor is the incentive removed to land catch in excess of ones holdings – compliance with the management regime is still required for it to be effective. Interestingly, it is increasingly reported that this is being achieved through peer-pressure on group participants.

Cap-and-trade regulation requires the regulator to define the level of economic activity that is capped. It also must regulate any aspect of asset use that is not captured under the cap-and-trade rule. The fisheries regulator must still set the TAC, a task common to any output controlled fishery or the total amount of effort permitted in the fishery. The environmental regulator must decide what level of pollution to allow and must manage problems such as localised concentration of pollutants. Under cap-and-trade regulation, the regulator retains ownership of all characteristics of the asset except the individually-allocated cap.

Property rights are more complete than regulatory rights and therefore create a much broader set of incentives. For example, the owner of an aquaculture operation does not have inappropriate incentives to high-grade. An aquaculture owner also does not need to be assigned a production level. Owners of such property possess a complex bundle of rights and within this bundle is usually a residual claimant’s right to any aspect of the resource that is not specifically reserved to some other agent. Thus, property rights have a dynamic characteristic: as new uses for the asset are discovered, or the size of the property is increased, e.g. through better husbandry, the benefits of those uses belong to the property rights holder. Property rights owners thus have incentives to invest in the discovery of new economic uses of the asset and to improve the quality and value of existing assets.

4.3 The role of self-governance in the evolution of more complete property rights

Fisheries self-governance is a way to internalize more of the decisions about exploiting fisheries resources. The potential for fisheries cap-and-trade regulation (ITQs) to evolve into more complete property rights is fundamentally different from such opportunities for cap-and-trade pollution rights. Because the economic benefits from a fishery resource can be vested in a closed set of users, the incentives for efficient use can be internalized. The benefits of all uses of the atmosphere cannot be vested with a closed set of users, because everyone uses the atmosphere. Therefore, a closed set of private rights holders cannot be created to internalize the decisions about the optimal level of atmospheric emissions.

The opportunities to increase economic returns from fisheries resources – including resources already subject to ITQs – are many. Most obviously, governments do not make perfect decisions about the TAC or related choices, such as the optimal level of research. Economic theory predicts that a sole owner of a fishery resource will internalize all decisions about the best time-stream of benefits and the optimal costs.

A sole owner would internalize decisions about risk and about future price changes, so a sole owner of the resource has the incentive to set TACs that maximize the expected present value of the resource, an incentive government lacks. And, if a sole owner pays the costs of research and compliance, the sole owner would also have an incentive to make economically efficient purchases of these services. Not surprisingly, self-governance has been more successful when the number of participants is small and they have similar attitudes to risk and discount rates.

TACs may be derived from a uni-dimensional conceptualisation of a stock of fish as some tonnage of biomass. With a more complex stock conceptualisation that includes age/size structures, sex ratios, spatial distribution and market conditions, the benefits of more complex controls to achieve efficient resource use become clear. But such complex controls are difficult for governments to implement, not least because the compliance costs of external controls are high. A sole owner has the incentives to harvest selectively to maximize the productivity of the stock. Complex harvest strategies over space and time are available to the sole owner to maximize product value when market conditions are best and to reduce harvesting costs, e.g. arising from inclement weather or fish distribution patterns. And, a sole owner may, for suitable species, be able to use stock enhancement and habitat enhancement to increase natural productivity.

The opportunities to create more comprehensive property rights are most apparent for sedentary resources such as shellfish. The institutions that define spatial rights for land can be applied directly to sedentary resources. (And technological innovations such as global positioning systems [GPS] have made marine spatial definitions much more practical.) Such rights are illustrated in the creation of exclusive spatial rights for harvesting sea urchins in Nova Scotia (Miller). Such spatial rights for wild resources are essentially identical to aquaculture rights. Further, shared users of scallop resources in New Zealand (Mincher) and France (Alban and Boncoeur) indicate that a set of collective rights holders can use aquaculture techniques to manage wild resources.

While complete private rights for mobile finfish resources are more difficult to achieve than those for sedentary resources, rights well beyond those for simple cap-and-trade are clearly possible. The **Crabco** example in New Zealand (Sobol and Craig) suggests an interesting model for internalizing and unitizing all dimensions of resource exploitation.

A sole owner has compelling reasons to optimize the benefits from resource exploitation, but most fisheries are exploited by multiple users. ITQs create a set of shares owners in the resource, not sole owners of separate stocks: to create more complete rights, an efficient decision-making structure for the joint owners is required within the context of common interests and utility profiles. An effective structure for self-governance is required. Government, through its legal ability to define the institutional setting, can crucially influence whether efficient self-governance will evolve and as such, self-governance is an institutional option that government policy can encourage or discourage.

5. TRANSACTIONS COSTS, GOVERNMENT AND SELF-GOVERNANCE

5.1 Transactions costs as a limit to self-governance

Most cases in this volume involve industries with relatively few harvesters. This is not a surprise. Because self-governance to date has often been self-organized without explicit enabling legislation, most self-governance occurs under the *de facto* requirement for unanimous consent. Reaching unanimity is difficult because the transactions costs increase more than proportionally with the number of participants, as Olsen (1965) first argued.

But the central issue is not that of the small number of participants, but rather that of transactions costs. Only in small groups have the transactions costs of achieving

unanimous consent been overcome. Joint resource users always have incentives to maximize their joint return; achieving that end is limited by transactions costs. As institutions lower the transactions costs of reaching decisions, the opportunity for self-governance increases. Because government has the authority to define the institutional structure, government has the ability to define institutions that decrease (or increase) transactions costs. Among the cases described in this volume, governments have changed institutions both to favour and to discourage self-governance. In a few instances, these institutional changes were intentional. More often, they were unintentional.

5.2 Bargaining within a closed set of users.

Open access creates insurmountable barriers to self-management. Any negotiated agreement will be undermined as new entrants claim (and erode) a share of the benefits of good management. When governments implement a policy of limited entry for fisheries, they make a crucial institutional change that enables self-governance to be an option. Despite the economic constraints of limited entry of vessels (i.e. the existence of incentives for capital-stuffing), the adoption of limited entry by governments since about 1960 has laid the basis for greater self-governance. The recent emergence of self-governance in many management jurisdictions has not been coincidental. Rather, it reflects the adoption of limited entry in fisheries over the past forty years on which self-governance has been able to evolve.

5.3 Transactions costs and characteristics of participants

The transactions costs of negotiations do not depend solely upon the number of participants as the characteristics of the participants will also influence transactions costs. And, the characteristics of the resource and its fishery will also shape the kind of rules that can be defined and be efficiently and effectively enforced.

Operators with similar situations and interests will face lower bargaining costs than will those with dissimilar vessels, markets and financial situations. The simple rule of equal sharing of benefits is available and participants who are identical in most respects will experience the same the economic motivations. The negotiation of a voluntary IQ in the British Columbia red sea urchin fishery by 100 participants was probably facilitated by the relative homogeneity of the divers (Featherstone and Rogers). Similarly, the relatively large number of participants (55) in the British Columbia geoduck industry is, no doubt, facilitated by the homogeneity of the situations of the divers (James).

The co-management literature often argues that non-economic ties between participants, such as family bonds or common social histories, reduce transactions costs. Trust that is formed in other social interactions is “social capital” that can facilitate agreement in more complex and uncertain settings. Such trust can reduce the complexity and cost of compliance regimes that must be implemented. This social capital is clearly demonstrated in the Montauk tilefish industry (Rountree, Kitts and Pinto da Silva). The small group in the Yaquina Bay herring roe fishery may also have benefited from broader social connections (Leal), but in the Chignik salmon cooperative, these community ties seem to have been at least as problematic as helpful (Knapp). But overwhelmingly, the self-governance agreements in this volume have been motivated by narrow economic self-interest and without clear evidence of pre-existing community ties. Legally enforceable contracts, often with specific compliance regimes and penalties, are present in roughly half the cases. While the social capital accumulated from long involvement in broader communities may facilitate these self-governance agreements, it is clearly not a pre-requisite. This experience is consistent with the argument that self-governance is an economic institution, while many other (less successful) models of co-management are based on broader political and social foundations.

Shellfisheries comprise slightly over half the cases in this volume. Eight cases involve scallop, sea urchin, geoduck and abalone resources; nine cases involve prawn, shrimp, lobster and crab fisheries. Shellfisheries are almost certainly over-represented in these cases and this is probably not coincidental. The spatially-limited nature of shellfish stocks makes it much easier to create a truly closed set of users. The migrations of finfish stocks often create multiple sets of users of the same resource who have different opportunities to benefit from the stocks and often have different cost and revenue structures. The sedentary (or relatively immobile) nature of shellfish resources means that the costs and benefits of management intervention are much clearer. The benefits of leaving small scallops and abalone in the water are self-evident: larger scallops and abalone may be harvested in exactly the same area for years. Spatial rotation strategies are both highly effective and relatively simple to implement. The opportunities for stock enhancement through re-seeding have been shown to be attractive in the case of scallops. For prawn fisheries, fine scale management of harvests within a season can have significant effects on average prawn size and thus their weight and value. Shellfish resources benefit more from self-governance both because the costs of self-governance are lower and because the potential benefits are higher, more visible, and thus more certain.

5.4 ITQs and self-governance

The negotiation of self-governance agreements has aspects of both positive-sum and zero-sum games. Better governance can increase the total economic profit to be derived from the resource, which creates a positive-sum game. On the other hand, the division of benefits has zero-sum characteristics, which can make resolution difficult or impossible. Here, the number of actors involved in the negotiations has a major influence on incentives. When there are a small number of players, each player receives a large share of any efficiency gains. The relatively large efficiency gain realized by each individual creates stronger incentives for cooperation in governance negotiations. In contrast, when there are a large number of operators, the gains from gaming strategic behaviour to increase one's own allocation are large relative to the share of efficiency gains any one player will, on average, realize. Tactics such as threatening to block an agreement (i.e. a hold-out tactic) to win a larger share of benefits become more attractive as the number of players increases. If the allocation issue can be resolved, negotiation costs will be reduced and agreements within larger groups may be possible.

When government allocates individual quotas among users, it resolves the allocation issue and reduces the transactions costs of negotiations. So one might expect ITQs to encourage the adoption of self-governance and, in particular, to make self-governance among larger groups more feasible. The adoption of the quota management system in New Zealand has resulted in significant self-governance activity. **FishServe** provides industry-wide administration of the QMS (Harte). The rock lobster fisheries in New Zealand involve relatively large number of harvesters who have taken considerable steps on research and some modest self-management initiatives (Yandle). Likewise, in Canada the implementation of ITQs seems related to adoption of self-governance under joint project agreements. Relatively elaborate self-governance arrangements are found in Canadian ITQ situations in a relatively large range of fisheries, such as geoducks (James) and sablefish (Sporer). While ITQs are not common in Europe, the allocation of quota to producer organizations on the basis of individual vessel fishing histories – a development driven by the industry themselves and almost in spite of the Common Fisheries Policy – has provided a logical basis for the POs to implement ITQ-like governance.

Government, for itself, faces its own transactions costs. Solving the zero-sum allocation problem inherent in ITQ allocation in the political sector is usually difficult. In the United States, the implementation of ITQs, as elsewhere, often requires many

years. The US had a moratorium on new ITQ programmes in federal fisheries for six years, from 1996 to 2002. Four of the six US self-governance cases in this volume involved users who negotiated their own agreements to circumvent the ITQ ban. These include Pacific whiting (Sylvia, Munro Mann and Pugmire), Alaskan weathervane scallops (Brawn and Scheirer), tilefish (Rountree, Kitts and Pinto da Silva) and Alaskan pollock (Wilen and Richardson.) The Yaquina Bay roe herring fishery is also a self-organized individual quota, but at the state level (Leal.)

The self-organized IQ arrangement in the British Columbia red sea-urchin fishery deserves special mention. The Department of Fisheries and Oceans was initially unwilling to implement an IQ programme (Featherstone and Rogers). That 100 divers could respond to this reluctance by the Department by unanimously agreeing both to voluntary individual quotas and to a self-financed implementing framework is truly incredible. Two factors contributed to this remarkable outcome. First, many divers were either participants in, or had observed, the benefits of the geoduck IQ. Second, the dangers to life of competitive diving in short 'Olympic' openings were obvious to everyone. But even these favourable factors do not diminish their achievement: No other industry operating under unanimous agreement rules has achieved such a comprehensive self-governance agreement with anything close to 100 participants.

In several other fisheries, self-governance has resulted in some kind of informal or limited individual quota. In eastern Canada, the government forced the creation of local governance arrangements for the inshore groundfish industry (Peacock and Annand). Some of these then implemented informal IQ arrangements. Producer organizations in Europe have sometimes converted the fishing history of members into individual quota arrangements, as in the Shetlands whitefish industry (Anderson) and the Spanish Celtic Sea fleet (Garza-Gil and Varela-Lafuente) – confirming the role of catch history in these arrangements and the need to anticipate distortions in fishing behaviour it may engender. In the Gullmar Fjord, operators of the six vessels negotiated individual input allocations (Eggert and Ulmestrand). In the sandfish industry in Japan, several of the FMOs manage their TACs by individual allocations (Suenaga). All these cases share an interesting contradiction. On the one hand, self-governance has allowed different sets of harvesters to decide for themselves whether individual quotas are appropriate. On the other hand, official adoption of self-governed individual quotas remains controversial, to the extent that the arrangements remain informal or obscure and unpublicized.

5.5 The role of cost recovery

The role and consequences of subsidies in the world's fisheries remain notorious. Within that context, the frequency of cost recovery among these cases of self-governance is notable. A policy of 'cost recovery' has two major policy implications. First, those who are responsible for creating the administration and management costs – the fishing industry – are responsible for paying for them. Second, when costs must be defrayed by an organization they have reason to minimize their costs by adoption of more efficient practices. Thus, one might expect both that cost recovery motivates adoption of self-governance and also that the greater profitability under self-governance will encourage government to seek more cost recovery. Both forces seem to operate in some jurisdictions, especially in New Zealand and Canada. The experiences in other jurisdictions are less clear. For example, cost recovery is allowed only in limited circumstances in the US.

Cost recovery does provide incentives to undertake broader self-governance. If a service, such as ensuring compliance, is funded by government, there is little incentive to economize on this 'free-to-the-industry' service. Self-governance can result in the replacement of expensive compliance regimes with less expensive alternatives. For example, an industry that does not pay for ships and aircraft to enforce compliance may prefer these expensive options over e.g. more intrusive electronic vessel monitoring

systems or persisting with efforts to overcome differences in the industry arising from rigidly pursuing self-interests. But if required to pay for the expensive patrols, industry will weigh the cost of patrols against the costs of electronic vessel monitoring or some other form of self-imposed compliance. More broadly, industry understands both the incentives and opportunities to undermine compliance regimes, so it can often design more effective compliance regimes. Even if industry is not allowed to provide a service itself, it has an incentive to push government agencies to provide services more efficiently and not to provide unnecessary services. In both Canada and New Zealand, cost recovery has resulted in greater transparency in government financing of fisheries functions and both countries have highly effective compliance regimes.

Self-governance that has resulted in, or arisen from, assignment of some form of property right to the participants has also changed the dynamics of compliance. As the direct and exclusive beneficiaries of compliance with conservation regulations, peer pressure to observe regulations develops and has proven to be most effective among small groups of participants, especially when most, if not all of the participants know each other personally.

Wilson uses 'institutional economics' to offer an interesting interpretation of why self-governance may lead to more cost recovery/rent extraction. He suggests that cost-recovery can be a kind of government agency rent-seeking. While Wilson developed his analysis in the specific context of Canada, the argument has general applicability. By empowering industries to better manage their own fisheries, DFO has enabled the generation of greater economic rents. In turn, DFO recovers some of those rents to finance 'public interest' research budgets that have been trimmed in recent years. Note that Canada does have modest resource rent recovery and this rent recovery is generally higher in fisheries with ITQs (see James, Stevens *et al.* and Wilson.) Governments also capture a share of rents through the conventional systems of taxation of company profits.

Cost recovery is a central principle of fisheries governance in New Zealand (Harte) and Australia, at least at the Commonwealth level. Cost recovery includes the costs of administration, compliance and research. Privatisation of the QMS administration through **FishServe** is generally believed to have substantially reduced the administrative costs of the quota management system in New Zealand (Harte). The rock lobster fishery contracts jointly with a science provider for most rock lobster research. But outside of rock lobster, cost recovery for many research programmes is a major point of on-going contention between the industry and government. This friction is unavoidable given the difficulty of determining if certain aspects of marine research are more appropriately considered as 'in the public domain' or whether the primary beneficiaries are in the fisheries sector. It would be naïve to assume that this debate would not be part of the ongoing discourse around a policy of cost recovery.

Canadian practice is to recover the costs of its dockside monitoring programme of catch and effort and they recover research costs from some industries in an *ad hoc* fashion. The high cost of the initial government-run dockside monitoring programme was a major incentive for privatisation of that function through certified third-party providers. As Wilson notes, cost recovery of research costs is negotiated for individual fisheries and has an *ad hoc* flavour. On the other hand, the shared responsibilities for research costs in Canada have led to a generally cooperative approach to research, in notable contrast to the contention over the more comprehensive policy for cost recovery of research in New Zealand.

The differences in resource rent recovery between Canada and New Zealand may influence the way government and industry view cost recovery. In Canada, modest resource rentals are recovered through licence fees and more profitable fisheries face modestly larger licence fees. Resource rentals are explicitly not permitted in New Zealand, because QMS shares were used to partially settle Maori claims of rights to

natural resources. Canada may be more flexible on cost recovery because it also collects resource rentals.

5.6 Government action to promote self-governance

Governments have the ability to set the constitution within which self-governance occurs. Governments may simply tolerate self-governance where the industry can establish its own self-governance. This results in the *de facto* requirement for unanimous consent, which inherently limits the scope for self-governance. But in a few cases, governments have taken specific steps to empower harvesters to govern themselves.

Among the countries represented in this volume, Canada has shown the most consistent interest in promoting self-governance, in part because of the diversity of their fisheries and because the regional nature of administration of fisheries permits some limited autonomy in management approaches. Fisheries and Oceans Canada has used the broad discretion of the fisheries minister to enable a wide array of self-governance options. Canada apparently has an informal policy of implementing rules to support policies that are endorsed by two-thirds of permit holders (Wilson.) It has used joint project agreements (JPAs) in Atlantic scallops (Stevens *et al.*), geoducks (James), sablefish (Sporer) and British Columbia red sea urchins (Featherstone and Rogers) to enable groups of harvesters to make a wide array of decisions that are usually reserved for government. To support JPAs in geoduck and red sea urchins, the DFO has required the use of industry-funded monitoring as a condition of the harvester licence. Under some JPAs, part of the quota has been allocated to industry associations as “use of fish” allocations to fund research. Both initiatives provide incentives for harvesters to join the industry association implementing the JPA. In the inshore Atlantic groundfish industry, the Canadian government established rules that forced the creation of community-level governance. In the Nova Scotia crab fisheries, the DFO required the creation of self-governed corporations to receive crab licences.

The national and prefectural governments of Japan have shown recent interest in fisheries self-governance through fishery management organizations (FMOs), which are derivatives of fishery cooperative associations (FCAs). Japan has a well-established system of local responsibility for fisheries management with long historical traditions. While these fishery management organizations often coordinate fishing activity to reduce short-run fishing costs, to provide equity in access to resources and to maintain prices, these FMOs have been less active in reducing fishing capacity or promoting stock objectives. However, the central Japanese government seems interested in promoting a more comprehensive role for FMOs that address overcapacity and overfishing more directly.

The MEABRs in Chile involve a higher degree of central control than, e.g., in Canada. Without the formation of an MEABR, access to valuable loco resources is denied and as a result, MEABRs have formed rapidly.

The United States government enacted a specific statute to allow self-governance in the Alaskan pollock industry (Wilen and Richardson.) But rather than enacting a broadly empowering statute, the federal government enacted legislation that applied only to Alaskan pollock and with specific rules for cooperative formation. This seems to reflect the broader US perspective. While self-governance has attracted considerable rhetorical support in the United States, the enabling legislation is highly prescriptive, which limits the actual scope for self-governance.

The Alaskan Chignik salmon experience offers an interesting approach for governments that want to empower self-governance. Faced with strong, but non-unanimous, local support for a cooperative harvest strategy, the Alaska Board of Fisheries divided the fish between the approximately 80 percent who wanted a cooperative and the 20 percent who wanted open access. By dividing the quota, the

Alaskan government facilitated non-unanimous self-governance, an approach that is reminiscent of the operation of producer organizations in Europe where quota is allocated on the basis of the fishing history of members.

While Alaska and Canada have enabled self-governance to be implemented when support is broad but still non-unanimous, no government seems to have considered allowing simple majorities to decide all aspects of self-governance. Perhaps the lowest transactions costs would be achieved if government empowered corporate governance under one-ITQ-share/one-vote self-governance (Townsend, 1995, 1997).

6. SELF-GOVERNANCE AS A LEARNED BEHAVIOUR

The self-governance cases in this volume are distinctly clustered. Some of this clustering of self-governance reflects policy and administrative structures that encourage and support self-governance. New Zealand, especially, has a legislative framework that enables self-governance. The administrative initiatives of DFO officials in British Columbia and Nova Scotia partially explain why self-governance in Canada is clustered in those two areas. In Japan, the traditional role of fishery cooperative associations provides a natural base for self-governance.

In the US and in Canada, there is also clear evidence that learning about self-governance occurs from observing the earlier successes in self-governance. In the United States, the initial success of the Pacific whiting producer cooperatives (Sylvia, Munro Mann and Pugmire) clearly provided a model that was subsequently followed in Bering Sea pollock (Wilen and Richardson), weathervane scallops (Brawn and Scheirer), Chignik salmon (Knapp) and even in the Northwestern Hawaiian Islands lobster (Townsend, Pooley and Clarke, 2003). Many of the British Columbia sea urchin harvesters who negotiated their own ITQ programme already had experience with the interplay of ITQs and self-governance in the geoduck fishery (Featherstone and Rogers). One of our objectives for this volume is to broaden the scale at which this learning from previous successes can occur.

7. THE FUTURE OF FISHERIES SELF-GOVERNANCE

There are two potential misconceptions about fisheries self-governance. One is that self-governance can spontaneously and entirely replace government regulation. The second is that governments can invoke (or impose) self-governance to avoid difficult choices about restricting access. Both are false. Self-governance requires a closed set of users with reasonable guarantees of exclusivity who can negotiate the terms of their self-governance. As long as the set of users is open, any benefits generated by investments in self-governance can be claimed and ultimately dissipated by new entrants. For most of the world, governments and governments alone have the power to close access to a fishery. For self-governance to continue to spread, governments must continue to address the core economic problems (and costs) of open-access fisheries. Governments have the sovereign authority to redefine institutions by legislative and, with more difficulty, constitutional change. Governments must exercise their power to enable and empower self-governance. Self-governance has much to offer governments: through appropriate institutional changes, much of the complex and often contentious detail of fisheries administration can be undertaken – more effectively – by the private sector and the constraints of command-and-control regulation reduced.

The institutional changes required of governments to empower self-governance depend in part upon the number of participants involved. When there are few users, the transactions costs of collective decision-making are lower and consensual decisions are more easily achieved. Government may be able to empower self-governance simply by defining an exclusive set of users. But as the set of users gets larger, better-defined rights are necessary to encourage participation and to lower transactions costs. Thus, self-governance will be easier for large groups when a well-defined right like an ITQ exists.

There are other steps that governments can take to enable larger groups to embrace self-governance. In several cases, governments have divided users into homogeneous groups or groups with similar attitudes towards self-governance, as occurred in the Chignik salmon fishery (Knapp), in producer organizations in Europe and in the inshore groundfish fishery of Atlantic Canada (Peacock and Annand). Canada, in particular, has shown that the creative use of regulatory tools can encourage self-governance even when the number of harvesters is moderately large. When an industry group has demonstrated wide support within the industry, Canada has used regulations to discourage or prevent free-riders from undermining the benefits self-governance.

The future of fisheries self-governance rests largely on the vision of fisheries regulators. If fisheries regulators are opposed to self-governance, government can easily raise the transactions costs and make self-governance impossible. Alternatively, governments may create greater incentives for industry to make more of the complex and usually difficult decisions that are required for efficient fisheries exploitation. Fisheries self-governance is an opportunity to further rationalize economic incentives that have occurred, first under limited entry and then with ITQs. But the transactions costs of self-governance are large, especially when unanimous consent is the only basis for moving ahead. Governments that want to empower self-governance for more fisheries must creatively redesign institutions to lower the transactions of self-governance and be open to the transfer of decision-making power to those most directly influenced by the outcomes of such decisions

8. ACKNOWLEDGMENTS

Our greatest debt is to the authors of the individual chapters. Their passion for better governance of fisheries is clear to all. The idea of a volume on fisheries self-governance can be traced to a conference on fisheries self-governance held in Anchorage, Alaska in 2003. That conference was funded by the Pollock Conservation Cooperative Research Center and by the Institute for Social and Economic Research at the University of Alaska Anchorage. The following chapters all represent cases that were presented in some form at that conference: James, Stevens *et al.*, Clement *et al.*, Mincher, Yandle, Knapp, Wilen and Richardson, Brawn and Scheirer, Sylvia *et al.*, Leal, and Nielsen and Olesen. A research grant from the Canadian Embassy (in Washington, D.C.) supported travel by Ralph Townsend to British Columbia and Atlantic Canada that assisted in development of the cases from Canada.

9. LITERATURE CITED

Asada, Y., Hirasawa, Y. & Nagasaki, F. 1983. *Fishery Management in Japan*. FAO Fisheries Technical Papers 238. 26p.

Blewett, E. 2002. *Status Report on Co-Managed Fisheries in British Columbia*. BC Seafood Alliance, Vancouver. Available at: http://www.bcseafoodalliance.com/BCSA/BCSA_BLEWETT.html

Christy, F.T. Jr. 1973. *Fisherman Quotas: A Tentative Suggestion for Domestic Management*. Occasional Paper # 19. Kingston, RI: University of Rhode Island, Law of the Sea Institute.

Crutchfield, J. A. & Zellner, A. 1962. *Economic Aspects of the Pacific Halibut Fishery*. Fishery Industrial Research, Vol. 1, No. 1. Washington: US Department of the Interior.

Gordon, H.S. 1954. The economic theory of a common property resource: The fishery. *Journal of Political Economy* 63:116-124.

Homans, F. & Wilen, J. 2005. Markets and rent dissipation in regulated open access. *Journal of Environmental Economics and Management* 49(2): 381-404.

Loucks, L.A. 2005. *The Evolution of the Area 19 Snow Crab Co-management Agreement: Understanding the Interrelationship between Transactions Costs, Credible Commitment, and Collective Action*. Ph. D. Thesis. Simon Fraser University, Burnaby, BC, Canada.

Makino, M. & Matsuda, H. 2005. Co-management in Japanese coastal fisheries: institutional features and transaction costs. *Marine Policy* 29(5): 441–450.

Moloney, D.G., & Pearse, P.H. 1979. Quantitative rights as an instrument for regulating commercial fisheries. *Journal of the Fisheries Research Board of Canada* 36: 859-866.

Olson, M. 1965. *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge: Harvard University Press.

Ruddle, K. 1987. *Administration and Conflict Management in Japanese Coastal Fisheries*. FAO Fisheries Technical Paper 273. 93p.

Scott, A. 1955. The fishery: The objectives of sole ownership. *Journal of Political Economy* 63:116-124.

Sinclair, S. 1961. *License Limitation – A Method of Economic Fisheries Management*. Fs34-1961/1. Ottawa, ON: Canada Department of Fisheries.

Stephenson, R.L. & Lane, D. 1993. Management of the 4WX Atlantic herring (*Clupea harengus*) fishery: an evaluation of recent events. *Canadian Journal of Fisheries and Aquatic Sciences* 50: 2742-2757.

Townsend, R.E. 1990. Entry restrictions in the fishery: a survey of the evidence. *Land Economics* 66: 359-378.

Townsend, R.E. 1995. Fisheries self-governance: corporate or cooperative structures? *Marine Policy* 19 (1): 39-45.

Townsend, R.E. 1997. Corporate management of fisheries. In J. Boreman, B. Nakashima, J. Wilson, & R. Kendall (eds.) *Northwest Atlantic Groundfish: Management Alternatives for Sustainable Fisheries*. American Fisheries Society, pp. 195-202.

Townsend, R.E., Pooley, S.G. & Clarke, R. 2003. Evidence on producer bargaining in the Northwestern Hawaiian Islands lobster fishery. *Marine Resource Economics* 18: 195-203.

Turris, B.R. 2000. A comparison of British Columbia's ITQ fisheries for groundfish trawl and sablefish: similar results from programmes with differing objectives, designs and processes. In R. Shotton (ed.) *Use of Property Rights in Fisheries Management*. FAO Fisheries Technical Paper 404/1. FAO, Rome. pp. 254-261.

Wilen, J. 1989. Limited entry licensing: a retrospective assessment. *Marine Resource Economics* 5(4): 313-324.

