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The potential and limits of a common-property system for sustainable high seas fishing

A thesis submitted in fulfilment of the requirements for the degree of

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Abstract

This thesis argues that the international regime for the governance of high seas fishing lacks a key institutional principle necessary to promote sustainable behaviours among state actors. The multilateral regional fisheries management organisations of the current regime have developed no system, or only a very weak system, to establish and enforce requisite norms of behaviour among member states.

The thesis thus distinguishes fisheries management from fisheries governance. With management defined by its control mechanisms and governance by its mechanisms of control. The mechanisms of fisheries management include controls on authorisation to fish, limits on fishing effort and on fish catch. Yet, high seas fisheries remain seriously degraded. This is because many multilateral fishing treaties have struggled to reverse the historical and unsustainable rates of catch that were already in place before they entered into force. Sustainable high seas fisheries require a new approach to governance mechanisms of control.

The thesis thus explores the relevant definitions and details of property structures. Particularly, the concept of usufruct as a specific and limited use privilege over a thing. The holder of such an individual withdrawal right may take away some of the natural thing of value provided it does not alter the substance of the thing. The individual benefits of fish catch must be harnessed to deliver the collective future benefits from a productive fish stock.

In this context, the thesis studies the potential and limits of property rights mechanisms in international fisheries institutions. It examines the statements of international treaties using Ostrom's institutional grammar technique. The coding techniques of the institutional grammar are used to extract statements of strategy, norm, and rule from the written conventions and measures of fishery treaties. These institutional statements are used to support the thesis argument that the studied treaties are purposive institutions but do not reproduce expected behavioural norms. The thesis research finds that requisite institutional rules to promote member state compliance are weak or non-existent.

Governance must shift the emphasis from an individual benefit from fish-caught to the collective benefit from a fully productive fish-stock. All group members expect violators of collective agreements to be punished. Effective international governance must cause compliant behaviour to be reproduced by state members. The thesis proposes institutional policy statements that will shift state member behaviour towards sustainable fishing practice.

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Abbreviations

CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CDS	Catch Documentation Scheme
CEP	Compliance Evaluation Procedure
CPUE	Catch per unit of effort
DWFN	Distant Water Fishing Nation
EEZ	Exclusive Economic Zone
EU	European Union
ISA	International Seabed Authority
IQ	Individual Quota
ITQ	Individual Transferable Quota
IUU	Illegal, Unreported, and Unregulated fishing
MEY	Maximum Economic Yield
MSY	Maximum Sustainable Yield
RFMO	Regional Fisheries Management Organisation
SPRFMO	South Pacific Regional Fisheries Management Organisation
TAC	Total Allowable Catch
TAFE	Total Allowable Fishing Effort
UNCLOS	United Nations Convention on the Law of the Sea
UNFAO	United Nations Food and Agriculture Organisation
UNFSA	United Nations Fish Stocks Agreement
USA	United States of America
WCPFC	Western and Central Pacific Fisheries Commission

Chapter 1

The problem with international fisheries

This thesis will assert that the failure to achieve sustainable fishing practices is a failure of fisheries governance. The thesis research project will focus upon the institutional principles of the current regional fisheries management organisation (RFMO) regime and explore those factors central to its failure to secure sustainable fishing practice.

As an aspiring scholar, improving the institutional principles, values, and norms of RFMOs is my contribution to improving ecological outcomes for our planet. All the big decisions in international politics are done collaboratively and with cooperation of other states. The goal of this thesis is to introduce a new dialogue into RFMO governance. It is a goal that expects fish stocks be rebuilt as quickly as possible. There are ecological imperatives for this expectation. The niche a fish species holds in a marine ecosystem may not always be maintained because other species may fill that space or the local ecosystem may be irrevocably altered. But there is also a growing imperative, as a constituent of civil society, that our society should attempt to recover from environmental degradation within the current generation. *Chapter 3 – Overfishing* and *Chapter 5 - Fisheries management* show that practices within all the studied RFMOs do not work toward this objective.

For fisheries governance, the core issue is not the quality of scientific rigour. Questions of scientific technique and scientific uncertainty are addressed in *Chapter 4 – Fishing as a production activity*. Such questions are debated within the scientific community and modified upon improved understanding. What is problematic are the political outcomes invested in decisions on allowed catch rates (fish mortality). Allowed catch is the reward that actors grant to themselves. *Chapter 7 – Property rights in high seas fisheries* shows that such practice lies at the core of self-optimising by state actors. Some state actors are fundamentally self-interested and these are the ones who are obliquely criticised in the RFMO statements on the failure to agree on certain reference points or targets as shown in *Chapter 5 – Fisheries management*. This situation is addressed specifically by environmental non-governmental organisations (NGOs) that are allowed to present at the yearly general assembly of RFMOs. In *Chapter 8 – Property rights in high seas fisheries*, this thesis cites their focus on the environmental degradation of targeted fish stocks, including bycatch and seabirds. These NGOs criticise existing self-maximising behaviours of state actors and exhort them to catch less and allow the fish stocks to regenerate. But these NGOs do not present an argument that attempts to change the frame of reference for state actors. They do not attempt to disrupt current behavioural and institutional practice.

This thesis does intend to disrupt current behavioural and institutional practice by introducing a new frame of reference. What is directly relevant to the topic of this thesis is the amount of fish mortality that is being extracted from the remaining fish biomass. *Chapter 5 – Fisheries management* shows how official statements and statistics obscure the current practice within studied RFMOs and shows the outcomes achieved by these RFMOs. At all times we, as civil society in general, must compare the

current degraded level of fish stock to the unfished biomass that existed before the intense 'industrial' fishing effort we have seen over the last 70yrs. We expect our governments to manage these affairs competently. The challenge is to keep awareness focused on these issues in other countries, and in those places where civil society can be less well developed and even suppressed. A significant problem within the studied RFMOs is the practice of not publicly criticising other state actors. Further, RFMOs have consciously kept argument and conflict internal. There are proposals to increase the public information flow, and make public many more of the conversations and disagreements. This new environment will help scholars and the media discover and disseminate the relevant information to civil society to ignite public discussion and political response.

In 1982, the United Nations Convention on the Law of the Sea (UNCLOS) created a global regime to govern the use of living marine resources in international waters. This regime is centred on a framework to form multilateral regional fisheries management organisations (RFMOs) with competency to govern the use of fish stocks. In some RFMOs this will include the catch of both krill and fish species. There are eighteen RFMOs worldwide and eight in the Pacific Ocean alone. At the core of each RFMO treaty is the obligation and objective to achieve the sustainable exploitation of fish stocks. Throughout this thesis the UN Convention on the law of the sea (UNCLOS) is cited to reinforce that all states have equal right to use high marine resources and all states must cooperate through RFMOs to use this right. Responding to limited uptake among state actors, a second UN Fish stocks agreement (UNFSA) was conducted to refocus upon the formation of RFMOs in particular the requirement to manage target stocks that straddle the national and international maritime boundaries. The UNFSA in particular encouraged compatibility between rules and practices among national and international governance authorities (UNFSA Art7.). All users of resources must be included in the regulation of fishing practices. All states have equal freedom to fish on the high seas. Complexity in governance occurs when agreements between parties affects these freedoms across national and international boundaries. The UNFSA guides RFMOs to not place disproportionate burden on developing nations for sustainability. These developing nations have food security issues and limited resources upon which to base their economic wellbeing (UNFSA Part VII Art. 11; Art. 24). In particular, the UNFSA recognised the need that management measures do not result in the direct or indirect transfer of a disproportionate burden of conservation action onto developing States (UNFSA Part VII Art. 24.c). This dispensation is particularly prevalent in negotiations between developing and developed state actors within the WCPFC.

Yet, this thesis will show that the international regime has failed to achieve the sustainable use of marine living resources. The ongoing overfishing of fish stocks in international waters (high seas) is the problem motivating this research project.

Fish products are one of the most traded food commodities worldwide (UNFAO 2013:3). In 2012, 80 million tonnes of fish were caught in marine fisheries (UNFAO SOFIA 2014:22). By 2014, it was 81.5 million tonnes (UNFAO SOFIA 2016:8). The share of world fish production utilized for direct human consumption has increased significantly in recent decades, up from 67% in the 1960s to 87% in 2014 (UNFAO SOFIA 2016:8). World trade in fish for human consumption is expected to exceed 46 million

tonnes in live weight equivalent in 2025, up 18% from the base period (UNFAO SOFIA 2016:22).¹ Fish are a primary source of protein for 17% of the world's population. In low-income food deficit countries, this figure rises to nearly 25%. In 2013, per capita apparent fish consumption in industrialized countries was 26.8 kg. In 2013, fish accounted for about 17% of the global population's intake of animal protein and 6.7% of all protein consumed (UNFAO SOFIA 2016:18). This significant growth in fish consumption has enhanced people's diets around the world through diversified and nutritious food. Fish provided more than 3.1 billion people with almost 20% of their average per capita intake of animal protein. If fish prices and consumer preferences remain the same, income growth will drive global per capita fish demand up from 20kg per year in 2015 to 25kg per year by the early 2020s (UNFAO DEM 2017:iv). Demand for fish products is rising at nearly 25% every five years.

Yet, in 2014, the United Nations Food and Agriculture Organisation (UNFAO) declared that 29% of all fish stocks are being fished at a rate beyond their capability to naturally regenerate, 61% are being fished at their maximum possible yield and require strict management to avoid decline, and only 10% of marine species are currently being fished at a rate within their ability to naturally regenerate (UNFAO SOFIA 2014:25). By 2016, its latest report on the state of the world's capture fisheries finds that 31.4% of assessed fish stocks were being fished at biologically unsustainable levels, 58% were being fully fished with no potential for increase, and only 10.5% were being underfished (UNFAO SOFIA 2016:14). The world's stock of living marine resources has not improved. Further, total world fishery production (capture plus aquaculture) is projected to expand over the period, reaching 196 million tonnes in 2025. This represents an increase of 17% between the base period and 2025 (UNFAO SOFIA 2016:22). World fish consumption is projected to increase by 31 million tonnes in the next decade to reach 178 million tonnes in 2025. On a per capita basis, apparent fish consumption will be 21.8 kg (live weight equivalent) in 2025. Living marine resources are a critical component of global human welfare.

Highly migratory species such as tuna are among the most commercially coveted living marine resources. These most valuable fish stocks are also those most at risk from overfishing. With a catch valued at over USD\$ 10 billion annually, tuna species account for about 20% of the value of all marine capture fisheries (UNFAO SOFIA 2013:4). In 2012, 7 million tonnes of tuna was caught (UNFAO SOFIA 2014:25). Total catches of tuna species were almost 7.7 million tonnes in 2014 (UNFAO SOFIA 2016:8). Around 3 million tonnes of this tuna catch was from the Pacific Ocean alone (UNFAO SOFIA 2014:25). Among the seven principal tuna species, 30% are estimated to be overexploited, 37.5% fully exploited and at risk of overfishing, and only one-third remain non-fully exploited (UNFAO SOFIA 2012:53). The UNFAO cited particular concern for the Western and Central Pacific region which currently contributes 14% of global marine production, but at rates of catch which are ecologically unsustainable (UNFAO SOFIA 2014:40). This region still produces the second largest tuna catch in the world (UNFAO SOFIA 2016:8). For example, Southern Bluefin Tuna was one of the major commercially fished species in the Pacific Ocean and has been exploited for more than 50 years. In 2011, only 5% of its unfished biomass remained (CCSBT16 2009:72; CCSBT24 SC22:104). The stock

¹ The United Nations Food and Agriculture Organisation has set its base period as the average of values over 2013–2015.

biomass increased to 9% by 2014. Despite, a total allowable catch at only 50% of maximum sustainable yield, a 2017 assessment put Southern Bluefin Tuna spawning biomass still at only 13% of its original unfished biomass (CCSBT24 SC22 2017:104;111). While an international regime for governance of high seas fishing does exist, this research project will argue that it lacks a key institutional principle necessary to promote sustainable behaviours among state actors.

Indeed, the state actors in each RFMO studied in this thesis are informed in every annual meeting that non-sustainable rates of catch and types of catch are the problem that must be addressed. In each annual meeting these issues are raised in statements by the invited environmental non-governmental organisations (NGOs) to establish mechanisms to reduce catch in the form of vulnerable marine environments and marine protected areas. These are reinforced by the recommendations to freeze or reduce catch made by each RFMOs own scientific committee (CCAMLR36 2017; CCSBT24 SC22 2017; WCPFC14 SC13 2017; SPRFMO5 2017). These recommendations are detailed in *Chapter 5 – Fisheries management*. In addition, civil society is increasingly informed of degradation in international marine fisheries (Newshub 2017). To varying degrees both state and non-state actors are aware that unsustainable fishing practices occur in our national and international fisheries. Yet, international law assigns the right to manage and govern fisheries to state actors, so it is the practice of state actors that are the focus of this thesis research.

Approaches to property rights in fisheries

The global degradation of the world's living marine resources has occurred despite comprehensive documentation of the economic, ecological and institutional conditions under which fish stocks decline and fisheries fail. Economically, commercial fishing is a means of production. Fish caught are a production output that is then exchanged at market. This is also true for illegal, unreported, and unregulated fishing (IUU) which always has the intent to insert catch into a legal supply chain for exchange at market (UNFAO TRACE 2017:2). Thus, the fundamental incentive for commercial fishery production is to make profit. This will be detailed in *Chapter 4 – Fishing as a production activity*. Ecologically, in the long term, fish stocks are a renewable common-pool resource. They are capable of full regeneration if catch rates are kept to within the natural reproduction rate of a species. This will be detailed in *Chapter 3 – Overfishing*. If rates of catch exceed rates of natural reproduction then inevitably there will be a drop in the total productive biomass of a fish stock. Catch (fish mortality) reduces the biomass of the stock and thus its immediate reproductive potential. Therefore, in the short term, any catch quantity taken from a stock by one actor is no longer available to other actors. Fish stocks are thus also a subtractable resource. Therefore, because they are finite and subtractable, fish stocks in capture fisheries are also a scarce resource and the competition to catch the available fish is intense. The scale of this competition is both a product of economic motivation but also of the prevailing political-institutional conditions.

This combination of competitive economic forces and institutional conditions, often termed the ‘tragedy of the commons’, is particularly acute for high seas fisheries.² Applied to the subject area of this thesis, the tragedy of the commons can be described as follows. Under the current regime, fishers have no ownership rights over wild fish stocks in international waters. They only possess the right to fish caught. This will be detailed in *Chapter 5 – Fisheries management* and *Chapter 6 – Governance of high seas fisheries*. Under these institutional conditions, any fish left uncaught by one fisher is likely to be caught by a competing fisher. Individuals and fleets thus race to be the first to catch available stocks. Total catch typically exceeds the productive capacity of the fish species to regenerate. This imbalance occurs season after season. Inevitably, the fish stock declines until it is exhausted, and the industries and communities dependent on the fishery also suffer.

Indeed, much of the scholarship on international fisheries management sensibly describes how the international community should conduct responsible fishing and achieve sustainable exploitation of commercially fished stocks (UNFAO 1995; HSTF 2006; UNFAO PORT 2016; UNFAO ABNJ 2018). At its core, much of this analysis and policy proposal asserts the fundamental necessity to maintain catch of any fish stock to within its biological limits, to apply risk-sensitive management approaches to fishing effort and fishing techniques, and to recognise the importance of a target species within the habitat and the broader ecosystem that sustains it. In addition, the policy and technical guidance from relevant international organisations such as the UN Food and Agriculture Organisation (UNFAO), is founded upon equally fundamental fisheries management measures like controls on the number and type of fishing licences, vessel monitoring systems, and the gathering of catch statistics as methods to control fishing effort and catch (UNFAO 1997:26). The behaviours and conditions that lead to overfishing are well known.

The governance of commercial fishing on the high seas is undertaken through a framework of international treaties. Overarching international law grants all states, and their nationals, the right to catch high seas fish stocks. The 1982 Law of the Sea Convention (UNCLOS) establishes the sovereign freedom of any state to catch fish in high seas areas (UNCLOS Art. 87). Yet, the UNCLOS also subordinated this freedom to fish to governance by multilateral treaties. These treaties are commonly termed regional fisheries management organisations (RFMOs) after the operational entity that is formed upon completion of the treaty negotiation and its entry into force. Each treaty convention has competency over a specific set of high seas species and/or high seas areas. The Conventions of all RFMOs established to govern high seas fishing in the Pacific Ocean declare the same aspirational goals and the objective to conserve the marine resources over which it has competency (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). In its report on the issues and future direction of regional fisheries bodies, the United Nations Food and Agriculture Organisation (UNFAO) defines fisheries governance as the continuing process through which actors “elaborate, adapt and implement appropriate policies, plans and management strategies to ensure resources are utilised in a sustainable and responsible manner” (Swan 2000:3). However, in practice, many of these treaties have simply formalised the historical and unsustainable rates of catch that were already in place when the treaty was negotiated among state members engaged in the fishery. See *Chapter 5 – Fisheries*

² This includes those fisheries of straddling and highly migratory fish stocks, such as tuna.

management for detail on the use of historical catch in determining rates of catch in studied RFMOs. This has led to the precipitous decline in fish biomass despite the formation of RFMOs with procedural competency over these same fish stocks. The inability of multilateral RFMOs to establish sustainable fishing practices results in outcomes directly opposite to the economic interests of those RFMO members. *Chapter 5 – Fisheries management* will show that current catch rates in most of the RFMOs studied are far below what is possible if the stocks of valuable species could have been preserved at a level that produced their maximum sustainable yield.

The conventions of RFMOs are agreed amongst state actors and the governance of RFMOs is conducted by these same state actors. It is too often the case that a majority of the actors are prioritising their own best interests. So, the failure to achieve sustainable fishing practice is a political one. And this is with full information the existing biomass of target fish stocks, and on the effect of rates of current fishing mortality and the expected recovery rates of the biomass of the targeted species. *Chapter 5 – Fisheries management* and *Chapter 6 – Governance of high seas fisheries* show that actors prioritise the short-term benefits over long term. As a regime of governance, this tendency within RFMOs is not ideal. RFMOs do reference trends and over-arching initiatives from other institutions in the framework of governance. But, each RFMO is ultimately a separate entity and is governed separately. Yet, the RFMO regime is not a failure. Within *Chapter 8 – Institution theory and International institutions* and *Chapter 9 – The institutional grammar of high seas property rights* the thesis shows that within the current institutional structure there is a possibility of reform and improvement. This possibility centres on reframing the notion of property and ownership from private-property to a common-property. That is, from owning fish-catch to owning the fish-stock. When state actors recognise that the productive asset is the stock, then governance can begin to focus on prioritising how to maximise the value of the asset – the biomass of the stock must recover its full productive potential.

There is very little literature that focuses upon the motivations of state actors to practice sustainable fishing within the current institutional regime. This is despite the fact that the economic, ecological and institutional conditions under which fish stocks decline are well known. Much of the analysis of RFMO performance justifiably laments weak monitoring and enforcement systems among RFMOs (Hannesson 2004:57; Jentoft 2004:141; World Bank 2004:45; HSTF 2006:24). There is a general recognition that traditional command and control governance approaches leave the burden (and costs) of compliance with the governing authority and may encourage self-optimising non-compliance among participants (Schmidt 2002:56). This is supported by analysis of the many failures of national jurisdictions, which has shown that command and control techniques do not stop wasteful and costly 'negative' incentives such as the race to fish, overinvestment in capital, and under-reporting of catch (Scott 2000a:3). What is lacking in the academic effort to understand the failure of the international RFMO regime is the consideration of a different approach to governance itself.

High seas living marine resources are an extremely valuable and free resource. *Chapter 2 – Analytical framework* shows the different proposals on regime and why these are discounted for this thesis argument. Any change of norms of high seas freedoms is a major change to international law codified into the UNCLOS. *Chapter 8 – Institution theory and International institutions* shows that this regime is a constitutional norm, and would require significant global debate. One can assume that DWFNs will

vigorously oppose such a change.

Any proposal to move limit commercial fishing to within EEZs incorrectly assumes that all coastal states have internalised and conduct their fisheries under principles of best practice in accord with existing UNFAO guidelines. This merely transfers the fundamental difficulty of governance from multilateral to national arenas. Nor is it politically sustainable to ignore the fundamental transboundary nature of living marine resources to straddle both national and international boundaries. Both scenarios require the sharing of allowable catch limits. *Chapter 2 – Analytical framework* shows how any limitation on inclusion into fishing treaties is confounded by the need to include all parties that exploit a resource that ranges throughout the marine environment and is heavily weighted upon their interdependency with other environmental factors.

Thesis argument and objective

Widespread overfishing occurs because state actors do not reproduce behaviours that support sustainable fishing practices. This thesis will argue that regional fisheries management organisations of the current regime of high seas governance have developed no system, or only a very weak system, to establish and enforce norms of behaviour among participants. The practice of sustainable fishing will only follow the creation and the enforcement of rules that reinforce desired institutional behaviours. These rules require effective governance. On the high seas, such systems of governance are undertaken by international treaties. For this reason, any prospects for sustainable high seas fishing rest principally in the realm of international politics.

Further, while the overarching international treaties that govern high seas fishing are global, the selection of high seas fisheries and regional fisheries management organisations to be included in this research will be those four Pacific Ocean RFMOs to which New Zealand is a party: the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), the Western and Central Pacific Fisheries Commission (WCPFC), Commission for the Conservation of Southern Bluefin Tuna (CCSBT), the South Pacific Regional Fisheries Management Organisation (SPRFMO). This is a representative and useful sample that includes the oldest and most recent RFMOs that govern the most heavily exploited fisheries in the Pacific region.

The objective of this research project

New institutional norms and rules are needed to harness the forces and conditions under which high seas fishing is conducted. A successful regime must recognise the economic forces and the underlying ecological and institutional conditions that influence state actor behaviour. Sustainable fishing practices rely upon both an individual incentive to conserve a valuable resource and the enforcement of rules to deter the opportunistic violation of individual catch limits. The fundamental force driving high seas fishing is profit seeking and the fundamental conditions shaping high seas fishing are the ecological limits of the living marine resources. Institutional structures are put in place to govern fishing practice.

To address the problem of overfishing, this thesis will first examine these forces and conditions of high seas fishing. Specifically, it will propose a new set of institutional norms and rules to reframe the concept of property within the fishery. From this platform, it will examine the potential and limits of a new institutional framework to harness actor incentives and achieve sustainable high seas fisheries.

Principal hypothesis

The principal hypothesis of this thesis is that the norms and rules of the current governance regime create powers over property. From an idealised starting point and based purely upon the observation that RFMOs include members and exclude non-members, this thesis begins with the proposal that a system of common-property may exist over high seas fish stocks. What remains to be explored is the actual characteristics of such an institution and the extent to which individual RFMOs reproduce or differ in expression of key norms and rules. Perhaps most important to the motivations for a research project is an answer to the question of 'so what'? In response, three guiding questions are proposed:

- What is the potential or limits of these evolving institutions to affect the practice of high seas fishing?
- Could the conscious application of ownership norms and rules have a tangible effect on unsustainable rates of catch?
- How can the conscious application of norms and rules of property systems be incorporated into new policy approaches to the governance of RFMOs and the practice of high seas fishing?

Institutional Structures

It is possible to determine the strategies, norms and rules of an institution. For the governance of high seas fisheries, the primary sources for statements of institutional strategies, norms, and rules are the convention documents of international treaties and the conservation and management measures they adopt. These institutional statements define the behaviours that are obliged, permitted or forbidden amongst both members and non-members of fisheries governance treaties. The institutional statements of an RFMO occur in two key areas. First, in the Convention document itself, the objective, bodies, functions, roles, and rules of procedure are collectively agreed. Second, these institutional statements also occur in the conservation and management measures adopted by the RFMO Commission once the Convention has achieved entry into force.

From these statements, it is possible to categorise behavioural norms in a particular action area and how these sets of obliged, permitted or forbidden behaviour can change over time. See *Chapter 7 – Institution theory and International institutions* and *Chapter 8 – The institutional grammar of high seas property rights*. A comparative analysis of the institutional statements of the studied RFMOs with

competency in the Pacific Ocean region can identify similarities and differences. From this analysis, it is possible to assess the institutional core and the boundaries of high seas fisheries governance as a regime. Once it has achieved entry into force, an RFMO establishes a new, albeit limited, jurisdiction and a collective 'ownership' over fish stocks that is enforced among both parties and non-parties. Within its jurisdiction, over a set of species or a defined area, the members of an RFMO cooperate to determine resource management objectives, rules for inclusion, and rules for the allocation of total allowable catch among parties.^{3,4} Using the institutional statements of international treaties on fishing, it is possible to determine the characteristics of a property rights system. Institutional statements reveal which types of rights over property are being articulated in the governance of high seas fisheries and which are not. Of interest here is the duration of the right, the extent to which it is exclusive or shared, and the possibility that the right be contested or changed.

Therefore, there are thus two key analytical frameworks of this thesis. The first relates to the research method as an institutional approach to understanding the role of international regimes. This will require an examination of the institutional statements of international treaties to extract norms and rules for comparative analysis. The second is an individual and creative exercise to reframe these extracted institutional statements within the framework of rights and obligations that define a regime of power over property. A key outcome of this thesis is to establish the extent to which international treaties have established a structure of rights over fish stocks, and to examine the extent to which new rights structures can create incentives that shape behaviour of actors in a RFMO fishery.

The potential and limits of property rights in high seas fisheries

The promise of property mechanisms in the governance of fisheries lies in their ability to incentivise the long term sustainable use of the resource. The fundamental requirement of a property rights structure in this context must be to shift the individual benefit from living marine resources from fish caught to the overall fish stock. In this way, a purposive institutional framework can achieve sustainability in high seas fisheries. A successful regime must combine both the individual incentive to comply with norms and rules, and the necessary sanctions to enforce compliance. By developing a set of institutional principles and rules it may be possible to make proposals on more effective treaty provisions and management measures. This thesis will explore the potential of property rights to incentivise the sustainable use of high seas living marine resources, but it will also recognise that the capability of the current regime has limits. The capability of the governing authority to enforce rules and reinforce the value of the system to members will be constrained by the practice of international law, the limits to the jurisdiction and authority of multilateral RFMOs, and the considerable cost of monitoring and enforcement on the high seas. The full potential of rights based management lies in its reordering of

³ For the purposes of this study, members also refer to cooperating non-members who agree to abide by the rules of the RFMO.

⁴ Note that the studied Western and Central Pacific Fisheries Commission still utilises the *input control* of vessel day effort as its control mechanism. The intention of any operational control mechanism, input or output, is to limit overall catch (fish mortality) to a sustainable level.

rights and the obligations upon states fishing in international waters to achieve sustainable high seas fishing.

The next chapter details the different elements of the analytical framework needed analyse the situation and institutions for the governance of high seas fishing.

Chapter 2

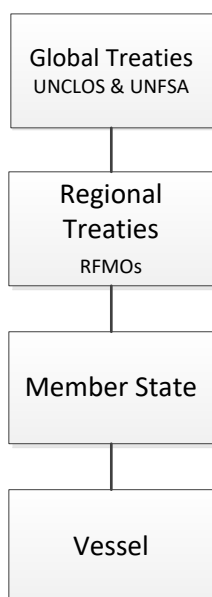
Analytical framework

This research project will draw upon the various bodies of literature that deal with relationships between international law on marine resources, economic approaches to natural resources, and the governance mechanisms most able to achieve the sustainable harvest of a common-pool living marine resource.

Units of Analysis

Before moving onto the substantive framework, it is useful to first establish the units of analysis for this research. As shown in Diag. 1. the thesis will consider global treaties, regional fishery management organisations, member states, and fishing vessels as responsible actors in the issue area. The global treaties create a framework for the governance of living marine resources. They also define the role of RFMOs.

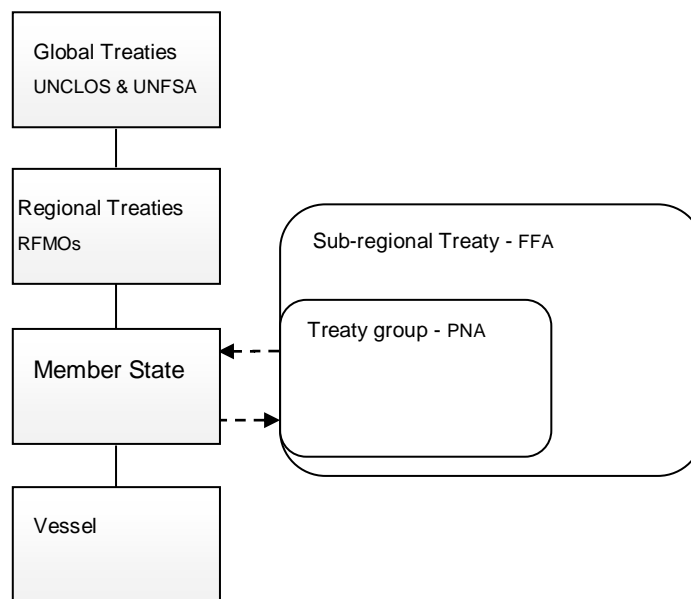
Diag. 1: *Core Units of Analysis*



Subregional groups

There is one exception to this general hierarchy of units. The tuna RFMO for the western and central Pacific Ocean region (WCPFC) has a complex arrangement of sub-regional treaties that affect its fishing governance. Regional management of tuna fisheries in the western and central Pacific Ocean is made up of a web of treaties, conventions and institutional frameworks that underlie regional cooperation. See *Chapter 5 - Fisheries management* for detail on the activities of the PNA subregional group. The complex set of governance and institutional arrangements that manage tuna fisheries in the western and central Pacific Ocean have been referred to as some of the most sophisticated sets of cooperative tools in the world (Hanich et al. 2010). In the Western and Central Pacific Fisheries Commission (WCPFC), the formal hierarchy of international governance is modified through the actions of regional coastal states who are also Parties to the Nauru Agreement (PNA). The WCPFC is particularly different to other studied RFMOs because of the existence of sub-regional groups which provide an additional level of governance amongst coastal state members that impact upon the formal governance invested into a RFMO. These institutional arrangements provide a variety of normative structures from which a range of international and domestic conservation and development policies emerge (Miller 2014:2).

Diag. 2: *Sub-regional group affecting units of analysis within the WCPFC*



The Forum Fisheries Agency (FFA) is an advisory body, providing support to its members for the conservation and management of living marine resources, in particular highly migratory species, within EEZs and the region. Within WCPFC proceedings, individual FFA members will make argue on behalf of all FFA members, second the arguments made by other members, and take actions in accord with the already agreed norms and strategies of the FFA. See *Chapter 6 – Governance of high seas fisheries* for detail on institutional governance. Yet, within the FFA there are also sub-regional groups that are active in setting and affecting the governance of the tuna species under the competency of the WCPFC. For example, the Nauru Agreement is an agreement on terms and conditions for tuna purse

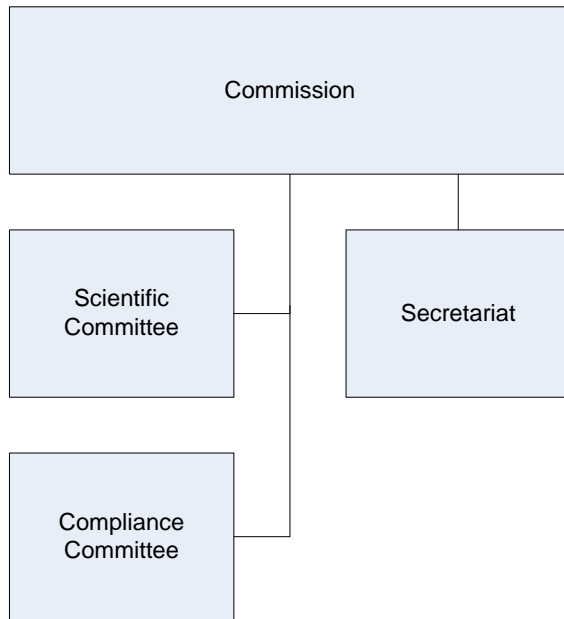
seine fishing licences in the western and central pacific region (PNA 2010). Parties to the Nauru Agreement (PNA) are the Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands, and Tuvalu. This sub-regional group of coastal states have set forth minimum terms and conditions that must be met by the fishing fleets of distant water fishing nations before they are awarded licenses to fish within the EEZs of the PNA group (FFA PNA3). Particularly, the PNA group requires that any fishery closures that are applied within their own EEZs will also apply to the high seas pockets that are enclosed between the boundaries. See *Chapter 6 – Governance of high seas fisheries* for detail on the practice of the PNA group within the greater jurisdiction of the WCPFC RFMO.

While compatibility between management measures is core element of the UNFSA and RFMO conventions it is nonetheless a source of contention within the FFA coastal states and DWFNs of the WCPFC. This revolves around the dominating position of the PNA group within the WCPFC. Specifically, two factors will be explored. First, the PNA group members are all coastal states within the WCPFC. Together, the catch from waters within their collective EEZs makes up 85% of the total catch of the fishery (WCPFC14 2017:74). The group uses this position to apply effort restrictions on the fishing fleets that buy licences to fish within their EEZs. Further, the PNA group applies the condition that such fishing restrictions must also apply to the high seas pockets that are adjacent and enclosed by their EEZs, even when they are more restrictive than those of the WCPFC (FFA PNA3 Art. 1.3). In this way, the PNA sub-regional group modify the governance of the fish stocks over which the WCPFC has competency. For this reason, the details of this unique situation in the WCPFC will be explored in later chapters on fishery management and governance.

The general structure of RFMOs

Returning to the general structure of all RFMOs, when moving between the units of analysis in high seas institutions it is useful to treat regional treaty organisations and states as separate unitary actors. This thesis will show that states have international obligations and the RFMO, while a collective treaty, also has obligations as an entity. These obligations are laid down by the UNCLOS and UNFSA framework treaties and self-imposed by the RFMO itself. Further, Diag. 3 shows that while RFMOs may be a unitary actor they also have a typical organisational structure. This is the context within which norms of behaviour for the RFMO are made. Norms specify which actions may or may not be undertaken by an actor. See *Chapter 7 – Institution theory and International institutions for detail on the theory of institutions*. This thesis will show that a RFMO will often express its norms with specific regard to these organisational units. So, we must recognise the different organisational units within a RFMO.

Diag. 3: *The basic organisational structure of modern RFMOs*



The Commission of a RFMO is made up of all members. It is the primary decision-making body and performs the following core functions: set total allowable catch (TAC); set a catch allocation method; establish a scientific basis for decisions on catch; monitor member performance; deter violations. Within this context of RFMO obligations, the scientific committee must analyse the effects of catch and methods of catch on target on the resource; the compliance committee is increasingly tasked with determining compliance with norms and sanctions for non-compliance; and the secretariat is tasked with administrative and data preparation functions. This is the basic structure of units that will be analysed in the course of this thesis research project. The study will now continue to explore the governance of international fisheries.

International law and the high seas

Ideas on the ownership and use of high seas resources reach back hundreds of years. The delineation of high seas boundaries has changed over this time. Yet, the concept of a high seas area and of marine resources beyond the possession of any one state has been a consistent one. See *Chapter 5 – Fisheries management* for detail on maritime boundaries. As early as 1609, the Dutch jurist Hugo Grotius proposed the doctrine that, in times of peace, the high seas must be open to all nations and may not be subject to national sovereignty.⁵ The ‘freedom of the seas’ did not become an accepted principle of international law until the 19th century. This was the period when Great Britain, the maritime and commercial power of the time, vigorously asserted the doctrine in international law.

⁵ This doctrine was ideologically connected with other 19th century freedoms, particularly laissez-faire economic theory (Britannica 2012).

However, it is the ability to exploit valuable resources and to exclude others from these resources that lies at the core of international principles of national sovereignty and maritime boundaries. In modern international maritime law, the high seas are all parts of the mass of salt water surrounding the globe that are not part of territorial waters or internal waters of a sovereign state (UNCLOS Art. 86). Just over 60% of the world's oceans lie beyond any national sovereign jurisdiction and high seas freedoms now include freedom of over-flight by aircraft, the laying of submarine cables and pipelines, marine navigation, and freedom of fishing (UNCLOS Art. 87). A high seas fishery is simply fishing undertaken in areas of ocean outside of the maritime boundaries of any state. On the high seas, all vessels must fly the flag of the country by which they are authorised to conduct fishing activities. A flagged fishing vessel is then subject to the laws of its flag state and any international obligations that state has adopted by treaty (UNCLOS Art. 116). The international institutions that govern high seas fishing are designed to act upon the rights and obligations of the various flag states, port states, and market states that are actors in high seas fisheries. See *Chapter 8 – The institutional grammar of high seas property rights* for detail on the actors within international fisheries governance institutions.

Multilateral treaties

Of course, states can agree bilaterally and even trilaterally to cooperate in the management of high seas fisheries. For example, in 1985 Australia, Japan and New Zealand agreed to apply catch limits on their respective fishing fleets in order to conserve dwindling stocks of southern bluefin tuna (UN ITLOS 2000). Similarly, the 2000 South Tasman Rise Agreement between Australia and New Zealand established annual catch limits for orange roughy (South Tasman Rise Agreement 2000). Yet, there is a fundamental weakness to such ad hoc agreements. Many different states have access to high seas fish stocks. International law creates high seas fish stocks as open access resources. Yet, any fishery governance system is founded upon the intent to limit catch. International agreements that limit catch must include all parties that catch the resources. Any effective agreement on rules of behaviour must include mechanisms to verify and enforce compliance (Ostrom 1994:5; Keohane 1995:2; McGinnis 1999:11). Yet, states have shown themselves unwilling to empower ad hoc agreements to this degree. Indeed, in efforts to contain Japanese exploitation of Southern Bluefin Tuna to within previously agreed limits, both Australia and New Zealand have sought to bring legal proceedings to the International Tribunal on the Law of the Sea (ITLOS) (Kwiatkowska 2000:150-155). Finding an international body that is invested with the competency to pass judgement on such issues of high seas fishing is itself problematic. Perversely, the ITLOS agreed to hear the case and issued recommendations against the expansion of Japanese catch but ultimately ruled that it had no jurisdiction over the matter (UN ITLOS 2000:46). The United Nations regime to govern fishing in international waters must rely upon its own RFMO entities to enforce sustainable fishing practices. See *Chapter 6 – Governance of high seas fisheries for detail on the system of governance over fisheries in international waters*. Therefore, the effective governance of high seas fisheries rests upon multilateral treaties that are both universal and binding.

International law on the governance of high seas fishing already exists. The principal instruments of international law for high seas fishing are the 1982 United Nations Law of the Sea Convention

(UNCLOS) and the 1995 United Nations Fish Stocks Agreement (UNFSA). Together, these two global 'framework' treaties lay down the fundamental principles and norms of high seas fishing. Crucially, they also mandate the establishment of regional fisheries management organisations (RFMOs) as the means through which interested states must cooperate to exercise their rights and duties under the law of the sea. The Convention (UNCLOS) is the primary treaty instrument that defines modern maritime boundaries, rights, and duties. It provides the 200-nautical mile (370km) exclusive economic zone for coastal states, and codifies sovereign rights and jurisdiction within that zone (UNCLOS Art. 55). Beyond sovereign maritime boundaries, the Convention also provides states the right to fish on the high seas (UNCLOS Art. 116), and goes on to assert that "all States have the duty to take, or to cooperate with other States in taking, such measures for their respective nationals as may be necessary for the conservation of the living resources of the high seas" (UNCLOS Art.117).⁶ In this way, the law of the sea confirms individual high seas freedoms yet binds them to collective duties and to mechanisms of collective governance. States must "cooperate to establish sub-regional or regional fisheries organisations" (UNCLOS Art.118). Likewise, the 1995 Fish Stocks Agreement reaffirmed the rights and duties of states established in the Law of the Sea, and focused on the problematic area of fish species that migrate across national borders and the high seas (UNFSA Art. 5). The Agreement sought to improve lacklustre cooperation between states in the decade following the introduction of the law of the sea. The Agreement reaffirms the mandate to establish regional fisheries management organisations (RFMOs) and their competence to govern fishing of species that moved across state maritime boundaries and the high seas. The UNCLOS and UNFSA framework treaties are further supplemented by the UN Food and Agriculture Organisation (UNFAO) 1995 Code of Conduct for Responsible Fisheries. This document, along with its many supporting Technical Guidelines, sets out the principles and international standards for best practice fisheries management to ensure the effective conservation, management, and development of living marine resources (UNFAO 1995). Yet, the current regime is failing to achieve the sustainable use of high seas fish stocks despite the existence of both hard and soft instruments of international law.

This research project must therefore consider a convergence of the forces and conditions most likely to enable binding sustainable fishing practices. Given the immediacy of the crisis in the overexploitation of living marine resources, the study will prioritise outcomes that can be achieved within the existing framework of international law. Because the governance of fishing in international waters relies principally upon self-enforcement by individual parties and through the internal mechanisms of regional fisheries management organisations, this study will focus upon both a method to harness the economic motivations that lie at the heart of commercial fishing and a method to incentivise the voluntary individual limitation of catch.

⁶ References to the role of states shall, where applicable, be read to include the fishing entity of Taiwan. Despite its ambiguous diplomatic status, Taiwan maintains a large fishing fleet and its inclusion and participation in fisheries management organisations in the Pacific Ocean is essential.

Economics and Property Rights

The primary interests and incentives of actors in a fishery are economic. See *Chapter 4 – Fishing as a production activity* for detail of the economic argument of this thesis. Commercial fishing is a means of economic production that encompasses the effort by humans to catch living marine resources then process and sell that catch. This includes illegal or unauthorised fishing which ultimately still seeks to introduce its catch into legitimate markets (HSTF 2006:24). All fishers and fishing nations seek the profitable exchange of their 'product' in a market transaction. At the heart of this perspective of the fishery is the economist's model of rational human behaviour – *Homo economicus*. Essentially, everybody acts from self-interest and is spurred by the profit motive (Stiglitz 2002:46). Economics studies how actors make choices. It also studies how these individual choices determine a group's use of scarce resources.

Fish stocks are a common-pool resource, so individual usage decisions affect the whole group. *Chapter 4 – Fishing as a production activity* will show that common-pool resources are characterised by their joint use by multiple actors and also by the subtractability of this usage. The primary production resource of a fishery is the biomass of a target stock, and catch reduces the biomass of that target species. When a resource is subtractable, extraction by one user reduces the amount of the resource left for other users in the group. Biomass will naturally regenerate if left alone, and on human timescales it will continue to regenerate indefinitely. Of course, this production capability is dependent upon the environmental habitat and ecological processes that sustain the targeted fish stocks. Fishery management regimes are therefore mindful of the impact of catch upon dependent and associated species, and upon the habitat itself (UNCLOS 1982; UNFSA 1995; CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Nevertheless, on a seasonal and annual timescale, any individual catch (fish mortality) subtracts from the overall biomass of the resource.

Balancing these ecological elements of mortality and reproduction leads to the fundamental definition of overfishing and of its economic effects. See *Chapter 4 – Fishing as a production activity* for detail on the mechanics of overfishing. The individual catch of each fisher has an immediate economic effect on the whole fishery by making the target species more scarce. The extra effort required to catch increasingly scarce fish stocks increases the production costs for all fishers. Therefore, to preserve their margin of profit, fishers are motivated to catch the most fish and to catch them first. To this end, fishers will also invest in ever larger vessels and gear to increase catch capability. The history and predicament of high seas fisheries shows us that this economic competition among fishers inevitably leads to rates of catch that exceed the ecological regeneration rate of even the most fecund and populous species. Overfishing is thus a level of catch that exceeds the capacity of the species to fully regenerate its biomass in a natural recruitment cycle. Sustained overfishing progressively reduces the spawning potential of the fish stock and the amount of new fish recruited to the species biomass. The United Nations Food and Agriculture Organisation estimates that rebuilding already overfished stocks could increase fishery production by 16.5 million tonnes and annual rent by US\$32 billion (UNFAO 2014:41). The economically rational competition to extract a valuable and common-pool living marine resource will invariably result in resource depletion without some focused institutional mechanism to limit catch.

Thesis argument

This thesis will argue that changing collective behaviours over common-pool resources requires changing structures of ownership. Under certain institutional conditions, economic incentives drive actor behaviour to degrade the productive potential of living marine resources. Yet, different institutional norms and rule sets have the potential to harness the same economic motivations to conserve the value of a common-pool resource. The pivotal factor in the ability to harness powerful economic incentives lies in ideas and institutions of ownership over resources. Profit motives can provide the impetus to maximise the immediate individual utility from a common-pool resource. Conversely, changing institutional structures of ownership can provide a profit motivated owner with the impetus to conserve a resource and to maximise future benefits from it. The practical function of property rights is to define and protect economic interests. Rights over resources are used to allocate their beneficial use to individuals (or groups) and to exclude others. This general conception of property as it relates to individual ownership provides the holder of a property right three general powers: (a) to use a thing or manage it, (b) to sell it or grant it to others, and (c) to take its yield as crop, rent or royalty (Stewart 2004:16). The potential for profit or loss creates an incentive for a property owner to think carefully about resource usage decisions.

For resources which are not privately owned, such as wild fish stocks, there is no incentive to conserve or reduce the rate of exploitation. With no ownership rights over a resource, no fisher has an economic incentive to conserve that resource. They have rights to capture - the power to take and keep the fish caught; but no powers to manage and conserve wild fish stocks for future production. Under a system where fish stocks are exploited by multiple actors, fishers are merely occupiers of a fishery. The absence of any powers to manage a resource, and in particular no trespassory protection, precludes any economic incentive to preserve fish stocks for future periods. Weak institutions that fail to encourage and enforce limits on catch among participants are a governance failure. Conversely, institutional rules that regulate catch limits and exclude certain actors from withdrawal of the resource create property rights. Yet, not one of the international treaties or studied regional fisheries management organisations records the intention to create property rights. This thesis will argue that, creating norms and rules to strengthen powers over property will be the achievements of a successful institution. A primary objective of this research project is to construct a model of property rights created by the conventions of RFMOs that govern high seas fishing.

Characterising the institutional structures of international fishing treaties

To construct a working model of international fisheries governance, this research project will adapt typologies of property system characteristics to an analysis of international treaties. Underpinning this characterisation are two key observations by Scott on the creation and the nature of property rights in domestic fisheries. Scott's first observation relates to the creation of property rights. It is that any mechanism of control may create property-like rights. Scott asserts that "social structures that create exclusive access to a valuable resource, and enforce that exclusivity, create property-rights regardless of the intention to do so or not" (Scott 2000a:6). Scott's second observation relates to the nature of property in a capture fishery. The exclusive component of the ownership unit in a fishery is the right to

catch a certain number of fish, in a certain location, of a certain species, during a certain period. In a capture fishery, the number is the property (Scott 2000b:111). Simply by permitting an actor a catch allocation, a governance authority may intentionally or unintentionally create property rights.

Thesis argument

This thesis proposes that the international RFMO regime creates a system of property rights over high seas fish stocks. However, this authority to create a property right is complicated by the governance structures put in place by the relevant international law. There is no single authority in the current regime to govern living marine resources in the high seas. Each RFMO formed by a multilateral treaty has a mandate to allow catch by members and to exclude non-members from the specific fish species or areas only over which it has competency (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). The argument of this thesis is that the institutional framework created by the Law of the Sea treaty is characteristic of a common-property regime. See *Chapter 6 – Governance of high seas fisheries* and *Chapter 7 - Property rights in high seas fisheries* for a deeper analysis of the international regime and of individual RFMO Conventions. Chapter 6 in particular will explore the extent to which bundles of property rights are defined and how they are distributed amongst actors.

Institutional Statements

New shared principles and norms can come to be codified in international law. For example, high seas freedoms and particularly the freedom of fishing was one such norm that first became customary law and was then codified in the 1982 UN Convention on the Law of the Sea. Since the 1950s, the problem with universal freedoms to fish came in the form of a rapid advance in the technology of engines, freezers and fishing gear, and a vastly increased investment in high seas fishing fleets (Scott 2000b:107). Predictably, the rapid rise of fishing efficiency and fishing effort led to a precipitous drop in wild fish stocks. The UN Law of the Sea and UN Fish Stocks Agreement treaties were in part a response to the rapid depletion of living marine resources in international waters. See *Chapter 6 – Governance of high seas fisheries* for detail on how these landmark treaties create the mandate and legitimacy for the formation of regional fishery management organisations (RFMOs). In accord with the Law of the Sea, all states have the right to fish on the high seas, and thus membership of a regional fisheries management organisation is open to all 'interested' state parties. An RFMO is incorporated by a group of state parties who collectively negotiate a set of duties and obligations on fishing actors formalised in a Convention document. As a party to a RFMO treaty, a state is entitled to an allocation of the total allowable catch of living marine resources that fall under the jurisdiction of the Convention. In addition, a member state is also entitled to participate in the determination of the RFMO's management measures. Within its jurisdiction, over a set of species or a defined area, the members of an RFMO cooperate to determine resource management objectives, rules for inclusion, and rules for the allocation of total allowable catch among parties. Upon their entry into force, RFMOs constitute the legitimate authority to collectively define the rules for a fishery. Once it has achieved entry into force, each RFMO establishes a new, albeit limited, jurisdiction over the fishery.

While the governance of high seas fishing falls to multiple multilateral RFMOs, the collective institutions of this regime are still evolving. *Chapter 8 – Institution theory and International institutions* provides the detail on the structures of fisheries governance in this study. Focusing on the purposive aspect of institutional design, North defines an institution as a framework of socially devised constraints that structure political, economic and social interaction (North 1999:5). The fundamental objective of an institution is the reproduction of its norms by actors through the desired behavioural set that defines those norms. More, the structure of an institution can reveal the linkage between intentions, actions and results. An important element of any purposive institutional framework is the creation of an incentive structure with rewards for compliance and penalties for non-compliance (North 1999:7; Petersen 2002:312). Further, formal international organisations are purposive institutions with explicit rules, specific assignments of roles to individuals and groups, and the capacity for action (Keohane 1989:162). Of interest to this research project is the evidence that RFMOs continue to develop rules and procedures that are designed to ensure regular and predictable behaviour.

Like in any institution, it is possible to analyse the constitution and objectives of an RFMO for the specification of its rules and enforcement mechanisms. *Chapter 8 – Institution theory and International institutions* provides the background and detail on the grammar of institutions technique used in this study. Institutional rules operate at a lower level of generality than principles and norms (Krasner 1983:187). These rules may be technical, such as a requirement for all flagged fishing vessels to be equipped with GPS enabled vessel monitoring systems (UNCLOS Art. 62.; UNFSA Art. 5.j; CCAMLR 2010:2; CCSBT 1994 Art. 5.2; WCPFC 2004 Art. 10; SPRFMO 2009 Art. 25.c). Similarly, institutional rules may prescribe actions such as forbidding a state to flag a vessel whose catch it cannot monitor and report, or forbidding a port state to accept fish catch that does not meet standards of documentation and verification. Examples of these statements can be seen in the overarching Fishing Agreement, and they are reproduced in the conventions of individual RFMOs (UNFSA 1995 Art. 17; CCAMLR 2010:2; CCSBT 2009:2; WCPFC 2004 Art. 27; SPRFMO 2009 Art. 26). Indeed, these rules are also referenced in individual conservation measures to guide specific behaviours and achieve specific outcomes within a RFMO. In addition, some rules affect behaviour indirectly. For example, a RFMO may permit a majority voting system and thereby remove the veto inherent in a consensus voting system (CCAMLR 1995 Art. XII.1; CCSBT 1994 Art. 7; WCPFC 2004 Art. 20; SPRFMO 2009 Art. 16).

The likelihood that purposive institutional design in an RFMO can reproduce a desired behaviour depends upon its legitimate authority, its mandate, and its enforcement capabilities. The first level of purposive intent in a RFMO occurs in the role of the Commission – the collective body of member state parties – to define the rules and standards of the Convention. The Commission seeks to establish a set of behaviours among its members. For example, a common rule set within RFMO conventions is (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012):

- Members must collect and verify monthly catch data from all flagged fishing vessels
- Members must report monthly catch data, in accord with data standards, to the RFMO
- Members must report annually on implementation of conservation and management measures, and compliance and enforcement procedures adopted by the RFMO

A second tier of purposive structure within RFMOs occurs in the role of the flag state to define rules and standards for its flagged vessels. Here, the member state seeks to establish a set of behaviours among its nationals and vessels over which it has sovereign jurisdictional authority. The core of these rules are those that must be undertaken in accord with its state obligations as a member of the treaty around which the RFMO is formed. As a member of a RFMO, flag states are required to enforce common rules sets such as (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012):

- Flagged vessels engaged in fishing activities must have vessel monitoring systems installed and operational
- Flagged vessels engaged in fishing activities must document all catch in accord with data standards
- Flagged vessels engaged in fishing activities must document all offloading or transshipment of catch in accord with data standards.

The different rules put in place to reproduce desired behaviours will operate on multiple institutional levels and across the multiple roles of each actor in the institutional framework. Just as is identified in Keohane's description of a purposive institution, an RFMO identifies many roles for its members, be they a flag state, port state and/or market state. Each role comes with its own set of actions and outcomes with which the actor is obliged to comply.

Rule governed behaviour is a necessity for sustainable high seas fishing. Sustainable exploitation of common-pool resources requires social institutions – rules-in-use – to enable individuals to utilise these resources over long periods of time (Ostrom 1994:4). Ostrom asserts that successful cooperation to manage common-pool resources generally requires two conditions: scarcity and mutual dependence. When a resource is scarce, each individual in the group has a strong incentive to sustain the resource in addition to the incentive to exploit it. Both these incentives are driven by economic self-interest – a profit motive. See *Chapter 4 – Fishing as a production activity* for detail on the economic argument. The second condition for cooperation is a strong and mutual economic dependence on the resource. This guarantees that every individual in the group who withdraws from the common-pool resource has an equal stake in avoiding the deleterious effects of overexploitation. See *Chapter 7 – Property rights in high seas fisheries* for detail on the property rights argument. A strong and mutual dependence upon the benefits from resource extraction is the prerequisite to create incentives for all individuals in the group to cooperate and sustain the expected future revenues from a scarce resource.

Thesis argument

Successful governance also requires the development of norms and rules to exert both internal and external control. See *Chapter 8 – Institution theory and International institutions* for detail on the theory of institutions. Externally, challenges to the institution come from free riders or poachers who seek to benefit from availability of the fish stock without contributing to the costs of maintaining the stock. Such costs may be compliance costs of gear restrictions or the opportunity costs of catch limits. Yet, within

an institution, rules must incentivise compliance with core principles and norms of behaviour among members (Keohane 1998:121). Those governance rules most likely to be successful are those closely aligned with the primary incentives for each actor. That is, their ability to create and sustain future revenues from the fish stocks. But, rules are only effective to the extent that they affect actor behaviour. Even as a hard law treaty, a RFMO has a strictly limited authority over member states. The UNCLOS mandated the formation of RFMOs to govern high seas fishing, but it made no reference to any enforcement capabilities to be invested in RFMOs (UNCLOS 1982). In accord with the law of the sea, states retain sovereign jurisdiction over flagged vessels, including all capacity for punitive legal measures. Therein lays the primary weakness of the RFMO regime. Enacted by consensus, states are generally unwilling to assign punitive capabilities to RFMOs (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Therefore, another key outcome of this research project is the examination of a different institutional approach to harness individual incentives towards the support and enforcement of sustainable fishing practices.

Research Method

A key element of this research project is the decomposition of the institutional statements of RFMOs into their component parts. To do so, Ostrom's 'institutional grammar' technique will be used to identify and categorise the strategies, norms, and rules defined by RFMOs in the Pacific region. See *Chapter 8 – Institution theory and International institutions* for detail on the grammar of institutions technique used in this study.

At the core of Ostrom's analytical approach is the identification of strategies, norms, and rules as different types of institutional statements which are governed by an underlying grammatical structure. Using these grammatical components, analysis captures the underlying prescription of the institutional statement in use:

- A shared strategy identifies an action or outcome expressed by the community
- A norm identifies an action or outcome that is obliged/permited/forbidden
- A rule identifies the penalty for violation of a norm

Researchers generally select a focal set of actions or outcomes for their studies of institutions. In this thesis, the focus is upon observing the extent to which RFMOs are expressing an institutional structure that is characteristic of a common-property system over a common-pool resource. The institutional analysis presented in *Chapter 8: The institutional grammar of high seas property rights* is thus alert to instances where the international community expresses a shared desire for a defined group to exercise exclusive withdrawal and management rights over a fish stock or marine area. Indeed, there are many normative statements made in the Conventions and management measures of the international treaties that govern high seas fishing. For example, in a common-property system over a common-pool resource, a core normative statement would forbid any actor who is not a member or cooperating non-member of the group from withdrawing any of the shared resource (UNCLOS 1982; UNFSA 1995; CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). An analyst may also look for additional

statements to determine the contours of the property system, such as the allocation of a resource portion or the creation of a means to share or trade that portion.

The primary sources of evidence for this thesis research project are the international treaties that govern the practice of high seas fishing. This approach is relevant to the regional fisheries management organisations (RFMOs) that are the primary subject of this study. Certainly, RFMOs are mandated by the law of the sea, and their principles and objectives are drawn from instruments of international law. Yet, each RFMO is constituted by a set of interested but diverse state actors. The constitutions of RFMOs, and the conservation and management measures they adopt are the result of hard negotiation and compromise among those actors who are party to it. This thesis research seeks to observe institutions by focusing on how they are expressed linguistically through 'institutional statements'. Institutional statements are spoken, written, or tacitly understood in a form intelligible to actors, and they prescribe, permit, or advise actions or outcomes for actors (Crawford & Ostrom 1995:583). Indeed, to understand regularised patterns of interaction affected by rules, one needs to examine the actions and outcomes that rules allow, require, or forbid, and the mechanisms that exist to enforce those rules. Crawford and Ostrom provide a grammatical syntax with concrete directions for coding of the three types of institutional statements that one might observe: strategies, norms, and rules (Crawford & Ostrom 1995:583). As Crawford et al. assert, an institution can be viewed as no more than a regular behaviour pattern sustained by mutual expectations about the actions that others will take (Crawford & Ostrom 1995:583). International institutions should not be treated as things that exist apart from the shared understanding and resulting behaviour of participants.

Ostrom's institutional grammar approach has culminated in the Institutional Analysis and Development (IAD) framework. Most empirical applications of the IAD framework over the past two decades have been to situations involving common-pool goods but none have involved a study of the institutions for the governance of high seas fishing. In addition, while the explorations of contemporary researchers using the IAD framework do centre on the polycentric nature of politics and policymaking over common-pool goods, they are primarily centred on scales within national jurisdictions such as water rights. Nonetheless, the IAD framework rests upon a view of actors capable of moving between being guided by rules and being rule makers. It is in this sense that the IAD framework is most useful for the analysis of the institutional statements of regional fisheries management organisations. The framework recognises that while these institutional statements may be observed and characterised, they also operate over different scales and will change over time.

This thesis will focus in particular upon institutional rules. It recognises the institutionalist prediction that shared strategies and norms are the basis for cooperation, but the practical implications of self-interest loom larger than aspirational objectives. Insert callout to detail on the theory of institutions in *Chapter 8 – Institution theory and International institutions*. It is expected for example, that statements of strategy and normative intent of broader scope will elicit more inclusive or cooperative modes of behaviour than narrower issues of implementation and possession. This highlights a major structural weakness in the consensual nature of international relations, and for the governance of high seas fishing. RFMOs do have authority and jurisdiction to govern, yet they are at the same time embedded within a regime of self-governance (UNCLOS 1982; UNFSA 1995; CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). In the issue area of commercial fishing, the practical implications for a state actor's

immediate self-interest may loom larger than aspirational objectives for long term sustainability. Therefore, opportunism and other forms of strategic behaviour will never be completely absent among actors (McGinnis 2010:173). The predicted outcome is that actors will maximise individual payoff at the expense of possible collective outcomes. Here, the model predicts that the minimum institutional structure that is sufficient to encourage a high rate of cooperation is one where (a) actors will cooperate and (b) there exists a low-to-moderate sanction with (c) a high probability of being monitored and sanctioned (Crawford & Ostrom 1995:592). Crawford and Ostrom assert that while institutions are based on shared strategies and norms, they are constructed by rules designed to reproduce the desired behaviour (Crawford & Ostrom 1995:583-6). Even within a group, someone will always try to cheat. Thus, greater weight is placed on institutional rules to influence actor behaviour. To understand regularised patterns of interaction affected by rules, one needs to examine the actions and outcomes that rules allow, require, or forbid and the mechanisms that exist to enforce those rules (Schlager & Ostrom 1992:250; Crawford & Ostrom 1995:583). If an action is forbidden by a norm and an actor engages in that action, then other compliant actors in a community expect the deviant to experience some type of cost. Shared strategies and norms are the basis for cooperation but it is rules that define the outcome of cooperation.

Chapter 5 – Fisheries management details the endemic overfishing and the dire state of fish stocks that demand the search for new approaches to the governance of high seas fisheries. The 1982 UN Convention on the Law of the Sea established the mandate for the creation of RFMOs, and marked a shift away from traditional individual freedoms of fishing and towards the advance of collective fisheries management regimes on the high seas. However, as shown in *Chapter 7 – Property rights in high seas fisheries*, the UNCLOS, UNFSA and other international legal instruments do not explicitly mandate the creation of property rights over high seas fish stocks. Nor do individual RFMOs self-identify their norms and rules with property-like structures. Yet, faced with scientific warnings of the magnitude of biomass and yield reduction, it is within the last decade that regional fisheries management organisations have begun to strengthen their institutional control over members and non-members (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). In sum, international treaty documents are the primary source material for this study. The various global and regional treaties collectively define the strategies, norms, and rules of high seas fisheries governance. The institutional statements which identify these components are found in both the convention documents of international treaties, and in the conservation and management measures they adopt.

Principal hypotheses

The principal hypothesis of this thesis is that the norms and rules of the current governance regime create powers over property. From an idealised starting point and based purely upon the observation that RFMOs include members and exclude non-members, this thesis begins with the proposal that a system of common-property may exist over high seas fish stocks. What remains to be explored is the actual characteristics of such an institution and the extent to which individual RFMOs reproduce or differ in expression of key norms and rules. Perhaps most important to the motivations for a research project is an answer to the question of 'so what'?

In response, three guiding questions are proposed:

- What is the potential or limits of these evolving institutions to affect the practice of high seas fishing?
- Could the conscious application of ownership norms and rules have a tangible effect on unsustainable rates of catch?
- How can the conscious application of norms and rules of property systems be incorporated into new policy approaches to the governance of RFMOS and the practice of high seas fishing?

Institutional Structures

It is possible to determine the strategies, norms and rules of an institution. For the governance of high seas fisheries, the primary sources for statements of institutional strategies, norms, and rules are the convention documents of international treaties and the conservation and management measures they adopt. These institutional statements define the behaviours that are obliged, permitted or forbidden amongst both members and non-members of fisheries governance treaties. The institutional statements of an RFMO occur in two key areas. In the Convention document itself, the objective, bodies, functions, roles, and rules of procedure are collectively agreed. These institutional statements also occur in the conservation and management measures adopted by the RFMO Commission once the Convention has achieved entry into force.

From these statements, it is possible to categorise behavioural norms in a particular action area and how these sets of obliged, permitted or forbidden behaviour can change over time. A comparative analysis of the institutional statements of the RFMOs with competency in the Pacific Ocean region can identify similarities and differences. From this analysis, it is possible to assess the institutional core and the boundaries of high seas fisheries governance as a regime. Once it has achieved entry into force, an RFMO establishes a new, albeit limited, jurisdiction and a collective 'ownership' over fish stocks that is enforced among both parties and non-parties. Within its jurisdiction, over a set of species or a defined area, the members of an RFMO cooperate to determine resource management objectives, rules for inclusion, and rules for the allocation of total allowable catch among parties. Using the institutional statements of international treaties on fishing it is possible to determine the characteristics of a property rights system. Institutional statements reveal which types of rights over property are being articulated in the governance of high seas fisheries and which are not. Of interest here is the duration of the right, the extent to which it is exclusive or shared, and the possibility that the right be contested or changed.

There are two key analytical frameworks of this thesis. The first relates to the research method as an institutional approach to understanding the role of international regimes. This will require an examination of the institutional statements of international treaties to extract norms and rules for comparative analysis. The second is an individual and creative exercise to reframe these extracted

institutional statements within the framework of rights and obligations that define a regime of power over property. A key outcome of this thesis is to establish the extent to which international treaties have established a structure of rights, and to examine the extent to which new rights structures can create incentives that shape behaviour.

The potential and limits of property rights in high seas fisheries

The promise of property mechanisms in the governance of fisheries lies in their ability to incentivise the long term sustainable use of the resource. The fundamental requirement of a property rights structure in this context must be to shift the individual benefit from living marine resources from fish caught to the overall fish stock. Purposive institutional frameworks can achieve sustainability in high seas fisheries. A successful regime must combine both the individual incentive to comply with norms and rules, and the necessary sanctions to enforce compliance. By developing a set of institutional principles and rules it may be possible to make proposals on more effective treaty provisions and management measures. This thesis will explore the potential of property rights to incentivise the sustainable use of high seas living marine resources, but it will also recognise that the capability of the current regime has limits. The capability of the governing authority to enforce rules and reinforce the value of the system to members will be constrained by the practice of international law, the limits the jurisdiction and authority of multilateral RFMOs, and the considerable cost of monitoring and enforcement on the high seas. The full potential of rights based management lies in its reordering of rights and the obligations upon states fishing in international waters to achieve sustainable high seas fishing.

The next chapter details the features of high seas fishing that make it so vulnerable to overfishing.

Chapter 3

Overfishing

Overfishing is a level of fish catch (fish mortality) beyond that which is biologically sustainable by a fish stock. Any action to minimise overfishing in the high seas must be multilateral because high seas fish stocks are situated beyond the national jurisdiction of any one state. Further, any rules and systems of governance must be established under the principles and practices of international law. Indeed, in accord with the Law of the Sea established in 1982, states must establish and cooperate through regional fisheries management organisations (UNCLOS Art. 118). Yet, over the last thirty years, this thesis will show that the current regime of international governance over high seas fishing has consistently failed to establish the practice of sustainable fishing.

Political, legal, and economic complexities confound the governance of high seas fishing. Every state possesses the sovereign right to fish on the high seas and so living marine resources of the high seas belong to every state. These open-access conditions shape both individual and collective behaviour. It is individually rational that fish must be captured as quickly as possible. Because otherwise they will be caught by somebody else and the benefit extracted from the marine resource will go to somebody else. This rationality is shared by all other actors in a fishery and informs the collective practice of fishing (UNFAO SOFIA 2016:14). Therefore, much of the scholarship on international fisheries management sensibly describes how the international community should conduct responsible fishing and achieve sustainable exploitation (UNFSA 1995; HSTF 2006; UNFAO PORT 2016; UNFAO ABNJ 2018). At its core, all this analysis asserts the necessity of maintaining catch of any fish stock to within biological limits, to apply risk-sensitive management approaches to fishing effort and fishing techniques, and to recognise the importance of target species within the habitat and broader ecosystem that sustains it. Likewise, fundamental fisheries management measures like licence controls, vessel monitoring systems, and catch statistics all work as means to control fishing effort and catch (UNFAO 1997:26). See *Chapter 5 – Fisheries management* for detail on the core objectives of competent fisheries management.

At the same time, much of the analysis of regional fisheries management organisation (RFMO) performance justifiably laments weak monitoring and enforcement systems (HSTF 2006:24; Hannesson 2004:57; Jentoft 2004:141; World Bank 2004:45). However, very little literature on the issues facing high seas fishing focuses upon the motivations of state actors to practice sustainable fishing. This is despite the general recognition that traditional command and control governance approaches still incentivise individual catch maximisation, and leave the burden and costs of compliance with the governing authority (Schmidt 2002:56). Analysis of the fishing policy and practices within many national jurisdictions has already showed that command and control techniques do not stop wasteful and costly 'negative' incentives such as the race to fish, overinvestment in capital, and under-reporting of catch (Scott 2000:3). The United Nations Food and Agriculture Organisation (UNFAO) thus calls for urgent governance solutions that provide positive incentives for good practice,

removal of perverse influences, and adequate deterrence for non-compliance (UNFAO 2012:206). It is recognised that there is already a considerable weight of excellent analysis and policy proposed for excellent fisheries management measures. This thesis asserts that what is required in analysis of high seas fishing is a consideration of a new approach to governance. The future of our marine resources and ecosystems depend upon a system of international governance that creates the individual incentives to limiting catch and allow the long-term use of marine resources. See *Chapter 10 – A common-property system* for the thesis argument that ideas on property within a fishery are the key problem to solve.

Many proposals to address overfishing practices centre upon radical departures from prevailing international law and practice. To address endemic overfishing, Crothers et al. propose establishing multilateral corporate ownership structures to manage high seas fishing activities and to distribute net wealth among all states (Crothers et al. 2006:4). Such egalitarian principles are the same as those first built into the International Seabed Authority (ISA) established by the UNCLOS to organise and control all mineral-related activities in the seabed and subsoil of the high seas (ISA 2018). What made the ISA so objectionable for some developed countries, and the USA in particular, was the provisions for the use of collected monies for wealth distribution and mandatory technology transfer. All these provisions were subsequently removed in the 1994 Part XI Implementation Agreement (Wood 1991:81). Just as controversial is a response to historically weak governance by RFMOs that proposes increasing the sovereign maritime boundaries of coastal states beyond the current 200-mile (370km) limits (Hannesson 2004:41; 2011:667). Thereby, increasing the amount of marine measures that fall within the exclusive economic zones and sovereign jurisdictions of individual coastal states. This approach has merit as long as one assumes that coastal states have the political and social competency to effectively manage stocks within national jurisdiction. However, this approach fails to recognise that some of the most valuable living marine resources are straddling and highly migratory species that naturally roam over large areas of ocean (UNFSA 1995). In most cases, shifting boundaries does not remove self-maximising behaviour as the root cause of ineffective fisheries management. This situation is explored further in later chapters, which explore the case of the Western and Central Pacific ocean where a regional sub-group of coastal states is struggling to achieve effective management of tuna stocks within the larger RFMO organisation (*Chapter 5 – Fisheries Management* and *Chapter 6 – Governance of high seas fisheries*).

In all these cases, diagnosis correctly focuses on the identification of missing or weak international institutions as a source of dysfunctional performance. However, given the current status of commercially fished stock, the international regime must deliver sustainable fishing practices in the high seas. Furthermore, governance improvements that can feasibly be implemented in the short to medium term should be pursued with much greater urgency than is evident in existing scholarship. That is, the focus of this thesis must be upon improved approaches to governance of high seas fish stocks that can be achieved within existing international principles and practices.

Overfishing

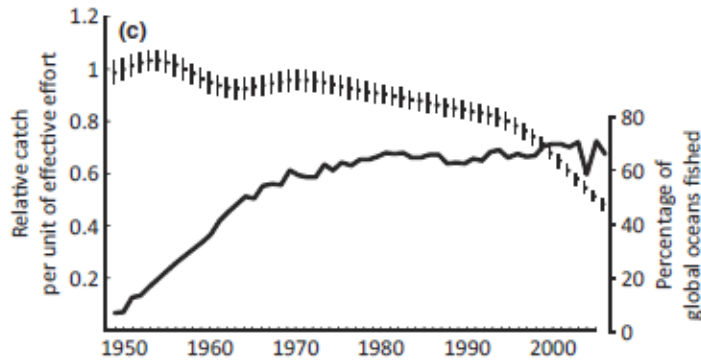
The global catch of living marine resources is driven by ever increasing world population growth and demand for fish protein. In 2014, 81.5 million tonnes of fish was caught in marine fisheries (UNFAO SOFIA 2016:8). Fish products represent a very valuable source of protein and essential nutrients for an ever-growing world population. In 2009, fish accounted for 16.6% of world population intake of animal protein and 6.5% of all protein consumed (UNFAO 2012:5). In 2013, fish accounted for about 17% of the global population's intake of animal protein and 6.7% of all protein consumed (UNFAO SOFIA 2016:18). World trade in fish for human consumption is expected to exceed 46 million tonnes in live weight equivalent in 2025, up 18% from the base period (UNFAO SOFIA 2016:22).⁷ There are also considerable economic benefits from the catch of fish. At 10% of total agricultural exports, fish and fishery products are among the most traded food commodities worldwide (UNFAO 2012:67). In 2012, world trade values in fish and fishery products were estimated at US\$125 billion. Global exports in 2014 were worth USD\$ 148 billion (UNFAO SOFIA 2016:17). Further, the primary production of fishing alone provides the livelihood and income for an estimated 56.6 million people (UNFAO SOFIA 2016:12). Adding ancillary activities like fish processing and including dependents, it is estimated that the fishing sector supports the livelihoods of 660-820 million people, or about 10-12% of the world's population (UNFAO 2012:10). While these global figures do include aquaculture stocks, wild fish stocks in the high seas remain under intense pressure from unsustainable levels of catch.

Declining global marine catch coupled with the increased percentage of overexploited fish stocks show that the state of the world marine fisheries is worsening. Fleets now fish all the world's oceans and have increased fishing power by an average of 10-fold since the 1950s (Watson et al. 2012:4).⁸ Note that there is great variability between regions, where a rapidly developing Asia has increased its effective fishing effort 25-fold. As a result, the fish biomass supporting global fisheries has been substantially reduced in the last few decades and more fishing effort measured in the power of fishing vessels is not returning a commensurate increase in fish catch. The trajectory of the relative catch per unit of effort in Fig 1. shows the continual decline in the abundance of our living marine resources (Watson 2012:6). Indeed, global catches have decreased 500,000 tonnes per year since the late 1980s (Swartz et al. 2010:1). In addition, global catch figures are likely to be underestimated because they do not account for illegal, unreported, and unregulated fishing (IUU) (Swartz et al. 2010:2). The global loss from IUU fishing in a range of studied national and high seas fisheries in 2003 was 13-31% and estimates place the total value of current IUU fishing losses worldwide at between \$10bn and \$23.5bn annually (Agnew et al. 2009:2-4). Indeed, it is estimated that illegal fishing may account for up to 26 million tonnes of fish a year, or more than 15 % of the world's total annual capture fisheries output (UNFAO SOFIA 2016:6).

⁷ The United Nations Food and Agriculture Organisation has set its base period as the average of values over 2013–2015.

⁸ This was when conventional data collection started.

Fig. 1: *Catch per unit of effort (CPUE) in global fisheries*



Besides economic damage, such practices can threaten local biodiversity and food security in many countries. It is evident from Fig. 1 that historical rates of catch were unsustainable and have degraded the productive fish stocks to fractions of their unfished biomass.

The argument for an inclusive international regime is a fundamental foundation for sustainable fishing practices. Not only must appropriate and effective institutional rules of behaviour be put in place. Every actor who insists upon using a valuable common-pool resource, such as marine living resources, must be a party to the regime and the institutions that govern sustainable exploitation of that resource. While the United Nations mandated RFMO regime has evolved rules to detect and punish illegal fishing it is preferred that all actors operate within the law of the sea agreements. The scientific and economic arguments to support sustainable fishing are also unequivocal. The only way toward sustainable global fisheries is through the reduction of fish catch (Swartz et al. 2010:5).

In sum, the current governance regime for high seas fisheries has failed to deliver sustainable fishing practices and demand is still increasing. Governance approaches must create institutional norms and rules that acknowledge the legal, economic and political conditions of the high seas. These new approaches must combine the incentive to catch fish with the incentive to self-limit catch to within sustainable rates of fish mortality.

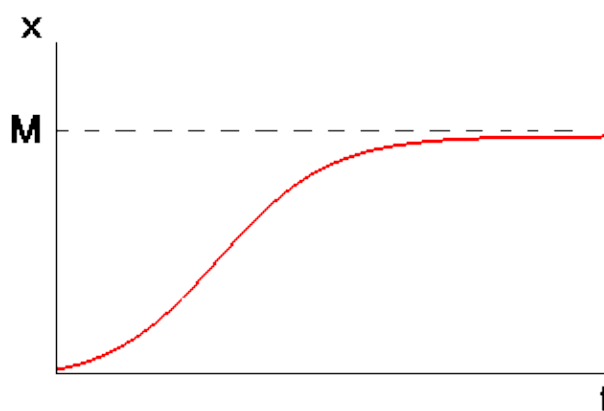
Fish stocks are valuable resources with natural limits on rates of use

Generally, natural resources are divided into two categories: non-renewable resources and renewable resources. See *Chapter 7 – Property rights in high seas fisheries* for more detail on types of property. Non-renewable resources are minerals or fossil fuels that have taken millions of years to form. Minerals and fossil fuels have no natural reproduction except on geological timescales and from a human perspective are regarded as being in fixed supply (Common 1995:33). In contrast, renewable resources are those whose supply is not affected by use or which have a natural rate of reproduction that is relevant to human life spans (Rees 1992:241). The first type of renewable resource, such as solar radiation, has availability that is unaffected by the amount exploited for production at any given moment. The second type of renewable resource is one where intensity of use does affect future

availability. Trees and fish are prime examples. This phenomenon of use affecting future availability is termed subtractability. Withdrawal of a unit of resource reduces the finite stock available to other users, and will increase the effort and unit costs of further use. The use of subtractable resources for economic production must account for ecological and environmental parameters.

Biotic populations like fish have the potential to grow by means of natural reproduction and this growth rate means that their biomass can increase naturally over time. A biotic population will continue to grow until the carrying capacity of its ecosystem is reached. Thus, the natural growth rate of a fish stock is limited by its environment. The general model of population growth is termed the logistic growth curve. Figure 2 below highlights the relationship between total population, environmental capacity and the rate of growth of a fish stock (Seijo et. al. 1998).

Fig. 2: *The logistic growth curve represents the growth rate of a biotic population over time*

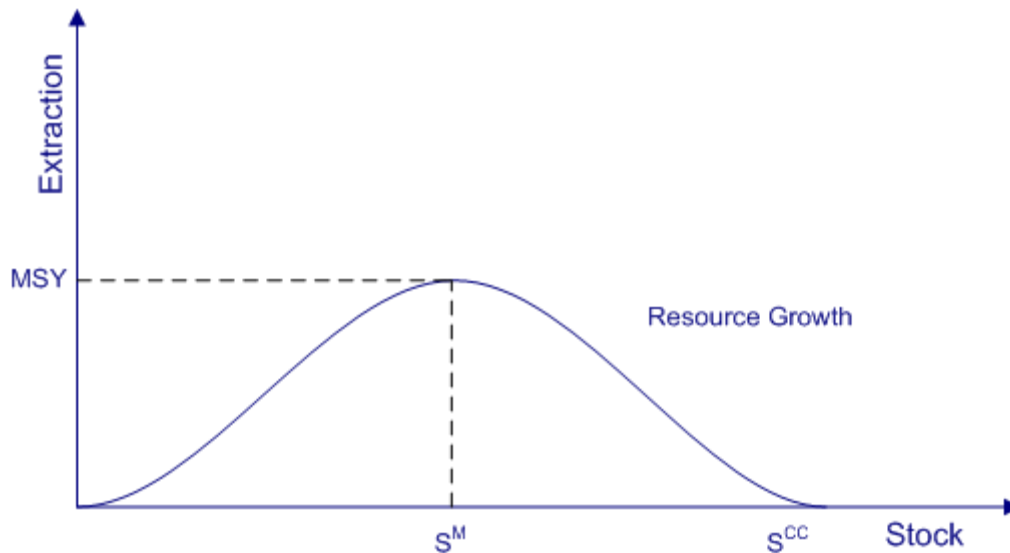


The curve shows that initially growth is exponential, then the growth slows as environmental saturation begins, and growth stops at maturity. Thus, net growth of the population is shown to be a function of population size itself (fish-stock biomass). Recall, that this is the feature of an unfished marine resource. As the population (axis-x) becomes larger, members interfere with each other by competing for the same critical resources, such as food or living space (Seijo et. al. 1998). As the population reaches maturity within the ecosystem over time (axis-t), the *carrying capacity* of the habitat is reached. This carrying capacity (M) is the number of individuals of a species an environment can support, given the available food, water, habitat and other necessities. Essentially, the logistic growth model shows that, all else being equal, the logistic growth rate of a biotic resource is proportional to both the existing population and the amount of available resources. Like all models it is the simplification of a complex reality to highlight key relationships. For example, it only measures a fish stock as a homogenous biomass while competent fisheries management systems tend to consider fecundity and specific age ranges of catch (Seijo et. al. 1998). In reality, there is considerable uncertainty in regard to stock dynamics. Issues such as age and fecundity are always critical factors, but complete scientific understanding of their characteristics is lacking. This uncertainty, or steepness, is explored in more detail in *Chapter 4: Fisheries Management*. Nonetheless, this idealised growth model is used by scientists to consider the rates at which an unfished biotic resource can renew itself in future periods.

This growth rate is a function of the existing resource population but is also dependent on past rates of use. If catch, or fish mortality, is always within the limits of natural growth then the resource can

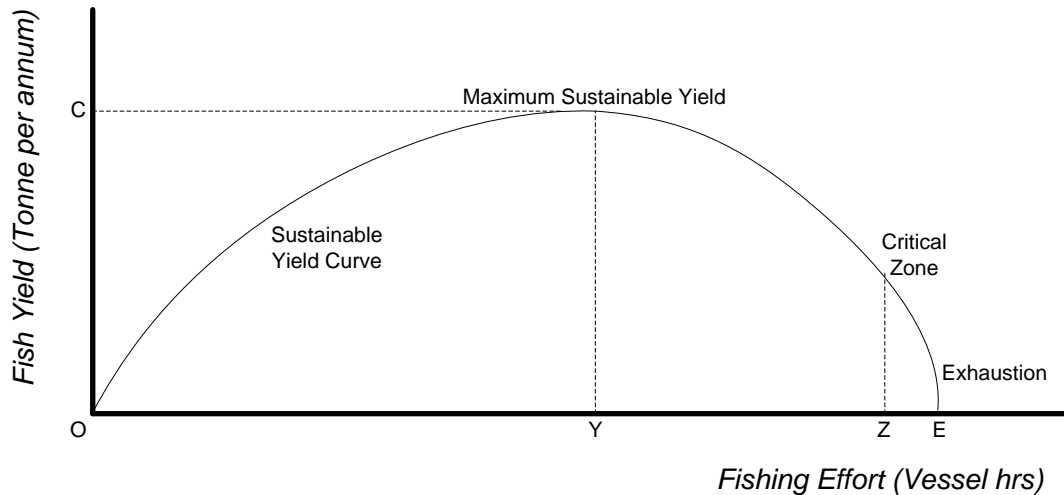
theoretically be used indefinitely. However, if the rate of catch consistently exceeds the rate of natural reproduction then even biotic populations are potentially exhaustible. Natural growth rate is linked to catch rate. If the catch rate from a resource is equal to its maximum natural growth rate, then the resource is said to be harvested at its maximum sustainable yield (MSY). Maximum Sustainable Yield is the theoretical maximum quantity of a resource that can be harvested without depleting the productive potential of a fish stock. Figure 3. represents this theoretical point at which a rate of fish catch is maximised but will not deplete the underlying fish stock.

Fig. 3: Maximum Sustainable Yield



Once a population grows to the level of the carrying capacity of its environment (S^{CC}), its growth will then be sufficient only to replace losses due to mortality. The net growth of a species at the carrying capacity of its ecosystem is zero (Markandya 2001:32). When a biotic population is harvested, the net growth rate initially increases the stock size. Within a given reproductive cycle, the rate of growth reaches a maximum at S^M and falls to zero at S^{CC} , which indicates the carrying capacity of the resource's habitat (Perman et. al. 1996:396). As already stated, if the harvest (catch) of a resource is equal to the maximum natural growth rate (S^M), then the resource is said to be harvested at its maximum sustainable yield (MSY). The MSY point also represents the maximum quantity that can be harvested from a biotic resource without reducing the size of the stock. This determination of a sustainable utilisation rate is essential for estimating levels of total allowable catch that will ensure a fish stock and its productive capacity is not degraded. See *Chapter 4 – Fishing as a production activity* for detail on the economic effects of resource degradation. Figure 4 adds the effect of sustained over-catch upon the target biomass (Clark 2006:95-97).

Fig. 4: Maximum Sustainable Yield – effect of overcatch



Essentially, the maximum sustainable yield model incorporates factors of ecological growth and sustainable harvest. As already shown, a maximum stock level exists for biotic resources, which is determined by the *carrying capacity* of the *ecosystem*. Fig 4. can also be used to highlight the result of rates of effort and catch that exceed natural reproductive rates. Any rate of catch that exceeds the rate of natural regeneration will degrade the productive biomass, resulting in an overall reduction in spawn to replace fish mortality. Continued overfishing will ultimately reduce fish stocks until they reach a critical reduction in reproductive capacity. Once a fish stock has reached the critical zone the biomass will continue to reduce until the fish stock is exhausted. While not shown in Fig. 4 there may also be a critical minimum stock for some resources, below which the resource cannot continue to exist and may become locally or regionally extinct. While biomass limits such as exhaustion are an ecological reality, economic analysis argues this is not a predicted outcome.

The inference of modelling the maximum sustainable yield of a fish stock is that a catch within the reproductive capacity of that stock may be taken indefinitely. The model does assume a single independent stock, one reproductive cycle, and no habitat destruction that limits regeneration. In reality an ecosystem is a web of species interdependencies, but while ecological and scientific models may recognise this fact economic models are often simplified. Nonetheless, maximum sustainable yield is the biological reference point for the absolute upper limit for sustainable rates of catch in RFMOs (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). It is used to evaluate past performance of fishing activities on target species and used for future management measures on target species, interdependent species and the environment as a whole. Interdependent relationships and habitat are important. Competent fishery management organisations do regulate bycatch and grossly destructive catch methods such as bottom trawling (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). But catch (fish mortality) is the primary activity to be controlled directly. Controlling the amount and methods of fishing of the stock are the only elements of a stock's dynamics that can be controlled by management. In capture fisheries of wild fish stocks, the welfare and regeneration of a stock cannot be directly influenced. The only control mechanisms open to a management authority is to not degrade the habitat of a fishery and to not exceed the maximum sustainable catch rate for a species.

The ultimate intent of a fishery management authority with respect to marine conservation of the resource is to ensure that there is sufficient spawning stock remaining after the harvest for the stock to sustain itself (Rosenburg et al. 1995). However, as is shown in Fig. 4, if the exploitation rate of the stock sufficiently and consistently exceeds its MSY then the resource can effectively be mined like a mineral resource and ultimately exhausted (Rees 1992:14; Perman et al 1999:83; Markandya 2001:160). Further, at a critical point in the exhaustion of a fish stock it cannot be assumed that it can entirely regenerate after being severely depleted, even when all exploitation has ceased. The depletion process may be so far advanced that the theoretical and anticipated natural recovery of the stock flows fails to take place because of a larger disruption affecting associated and dependent species, conditions of spawning and juvenile growth, or being replaced by rival species (Worm et al. 2007:6). The decline of stocks is masked by continual expansion to new species or areas.

In sum, the sustainable use of natural regenerating resources is dependent upon the *intensity* of its exploitation. Biological utilisation models like the natural growth curve and maximum sustainable yield answer the core economic question of how much of a resource is available for use by humanity. Sustainable usage implies that the natural capital stocks that generate human wellbeing should not be depleted over time (Markandya 2001:171). Therefore, sustainable rates of use are dependent upon rules and systems that create the incentive to restrain catch to within the natural limits of a fish stock.

Common-pool resources

Ocean fisheries are a classic case of the Hardin's 'tragedy of the commons' because fish stocks are common-pool resources. See *Chapter 7 – Property rights in high seas fisheries* for detail on types and economics of property. This type of resource is subject to joint use by a group of users, and any extraction by one user reduces the amount of the resource left for other users (Ostrom 1994:4). The so-called tragedy occurs because the sum of each actor's individual rationale to maximise catch results in a collective irrationality by reducing the overall yield available to all actors (Hardin 1968:1244). There are two reasons for this outcome in a capture fishery. First, the only way to claim ownership of wild fish in such a common pool is to catch them. Under this system of ownership, fishers cannot save fish for the future. If they restrain their catch to leave enough fish to reproduce for the following season, the uncaught fish may be taken by someone else. Second, each fisher in a commons captures all the benefits of catching more fish while facing only a fraction of the cost of stock depletion because the cost of increased effort to catch the increasingly scarce remaining fish is split among all fishers. Effectively, when fish are plentiful capture costs are lowest.

When a fish resource is exploited under common pool conditions, each fisher is motivated to be the first to capture fish. Thus, do fishers invest in equipment such as faster boats, boats with increased storage capacity, and better detection devices that improves their chances of winning the race for fish. Not only do the fish stocks decline under common-pool conditions but fishing eventually becomes wastefully expensive. *Chapter 4: Fishing as a production activity* further details the dilemma of marginal cost vs. marginal profit in an actor's calculations. This disparity between full benefits received and

fractional costs paid encourages too many fishers to enter the fishery and too many fish to be taken (Leal 2005:3). Such individual rational maximisation has adverse ecological and economic effects.

Overfishing resulting from individual maximising behaviour is the central problem in the governance of high seas fishing. See *Chapter 7 – Institution theory and International institutions* for more detail on game theory and its influence on institutional design. The freedom of fishing provisions in the United Nations Convention on the Law of the Sea makes high seas fish stocks common-pool. However, rational actors will seek to maximise their own return on investment. Rational actors will also assume that all other actors are rational and will maximise their own returns on investment. Likewise, some state actors in a high seas fishery fail to pursue collaborative strategies because they expect the other members of the anarchic international system to pursue competitive strategies. Hence, it would be individually irrational for one state to require its fishing fleets to observe a catch limit if it believed that the fishing vessels of other states are allowed to disregard similar limits (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Even state actors are driven by individual rational calculation to pursue a strategy which, collectively, leads to a sub-optimal collective outcome. Sustainable high seas fisheries can only be achieved with the creation of an international regime whose systems and rules incentivise individual catch limits.

A governance regime

Chapter 8: Institution theory and International institutions describes the key theoretical concepts within the context of the governance of high seas fishing. International regimes should enhance the ability of state actors to cooperate in each issue area. In this context, a regime is a general pattern of activity or shared practices. These practices are often informed by 'social facts' such as commonly held assumptions of legitimate behaviour or normative value (Keohane 1998:76). An international regime is thus a set of behavioural norms or rules accepted by a group of states as a means of dealing with a certain sphere of common concerns (Keohane 1998:113). Similarly, Krasner describes a regime as set of implicit or explicit principles, norms, rules, and decision-making procedures around which actor's expectations converge in each area of international relations (Krasner 1983:2). In this context, principles are beliefs of facts, causation and rectitude. For Krasner, the rules that define a regime are derived from shared principles and norms (Krasner 1983:4-5). Specific rules convert the regime norms into concrete prescriptions for behaviour or action. So, a regime can be considered rule-governed behaviour. Further, while regimes are characterised by a set of shared principles and norms, they are by no means permanent. Regimes are constructed, maintained, and transformed by humans (McGinnis 2011:170). In many cases, international regimes are accompanied by organisations designed or employed to deliver on the specific objectives and targets derived from guiding principles. The outcome of sustainable fishing practices is exactly what RFMOs were intended to achieve.

Solutions to Overfishing

Solutions to common-pool resource problems require rules that restrict access and rules that create the incentive to invest in a resource. Indeed, through research into solutions to open-access conditions in water resources, Ostrom famously shows that the key objective for successfully managing common-pool resources is to develop social institutions – rules-in-use – to enable individuals to utilise these resources over long periods of time (Ostrom 1994:4). Successful governance requires shared principles and norms, and agreed rules of behaviour. Solving common-pool resource problems requires rules for restricting access to a resource and for creating incentives for users to invest in the resource instead of overexploiting it (Ostrom et al. 1999:279). The idea of restricting access has both theoretical and political dimensions. In theory, a limit on the number of users who are authorised to withdraw from the resource, when coupled with limits on access to the resource via volume and gear restrictions, would keep rates of use to within sustainable limits. High seas fisheries also confront issues of scale. The basis of most scholarship on common-property systems centres on a domestic context and on groups who can successfully exclude others from use of the resource (McKean 1992:251; McGinnis 2011:180). For fish stocks, these are traditionally small-scale domestic fisheries where one group can define and exert territorial enclosure, usually relying upon enforcement by local and state authorities. On a broader national scale, the maritime boundaries of coastal states are defined by the UN law of the sea. Access to fish stocks within a state's exclusive economic zone is restricted by nationality. In practice, this type of access limit is only as effective as the means of a sovereign state to detect and enforce illegal, unreported, and unregulated (IUU) fishing within EEZ areas. This is especially problematic for less developed and failed coastal states (UNCLOS 1982; UNFSA 1995; CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012; UNFAO Somalia 2018). Beyond sovereign boundaries are the high seas. The overarching international legal principle in high seas areas is the freedom to fish for the nationals of all states.

High seas fish stocks are common-pool in accord with the freedom of fishing provisions in the law of the sea. These fish stocks are resources to which no-one has rights of ownership before capture and subsequently from which no-one has the right to exclude anyone else or to limit their use (McKean 1992:250). Under such conditions, and intense economic competition, the rational incentive is for individuals and fleets to catch as much fish as possible in as short time as possible. Yet, while Hardin's tragedy of the commons is the definitive portrayal of individual maximising behaviour, it also omits the efforts of people to engage in cooperation (Rettig 1995:445). Fisheries management authorities have attempted various controls to prevent fishers from taking too many fish each season. These include restrictions on the size and power of fishing vessels, the types of fishing gear allowed, the area where fishing is allowed, and the time during which fishing is allowed. In addition, fishery management authorities in national and international fisheries have attempted to control the total harvest, vessel catch per fishing trip, and catch characteristics (e.g. requiring that all fish landed be of a minimum size) (UNFAO 1997; CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). These traditional 'command and control' mechanisms are all elements of effective governance but are rarely enough "to prevent crowding, congestion, strategic [gaming] behaviour, racing, and capital stuffing" (Scott 1988:7-

8). In a common-pool resource all interested parties have the incentive to maximise individual returns on exploitation effort.

High seas governance

The authority and mandate to agree and enforce rules of behaviour in high seas fishing falls to international treaties, and particularly to regional fisheries management organisations (RFMOs). In addition to its provisions of freedom of fishing, the UNCLOS requires all states to form and cooperate through regional fishing management organisations (RFMOs) (UNCLOS Art. 118). In practical terms, the state participants in a regional fisheries governance organisation must deliberately devise (then monitor and enforce) rules that: limit who can use a resource, specify how much and when that use will be allowed, create and finance formal monitoring arrangements, and establish sanctions for non-conformance [to rules] (UNFAO 1995:8; HSTF 2006:62-67). Rules negotiated and agreed within each of these multilateral treaties define the acceptable and unacceptable behaviour when exploiting fish stocks over which a RFMO has competency (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Members and cooperating non-members must follow rules and non-members are excluded from access to the fish stocks over which the RFMO has competency.

In practice, high seas spaces are vast, compliance among members is variable, and exclusion of non-members is costly. This leads to practical matters of enacting monitoring and enforcement measures to ensure that the cost of unauthorised withdrawal is so high as to make the activity unbeneficial to the offender. Even with some form of restricted access or exclusions, a group with powers over a common-pool resource still require rules to set catch limits and allocate shares of allowed catch among the authorised group members. However, moving from open-access to group-access over a common-pool resource can still fail to achieve sustainable rates of catch if the actors with withdrawal rights must still compete for catch. An effective governance regime must develop internal incentives to prevent overfishing.

The potential of property rights to achieve sustainable high seas fisheries

Property-rights hold great potential for the governance of high seas fishing. When a governance system strengthens individual property-rights over a resource, the holders of such rights secure for themselves future benefits from the resource. The anticipation of these benefits provides the incentive to conserve that resource over the long-term. Harnessing this incentive is the core promise of property-rights systems. The common-property approach suggests the obvious remedy: to assign catch quotas to individual actors in such a way as to make the aggregate of quotas equal the maximum sustainable yield of the fish stock. Indeed, such property-rights systems are an increasingly favoured approach to governing fisheries within the exclusive economic zones of coastal states (Christy 1975:695, 1996: 298; Scott 2000:7; Stewart 2004:5). Of interest for this study are systems of rules that describe the nature of property rights over a resource.

The use of property-rights systems is a highly regarded governance approach for fishing within national jurisdictions, yet they are not a common element in the discourse on the governance of high seas fishing. Indeed, there is no mention of property rights in the convention documents of the overarching UNCLOS nor in any studied RFMO. This may be because limiting overall catch to levels of maximum sustainable yield (MSY) is the essential and first milestone of governance, and doing so under existing governance approaches is difficult (Hoare 2010). Yet, where high seas fisheries are in focus, considerations of property-rights as mechanisms of control are rare. Even when they are considered, rights-based management is merely used as a device to observe the limits of sovereign jurisdiction and state cooperation (Jentoft 2004:139). A new approach to institutional treatment of international common-pool resources is needed. This thesis proposes that institutional rules focused on optimising biomass recovery rates as opposed to yield from the remaining biomass will result in increased benefits for all members. See *Chapter 11 – Conclusion* for detail on the necessary rules and policy proposal to achieve this outcome.

Thesis objective

This research project seeks to determine the extent to which regional fisheries management organisations define norms or rules that are characteristic of rights over common-property. Governance can be reduced to a system of behavioural rules. McGinnis aptly defines governance as “a process by which the repertoire of rules, norms, and strategies that guide behaviour within a given realm of policy interactions are formed, applied, interpreted, and reformed” (McGinnis 2011:171). For McGinnis, governance determines who can do what, to whom, and on whose authority. By examining the institutional principles, norms, and rules within regional fisheries management organisations, this thesis research will show that a framework for property-rights has largely emerged in high seas governance.

It will show this institutional landscape in two steps. First, it will use Crawford and Ostrom’s institutional grammar technique to analyse rules of obligatory, permitted, and forbidden behaviour defined in RFMO treaties (Crawford and Ostrom 1995). Second, these instances of institutional grammar will be reframed to show their dual aspect as components of rights in a common-property system. Each of these components will be assessed for its relative strength against an ideal rights system and then compared with other RFMOs. Together, these dimensions will identify where and how property-rights have currently been defined in international fishery governance. They will also be used to identify gaps and the opportunity for new institutional statements.

The next chapter contrasts the mechanisms used in fishery management to the mechanisms available to fishery governance. Effective fishery management controls are essential to ensuring catch limits are known and compliance is monitored. But it will be shown that these control mechanisms are not sufficient to create institutional rules that shape behaviour to support sustainable catch.

Chapter 4

Fishing as a production activity

The previous *Chapter 3: Overfishing* showed that sophisticated economic control mechanisms can be problematic in a high seas fishery. It is difficult for a RFMO to create a market for individual transferable quota because it requires agreement on a unit quote price. This price must reflect the fisheries expectations about future prices, catch cost, stock size and the efficacy of the RFMO to achieve the compliance of all other parties to its norms of legitimate behaviour. However, one should not equate the difficulty of achieving an agreement on unit price with the inherent economic motivations of the actors choosing to pursue high sea fish stocks.

This chapter examines the economic principles that underpin fishing on the high seas. Fish stocks and their habitats are ecological systems, and multilateral governance over the high seas is a political process. But, above all, high seas fishing is a commercial activity whose actors are driven by the motivation to make a profit. Further, fishing is a production activity with inputs of fish stocks and fishing effort, and an output of caught fish. The economic modelling of this production is singularly anthropocentric. It is centred upon human interest and welfare. At its heart is the assumption that actors are self-interested, self-maximising, and that their welfare is largely a function of profit (Stiglitz 2002:10). These assumptions also inform those mechanisms of fishery governance that seek to manipulate behaviour through economic incentives. Munro succinctly expresses the economic approach to living marine resources (Munro 1981:129):

As is true of all natural resources, fishery resources constitute capital assets from the point of view of society. Similar to man-made capital assets, such as factories and machinery, fishery resources are capable of producing a stream of returns to society through time.

Acknowledging this core economic element of fishing provides clarity in the approach to the governance of high seas fisheries. Certainly, the actors in high seas governance are a highly diverse mix of distant water fishing nations and coastal states. But all states engage in high seas fisheries because of their desire for the benefits that can be profitably gained from fishing. Understanding the economic rationale that underpins high seas fishing highlights the central role property-rights can play to achieve sustainable high seas fishing. Property rights systems can either distort resource usage behaviours or mobilise the incentive to sustain the value of a resource and the stream of returns from it over the long term.

This chapter will show that common-pool conditions have a powerful impact on exploitation behaviours and on incentives to sustain a productive resource. In high seas fisheries, fish stocks are historically subject to open-access or common-pool conditions. Under both these conditions, no one actor has exclusive withdrawal rights over any portion of the resource. Spurred by the incentive to profit, each actor must race to secure their own catch from the common pool of fish. Ultimately, marginal utility

becomes the underlying principle in each actor's level of effort. Each rational actor will increase fishing effort until the profits from exchanging one more unit of fish at market are cancelled by the cost of effort to catch that extra unit of fish. Because of these conditions, the resource is not given its true value as an input cost to production, and with no guarantee of future benefit the resources are priced at zero. The property externalities are a problem with appropriate valuation of the resource. Actor incentives based purely on market mechanisms such as marginal utility cannot be relied upon to deliver biologically sustainable rates of catch.

The core assumptions of microeconomic modelling

Microeconomic models are concerned with how individuals make decisions, and with the positive and negative effects of those decisions. This economic approach to decision-making focuses upon the interaction of choices, incentives, and exchange (Stiglitz 2002:67). Choice shaped by incentives is a core motivator in economic thought. An incentive is a benefit (such as reduced costs) that might motivate a decision-maker to favour a particular choice. While many factors affect incentives, an economic approach to decision-making prioritises prices. A price is the value given in exchange for the transfer of ownership of a good or service (Besanko et al. 2005:33). The context for economic decision making is commercial activity. Here, actor incentives are centred on the profit they expect to earn from the production of a good or service (Stiglitz 2002:10). Broadly, actors take labour, capital and materials as inputs, and produce goods and services to sell as outputs. In a fishery, fish stocks and fishing effort are inputs while fish caught are the production output.⁹ In economic terms, *natural capital* is the assets and flows of goods which are produced by nature rather than being human-made (Asheim 2000:2). Economic interest in natural resources centres on their value and availability as an input to production. Fish catch is valuable and great effort is expended to convert wild fish to caught fish.

At the core of economic theory is a model of rational human behaviour - *Homo economicus*. Classical economics is centred on the belief that the greatest possible economic benefits for society are produced through (a) the pursuit of individual self-interest and (b) the power of a free market to allocate resources, labour, and capital in the production of goods and services to their most valuable use (Mankiw 2004:7-10; Bishop 2009). Here, rational behaviour is a core economic idea whereby the actor balances costs against benefits to arrive at an action that maximises personal advantage (Friedman 1953:15). If everybody acts rationally and is spurred by the profit motive then the economy will work more efficiently and more productively. Following classical economic theory was the Keynesian economic perspective which maintained the core idea but was a critical response to the free market mechanism. Keynesians do still advocate market economics, but generally conclude that markets require governance intervention and stabilisation policies to reduce the extreme booms and busts of an unfettered business cycle (Blinder 2008:318). This was a mainstream economic model from the late 1920s to the 1970s, but lost some of its influence following the stagflation period of the 70's. The interventionist Keynesian approach has since been overshadowed by the neo-classical economic approach.

⁹ The existence of a market through which prices are set and the catch exchanged (sold) is assumed.

Neoclassical economics is the mainstream economics today. It disputes that the government's role in economic stabilisation can be positive, and instead develops the free-market ideas of classical economics into a full-scale model of how an economy works (Bishop 2009). Neoclassical economic models can be characterised by three familiar assumptions: (a) actions are taken based on full and relevant information, (b) actors have rational preferences among outcomes, and (c) actors maximise marginal utility and maximise profits.

The key development of neoclassical economic theory is its use of margin analysis tools to extend the concept of individual self-interest in the pursuit of optimal outcomes. Later in this chapter, margin analysis will inform the key model of Maximum Economic Yield used in the analysis of fisheries. Here, a margin is the difference made by one extra unit of something (Bishop 2009). For example, a rational actor will increase units of production up to the point where marginal revenue equals marginal cost. The actor will do this because if marginal revenue still exceeds marginal cost then the actor will increase its profit by producing an extra unit of output. Alternatively, if marginal cost exceeded marginal revenue, then a rational actor would increase its profit by producing fewer units of output (Bishop 2009). These models do assume perfect information. Where information is only partially available then decisions are made within a bounded rationality. Here, decision-makers lack the ability and resources to determine the optimal solution. They instead apply their rationality only after they have greatly simplified the choices available. Because imperfect information is the normal condition, actors will often seek a satisfactory solution rather than an optimal one (Gigerenzer et al. 2002:4). Nonetheless, the techniques of margin analysis at the core of neoclassical economic thought do still advance the assumptions of rational decision-making invested in *Homo economicus*: Produce a unit of something only if the marginal utility you get from it exceeds the marginal cost of doing it. For this reason, the valuation of production inputs is a key factor in the rational decision-making invested in market mechanisms.

The valuation of production inputs

The *basic competitive model* describes an efficient market but also reveals factors that make market mechanisms imperfect. The model describes an 'idealised' market made up of three ingredients: rational self-interested consumers, rational profit-maximising producers, and competitive markets with price-taking behaviour (Stiglitz 2002:22-27). Producers compete with one another to offer consumers products that they want. At the same time, there is only a limited number of goods available and they come at a price. Thus, consumers also compete with one another and only those who can meet the price can enjoy the goods. The basic competitive model is designed to highlight an efficient market system that optimises production and exchange given the scarce resources available. In an optimal market, resources and goods should go to the actor who values them most and who will pay the most for them.

Markets operate through *prices*, *profits*, and *property-rights*. The first element of a market is the price system. Prevailing prices in a properly operating price system send accurate signals about the demand and scarcity of resources and goods (Markandya 2001:153). Actors will respond to prices by adjusting

their consumption of a resource. Profit is the second element of a market. The potential for profit or loss creates the incentive for an actor to think carefully about both production output and resource usage. For the profit motive to be effective, producers need to be able to keep at least some of their profits. This leads to the third essential element of a market. Incentives are created only when the profit motive is combined with a system of private property-rights (Stiglitz 2002:29). Actors must have rights over a good to use it as they see fit and to sell it. Systems of ownership are also fundamental to the valuation of resources. For example, when a fish stock is subject to common-pool conditions it is exploited by multiple actors and no one actor has a right of exclusive use. Common-pool conditions distort usage behaviours in two fundamental ways. First, the resource has no current value because there is no market exchange for consumption of the fish stock as an input to production. This severely distorts the cost function because there is no limit on how much fishing effort to substitute with the free input of stock biomass until the resource is fully converted into fish caught. Second, even if a governance authority were to impose some nominal unit price on fish stocks, usage behaviours would still be distorted because the resource has no future value. This is due to the practice of discounting.

The practice of discounting arises because individuals attach progressively less weight to a benefit or cost in the future than they do to a benefit or cost realized now. Recall that, in a fishery, the fish-stock resource is subtractable. Discounting behaviour affects production activities like fishing because under common-pool conditions no individual user of a resource can afford to take future returns into account (Christy 1975:698). Fishers do not own the productive fish stocks. Fishers only own the fish caught, and under common-pool conditions, fishers compete with each other to consume fish stocks. Thus, the incentive is to maximise value from the fishery before the available catch is consumed by other fishers. The condition of subtractability inherent in biological renewable resources induces competitive fishers to behave as if they had an infinitely high rate of discount where all value lies in the current period (Clarke 2006:96). That is, when many actors are exploiting a subtractable and common-pool resource, all actors will attribute an infinitely high rate of discount to a resource because they see zero future benefits to leaving a resource unexploited. Thus, the effective price of wild fish as an input to production is zero. Of course, fishing activities have an effort cost such as price of labour and equipment. These unit costs are discussed as elements of a cost curve in models of maximum economic yield later in the chapter. Nonetheless, in fisheries conducted under common-pool conditions this discount rate of the stock itself underpins the rationale to engage in unsustainable exploitation.

The effect of resource valuation on usage rates

This section will show that market mechanisms cannot be relied upon to deliver sustainable catch rates of fish stocks because price inputs that inform economic rationality can be distorted by the condition of common-pool resources.

Once a substance has been defined as a resource, the question inevitably arises as to how much is available for use by mankind. Generally, natural resources are divided into two categories: non-renewable resources and renewable resources (Rees 1992:14). Non-renewable resources are generally minerals or fossil fuels that have taken millions of years to form. Minerals and fossil fuels

have no natural reproduction except on geological timescales and from a human perspective are regarded as being in fixed supply (Common 1995:33). In contrast, renewable resources are those whose supply is not affected by use or which have a natural rate of reproduction that is relevant over human life spans.

The primary economic characteristic of renewable resources is that they are capable of natural regeneration into useful 'products' within a time span relevant to man. Trees and fish are prime examples of a renewable resource. Renewable resources can be further divided into two types dependent upon whether the intensity of use affects future availability (Rees 1992:241). The first are those renewable resources such as solar radiation, wave power, and wind power whose availability is unaffected by the amount exploited for production at any given moment.¹⁰ The second type of renewable resource is one where intensity of use does affect future availability. This type of renewable resource is subject to subtractability. Recall that, subtractability is a measure of use in the same period. Future availability is a measure of availability for all users in future periods. It is attributed to renewable resources with a biological growth potential such as forests and fish stocks.

The incorrect valuation of subtractable renewable resources affects actor decisions on usage rates. Bioeconomic models of fisheries combine biotic population dynamics with the economic tension of costs vs. earnings. Just as in general economic analysis, bioeconomics is fundamentally anthropocentric. It assumes that human welfare is the objective.¹¹ The objective of bioeconomic modeling is the optimum utilisation of natural resources. Recall from *Chapter 3: Overfishing* that a natural growth curve describes unexploited biotic population growth and illustrates how a renewable resource will regenerate over time, but only until the limits of its habitat or ecosystem. The natural growth characteristics of a fish stock make it theoretically possible to maintain a set yield of fish-caught over time. Recognizing this regeneration capability, maximum sustainable yield (MSY) is the maximum amount of a fish stock that can be caught without reducing its biomass below the level required to achieve maximum regeneration within the next seasonal cycle (Clark 2006:96).

However, biological models also show that if the fishing effort consistently exceeds this maximum sustainable quantity then the resource biomass and its reproductive potential will progressively decrease. Biological models predict that a biomass could decrease until a critical point is reached and the population may become too depleted even to reproduce itself (Markandya 2001:24). In some cases, even if the biomass is sufficient to begin natural regeneration some fish stocks cannot regenerate because their place in the ecosystem is replaced with another species (Worm et al. 2009:582). Yet, regional extinction is not a predicted outcome of bioeconomic analysis (Clark 2006:95). Fisheries will instead limp along in the long term, albeit with depleted fish stocks and with no net benefit to fishers. This prediction is based on the relationship of input cost to production effort shown in the bioeconomic models of sustainable revenue.

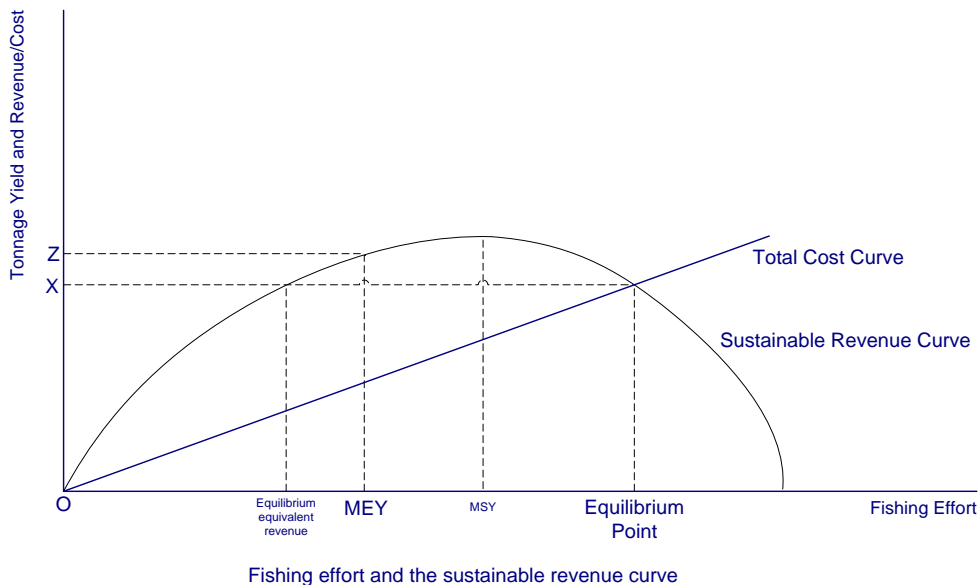
¹⁰ Although these are regionally and temporally variable.

¹¹ As opposed to a biocentric assumption which accords equal value to non-human life in nature (Rees 1992:27).

Sustainable Revenue

The modeling of sustainable revenue shows that the rationale to maximize individual utility has suboptimal economic results. Figure 1. shows the Maximum Economic Yield (MEY) model (Clark 2006:96). This model highlights the contrast between biological maximum sustainable yield, maximum economic yield, and the predicted long-term outcome for a fishery.

Fig. 1: Maximum Economic Yield – effort, harvest and the cost curve



As in a sustainable yield model, the point MSY shows the maximum quantity of a biotic resource which can be caught each cycle without reducing its overall biomass. Any level of catch beyond the point of MSY is undesirable because continually reducing stock biomass reduces its regenerative capacity for future periods. The point of MSY is not the most desirable point from a commercial perspective. The biological equilibrium point of MSY is neither the point of equilibrium effort nor optimal effort. Economic principles describe the relationship of incentive-based behaviour to the perceived benefits from profit. Recall that neoclassical economics focuses on the rational profit seeking incentive to maximise marginal utility. However, the point of Maximum Economic Yield (MEY) on the Fig. 1 model shows the maximum profit for a given level of fishing effort, and so it represents the economically optimal effort.¹² At this level of fishing effort, the value of the fish-caught exceeds the fishing costs by the largest possible amount and the net economic return (rent) from the fishery is maximised.

Maximum Economic Yield works on two principles. First, fish are easier to catch when stocks are plentiful. Thus, the gap between cost and yield at market is higher. But MEY is a purely idealized point because there are still marginal, although steadily decreasing, profits to be made right up until the equilibrium point. The MEY model predicts *overexploitation* if the total cost curve (TC) intersects the

¹² Effort is defined as the number of standard-vessel days of fishing per year. Costs are assumed to be linearly proportional to effort.

sustainable revenue curve at higher levels than those required to operate at MSY. This is the scenario shown in Fig. 1. The economic equilibrium point occurs where total sustainable revenues equal total costs. At this point any extra effort to fish is unprofitable. This equilibrium of resource exhaustion vs. extinction is the predicted final state for a common-pool resource because there is no longer any incentive for existing entrants to produce extra units nor for new entrants to enter the fishery. Any extra production effort past the economic equilibrium point will receive no profit because revenue is consumed by the cost of catch. Optimal economic effort is related to the equilibrium point of yield and revenue.

In a fishery that is subject to market forces, the rational actors will continue to fish right up to the equilibrium point. To fish beyond this point incurs costs that exceed returns from yield. So, the equilibrium point represents the likely economic steady state of the fishery. Therefore, the bioeconomic model does not predict exhaustion of the target fish stock. But consider that the tonnage yield at the equilibrium point can also be achieved for less effort and at an effort resulting in fish caught (fish mortality) that is easily within the maximum sustainable yield from the stock. Thus, the form of the cost function is an important factor in the modelled outcomes for natural resources. If effort costs are large then equilibrium effort point might be at a point before MSY (Clark 2006:96). This is a positive outcome for the fish stock. Conversely, if fishing costs are subsidised or if some inputs to production (costs) are ignored then the resulting shift in the cost curve tends to increase effort levels beyond the MSY point. The position of the cost curve will determine changes in MEY and equilibrium point levels. This is because any level of effort before the equilibrium point the fishery is profitable and will attract more fishing effort. Once fishing effort exceeds the equilibrium point, fishing becomes unprofitable and some fishers will depart the fishery. The actual equilibrium point also depends upon price at market so high value products are more at risk. Higher value products push the cost curve more to the right on the sustainable revenue curve thus they attract more fishing effort.

Actor incentives based purely on market mechanisms such as marginal utility cannot be relied upon to deliver biologically sustainable rates of catch. The actual economic equilibrium point depends upon two factors: (a) the price of production outputs at market and (b) the price of production inputs. Essentially, high value goods (production outputs) are more at risk because the high value allows for much greater expenditure of effort. The high valuation of a natural resource is the outcome of various international and domestic factors of demand and so lies outside the fishery governance focus of this study. For this thesis, *Chapter 1: The problem with international fisheries* reduced demand factors to increasing population and increasing standards of living.

Nonetheless, of most interest to this study is the cost function of production inputs to outcomes for natural resources. If effort costs are subsidised or if some inputs to production (costs) are ignored then the resulting shift in the cost curve tends to increase effort levels beyond the MSY point. Indeed, a major problem for fisheries is the widespread provision of subsidies for the exploitation of fish stocks (HSTF 2006:43; World Bank 2009:24). A vessel subsidy might promote the construction of new vessels to enter a fishery, thereby increasing pressure on already limited resources when returns on investment would not warrant such investment. Similarly, a directed fuel subsidy acts to artificially lower the cost of catching fish stocks. Subsidies towards capitalisation of fishing fleets, or subsidisation of

costs encourage the catch of fish resources beyond what would be signalled even by margin analysis. There are international initiatives to reduce subsidisation by fishing nations (UNFAO Capacity 2008).

A structural condition that lies firmly within the area of influence of RFMO fishery governance is the valuation of a resource. Governance solutions must rest upon mechanisms of control that forces users to account for the fish stocks as a cost of production, to limit rates of catch in current period, and allows them access to future benefits from the preserved fish stock. The theoretical mechanics of property rights in market analysis are explored in the next section.

Imperfect markets and the role of governance

Imperfect market mechanisms

Market mechanisms are rarely perfect despite the assumptions of perfect conditions in economic models of market behaviour. The basic competitive market model assumes that producers and consumers bear all of the consequences of their actions. This assumption does not hold for fishery production. Any costs or benefits that are not fully valued by market participants, or not captured by market transactions, or not reflected fully in prices, are called externalities (Bishop 2009). The externalities of a capture fishery impact on the assumptions of the market model in two key ways: (a) Common-pool resources are free, and (b) they are subtractable. First, recall that value is only determined through the price that is given in exchange for a good or service. Under these conditions a natural resource has a price that is effectively zero because there is no market exchange for the consumption of the stock as an input to production. There is only a market exchange of fish-caught. In the high seas, wild fish stocks are made a common-pool resource under international law. While the UNCLOS declares that living marine resources of the high seas are open-access to all states, it goes on to declare that states must cooperate in these fisheries through regional fishery management organisations (RFMOs). Once a RFMO enters into force all fish stocks over which it has competency are now a common-pool resource available only to members of that organisation. However, even though some actors are excluded from a RFMO fishery, wild fish stocks are still not owned until they are caught. When a resource is available to multiple actors there is no limit to the amount of effort expended to exploit this free resource. Of course, within the competency of a RFMO all authorised members must pay fees to the RFMO. But, these fees are based on the percentage of the fish catch that is allocated to each member. Thus, even under RFMO governance, any valuation of the resource only applies to fish caught.

Wild fish stocks are a free input to production. That is, catching wild fish has effort costs but fishers pay no owner a market valued price for the fish stock. While fish stocks are free for the fisher, the capture of fish from a stock still creates costs for all other actors. Fish stocks are a subtractable resource, so consumption by any one actor reduces fish stocks available for all other actors. For each unit of stock extracted extra fishing effort (cost) by all actors is required. Essentially, fish-caught are consumed and not available for other actors to consume. Further, if the biomass of the stock is reduced beyond its natural regenerative capacity there will be less stock available in the next period.

Subtraction externalities also include secondary effects and subsequent impacts. For example, the fishing technique of bottom trawling (dragging chain rimmed nets along the sea floor) not only extracts fish from the biomass but damages the habitat, reduces the productive capacity of a fish stock, and degrades the carrying capacity of the ecosystem. While recognising the subtractability of fish stocks, the conventional economic treatment of externalities is essentially atemporal in nature. It is assumed that the damage inflicted by production in any time period and the potentially usable regenerative capacity of the environment are unaffected by previous production activities. This assumption offers no consideration of the extent to which current production decisions will affect future absorptive or regenerative capacity (Rees 1992:287). If a fish stock is persistently overfished, the biomass of the stock will diminish until it inevitably collapses.

The externalities and secondary effects of subtractability allow individual actors to pass production costs (the increased effort of catching increasingly scarce fish) onto other actors. Such externalities challenge the assumptions of the market model because they depart from the pure market-based mechanisms that are assumed to be so beneficial. Under the common-pool conditions of a high seas fishery, a fish stock has no future value because there is no guarantee that any fish stock left behind by an actor will be available for future use by that actor. When a fishery is conducted under common-pool conditions it is free and has no future value. Market externalities distort the rationality of *Homo economicus*.

From this economic perspective, property rights are an essential element for the optimal allocation of natural resources. Property-rights need to exist, and any ownership powers should be akin to private property. Strongly defined rights should (Randall 1981:199, Schmid 1995:60):

- Be completely specified in terms of rights and restrictions over the resource, and the penalties corresponding to their violation
- Allow the holder of the right exclusive use of the property
- Be transferable, to have those rights in the hands of those who value them the most (pay the most for them)
- Be effectively enforced, because a non-policed right becomes an empty right

In *Chapter 7: Property rights in high seas fisheries*, different types of property are examined, especially the common-property systems that are increasingly evident in RFMO's. This thesis argues that consideration of power over property is important, be it private or common, to ensure that the resources are valued and priced as an input to production. When inputs to production are improperly or incompletely priced they may be subject to levels and types of exploitation beyond rational economical limits that would be evident were the resource fully priced. In the economic modelling of production, a resource is only correctly valued once it becomes property. If property rights over a valuable resource are created then owners of those resources are motivated to conserve them and ensure future profits.

Once a regional fisheries management organisation (RFMO) achieves entry into force, the fish stock or area under its competency are subject to whatever governance measures it adopts. The core of any

competent fisheries management system is a limit on total allowable catch within the regenerative capacity of the target fish stocks. In open-access or common-pool fisheries, any group of actors who limit their own catch to within sustainable levels make fish more abundant and so produce a public good. Therefore, all such groups seek to exclude outsiders (free riders) from access to the fish stock. But they also expect that all group members to self-limit their own levels of catch. Within RFMO governance, this is the ever-present tension between behavioural constraints and the intention that each actor be able to benefit from their constraint. Anticipation of this benefit incentive is the only reason that actors would agree to self-impose catch limits. The exclusion of outsiders is therefore fundamental to successful governance by a RFMO. But the behaviour of all group members is also fundamental to the success of the RFMO as an institution.

The role of governance

Market mechanisms are by no means a natural condition, despite economic dogma often presenting government and governance as being distinct from the market. Market operations are dependent upon systems of law and systems of property for existence. Indeed, markets cannot function without a clear and precise articulation of property-rights, and the authority to enforce those rights and their commensurate obligations upon others (Bromley 1989:300; Rees 1992:278; Common 1995:146). Systems of property rights force the actors to consider the welfare of all who are affected by an economic activity (Stiglitz 2002:145). Indeed, economic models present weak property rights as a key factor in the overexploitation in natural resources. If everybody owns something then nobody does (Hardin 1968:1244; Pauly et al. 2002:691). Common-pool conditions with no strong property-rights invariably result in the overcapitalisation of fishing fleets in the race to fish, the overexploitation of available stock from deeply flawed incentive structures, and the dissipation of economic rent for all actors in a fishery.

Governance authorities can respond to externalities and undertake policies designed to induce actors to produce fewer negative and more positive externalities. These interventions seek to reduce externalities through regulation, a tax or subsidy, or by using property-rights to force the actors to take into account the welfare of all who are affected by an economic activity (Stiglitz 2002:145). For example, a regulation may ban a particularly onerous negative externality or to tax a general activity. Conversely, if the externality is positive a subsidy may be applied in order to encourage it. The most economically efficient solution to externalities, and most favoured by economists, is to require them to be included in the calculation of those engaged in the economic activity to create incentives for self-regulation (Stiglitz 2002:149). In this context, a governance authority may regulate directly to impose fees upon levels of pollution, or limits on total and individual catch. In a fishery, it may also impose limits on levels of catch and penalties to enforce them.

While these mechanisms are designed to control behaviour, they are not the preferred option in economic modelling of actor behaviours. The most economically efficient solution to externalities, and most favoured by economists, is to require all costs and benefits that effect actors to be included in the calculation of those engaged in the economic activity. In order for natural resource products and environmental services to be allocated rationally and efficiently they must be priced and incorporated

into a system of commercial exchange. For example, a governance authority may impose a nominal cost on a fish stock unit, limits on levels of catch, and even penalties to enforce them, but these mechanisms impose the full cost of enforcement onto the governance authority. Therefore, an optimal economic solution would create the requisite conditions to incentivise self-regulation of limits to catch.

Thesis argument

Individuals and firms make economically efficient decisions when they bear the full benefits and costs of their choices. Therefore, for competent RFMO governance, what is required is an institutional solution that can still harness the incentive to profit but stay within biological limits of the resource. In a fishery, the current incentive to profit is realised in the form of a property-right for exclusive and stable possession of individual allocation of a total allowable catch within the maximum sustainable yield of a species secures access to future harvest. In accord with economic models, it is only when actors have exclusive withdrawal rights over a fish-stock that they are incentivised to limit individual catch rates. A system of property-rights is prerequisite to the effective valuation of natural resources and provides the impetus for incentives that support sustainable fisheries.

However, this thesis argues that the true incentive to self-limit individual fish-catch is a shift to value the fish-stock essential for the stream of benefits over time. The incentive to benefit from its long-term production potential is only created with some form of exclusive rights over a fish-stock. All the costs and benefits of use would be considered by the rights holder when making decisions about usage rates. This shift in ownership from fish-catch to fish-stock is the pivotal element. The incentive to profit combined with a system of exclusive rights over a common-property can still provide actors the incentive to sustain natural resources. Individual powers over property ensure that the resources are priced as an input to production and owners of appropriately valued resources have an economic incentive to conserve them in order to ensure future profits.

Conclusion

Bioeconomic models are useful because they highlight core management reference points such as Maximum Sustainable Yield and Maximum Economic Yield. The principles and incentives incorporated into bioeconomic models enable policymakers to predict behaviour. A central outcome of any study of open-access conditions in a fishery is that individual economic rationality will doom natural resources to overexploitation and depletion. In the vast ocean spaces of the high seas, governance is necessary to constrain effort yet the burden of monitoring and enforcement is often technologically and financially unfeasible for the governing authority.

The economic approach to natural resources is determinedly anthropocentric. In this context, sustainability is equated to availability as an input for production. Only when owned and priced in a market are resources recognised as valuable, and only then can the incentive for their sustained exploitation be created. The social structures that enable rules of ownership and exchange are largely externalised from economic models. Nonetheless, institutions of jurisdiction and property are an

essential component to the creation of economic incentives to preserve natural resources. Natural resources are regarded as a commoditised good that is valuable only when exchanged for profit. Only those resources that are given a price as inputs or outputs to production are valuable. Costs and benefits beyond the exchange of ownership are regarded as a form of market failure. Further, any rewards from natural resources apply to only those parties undertaking commercial transactions. In order for natural resource products and environmental services to be allocated rationally and efficiently, an economically rational approach demands they must be priced and incorporated into a system of commercial exchange. The productive asset in a fishery is the fish-stock. In order for renewable natural resources to be used sustainably the fish-stock must be subject to rights of ownership.

This chapter established an approach to the analysis of powers over property. In focus were two approaches to understanding property rights: the economic incentives for rights over property and mechanisms to achieve power over property. Economic models present weak property rights as a key factor in the overexploitation in natural resources. Individual profitability is the primary incentive in each actor's decision-making. They must race to secure their own catch from a common pool of fish. Marginal utility is the underlying principle in each actor's level of production effort. Each actor will increase fishing effort until the profits from exchanging one more unit of fish at market are cancelled by the cost of effort to catch that extra unit of fish. Under market conditions of high or improperly valued resources, this level of exploitation exceeds the natural regenerative capacity of the species, and its biomass declines. In accord with economic models, it is only when actors have exclusive withdrawal rights over a fish stock that they are incentivised to limit individual catch rates.

The incentive to benefit from the long-term production potential of an asset is only created with some form of exclusive right over a fish stock. This shift of ownership from fish-catch to fish-stock is the pivotal element in the argument of this thesis. In a fishery, the incentive to profit is realised in the form of property right for exclusive and stable possession of individual allocation of a total allowable catch. This total allowable catch must fall within the maximum sustainable yield of a species to secure access to optimal biocentric production capability of the target fish-stock.

The next chapter details the control mechanisms used by fishery management authorities. It shows the complexity of the challenge facing regulatory authorities and the need to shift to higher order mechanisms of control.

Chapter 5

Fisheries management

The previous *Chapter 4: Fishing as a production activity* examined the economic principles that underpin commercial fishing on the high seas. Fishing was defined as a production activity with inputs of fish-stock and fishing effort, and an output of fish-caught. The fundamental motivation for engaging in a commercial fishery is to make a profit. Thus, it was shown that self-maximising behaviours are expected rational actions for actors in high seas fishing. However, individual self-maximising will inevitably doom a subtractable living marine resource to overexploitation and degradation of its productive potential.

Rational economic behaviour coupled with increasing fishing technology and global demand for fish products have fundamentally transformed modern fisheries. Advances in fishing efficiency and vessel capacity have combined with increasing demand for fish products to put unprecedented pressure on marine living resources in the last four decades. Improved fish detection and catch technology in vessels have greatly increased fishing efficiency per unit of effort. At the same time, increased demand and rising prices for seafood have led to unprecedented volumes of fish caught (UNCLOS 1982; UNFSA 1995; CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). This unsustainable rate of catch has caused the degradation and collapse of many fish stocks worldwide.

In the preceding chapter, this thesis argued that overfishing is the outcome of the economic and institutional conditions created around high seas fishing. The economic impetus to maximise profit is inherent in the motivation to engage in a commercial fishery. In addition, this thesis argues that international law has created conditions of common-property over fish stocks but that the institutions governing actor behaviour have not fully embraced the necessary norms and rules to maximise the potential stream of benefits possible from our living marine resources.

To pursue this argument, it is necessary for this thesis to contrast fisheries management from fisheries governance. The two activities are complementary but they are different. This thesis will demarcate them based on the mechanisms outlined in *Chapter 1: The problem with international fisheries*. Fisheries management defines control mechanisms. Fisheries governance defines mechanisms of control. The object of this thesis is to establish the existence of property powers over living marine resources in the high seas. This condition of power over property exists in the realm of fisheries governance and is styled in the following thesis argument as a mechanism of control. The objective of fisheries governance is to achieve sustainable fishing practices in a competitive commercial fishery. Yet, there are fundamental control mechanisms upon which a sustainable fishery depends.

This chapter details the necessary control mechanisms of fishery management. These encompass conventional management measures such as minimum size limits and reductions in catch or in fishing effort have been used to promote stock rebuilding. These control mechanisms fall within the domain of

fisheries management. The complexity of fishery management is common to both the national and international context, and it is fundamental to the success of fisheries governance.

Fisheries management cannot be reduced to purely scientific method. There are still uncertainty levels in stock estimates, increases in fishing power, a risk prone management attitude, and a high intertemporal preference (discount rate) in resource use that have led to drastic collapses of some stocks, even under previously successful management scenarios (Ludwig et al., 1993) (in Seijo 1998). In addition, there are complex policy objectives. For example, in any national marine fisheries conservation programme there could be at least four important objectives (Rees 1992:330). First, fisheries management should ensure the physical sustainability and ecological diversity of the marine environment. Second, it should maintain employment levels among fishing and fish-processing communities in the short and/or longer terms. Third, it should ensure the efficient stream of returns from a resource. Finally, a management regime should reduce the direct costs of fisheries regulation and of various community support programmes. Fisheries management is a complex undertaking.

The control mechanisms of fishery management are the necessary foundation for effective fisheries governance of common-pool resources. The analysis of the fundamental fishery control mechanisms in this chapter is necessary to explain how fishery authorities seek to measure catch and control actors in a fishery. This chapter will also establish the operational complexity of such fishery management control mechanisms. In addition, this chapter will introduce the intention behind a key control mechanism called individual quota. This will be important because catch allocation amongst group members is a key point in the argument of this thesis. In the creation of individual quota systems, public servants and biologists never regarded the licences of the time as a kind of property (Scott 2000:3). The purpose of fishery management initiatives was a response to real issues in achieving sustainable rates of catch in a fishery. But the intention was purely to improve regulation within a fishery management system. This understanding is necessary to develop the thesis argument in later chapters that a system of property rights does exist even though it is not explicitly acknowledged in policy proposals. Nonetheless, the thesis will argue that its achievement enables potential improvements to governance mechanisms of control. However, this chapter will first establish the prerequisite fisheries management control mechanisms that are fundamental to the achievement of sustainable high seas fishing.

Background on high seas fisheries

The freedom of the seas and open access to living marine resources were first developed as a legal principle in the 16th and 17th centuries. The argument appealed to reason and to natural law in accord with the philosophical approach of the time. This started with the writings of Grotius who applied the principle to tidal waters within national territory as well as to the open ocean (Grotius 2004:26). Grotius argued there were two conditions for holding property in a thing. First is the power to appropriate the thing and hold it in possession against others. Second, the thing itself has to be scarce and exhaustible so it would be worthwhile holding it as property. These two conditions are usually not satisfied in offshore or ocean fisheries. In the time of Grotius, fish were abundant and it was not feasible to

exclude outsiders from access to a fish stock (Ciriacy-Wantrup et al. 1975:724). Grotius asserted that because neither condition was satisfied, there could be no property and thus no national sovereignty on the high seas. Both assertions became customary law and then ultimately enshrined in international law as the 'freedom of the seas' (UNCLOS 1982). Grotius's two conditions correctly predicted that wild and uncaptured fish could not be subject to traditional conceptions of ownership.

A stock of fish offshore is not analogous to a herd of domestic animals which are both exhaustible and subject to fencing. Fish are more analogous to a population of wildlife or birds that shifts from place to place (Scott 2000:4). Predating the 13th century Magna Carta, western legal systems have long recognised private rights to take and even to own fish in inland waters. Further, the fundamental right of public access to fisheries in tidal waters was equally well established. Yet, both private and public property systems over fisheries hold the same doctrine. There was no ownership in the wild fish until they were captured (Stewart 2004:3). In this context, the thesis equates public access to more modern terminology of open-access. Much of the historical rationale behind the principle of open-access to a fishery was the belief in the inexhaustible abundance of living marine resources. But fisheries science and technology underwent many revolutionary developments between the two World Wars. The result was an obvious decline in the abundance of fish stocks (UNCLOS 1982). In response, new regulations over fishing commenced. These new regulations began with the introduction of gear and season restrictions over a stock of fish.

However, an overarching question of jurisdiction and the authority to set regulation for limiting catch remained. In 1954, it was supposed that the only solution to the problem of marine resource depletion is a system of private property or public property that is subject to a unified directing power (Stewart 2004:4). Working within the same theme, the biologist Hardin formulated his famous model for the 'tragedy of the commons' (Hardin 1968). Hardin's model is useful to explore the outcomes for a resource that is exploited by many actors whose behaviour is not effectively regulated. This model focused attention on the relationship between the degradation of a natural resource and the absence of rules regulating its use. It described an open-access situation in which no collectively accepted rules on resource use are in place or observed.

A rational individual incentive to self-maximise exploitation will exist in either an open-access and common-pool fishery. In an open-pool condition, a resource is available for exploitation by all interested parties. The difference for a common-pool condition is that only an authorised group of actors may claim the right to exploit the resource. Regardless of which of these two conditions prevail the outcome for the exploited fish stock is the same and is entirely in accord with Hardin's argument. In the context of a fishery, fishermen only have rights to the fish they catch. The increased pressure on them to catch as much as they can in a competitive situation has led to the 'race to fish'. The resulting collective degradation of a productive resource results from individual self-maximisation. Regulation may be badly designed and thus lock an industry into an inefficient equilibrium. For the argument of this thesis, the real tragedy that awaits any open-access or common-pool resource is ineffective governance by an authority. This thesis is focused on the governance of a fishery. While a management authority may be in place there is no assumption that it is effectively governing the fishery.

Hardin's model of shared resource tragedy did suffer criticism a few decades later due to its apparent failure to distinguish common-pool conditions from a 'common property' regime that is subject to its own form of rules. Most of this criticism from scholars writing in the environmental field such as Rees and Ostrom is based on the argument that under common-pool resource conditions the 'tragedy' is far from inevitable. Groups of people can and do cooperate. These arguments for cooperation were particularly relevant in the issue area of indigenous peoples who were subject to the nationalisation of traditional resources such as water and in-shore marine resources (Rees 1992:269; Ostrom 1994:5). The practice of nationalising these resources was based on the argument that a right over a property must be a formal expression of private or public property. It was argued that informal common-property systems invalidate any argument by policy makers and interested groups that individual or state owned private property was the only solution to the overexploitation of common-pool resources (Rees 1992:269; Ostrom 1994:5). Other formulations of property were possible and other regimes for powers over property do exist. These could be microscale such as shared rights to a local water resource or macroscale like a highly migratory fish stock that moves between national and international waters. The criticism of Hardin's model is fair. Indeed, as shown in *Chapter 9 – The institutional grammar of high seas property rights*, the evolution of common-property characteristics is that of the continual amendment and update to the basic framework of fisheries law. Nonetheless, Hardin's main argument was that individual users will maximise their own interests at the expense of others and so a shared resource must be regulated. For this thesis, Hardin's 'tragedy' for common-pool resources is relevant to the structures and outcomes of effective regulation by an authority.

The development of fishery management approaches

Until the 19th century, the main fisheries in the world's seven seas were open-access and unregulated. These offshore fisheries expanded steadily over the centuries but the fish stocks were large and robust, and technology not industrialised. So, the expanded fishing effort hardly affected the overall catches. By the mid-19th century, ocean fishing had expanded to the point where fishers began to race each other to catch available fish. These competitive responses to the increasingly scarce fish stock raised fishing costs further. Vessel owners applied ever more fishing capacity through investment in more powerful gear, larger vessels, and more effort (Scott 2000:2). During this period, there was only a three-mile sovereign limit for coastal states and beyond it the living marine resources of the high seas were open-access. There was also little or no government regulation of fisheries. The general condition of fish stocks in these oceanic capture fisheries were as common-pool resources with high subtractability but also with high costs of exclusion.

From the 1960s two new types of regulatory control mechanisms were suggested to encourage fishers to limit catch: royalty and restricted access. Royalties are an economic and price based mechanism that reduces the profitability per unit of a resource extracted. A royalty is effectively a usage based payment to a regulatory authority. As shown in *Chapter 4 – Fishing as a production activity*, it was well known from people's response to prices, excise taxes and customs tariffs that the less the suppliers got paid, the less they produced. When applied to a fishery, the idea was that the higher a royalty on landed fish then the less profit can be extracted from production of that unit of catch. With diminished

profit per unit of extraction then the less the fleet would catch. In principle, the incentive to catch fish is diminished as profitability is diminished. But, using prices (or profit per unit) as a control mechanism in fisheries management never took hold among fishers and administrators. Instead, fishery managers chose other control mechanisms to restrict catch in a fishery.

Fishery management instruments

Once regulation of a fishery is introduced there are at least four fisheries management instruments that are regarded as traditional: gear restrictions, seasons, total allowable catch, licensing. First, gear restrictions are an attempt to restrict the number of fish caught by reducing the effectiveness of fishing effort. For example, a minimum mesh size would be intended to allow smaller younger fish to escape and provide the necessary growth for a stocks biomass (Conrad 1995:427). Second, closed seasons are often adopted to protect a fish stock during a critical spawning stage in its life cycle. This mechanism tries to maximise the natural regeneration potential of a fish biomass.

Total allowable catch is the third management instrument and intended put a cap on fish mortality from the fishery. This chapter will also discuss the alternate input control mechanism of total allowable effort used in one of the studied RFMOs. Both controls are centred on an actor's maximum allocation of catch effort or actual catch. For the purpose of this thesis, both controls can thus be referred to as an individual quota. This is an important point because individual quota in the studied fisheries is generally based on total allowable catch (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Limiting catch to equal or less than the reproductive capability of a target fish stock is fundamental to achieve sustainable fishing.

The first approach to limiting fish catch in many fisheries was limited entry. This attempts to restrict catch by reducing the number of vessels in a fishery by putting a limit both on the number of licences and on the permitted fishing effort available to each licensee. Yet, major social and political problems arise over the fate of the labour and capital made redundant by any effort control measure.

Theoretically, the excess factors of production could be put to more productive use elsewhere in the economy, but this presupposes that the workers and vessels are mobile and that alternate employment opportunities exist. The effects of unemployment, the rundown of local fishing communities and the wastage of fixed capital invested in vessels and infrastructure must be considered in the formulation of politically acceptable fisheries management strategies (Markandya 2001:128). While socially and economically painful, these are all policy improvements on simple licensing and versions of these control mechanisms are still being refined in fisheries worldwide. Yet, the fundamental flaw with limiting access is that while it reduces the total number of actors in a fishery, it does nothing to account for the incentive of each actor to maximise individual benefit from the fishery. Limited licensing - the fourth instrument - still saw each licensee racing for catch and searching for ways around the limits. It was found that even within a limited group there was still a competitive race to fish with other licence holders and retained the incentive to 'stuff' their vessels with more and more equipment, capacity and to increase vessel size (Scott 2000:3). By requiring that authorised fishers be licensed, authorities do change the resource condition from open-access to common-pool. However, the total catch was unsustainable because the group still competed to catch first and catch the most.

Total allowable catch is theoretically based on a scientific assessment of the maximum catch which the fish stocks in question can sustain. As an iteration of catch limit instruments, the total number of individual permits distributed represents the maximum total allowable catch, and an individual allocation permits represent the right to extract a given quantity of fish. These permits can either be used by the holder or be sold to other users of the resource (Perman et al 1996) (Markandya 2001:130). This quota method emerged by trial and error in Iceland, and as a privatising expedient in New Zealand (Scott 2000:3). For many fisheries, it removed all or nearly all the wasteful and costly incentives at one stroke. Further, there was no longer any reason to spend money on ever more elaborate vessels or equipment (Scott 2000:3). There was still an efficiency to be gained by catching fish first. But when individual quota is a fraction of a total allowable catch based on maximum sustainable yield then it was technically feasible that sustainable fishing can be expected. There are still social and political complications to the development of the individual quota approach. The most serious initial management problem was with the question of transition. Questions such as who should get quota, how large should it be, and what price should quota cost? The introduction generally exposes many inequities, special cases, and occupies administrators for many, many months (Scott 2000:3). This included issues such as equitable allocation amongst existing actors and for new entrants to a fishery.

A common political expedient for the allocation of catch was termed 'grandfathering' which is now commonly referred to as historical catch. This is a method in which each authorised actor's future quota is based on the average catch in past years as a percentage of the total catch at that time. Yet, these are historical rates of catch that certainly exceeded the natural rate of regeneration of a fish stock (UNFAO SOFIA 2016). Quota mechanisms combined with seasonal allocation do enable fishers to maximise their exchange for fish-caught at market. A quota holder may defer catch to when market prices are low and enable the catch to be taken when prices were high. Monitoring is a problem because each actor's actual cumulative catch had to be compared to their own quota for any given season. Systems of inspecting and auditing licensees must be devised. Further, regulatory organisations and bureaucracies must exist to solve these issues. In many cases, the solutions they devise are specific to available technology, and they must often shoulder the responsibility of administration and punitive enforcement of quota limits. Despite the administrative burden, fishing authorities do recognise that individual allocation is a useful instrument to manage a common-pool fishery.

Resource Rent

Fisheries management is also tasked to charge for the usage of resources. It is standard practice for the governance authorities of states to extract rent for use of living marine resources. This is supported by the international law that living marine resources within the territory and exclusive economic zone of a coastal state is the property of that state (UNCLOS Art. 56). There are various approaches to cost recovery (or resource rent) that are taken within the socio-political context of national fisheries. Historically, charges for the privilege of commercial fishing in national waters usually took the form of licence fees. The costs of administration, data collection and collation, research, monitoring and

enforcement may well increase significantly (Stewart 2004:150). Resource-rent collection by authorities may take the form of license fees and produce taxes, charges for initial allocation and transfer taxes (Stewart 2004:151). Fees may be controversial. The charging of resource rents can give rise to questions about the state's right to claim 'ownership' of the resource and the consequent right to extract a rent. A detailed analysis of common-property vs. public property rights is conducted in *Chapter 7: Property rights in high seas fisheries*.

Within a RFMO, resource rent is also exacted via membership charges. These are payable by each member per annual period. This charge is prerequisite to continued participation in the fishery and is proportional to the allocation of the member's individual quota. It is payable even if the full right to take fish has not been exercised (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012).

The question of authority to regulate fishing is often focused on territory. Here the control of the fishery is assigned to one person, group, corporation, cooperative or community. Historically, this approach has been advocated for fisheries that are inshore and for traditional fisheries. It was in this context that some scholars argued against the type of property right that assumed groups, particularly indigenous groups, could not cooperate and agree on common-property divisions over a common-pool resource (Rees 1992:269; Ostrom 1994:5). It was shown that actors in a fishery will cooperate. Further, this common-property system was one that was ultimately mandated by the UNCLOS. State actors active in a fishery must cooperate to ensure the conservation of the productive capacity of the fish stock (UNCLOS 1982 Art. 118). In fact, if actors did not agree to cooperate and abide by the collectively agreed behaviours then they would be prohibited from fishing the regulated fish stocks.

Economic approaches

To balance the burden of compliance with regulations, authorities can introduce economic and market-based mechanisms. There are a large number of regulatory measures which qualify as economic instruments. A distinction can be drawn between instruments which act directly, and fiscal and financial instruments which provide an indirect economic incentive through their effect on prices paid for the inputs or received for the outputs of a production process (Markandya 2001:71). The direct economic instruments are charge systems, market creation, and property. Charge systems are often the first economic instruments to be applied (Markandya 2001:71). These are categorised as user charges, access fees, damage liabilities, usage tolls, and general administrative charges. Another economic instrument is the creation of markets. These may be markets for permits to emit pollutants, permits to exploit a resource, and even permits for individual quota of a resource. The final economic instrument is the creation of property and rights over property (Markandya 2001:80). Here it is important to distinguish between ownership and use rights. Ownership rights are invested in titles to possess a property or rights to a property. Whereas use rights come in the authorisation to use a thing for advantage.

However, a number of issues concerning administration cost and monitoring can also arise in the use of economic instruments. Economists also assert that an upward scale on landings taxes can penalise large catches. This rationale is described as a policy to "induce fishermen to collectively equate price to the sum of marginal cost-plus user cost" (Conrad 1995:429). That is, a management system that can

promote an economically optimal harvest. *Chapter 4 - Fishing as a production activity* has already established the differences between maximum sustainable yield (MSY) and maximum economic yield (MEY). Recall that MSY is the scientifically determined maximum quantity that can be taken from a fish stock and still allow it full regeneration for the next fishing season. Whereas, MEY is the maximum profit that can be extracted for unit of catch effort. MEY represents the economically optimal harvest effort (Clark 2006:96).

On the other hand, market and other dynamic economic instruments such as sliding scale penalties work to alter the marginal utility of exceeding the threshold. Manipulating marginal utility is the fundamental feature in the incentive structure of an economic instrument. The fundamental issue for a regulatory authority is the structuring of rules with the intent to reproduce a desired behaviour at a manageable or practical cost. For example, command and control regulation might define an absolute catch limit with penalties for exceeding this limit. In contrast, a market-based mechanism might work with similar catch limits but it would employ a sliding scale of penalties aimed at reducing the marginal utility of exceeding the limit.

RFMOs complicate the use of economic instruments

RFMO conditions complicate the efficacy of many economic instruments. Indirect economic instruments such as prices paid for fishing inputs or received for production outputs are not directly influenced by the international governance system. Input prices are largely determined within different domestic jurisdictions and economic systems. Indeed, fishing inputs such as fuel and capital loans may be subsidised by a state to incentivise fishing activity. Therefore, the United Nations Food and Agriculture Organisation monitors fishing fleet numbers and is concerned about overcapacity in the world's fishing fleets (SOFIA 2016). In addition, the element of cost effectiveness or optimal economic use of a natural resource is largely in-applicable to the context of a multilateral RFMO.

Individual transferable quota is another economic mechanism that is difficult to translate into a multilateral RFMO arena. To understand the mechanisms to achieve catch limits it is necessary to differentiate between individual quota and individual transferable quota mechanisms. Individual quota must precede yet can also remain independent from mechanisms of transferability of that quota between actors. In general terms, an IQ system will work as below (Conrad 1995:429). Each vessel within a common-pool fishery is endowed with an entitlement to harvest up to a specified fraction of the allowable catch per period. For example, one vessel can harvest 2% of the allowable catch. If this quota was transferable between licensed holders then regulation allows individual transferable quota. The vessel-owner would then have the option of leasing all or a part of that individual transferable quota (ITQ) during a year, or selling the ITQ completely and leaving the fishery. In economic terms, the market price of a unit of harvest is modelled as follows. Between a large number of quota-holders and potential buyers a per unit quota price would emerge. This quota price would reflect the current market price of fish and the cost of fishing which, in turn, would depend on the size of the fish stock. The price for permanent acquisition of additional quota units would also reflect the industry's expectations about future prices, catch cost, stock size, and the efficacy of the fisheries management authority to achieve the compliance of all other parties to its norms and rules of legitimate behaviour (Conrad 1995:429). In national fisheries, the regulatory authority would be charged with recording ITQ ownership, rentals, and

sales and might serve as a broker, facilitating transactions by the electronic posting of bid-ask prices (Conrad 1995:429). Regardless of the national or international jurisdiction within which it falls, any fishery governed with a system of individual quota or individual transferable quota would require similar systems and controls. However, it would take considerable effort and upkeep to support the market mechanics of a transferable quota system is fully portable to the international fishery conditions.

The fish-caught yields from these degraded fish-stocks are a fraction of what once possible. This type of economic damage is not allowed and should not be allowed to continue. It is curious that RFMOs continue to allow the economic damage of depleted fish stocks to continue for so many decades. This is a case of regulatory failure.

A fishery management system

In the previous section scientific rationality and economic rationality were compared through their control mechanisms. It is also useful to demarcate this rationality when discussing the form of a fishery management system. There are ecological limits to sustainable rates of catch. There are some fishing methods such as bottom-trawling that destroy marine habitats and degrade the productive fish biomass. A scientific approach to management is predicated on the notion that better administrative systems, more data, improved data handling facilities, and more rigorous appraisal methodologies will yield balanced, rational and efficient decisions (Rees 1992:355). But environmental impact assessments and similar techniques for evaluation of mechanisms are only tools to inform what is actually a political decision-making process. In reality, disputes over the use of renewable resources are distributional conflicts about who gets what and when (Rees 1992:355). Arguments like these cannot be depoliticised.

Political arguments cannot be settled by rational and value-free scientific assessments producing optimal administrative control mechanisms. Indeed, some scholars writing in the early 1990s find that environmental interests had a relatively minor impact on the substance of policy up to that time. The underlying policy direction was still towards exploitive resource development and material growth (Rees 1992:417). International fisheries are primarily a commercial exercise. Further, all state actors established in a fishery have some intent of continuing historical proportions of catch.¹³ The period spanning 1950 to 2000 was one of significant overfishing and degradation of productive fish stocks worldwide. Historical rates of catch from this period were unsustainable.

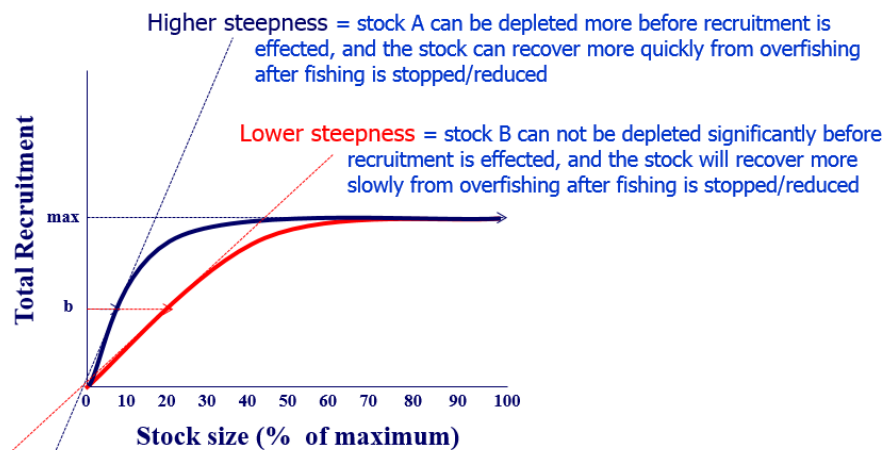
Before detailing the common characteristics of studied RFMOs it is necessary to recognise the inherent scientific uncertainty of the science upon which recommendations and management achievements are based.

¹³ Proportions if not historical volumes of catch because the fish stock has likely collapsed under overfishing practices.

The uncertainty of total allowable catch

Scientific models must accurately estimate the point at which recruitment of a fish stock starts to decline. The critical parameter in a stock recruitment relationship is the steepness of the curve. We have already explored maximum sustainable yield in *Chapter 3: Overfishing*. Fish stocks will not increase past the carrying capacity of their habitat. Yet, a fish stock biomass that is reduced will recruit less new cohorts into the stock. The uncertainty in determining the stock status rests in understanding the rate of recruitment (steepness) of that species in that habitat (OFP 2011:3). The problem is estimating the point of adult stock size at which recruitment starts to decline and the rate at which it declines. This uncertainty means that critical questions to the regulation of total allowable catch remain unanswered. Such as, what level of fishing constitutes overfishing, how long can a stock be fished before it is overfished, how quickly the stock might decline as fishing rates increase, and how quickly the stock might recover when fishing rates decrease?

Diag. 1. *Steepness as a measure of uncertainty*



Specifically it is this parameter "steepness" that is so uncertain in tuna (and other) stock assessments and results in uncertainty about stock status and management.

Steepness is due to the vulnerability of eggs and larvae to environmental conditions, and food availability when larva hatch (OFP 2011:12). Further, steepness is a variable. In some years there may be abundant food for larvae and larval survival is high. In other years larvae may not have access to sufficient food and recruitment is lower. Successful recruitment in a year classes is the result of a spatio-temporal 'match' between first breeding larva and availability of suitable food. The variability in recruitment over time and at many different stock sizes makes it difficult for a model to detect at which point the adult stock might be too low to produce sufficient recruits to replace fish that are removed by fishing (OFP 2011:13). Overfishing an adult stock that is already low at that point can cause rapid reduction in stock recruitment. Scientists typically run sensitivity analyses to demonstrate the full impact of this uncertainty (unknown steepness) upon estimates of stock status (OFP 2011:14). Despite the scientific method used in biocentric modelling there is still considerable uncertainty in model outcomes.

Total Allowable Catch in the studied RFMOs

International law requires each coastal state to “determine the allowable catch of the living resources in its exclusive economic zone” (UNCLOS 1982 Art. 61). The determination of total allowable catch for a commercially exploited fish stock is crucial to the operation of a quota system in respect of that stock. Total allowable catch for most national fisheries are calculated annually or by fishing season (Stewart 2004:113). The initial allocation process is problematic for all authorities. There are both inclusionary and exclusionary factors to hold individual quota. The initial allocation of quotas can be a highly contentious matter particularly where quota has value (Stewart 2004:119). Once the parameters of participation have been determined, the process of allocation must be established.

In international fisheries, the authority of one RFMO is delineated from another by area or species. That said, highly migratory species such as tuna will range through both international and national jurisdictions. All the studied RFMOs express their powers to determine the status of fishery resource and determine catch levels (CCAMLR 1982 Art. XV.2.a; CCSBT 1994 Art. 8.6; CCSBT 1994 Art. 9.2; WCPFC 2004 5.b; SPRFMO 2009 Art. 10.2.a-b). Further, all RFMO Conventions set TAC for the fisheries over which they have authority (CCAMLR 1982 Art. IX.2; CCSBT 1994 Art. 8.3; WCPFC 2004 Art. 10.1.a; SPRFMO 2009 Art. 16.3). However, this thesis will detail the dysfunction within studied RFMOs, and a misalignment between the RFMO obligation to ensure total allowable catch and the preservation of the productive fish stock upon which the commercial fishery depends. The magnitude of this performance gap is made obvious by the continuing low stock levels and low recovery targets set by each RFMO.

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

The different CCAMLR fisheries all have a different spawning biomass and thus a different total allowable catch. Two major fisheries are Antarctic Icefish and Toothfish. Icefish fisheries in the CCAMLR area began in the late 1970's with large catches taken by eastern European vessels. These historical catches peaked in 1983 at a reported 178,000 tonnes for that year (CCAMLR SC 2016:24). By the 1990s the CCAMLR was concerned about depleted stocks and closed the fishery. The fishery was later reopened with a drastically reduced catch limit. In recent years, the total allowable catch for this fishery has been between 1500 and 5000 tonnes a year. At these levels, some sub-region fisheries were certified as sustainable in 2010 and recertified in 2016. Determining biomass levels and sustainability of fishing practices can be problematic. For example, a 2015 stock assessment put the median demersal spawning biomass on one of the Antarctic fisheries at just on 59,000 tonnes. In 2017, the stock assessment of the same stock put spawning biomass at just over 91,000 tonnes. This is a significant jump in spawning biomass but large upward or downward variations are a feature of this species of Antarctic icefish. For example, other icefish fisheries have recorded biomass in 2016 that was five times that of 2015. But this one instance was three times the average variation for this species (CCAMLR SC 2016:25).

To account for such seasonal variability allowable catch in the CCAMLR is determined for a two-year period. This current harvest strategy seeks to maintain at least 75% of the existing spawning stock to escape harvest (CCAMLR SC 2017:10). This conservative strategy put total allowable catch for this particular icefish fishery at 3269 tonnes for 2018/19. The Icefish stock in CCAMLR area was decimated. The other significant fisheries under CCAMLR competency are toothfish species. These species have also been heavily fished in the past. It is estimated that only 51-61% of the unfished spawning stock biomass still exists in 2017 (CCAMLR SC 2016:26; CCAMLR SC 2017:13). The same conservative allowable catch strategies are in place for these fisheries.

All the fisheries of the CCAMLR have been overfished in the past. Historical and unsustainable rates of fishing continue to degrade the current potential of living marine resources in the Antarctic. Nor have they recovered sufficiently. Further, the use of current stock biomass to declare the sustainability of fisheries management controls can be problematic if statistical reference points are not well understood.

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT)

Southern bluefin tuna has been heavily fished in the past. Note that *Chapter 9 - The institutional grammar of high seas property rights* details the extent of illegal fishing activity that was undertaken by some RFMO members. Nor has the CCSBT management of fishing practices been beneficial to the long-term productivity of the fish stock. In the years preceding 2006, the existing level of TAC in the CCSBT was criticised for being nearly double the maximum sustainable yield of the remaining tuna stocks. In addition, it was revealed that even this official and unsustainable TAC of 11,810 tonnes per year had been systematically violated. There is still substantial uncertainty regarding the true levels of total SBT catch over this period (CCSBT24 SC22 2017:102). In 2009, the CCSBT scientific committee reported that spawning stock of southern bluefin tuna was critically low at 5% of the unfished stock biomass and under the current TAC of 11,810t per annum could not rebuild until at least 2025 (Scientific Committee 2009 CCSBT15). The 2011 stock assessment indicated the stock was at 5.5% of original biomass. In 2014 the stock was at 9% of the original unfished biomass (CCSBT24 SC22 2017:37). The 2017 assessment put southern bluefin tuna spawning biomass at 13% of its original biomass.

However, the Science Committee noted that increased recruitment is not necessarily indicative of increased spawning stock biomass (CCSBT24 SC22 2017:103). The CCSBT emphasised the need to take a precautionary approach to increase the likelihood of the spawning stock rebuilding in the short term and to provide industry with more stability in the TAC. Recent TACs were as follows (CCSBT24 SC22 2017:104):

- 2006-2010 - 11,810 tonnes
- 2011-2014 - 12,499 tonnes
- 2015-2017 - 14,647 tonnes
- 2018-2020 - 17,647 tonnes

This TAC of 17,647 tonnes is the historical high since the CCSBT was established in 1993 (CCSBT24 2017:65). Environmental observers at the CCSBT meeting have called on the RFMO to enter into the next phase of SBT management. It is again notable that the total allowable catch was set such an aggressive target level. The current TAC is set using a management procedure adopted in 2011. It has a 70% probability of rebuilding to 20% of the original spawning biomass by 2035 (CCSBT24 SC22 2017:103). Southern bluefin tuna stocks remain depleted throughout the fishery and far below the level that could produce maximum sustainable yield (CCSBT24 SC22 2017:39). The unfished biomass, and historical ecological capacity for southern bluefin tuna, is estimated at 1,351,710 tonnes (CCSBT24 SC22 2017:107). The 2017 TAC is 50% of the maximum sustainable yield for the current stock biomass of 135,171 tonnes. These figures are based on the B10+ cohort that is used to estimate current biomass. This cohort currently sits at 10% of its unfished biomass. This study notes that total allowable catch approved by the CCSBT for 2018-2020 is set to an historical high when only an estimated 13% of original biomass remains. In its justification, the RFMO makes reference to its desire to provide the fishing industry with more sustainably.

The Western and Central Pacific Fisheries Commission (WCPFC)

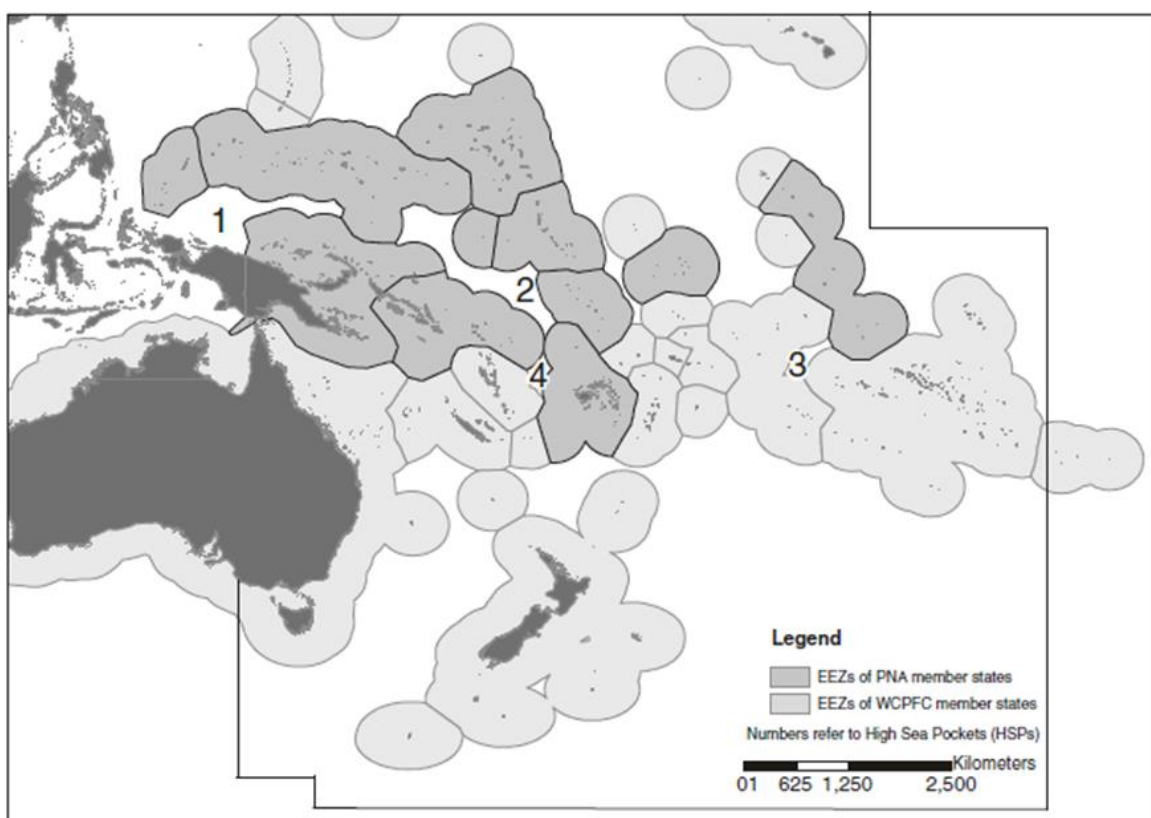
The WCPFC is unique among the studied RFMOs to explicitly include socioeconomic factors of its members in its institutional statements on strategy. The special requirements of developing states was recognised in the UNFSA (UNFSA Art. 61-62), and was a core issue in the negotiation of the WCPFC Convention. In terms of distribution of the conservation burden, WCPFC members all favour conservation and management measures (CMMs) that maximise their own interests in the various tuna fisheries that exist. For example, some propose historical precedents that favour their own catch history, some favour blanket exemptions for their own fleets, and some favour imposing restrictions on types of fishing done by other fleets (Hanich 2011:330). All member states are self maximising.

Within the WCPFC, members must account for the requirements of developing states whose economies are overwhelmingly dependent on marine living resources (WCPFC Art. 10.3 & Art. 30). Indeed, this position is central to the policy of the three sub-regional groups that preceded and were responsible for creating the WCPFC: the Secretariat of the Pacific Community (SPC), the Forum Fishing Agency (FFA), and the Parties to the Nauru Agreement (PNA). All three bodies closely coordinate their activities through joint participation in regional meetings and formal annual consultations between secretariats (Miller 2014:8). The SPC oceanic fisheries programme provides independent scientific stock appraisal information and advice to Scientific Committee members. The FFA is an advisory and support body to 17 Pacific Island countries targeting sustainable management of fish stocks in their state EEZs while also maximising their social and economic benefits. All coastal state members maintain sovereign control over fisheries in their EEZs and archipelagic waters, and the FFA provides support by facilitating capacity building and regional cooperation through providing technical and policy advice to its members participating in international forums like the PNA and WCPFC. The PNA has the objective of controlling the terms and conditions for foreign fishing vessels within the EEZs of its members. This group of pacific coastal states controls around 50% of the global

skipjack tuna (the most commonly canned tuna) (PNA 2018). The primary focus of PNA efforts to sustainably manage tuna is the Vessel Day Scheme. Here, PNA members agree on a limited number of fishing days for the year, based on scientific advice about the status of tuna stocks (PNA 2018). Fishing days are then allocated by country and sold to the highest bidder.

The structure of the tuna fisheries under the competency of the WCPFC are unique among those RFMOs studied. Up to 85% of the WCPFC target fish catch is taken within the EEZs of coastal state members (WCPFC14 2017:74). This enables the FFA and PNA to regulate fisheries management measures for its members through the WCPFC. As shown below in Diag. 2, there are four high seas pockets enclosed within coastal members of the RFMO. Under the WCPFC, pockets 1 and 2 are closed to purse seine fishing since 2010. Pockets 1 to 4 are closed to any purse seine vessels licensed to fish within the EEZs of coastal states which are part of the PNA (Miller 2014:5).

Diag. 2: WCPFC Area and corresponding EEZs



Two points illustrate this WCPFC regulatory action: fishing reference points and fishing restrictions (Miller 2014:11). Reference points are fundamental to the precautionary approach to managing a fishery. A limit reference point aims to constrain catch within safe biological limits, while a target reference point aims to meet a management objective such as desired biological, social, and economic outcome. The WCPFC has been able to agree some reference points but others are still dependent on ongoing scientific study (WCPFC14 2017:229). The establishment of reference points is important to the PNA because in 2011 it obtained a Marine Stewardship Council (MSC) certification for its purse seine skipjack fishery. This certification is awarded because management guarantees that the fishery does not use fish aggregating devices (FADs) to bait the fish which helps reduce incidental bycatch of

non-target species, and the fishery has limited the number of days when fishing is allowed (MSC 2011). The condition for setting both reference points came from the MSC certification (Miller 2014:10). PNA members asserted that the WCP was the only oceanic region where most of the catch in the purse seine fishery was taken on free schools not FADs. They further asserted that more controls be placed on high seas purse seine effort limits, FAD closures, and longline limits by the WCPFC (WCPFC14 2017:234-5). And they noted that Flag states were using the consensus mechanism within the WCPFC to refuse to agree on a timeframe for FAD closure and refuse to agree on a limit for longline vessels. The capture of economic benefits to PICs from these fisheries is regarded by PNA member countries as central to its cohesiveness as an institution.

The focus on capturing benefits from living marine resources is not surprising considering that tuna catch in the western and central pacific for 2016 was 2,717,850 metric tonnes (WCPFC14 SC13 2017:v). The total estimated delivered value of catch in the region increased by 11% to \$5.3 billion during 2016 (WCPFC14 SC13 2017:5). This is the second highest on record and 56% of the global tuna catch. This reversed the declining trend evident since the 2012 peak when the value reached \$7.5 billion (WCPFC14 SC13 2017:5). In terms of value by species, all species increased in value except for albacore which declined 13% to \$293 million (6% of total catch value). The value of the bigeye catch increased by 8% to \$697 million (13%). The value of the skipjack catch increased 19% to \$2.7 billion (51%). The value of yellowfin catch increased by 7% to \$1.6 billion (31%) (WCPFC14 SC13 2017:5).

Unsustainable historical practice also affects WCPFC fish stocks. For example, immediately upon achieving entry into force in 2005, the WCPFC Commission sought to reduce TAC from its purse seine fishery.¹⁴ The WCPFC adopted a measure that catch must not exceed 2004 levels (WCPFC CMM 2005 Para. 8). Compliance levels among WCPFC member states were low. In 2008, the Commission responded to continued low levels of tuna stocks by adopting a measure to reduce catch to 30% less than the 2004 historical baseline (WCPFC 2010-2011 Para. 31). The current WCPFC conservation and management measure for its tuna fisheries follows.

Pacific Bluefin Tuna

The strategy for harvest management for Pacific bluefin tuna is to maintain or restore the stock that produces maximum sustainable yield and to maintain an equitable balance of fishing privileges (WCPFC14 HS02 2017:1). Yet, there are two actual target reference points to rebuild Pacific bluefin tuna. The first is the initial rebuilding target. This first target is a 60% probability to rebuild tuna to the median biomass of the period 1952 - 2014 to be reached by 2024 (WCPFC14 HS02 2017:1). The second more ambitious rebuilding target is 60% probability to achieve 20% of the unfished spawning stock biomass by 2034 (WCPFC14 HS02 2017:1).

Bigeye

The conservation and management measure for bigeye, yellowfin, and skipjack tuna asserts that bigeye and yellowfin do not experience overfishing and are not in an overfished condition. There is

¹⁴ Purse seine is a type of fishing in which a trawl net is pulled close like the drawstring on schooling fish (Purse Seine 2017).

structural uncertainty within the bigeye tuna stock because of doubts around different stock projection models (WCPFC14 SC13 2017:xv). The assessment results show that there has been a long term decrease in spawning biomass from the 1950's to the present. For bigeye tuna the existing biomass sits at 34% of the unfished spawning biomass (WCPFC14 SC13 2017:xiv). The practice of setting a 20% limit reference point then asserting that the stock is not experiencing overfishing continued (WCPFC14 SC13 2017:xvi). The bigeye catch has been similar for the last 10 years (WCPFC14 SC13 2017:3). It was also noted that the harvest strategy for bigeye showed a 29% risk of breaching the limit reference point and this was not consistent with the guidelines set by the UNFSA and agreed by the WCPFC (WCPFC SC13 2017 Para. 55-58). Mortality on bigeye stock should not be increased from the current level to maintain spawning biomass until the WCPFC can agree on an appropriate target reference point.

Yellowfin

Yellowfin tuna have also been in continuous decline since the late 1960s. The current stock sits at 35% of unfished biomass (WCPFC14 SC13 2017:xxi). However, juvenile and adult fishing mortality show a steady increase since the 1970s, and for the last three years scientific committee advice has been to reduce fishing mortality of juveniles with the goal to maximise fishery yields and reduce any further impacts on spawning potential.

Skipjack

Skipjack tuna fishery spawning biomass projections for 2018 sit at 47% of the unfished biomass. The 2016 catch from this fishery was 160,000 metric tonnes less than the record in 2014 yet it is still the fourth highest recorded since data collection began (WCPFC14 SC13 2017 Para. 77-79). WCPFC members could not reach consensus on the scientific models for stock status and trends. The majority view accepted that fishing mortality of all age classes have increased significantly since the beginning of industrial tuna fishing, but mortality still remains below the level that would result in MSY. Therefore, skipjack are not being overfished (WCPFC SC12 2016 Para. 309). China, Japan, and Taiwan held the view that alternative models indicated that biomass is below the target reference point of 20% of unfished biomass. This largely reflects the view that high catch rates of skipjack tuna in equatorial regions may be causing a range contraction of the Western and Central Pacific stock thus reducing skipjack availability to fisheries conducted at higher latitudes to the equatorial region (WCPFC SC12 2017:319). Research is ongoing.

Albacore

The south pacific albacore tuna fishery currently sits at 42% of unfished biomass and is projected to decrease to 35% by the end of the current 20yr projection in 2033 (WCPFC14 SC13 2017:xxiii). At current catch rates this fishery cannot support the current costs of fishing, and fleet size will have to decrease (WCPFC14 TC13 2017:172). Members agreed that that the status quo could not be maintained and a target reference point for maximum effort must be agreed in 2018. Yet, the scientific committee declared it likely not overfished relative to the limit reference point of 20% of the unfished spawning biomass adopted by the WCPFC. It is WCPFC practice to compare existing fish stocks to 20% limit reference point and then declare that the stock is being fished within acceptable limits

(WCPFC14 SC13 2017:xxv). The WCPFC also declares that no more than 10 years is the 'reasonable timeline' for rebuilding stock back to the limit reference point. The most recent interim strategies assert that the management objective for the North Pacific albacore fishery is to maintain the biomass around its current level with reasonable variability to allow recent exploitation levels to continue (WCPFC14 HS01 2017:1). However, the reality of the stock status is revealed by the scientific committee declaring that spawning biomass will undergo a moderate decline if the current fishing intensity continues.

The Southern Pacific Regional Fisheries Management Organisation (SPRFMO)

Jack mackerel

The SPRFMO Commission has also sought to push total allowable catch of its jack mackerel fishery below historical and unsustainable baselines. During the negotiation period leading up to its agreement and entry into force, individual allocation among member states was set at a 2007 historical catch baseline but was in no way endorsed by the Commission as sustainable (SPRFMO 2007:1). The SPRFMO recognised the historically high rates of fish-catch, the need to maintain low fishing mortality, and the high degree of uncertainty of stock recovery (SPRFMO-COMM-03 2015:1). Actual fishing mortality of jack mackerel peaked at 90% of its biomass in the late 1990s. Total allowable catch is now set to 10% of biomass (SPRFMO SC 2016:7). In 2017, jack mackerel stocks remain at very low levels. Nonetheless, since 2015 total allowable catch has increased 23,000 tonnes to a total SPRFMO allowable catch of 493,000 tonnes (SPRFMO-CMM 01-2017). Further, total catch is set to 576,000 tonnes for 2018 (SPRFMO SC 2017:47).

Orange roughy

The other major fishery in the SPRFMO is Orange Roughy. There are no target or limit reference points for Orange Roughy stocks. The precautionary limit reference point is 20% of unfished biomass (SPRFMO SC. 2017:16). This total catch is down to around 50% of the catch over the previous reference years of 2002-2006 (SPRFMO SC. 2016:7).

Toothfish

Finally, in 2015, New Zealand undertook an exploratory Antarctic toothfish fishery with a precautionary retention limit of 30 tonnes greenweight in 2016 and 2017 (SPRFMO SC. 2015:6). The CCAMLR assessed the stock in the adjacent area at 77% of unfished biomass. New Zealand undertook to involve CCAMLR scientists and share all information on results.

TAC is not a perfect control mechanism

Total allowable catch will still perpetuate a 'race to fish' prompting fishermen to overcapitalise their vessels and equipment. This is because catch per unit of effort is high when fish are abundant. This makes the financial return on fishing effort high and every commercial fisher seeks to maximise return on investment. Thus, in a limited entry fishery, vessels engage in 'capital stuffing' in order to maximise

their capability to catch first. Further, a total allowable catch often leads to a shortened fishing season of only a few weeks or days. This has a negative economic impact for the fishing industry as catch floods the market, lowering the price and forcing returns much lower than could have been achieved over a longer fishing season. Finally, the monitoring and enforcement necessary to ensure the implementation of any of the measures, especially catch documentation, is costly.

Catch documentation

Indeed, catch documentation is a primary mechanism to support compliance with catch limits among all the studied RFMOs. To this end, the CCAMLR requires catch documentation in the form of five, ten, and monthly catch details. It also requires data on movements of fish-catch transshipments, port offloads, trade movements, and market sales (CCAMLR COM 2017:32). In another example, the CCSBT Catch Documentation Scheme (CDS) came into effect in 2010 replacing the trade information scheme which had operated since 2000 (CCSBT24 SC22 2017:105). The CDS provides for tracking and validation of legitimate SBT product flow from catch to the point of first sale on domestic or export markets. As part of the CDS, all transshipments, landings of domestic product, exports, imports and re-exports of SBT must be accompanied by the appropriate CCSBT CDS documentation. Inevitably, catch documentation processes are still experiencing technology related issues. For example, New Zealand submitted a large number of duplicate catch tag numbers in 2015-2017. New Zealand claimed that their catch documentation system is still manual and the planned introduction of electronic reporting will help reduce duplicate tag numbers (CCSBT24 CC12 2017:2). Other members are also trialling different electronic methods to secure tag numbers such as bar codes. There is general agreement that the CCSBT should be moving towards electronic CDS systems and this would be considered in discussion of the Compliance Action Plan for 2018-2020 (CCSBT24 CC12 2017:9). There are also issues with full supply chain tracking. After implementing a new process in 2016, Korea's submission of import copies of forms has increased a lot for re-exports after landing but no expected related importer copies were submitted (CCSBT24 CC12 2017:2). Despite being appraised of the issue in 2016, 61.5% of Japan's claimed re-exports were not validated during 2016.

Illegal, Unreported, and Unregulated (IUU) Fishing

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

States are forbidden to flag a vessel that has been confirmed as engaged in IUU activities. There has been significant progress towards deterring IUU fishing activities due to action taken by CCAMLR members, non-members, and agencies such as INTERPOL resulting in the investigation and prosecution of beneficial owners or the detainment or sinking of several IUU-listed vessels (CCAMLR SCIC 2017:24). The committee noted that at least seven vessels had persistently engaged in IUU

fishing activities. And some of these vessels had a history since 2004 of operating together in the Area. In some fisheries, the presence of authorised vessels in the region of IUU activity did not appear to deter the IUU fleet (CCAMLR SC 2017:41). In addition, the significant quantity of removals by the IUU fleet compared to authorised catch may have potentially impacted on previous research conducted in the region.

Indeed, a vessel has recently been seized by member state China, and Antarctic toothfish onboard are likely from within the Convention area (CCAMLR SC 2017:41). China has publicly auctioned the catch. The proceeds of the auction are permitted to be put into the CCAMLR catch documentation scheme fund or into a national fund that promotes achievement of the objectives of the CCAMLR (CCAMLR COM 2017:37). This is an example of vessel and beneficial owner exclusion from the benefits of illegal withdrawal from the CCAMLR governed fish stocks.

Yet, IUU is still an issue in the CCAMLR and threatens serious depletion of Toothfish populations. Some vessels are observed on radar and other member flagged vessels discover fishing gear in the Area that is not identified with any authorised vessel. In 2017 the CCAMLR introduced a conservation measure CM 10-05 for catch documentation to monitor the catch, port movements, trade movements, and market movements of toothfish (CCAMLR COM 2017:32). Recall that it was exactly this kind of wholistic port and market analysis that exposed the systematic non-compliance in the trade of southern bluefin tuna in the CCSBT.

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT)

The CCSBT has similar IUU issues. After detection by members in 2016, three Chinese flagged vessels were placed on the Draft IUU list along with supporting evidence. This was transmitted to non-member China who responded that they do not agree that these three vessels be added into the IUU list (CCSBT24 CC12 2017:7). China was also requested to take appropriate action on the use of large scale driftnets and SBT found onboard (CCSBT23 CC11 2016:21). These drift nets are more than 2.5 kilometres in length and designed to catch fish by drifting on the surface or in the column of water. They are prohibited in SBT fisheries. Any vessel fishing with large-scale driftnets on the high seas is likely to undermine the effectiveness of CCSBT Conservation Measures. The CCSBT agreed that China had taken effective action against all three vessels. The CCSBT requested China to consider membership or co-operating non-membership otherwise its vessels bycatch of SBT would be considered IUU fishing.

The Western and Central Pacific Fisheries Commission (WCPFC)

The WCPFC must also maintain a list of IUU vessel list (WCPFC IUU 2010). The WCPFC now holds its Compliance Monitoring Scheme (CMS) at the core of its Compliance Committee work (WCPFC14 TC13 2017:6). These initiatives are effective but compliance with new administrative processes and rules takes time. New Zealand observed that the Compliance Monitoring Scheme had improved in recent years through incremental improvements in the system, increased awareness and responses by

members to their obligations, and in improved remedial action after compliance issues had been identified (WCPFC14 TC13 2017:13). In 2017, three Chinese flagged vessels not on the registered vessel list were boarded in the WCPFC area and found to hold catch. The offences were very serious but the WCPFC members were satisfied with the actions taken by non-member flag state China. These included permanent disqualification of the company owning the vessels, the beneficial owner of the company was no longer permitted to work in any business related to distant water fishing activity, the fishing licences for all ten (10) vessels owned by the company had been suspended or relevant registration cancelled, the captain's certificate for all three captains had been permanently revoked, the maximum penalty of \$300,000 had been imposed on all vessels (WCPFC14 TC13 2017:8). These are all vessel and beneficial owner related sanctions.

However, it was noted by other members that other vessels flagged to Georgia and Chinese Taipei¹⁵ had been on the IUU List for seven–eight (7–8) years and that this continued to be a serious concern. Especially as these vessels had also been listed in other RFMO Lists. Chinese Taipei advised that no additional information was available and noted that the vessel was recently unregistered from Chinese Taipei (WCPFC14 TC13 2017:9). Members noted that deregistration of a vessel did not free the flag state of its IUU compliance responsibilities. The WCPFC did not become routine to simply roll over the IUU List each year. These interactions show that group members are beginning to hold member and non-member flag states responsible for the actions of IUU vessels. But there is still no talk of catch allocation sanctions being applied to members for IUU rule non-compliance.

The Southern Pacific Regional Fisheries Management Organisation (SPRFMO)

The SPRFMO also requires member states to demonstrate that effective action to punish non-compliant behaviour among fishing vessels (SPRFMO 2012 Art. 8.i). Most recently, member flag state Russia claimed that one of its vessels on the IUU list was only transshipping supplies to authorised fishing vessels in the SPRFMO area during 2015 (SPRFMO CTC. 2017:3). Other member states asserted that this was still considered fishing, was not to be taken lightly, and there had been sufficient time since to remedy the infringement. The SPRFMO reminded Russia that another SPRFMO flag state Vanuatu had already imposed and received a fine from its fishing vessel which had transhipped with the Russian vessel. The compliance committee agreed to keep the Russian vessel on the IUU list for 2018 and effectively prohibit it from any activity in the SPRFMO area including those areas of cooperating RFMOs. Further, the committee expected to receive notification of effective punitive measures from Russia during 2018. In a second IUU incident, Russia claimed that another vessel on the list had changed beneficial owners. The committee did not agree to remove the vessel until evidence of the change was submitted (SPRFMO CTC. 2017:4). Further, the committee did not agree to re-open a discussion with the flag state on the reasons for putting the vessel on the IUU list. There was no evidence that the SPRFMO considered sanctions against member state Russia for its non-compliance to regulate and sanction its flagged vessels.

¹⁵ Taiwan

In contrast, an EU flagged vessel undertook unauthorised bottom-fishing activities during 2014. The EU member state withdrew the licence of this vessel to fish within the SPRFMO area between 2015-2017 and undertook an administrative programme to strengthen compliance (SPRFMO CTC. 2017:4). Some members expressed concern that this vessel was able to continue fishing in other RFMO areas. They agreed that this constituted a lack of appropriate sanction and the owner received economic benefit during this period. The committee agreed that the vessel will stay on the SPRFMO IUU vessel list. A port state member had impounded a vessel on the SPRFMO IUU list and imposed a 1.6million dollar fine on the vessel owner (SPRFMO CTC. 2017:4). The committee agreed to keep the vessel on the IUU list while this compensation dispute was before the courts in Peru. A Bolivian flagged vessel was inspected in a port in Ecuador. The non-SPRFMO member Bolivian state had authorised the vessel to fish for demersal species in the SPRFMO area (SPRFMO CTC. 2017:5). International law prohibits non-member flag states from authorising vessels to fish in RFMO areas. The SPRFMO invited Bolivia to attend the next meeting or to apply for co-operating non-member status. Three other countries were in the process of achieving co-operating non-member status.

The role of property rights to motivate sustainable fishing

National jurisdiction

The evolution to individual quota within a total allowable catch mechanism enables individual and group benefits to accrue from the choice to limit individual catch. Individual quota is an extension of the catch limit mechanism. Some form of licence or permit issuing system is necessary, but it is assumed that this already exists in fisheries regulation (Stewart 2004:101). The declaration of total allowable catch, whether specific or indirect, is also necessary. At this point in a regulatory regime all that is needed for the commencement of an individual quota system is legislation that does not specifically prohibit it. The next element in the development of an individual quota mechanism is the extent of the property nature decided upon (Stewart 2004:102). For example, a system will accommodate actors who are variously individuals, partnerships, and corporate entities. Thought must be given to investing individual quota with property rights. For these types of actors in possession of a right to catch fish then possible events must be anticipated such as mortgage, death, divorce, and disincorporation. This focus on the propertisation of individual quota rights is on national fisheries yet the points made do complement the development of RFMO norms and rules.

International jurisdiction

The primary actors in RFMOs are unitary states. The UNCLOS has already mandated that all states have the right to fish in international waters (UNCLOS 1982 Art. 87). Therefore, any sovereign state inherently holds the right to participate in a high seas fishery. Under the Law of the Sea, state membership of an RFMO provides it the licence to fish for stocks under competency of that RFMO (UNCLOS 1982 Art. 118). Therefore, a member state that has agreed to comply with the convention and conservation measures of a RFMO possesses the right to fish for species and in the area under the competency of a particular RFMO. As long as the member state continues its membership it agrees

to comply with the norms and rules of the RFMO. In addition, it's right to fish is preserved into the future.

The determination of participants in RFMOs is already determined by the UNCLOS. As unitary actors, all states have the right to participate in high seas fisheries. Each member state will receive an individual quota of a fraction of the total allowable catch for a specific species in a specific area. The exception is the CCAMLR which due to extreme fishing conditions only sets total allowable catch of a species within very specific geographic areas. Vessels flagged to such states are permitted to catch in accord with a secondary allocation performed in accord with that member state's own fisheries regulations. In RFMOs, traditional methods of initial allocation are based on historical catch. This remains the norm for initial allocation but historically unsustainable levels of catch and the gaming of catch history have largely discredited this method (SPRFMO 2009). Yet, while established actors have strongly vested interests in the status quo any efforts to reform and distribute individual quota more equitably is slow. These are particularly acute when vessels from several nations have traditionally exploited the now controlled fishery; few governments will willingly accept cross-national redistribution of real income.

Of course, the individual quota of each member state is variable. In the past, RFMOs have relied upon historical catch levels that were in place when it was put into force. Further, among the studied RFMOs there is no current platform to allow or easily facilitate the trading of individual quota among authorised member states. But there are other methods to achieve similar allocations of an individual quota. In the Pacific region, some state actors allow their quota to be caught by fishing companies which are owned by foreign nationals but whom have entered into contractual relationships with the state member. This allows the member nation to extract its allocated value from the fishery without incurring the various costs of maintaining a domestic fishing fleet. This practice is more akin to outsourcing than any form of transferability.

Some nations will also allow part of their quota to be caught by fishers who fly the flag of other state members to the RFMO. This is more closely aligned to the concept of transferability in that the exchange of the right to exploit an agreed quantity is transferred between two member state quota holders. The transfer is undertaken as an agreement between two member states. Certainly, the secretariat of a RFMO must be informed in order to correctly account for and allocate quantities of fish caught in accord with their monitoring duties. The statements that can deliver more effective value from the propertisation of individual quota will be explored in later chapters.

Conclusion

This chapter has showed that, in terms of solutions to fishery management challenges, there is not a blueprint waiting to be discovered. Management problems must be addressed with the knowledge of how the total system functions and in explicit recognition of the fact that such knowledge is incomplete, imperfect, and changing over time. This approach is anthropocentric (Common 1995:55). The problem itself changes over time as the result of economy-environment linkages, and their repercussions in human societies (Common 1995:6). In terms of policy relevant analysis, it is a matter of addressing

current and prospective threats to sustainability, rather than preparing and implementing the blueprint for a sustainable system (Common 1995:6). Successful adaptation to changing circumstances is the best solution to the problem of fish stock sustainability.

Fisheries governance is a complex process. Control mechanisms such as setting total allowable catch under fisheries management is not itself sufficient to enable a fish stock to regenerate and to achieve its full productive potential. A successful governance outcome requires the integration of marine resource biology and ecology with socio-economic and institutional factors affecting the behaviour of fishers and policy makers (Seijo 1998). Yet, total system functions must not be ignored. The achievement of regional fishery management objectives cannot be reduced to the scientific determination of reference points or economic optimisation. Even within a RFMO, cooperation is undertaken without any notion of collective welfare amongst state actors.

Economic mechanisms would invariably be defeated by the very nature of an international fishery. Indirect economic control mechanisms must reference market prices. This reference point would be infeasible for an RFMO governance authority whose actors each come from multiple jurisdictions. Of course, tuna catch is largely traded through Japanese markets and a model for setting tuna catch prices could be possible. But there are many other species and other markets at play in the RFMO competency. The volatility of such markets individually and collectively would make it problematic for a RFMO regime to set charge or penalty type regulations based on marginal costs. The governance of international fisheries is far from applying these principles of economic rationalisation beyond the preservation of historical catch rates for individual maximisation.

This thesis has instead focused upon those institutional structures that already exist and may be adjusted incrementally to achieve sustainable rates of catch and conserve the common-property resource of living marine resources. This is necessary because regulatory failure to secure sustainable fishing practice based on MSY of unfished stock levels is the major disappointment in the conduct of RFMOs to date. Indeed, the practice of recognising historical catch when setting total allowable catch and individual quota, and levels of unsustainable historical catch have been a major failure of the RFMO institution. The failure to move towards regeneration of stock to allow the exploitation of maximum value from the naturally occurring resource is particularly galling. The magnitude of the dysfunction within the studied RFMOs is such that it appears that some form of regulatory capture by interested parties has occurred. This is not surprising given the difficulty of securing agreement from self-interested parties to act against their own interests. However, from the grievous situation of fish stock levels under the management of RFMOs it is clear that a more radical approach to regeneration of stock levels and the compliance to quota allocations of total allowable catch must now be among the foremost objectives of RFMOs.

The next chapter will explore the nature of property rights systems and select an appropriate mapping of such a system to the governance structures of high seas fisheries.

Chapter 6

The governance of high seas fisheries

The *Chapter 5 - Fisheries management* detailed the regulatory control mechanisms used to guide the practice of commercial fishing in the high seas. Some of those mechanisms were focused on determining the total allowable catch that can be taken from a fish stock without degrading its productive capacity. However, it was shown that historical catch volumes with current total allowable catch allocations do not enable stock to sufficiently recover. The current harvest strategies of all the studied RFMOs will have stocks to recover only a fraction of their productive capacity over the next ten years. Even this lacklustre target is subject to a mid-range probability of success. The low fractions of stocks remaining and the current high quantities of catch planned under the current RFMO management plans are concerning (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Especially given the UN projection for increased demand for fish products. This thesis argues that the current RFMO management plans are untenable. Therefore, this thesis argues that the current set of values, focused on preserving current levels of income from exploitation of marine resources held by state actors in high seas fisheries must change. To support the development of this argument, this chapter will detail governance structures currently in place by international law.

The governance of high seas fisheries faces both the substantive issues of managing a fishery and the structural issues inherent in the international regime created by the 1982 Law of the Sea. The following chapter builds upon the management measures required to achieve sustainable fishing discussed in *Chapter 5 - Fisheries management* and situates them within the international governance regime where norms of behaviour must be created and enforced. In accord with the 1982 United Nations Convention on the Law of the Sea (UNCLOS), all states have the right to capture fish from the international commons. The intense competition resulting from this institutional condition motivates fishing fleets (and their beneficial owners) to race and catch as much fish as possible in as short a time as possible. Since each fishing actor operates with the same rationale, they are caught in the inevitable outcome of degradation of the very resource on which they all depend.

Despite increasing numbers of multilateral international treaties focused on governing high seas fishing, in 2006 the United Nations Food and Agriculture Department declared that (UNFAO 2006:33):

... there has been emerging recognition that existing regulatory regimes, based primarily on the 1982 Law of the Sea Agreement, are proving incapable of effectively regulating these fisheries. This is especially the case for deep-sea fisheries which concern high-seas stocks.

Unless the behaviour of high seas fishers, and their flag states, is somehow regulated in the common interest, the long-term outcome is ecological and economic degradation of high seas fisheries. Effective fishery governance must create institutions that incentivise limits on individual catch of high seas stocks. To achieve this outcome, sustainable fishing practice draws from rules and systems that close the gap between individual and collective rationality. This chapter will introduce the rules and

systems necessary to both incentivise sustainable levels of catch and empower governance institutions to uphold the fundamental biological limits on catch. These outcomes are necessary to rebuild stock levels at a rate beyond that currently being practised in the studied RFMOs.

The failure of RFMOs to achieve sustainable fishing practices stems from their failure to fully realise effective institutional mechanisms of control. This chapter will make a distinction between control mechanisms that limit actor activities and mechanisms of control that shape actor choices. The overarching law of the sea mandates that multilateral treaties are required for states to cooperate when fishing for resources in the high seas. There are now eighteen such regional fishery management organisations (RFMOs) worldwide and eight in place in the Pacific Ocean. These RFMOs all have very similar sets of organising principles and norms. Yet, there are still significant issues with compliance to sustainable fishing practices and the strategies that allow degraded fish stocks to recover remain weighted towards maximising fish catch.

Therefore, this chapter will argue that the failure of the governance of high seas fishing is not the lack of international law or action plans to address issues. Nor is the principle problem a lack of technical knowledge of management measures or control mechanisms. Control mechanisms like catch documentation schemes, and the VMS technologies that enable them, form the core of fisheries management measures in all the studied RFMOs. Further, control mechanisms such as total allowable catch (TAC) and individual quota (IQ) are essential to identifying catch limits. However, this thesis will argue that the most important step in achieving sustainable fishing practices is an institutional solution that introduces a new mechanism of control that shifts the enforcement of violations to the context of a property right.

What is required to achieve sustainable fisheries is exploration of a new mechanism of control based on the emergent property rights already evident in the studied regime. Exploration of the potential and limits of this mechanism of control will be explored in two ways: (a) the potential of property rights with requisite market mechanisms and (b) the importance of rules to enforce those property rights. Within a system of property rights, individual quota creates the rationale for actors to preserve the valuable common property resource. This is important because a system of common property needs exclusion rules to be successful. This exclusion has two aspects. The first is the obvious exclusion of outsiders who refuse to commit to the rules of the collective governing RFMO authority. The second aspect is more subtle and more difficult to enforce given that RFMOs tend to adopt the historical catch volumes and proportions of existing actors. Nonetheless, the baseline requirement to the success of a governance regime is that its system of enforcement is sufficient to deter landings by authorised members of over-quota fish-catch. This rule is necessary to enable tough but necessary rebuilding of high seas fish stock biomass.

A framework of international treaties

The polycentric nature of high seas governance makes it necessary to analyse international legal instruments at their multiple levels. The principles, norms, and rules that constitute high seas governance are spread across a series of multilateral agreements that have been negotiated at both

global and regional levels. In the international relations over high seas fishing, as with other arenas of world politics, a fundamental principle of international law is *pacta sunt servanda* – treaties are to be obeyed. In accord with the Vienna Convention on the Law of Treaties, “Every treaty in force is binding upon parties to it and must be performed by them in good faith” (1969 Art. 26). Indeed, the practice of international treaties has evolved from simple records of bilateral (or regional) political arrangements to include multilateral regulatory agreements that require cooperative action among states over time (Chayes 1993:177; 1995:1). This same evolution toward active governance of treaty member compliance is evident in treaties governing high seas fishing.

The 1982 UN Convention on the Law of the Sea (UNCLOS) and the 1995 UN Fish Stocks Agreement (UNFSA) both define the principles for who may possess withdrawal and management rights in high seas fishing. The primary development from the Law of the Sea Convention was the enlargement of the maritime boundaries of coastal states. This enclosure made living marine resources within the 200mile (370km) exclusive economic zone (EEZ) from the coast is the property of that coastal state (Vicuna 2001:26; Hannesson 2004:23). Third parties were excluded from fishing in the EEZ of any coastal state. Only the coastal state possesses the right to fish in these areas. Yet, the UNCLOS is largely a framework treaty. It provides the basic structure of ocean management and little more, leaving the actual management rules to the expected supporting and enabling treaties that follow. The UNCLOS did codify the right of all states to withdraw from high seas resources as an overarching principle of international politics (UNCLOS 1982 Art. 87). Yet, the governance of high seas resources was left as a general requirement for cooperation (Chayes 1995:16). That said, for high seas areas the UNCLOS does define some important, if not always clear, principles. The treaty established the principle that, while all states retain the right to fish, access is limited to those who would obey certain conditions (Friedheim 1999:753). Friedheim’s assertion can be rephrased in the following way: the right to withdraw (catch) fish from high seas fish stocks is conditional on obeying a set of rules. Since the UNCLOS agreement, the high seas can no longer be considered an area free from certain regulations, just as coastal states could no longer freely permit unregulated fishing within their maritime areas (Birnie et al. 1992:505-507). This restatement of principle as an expression of rights exists in the global UNCLOS and UNFSA treaties, and in those enabling treaties that establish regional fisheries management organisations.

From the UNCLOS and UNFSA there is a clear statement on the requirement to cooperate. Yet, the form in which this collective governance should take was left to those interested state parties. In reference to the establishment of 370km EEZs, Stokke argues that the enclosure of the oceans did not eliminate the high seas governance challenge, but rather moved the problem further away from shore (2001:5). The decade following the signing of the 1982 Convention was characterised by increasing activity in high seas fisheries. Likewise, Vicuna concluded that while it was significant the evolution on the law of high seas fishing under the Law of the Sea was not sufficient to dispose of high seas fisheries problems (Vicuna 2001:6). To this end, the 1995 UNFSA treaty built upon the UNCLOS mandate for states to cooperate. The Agreement included even more powerful enclosure measures for high seas fish stocks. States who fish an area where there are stocks of fish that straddle exclusive economic zones, or that are highly migratory, are prohibited from fishing unless they become members of a multilateral RFMO with competency over that stock (Friedheim 1999:753). Indeed, states are

forbidden from fishing unless they become a member of a RFMO (UNFSA 1995 Art. 8.4). Essentially, international law establishes that all States are free to exploit high seas resources but they must do so within collectively agreed rules.

This thesis will argue that the governance of high seas fishing is based in principles of power over property. The issue area of high seas fishing is therefore one of international cooperation to govern common-pool resources and also one of property-rights over resources. In her study of common-pool resource issues, Ostrom found that by far the most problematic rules are those that determine who has the right to benefit from the resource, who has the right to govern such access to the resource, and, critically, who is excluded from these powers over property (Ostrom 1994:7). The UNCLOS and UNFSA are framework treaties. They outline principles and approaches to governance, and the requirement for states to cooperate through RFMOs to manage and to govern high seas fishing. The RFMOs were intended to be those agreements that governed specific cooperative action in an area or over specific fish species. So, the question remains, to what extent has the international community expanded this principal of rights contingent on compliance, in the regional fisheries management organisations that followed? Of interest are those regional fisheries management organisations in the Pacific Ocean and each of these are included as case studies in this thesis: The Convention for the Conservation of Antarctic Living Marine Resources (CCALMR), the Convention for the Conservation of Southern Bluefin Tuna (CCSBT), the Western and Central Pacific Fisheries Commission (WCPFC), and the South Pacific Regional Fisheries Management Organisation (SPRFMO). This research project analyses the institutional principles and rules of legitimised behaviour within the studied RFMOs in the Pacific Ocean.

The international regime for governance of high seas fisheries

There are three structural elements to the international regime for governance of high seas fisheries: hard law framework treaties, soft law instruments, and the active treaties that form regional fishery organisations. The 1982 Law of the Sea (UNCLOS) and 1995 Fish Stocks Agreement (UNFSA) treaties provide the international framework for ocean use. Both mandate Regional Fisheries Management Organisations (RFMOs) as the instruments for international cooperation and governance of high seas fisheries. Yet, this RFMO regime is itself problematic. As stated, there are eight RFMOs in the Pacific alone and there is considerable variation in their jurisdiction, ranging from a single species tuna fishery, to multiple tuna fisheries in a particular region, or to non-tuna fisheries in a particular region. The defining structural feature of this regime is one of multiple authorities each with a narrow competency, a considerable governance burden, and a very limited jurisdiction.

Law of the Sea and the Fish Stocks Agreement

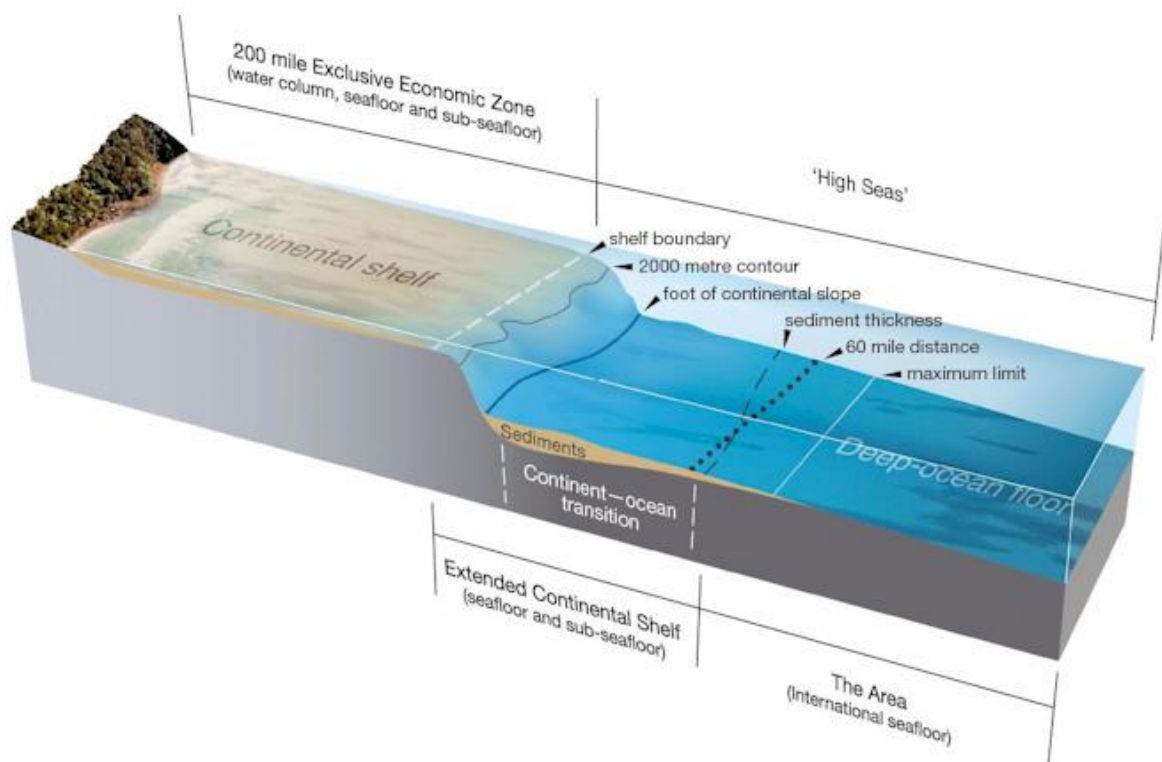
The principle hard law - legally binding - instruments for high seas fisheries are the 1982 UN Convention on the Law of the Sea (UNCLOS) and the 1995 FAO Fish Stocks Agreement (UNFSA). The Law of the Sea is the core international convention dealing with matters related to ocean use. In

large part, UNCLOS articles centre upon defining rights over resources within coastal maritime boundaries and provide only a general framework for governing high seas fisheries.

The Law of the Sea

The UNCLOS established the modern maritime boundaries of the territorial sea, exclusive economic zone, extended continental shelf, and the high seas. As shown in Diag. 1. on the principal maritime boundaries, the territorial sea of a coastal state extends 12 nautical miles (22km) beyond its territorial baseline at the low water mark (UNCLOS 1982 Art. 12.1). Expressed as a property right, the coastal state is the owner of all living and non-living resources within its territorial sea, including those resources found in the seabed and in the subsoil. The next maritime boundary is the exclusive economic zone (EEZ) which extends 200 nautical miles (370km) beyond the territorial baseline. Within its EEZ, a coastal state has sovereign rights to explore, exploit, and manage its natural resources, whether living or non-living, of the seabed, its subsoil, and the column of water above it (UNCLOS 1982 Art. 56). The exclusive economic zone is the limit of a state's sovereign and exclusive rights to fishery resources.

Diag. 1: *The principal maritime boundaries provided for in the UNCLOS*



Source: NZ Gov. Institute of Geological and Nuclear Sciences

The extended continental shelf is the last maritime boundary relevant to a coastal state. A coastal state may claim its 'extended continental shelf' if this geological feature extends beyond the outer edge of a state's exclusive economic zone. On a successful claim, a coastal state possesses sovereign and exclusive rights over the continental shelf for purpose of exploring and exploiting its non-living natural resources on the seabed or subsoil but possess no ownership rights over resources in the column of

water or of the air space above its continental shelf (UNCLOS 1982 Art. 77 & 78). Other states are lawfully permitted to enter the area of extended continental shelf to fish in the waters above it.

Thus, the high seas are the column of water beyond the EEZs of any coastal state. All states possess the right to access and withdraw living marine resources, and to participate in the taking of decisions for the management of these resources in high seas areas (UNCLOS 1982 Art. 86, 87, 116). Further, each state has a duty to effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag (UNCLOS 1982 Art. 94). Yet, the freedom to fish in the high seas was modified in two important ways. These UNCLOS provisions codified long-standing international principles on the freedom of fishing, the primacy of flag state jurisdiction over its vessels on the high seas, and set out a duty to cooperate in the conservation and management of living marine resources (HSTF 2006:106). States must cooperate with other states in the conservation and management of living resources, and to this end states must cooperate to establish regional fisheries organisations (UNCLOS 1982 Art. 118). In exercising its duty to participate in the management of a high seas fishery, a state must collectively determine the allowable catch and take other conservation and management measures that use best available scientific information to maintain or restore harvested populations to levels that can produce the maximum sustainable yield (UNCLOS 1982 Art. 119). Under the law of the sea, the right of states to fish on the high seas is modified by the duty for states to respect their treaty obligations. A state has powers to access the high seas, the power to withdraw high seas fish stocks, and must participate in collective management through multilateral institutions. These modifications underpin the regime of RFMOs that govern fishing on the high seas. See Table 1. for a summary of property powers by maritime boundary.

Table 1: *Principle gradations in powers over marine resources*

Boundary	Resource context
Exclusive Economic Zone	Seabed and subsoil Column of water
Extended Continental Shelf	Seabed and subsoil
High Seas	Column of water

The law of the sea is specific in its definition of the rights and duties over living and non-living resources found in our international ocean spaces. But, while it is the central instrument defining the modern principles of ocean use, the UNCLOS is limited by its construction as a framework treaty with no ongoing operational capacity.

The Fish Stocks Agreement

The 1995 UN Fish Stocks Agreement was developed in response to continuing issues with the unsustainable catch of high seas fish stocks. Despite the advances of the 1982 UNCLOS, the governance of high seas fisheries remained inadequate and some living marine resources continued to be over-exploited. Focused on tuna and tuna-like fish species that migrate across national jurisdictions

and the high seas, the Fish Stocks Agreement delivered more extensive provisions on the concepts of international cooperation and the duties of states to conserve highly migratory living marine resources. It paid particular attention to the precautionary approach (lower risk to fish stocks in face of scientific uncertainty) as the basis for conservation and management measures, the importance of scientific reference points to establish the utilisation levels for fish stocks, and the importance of the collection and exchange of information (UNFSA 1995 Art. 2). The Agreement also reasserted the mandate to place all high seas fisheries under RFMO governance.

In particular, the Agreement sought to improve cooperation between states within the establishment of regional fisheries management organisations (RFMOs). It refocused states on their collective responsibilities to strengthen RFMO capabilities (UNFSA 1995 Art. 8.4). To this end, (a) states must maintain or restore stocks at levels capable of producing maximum sustainable yield as qualified by relevant environmental and economic factors, and (b) states must implement and enforce conservation and management measures through effective monitoring, control and surveillance (UNFSA 1995 Art. 5). Membership of a RFMO carries specific duties to capture and report vessel position, catch of target and non-target species, fishing effort and other data in accord with global and RFMO standards (UNFSA 1995 Art. 18). Note that, while the context for the 1995 Agreement was highly migratory and straddling fish stocks - tuna and tuna-like species - these principles and norms are now being used as foundation for all RFMOs. For example, the 2012 South Pacific Regional Fishing Management Organisation (SPRFMO) has competency all over discrete high seas fish stocks in its area (except tuna). The international governance of all high seas fishing is founded on principles and norms intended to achieve sustainable fishing (UNCLOS Art 119; UNFSA Art. 5).

Soft law instruments

Unlike formal treaties, soft law instruments are non-binding declarations and resolutions. The voluntary 1993 Compliance Agreement required flag states to establish a record of fishing vessels authorised for fishing on the high seas and ensure that flagged fishing vessels do not engage in activities that undermine international conservation and management measures. But the most important soft law instrument defining international best practice in high seas fishing is the 1995 FAO Code of Conduct for Responsible Fisheries. The Code is much more expansive in scope and complements hard law fishery treaties with technical detail, best practice guidelines, and action plans for the conservation and management of fisheries. Further, the Code is enacted through a growing set of international plans of action. These include actions to reduce the incidental catch of seabirds in longline fisheries, to conserve and manage sharks, to manage fishing capacity within states, and to eliminate illegal, unreported, and unregulated (IUU) fishing. These and other issues are further elaborated in technical guidelines and implemented through National Plans of Action or through regional fisheries management organisations. In addition to action plans, there are technical guidelines to provide specific detail and guidance on the articles of the Code. Examples of guidelines range from the application of precautionary management principles, to data standards, and to vessel monitoring systems.

The Code is complemented by other soft law instruments such as the UN General Assembly and the Committee on Fisheries. The UN General Assembly can issue supporting resolutions such as the UNGA 61 105 (2006) intended to address the impacts of bottom fishing. Another very important source of normative principle and intent is the UN Committee on Fisheries (COFI). This subsidiary body of the United Nations Food and Agriculture Organisation (FAO) Council is the only global intergovernmental forum where major international fisheries problems are examined and recommendations addressed to governments and RFMOs. COFI membership is open to any FAO member and it is responsible for the review of the FAO work programme on fisheries. Together, the Code and its complementary soft law instruments progress new initiatives in fishery governance and are an important source of normative best practice for regional fishery management organisations.

In sum, there is no shortage of high quality information and guidance for the control mechanisms of fishery management. But, there is a notable structural feature in the governance of living marine resources of the high seas.

The UNCLOS created two separate resource governance regimes beyond the EEZ

The principles, norms and rules of RFMOs are a product of the broader institutions of international law. However, the institutions for the governance of living versus non-living resources in international areas are radically different. The UNCLOS established two very different governance regimes for high seas resources found beyond the limits of national jurisdiction. One of those regimes was created to govern the resources found upon and in the seabed, while another was created for resources found in the column of water (high seas) above it.

Non-living resources

At the time of its agreement in 1982, most emphasis of the UNCLOS was placed on the economic value of minerals found on and below the seabed. The seabed, ocean floor and subsoil were termed the Area. The Convention, asserts that the Area and its resources are considered the common heritage of mankind (UNCLOS 1982 Art. 136). Any exploitation activities in the Area are to be carried out for the benefit of mankind as a whole (UNCLOS 1982 Art. 140.1-2). This benefit was to include equitable sharing of financial and economic benefits derived from activities. The sole international governmental organisation established under UNCLOS to manage and control the exploitation of resources found in the Area is the International Seabed Authority (ISA).

At the time of its agreement some industrialised countries, particularly the USA, objected to UNCLOS provisions requiring the mandatory transfer of technology. The USA also objected to granting the Authority a mandate to create a supranational mining company called the Enterprise as a method for the distribution of wealth from deep sea mining amongst all nations. The USA ultimately refused to become a signatory to the UNCLOS. It was nearly a decade until resolution was found with the 1994 Implementing Agreement. This new agreement comprehensively revised provisions on the governance of seabed resource by removing all competitive advantages provided to the Enterprise, eliminating technology transfer requirements, and obliging nations to acquire equipment on the open market

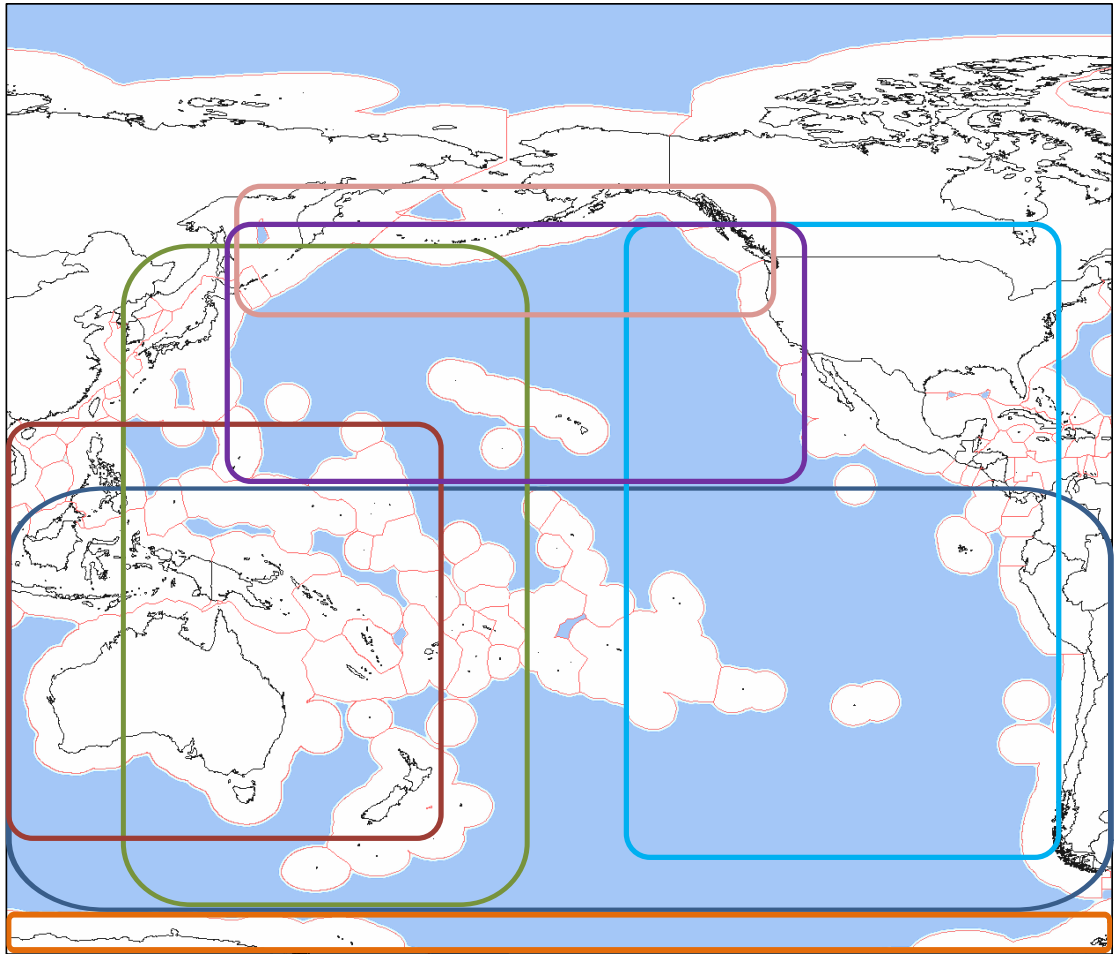
(Oxman 1994:691-693). The organisation remains the single governance authority for the exploitation of seabed resources. However, the implementing agreement significantly changed the international seabed authority's original mandate. What did not change was the stark contrast in the institutional structure created for mineral resources versus the one created for governing exploitation of living marine resources.

Marine living resources

There is no single international authority for the governance of resources in the column of water beyond national limits. Under UNCLOS provisions, all states have the right to catch high seas fish stocks, but states must cooperate in the governance of high seas fishing. Regional fisheries management organizations (RFMOs) are the mandated fisheries governance bodies on the high seas as decreed by the 1995 Fish Stocks Agreement. The national fleets of fishing states must abide by RFMO regulations in order to fish in these areas (Suzuki 2010:1036). RFMOs are designed to manage and govern high seas fisheries. Yet, they are required to do so with an authority and jurisdiction that is limited to specific stocks or territory or some combination thereof. Once they achieve entry into force, RFMOs are invested with authority and jurisdiction to govern those elements of high seas fishing under their specific competency. Some are created with competency over a specific fish species, some over multiple species and some for many different species with a defined area (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Almost all the high seas of the Pacific region are now covered by at least one RFMO. See Diag. 2. below.

In light blue is the 1950 Inter-American Tropical Tuna Commission (IATTC) focused on tuna species. In 2003 the member countries agreed upon the Antigua Convention to intended to strengthen and replace the IATTC. In orange is the 1982 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) mainly concerned with Patagonian toothfish or Antarctic toothfish. In pink, formed in 1994 North Pacific Anadromous Fish Commission (NPAFC), focused on Salmon. In red, is the 1994 Convention for the Conservation of Southern Bluefin Tuna (CCSBT) focused on Southern Bluefin Tuna. Since 2006, the CCSBT has been undergoing a major reform process in response to discovery of massive unreported overfishing by one of its members. In green, the 2004 Western and Central Pacific Fisheries Commission (WCPFC) focused on tuna species such as skipjack, yellowfin and bigeye tuna, plus swordfish and marlin. Recently entered into force in 2009 is the South Pacific Regional Fisheries Management Organisation (SPRFMO). This is focused on non-tuna species with the most commercially valuable being skipjack mackerel in the waters off South America and orange-roughy in the waters around New Zealand. The SPRFMO is unique in that it has competency over only high seas species as opposed to highly migratory or straddling tuna like species envisaged under the 1995 Fish Stocks Agreement. Finally, the newest arrival in purple is the 2015 North Pacific Regional Fisheries Management Organisation (NPRFMO). This organisation is competent over both bottom and pelagic fisheries. All these RFMOs are very specific in outlining their competency and are careful to avoid overlap with other existing fishery management organisations.

Diag. 2: RFMOs in the Pacific region



Regional Fishery Management Organisations

Within the limited mandate given to RFMOs, all struggle to achieve sustainable fishing practices within the fisheries under their authority. Especially for the most commercially valuable species as shown in the remaining stock levels in *Chapter 5 – Fisheries management*. Regional Fishery Management Organisations (RFMOs) are active international instruments for the collective governance of high seas fisheries. Wherever states are engaged in exploitation of high seas fish stocks they are obliged to establish an international organisation through which they must cooperate to ensure the conservation and optimum utilisation of those species (UNCLOS 1982 Art. 64). Once an RFMO has achieved entry into force, members continue to develop conservation and management measures through its Commission and various sub-committee bodies. What follows is a study of the four RFMOs in the Pacific Ocean of which New Zealand is currently a member:

- Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)
- Convention for the Conservation of Southern Bluefin Tuna (CCSBT)
- The Western and Central Pacific Fishery Commission (WCPFC)
- South Pacific Regional Fisheries Management Organisation (SPRFMO)

The Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)

The Convention for Conservation of Antarctic Marine Living Resources (CCAMLR) was established in 1982. It is focused on the rational use of Antarctic marine living resources, of which the most commercially valuable species is the Patagonian Toothfish. The Convention seeks to prevent the decrease in the size of any harvested population to a level below that which ensures the greatest net annual increment (CCAMLR 1982 Art. II.3).¹⁶ To this end, members pledged to restore already depleted populations to the levels that allow stable recruitment. In the 30 years since its entry into force the CCAMLR has made many management measures in attempts to conserve Toothfish stocks. In 1991, the Convention re-focused members on their duties as flag states to obtain, from each of its flagged vessels, a total catch of all species (including bycatch) and a total effort for that period, and transmit the aggregated catch and effort data to the Secretariat (CCAMLR 1991 Para. 2). In 1993, members were tasked to obtain from each of its vessels, a total catch of all species (including by-catch), total fishing effort for each 5-day period, the aggregate catch for the season so far, and an estimate of the date upon which its allocation of total allowed catch is likely to be reached for that season (CCAMLR 1993 Para. 2-5). In 2000, parties were reminded of their obligation under the catch documentation scheme to prevent trade in Toothfish in their territory or by flag vessels with Members or Non-members when it is not carried out in compliance with the Scheme (CCAMLR 2000). In 2002, the CCAMLR recognised the lack of effective control by some Flag states that allowed IUU catch. These member states were again urged to forbid the export or transfer of flagged fishing vessels to a non-member and non-cooperating state (CCAMLR 2002 Para. 1).

Concerned that many of the non-member flag states of IUU vessels had not responded to correspondence and other representations by the Commission, members were again urged to individually and collectively pursue diplomatic action in accordance with international law (CCAMLR 2006 Para. 1). The implementation of its catch documentation schemes is thought to have reduced IUU catch of Patagonian Toothfish to zero in States that are members of the convention. Nonetheless, the Commission is aware that vessels registered to non-members are still engaged in IUU activities and that there is transshipment of IUU catches by member vessels, and Port states are allowing landings of Toothfish without the required catch documentation. So Members are still urged to deter such activities and take domestic legal action against those vessels that disobey (CCAMLR 2010 Para. 3). In 2014, parties were urged to pursue action, in accordance with international law, with non-Contracting Party non-compliant flag states such as Tanzania, Nigeria, Sierra Leone, and Mongolia (CCAMLR 2014). *Chapter 5: Fisheries management* detailed the latest update on IUU vessel activity. Overall, the CCAMLR claims it has achieved neutral to positive results in its governance of the fishery resources over which it has competence.

¹⁶ To below the maximum sustainable yield.

The Convention for the Conservation of Southern Bluefin Tuna (CCSBT)

Southern Bluefin Tuna (SBT) have long been heavily fished, with annual catch reaching 80,000 tonnes in the early 1960s. The magnitude of this overfishing caused a significant decline in the numbers of mature fish and the annual catch fell rapidly. A first formal response was a 1985 trilateral agreement between New Zealand, Australia, and Japan (UN ITLOS 2000). These three countries caught most of the SBT at the time and agreed to hold catch at existing levels in the hope that this would enable SBT stocks to rebuild. However, other countries were also engaged in fishing SBT. A more inclusive response was required and in 1994 led to the establishment of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). The Commission's objective is to ensure the conservation and optimum utilisation of the global SBT fishery throughout its distribution (CCSBT 1994 Art. 3). But by 2000, and in response to significant catch of SBT by vessels flagged by non-members, the Commission developed an action plan to compile catch data based on trade information and port information (CCSBT 2000 Para. 1). Tuna stocks did not recover. In 2006, an investigation by Japan and Australia uncovered massive illegal catches and laundering of southern bluefin tuna in Japanese markets.

Since 1985, poor regulation and enforcement by Japan had allowed 178,000 metric tons of southern bluefin tuna overcatch to slip through its markets undetected (CCSBT 2006). The value of this overcatch was estimated at \$6-8billion Australian dollars. The Scientific Committee of the CCSBT estimated that the tuna spawning biomass was at a low fraction of its original biomass, well below the 1980 level, and well below the level that could produce maximum sustainably yield (CCSBT Meeting Report 2006:9). The investigation was a huge embarrassment for Japan, the market for 75% of the SBT catch, forcing it to overhaul its fishery management system. In response to this crisis, the CCSBT reduced global TAC for 2010-2011 by 20% (CCSBT16 2009). The most recent 2011 assessment confirmed that the SBT spawning biomass remains at a very low fraction of its original biomass and still far below the level that could produce maximum sustainable yield. *Chapter 4: Fisheries Management* detailed the latest update on IUU vessel activity, harvest strategy, and issues with IUU fishing. The CCSBT has failed to achieve the main objective of its founding Convention.

The Western and Central Pacific Fisheries Commission (WCPFC)

The Western Central Pacific Fisheries Commission entered into force in 2004. Like all RFMOs, the WCPFC was founded with the objective to effectively manage fishing to ensure the long-term conservation and sustainable use of the fish stock over which it had competency (WCPFC 2004 Art. 2). To this end the Commission, and each member, has a duty to adopt measures to ensure the long-term sustainability of tuna stocks in the Area, to promote their optimum utilisation, prevent or eliminate overfishing and excess fishing capacity, and apply these measures in accordance with the precautionary approach in accordance with international standards (WCPFC 2004 Art.5.a.b.g). In addition, each member state had the duty to implement and enforce these conservation and management measures through effective monitoring, control and surveillance of its own and other fishing vessels in the Area (WCPFC 2004 Art. 5.j). The Convention principles are closely aligned with those established in the UNCLOS and UNFSA.

Unique characteristics

As was discussed in *Chapter 5 – Fisheries management*, the governance of the WCPFC fisheries is modified by the sub-regional institutions of the FFA and PNA. WCPFC member fleets are forced, via licence restrictions for PNA member's own EEZ's, to observe the same purse seine fishing limits and fishing restrictions in high seas pockets. The PNA controls DWFN fleets by setting the adherence to CMMS for fishing in their EEZs. They close high seas fishing to DWFN vessels that have licences to fish in their EEZs (FFA PNA3; Miller 2014:13). This effectively redefines the spatial jurisdiction of PNA members by changing access arrangements to high seas pockets (Miller 2014:15). The PNA is therefore a functionally important sub-regional group of coastal states within the WCPFC whose own regulations impose limitations upon flag states and so modify the fishery management of the WCPFC.

The PNA group of Pacific island states also acted to distribute the conservation burden of catch limitation back onto DWFN states within the RFMO. Strategically, having gained MSC certification adds market value to the PNA skipjack tuna, connecting the PNA to powerful external markets like the EU and US, further ensuring member countries economic stronghold over this part of the tuna resource (Miller 2014:16). The sub-regional PNA group uses the institutional backing of the WCPFC Article 30 and reinforces the legitimacy of its decision-making leadership through the MSC certification of the PNA free-school skipjack fishery.

The practice of WCPFC members who are members of the FFA further deviates from the principles of international law on RFMOs through the ongoing discussion on membership. There is not a clear process for inviting new members to join the organisation (WCPFC 2017 Para. 72). Coastal states who are members of the Forum Fishing Agency and who are Parties to the Nauru Agreement consider the WCPFC to be unique compared to other RFMOs. The majority of members are small island developing states (SIDS) that are overwhelmingly dependent on fisheries resources, the majority of fishing takes place within their waters, and the interests of SIDS need to be addressed before considering the issue of new members (WCPFC 2017 Para. 73-74). Other flag state members (who are not Pacific island countries) do not regard the WCPFC as different in international law and that it should not be a closed organisation. Nonetheless, there was no consensus to consider developing a process for new membership beyond the existing process to establish cooperating non-members who agree to abide by the rules of the WCPFC.

While the points detailed in *Chapter 5 – Fisheries management* and above show unique characteristics of the WCPFC they are not replicated amongst the other studied RFMOs. This is because the characteristics of the WCPFC are unique to it only. Essentially, this is because up to 85% of the fish catch is taken within the EEZs of coastal state members (WCPFC14 2017:74). The importance of this catch to flag states within the WCPFC confers upon the Pacific coastal states a opportunity for organisation within the WCPFC that cannot be replicated in any other RFMO (Miller 2014:15). While the existence of the PNA sub-group does affect the management of the fisheries within the WCPFC, this structural effect is unique to that RFMO. So it is unlikely that the PNA model of influence can be replicated within other RFMO institutions.

General characteristics

By 2008 it was clear that measures to restrict growth in fishing capacity or reduce fishing mortality of Bigeye and Yellowfin had been unsuccessful. The Scientific Committee reported that Bigeye were being overfished and Yellowfin were being fished at capacity. They recommended that reductions in fishing mortality, particularly in juvenile fisheries, were required in order to ensure that stocks could recover to levels capable of producing their maximum sustainable yield. In response to high levels of historical catch for Big Eye and Yellowfin tuna, conservation and management measures centred on freezing catch at 2004 levels (WCPFC 2008 Res. 10 & 11). However, the Scientific Committee recommended that the Commission should reduce 2004 catch levels of Bigeye tuna by 30% (WCPFC 2008 CMM 3). In 2010, the WCPFC expanded upon its Compliance Monitoring Scheme. The focus was on compliance with catch and effort limits, catch and effort reporting, spatial and temporal closures, and gear restrictions, observer and VMS requirements, provision of scientific data (WCPFC 2010 3). An additional measure saw the introduction of a so-called 'negative list' of vessels that do not record or report catches made in the area, take undersized fish, fish during closed seasons, use prohibited fishing gear, tranship with vessels on the IUU list, or are under the control of the owner of any vessel on the WCPFC IUU Vessel List (WCPFC 2010c Art.1). Members were requested to withdraw fishing licences of flagged vessels on this list and report on those measures taken and Port state Members urged to not refuel or re-supply such vessels (WCPFC 2010c Art. 21 & 22). *Chapter 5: Fisheries management* detailed the latest update on IUU vessel activity, harvest strategy, and issues with IUU fishing. Bigeye and Yellowfin tuna fisheries under competency of the WCPFC are not being fished sustainably. The WCPFC has failed to achieve the main objective of its founding Convention.

South Pacific Regional Fisheries Management Organisation (SPRFMO)

Established in 2009, and achieving entry into force in 2012, the South Pacific Regional Fisheries Management Organisation (SPRFMO) is one of the most recent Pacific RFMOs. Like all the others, the objective of the SPRFMO is to ensure the long-term conservation and sustainable use of fishery resources. Each member must prevent or eliminate overfishing beyond its allocation (SPRFMO 2012 Art. 2 & 3 Para. 1 (a) (iii)). Each member is tasked to ensure flagged fishing vessels comply with Convention provisions and Commission CMMs (SPRFMO 2012 Art. 25). The Commission tasked itself to establish procedures for effective monitoring, control and surveillance of fishing (SPRFMO 2012 Art 27.). In its interim measures for pelagic fisheries – principally jack mackerel – members participating in that fishery initially agreed a measure to forbid a gross tonnage individual catch in excess of a baseline 2007 level. This 2007 baseline was itself based on historical activity in the fishery, was in no way endorsed by the Commission as sustainable, merely a baseline upon which to begin management of catch and effort (SPRFMO 2007:1). In 2009, the Commission established a new baseline individual catch and the measure that state members were forbidden to exceed (SPRFMO 2009a Para. 6 & 9). Despite this, some members again exceeded their catch limits. Indeed, some states increased overall catch by 160,000 tonnes in 2010 (SPRFMO 2010b, 2010c). Even with historically high and ongoing unsustainable levels of catch, the SPRFMO Commission introduced a measure to limit individual catch to another new baseline incorporating increases from Peru (10,000 tonnes) and Russia (60,000 tonnes) (SPRFMO 2011 Table 1). The Commission also introduced a measure to reduce total

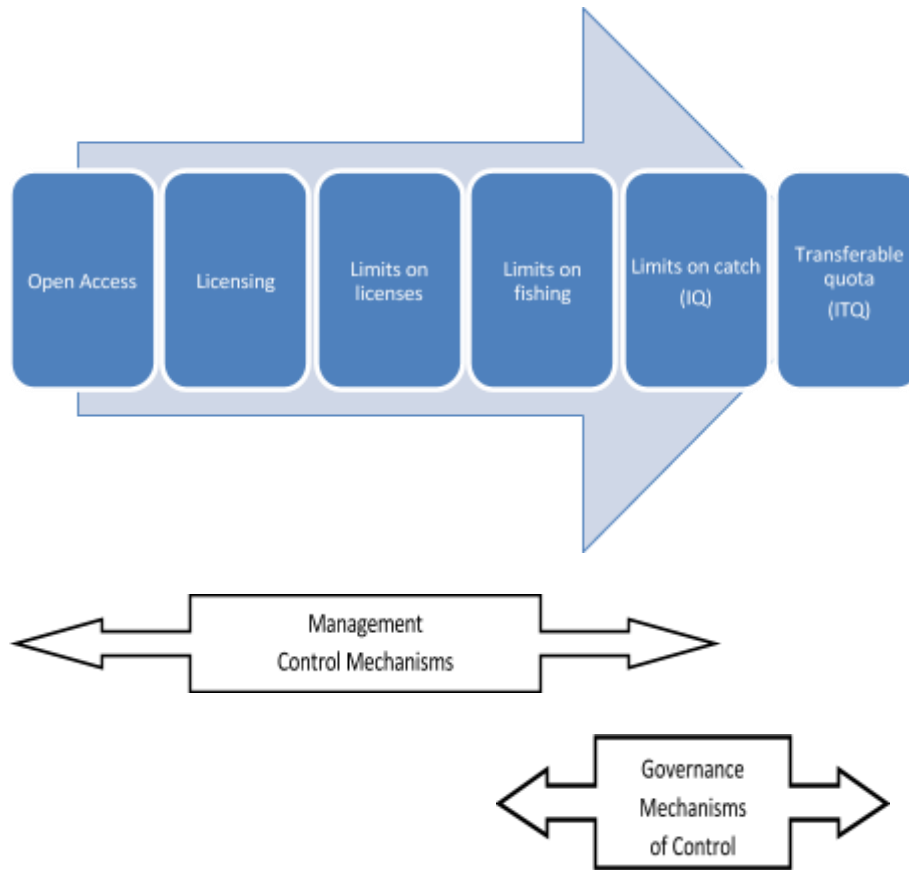
allowable catch to 60% of baseline in 2011 and to 40% of baseline for 2012 (SPRFMO 2011 Para 12.). Instead, the 2011 fishing season once again saw some members 'authorise' catch increases above even their baseline allocation and around 200,000 tonnes more than the agreed TAC (SPRFMO 2011b). In 2012, the Commission again introduced a measure to reduce individual catch to 40% of the 2011 baseline, bringing total allowable catch for the fishery to 300,000 tonnes below the 2011 baseline, yet 'authorised' catches for the 2012 fishing season look to again far exceed their institutional agreements. *Chapter 5: Fisheries management* detailed the latest update on IUU vessel activity and harvest strategy. Like all Pacific RFMOs, the SPRFMO Convention provisions attempt to reproduce the principles of sustainable fishing established under the UNCLOS and UNFSA framework treaties. But it is challenged by consistent unsustainable quantities of individual catch by certain member states.

Overall, the multiple entity RFMO regime created by the law of the sea to manage deep-seas fisheries has performed poorly to date. These organisations faithfully reproduce the principles and rules of sustainable fishing laid out in international instruments. But all the studied RFMOs struggle to institute the practice of sustainable fishing on the high seas.

Governance Mechanisms

There is a well-defined structure of principles and norms defined within the UNCLOS, UNFSA and supporting work of multilateral organisations such as COFI. From this, one could anticipate that among the majority of states there exists a shared understanding of the issue area of common-pool fisheries and the most problematic cause-effect relationships. That is, to some extent, members of the international community share the same core values or goals to preserve a stream of future benefits from the resource. McGinnis defines this shared understanding as "the set of strategies, norms, rules, organisational templates, and other remembered or imagined practices that are readily available to the members of that community for their use in processes of deliberation and implementation" (McGinnis 2011:175). The sustainable use of a regenerating resource requires exploitation within the limits of its biological regeneration. Under open-access and common-pool conditions, each actor's levels of exploitation are determined based on their individual utility maximising. Overexploitation of the resource is the invariable outcome of this practice. As shown in Diag. 3. below many control mechanisms have been developed by governance authorities in the attempt to keep rates of fish-catch within the regeneration rates of the fish-stock.

Diag. 3: *Development of control mechanisms and mechanisms of control in fisheries*



Input controls

Governance authorities attempt various controls to prevent fishers from catching too many fish each season. Open-access conditions exist where there is no effective system of rules to constrain access to a resource nor to constrain individual decision making. Similarly, common-pool conditions exist where resource is limited to an authorised group. A straightforward, and often the first, governance approach is to control fishing effort by limiting entry to a fishery. The first input control generally requires users of a resource to be licensed. This is often offset by a limited entry scheme that distributes a range of different fishing rights by species or gear type. These include restrictions on the size and power of fishing vessels, the types of fishing gear (e.g. mesh size), the area where fishing is allowed, and the time during which fishing is allowed. Gear regulations are probably the first type of regulation systems aimed at protecting the biological resource (Cochrane 2009:92). The control cost falls to the governance authority and can be substantial.

In addition, fishery managers have attempted to control the total harvest, vessel catch per fishing trip, and catch characteristics (e.g. requiring that all fish landed be of a minimum size). It is often observed that effort control mechanisms are easier to administer than catch limit mechanisms. Indeed, the WCPFC has recently implemented an effort quota system as the interim basis for its vessel day scheme because of the reduced compliance and information system costs (WCPFC 2009). However, even in limited entry (licensing), investments in new technology act to increase rates of catch. The

actual fishing effort produced by license owners is increased even if the nominal effort (magnitude controlled) is kept constant. These 'command and control' type control mechanisms are all elements of effective governance but are rarely enough "to prevent crowding, congestion, strategic behaviour, racing, and capital stuffing" (Scott 1988:7-8). Therefore, biological limits must be the foundation of any governance system aiming to achieve a finite and sustainable total catch limit. As shown earlier in this chapter, regional fishery management organisations are correct in focusing upon biological limits of total allowable catch in order to preserve fish-stock biomass.

Output Controls

When an authority implements rules that impose a limit on catch, these are termed output controls. Limits on total allowable catch (TAC) are generally aligned with biological parameters such as maximum sustainable yield (MSY). A total allowable catch (TAC) is a limit on the catch (fish mortality) for a target species. It is a hard limit set by the governance authority of a fishery. Constraining rates of fish-catch (fish mortality) to within biological limits of the fish-stock is the fundamental requirement for sustainable fishing. Catch outputs are easily measured in principle, particularly in well-developed fisheries where comprehensive catch statistics and market information are available (Cochrane 2009:94). Because they are a direct measure, catch limits are more effective than effort limits. However, the race to fish and the incentive to self-maximise fish-catch remains even with a scientifically determined total allowable catch. So, further regulatory detail is necessary. TAC is the prerequisite element of sustainable exploitation, but the incentive to use a resource sustainably requires additional mechanisms of control.

The simplest form of TAC-based management is to keep a common total catch covering the whole fishery without subdividing it amongst individual fishers. But, even with TAC based on biological limits, the lack of individual effort limits creates an incentive for a fisher to increase the capacity of each fishing unit and to 'race for fish'. This is simply because abundant fish are easier and cheaper to catch per unit than scarce fish. Inevitably this results in a collective increased unit cost of effort, reduced price (if the catch quality is reduced by increased competition) and waste of resource rent from the fishery. To avoid these undesirable effects, TAC allocation rules must sub-divide the catch into individual quotas.

Use rights

Use rights in the form of individual quota create the incentive for an actor to sustainably use a resource. This is particularly true in high seas fisheries. When an RFMO achieves entry into force, its members are granted access rights to the marine living resources under competency of that treaty. These resources are now 'owned in common' by members of that RFMO and non-members are excluded. The creation of an RFMO moves living marine resources from a condition of open-access to one of common-property. Constraining use of the resource is the critical first step in fishery governance but it is not the complete solution. While excluding non-members helps to prevent outsiders from taking

part in a fishery it does not constrain effort by members (Charles 2009:265). Fisheries management mechanisms such as licences, gear and seasonal constraints act to limit fishing effort. Yet, as long as rule systems allow individual maximization there is the ever-present incentive for each fisher to try to catch the fish first. Even with exclusion of outsiders, common pool fisheries require output controls. As already said, output controls are designed to directly constrain the amount of resource that can be extracted. The primary output control mechanism for a fishery is total allowable catch.

However, total allowable catch is not a use right. Total allowable catch is the reference point of a harvest strategy. Setting allowable catch makes no statement about the individual right to catch fish (Charles 2009: 267). With no quantitative limit on how much an individual actor may catch, the fish stock is still threatened with unsustainable catch volumes and the fishery is subject to a decreasing resource and increasing costs of extraction. Simply limiting resource use to a select group – creating a system of common property – does not remove the externality of subtractability. Structures that create common-pool conditions over a living marine resource do not force users to consider the consequences of their own catches on the catch rate of others (Mahe 2002:168). Setting quantitative limits on individual catch is the definitive output control.

Individual quota

A quota is an individual portion – a percentage – of the total allowable catch (TAC) for a fish stock. Individual Quota (IQ) is designed to give owners exclusive rights to a given portion of the TAC of fish. Within a TAC limit, individual catch quota is that fraction of the TAC allocated to an individual actor or group of actors. In terms of property rights, this is an exclusive right to withdraw a quantity of a resource. It requires a governance authority to establish TAC for a given species and then divide this total among individual fishers (Sumaila 2010:36). With an effort quota system, rights holders still seek to increase the volume of their catch within a given effort allocation (e.g. during an open season, or number of fishing days). When TAC is subdivided into quotas then each of these shares represent a quantitative and individual right to catch an amount of fish.

Quota is the exclusive individual *property* right to land a certain *number* of fish, in a certain location, of a certain species, during a certain period. The *number* is the *property* (Scott 2000:111). Individual catch quota gives the quota holder marginal profit at the last unit of catch within the quota constraint (Hatcher 2005:79). All profit from production up to the quota limit is retained by the fisher.¹⁷ A system based on individual quota will remove the impetus for race to fish and instead create the incentive among fishers to regard the fish-stock as an asset that promises to deliver a stream of economic benefits over the long term. The incentive to conserve a resource is created by the right inherent in an allocation of individual quota.

However, enforcement is needed even with requisite quota rules. An important element to realising the incentives inherent in an IQ system is enforcement of compliance to rules. In a real-world fishery, some actors always seek to catch more than the quota if it is profitable to do so. Indeed, a singularly

¹⁷ Assuming no taxation.

economic rationale will balance monetary costs and benefits against the cost of sanctions upon discovery. The governing authority is left with the task of enforcing compliance with quotas by imposing a penalty on actors which violate the rules. Authorities will inevitably develop a monitoring system to detect infringements through observers and catch documentation systems. Critically, authorities must also rely upon or develop a judicial system to impose penalties of an appropriate size (Hatcher 2005:79). This model of enforcement derives from the utilitarian approach. The violator balances the benefits of overfishing against the probability of detection and sanction (penalty). Thus, self-maximisation is economically rational if the probability of detection is low and if the sanction when caught is low.

Indeed, the areas of high seas RFMOs are vast and detection methods are expensive for an organisation reliant upon member fees. Further, even when vessels are to be found non-compliant the only legal jurisdiction is the flag state. Therefore, an RFMO authority may face difficulties such as political or judicial resistance from targeted Flag states to the imposition of larger financial penalties for fishing offences. It will also face the rising costs and decreasing marginal returns of increasing enforcement to the probability of detecting offences. Nevertheless, the baseline requirement to the success of a governance regime is that its system of enforcement is sufficient to deter landings of over-quota fish. Therefore, RFMOs seek networks of fishery actors to assist such as port states and market states.

The promise of individual catch quota to enable sustainable practices by actors centres on behaviours driven by the motive for profit. As stated, individual quota (IQ) is a percentage of a TAC. The specified percent of the TAC is nominally set by the governance authority. Many RFMOs are formed around existing fisheries and they have tended to adopt historical catch volumes as the individual quota of each fishing state (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). These quantities are adopted even as the Committee of the RFMO expresses concern about the sustainability of the quantity of fish-caught against the existing fish-stock quantity. Nonetheless, IQ represents an individual right to catch a given quantity of fish over a given period. Other actors may also hold individual quota, but any holder of quota has an exclusive right to only catch that fraction of TAC. Actors are forbidden to exceed their individual quota. This is the characteristic of individual quota which makes it analogous to an actor's private property. The incentive structures of a catch quota system are further enhanced by secure and relatively long duration withdrawal rights over a resource. Within this system of use rights over a regenerating marine living resource, holders can be relied upon to conserve that resource with a view to deriving future profits from it.

In addition, as total allowable catch is a variable so too is the individual quota of that catch a variable. In the realm of high seas fishing, the unique aspect to this type of common-property is the relationship to collective governance and preservation of the fish-stock as a productive as a productive asset. The mechanism of individual quota introduces future resource value as a factor into individual decision-making behaviour. With an IQ system, holders have the incentive to maximize economic returns associated with their allocated catch (Havice 2013:259). Effectively monitored and enforced, an individual quota system can improve the economic performance of a fishery in two key ways. First, the value of the quota depends on the state of the fish population, so conservationist management strategies that maintain or increase stock are favoured. Second, assured of quota, the actor may

arrange catch in the most cost-efficient way. Quota holders may land fish in alignment with the most profitable mix of market demand.

Individual Transferable Quota

An individual quota system may even be extended by allowing the quota to be transferred among authorized actors. When a system of rules allows quotas to be unlinked from licenses and to be traded, it creates individual transferable quota (ITQ). In its purest form, an ITQ system gives the quota holder a harvest amount with the right to divide, sell, lease or mortgage the right to that harvest amount (Stewart 2004:16). One caveat for a RFMO is this transferable quota may only be bought, sold, or leased among authorised actors. While individual quota creates the core incentives for conservation, individual transferable quota adds value in many ways. ITQs are designed to give their owners exclusive and *transferable* rights to a given portion of the TAC of fish. Some authors argue that a transferable right to a resource is primarily an instrument for promoting economic efficiency, rather than conservation or equity (Hannesson 1996:91). It is true that transferability does not in any way promote the reduction of fish caught. Under a market based allocation system, an actor can vary its quota allocation by buying or selling quota at the prevailing market price. In this way, the most efficient - cost effective - actors can purchase catch production rights (at their desired marginal rate) from those who are less efficient.

Transferable quota is also a useful instrument for reducing the incentive to discard or high-grade catch. Even if they choose to only catch up to their IQ limit, owners are incentivised to make sure that their quotas are filled with the most valuable fish available (Hatcher 2005:84). Fishers will take more fish than their quota with the intention to discard them for higher grade fish-caught. This high-grade discard sequence is a cause of fish mortality in a fishery above allowable catch. Extra monitoring and enforcement is required, which will decrease efficiency benefits. But, IQs and ITQs tend to encourage better monitoring and enforcement as well as more precise setting of TACs by governance authorities (Munro et al. 2009). Thus, species specific quota with associated catch quota helps to mitigate some of these high grading and discarding incentives (Sumaila 2010:37). ITQ may also be useful to assign harvesting entitlements for bycatch species. Rather than stop fishing once an individual actor reaches its entitlement limit an actor can obtain additional bycatch entitlements from another fisher in a market (UNFAO 2006:19). Thus the bycatch, rather than discarded, will be included within authorised catch. A market system for transferable quota can be more economically efficient.

Markets to transfer catch quotas or fractions of catch quotas add efficiencies to a fishery and strengthen the property mechanism inherent in fishing rights. As the right to catch a certain number of fish, quota can become a form of tradable use right with intrinsic value on a quota market. For proponents of quota systems, the transfer mechanism is the key enabler for a fisheries governance system to achieve basic competitive model of a market. See *Chapter 4 – Fishing as a production activity* for economic detail on market mechanics. A system of rules that allow market mechanisms is inherently valuable because it allows resources to go to the actor which values them the most – who can pay the most for them. Thus, tradeable quota creates optimal value from the resource and achieves the greatest economic efficiency. Townsend argues for three broad reasons not to restrict ownership transferability: 1) Users who may be able to increase value from the resource may be

restricted from ownership. 2) As a claim to a future stream of rents, the ITQ element will be most valuable to investors with the lowest discount rate. That is, those who are most willing to make short-term sacrifices to realize higher long-term returns. 3) Investors who see those opportunities can buy the entitlements and take actions to increase the value of the resource (Townsend 2006:133). Therefore, IQ and ITQ are congruent to systems of property. Property-rights need to exist for a market mechanism to achieve optimal allocation of natural resources, and ideally any ownership powers should be akin to private property (Randall 1981:199, Schmid 1995:60). Nonetheless, it is acknowledged that catch limits deliver the incentive structures underlying decisions to catch and land fish is essentially delivered by the creation of individual quotas. Shared goals and collective interests can result in institutional norms and rules to create these structures and guide behavior to collectively beneficial outcomes.

The rationality of cooperation

Actors have individual interests. But in the issue area of common-pool resources, to achieve collective benefits then individual interests must weigh far below cooperative outcomes. When studying the evolution of international governance, the most important primary evidence is rules put into practice. This largely neoliberal institutionalist perspective on international politics is based on three key assumptions, that: a) states remain the most important actors, b) the international system has no hierarchy, and nevertheless c) world politics does have institutions and orderly procedures (Keohane 1989:2). Indeed, the meaning and importance of collective state action can only be understood in the context that actors must have mutual interests, can undertake calculations to maximise expected value within an issue-area, and must potentially benefit from cooperation.

Each state actor has individual interests yet, under conditions of consensus-building and compromise, international cooperation still occurs. Of course, states will use negotiation tactics to maximise the achievement of individual policy objectives. This is evident in the negotiations to establish RFMO conventions and their ongoing tension to strengthen key conservation and management measures. For example, states will formally or informally arrange themselves into issue-area interest groups. In Pacific fisheries, there is the Forum Fisheries Agency (FFA), a multilateral group of Pacific Island countries whose members develop consensus approaches to measures such as vessel monitoring and enforcement in the RFMOs in which they participate (Cartwright 2000:190; Hanich 2009:1). In addition, states will arrange themselves into informal interest groups such as coastal states or distant water fishing nations (DWFNs) who, depending on the issue, may favour more over less regulation of high seas fishing or may favour the primacy of high seas governance measures over coastal state measures (SPRFMO 2009). Actors will certainly adopt a self-interested perspective in institutional settings but they can also use principles of reciprocity to overcome social dilemmas of cooperation.

The principle of reciprocity is important for understanding state actions in cooperative conditions. The foundation for international agreements is shared standards of behaviour, or norms, defined in terms of rights and obligations (Keohane 1989:113; Ostrom 1994:5). Such norms, however, are not always sufficient to ensure confidence among group members that an agreement will be honoured. In these cases, cooperation depends upon the principle of reciprocity. Simply, reciprocity is the equivalence of

benefits or penalties. These may be based on calculations of self-interest as well as shared concepts of rights and obligations. Keohane uses this principle of reciprocity to establish the rationality of cooperation, particularly under conditions of prolonged or indefinite interactions, which significantly reduce the value of defection from an agreement (Keohane 1989:136). In multilateral situations, the beneficial outcomes of cooperation cannot be denied to any members of the group (public goods).

Even under the problematic conditions of a fishery, the incentive to defect or free ride can be mitigated by institutional arrangements that require actors to publish performance on collectively agreed outcomes. Indeed, this is what all the studied RFMOs have done (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Institutional norms and rules make it possible to exclude non-compliant actors from benefits (Keohane 1989:139). This general principle in institutional design has direct application to the governance of high seas fisheries. In practical terms, the participants in a regional fisheries governance organisation must deliberately devise, monitor, and enforce rules that (FAO 1995:8; HSTF 2006:62-67):

- limit who can use a resource
- specify how much and when that use will be allowed
- create and finance formal monitoring arrangements
- establish sanctions for non-conformance

Indeed, in the South Pacific Regional Fisheries Management Organisation (SPRFMO), sanctions for violations of agreed rules were designed to trigger automatically (SPRFMO 2010). Clear rights and obligations are articulated within international instruments. Indicating that, at the institutional level, states are increasingly inclined to enforce collective obligations over sovereign rights to fish. However, the continuing depletion of high seas fish stocks over this period demonstrates that the current regime of high seas management is still insufficient to address the problems of high seas fisheries.

Approaches to the collective governance of high seas fishing are still evolving. States often present rhetorical or aspirational statements when describing their commitment to group policy. Such statements may indeed be the communication of a state actor's sincere intention. However, principles and intentions are often modified by prevailing economic and political forces (Hoadley 1993:47-48; Templeton 1995:154-155). Policy positions are sufficient to communicate a general approach to an issue-area. Nonetheless, economic and political reality significantly modify such positions once actors come closer to issues of participation and allocation of access to valuable resources (Ostrom 1994:16). Therefore, the crucial information for this study is not what state actors hold as ideal or aspirational goals. Rather it is what outcomes are achievable under the conditions of collective decision-making in the governance of high seas fishing.

The governance of high seas fish stocks relies upon multilateral cooperation, and international law and treaties. Within treaties, state actors collectively articulate legitimate behaviour. Identifying the principles and norms of international fisheries governance is the primary question motivating this thesis. RFMOs are constituted by institutional statements of such principles, norms, and rules. This study seeks to analyse how these principles, norms, and rules – these legitimate behaviours – form

powers over property. It seeks to do so because the successful collective governance of common-pool fishery resources requires fishing practices that predicated on maximising future returns on the productive asset, such as an actor would do so for their own asset.

Conclusion

A state's right to fish high seas stocks cannot be exercised unilaterally. A regime of collective governance over high seas fish stocks exists. Yet, its success remains dependent upon harnessing individual incentives to exploit fish stocks at a rate that is sustainable over the long term. The long-term preservation of the fish-stock is a collective goal and it can only be achieved by the sum of individual behaviours that are compliant with biologically sustainable rates of catch. When based on a biologically sustainable total allowable catch then quota mechanisms provide secure, exclusive and transferable fishing entitlements that allow individual fishers to benefit from decisions to abide by catch limits.

The next *Chapter 7 - Property rights in high seas fisheries* will detail the system of common-property rights that have evolved over high seas fish stocks. It will also outline the opportunities this presents for achieving sustainable high seas fishing.

Chapter 7

Property rights in high seas fisheries

The previous *Chapter 6 - Governance of high seas fisheries* detailed the volume of existing international law and guidelines for best practice in high seas fisheries. It also outlined the necessary governance mechanisms of control that shape actor choices over exploitation of a common-pool resource.

The goal for governing renewable resources is to secure long-term benefit streams through sustainable rates of exploitation. Fisheries management control mechanisms can range from licensing limits to gear limits, and from the control of effort to the control of catch. Input controls such as licensing seek to directly limit the quantity of catch by reducing the number of actors exploiting the resource. Whereas output control mechanisms seek to limit catch quantity directly. However, the control of catch quantity solely in the form of a total allowable catch (TAC) is an insufficient mechanism. This is because, as detailed in *Chapter 3 – Overfishing*, under common-pool conditions actors may still maximise individual welfare at the expense of other actors. Securing sustainable rates of exploitation relies upon a governing system that ensures an actor will face the full cost of their usage decisions. While any limitation of participation in a fishery creates a form of property, it is the rules defining catch limits in the form of individual quota (IQ) that create a system of individual property rights. It is only the system of private property inherent in individual quota that creates the incentive to maximize economic returns through sustaining the productivity of the resource over the long term.

Chapter 4 - Fishing as a production activity explored the profit seeking rationale inherent in the commercial exploitation of renewable biotic resources. Property rights also have a powerful effect on usage behaviours, and all that is required for the emergence of property rights is the refusal of governance authorities to legislate against them (Scott 2000:112). *Chapter 5 – Fisheries management* showed the extent of the degradation in fish stocks under the governance of RFMOs. Evolution in the mechanisms of control in high seas fisheries must be explored because the incentive to conserve a living marine resource for future use is only delivered by secure rights to future benefit streams.

This chapter presents the bundles of rights that make up property systems. This same bundle of rights can also be used to determine the extent to which a power over property is being expressed through institutional statements.

A system of property rights emerges in high seas fishing

Mechanisms to allocate shares of a resource are only required when a resource becomes scarce. Before the 1982 law of the sea convention was agreed, principles of international conduct centred on sovereign freedoms. This ‘free seas doctrine’ is attributed to the 17th century Dutch philosopher Hugo

Grotius. He argued that the sea is so infinite that it cannot be possessed by any one nation and so all nations were free to fish on the high seas (Grotius 2004:26). In his classic text *The Free Seas*, Grotius argued that the high seas are open to all nations and may not be subject to claims of possession based on national sovereignty (Christy 1975:702; Scott 2000:4; Hannesson 2011:668). As interpreted and practiced by maritime states, the high seas were subsequently treated as open-access. That is, anyone and everyone had rights to fish there. The principle of high seas freedoms remains the foundation of the law of the sea today. However, Grotius' assertion was made in an historical context where fish were abundant and fishing by mankind did not affect this abundance. Indeed, when resources are ubiquitous then rules of exclusion are not required (Ciriacy-Wantrup et al. 1975:724). Socio-political institutions to regulate the use of an open-access or common-pool resource are not needed until that stage of economic development is reached when actors compete to exploit them and the level of exploitation reduces their availability (Ostrom 1999:278; Harris 2005:131). Further, controlled access and regulated exploitation is not required while usage remains within a natural system's absorptive or regenerative capacity. This maxim holds true for resource issues on the local, national and international scale.

The magnitude of the unsustainable fishing practices currently occurring in the high seas was highlighted in *Chapter 3 - Overfishing* and *Chapter 5 - Fisheries management*. Thus, the focus of this study is to develop a solution that can be achieved within the existing international regime. The thesis seeks an outcome that can be implemented within the existing structure of the international fishery governance regime.

Our biosphere is the region of earth and its atmosphere in which life exists. This envelope extends from 6km above to 10km below sea level (Common 1995:31). On this global scale, some scholars argue that our planet's ecosystem and all the ecological and biogeochemical cycles which are encompassed within it are the common property of all peoples (Rees 1992:262). It is at this planetary scale that we most often encounter ideas promoting intergenerational equity and common heritage as the basis for conservation (Rees 1992:254; Common 1995:179; Hannesson 2004:166). There is a similar principle termed *res communis omnium* in international law, which positions our world's natural resources as a common heritage for humankind to be regulated and garnered on behalf of all nations (Baslar 1998:40-41).¹⁸ However, these aspirational ideas contrast with the practice of international politics.

Many state actors remain focused on self-maximisation. The international regime on marine resources and its focus on defining rights over resources was explored in *Chapter 6 - The governance of high seas fisheries*. The modern maritime boundaries of the exclusive economic zone, the extended continental shelf and the high seas was established in the 1982 law of the sea convention. Within each boundary, the Convention detailed rules for what is permitted, what is obliged, and what is forbidden in relation to the world's natural resources. Living marine resources are firmly divided into those enclosed within the territorial jurisdiction of nation states, those enclosed within the competency of multilateral regional fisheries management organisations (RFMOs), and those which remain unregulated and open-access.

¹⁸ See Baslar (1998) for an analysis of the philosophical foundations of property in international law, and a critique of the prevailing positivist orthodoxy of international law by consensus.

Yet, this division of resources in accord with political boundaries is in fundamental contrast with ecological reality. The governance of high seas fisheries is complicated by the nature of the resource itself. Wild fish have characteristics which make them problematic for an international system centred on the ownership and control of territory. Fish are a fugitive living resource whose habitat is largely opaque to mankind (Scott 2000:4). Further, fish stocks generally extend over large areas with total disregard for man's artificial sovereign boundaries (Ciriacy-Wantrup 1975:724). The natural world is not divided into differentiated political spaces. This situation creates a complex political issue for the exploitation of resources found in the high seas area. Here, all states have access to the resources but no state has any sovereign claim (UNCLOS). Nevertheless, living marine resources are subject to international law of the sea and high seas fisheries are increasingly governed by a type of multilateral institution called a regional fisheries management organisation (RFMO). To understand why this collision between ecological and political realities is important to a sustainable fishing regime it is necessary to understand the nature and uses of property rights.

What is property?

Property rights define and protect economic interests. Property is often assumed to be something tangible that is owned like a fishing vessel, equipment, and inventories. These are indeed a type of property, but it is more correct to recognise these objects as examples of tangible assets (IASB). Assets may also be intangible such as a property right. For example, an actor may possess the right to catch a certain number of fish. The holder of this use right can catch a certain number of fish, of a certain species, in a certain area, for a certain period (Scott 2000:111). In this case, the property is the number. Indeed, assets are defined as any economic resource from which future economic benefits are expected to flow (IASB 2009). When in place, property rights allow the holder to put resources to certain uses and to prevent non-rights holders from using these same resources (Markandya 2001:155; Stewart 2004:15). Property confers a benefit (or income stream), and a property right is a claim to a benefit stream that some authority – usually the state – will agree to protect (Bromley 1992:2). Further, rights over resources are used to allocate their beneficial use to owners, and to exclude others from use of the resource (Connor 2000). Therefore, in an economic and commercial arena, property rights are desired.

Property rights as a system of rules

Natural resources, such as forage, trees, or fish can be controlled and managed as private property, state property, common property, or it can be open-access with no property rights recognised. Therefore, property rights are human constructions. There is no socio-political institutional form inherent in a natural resource and no resource should be regarded as having a universal and immutable institutional classification (Bromley 1992:1). Property rights are created through a system of rules. They are human constructed arrangements (Keohane 1989:162). In political science, institutions are constituted by formal rules, the enforcement characteristics of those rules, and the informal behavioural norms that structure repeated human interaction (North 1990:5-8). Further, while

institutions are characterised by a set of shared principles, norms, and rules they are by no means permanent. Institutions are constructed, maintained, and transformed by humans over time (McGinnis 2011:170). Expressed in terms of political power, institutions are the sets of rules, norms, and decision-making procedures that define who constitutes legitimate actors and what constitutes legitimate action in each domain (Reus Smit 2008:281). At their core, institutional rules describe which actions are mandatory, which are permitted, and which are forbidden. Indeed, rights are the product of rules (Ostrom & Schlager 1992:250). Rights refer to actions that are authorised whereas rules refer to the prescriptions that create those authorisations.

Within a system of rules, property rights are those rules that associate economic resources with an owner. A rights holder need not have an exclusive right to have an asset. Multiple rights holders may possess use rights to the same fish stock. This makes the fish stock a common-pool resource. Different arrangements of property rights over common-pool resources are shown later in this chapter. For example, two or more rights holders might have different rights to an economic resource at the same time, or might have rights to the same economic resource at different times. Further, lease arrangements can unbundle the economic resources embodied in a property by giving the lessee the right to hold and use the property, and the lessor the right to receive rentals and any residual value (IASB 2009). Even though there exists a single base resource, each of the rights holders has an asset based on the rights that are held. The potential for profit or loss spurs rights holders to think carefully about their resource usage decisions.

Categorising property-rights

This section explores different categories of property rights and the characteristics that support the sustainable use of high seas fish stocks. Consider the following two ways to categorise property rights: (a) the actor who holds the rights, and (b) the powers that a right confers.

The actor who holds the rights

From the context of the actor who holds the use rights there are four general types of property-right (Berkes 1989:91):

• Open-access	• Private	• State	• Common-pool
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Open-access means there is no property. Open-access is the result of the absence or the breakdown of an authority system with respect to the natural resource (Bromley 1992:13). A resource is said to be open-access when it is non-excludable, i.e. when exploitation of the resource cannot be restricted to a limited group of people. Recall that property is some measure of exclusive use of a future benefit stream. Hence, there is no property in an open-access situation, there is only the opportunity to use something (Bromley 1992:14). Therefore open-access conditions are generally associated with the absence of an authority to impose rules of use. However, the existence of a governance authority is

still no guarantee that a property right system exists in practice. Even resources that fall under control of a sovereign state can be regarded as open-access. Governments who have appropriated a resource such as forests or fish stocks have still failed to manage them in an effective manner. The government authority may have created *de jure* state property but *de facto* open-access property.¹⁹ The same may be said for an international governance authority that fails to control exploitation of resources over which they are competent. A resource subject to open-access conditions is invariably exploited on a first come first served basis and at a rate that will inevitably exceed its natural rate of regeneration.

In a system of private property, the rights holder can exclude others from using a resource and can regulate its use. General definitions of private property rights include both the right of the owner to use the property as they see fit and the right to sell it (Stiglitz 2002:28). Even if a system of rules does not explicitly create such open-ended powers over a resource, they may still create ownership interests that allow privileges like private property. One example of a non-ownership proprietary interest is *usufruct* that creates a specific and limited use-privilege over a thing. For example, an individual or group may hold the right to enter the land of another and take away some natural thing of value, such as by fishing, harvesting, hunting, logging, mining, or pasturing provided it be without altering the substance of the thing (Black's Law Dictionary; Business Dictionary).

There are many examples of usufruct systems in agriculture and aquaculture. To take a general agricultural example, the holder of this type of right might not be granted title to a parcel of land, but would be given use of that land and ownership rights of its produce. In aquaculture, there may be an oyster bed clustered on a group of coastal rocks. The licensee of an oyster bed has a very specific right to oysters on those rocks. These rights do not extend to the real-estate itself nor to any other marine species found in that locale. Further, members of the public may be permitted access to the same oyster beds and to personally consume as many oysters as they wish at that coastal location. They may also be permitted to take a small quantity away for personal use. But no actor, aside from the licensee, may legally remove any oysters from the location with the intent to exchange them in a beneficial transaction.

In a state property regime, ownership and control over use of a resource rests in the hands of the state. State property regimes are characterised by control and separation of ownership. That is, management is separate from actual use. At the forbearance of the state, individuals and groups can make use of the resources (Bromley 1992:10). The state may either directly manage the use of state-owned natural resources through government agencies or lease them to groups or individuals who are given rights of usufruct over such resources for a specified period of time. There is obviously a degree of overlap between these definitions of property right systems.

Finally, a common-property system refers to a distribution of property rights in which a well-defined number of owners are co-equal in their use rights to an asset from which they gain an annual stream of benefits (Ciriacy-Wantrup et al. 1975:714; Berkes 1989:91; Bromley 1992:14). For example, licensing regulations that limit entry to a fishery only to license holders shifts that fishery from an open-access to a common-pool condition. However, the essential component of a formal common-property system is

¹⁹ *de jure*: according to law; *de facto*: in reality

the need for group management of both the capital stock and the annual flow to make sure that the system continues to yield benefits to the group. There is an obvious correlation between systems of common-property and the international regime created to govern living marine resources in the high seas. But before the RFMO regime can be mapped to a system of property rights further investigation into the nature of rights is required.

The powers that a right confer

The second categorisation of property rights is also the most useful for a more detailed analysis of common-property systems. In particular, the need to distinguish between rights to use a resource and rights to govern use of a resource (Ostrom & Schlager 1992:250):

Rights to use	Rights to govern use
<ul style="list-style-type: none"> • Access to area (non-subtractive) • Withdrawal (subtractive use) of resource 	<ul style="list-style-type: none"> • Management of harvest • Exclusion of others • Alienation to others

Rights to Use

Rights 'to use' a resource are related to the exclusive and beneficial use of a resource. The *right of access*, authorises the possessor to enter an area and enjoy non-subtractive benefits. For example, we all have the right to enjoy a public access beach. The key element of access rights to a resource is the proviso that benefits do not subtract from the value of the resource. Building upon access rights, is the *right of withdrawal*. Which, in addition to the right of access, gives the possessor the right to obtain the "products" of the resource. Withdrawal rights apply to the exploitation of natural resources, such as fish stocks, that have a productive capacity but are not owned until harvested. Of course, any system of rules intended to shape behaviour depends upon the existence of an authority system to punish non-compliance. The bundle of rights 'to use' do not grant the additional right of participating in the design of rights nor of playing an active role in the management of the resources (Ostrom & Schlager 1992:252). Both access and withdrawal rights to use a resource are conferred by a governance authority.

A measure of the quality of a property right can focus on exclusivity. Exclusivity is the ability to hold and manage the right over a resource. Exclusivity provides the right holder exclusive use of the resource and frees them to harvest the fish as they wish. However, regulations such as licence conditions, gear, area and seasonal restrictions imposed by the authority all interfere with a fisheries right-holder's exclusivity (Stewart 2004:11). Therefore, a second bundle defines those rights 'to govern'.

Rights to govern use

The first of these is the right of *management*, which gives to a holder the authority to determine how and where harvesting of a resource may occur, and how the structure of a resource may be changed (Ostrom & Schlager 1992:252). Beyond management rights, a holder of a *right of exclusion* can regulate access to the resources and how this access can be transferred. Finally, the *right of alienation* gives the possibility of transferring part or all the rights bundle to others.

In sum, this combination of category and powers of rights is valuable for the analysis of the international RFMO regime. Together they will be used to capture the essence of international governance over high seas fish stocks. This formulation of property right powers will be used to show both the potential and the limits of the current RFMO regime. But before moving on to mapping rights of the regime to govern high seas fisheries, one other element of a system of property rights must be established. The rules of property are analogous to the way social institutions define norms and rules of legitimate behaviour.

A property right is created by a system of rules

Rules create property

An authority system that can enforce compliance with the rights and duties of all actors is a necessary condition for the viability of any property regime. Any institution in human interaction is constituted by its shared strategies, norms, and rules. Institutions are enduring regularities of human action in situations (Crawford & Ostrom 1995:582). An institutional structure may also be relatively stable or there may be evidence of some change occurring. Crawford and Ostrom acknowledge their concept of institutions with its constitutive character of rules parallels Giddens' concept of systems (Giddens 1979, 1984). There is also a parallel to Keohane's formation of institutions as practice (Keohane 1989:166). To understand the function of this formulation of institutions "one needs to examine the actions and outcomes that rules allow, require, or forbid and the mechanisms that exist to enforce those rules" (Crawford & Ostrom 1995:583). Rules describe generally agreed upon and enforced prescriptions that require, forbid or permit specific actions. For example, rules used by fishers may specify the types of fishing equipment and amount of catch authorised within a fishery. In this chapter, the terms system and institution are used interchangeably. Both terms are read as a socially constructed set of rules to define legitimate behaviour and the mechanisms used to enforce those rules.

The value of any right over property is only as secure as the duty of all others to respect that right. A system of property rights provides an actor exclusive use of a benefit stream and protection against adverse claims. This protection comes from a unit of coercion that has the legitimate authority to enforce structures of rights and duties (Bromley 1992:3). Mechanisms to enforce the rights differ in accord with the institutional setting. In a sub-state context, institutional norms and rules creating property rights are found in indigenous tribes (Nonini 2007:46). The rule systems of those groups rely upon social guarantees and collective sanctions to deter cheaters and free riders. The authority system

can be a local village council, a central government, or an international organisation established by multilateral treaty such as a regional fisheries management organisation (RFMO).

Most legal definitions of property rights assume the jurisdiction of a sovereign state and its legal system. For example, property rights are described generally as a capacity for controlling the actions of others with the assent and assistance of the state (Black's Law Dictionary). Or, as a collection of legal rights over an economic resource, commonly described as ownership, and fully enforceable by the state or the owner through the Court against others (Duhaime Legal Dictionary). The social group or unitary state are both examples of a 'unit of coercion' that maintains the socio-legal structure within which the right exists.

These concepts and expectations of property also apply in the international arena. Regardless of whether it is sanctioned by a state or by legitimate multilateral authority, a property right relies upon the capacity of the claimants to call upon others without such claims to acknowledge their duty to honour the claim (Stewart 2004:8). The important element is that actors must feel compelled to comply with the system of rules in effect. Issue areas that are sub-national or inter-national do not substantially alter the definitions of property nor the requirements to deter violations.

Three weak implementations of property rights

At this point, it is useful in the development of the thesis argument to briefly explore three fundamental ways that a system of property-rights may be poorly implemented. First, property-rights over a resource may be poorly-defined with no or weak ownership powers. Here, no party or authority has the rights of management or exclusion necessary to regulate access to the resources (Ostrom et al. 1992:244). A second weakness occurs where a property-rights system may be defined but ownership rights are restricted. This prevents the economically optimal allocation of the resource (Ostrom et al. 1992:245). For example, parties may have rights of access and withdrawal but possess limited powers to sell or transfer the rights to another actor. The third way that property-rights may be weak, or of low quality, is where property-rights are defined but do not confer full ownership or control of a property. For example, a license holder near the end of their tenure may have little incentive to improve or even maintain the condition of a property (Scott 2000:109). So, any factor that reduces an owners power over a resource poses a problem of incentive to preserve it.

Chapter 4 - Fishing as a production activity showed that a market system and the incentive to realise profits will operate if there is information and property-rights. It is property-rights over a resource that is the essential component for the incentive to invest in, maintain, and to put assets to the best possible use. This thesis asserts that possessing the right to a secure stream of benefits into the future is the foundation for sustainable fishing practices. However, it also recognises that the principles, norms, and rules of a system of property rights require a governance authority with competency and jurisdiction.

Rules must be enforced

The behavioural norms and rules that define powers over property are enforceable by means that are equivalent to legal enforcement. Under non-state systems of common-property it is usual to see enforcement emerge within a self-regulatory structure. An indigenous tribe may violently uphold exclusive access to a resource against outsiders (Nonini 2007:4). In response to a violation of internal principles and rules, a professional organisation may strip a violator of the status and privilege associated with membership, and may even withdraw the license to conduct that activity with which it is competent. Likewise, in the international setting RFMOs adopt measures that uphold their power over fish stocks.

Just as in any system of property rights, the RFMOs define rules to exclude non-members from certain activities with respect to the resource and ensure members abide by withdrawal limits. Rules that uphold what is allowed and what is forbidden are just as important within a group as it is for actors outside the group. Any catch from a fish-stock by non-members is not permitted (UNFSA 1995 Art. 8.4; SPRFMO 2010 Art. 3.1.a.ix; CCSBT 1994 Art. 15.4). Likewise, in response to the behaviours of a member state that undermine the objectives of an agreement, the commission of some RFMOs are permitted to reconsider that state's ongoing participation and allocation rights (WCPFC 2004 Art. 10.3.f; SPRFMO 2010 Art. 21.1). Sanctions are more explicit when dealing with non-member fishing vessels. As part of an enforcement initiative, member states are asked to exercise their sovereign authority and deny violating non-member vessels access to ports, report their movements, and deny illegal catch access to their markets (CCSBT 1994 Art. 5.4; WCPFC 2004 Art. 32.2; SPRFMO 2010 Art. 23.1.d; CCALMR 2010 Para. 2). RFMOs will call upon fishing states, port states, and market states to support and enforce multilaterally agreed rules of behaviour and punish non-compliant behaviour.

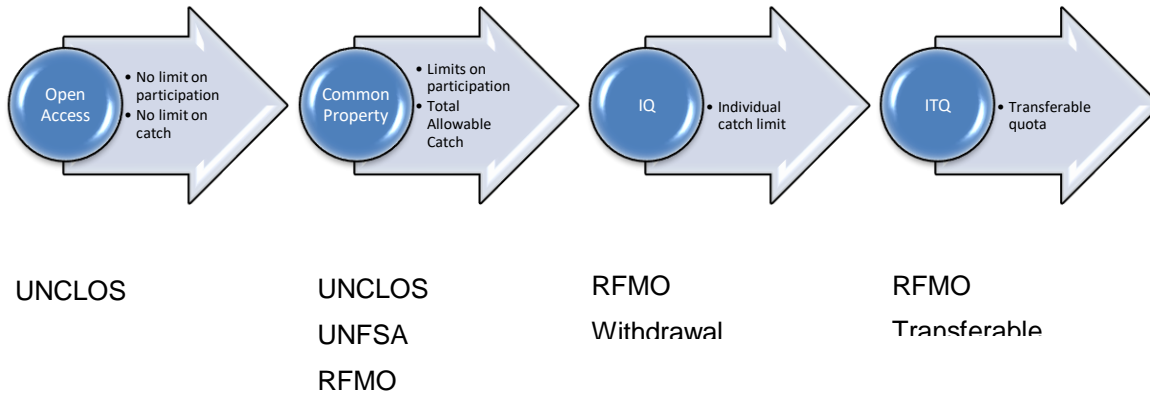
In sum, rights can be enforced by different means in accord with their subnational, national or international institutional setting. Certainly, the consequence of enforcement might differ. As is common in multilateral institutions such as RFMOs, these rules are often defined only in the broadest terms and enforcement mechanisms rely upon administrative sanctions because no judicial authority exists. Nonetheless, such rights created within these institutions may be regarded as the equivalent of legally enforceable rights, even against violating member states, if sanctions include loss of management rights or withdrawal rights over a resource.

Rights-based management in high seas fisheries

Restricting the use of fishery resources is the basic premise of fishery governance. As detailed in *Chapter 5 – Fisheries management*, the development of control mechanisms in fisheries generally proceeds along similar lines (Stewart 2004:86). The default condition is open access where anyone can fish. Regulation and control over resource use follows the establishment of a governance authority. Governance invariably starts with input controls in the form of licenses and effort restrictions. A licensing system will generally cap license numbers, and restrict who they may be issued to. Property rights in fisheries generally evolve from the licensing system because this is the first mechanism to exclude some actors from the withdrawal of fish stocks. See Diag. 1: Property rights in high seas

fisheries.

Diag. 1: Property rights in high seas fisheries



However, a licensing system does not protect licensed fishers from each other. If a subtractable resource remains in a common-pool and available to multiple actors, competitive forces motivate fishers to increase the volume of their catch in the race to fish. Beyond licenses, control measures generally move to a range of limitations on effort, such as vessel type, gear type, fishing seasons, area of fishing, and catch species. Such input controls are the first to be applied because these types of restrictions are less costly to implement and administer (Havice 2013:261). While a range of input controls may act to slow the overexploitation of fishery resources it cannot address all fishery management problems.

As detailed in *Chapter 3 – Overfishing*, there are biological limits to the amount of biomass that can be sustainably removed from a fish-stock over the long term. This fundamental biological limit underpins the formulation of a total allowable catch (TAC) for that fishery. The sum of all individual catches must not exceed this limit. In a fishery, individual catch is called a quota. This individual withdrawal right has more exclusivity than a mere license. Nonetheless, quota-holders possess withdrawal rights in common with all other quota-holders. Therefore, any quota holder must be guaranteed protection not only from the unlicensed actor but also from any of their authorised counterparts who may be inclined to exceed their own quota share.

Mapping property rights systems to maritime boundaries

The definition of a property rights system becomes more complicated when applied to the context of international governance of a fishery. Most legal definitions of the various powers over property assume that such powers exist with the assent and enforcement of an appropriately legitimate and potent authority. Within its jurisdiction, and in accord with various international treaties, this authority rests with the sovereign state. However, in the issue area of high seas resources it is necessary to change one's level of analysis. The state is a unitary actor even though the actual fishing is conducted by numerous vessels flagged by the state. Yet, unitary states are obliged to govern the compliance of

their flagged fishing vessels. So, the system of rules that define rights to use and rights to govern in a high seas fishery applies to unitary states.

To advance this thesis argument, a diagram of international maritime boundaries mapped to the property rights system they create over resources is provided below:

Diag. 2: Property right systems mapped to the framework of international maritime boundaries

	UNCLOS			RFMO	
	Exclusive Economic Zone	Extended Continental Shelf	High Seas	RFMO	RFMO (Quota)
Living resources	Private Property	Private Property ²⁰	Open Access	Common Property	Usufruct
Non-living resources	Private Property	Private Property	Open Access		

In accord with the rules of the UNCLOS, living and non-living resources within its exclusive economic zone (EEZ) are the private property of that unitary state. The state may put these resources to certain uses and may exclude other actors from using these same resources (UNCLOS 1982). Further, when the UN Commission on the Limits of the Continental Shelf approves a coastal state's submission to claim an area of its extended continental shelf, non-living and sedentary living resources within this boundary can now also be considered that state's private property (CLCS 2008). Beyond the EEZ boundary, living resources existing in the column of water that constitutes the high seas are nominally exposed to conditions of open-access. However, the evolving regime of RFMOs bring these resources within a system of governance which is characteristic of common-property. This thesis asserts that in accord with the definitions of property outlined earlier in the chapter, the allocation of a fraction of collectively determined total allowable catch as a state's individual quota thus creates a withdrawal right which is characteristic of private property. However, recall that individual quota permits the holder to catch a certain number of fish, of a certain species, in a certain area, for a certain period (Scott 2000:111). The detail of this quota is only concerned with fish-caught and not the productive fish-stock. Therefore, this definition of individual quota is more closely aligned to system of usufruct. Where usufruct is a specific and limited use privilege over a thing. The holder of an individual quota withdrawal right may take away some of the natural thing of value provided it be without altering the substance of the thing. In addition, all holders of an equivalent individual quota have the equal right to expect a stream of future returns from the substance of the thing. In a fishery, the productive asset is the reproductive biomass of the fish stock. Thus, when a withdrawal right is usufruct then an actor may not

²⁰ Sedentary (non-migratory) species only.

degrade the substance of that productive fish stock. This can only be achieved when catch rates are conducted within the limits of a stocks maximum sustainable yield.

Mapping high seas governance rule systems to property rights

This thesis will now map the instruments of international law that define rules in high seas fisheries to a system of property rights. The *right of access* authorises the possessor to enter in an area and enjoy benefits that do not subtract from the value of a defined resource. As defined by the UNCLOS, every state has the right to sail ships flying its flag on the high seas (UNCLOS 1982 Art. 87). So, the vessels (fishing vessels) of all states are free to access any area of the high seas. The *right of withdrawal*, in addition to the right of access, gives the possessor the right to obtain the “products” of a specified resource. International law provides all states the right to fish on the high seas. This universal right to catch high seas fish stocks is modified by the obligation for all states to cooperate and establish regional fisheries management organisations (UNCLOS 1982 Art. 118; UNFSA 1995 Art 8.2). The UNFSA is unequivocal in its statement on withdrawal rights:

Only those states which are members of such an organization... or which agree to apply the conservation and management measures established by such organisation or arrangement, shall have access to the fishery resources to which those measures apply.
(UNFSA 1995 Art. 8.4).

And,

Such [a non-member] State shall not authorize vessels flying its flag to engage in fishing operations for the straddling fish stocks or highly migratory fish stocks which are subject to the conservation and management measures establish by such organization or arrangement.
(UNFSA 1995 Art. 17.2).

Together, the Law of the Sea and the Fish Stocks Agreement define a system of property where all state actors hold access rights to the high seas but only RFMO member states and cooperating non-members hold withdrawal rights to marine living resources.

As described in *Chapter 6: The governance of high seas fisheries*, there is no overarching international entity to regulate the exploitation of high seas fish stocks like the International Seabed Authority regulates the exploitation of high seas mineral deposits. Rather, individual RFMOs govern commercial fishing activities in the high seas (CCAMLR 1982 Art. 1.1; CCSBT 1994 Art. 3; WCPFC 2004 Art. 3; SPRFMO 2010 Art. 2). To do this, RFMOs are invested with competency over a valuable fish species such as tuna, or have competency over a geographic area that includes a specific set of commercially valuable fish species.²¹ Once they achieve entry into force, RFMOs create an authority and jurisdiction over high seas resources. Their governance replaces the underlying open-access conditions. By using

²¹ RFMOs will often apply a lesser interest to associated or dependent species in accord with ecosystem and precautionary principles.

their authority to limit total allowable catch (TAC) and to allocate individual quota only to members²² then RFMOs create a system of rules that are characteristic of common-property rights. Within this system of common-property the right of withdrawal confers powers like that of usufruct.

Rights to govern use

Management

In Ostrom and Schlager's schema of property rights over resources, it is the *right of management* which gives its holder the authority to determine how, when, and where harvesting from a resource may occur, and how the structure of a resource may be changed (Ostrom & Schlager 1992:251). The UNCLOS created the mandate to create RFMOs. The UNFSA reinforced the role and purposive intent of RFMOs. RFMOs are multilateral institutions governed by member states under conditions of consensus and majority. International law requires RFMOs to adopt and apply international standards for the responsible conduct of fishing, to obtain scientific advice and review the status of stocks, and to establish mechanisms for effective monitoring, control, surveillance and enforcement (UNFSA 1995 Art. 10.c-h). The right of management also authorises its holders to devise withdrawal rights governing the use of a resource. International law obligates member states that form a RFMO's Commission to collectively determine "participatory rights such as allocations of allowable catch or levels of fishing effort" (UNFSA 1995 Art. 10.b). For marine living resources on the high seas, international law has assigned management rights to RFMO collective of members. The formation of a RFMO creates a new, albeit narrow, authority and jurisdiction over the area and species for which it is competent.

Exclusion

The next right in the right to govern bundle over a common property resource is that of exclusion. The holder of a *right of exclusion* can regulate access to the resources and how this access can be transferred (Ostrom & Schlager 1992:251). As already shown, international law modifies the universal freedom of fishing in the high seas by making it conditional upon membership of an RFMO. Stewart asserts that, under the UNCLOS RFMO regime, high seas fishery resources can be considered as international property; belonging to all (Stewart 2004:13). Indeed, the law of the sea does provide all states the freedom to fish high seas resources. However, the UNCLOS also asserts that states must cooperate over shared resources and required them to do so through multilateral treaties in the form of RFMOs (UNCLOS 1982 Art. 117-118). In 1995 the UNFSA strengthened the mandate for nations using high seas resources to cooperate.

While the UNFSA was focused on highly migratory and straddling species such as tuna, the most recent Pacific Ocean RFMO – South Pacific Regional Fisheries Management Organisation – has

²² Cooperating non-members can be accorded the privileges of membership on the proviso that they abide by all norms and rules of the RFMO and are working towards full membership.

extended this mandate to other (non-tuna like) species (SPRFMO 2010 Art. 20.2). Moreover, Stewart's assertion that the UNCLOS created living marine resources as international property does not account for the practice of RFMOs to exclude non-members from participating in fishing species under their competency (CCSBT 1994 Art. 15.4; WCPFC 2004 Art. 32.1; CCALMR 2009 Para. 2; SPRFMO 2010 Art 32.1-2). This thesis argues that rather than international property, and applying Scott's assertion that exclusion creates property, by its own practice the UNCLOS RFMOs have created a framework for power over property.

As some scholars asserted, high seas resources are no longer open access and, through the formation of international treaties, a transformation to international common-property is underway (Allen et al. 2010:66). Recall that a common-property system is one where powers over property are held by a limited and identifiable group of actors. By using their authority to limit total allowable catch (TAC) and to allocate individual quota only to members, RFMOs create a system of rules that are characteristic of common property rights.²³ However, it must be noted that these rights are by no means fully formed and there are considerable differences among RFMOs. New state entrants have the right to enter any high seas fishery if they agree to comply with RFMO rules. However, the studied RFMOs are asserting that fish stocks are already fully exploited or overexploited and that the allocation of a quota to a new member must be agreed by the respective RFMO commission body. That said, no state has ever been refused membership of a RFMO.²⁴ But what is contested is the amount of catch that new member is allocated. Indeed, new entrants are only allocated a small fraction of the quota that founding members possess. This practice persists even when the new entrant formally requests a small fraction of allocation from each current member (SPRFMO COMM 2015:2). No RFMO has a formal statement on rights of exclusion. Yet, practices of participation and allocation are still evolving.

Within the limited jurisdiction established with the formation of a RFMO a type of property right is established. Once a state is party to a RFMO, it is permitted to participate in fishing for specific species in the area and it receives its allocation (quota) of a collectively defined total allowable catch. This permission to fish and allocation of a quantity of allowable catch is analogous to access rights and use rights. This thesis has proposed usufruct is the type of withdrawal right for common-property resources under the authority of a RFMO. Coastal states are already provided with full use and management powers over all resources in the column of water within its EEZ. Yet, membership of an RFMO does not allow a state any formal extension of its jurisdiction over living marine resources in the high seas. Rather, as party to an RFMO, a member state now has a right to a catch quota. In contrast, non-members are excluded from the fishery and cannot legitimately draw profit from the high seas fish stock. This structure of rights over high seas resources creates a hybrid form of property right. This thesis argues that common-property rights over the fish stocks is created and held by the RFMO, and the quota allocations deliver a usufruct form of withdrawal right to an authorised quantity of fish-catch.

²³ Cooperating non-members are often accorded the privileges of membership on their commitment to abide by all norms and rules of the RFMO, and are working towards full membership.

²⁴ Recognising the administrative barriers that PNA members have practiced in the WCPFC. See *Chapter 6 – The governance of high seas fisheries*.

Another measure of the quality of a property right is known as duration. It is the time span of a property right. This is the period during which the holder of the right may exercise powers of ownership. Unlike exclusivity, duration can be perfect. That is, a right can be permanent. Among all other characteristics it is duration that encourages rights holders to take a long-term view of the resource because it secures the full value of all future harvests. In national jurisdictions, duration is also linked to the ability of the governance authority to withdraw or terminate use rights (Scott 2000:112). Within a national jurisdiction, a fishery right may last anywhere from a limited period of a year or less (the time-span of an ordinary fishing licence) to perpetuity (Stewart 2004:11). Administrators may set use rights or licenses with a limited duration, but commonly offset this with a practice of automatic renewal. Under the law of the sea, state parties have universal rights to fish stock in the high seas (UNCLOS 1982). But this right is modified by the governance mandate invested in RFMOs. Generally, RFMOs may apply a condition that members must have been actively fishing in the last two years, or intend to fish within the next two years, within its area of competency (SPRFMO 2010 Art. 12.5).

A final measure of the quality of a right is security. This is the ability of a right holder to withstand challenges of others to the right (Stewart 2004:4). Challenges may centre on enforcement of use rights (within the system) or may be a formal challenge to the system itself. In its simplest form, a governance authority achieves security through establishment of a register and licence system (NZ Fish 1996). In any fishery, the control (and limitation) of use rights increases the security and value of the property interest. For example, simply taking fish when not licensed, not a use right holder, or taking a catch beyond the quota limit is a violation of the rights and duties built into the property system (NZ Fish 1996; Peart 2007:xvii). In addition, there may be formal challenges to the principles or system by stakeholders unhappy with some aspect of the system. They may have been excluded because of limits on effort or gear. Conversely, a right may be challenged by the governance authority, which can withdraw or terminate the right in accordance with law (Stewart 2004:11). As already described, RFMOs may apply a condition that members must have been actively fishing in the last two years, or intend to fish within the next two years, within its area of competency (SPRFMO 2010 Art. 12.5). While RFMOs meet UNCLOS provisions and grant use rights for 'interested' parties, these use rights are universally linked to one, two, or three-year harvest strategies (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Total allowable catch is determined periodically and in accord with performance parameters determined collectively within each RFMO. As a proportion of this TAC, the quantity of each nation's withdrawal right (individual quota) is therefore somewhat variable.

Also, as in any institution, the enforcement of rules is a key element to achieving compliant behaviour. Some actors will exceed their quota, so rigorous monitoring and enforcement of individual catches is essential (Scott 2006:97). The framework of international law on living marine resources rests upon the state duties, a RFMO regime with no overarching governing body, and a refusal of international courts to assign themselves jurisdiction.²⁵ The enforcement of rules for high seas fisheries is left to individual RFMOs. This thesis observes that, the only leverage available to RFMOs is their control over withdrawal rights to resources under their competency. The UNFSA treaty obliges states to ensure

²⁵ Southern Bluefin Tuna (New Zealand v. Japan; Australia v. Japan): In 2000, the International National Tribunal on the Law of the Sea (ITLOS) ruled that it did not have jurisdiction to hear the merits of the case. The dispute was subsequently resolved by negotiations amongst the three parties.

flagged vessels comply with RFMO conservation and management measures, to immediately and fully investigate any alleged violations, and to apply sanctions that deprive offenders of benefits accruing from their illegal activities (Art 19.1-2 UNFSA 1995). Indeed, *Chapter 5 - Fisheries management* detailed that some members were in breach of these obligations through IUU activities.

Yet, parties to RFMOs are a diverse population of developing and developed Coastal states put together with distant water fishing nations. Forging consensus and agreement between such disparate actors is always difficult, particularly on rules like sanctions for violations. Further, it is common for parties to compromise on the initial formulation of such rules in the anticipation that over time they may 'fall forward' to achieve incremental gains (Zartman 1992:117). Nonetheless, this thesis observes that within conditions of common-property over a valuable resource, a powerful tool for any governance authority is to use the right of exclusion as an enforcement mechanism.

Alienation

Finally, the right of Alienation gives the possibility of transferring part of or all the collective choice rights to others. Alienation (also known as transferability) is the characteristic which, more than any other, gives a property right itself an economic value in a market (Ostrom & Schlager 1992:251). Within an RFMO, member states are issued an individual quota (quantity or effort) of which each then re-distributes a fraction to its flagged vessels in accord with its national licensing and regulatory regime. In addition, the Law of the Sea and Fish Stocks Agreement make no provisions on the transferring of rights among state members themselves. A review of legal issues has found that any such systems in international fisheries depend on decisions of the RFMO concerned, rather than on the development of new international law (Allen et al 2012:70). It found that rudimentary systems for quota trading among states are allowed in some RFMOs, and the any such systems depend on decisions of the RFMO concerned. There is no evidence of formal mechanism of market exchange or trade of quota amongst RFMO members.

Within Pacific RFMOs, the fact that allocations are limited, imbues them with a measure of exclusivity. This creates the quota as a use right that is valuable. Indeed, demand often emerges for the power to transfer ownership of these rights. This transferability has two elements: divisibility and flexibility. Divisibility rules allow the right to be divided into smaller portions which can be transferred (i.e. sold or leased) individually (Scott 2000:112; Stewart 2004:11). With divisibility, rights-holders and potential transferees can tailor their holdings, and in accord with economic objectives, the fishery can become more efficient as actors specialise. Divisibility already occurs when state members of a RFMO allocate fractions of state individual quota to flagged vessels. Indeed, some of the beneficial owners of these vessels may be foreign nationals. But there is no RFMO provided platform for the divisibility and transfer of individual quota between member state actors among the studied RFMOs. On the other hand, flexibility is the ability to alter or relax the right to meet sudden changes in circumstances. These two dimensions can show how rules create property rights, and show how RFMOs may create rights variably. There are informal arrangements whereby members are engaging vessels of another state to conduct fishing operations and where a RFMO commission has been informed that a quota has been

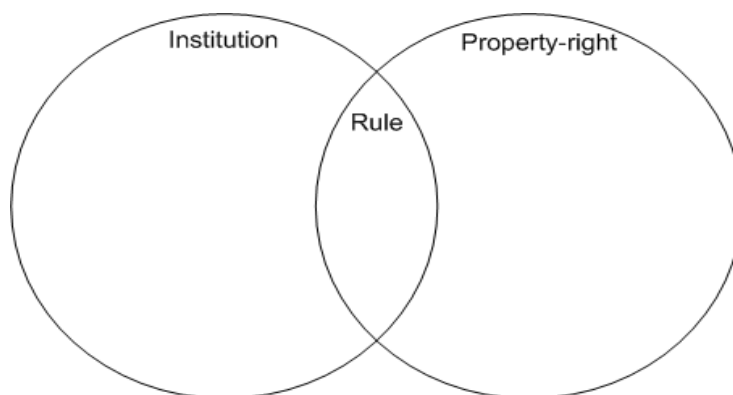
allocated to another member state (SPRFMO 2014). Technically, this flexibility mechanism is not individual transferable quota (ITQ) because economic efficiency is not achieved.

In sum, this thesis asserts that within the limited jurisdiction established with the formation of a RFMO, a type of common-property right is established. Once a state is party to a RFMO, it is permitted to participate in fishing for specific species in the area and it receives its allocation (quota) of a collectively defined total allowable catch. This permission to fish and allocation of a quantity of allowable catch is analogous to withdrawal rights. The nature of system of rights resembles usufruct; member states hold a right to exploit the marine resource 'collectively owned' by the members of the RFMO and take away some fraction of the catch by fishing. Also, the member is forbidden to degrade the quality or performance of the productive resource. Recall that degradation of the productive fish-stock negatively affects all other quota holders. Any factor that reduces an owners power over a resource within a market poses a problem of incentive. The price system and incentives to realise profits will operate to if there is information and property-rights. It is property-rights over a resource that provides the essential incentives to invest in, maintain, and to put assets to the best possible use. However, the principles, norms, and rules of a system of property rights require jurisdiction and effective governance.

RFMO rules define common-property rights

Rules of behaviour are the central issue in the practice of sustainable high seas fishing. See Diag. 3. Rules are the outputs of institutions and the inputs of property rights (Crawford & Ostrom 1995:583). This thesis finds that such rules are also the unifying methodological link between common-pool resources, international institutions, and common-property systems. The authority and mandate to agree and enforce these rules of behaviour in high seas fishing falls to international treaties, and particularly to regional fisheries management organisations (RFMOs). Rules negotiated and agreed within these treaties define acceptable and unacceptable behaviours (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012).

Diag. 3: *Rules as the outputs of institutions and the inputs of property rights*



Of particular interest to this study is the category of rules that describe rights and obligations among users of a resource. The use of property-rights systems is a highly regarded governance approach for

fishing within national jurisdictions, yet they are not a common element in the discourse on the governance of high seas fishing. This may be because limiting overall catch to levels of maximum sustainable yield (MSY) is the essential and first milestone of governance, and doing so under existing governance approaches is difficult (Hoare 2010). Indeed, *Chapter 5 - Fisheries management* detailed the grievously low percentage of productive fish-stock that currently exists in the studied RFMOs. The deficiencies of traditional command and control governance approaches underline the need for new governance approaches. Achieving sustainable fishing practices requires the harnessing of actor motivations to create and enforce new rules.

This thesis also asserts that common-property systems are an institutional approach to collective decision-making over a common-pool resource. Institutions can be broadly defined as social decision systems that provide decision rules for adjusting and accommodating, over time, conflicting demands from different interest groups in a society (Ciriacy 1975:715). In this context, Ciriacy used the term “common property” to refer to a distribution of property-rights in resources in which a number of owners are co-equal in their rights to use the resource. This is broadly equivalent to Ostrom’s definition of common-pool resources (Schlager et al. 1992:250-251). But both common-pool resources and common-property systems are decidedly different from the definition of an open-access resource. By definition, open-access resources are exploited under conditions where there is no social or political system of authority to impose rules of behaviour.

Recall that governance can be defined as the processes, mechanisms and institutional structures that establish legal authority or mandate to conserve and manage fisheries resources, and the decision-making frameworks that exist within such institutional structures (Lodge 2005:2). Put another way, if no institutional arrangements exist then common-property systems cannot exist. In addition, if the institutional arrangements are weak then the property system is weak. A key component of common-property systems, as opposed to open-access conditions, is the capability to exclude potential resource users that violate the group’s norms of behaviour. The concept of ‘property’ has no meaning without this feature of the exclusion of all who do not reinforce the value of the resource. Thus, a strong system of property rights and a strong institution both depend upon their ability to harness an actor’s behaviour.

The analysis of RFMO treaty documents can identify where definitions of rights over property exist and the extent to which they create a property system. There are two aspects to the definition of common-property systems: components of rights and the strength of rights. In the first, a common-property system is built from the following component rights (Schlager et al. 1992:250-251; McGinnis 2011:178):

- *Access rights* define an area and allow the holder to enjoy its benefits without removing any resources.
- Whereas *withdrawal rights* are those to obtain specified resources from a resource system and remove that product from the area.
- *Management rights*, on the other hand, define the right to participate in decisions regulating the resource or making improvements in infrastructure.
- At the next level of authority, the holder of *exclusion rights* can participate in the determination of who has the right of access or withdrawal or management.

- Finally, *alienation rights* determine who has the right to sell, lease, bequeath or otherwise transfer any of the preceding component rights.

Together with decision-making procedures and enforcement characteristics, these bundles of rights constitute a common-property system.

Conclusion

This chapter detailed the principles, norms, and rules that define these bundles of common-property rights within treaty conventions and measures is the primary data gathering undertaking of this thesis research. Showing the extent of the developing common-property approach in high seas fisheries governance is the ultimate goal of this thesis. From this data, analysis can determine the relationship between global and regional treaties, as well as identify similarities and differences among regional treaties. Yet, any judgment on the efficacy and potential of this approach requires additional guidelines for the assessment of their strength.

The strength of property-rights can be qualitatively assessed along the dimensions of exclusivity, transferability, security and durability (Scott 2000:5; Arnason 2000:20). Recall that rights refer to actions that are authorised, whereas rules refer to the prescriptions that create authorisations. Therefore, rules that define actions that are required, permitted or forbidden in relation to a resource also create powers over property. An analysis of this aspect of rights and obligations will allow an observation of the current governance frameworks in practice. A fishing right which is permanent, exclusive, transferable and secure to a reasonable degree is a type of property. This is true for both bundles of rights created within a national jurisdiction and those rights created within the jurisdiction and authority of the RFMO regime. The evolving RFMO regime moves high seas resources from an open-access condition to one of common-property. Membership of a RFMO confers a type of ownership right. The RFMO regime is based on the exclusion of non-group members, and the monitoring and enforcement of catch limits by group members. But nowhere are property rights absolute and all are attenuated to some degree.

The international and institutional setting of this transformation is the focus of this research project and this is developed further in the next chapter on international institutions. The analytic framework presented in this chapter will be used to reveal the extent to which a system of property rights is emerging within the international governance of high seas fishing. The next chapter provides the institutional framework used by the thesis to compare the system of rights among the studied RFMOs.

Chapter 8

Institution theory and International institutions

The previous *Chapter 7 - Property rights in high seas fisheries* detailed the property rights inherent in the international boundaries established by the Law of the Sea and invested in regional fisheries management organisations.

This chapter presents a framework to identify and organise the factors most relevant to understanding the multilateral institutions expected to govern fishing on the high seas. *Chapter 4 - Fishing as a production activity* detailed the prediction that resource users are led inevitably to exhaust common-pool resources assumes that all actors are selfish, norm-free, and maximisers of short-term results. The defining model behind these predictions is Hardin's 'Tragedy of the Commons'. However, these predictions are not supported when individuals face a common-pool resource problem and are able to communicate, sanction one another, or make new rules (Ostrom et. al. 1999:179). This chapter adopts Ostrom's proposal on rule-based cooperation, and uses her 'institutional grammar' approach to explore the treaty framework of international law and the operational organisations for international governance of high seas fisheries.

The first section of this chapter defines institutions. All actors and governance institutions in high seas fisheries of the Pacific make very similar aspirational statements on the need to catch high seas fish stocks at sustainable rates and preserve fish stocks (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Yet, *Chapter 5 - Fisheries management* detailed how the current governance regime has failed to produce sustainable rates of exploitation. This section thus presents a theoretical framework to explore the strategies, norms and rules evident in these high seas governance institutions. It presents the extent to which institutional rules proscribe or omit rules that motivate actors to comply with desired actions and outcomes. Here, evidence exists in the institutional statements agreed upon and published for the regional fishery treaties that guide the governance of high seas fishing. The second section of this chapter introduces a technique and grammar that provides a theoretical structure to identify and organise the principles, norms, and rules of high seas fishing.

The second section in particular relies upon the formative work of Elinor Ostrom. In her efforts on institutional approaches to governing the commons, Elinor Ostrom provided an influential counter to the pessimism of Hardin's tragedy of the commons. This body of work starts with a grammar of institutions which provides a template for the analysis of institutional strategies, norms, and rules. The goal was to provide a theoretical structure for analysis of the humanly constituted elements of institutions. The ground for looking at institutions as norms rest on an assumption that many observed patterns of interaction are based on the shared perceptions among a group of individuals or proper and improper behaviour in particular situations. To understand regularised patterns of interaction affected by rules, one needs to examine the actions and outcomes that rules allow, require, or forbid and the mechanisms that exist to enforce those rules (Crawford & Ostrom 1995:583). Institutional statements

are spoken, written, or tacitly understood in a form intelligible to actors in an empirical setting (Crawford & Ostrom 1995:583). The institutional grammar technique is based on the view that institutions are enduring regularities of human action in situations structured by rules, norms, and shared strategies, as well as by the physical world.

A basic structure of international cooperation

Theory is a kind of simplifying device that allows you to decide which facts matter and which do not (Baylis et al. 2008:4). This very useful perspective allows exploration of the contrast between realism, liberalism, and constructivism. Each of these theoretical frameworks can be allowed to exist on their individual and situational merits. Baylis argues that the three major theories of international relations are not so much different views of the same world, but are instead three views of different worlds. Realism focuses on power relations between states, liberalism on a much wider set of interactions between states and non-state actors, and constructivism on the ways in which actors develop different social structures and processes (Baylis et al. 2008:7). Baylis represents these three views as power-based, interest-based and knowledge-based. As below:

<i>Realism</i>	<i>Liberalism</i>	<i>Constructivism</i>
<ul style="list-style-type: none"> • Power based 	<ul style="list-style-type: none"> • Interest based 	<ul style="list-style-type: none"> • Knowledge based

Each theoretical framework works to pick out the most important power, interest, and knowledge based features of world politics. In this way, each framework offers a valid account of international relations and practice. The power-based paradigm asserts that in the absence of a centralised authority, it is a hegemon (the strongest state) that shapes collective behaviour. International governance is effectively, government by that state which supplies the power necessary for governing. Neorealism computes the components of power of individual states, and assesses the relative chances of moves in the game of power politics (Cox 1996:147). These games of power among states are often conducted under overarching differences in strategic outcomes or profound differences in fundamental socio-political ideology. An alternative framework to understand world politics is liberal institutionalism. The liberal institutionalist framework shares with neo-realism an acceptance of the importance of the state and the anarchical condition of the international system. But, liberal institutionalists argue that within this system there are prospects for cooperation. Through the membership of institutions, states can significantly broaden their conception of self-interest to widen the scope for cooperation (Keohane 1989:166). Broadly, these institutions are sets of rules which define permitted and forbidden state behaviour in specific policy areas, such as the law of the sea (Burchill 2005:64). Liberal institutionalists assert that states are not always preoccupied with relative gains versus rivals and can feel secure enough to maximise their own gains. In many issue areas, states discover a coincidence of strategic and economic interests which can be realised with a formalised agreement on rules of conduct.

The existence of such mutual interests is the prerequisite to international cooperation. States are still self-interested and self-maximising but the identification of the mutual benefits from cooperation are the impetus for cooperative behaviours and outcomes. Therefore, international institutions should not be treated as things that exist apart from the shared understanding and shared behaviour of participants. In this context, an institution can be viewed as no more than a regular behaviour pattern sustained by mutual expectations about the actions that others will take (Crawford and Ostrom 1995:583). But even when states do have interests in common the lack of a central world authority often deters them from incurring the reciprocal obligations that cooperation demands. While mutual interests are the prerequisite condition they are no guarantee of mutually agreed outcomes.

All states are self-maximising to some degree. States will calculate the individual value of expected outcomes (Keohane 1989:108). States are rational egoists who are concerned primarily with their own narrowly defined interests, and pursue those interests in the most efficacious manner possible (Reus-Smit 2005:193). Indeed, states fear that others will cheat on agreements, and monitoring and compliance enforcement can be very costly. Therefore, a group of states may fail to cooperate even when they have common interests (Reus-Smit 2005:191). On the other hand, this observation of states as rational egoists can also explain how states will cooperate when they do. States construct international institutions to overcome obstacles to cooperation. Institutional norms and rules facilitate cooperation by increasing information, lowering transaction costs, and raising the cost of cheating (Keohane 1989:162). International institutions are the outcome of organised and formalised cooperation between states. International organisations are formed to manage agreed action plans and as a forum for collective governance.

It is here that constructivist theory inserts itself to pursue the argument that actors are inherently social, and that their identities and interests are socially constructed. Constructivism provides an understanding of the evolution of norms of authority and legitimacy. Its main instruments of policy are ideas and discourse (Jackson 2007:2208). Knowledge-based theories of regimes emphasise the importance of the normative and causal beliefs that actors hold. How actors develop their interests is crucial to explaining a wide range of political phenomenon. In a constructivist framework, changes in belief systems can trigger changes in policy because knowledge constitutes identities, and identity shapes the preferences and the perceived options of state actors (Wendt 1992:398). Constructivists explore the framework within which actors interact. Constructivists contend that actor and institutional structures are mutually constituted, and it is practice that both maintains and transforms those structures (Reus-Smit 2005:1997). Institutional structures are constituted by the actions and outcomes they legitimise. Yet, they also transform the identities and beliefs of the actors which constitute them. New actions and outcomes are made possible by the existence of the institutional practices themselves.

Selecting a view of the world for the study of high seas fisheries

This thesis explores the international treaties governing high seas fishing and it will approach these treaties as systems of rules of behaviour. It will do so with an objective and liberal institutionalist framework. Interested states have already made international treaties and formed operational regional

fisheries management organisations to govern shared interests in high seas fisheries. These treaties will be viewed as institutions intended to guide the behaviours of participants to achieve intended outcomes. Realism could effectively describe the anarchic conditions under which sovereign states work to move open-access resources to the authority of collective governance. Alternatively, constructivist insights could explain differences in actor preferences and provide insights to the identities of developing vs. developed states and coastal vs. distant water fishing nations. But this thesis study will adopt the liberal institutionalist framework. The goal of this thesis is to propose a new policy approach for states that are members of the studied international treaties. This new policy approach will be presented in the form of treaty articles so that other scholars and analysts may immediately consider the merits of the new formulations of permitted and forbidden behaviour towards the goal of achieving sustainable high seas fisheries.

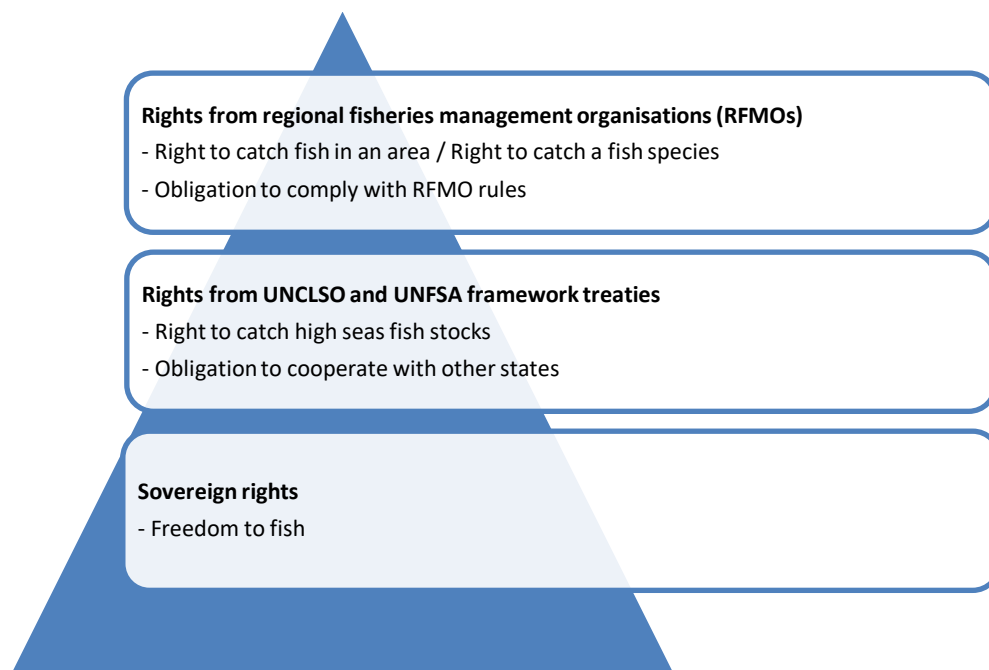
Rule-governed behaviour

Regimes enhance the ability of nation states to cooperate in a given issue area. Keohane sees a regime as a set of behavioural norms or rules accepted by a group of states as a means of dealing with a certain sphere of common concerns (Keohane 1998:113). These behaviours are based on 'social facts' such as commonly held assumptions of legitimacy or normative value (Keohane 1998:76). Another definition of a regime by Krasner is a set of principles, norms, rules, and decision-making procedures around which actor's expectations converge in each area of international relations (Krasner 1983:2). This conception views principles as beliefs of fact and causation that inform expectations of legitimate behaviours and the rules to convert the regime norms into concrete prescriptions of behaviour (Krasner 1983:4-5). A regime can be considered rule-governed behaviour. In many cases, regimes are accompanied by organisations designed or employed to deliver on the specific objectives and targets derived from guiding principles. This language closely matches definitions of institutions and the role they play in guiding actor behaviour. Recall from *Chapter 7 - Property rights in high seas fisheries* that institutions are defined as sets of norms, rules, and decision-making procedures that define who constitutes legitimate actors and what constitutes legitimate action (Reus Smit 2008:281). Similarly, an institution may be understood as an enduring regularity of human action in situations structured by shared strategies, norms, and rules (Crawford and Ostrom 1995:583). This thesis chapter will read the term regime and institutional structure as interchangeable. The definition of a regime and institution are equivalent. While the context of an institution may be variable, the context of a regime is definitively in the international arena. While acknowledging this equivalence, this chapter will utilise the word institution for expediency. It will do so because the goal of this chapter is to introduce the institutional grammar framework the thesis will use to analyse the UNCLOS, UNFSA and the studied RFMO treaties that define multilateral fisheries governance.

The 1982 Law of the Sea (UNCLOS) and the 1995 Fish Stocks Agreement (UNFSA) form the institutional core for the new structures of high seas fishery governance. See Diag. 1 below. The UNCLOS and UNFSA framework treaties correspond to the traditional function of treaties as records of multilateral political settlements and arrangements (UNCLOS 1982; UNFSA 1995). As mandated by the UNCLOS and UNFSA, regional fisheries management organisations have now entered into force in

almost all areas of the high seas. The nested structure of international treaties governing fishing corresponds with trends in other aspects of international law. The focus of treaty practice moves from framework statements of principle and strategy to regulatory agreements that require ongoing cooperative action among states over time (Chayes 1995:1). In accord with the provisions of these framework treaties, regional fisheries management organisations are the prescribed institutional and organisational vehicle to multilateral cooperation for the governance of high seas fisheries. All institutional levels implicitly and explicitly record a convergence of actor's principles, norms, and rules.

Diag. 1: Powers over property are provided by nested institutions



Levels of international institutions

Reus-Smit describes three levels of international institutions. The most fundamental are *constitutional institutions* which comprise the primary rules and norms of international society, without which society among sovereign states could not exist. The most commonly recognised of these is the constitutional norm of sovereignty (Keohane 1989:165; Reus Smit 2008:281). Under the principle and practice of sovereignty, the government of a country has supreme authority to give and enforce the law within its territory (1970 UN Declaration of Principles of International Law). Sovereign governments have a right to control their own territory and to be independent of all other states. Within the state, power and authority are centralised and hierarchical, and outside the state no higher authority exists. These rules constitute and regulate the external independence and the domestic authority of states (Jackson 2007:265). Next are *fundamental institutions*, which rest upon the foundation provided by constitutional institutions. They are the elementary practices that states reach for when seeking to collaborate or coordinate their behaviour. Fundamental institutions have varied from one historical system to another (Cox 1996:8). In our modern international system, contractual international law and multilateralism have been the most important institutional practices. Within this structure, *issue-specific institutions* are

the most visible of all international institutions. These institutions are constituted by the sets of rules, norms, and decision-making procedures that states formulate to define who constitute legitimate actors and what constitutes legitimate action in a given domain of international life (Reus Smit 2008:281). Examples range from Nuclear Non-proliferation Treaty, to the WTO, and the UNCLOS. Issue-specific institutions are concrete enactments in specific issue-areas of fundamental institutional practices.

What makes Reus Smit's formulation of institutions particularly salient to the governance of international fisheries is his focus on the language and practice of justification. He argues that international institutions are more than a pristine set of rules calmly and logically applied to clear-cut situations. Rather, they are alive in the central political debates of international society. They structure arguments about right and wrong, about the bounds of legitimate action, about authority and membership (Reus Smit 1998:284). These debates and institutions also range the full spectrum of international issues from the use of force to the management of fisheries. Institutions play an important role to normalise and legitimise a set of principles, norms, and rules in the practice of international relations. These institutions can take the form of treaties. These treaties are the formal expression of legitimate action.

Treaties

International law is a consensual process with formalised international law derived from international custom and practice. The expression of *fundamental* institutions and the formal expressions of international law is evident in the 1969 Vienna Convention on the Law of Treaties which codified the pre-existing customary international law on treaties.²⁶ Positivist international law asserts that state consent or the acts of states are the basis of international obligation and international law (Baslar 1998:27). The principles and rules of international behaviour, while path dependent, have been developed by the international community itself. During the 19th century, it was recognised that a sovereign state could limit its authority to act by consenting to an agreement with other sovereign states in accord with the principle *pacta sunt servanda*. A treaty is such an agreement and is recognised under international law entered into by state actors.

Under international law, a treaty is an official written agreement that states use to legally bind themselves. One type of treaty is a framework treaty, which may require subordinate and implementing legislation in the form of additional treaties. Treaties may also be self executing. Merely becoming a party to such a treaty puts that treaty and all its obligations in action. An example of a self-executing treaty is membership of the World Trade Organisation. Other treaties require implementing legislation. That is, a change in the domestic law of a state party that will direct or enable it to fulfill treaty obligations. An example of a treaty requiring such implementing domestic legislation would be one mandating local prosecution by a party for particular violations such as in the law of the sea. That said, it is not uncommon for a state party to find that existing national legislation can provide for all obligations under a treaty. In the governance of high seas fisheries, Regional Fisheries Management Organisations (RFMOs) are multilateral organisations. Nonetheless, they are the mandated

²⁶ Codification is the process of collecting and restating the law of a jurisdiction in certain areas.

implementing legislation of the UNCLOS.

Successful Institutions

Liberal institutionalists recognise two different approaches to explain the emergence of international institutions: hierarchy and reciprocity. *Hierarchy* is a mechanism that centres on the existence of a dominant or hegemonic actor. A prime example is the economic institutions such as the World Bank and World Trade Organisation established under USA hegemonic influence after the Second World War. When hierarchy is prioritised as a factor, these institutions all owe their existence to the presence of the USA as a hegemonic power. However, it is here that institutionalists depart from the realist version of hegemonic stability. Institutionalists assert that once an institution is established it is no longer wholly dependent upon the hegemonic actor maintaining its position. An institution will persist because there is no incentive for states to defect from the mutually collaborative strategies and return to sub-optimum outcomes. Once collaborative strategies have allowed movement from sub-optimum outcomes rational states will permit them to continue (Little 2008:304). Therefore, liberal institutionalists assert that established regimes will survive even in the absence of a hegemon.

The second mechanism for establishing and maintaining an institution is the principle of *reciprocity*. Reciprocity explains the persistent nature of institutions. Expectations of reciprocity are the basis for cooperation amongst actors. Cooperation is synonymous with patterns of practice based on shared norms of behaviour and expectations of reciprocity (Keohane 1989:121). Liberal institutionalists have increasingly come to focus on factors that will strengthen reciprocity within the institutional group. Reciprocity centres on repeated interaction amongst actors. Because behaviour will be factored into future interactions it becomes worthwhile taking a risk and pursuing a collaborative strategy to produce the optimum outcome (Keohane 1984:84). Inspection and surveillance facilities also become very important for ensuring that states are operating within the parameters of agreed behaviour. These measures reduce the opportunity and risk of defection by other actors who are party to the agreement.

Herein lies the value of institutions. They reduce certain forms of uncertainty about the behaviour of other actors and alter the transaction costs to monitor this behaviour. Institutions do this by increasing the availability of key types of information, such as proof that other actors are honouring the rules and procedures of an agreement (Keohane 1986:24). Transaction costs, in this context, are the costs of devising, monitoring and enforcing the rules of an agreement. For example, within RFMOs two key types of information meet this need: a) reference points and measures of achievement, and b) the monitoring and reporting of compliant and non-compliant behaviours. These two types of information limit the opportunity for free-riders and reduce the uncertainty that a contract of agreement (cooperation) will be observed by all parties. Within RFMOs, fisheries management apparatus also facilitate the capture and availability of information by creating database repositories to capture performance measures and a secretariat to report on compliance to key measures.

By increasing the flow of information among participants an organisation reduces the uncertainty that all actors will abide by agreement rules. Indeed, this information rich environment that will do most to facilitate institution building in the future (Little 2008:305). The authority of an institution to require and

share information amongst members acts to reduce the ever-present uncertainty that other actors are observing the norms of the agreement.

Institutional Norms

An institutionalist perspective is useful for understanding the conditions that shape the governance of high seas fisheries. Institutionalists begin with the assumption that states desire the benefits of cooperation and then focus analysis on norms of behaviour within the institution. The thesis has already shown that, under international law, all states have the right to capture fish from the international commons. The intense economic competition that results incentivises fishing fleets to race and catch as much fish as possible in as short a time as possible. The overexploitation of common-pool resources is evident in all the studied high seas fisheries. These fish-stocks are resources to which no-one has rights of ownership before capture and subsequently from which no-one has the right to exclude anyone else or to limit their use (McKean 1992:250). Thus, the problems of high seas fishing cannot be solved unilaterally and will not go away if ignored. In an issue-area such as this, states desire the benefits of cooperation. Norms and institutions enable this cooperation.

Successful institutions require mechanisms that strengthen cooperation by reducing defection and non-compliance. In their approach to institutions, liberal institutionalists draw on some of the conceptual apparatus developed by game theorists. Within game theory, the Prisoner's Dilemma demonstrates the importance of identifying a mechanism that will convince all the actors that there is no danger of defection (Little 2008:303). This is explored in more detail later in the chapter, for now the thesis argument will recognise that this dilemma accounts for a wide range of irrational outcomes in the international arena. The prisoner's dilemma model predicts that with the uncertainty over other actors choices a selfish rational actor in a non-cooperative arena will always choose to defect. When collective behaviour is a factor in outcomes but cooperation is uncertain then actors will attempt to maximise individual gain. This dilemma explains why states have persisted in promoting policies that inhibit trade, pollute the atmosphere, and overfish the seas. States fail to pursue collaborative strategies because they expect the other members of the anarchic international system to pursue competitive strategies. It would be individually irrational for one state to require its fishing fleets to observe a quota limit if it believed that the fishing vessels of other states are allowed to disregard similar limits. As a consequence, states avoid a Pareto optimal outcome. Pareto optimality is a state of allocation of resources in which it is impossible to make any one individual better off without making at least one other individual worse off (Shor 2013). Instead, actors are driven by individual rational calculation to pursue a self-optimising strategy which, collectively, leads to a sub-optimal outcome. Liberal institutionalists believe that the establishment of multilateral institutions provides evidence that states desire mechanisms to overcome the cooperation dilemmas of these anarchic conditions.

Multilateral institutional structures are purposive. North describes institutions as constituted by formal rules, the enforcement characteristics of those rules, and the informal behavioural norms that structure repeated human interaction (North 1990:5-8). An important point North makes is that the rules for such institutions are not created new. Institutions explicitly identify with the precedent and the legitimacy of

prior practice. Much like the UNCLOS codified high seas freedoms, so too do RFMOs explicitly identify with relevant international law in articles of the 1982 Convention on the Law of the Sea (UNCLOS) and the 1995 Fish Stock Agreement (UNFSA). This international legal framework, and the institutionalised principles and norms they embody, are the precedent for both the establishment of a RFMO in the South Pacific, and the ecosystem and precautionary approaches as its governance principles (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). While institutions are characterised by a set of shared principles and norms, they are by no means permanent. Institutions are constructed, maintained, and transformed by humans (McGinnis 2011a:170). They are a framework of human devised constraints that structure political, economic and social interaction.

Behaviours that reproduce institutions are subject to evolution over time. The negotiation and compromise necessary to agree on each RFMO treaty represents an incremental milestone in this evolution. Incrementalism is thus a key feature not only the articulation of norms but also of the mechanics of the development of multilateral institutions at the global and regional level. All these elements of institutionalised principles and norms of behaviour are underpinned by practice. Multilateral institutional structures are designed to shape behaviour in accord with expected outcomes.

Internal and External Control

Institutions seek to exert both internal and external control in order to reproduce legitimate actions and outcomes, and to ensure the success of the institution as a behavioural guide. *Internal control* refers to achieving compliant behaviour among members (Keohane 1998:121). RFMOs are control orientated like most other international agreements. The authority to collectively determine total allowable catch (TAC) or total allowable effort (TAE) is the substantive core of any modern fisheries management system. All the studied RFMOs demand detailed compliance reporting requirements for catch and effort in its Area. This monitoring and reporting of member behaviour is necessary to reduce the uncertainty among its members.

In part, governance rests in the RFMO Commission's control over the definition of the structure and detail of data to be provided by member states and maintenance of a central database that makes summary information public (CCAMLR 1982 Art. XX.2, CCSBT 1994 Art.8.1, WCPFC Art. 10.1.e, SPRFMO 2009 Art. 23.1.a). Flag states, as parties to agreement, are obliged to ensure that all their own flagged vessels comply with the conservation and management measures of the RFMO. Port states are similarly obliged to monitor and report on compliance with the same conservation and management measures in relation to the entry and use of their ports with respect to the landing and transshipment of fishery resources (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). In this way, modern RFMOs facilitate the gathering and publication of information that members of the agreement are complying with the terms of the agreement. Internal controls seek to ensure that individual practice reproduces the principles and norms of the group. The goal of the institution is to achieve the benefits of cooperation.

The primary *external control* mechanism for institutions is the exclusion of outsiders from the benefits of membership. All the studied RFMOs seek to exclude actors who will not agree to abide by their rules (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). For example, upon its establishment,

the SPRFMO is invested with a limited authority and jurisdiction over a defined geographical area and over defined fish species.²⁷ Only members of the agreement allowed to participate in fishing of species in its Area and are allocated a percentage of the total allowable catch. The fishing of species under the competency of the RFMO by vessels flagged to non-member states is illegal. 'Violations' expose non-member states to sanctions from member states of the RFMO as provided for by international law.

The threat of such exclusion is a powerful incentive to enter into an agreement. For example, when announcing its agreement to join the South Pacific RFMO, Taiwan asserted that it must take part in international fishing groups and cooperate in adjusting its catches, so that marine resources will not be exhausted. It then followed this with an additional rationale that if Taiwan did not join SPRFMO, its catch quota would be distributed among other member nations, and its boats might not be able to fish in the South Pacific (Taiwan Today 2009). Beyond any perceived benefits for collaboration, the potential for exclusion and denial of withdrawal rights to resources is a fundamental incentive for the cooperation and membership of Distant Water Fishing Nations (DWFNs) with a fisheries management institution.

The Grammar of Institutions

The first section of this chapter detailed the characteristics of international institutions and provided a broad outline of the international institutions of high seas fishing. The next section introduces a technique for the analysis of institutions. This detail is necessary to show how international treaties shape high seas property rights.

The institutional grammar approach was developed by Crawford and Ostrom to provide a theoretical structure for the analysis of institutions. The approach seeks to observe institutions by focusing on how they are expressed linguistically through 'institutional statements'. These institutional statements are spoken, written, or tacitly understood in a form intelligible to actors and they prescribe, permit, or advise actions or outcomes for actors (Crawford & Ostrom 1995:583). The data going into such analysis can come from a range of observations collected through interviews, focus groups, observations of behaviour, and analysis of texts (Basurto et al. 2009:524). Using this technique involves the decomposition of institutional statements into their component parts as a prelude to understanding how these parts affect each other and how they shape outcomes. Crawford and Ostrom provide a grammatical syntax with concrete directions for coding of the three types of institutional statements that one might observe in action arenas: strategies, norms, and rules (Crawford & Ostrom 1995:583). The institutional grammar technique focuses broadly on an issue area to help understand the institutional incentives that guide actor interactions towards observable outcomes.

²⁷ The South Pacific RFMO jurisdiction excludes highly migratory species (tuna and tuna like) which already fall under the jurisdiction of the WCPFC; anadromous and catadromous species; marine mammals, marine reptiles and seabirds.

Property-right rule sets within treaty documents

The primary sources of the evidence for this thesis research are the international treaties that govern the practice of high seas fishing. Convention provisions, and the conservation and management measures adopted by a RFMO commission are the outcomes of cooperative processes. These collective decision-making processes do occur within the group limits of consensus and compromise. Nonetheless, the rules generated do constitute evidence of collectively defined principles and norms in the practice of high seas fisheries. Analysis of these structures can determine which rule sets currently exist in the constitutions, and conservation and management measures, of studied RFMOs. This information becomes even more useful when one then determines if these rule sets – and the principles and norms that inform them - exist in comparative strength or weakness among these RFMOs.

The nature of political orders is the core of political study. To understand regularised patterns of interaction affected by rules, one needs to examine the actions and outcomes that rules allow, require, or forbid and the mechanisms that exist to enforce those rules (Crawford & Ostrom 1995:583). In her formative work on governing the commons, Elinor Ostrom provided an influential counter to the pessimism of Hardin's tragedy of the commons. This body of work starts with a grammar of institutions which provides a template for the analysis of a group's strategies, norms, and rules. The goal was to provide a theoretical structure for analysis of the humanly constituted elements of institutions (i.e. rules, norms, and shared strategies). The grounds for looking at institutions as norms rest on an assumption that many observed patterns of interaction are based on the shared perceptions among a group of individuals of proper and improper behaviour situations. To understand regularised patterns of interaction affected by rules, one needs to examine the actions and outcomes that rules allow, require, or forbid and the mechanisms that exist to enforce those rules (Crawford & Ostrom 1995:583). The institutional grammar technique is based on the view that institutions are enduring regularities of human action in situations structured by rules, norms, and shared strategies, as well as by the physical world.

It is important to look at institutions as equilibriums and to understand why actors would be motivated to produce such regularised patterns of interaction. This view places responsibility for a social order on the individuals who are part of that order, rather than on some external 'third-party enforcer' (Crawford & Ostrom 1995:583). By focusing on mutually understood actor expectations, preferences and optimising behaviour, the analyst can examine institutions that do not require outside enforcement. This approach is relevant to the regional fisheries management organisations (RFMOs) that are the primary subject of this thesis study. Certainly, RFMOs are mandated by the law of the sea, and their principles and objectives are drawn from instruments of international law. Yet, each RFMO is constituted by a set of interested but diverse state actors. The constitutions of RFMOs, and the conservation and management measures they adopt are the result of hard negotiation and compromise among those actors who are party to it. An institution can be viewed as no more than a regular behaviour pattern sustained by mutual expectations about the actions that others will take (Crawford & Ostrom 1995:583). International institutions should not be treated as things that exist apart from the shared understanding and resulting behaviour of participants.

As an approach to the study of institutions and the nature of political orders, the body of work centred on institutions has culminated in the Institutional Analysis and Development (IAD) framework. The IAD framework was developed to understand institutions in their full complexity. Most empirical applications of the IAD framework over the past two decades have been on situations involving common-pool goods. While all centred on the nature of the good, many also explore the multiscale characteristics of resources. A resource is certainly a good, but it is also composed of multiple smaller scale local resources and communities. Therefore, within a national jurisdiction, a resource as a whole cannot be managed through a single organisational structure and a single set of rules (Blomquist 2011:2). A key area of inquiry for contemporary researchers using the IAD framework is the interactions that occur among organisations and rules systems that operate at diverse scales. While all explorations centre on policymaking over common-pool goods, they are primarily centred on a scale within national jurisdictions. Nonetheless, within the IAD framework, researchers pose questions not only about what rules characterise an action situation, but also how those rules are formulated and change over time. Specifically, policy decisions are institutionally dependent on other institutions. They exist in a hierarchy. These different levels of action do not necessarily mean different sets of actors or different levels of government. The IAD framework rests upon a view of actors capable of moving between guided by rules and being rule makers (McGinnis 2011a). It is in this sense that the IAD framework is most useful for the analysis of regional fisheries management organisations. The members of an RFMO are rule makers and are guided by overarching principles from the UNCLOS and UNFSA treaties. At the same time, the same members are guided by management measures they collectively put into effect.

The IAD framework also allows the nested arrangement of action situations. An action situation is a core component of the IAD framework. Action situations can be studied at any level that individuals (acting on their own or as agents of organisations) observe information, select actions, engage in patterns of interaction, and realise outcomes from their interaction. It is expected that those choice situations of broader scope will elicit more inclusive or cooperative mode of behaviour than narrower issues of implementation. The recognition of action situations highlights a failure of institutional norms and rules in RFMOs. As already stated in *Chapter 6 – The governance of high seas fisheries*, RFMOs are guided by overarching principles from the UNCLOS and UNFSA treaties. Within the studied RFMOs, general statements of principle and norm are not contentious. But, the following *Chapter 9 – The institutional grammar of high seas property rights* will show that specific and punitive rule driven actions do range from being vague to being non-existent. This highlights a major structural weakness in the consensual nature of international relations, and for the governance of high seas fishing. Governance is a process by which the repertoire of rules, norms, and strategies that guide behaviour within a given realm of policy interactions are formed, applied, interpreted, and reformed. A useful shorthand expression is that 'governance determines who can do what to whom, and on whose authority' (McGinnis 2011a:171). A RFMO does have authority and jurisdiction to govern yet it is at the same time an institution of self-governance.

Self-governance is the capacity of communities to organise themselves so they can actively participate in all (or at least the most important) decisions processes relating to their own governance (McGinnis 2011a:171). Punitive actions triggered by non-compliance are problematic for RFMO members in their

governance capacity because the immediate practical implications for an actor's self-interest looms larger than aspirational objectives. Therefore, opportunism and other forms of strategic behaviour will never be completely absent (McGinnis 2011a:173). See *Chapter 5 - Fisheries management* for examples of short-term self-maximisation evident in the high rates of catch still being approved by RFMO commissions. The IAD framework's focus on rule-governed and/or norm-governed action fits more comfortably with a model of the individual as 'boundedly rational' and problem-solvers collected within a community with shared interest (Blomquist 2011:4).

In summary, the liberal institutionalist world view is the most appropriate for an analysis of existing multilateral institutions. The polycentric and nested institutional structure of multilateral institutions is acknowledged. Further, the Institutional Analysis and Development (IAD) framework is the most useful to examine current behavioural trends because it is geared to explicitly distinguish between written statements of strategy, norm, and rule.

The Institutional Grammar Technique

This thesis study will analyse the institutional statements of RFMOs. This analysis requires the decomposition of institutional texts into their component parts. To do so, it uses Ostrom's 'institutional grammar' technique and the broader IAD framework to reveal the principles, norms, and rules defined by studied RFMOs in the Pacific region. It will also show how these parts then create a system over common-property rights of fishery resources of the high seas.

The Institutional Analysis and Development (IAD) framework was developed for this analytical task. The framework involves a decomposition of institutional contexts into their component parts as a prelude to understanding how these parts affect each other and how institutions shape outcomes (McGinnis 2011a:170). At the core of this analytical approach is the identification of the underlying grammatical structure of strategies, norms, and rules as different types of institutional statements. This grammatical structure has the following components: attributes, deontic, aim, conditions, and or-else (Crawford 1995:584). Attributes (A) describe the actors to whom the institutional statement applies. The deontic (D) specifies if the action may, must, or must-not be undertaken by the actor. The aim (I) denotes the action or outcome which is to be applied, and the conditions (C) describe when, where, and how this aim is to be applied. Finally, or-else (O) specifies the sanctions imposed for not following a rule.

Further, this syntax of institutional statements is cumulative. That is, shared strategies can be written as AIC, norms can be written as ADIC, and rules can be written as ADICO. Norms contain all the components of a shared strategy plus a deontic (D) operator. Likewise, rules contain all the components of a norm plus an or-else (O) operator (McGinnis 2011a:177). Using these grammatical components, analysis focuses on the capture of the underlying prescription of the institutional statement in use:

- A shared strategy (AIC) identifies an action or outcome
- A norm (ADIC) identifies an action or outcome that is obliged/permited/forbidden
- A rule (ADICO) identifies the penalty for violation of a norm

In other words, a shared strategy is a desired possible action or outcome. It is an action or outcome that is identified as necessary or beneficial by the group. A norm can then be thought of as a possible action or outcome that is either obliged, permitted or forbidden for the identified actor. It identifies institutionally agreed or 'legitimate' behaviours. Conversely, in response to the collective understanding of the problem or the cause-effect relationships at work in the issue area, the norm may identify a behavioural action or outcome that must be avoided. Finally, a rule defines the penalty for non-compliant or 'illegitimate' behaviour. A rule identifies the penalty for causing a non-compliant action or outcome to occur.

In this way, an analysis of the institutional grammar expressed in the treaties that govern high seas fishing can show how member states are defining norms and rules as they relate to living marine resources. When describing the characteristics of a governance approach, analysis can show how those norms and rules define powers over property. This is useful because applying institutional grammar can help to decode the quasi-legal grammar adopted by many international treaties. For example, Article 56 of the Law of the Sea Convention states that:

In the exclusive economic zone, the coastal State has: sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone...

Using the institutional grammar framework this statement would break down in the following way:

- A – the Coastal state
- D – has [possesses]
- I – sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living
- C – in the exclusive economic zone (waters superjacent to the seabed and the seabed and its subsoil)

Within the framework, an institutional statement with the components ADIC is recognised as a norm. The possible action or outcome that is either obliged, permitted or forbidden for the identified actor. In this manner, the law of the sea describes the norm as a coastal state possesses exploitation rights over fish stocks within its exclusive economic zone (200miles) (UNCLOS 1982 Art. 56). It defines the institutionally agreed or 'legitimate' behaviour. Conversely, no other state possesses these rights. Using the analytical framework, and keeping the original intent, this norm can also be expressed *mutatis mutandis* as the complementary institutional statement: a Flag state is forbidden to exploit living natural resources found in the exclusive economic zone of a Coastal state.²⁸ All other states are excluded from catching fish within this area. In simple terms, property rights are the formal or informal rules regarding use, ownership, and transfer of property (Leal 2005:ix). The identification of these

²⁸ Allowing for the full range of inclusions that would typify the formal legal text of a treaty provision.

statements of strategy, norm and rule are a key methodological link from the institutional statements of treaties to the definition of property rights.

Applying the institutional grammar technique to treaties

Institutions are often nested within other institutions. An institutional structure may operate simultaneously on one level as a whole system and at a different level as part of a larger system (Ostrom 2005:11). Thus, it can be necessary to analyse institutional statements as single units of observations and then organize them into aggregated units of observation. This configuration can produce more complex statements which then serve as the next unit of analysis. Therefore, a distinction must be made between a unit of analysis and a unit of observation. A unit of analysis refers to the entities under study and to the level at which the data is analysed and generalisations are made (Basurto et al. 2009:530). This is contrast to a unit of observation, which refers to the entities at which data are collected.

Depending on the research objectives, the units of observation can be analysed without aggregation as units of analysis or combined and analysed as new, aggregated units of analysis. One example of a nested institutional structure is complex legislation directing activities at federal, state, and local levels. Such a structure is often heavily nested, with many subsections and sub-subsections, and can be developed by amendments over time (Basurto et al. 2009:530). *Chapter 5 - Fisheries Management* showed further examples in the international treaties that govern fishing in the high seas. There is a well-defined structure of principles and norms defined within the UNCLOS, UNFSA, and supporting work from multilateral organisations such as resolutions from the United Nation General Assembly and international plans of action from the UN Food and Agriculture Organisation's - Committee of Fisheries. Further, the UNCLOS and UNFSA mandate that RFMOs must govern high seas fishing, and these RFMOs must implement additional legitimate actions and outcomes for high seas fishing.

Institutional statements embedded in legislation have a set of advantages and disadvantages. One of the advantages of focusing upon legislation is that these documents are often designed to mediate the different levels of institutions by linking constitutional principles to shape organisational and individual behaviour. Yet, they also explicitly reference and position themselves within a broader institutional structure. They do this by referring to preceding or overarching institutions, and the key principles and normative prescriptions defined by these overarching institutions. While this does give obvious and intentional continuity, it is often difficult to demarcate one unit of observation from another. There is another challenge when working with legislation. Even a single unit of observation is still complex. For instance, one sentence may span multiple sections and subsections. Alternatively, a section or subsection may have more than one sentence or not be a sentence at all. Further, legislation in international treaties is structured in its own legal and quasi-legal syntax that can make it a challenge to code grammatically. Finally, such documents included many 'musts' and 'shalls'. Shall, like must, is often used in laws or regulations to express what is mandatory (Merriam-Webster Dictionary).

A deeper exploration of institutional grammar

Recall the three types of institutional statement: strategy, norm, and rule. A shared *strategy* is a desired action or outcome expressed by a community. A strategy may also be expressed in the form of an action or outcome that is forbidden. In all cases, this strategy statement will identify to whom, when, and where this desired or forbidden action or outcome is applied. Researchers generally select a focal set of actions or outcomes for their studies. For example, in this thesis, the focus is upon observing the extent to which RFMOs are expressing an institutional structure that is characteristic of a common-property system. The institutional analysis presented in *Chapter 9 - The institutional grammar of high seas property rights* is thus alert to instances where the international community expresses a shared desire for a defined group to exercise exclusive withdrawal and management rights over a common-pool resource.

Like a strategy, a *norm* contains an action or outcome but it also contains a prescriptive statement for a behaviour. That is, the grammatical statement of a norm specifies which actions may, must, or must not be undertaken by the actor. There are many normative statements made in the conventions and management measures of international treaties. These can range from who is permitted to be party to a treaty, to the allowed number of representatives from each state who can attend a compliance committee meeting, and to when membership dues must be paid (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). For example, in a common-property system over a common-pool resource, a core normative statement would forbid any actor who is not a member of the group from withdrawing any of a shared resource. An analyst may look for additional statements to determine the contours of the property system such as the allocation of individual quota or the creation of transferable individual quota.

Models of cooperation

Researchers have long sought to determine the basis for observed regularities in actor and group behaviours. Crawford and Ostrom assert that although institutions are based on shared strategies and norms, they are constructed by *rules* designed to reproduce the desired behaviour (Crawford & Ostrom 2005:583-6). They summarize this analysis through a game theory model. In the first instance of the model, game theory isolates and models a rule making arena using a two-person 'Prisoner's Dilemma'. Here the core assumption is that actors are selfish, rational, and do not communicate. A selfish rational actor is a type that assigns zero value to praise or blame for obeying or breaking behavioural prescriptions (Crawford & Ostrom 1995:590). The game mechanism in a prisoner's dilemma centers on a set of decisions whereby each individual actor must choose between either complying with some limitation or defecting. Each actor anticipates a payoff from their individual action.

However, the size of the payoff is determined by the combination of each actor's choice. If both comply with the limit each will receive the largest individual payoff. However, if one actor complies and the other defects, the largest payoff will go to the defecting actor. Finally, if both actors choose to defect then each will receive an equal but lesser payoff than was possible if both had chosen to comply or if

they had been the sole defecting actor. Thereby avoiding the lowest possible payoff but only ever achieving the third highest possible payoff.

The second game model instance maintains the group of selfish rational actors but adds the possibility for cooperation through communication of a shared and desired outcome. Despite the ability to communicate, the model predicts that players will cooperate if, and only if, the expected payoffs from cooperating are greater than the expected payoffs for defecting. Selfish rational actors will continue to make choices that self-maximise rewards.

A third instance is still a greatly simplified model but assumes that all players now hold the same degree of internal motivation towards the function and the utility of cooperation. Actor incentives now take account of 'obligatory norms' defining what actors consider to be acceptable and unacceptable behaviour. Crawford and Ostrom do acknowledge the extent to which individuals internalise the norms of their community. This internalisation ensures that certain socially undesirable actions are costly to the relevant individuals but these internal costs are rarely sufficient to completely prevent the occurrence of forbidden behaviour. This informs their assertion that shared expected outcomes and expected norms of behaviour must still be enforced with punitive penalties. No norm is self-enforcing but must instead be supported by some form of monitoring and sanctioning (Ostrom 1990). Finding some way to monitor and sanction rule-breaking behaviour remains essential to the maintenance of social cooperation. Once again, the model predicts that selfish rational actors will only cooperate where the value of internal obligatory norms exceed the advantage of defecting. *Chapter 4 – Fishing as a production activity* showed that high seas fisheries are a commercial enterprise centered on the incentive to profit. The advantage of defecting is obvious and would outweigh any value of upholding RFMO norms. Crawford and Ostrom do assert that the presence of a monitor that will share information on compliance may boost the level of cooperation but would not ensure total cooperation (Crawford & Ostrom 1995:592). A group of actors may desire the benefits that accrue from cooperation. But the model predicts that some selfish rational actors would continue to defect and maximise individual payoff at the expense of other actors.

Thus, the final game instance introduces rules (a threat) to the norm game. Of course, even in a rule-governed game, if governance units are not motivated to monitor and sanction, then cooperation again rests upon on internalised obligatory norms of the actors. The predicted outcome here is that actors will maximise individual payoff at the expense of possible collective outcomes. However, this is the optimum set of conditions for institutional achievement. Here, the model predicts that the minimum institutional structure that is sufficient to encourage a high rate of cooperation is one where (a) actors will cooperate and (b) there exists a low-to-moderate sanction with (c) a high probability of being monitored and sanctioned (Crawford & Ostrom 1995:592). The shared outcomes and strategies of the group will be achieved. *Chapter 5 - Fisheries Management* showed that all the studied RFMOs now have comprehensive catch documentation schemes. But shared strategies, particularly in the governance of a sustainable fishery, will only be achieved if actor behaviour is both monitored and enforced.

Conclusion

The most appropriate analytical approach for analyzing existing international treaties is the institutionalist framework. Particularly useful is Ostrom's institutional grammar approach that allows the decomposition of complex quasi-legal treaty texts into institutional statements. This approach allows the coding of those statements with a grammatical syntax by which one can identify institutional strategies, norms, and rules. Where strategies and norms will show the contours of the studied RFMO treaties it is ultimately the ability to explore rules that reveals the prescriptive strength of the institutions.

Thus, the focus of this thesis on institutional rules rests on the institutionalist prediction that shared strategies and norms are the basis for cooperation, but the practical implications of self-interest loom larger than aspirational objectives. Someone will always try to cheat. When a cooperative arena contains one or many selfish rational actors and if violators can expect to reap the benefits of violating prescriptions without facing the probability of some established punishment, then the experience of feeling like a 'sucker' may erode the cooperative basis for the institution itself (Levi 1988, 1990; E. Ostrom 1990; Mansbridge 1994; Ostrom, Gardner and Walker 1994). Thus, great weight is placed on institutional rules to influence actor behaviour. To understand regularised patterns of interaction affected by rules, one needs to examine the actions and outcomes that rules allow, require, or forbid and the mechanisms that exist to enforce those rules (Schlager & Ostrom 1992:250; Crawford & Ostrom 1995:583). If an action is forbidden by a norm and an actor engages in that action, then other actors in a community expect the deviant to experience some type of cost. Likewise, if norms indicate that an action or outcome is permitted, then we expect others who treat that action as if it were forbidden to experience some cost. Shared strategies and norms are the basis for cooperation but it is rules that define the outcome of cooperation.

This analytic framework will allow the research to determine if an institution is empowered to shape the behaviours of its members. This capability to enforce behavioural change is a keystone to developing the thesis argument that the studied RFMOs are expressing powers over property.

The next *Chapter 9 - The institutional grammar of high seas property rights* applies the institutional grammar approach to extract statements of rights over common-property from the studied RFMOs.

Chapter 9

The institutional grammar of high seas property rights

The previous *Chapter 8 - Institution theory and International institutions* detailed the structure of international institutions governing high seas fishing. It also introduced the institutional grammar approach for extracting statements of expected behaviour from institutional texts.

The governance of high seas fishing is conducted through regional fisheries management organisations (RFMOs). Each RFMO is enacted by a convention document and additional documents record the agreement of subsequent management measures. All these treaty documents are the mechanisms through which individual RFMOs express actions that are required and those that are forbidden. These RFMOs are part of a hierarchy of treaties capped by the United Nations Convention on the Law of the Sea (UNCLOS) and United Nations Fish Stocks Agreement (UNFSA). It is the UNCLOS which recorded to agreement to conserve fish stocks and mandate the creation of RFMOs to achieve this outcome. So, the conventions of the studied RFMOs are all remarkably similar in their declarations to conserve fish stocks over which they are competent.

However, as shown in *Chapter 5 – Fisheries management*, these same RFMOs have remarkably failed to achieve sustainable rates of catch of high seas fish stocks and the majority of these stocks remain severely depleted. There must be a fundamental shift in the propertisation of high seas living marine resources. Only this shift from the propertisation of fish-catch to fish-stock as the productive asset can shift incentives to sustainable rates of catch. This thesis research is looking for institutional statements that confirm the current state and nature of common-property rights in international fisheries. Therefore, what is required is a method that can distinguish between the institutional statements that create such powers over resources. The study will also assign such statements some measure of relative strength.

Convention documents are written in a particular legal language and syntax. The meaning of convention sentences, phrases, the method of inclusions and exceptions necessarily require some interpretation by the analyst. In addition, the highly political nature of some of these treaty statements cause them to be purposively ambiguous in meaning and scope. Therefore, a method that deconstructs treaty texts to extract syntax and meaning is desired. The approach taken by this thesis research uses the institutional grammar technique. Convention documents are written to encompass all aspects of a treaty. These range from overarching treaty objectives to procedural aspects of financial management and secretariat functions. A method that deconstructs treaty texts to extract the subject and object is desired. Those institutional statements which do not relate to the creation of a property system are put aside for this research project.

Recall from *Chapter 8 – Institution theory and International institutions*, that Crawford and Ostrom's grammar of institutions is a framework for understanding strategies, norms, and rules as different types of institutional statements. The categorisation of these statements is governed by the underlying grammatical structure. The syntax of this grammatical structure is made up of the following components (Crawford & Ostrom 1995:584):

- (A) - *Attributes* of actors to whom an institutional statement applies
- (D) - *Deontic* specifying which actions may, must or must not be undertaken by the relevant actor.
- (I) - *Aim* denotes the action or outcome to which the action in question is to be applied
- (C) - *Conditions* under which this particular statement is deemed appropriate or relevant for application
- (O) - *Or Else* specifies the actor or actors to whom is given the responsibility of imposing sanctions on those who fail to implement the statement as intended.

Essentially, the syntax is cumulative. Linguistic statements that explain shared strategies contain three of the syntax components - the actor, aim, and condition (AIC). Those statements that explain norms contain four components - the actor, aim, condition, and action (ADIC). Finally, those statements that explain rules contain all five components - the actor, aim, condition, action, and sanction for non-compliance (ADICO). Thus, norms contain all of the components of a shared strategy plus a *Deontic*; rules contain all the components of a norm plus an *Or Else*.

Exploring the syntax of institutional statements

An *Attribute* describes the actor to which the institutional statement applies. The attribute can be explicit or implicit. When an attribute is explicit, it is the portion of the statement that describes the actor and descriptions of the actor. There are a range of implicit scenarios. First, when no specific attribute is listed, the default is 'all members of the group'. This means that the attributes component always has something in it, even when a specific attribute is not contained in the statement (Crawford & Ostrom 1995:583). Second, one institutional statement might be in reference to an attribute in another statement (Basurto et al. 2009:525). Recall that treaties are written with a quasi-legal structure and syntax. Finally, while it can be challenging to identify the focal agent or the object of an institutional statement, analysts can apply their substantive knowledge about the text and the research question at hand to determine the level of grouping that makes the most sense (Basurto et al. 2009:535). Basically, whether by explicit or various implicit methods, each institutional statement of strategy, norm, and rule will contain an actor to which the statement applies.

The *Aim* is the specific action or outcome to which an institutional statement refers. The aim also includes all descriptions about process and goals of the action (Ostrom & Crawford 2005:140). It may specify an action or may only specify a forbidden outcome. Anything thought of as an aim must be physically possible and similarly its negation must be physically possible (it is avoidable). Every institutional statement will specify the aim or outcome to which it refers.

Conditions represent when and where the aim is allowed, required or forbidden (Ostrom & Crawford 2005:149). An action or outcome may only apply during certain times of a year, or when some management reference parameter has been reached. Likewise, a statement may only apply within a

particular geographic or jurisdictional area, or an action or outcome may only be followed through a defined process. In an extension to condition operators, some analysts allow qualifiers be included for temporal and procedural restrictions such as *when*, *where*, *if*, and *unless* operators (Basurto et al. 2009:535). If an institutional statement does not specify a particular condition, the default value for the condition is 'at all times and in all places' (Ostrom & Crawford 2005:149). Thus, like attributes, the conditions component always has some value, regardless of whether an institutional statement explicitly specifies conditions.

The *Deontic* distinguishes prescriptive from non-prescriptive statements. The prescriptive operator describes what is permitted, obliged, or forbidden (Ostrom & Crawford 2005:141-149). The deontic is usually explicitly stated, but may be implicit if the explicit deontic is prescribed in a preceding institutional statement. Implicit deontics are fairly common in legislation. A deontic prescription places behavioural expectations upon actors. In complex legislation, many institutional statements are linked through the structure of the legislation to previously stated deontics. Therefore, an analyst must determine the implicit presence of a deontic with a strong degree of certainty. This may be difficult. Another potential drawback of implicit deontics is an overcount of norms and an undercount of strategies (Basurto et al. 2009:535). This was evident in the analysis of the law of the sea because the UNCLOS is the framework treaty for all other treaties in the use of ocean spaces and resources. A complementary or subordinate treaty may explicitly link itself to the UNCLOS but would not explicitly reproduce the strategies and principles that guide the development of its own norms and rules.

In addition, the deontic may come in a range of forms, such as may, must, should, must not, and should not (Ostrom & Crawford 2005:141-149). Therefore, deontic operators can vary by prescriptive force. In some contexts, *must* represents more force than *should* (Ostrom & Crawford 2005:142-149). However, an empirical study of legislation recognises the inherent legal syntax and allow the various operators like *should* and *must* to represent an equal amount of prescriptive force (Basurto et al. 2009:525). As prescriptions for behaviour, the meaning of obliged (must) and forbidden (must not) operators are self-evident. However, statements that assign *permission* for an action can be especially meaningful because this is the equivalent of 'constituting' that action. That is, a permission creates a right to take action or to affect an outcome that did not exist before. Actors now have a duty to recognise that right. Measures that would be taken to prevent that action or to react to that action as if it were forbidden are no longer acceptable. Permitted behaviours create an obligation where previously one never existed. As an extension of international law, these types of rules extend and create a basis for the further extension of international practice and customary international law.

The second element rests upon the prescriptive force of a statement or rule. Consider the contrast between two statements: (1) The actor must enforce compliance with adopted measures, versus (2) The actor should enforce compliance with adopted measures. While there is expected to be extensive definition of actions and outcomes within the analysis of RFMOs one may find significant detail in the development of new norms through statements that permit new actions and in the variation of prescriptive force for threats and sanctions that might impinge upon existing proprietary limits allowed to multilateral institutions. Thus, while a permitted action could be regarded as having weak prescriptive force it in fact represents a very powerful mechanism and marker for the analysis of developing institutional practice. This mechanism is particularly relevant for international law. Vague,

ambiguous and high-level statements are often laid down for controversial issues in an incremental aspect to treaty making and international agreements (Zartman 1992:117). Actors expect the overall norm will 'fall forward' in subsequent negotiation. Therefore using knowledge of the overall text and multiple layers of institutional statements between texts, an analyst may link stronger clarifying statements back to original weaker prescriptive statements.

An *Or Else* component is the consequence or punitive action assigned to non-compliance with an institutional statement (Crawford & Ostrom 1995:585). Only rules include this threat component. To have substance, the threat must be crafted in an arena used for discussing, prescribing, and arranging for the enforcement of rules (Crawford & Ostrom 1995:586). When viewed as a part of a larger system, the coded statements in this article might all be viewed as rules as the policy is nested in a broader constitutional system that authorises penalties for violations. But the punitive consequence must be explicit. That is, the consequence must be at least listed on a range of possible punishments for that specific non-compliance. Some authors assert that *Or Else* statements, while absent within the piece of legislation being studied, can be present in a separate piece of legislation and still affect the original piece of legislation under study (Basurto et al. 2009:535). This arena may be a legislature or a court. This could be counted if the responsible state actor identifies the list of penalties for a specific non-compliance.

However, many communal organisations develop their own rules and bodies to determine and apply sanctions. For example, the Secretariat in RFMOs is often assigned responsibility to monitor compliance with catch reporting requirements and to notify all participants when one is nearing their catch limit (CCAMLR 1995; CCSBT 2005; WCPFC 2009; SPRFMO 2012). Whereas sanctions for violations may be decided and approved by the RFMO Compliance Committee or the RFMO Commission body. Therefore, the full description of the *Or Else* would require the aggregation of two statements. One norm for the functions of the Secretariat and a rule permitting the Commission or Committee to action a sanction for the violation. Yet, even if an analyst were to identify this conjunction of institutional statements there would need to be evidence of this formulation resulting in sanctions before one could claim this type of institutional grammar qualifies as a ADICO statement.

A rule is the requisite foundation for success of an institution as an institution. Most importantly, a rule must establish both a range of punishments available, and assign the authority and procedures for imposing a sanction. Often the actions threatened in an *Or Else* statement are forbidden under most conditions except when an actor breaks a rule. When a Deontic operator exists, one expects negative repercussions to follow behaviours that do not conform to the prescription and positive rewards to follow compliance (Crawford & Ostrom 1995:587). It is useful to capture the costs and benefits of these inducements and deterrents for any particular Deontic. Usually, the analyst would expect the severity of the sanction to provide some indication of the importance or valence of the Deontic to the community. Within a RFMO, the sanction might involve forbidding some action such as the entitlement to an allocation of catch of a high seas fish stock. This chapter will show that as in any institution, RFMO sanctions are the least well-defined statement and they are applied variably.

Coding legislation using the institutional grammar technique

The framework's focus on rule-governed normative action fits with a model of individuals as 'boundedly rational' actors collected within a community with shared interest (Blomquist 2011:4). But, we must be aware of the ratio of strategies, norms, and rules and of the issue areas where rules are not effectively implemented. For a practical coding example, a typical format for legislation from RFMOs is presented below. This excerpt is taken from the South Pacific Regional Fisheries Management Organisation (SPRFMO).

Fig. 1. *SPRFMO Treaty legislation example*

Article 3 CONSERVATION AND MANAGEMENT PRINCIPLES AND APPROACHES

Para 1 In giving effect to the objective of this Convention and carrying out decision making under this Convention, the Contracting Parties, the Commission and subsidiary bodies established under Article 6 paragraph 2 and Article 9 paragraph 1 shall:

(a) apply, in particular, the following principles;

- (i) conservation and management of fishery resources shall be conducted in a transparent, accountable and inclusive manner, taking into account best international practices;*
- (ii) fishing shall be commensurate with the sustainable use of fishery resources taking into account the impacts on non-target and associated or dependent species and the general obligation to protect and preserve the marine environment;*

Using the institutional grammar technique to code the part (ii) the syntax of this statement is presented below. The combination of aim, attribute, and condition, with the absence of a deontic makes part (ii) a norm (ADIC):

- Aim – Fishing must be sustainable
- Attribute – Commission
- Condition – at all times and in all places
- Deontic – must

When rewritten using the syntax this statement of a norm results in the following passage:

The Commission²⁹ must make decisions that apply the principle that fishing be commensurate with the sustainable use of fishery resources and take into account impacts on non-target, and associated or dependent species, and the general obligation to protect and preserve the marine environment.

First, note that in Fig. 1. the attribute of the actor is defined in an overarching introduction while specification of actions or outcomes are defined subsequently and separately in the flow of the statement. This is a common complication of legislative texts. Second, the ability to translate formal representations of institutional statements into an established format provides many advantages for comparison, analysis, and synthesis. But the principles that guide the identification of components and

²⁹ Made up of all Contracting Parties

the classification of statements cannot eliminate all ambiguity (Crawford & Ostrom 1995:583). As with any grammar, its application to existing statements sometimes yields tough judgment calls and counterexamples.

The institutional grammar of high seas property rights

In this section, the institutional grammar method will be applied to the UNCLOS and UNFSA framework treaties. *Chapter 7 - Property rights in high seas fisheries* explores Schlager and Ostrom's formulation of a general common-property structure. See table 1 below for a map of this property framework to the institutional statements extracted from the instruments of international law that define actor rights in high seas fisheries.

Table 1: Framework of rules defining the governance of high seas fisheries

Right to Use	Institutional Statements
Access	UNCLOS
Withdrawal	UNCLOS; UNFSA

Right to Govern Use	Institutional Statements
Management	UNCLOS; UNFSA
Exclusion	UNCLOS; UNFSA; RFMO
Alienation	-

Right to Use

Right of Access

The *right of access*, authorises the possessor to enter an area and enjoy non-subtractive benefits. This is the key proviso to access rights to a resource, the benefits extracted must not subtract from the value of a defined resource. The right of *access* authorises the possessor to enter in an area and enjoy benefits that do not subtract from the value of a defined resource. As defined by the UNCLOS, every state has the right to sail ships flying its flag on the high seas (UNCLOS 1982 Art. 87). So, the vessels (and fishing vessels) of all states are free to access any area of the high seas.

Strategy

There are no statements of strategy identifying a right of access to the high seas. This is because freedom of navigation is already a fundamental norm.

Norm

International law balances high seas freedoms with the obligation to cooperate. The 1982 Law of the Sea (UNCLOS) and 1995 Fish Stocks Agreement (UNFSA) treaties provide the international

framework for ocean use. The Law of the Sea is the primary international convention dealing with matters related to ocean use. It provides the core normative statement that permits all states the freedom of navigation, overflight, to lay submarine cables, and to fish in the high seas (UNCLOS 1982 Art. 87.1). This universal right of access is reinforced with the statement that all states are forbidden to claim exclusive use of any part of the high seas (UNCLOS 1982 Art. 89).³⁰ In large part, UNCLOS articles centre upon defining rights to resources for coastal maritime boundaries and provide a general framework for governing high seas fisheries. The subsequent Fish Stocks Agreement delivered more extensive provisions on the duties of states to conserve living marine resources, compatible joint use, and on international cooperation.

Rule

The UNCLOS and UNFSA contain no institutional statements obliging or permitting sanctions against a state preventing access to a high seas area.

Right of Withdrawal

A *right of withdrawal*, in addition to the right of access, gives the possessor the right to obtain the “products” of a specified resource. Withdrawal rights apply to the exploitation of natural resources, such as fish stocks, that have a productive capacity but are not owned until harvested.

Strategy

The UNCLOS and UNFSA contain no institutional statements of strategy over withdrawal rights to a high seas area. Just as in freedom of navigation, the freedom to fish is a fundamental institutional norm.

Norm

Nested institutions

Nested institutions define the freedom to fish on the high seas. The right of all states to fish in the high seas is a fundamental norm preserved in the law of the sea and its complementary fish stocks agreement. The core UNCLOS statement that identifies that the high seas are open to all states also provides the universal freedom to fish (UNCLOS 1982 Art. 87.1-2). While the freedom to fish is never put aside, it is modified by formal treaty obligations and informal international practice. First, all states are permitted to fish on high seas subject to treaty obligations (UNCLOS 1982 Art. 116). Further, all states must cooperate in the conservation and management of high seas fish stocks and cooperate to establish regional fisheries management organisations (UNCLOS 1982 Art. 118). The UNFSA is unequivocal in its statement on withdrawal rights:

³⁰ No state may forbid access because all states are entitled access.

Only those states which are members of such an organization... or which agree to apply the conservation and management measures established by such organisation or arrangement, shall have access to the fishery resources to which those measures apply (UNFSA 1995 Art. 8.4).

The complementary UNFSA reinforced this mandate. Based on this general duty to cooperate, only members of a RFMO may legitimately fish on the high seas. The UNFSA statement identifying this norm is actually written in the negative:

Such State [non-member] shall not authorize vessels flying its flag to engage in fishing operation for the straddling fish stocks or highly migratory fish stocks which are subject to the conservation and management measures establish by such organization or arrangement (UNFSA 1995 Art. 17.2).

Further, if a non-member fishes for a stock that falls within the competency of a RFMO, that state is fishing illegally (UNFSA 1995 Art. 19.2). Recall that *Chapter 8 - Institution theory and International institutions* introduced two categories of withdrawal right granted on membership of a RFMO: the right to fish (participation) and the right to a certain amount of fish (allocation). In the institutional statements of the UNCLOS and UNFSA, only members of RFMOs possess the right to fish high seas stock. Thus, the UNCLOS and UNFSA define participation rights but allocation rights are left to each individual RFMO. The comparative analysis of these norms and rules is detailed in *Chapter 10 - A common-property system*.

Together, the Law of the Sea and the Fish Stocks Agreement define a institution where all state actors hold *access* rights to the high seas but only RFMO member states may hold *withdrawal* rights to marine living resources. Schlager and Ostrom's schema holds true for use rights over high seas fisheries. Holders of access rights and withdrawal rights do not play an active role in the management of the resources, they can only exercise the specific rights allocated to them (Ostrom & Schlager 1992:251). We have seen access and use rights defined in broad terms.

Rule

Under the law of the sea each has a duty to effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag (UNCLOS 1982 Art. 94). Under Art. 17 of the UNFSA, states are forbidden to authorise fishing by flagged vessels for species or in an area under the competency of a RFMO treaty to which they are not a member. Indeed, the Fish Stocks Agreement obligates a member state to apply sanctions adequate in severity to be effective in securing compliance and to discourage violations wherever they occur, deprive offenders of the benefits accruing from their illegal activities, and finally, to permit provisions such as refusal, withdrawal or suspension of authorisations to serve as masters or officers on such vessels (UNFSA 1995 Art. 19). Further, the member state must provide information on progress and outcome of the investigations to all States interested in or affected by the alleged violation (UNFSA 1995 Art. 20). At the UNFSA level,

the expectation that states sanction violations and non-compliance is explicit.

Right to Govern Use

Right of Management

The *right of management* builds upon the right of access and withdrawal to give to the holder authority to determine how and where harvesting of a resource may occur, and whether and how the structure of a resource may be changed (Ostrom & Schlager 1992:251). Here, the UNFSA reinforced the role of RFMOs where the UNCLOS provided only an outline.

Strategy

Both the law of the sea and the fish stocks agreement mandate Regional Fisheries Management Organisations (RFMOs) as the instruments for international cooperation and governance of high seas fisheries (UNCLOS 1982 Art. 118; UNFSA 1995 Art. 8.5). Every state has the right to fish for straddling and highly migratory stocks, and the right to become a member of a RFMO, and to be allocated a share of the total allowable catch of that fish stock.

Norm

Nested Institution

The right of management invested in RFMOs by international law centers on the duty to cooperate. Each state party must cooperate with other states to take measures necessary for conservation of living resources of the high seas (UNCLOS 1982 Art. 117). RFMOs are the mandated instrument for multilateral governance of high seas stocks and states must cooperate to establish regional fisheries organisations for conservation and management of living resources in areas of high seas (UNCLOS 1982 Art. 118). As an RFMO member, each state must determine allowable catch and take measures to produce maximum sustainable yield of living resources of the high seas based on best scientific information (UNCLOS 1982 Art. 119.1-2). The UNFSA reinforced this norm with the following additions. RFMOs must adopt and apply international standards for the responsible conduct of fishing, to obtain scientific advice and review the status of stocks, and to establish mechanisms for effective monitoring, control, surveillance and enforcement (UNFSA 1995 Art. 10.c-h). The right of management also authorises its holders to devise withdrawal rights governing the use of a resource. Again, the obligation is on member states that form a RFMO's Commission to determine "participatory rights such as allocations of allowable catch or levels of fishing effort" (UNFSA 1995 Art. 10.b). RFMOs are multilateral institutions governed collectively by member states. The formation of a RFMO creates a new, albeit narrow, authority and jurisdiction over the area and species for which it is competent. For marine living resources on the high seas, international law has assigned management rights to RFMOs.

Right of Exclusion

The next bundle of rights in the common-property schema is the *right of exclusion*. The holder of a right of exclusion can regulate the access to the resources and how this access can be transferred (Ostrom & Schlager 1992:251). The law of the sea provides no explicit or implicit exclusion of non-member states from a fishery.³¹ The customary practice of freedom of the seas existed for over 100 years before it was codified in the law of the sea. All states retain other high seas freedoms like access and passage.

Strategy

Nested institutions on the regulation of access to a fish stock

The UNCLOS does rely upon the statement that all states must cooperate with other states to establish RFMOs for the conservation of living marine resources (UNCLOS 1982 Art. 118). States do regard exclusion as a possibility (2009 Taiwan Today). So, exclusion remains an implicit strategic threat against non-membership.

Norm

There are two aspects to exclusion from high seas fisheries. First, international law modifies the freedom of fishing in the high seas by making it conditional upon membership of an RFMO. It was in this way that the Law of the Sea created a system of common-property over marine living resources. But, the UNCLOS and UNFSA are only framework treaties. They define the framework of the system, the fundamental laws and principles that prescribes the nature, functions, and limits of the relevant governance authority.

The only explicit statement of exclusion from participation is in the UNFSA where a non-member state is forbidden to authorise its flagged vessels to engage in fishing operations (UNFSA 1995 Art. 17). That is, a non-member and non-compliant state is forbidden to authorise its flagged vessels to fish for the living marine resources under the competency of a RFMO. Any fishing conducted by these vessels is as illegal. Further, to honour the treaty obligations of the Fish Stocks Agreement a member of a RFMO must exchange information on activities of fishing vessels of non-Members and deter activities of such vessels which undermine the effectiveness of a RFMOs conservation and management measures (UNFSA 1995 Art. 17.4). An actor must participate in a collective decision-making process and an actor must comply with the decisions made or face exclusion from fishery resources. The Fish Stocks Agreement obligates a member state to apply sanctions against flagged vessels that are adequate in severity to be effective in securing compliance and to discourage violations wherever they occur, deprive offenders of the benefits accruing from their illegal activities, and finally, to permit provisions such as refusal, withdrawal or suspension of authorisations to serve as masters or officers on such vessels (UNFSA 1995 Article 19.1-2). Further, the member state must provide information on

³¹ There are only 15 UN member and observer states which have neither signed nor acceded either the Convention or Agreement: Andorra, Eritrea, Israel, Kazakhstan, Kyrgyzstan, Peru, San Marino, South Sudan, Syria, Tajikistan, Turkey, Turkmenistan, Uzbekistan, Holy See, Venezuela.

the progress and outcome of the investigations to all States interested in or affected by the alleged violation (UNFSA 1995 Art. 20).

However, the UNCLOS and UNFSA have no operational organisations to implement and monitor this regime. For living marine resources of the high seas this is the role and function of RFMOs. So, there is a second aspect to exercising the right of exclusion within RFMOs. As in any institution, the enforcement of rules is a key factor to the achieving compliance. With a framework of international law that rests upon the state duties, a refusal of international courts to assign themselves jurisdiction, and a regime with no overarching governing body, the enforcement of rules for high seas fisheries is left to individual RFMOs.³² Indeed, the only leverage available to RFMOs is their control over use rights to resources under their competency; applied in the form of administrative sanctions. Yet, parties to RFMOs are a diverse population of developing and developed Coastal states put together with distant water fishing nations (DWFNs). Forging multilateral consensus and agreement between such disparate actors is always difficult, particularly on rules like sanctions for violations. Indeed, it is common for parties to compromise on the initial formulation of such rules. Interested parties will allow weaker and more vague statements to be recorded in treaty conventions and measures. They do this with the anticipation that such measures will ‘fall forward’ and achieve incremental gains (Zartman 1992:117). What is evident in studied RFMOs is a movement from absent or vaguely defined sanctions to explicit linkage between compliance history and participation in the fishery (WCPFC 2005 CMM2005-01; CCSBT17 2010 Para. A; SPRFMO 2010 Art. 21.1). Within a system of common-property, the governance authority is permitted to use the right of exclusion as an enforcement mechanism.

Member states are permitted to prevent vessels who violate RFMO measures from fishing on the high seas until appropriate action is taken by the flag state (UNFSA 1995 Art. 20). Once they achieve entry into force, RFMOs create a jurisdiction – specific and limited – within which new rights and obligations are created, and within which control mechanisms operate to monitor and enforce compliance with institutional norms. The Fish Stocks Agreement goes on to define the behaviour that constitutes a “serious violation” (UNFSA 1995 Art. 21). As expected the behaviours are those that both ‘undermine the effectiveness of regional conservation and management measures’ and fail to conform to the institutional rules that define legitimate behaviour. At the level of an individual flagged fishing vessel, a serious violation is (UNFSA 1995 Art. 21):

- fishing without a valid license
- failing to maintain accurate records of catch and catch-related data
- serious misreporting of catch, contrary to reporting requirements
- fishing in a closed area, during a closed season, after attainment of quota
- directed fishing for a stock subject to moratorium or for which fishing is prohibited
- using prohibited fishing gear
- falsifying or concealing markings of a fishing vessel
- concealing or tampering with or disposing of evidence

³² Southern Bluefin Tuna (New Zealand v. Japan; Australia v. Japan): In 2000, the International National Tribunal on the Law of the Sea (ITLOS) ruled that it did not have jurisdiction to hear the merits of the case. The dispute was subsequently resolved by negotiations amongst the three parties.

- multiple violations of which constitute a serious disregard of CMMs

Rule

In response to evidence and confirmation of serious violations by flagged fishing vessels a member state must take any measures, including proceedings to impose penalties, according to its laws (UNFSA 1995 Art. 21). The enforcement of penalties against vessels is expected. But this assumes that all states are responsible members of the international community. In fact, many states are failed or habitually used as flags of opportunity by recidivist violators of fishing measures.

Member Port states are also provided the right and duty to take measures to promote the effectiveness of RFMO or global CMMs (UNFSA 1995 Art. 23). The Fish Stocks Agreement is careful to forbid discrimination in form or fact against the vessels of any State. But it permits states the right to inspect documents, fishing gear and catch on board fishing vessels when such vessels are voluntarily in its ports or at its offshore terminals. Further, port states can adopt sanctions that include regulations that prohibit landings and transshipments where it has been established that the catch has been taken in a manner which undermines the effectiveness of RFMO CMMs on the high seas (UNFSA 1995 Art. 23). A type of sanction that increases costs of violation and makes the behaviour less profitable.

The argument of this thesis presents rules as the foundation that property rights are emerging from within RFMOs. The terms rights and rules are frequently used interchangeably in referring to uses made of natural resources. Clarity in analysis is enhanced by recognising that rights are the product of rules and thus not equivalent to rules. Rights refer to particular actions that are authorised. A property right is the authority to undertake actions related to a specific domain (Commons 1968). Rules refer to the prescriptions that create authorisations. For every right an individual holds, rules exist that authorise or require particular actions in exercising that property right. Thus, rules specify both rights and duties (Schlager et al. 1992:250). To possess a right implies that someone else has a commensurate duty to observe this right. Rules create rights.

Right of Alienation

Finally, the *right of Alienation* gives the possibility of transferring part or all of the collective choice rights to others. The Law of the Sea and Fish Stocks Agreement make no provisions on transferring of rights among members. Scott finds that all that is required for the emergence of property rights is the refusal of governance authorities to legislate against them (Scott 2000:112). A review of legal issues has found that any such systems in international fisheries depend on decisions of the RFMO concerned, rather than on the development of new international law (Allen et al. 2012:70). As already detailed in *Chapter 8 - Institution theory and International institutions* some states will flag vessels from other states to fish for their own quota but there is no precedent for an official transfer of quota from one RFMO member to another.

Data Collection

International treaty documents are the primary source material for this study. Within various global and regional treaties, the international community collectively defines the strategies, norms, and rules of high seas fisheries governance. This study analyses the extent to which these strategies, norms and rules form powers over property. The institutional statements which identify these components are found in both the convention documents of international treaties, and in the conservation and management measures they adopt. From these statements, the analysis can construct a categorisation of the behavioural norms and rules in fisheries governance treaties. In addition, comparative analysis among the various institutions will identify similarities and differences allowing the study to sketch the normative core and boundaries of the studied RFMOs as a regime.

Global framework treaties

The first task is to code the grammar of the foundation institutions for the property based governance of high seas fishing.

The 1982 Law of the Sea Convention both codified and modified the traditional international principle of freedom of fishing. On one hand, the Convention reconfirmed the freedom of the high seas by declaring that the high seas are open to all States, whether coastal or land-locked (UNCLOS 1982 Art. 87). It also put aside any claims of sovereignty over the high seas by asserting that no state may validly purport to subject any part of the high seas to its sovereignty (UNCLOS 1982 Art. 89). Yet, the Convention went on to subject this right to fish on the high seas to various conditions regarding the conservation and management of living resources. Principal among these is the right to engage in fishing subject to treaty obligations (UNCLOS 1982 Art. 116), and the duty to cooperate with other states in the management of living marine resources in the high seas, in particular that they [states] shall, as appropriate, cooperate to establish regional fisheries organisations to this end (UNCLOS 1982 Art. 118). These negotiations were contentious so the obligations to cooperate were vague (Templeton 1995:155).

In the face of expanding high seas fishing, the subsequent decade saw some states argue that while the UNCLOS provisions set forth the rights and obligations of states with respect to the conservation and utilisation of living marine resources, the adoption, monitoring and enforcement of effective conservation measures was inadequate (Agenda 21 Ch 17.44). Thus, at the 1992 UN Conference on Environment and Development it was agreed that states should further negotiate international agreements for the effective management and conservation of fishery stocks and in particular, must fulfil their obligations to cooperate through the formation and participation with regional fisheries bodies (Agenda 21 Ch 17.49, 57-59). In addition to its environment and development initiatives the 1995 UN Fish Stock Agreement reiterated the principles that states, while free to exercise their right to fish, must also give effect to their duty to cooperate commensurate with this right to fish (UNCLOS 1982 Art. 5 Par. (a)). The UNFSA mandated that coastal states and states fishing on the high seas shall pursue cooperation in relation to straddling fish stocks and highly migratory fish stocks either directly or

through appropriate regional fisheries management organisations (UNFSA 1995 Art. 8 Par. 1). Using the institutional grammar framework these two statements would be characterised in the following way:

Given the grammatical components (ADIC), we see that UNFSA 1995 Art. 8 Par. 1 defines a norm:

A – A state

D – shall [must]

I – pursue cooperation directly or through appropriate regional fisheries management organisations

C – when fishing straddling fish stocks and highly migratory fish stocks

The agreement also extended the principles of collective governance through the mandate that only those States which are members of such an organisation or participants in such an arrangement, or which agree to apply the conservation and management measures established by such organisation or arrangement, shall have access to the fishery resources to which those measures apply (UNFSA 1995 Art. 8 Par. 4).

Similarly, the pattern (ADIC) with no (O) or-else operator is repeated in Art. 8 Par. 4; so this article also defines a norm:

A – A state

D – permitted

I – access to fishery resources

C – when it is a member, participant or agree to apply the conservation and management measures of the competent regional fisheries management organisation

In addition, the complementary institutional statement for this can be presented as follows:

A state is forbidden access to fishery resources unless a member, participant, or they agree to apply the conservation and management measures of the competent regional fisheries management organisation.

(UNFSA 1995 Art. 8 Par. 4)

Indeed, UNFSA membership imposes upon the flag state duties of compliance and enforcement over its authorised fishing vessels. An alternate procedure for coding statements is to assign the grammatical components directly into the original text. For example:

Article 19 Par. 1 – A state (A) must (D) ensure compliance by flagged vessels with regional fisheries management organisation conservation and management measures (I) [at any time and in any place (C)].

Article 19 Par. 2 – A state (A) must (D) ensure that sanctions for violations are adequately severe to secure compliance and deprive offenders of the benefits from illegal activities (I) [at any time and in any place (C)].

By analysing the institutional grammar of treaty documents it is possible to identify the 'legitimate' behaviours collectively articulated by the party states. Recall that treaties are conducted under consensus conditions and in the absence of precedence may only commit to a vague description of desired behaviours at the time of agreement (Zartmann 1992:117). With the incremental process of formulation that tightens the obligations and broadens the coverage. Indeed, such negotiated outcomes have the distinct intent to 'fall forward'. The reality of collective decision-making does not diminish the value of the institutional statement technique.

In sum, the UNCLOS and UNFSA treaties articulate the foundational principles and norms for high seas governance, and for the subsequent development of common-property practices. The UN Convention on the Law of the Seas articulates the key shared strategy (AIC). First, the high seas are open (I) to all States (A) whether coastal or land-locked (C); and States (A) shall cooperate to establish RFMOs for the management of living marine resources in the high seas (I). In turn, the UN Fish Stocks Agreement builds upon the UNCLOS to articulate two key norms (ADIC); first a state (A) must (D) pursue cooperation directly or through appropriate regional fisheries management organisations (I) when fishing straddling fish stocks and highly migratory fish stocks (C); and second "A state (A) is forbidden (D) access to fishery resources (I) unless a member, participant, or they agree to apply the conservation and management measures of the competent regional fisheries management organisation (C)".

What becomes obvious under the 'Grammar of Institutions' technique, and a central criticism of the both the UNCLOS and UNFSA, is that the agreement did not include any rules to define penalties for non-compliant or 'illegitimate' behaviour. The Fish Stocks Agreement does obligate a member state to apply sanctions adequate in severity to be effective in securing compliance and to discourage violations wherever they occur, deprive offenders of the benefits accruing from their illegal activities (UNFSA 1995 Art. 19). But agreement on specific sanctions for causing or allowing a non-compliant action or outcome to occur was left to negotiation and agreement within individual regional fisheries management organisations.

Regional treaties

New Zealand is a member of four regional fisheries management organisations in the Pacific. These are the Convention for Conservation of Antarctic Living Marine Resources (CCALMR), the Convention for the Conservation of Southern Bluefin Tuna (CCSBT), the Western and Central Pacific Fisheries Commission (WCPFC), and the South Pacific Regional Fisheries Management Organisation (SPRFMO). For presenting the methodological approach of this study, the following section is specific to the South Pacific Regional Fisheries Management Organisation (SPRFMO). The SPRFMO entered into force on August 2012 and is the most recent of the studied RFMOs to have formed. Leading up to this achievement was five years of negotiation and compromise. Yet, throughout the negotiation

process parties published agreed interim measures prefaced with the statement that they are “voluntary and not legally binding under international law” (SPRFMO 2007; SPRFMO 2009; SPRFMO 2011). They are nonetheless determined by consensus decision-making, and formed the core principles and norms of the SPRMO Convention. This makes them especially interesting as part of a study of the institutional principles, norms, and rules in practice for the governance of high seas fishing.

The SPRFMO Convention agreed upon norms that modify the sovereign right to access high seas fish stocks. Flag state duties are obligations that accompany withdrawal rights. In accord with the institutional grammar technique these can be coded as:

Art. 25 Par. 1(a) – the member state (A) must (D) ensure flagged fishing vessels comply with Convention provisions and Commission CMMs (I) [at all times and in all places (C)].

Art. 25 Par. 1(b) – the member state (A) must (D) ensure flagged fishing vessels do not conduct unauthorised fishing (I) within waters under national jurisdiction adjacent to the Area (C).

Note: this particular norm was already in law of sea - sovereign rights over fish stocks in the column of water within its EEZ. It is now a violation under SPRFMO, and in an example of evolution of RFMO norms, linked (weakly) to SPRFMO sanctions. The SPRFMO goes on to articulate the norms that:

Art. 25 Par. 2 – the member state (A) is forbidden (D) to allow flagged fishing vessels to conduct unauthorised fishing (I) in the Area (C).

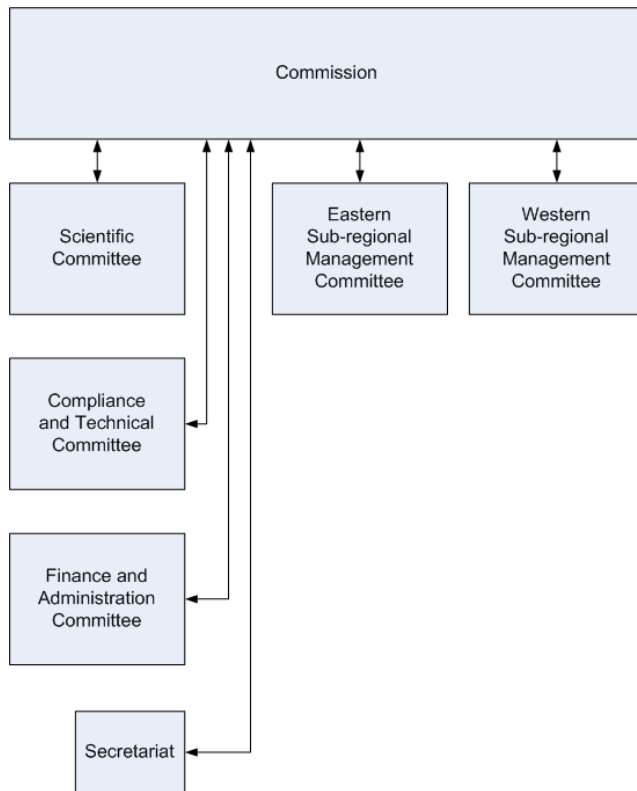
Art. 25 Par. 3 (a) – the member state (A) must (D) exercise its responsibilities over flagged vessels (I) fishing in the Area (C).

The complementary statement can be written as the member state (A) is forbidden (D) to authorise fishing (I) if it is unable to exercise effective responsibilities in the Area (C).

These flag state responsibilities are specified as norms in subsequent articles. The member flag state must maintain vessel registers, investigate and report on alleged violations, apply penalties of appropriate severity for violations, and in a extension of UNCLOS and UNFSA norms, ensure penalties take into account the value of the catch (Art. 25 Par. 3 (b)(c)). This obligation is specified as a normative action for flag state members of the RFMO. But the penalties for these violations are not specified in the RFMO and left up to the flag state's national laws. However, the thesis argument notes that the penalties for flag state non-compliance is also not specified.

A treaty member's rights to fish in the SPRFMO Area are further contingent on its compliance with additional institutional norms. The technique used in the SPRFMO to construct its Convention is of nested institutional statements. The SPRFMO constructs its own institutional structure to govern its norms and rules, as in Diag 1 below.

Diag. 1: SPRFMO organisational structure



The Convention explicitly identifies member state duties. States must ensure flagged vessels comply with SPRFMO provisions and measures (Art. 25 Para. 1). States must immediately and report on violations by flagged vessels (Art. 25 Para 3). States are forbidden to open a new or exploratory fishery before Commission conservation and management measures are agreed (Art. 22 Para. 1). Once established as agreed behavioural norms, the Convention then expresses enforcement measures through institutional roles and institutional rules. As roles, the Convention assigns enforcement (or-else) responsibilities for monitoring compliance to the Technical and Compliance Committee (Art. 11), requires the Secretariat to share information (incl. discrepancies) on catch reporting among members (Interim Measures Para. 12, 14, 18-19), and the Commission is permitted to share information on vessels engaging in illegal and unreported fishing among members and with other RFMOs (Art. 23 Para. 1 (f)).

Within the SPRFMO Convention its institutional rules are currently limited to a permission to modify the individual quota of catch possessed by a state in response to compliance with institutional norms. For example, the SPRFMO Commission (A) must (D) take into account the status of the fishery resource and existing levels of fishing effort. Commission (A) is permitted (D) to take into account a member's compliance with flag state duties, compliance with monitoring, control, surveillance, and enforcement measures, compliance with principles of new or exploratory fisheries, contribution to scientific research, and compliance with reporting of scientific research (I) of SPRFMO Convention provisions and Commission measures (C) (Art. 21 Para. 1)

In addition, the SPRFMO permits the consideration of compliance with the norms of other RFMOs:

Art. 21 Para. 5 – Commission (A) is permitted (D) to consider the performance of a member in other international fisheries management organisations.

The complementary statement here: A Flag state (A) must (D) always (C) exercise its duties in other international fisheries management organisations (I) or-else (O) the SPRFMO Commission can take account of violations when determining participation in Area.

Within the methodological approach of the institutional grammar technique, the deontic component is generally used to distinguish prescriptive from non-prescriptive statements. In these cases, the modal verb 'permitted' is particularly meaningful as it constitutes the possibility for an action or outcome that didn't exist before. That is, a 'permitted' behaviour *creates* that legitimate action or outcome (Crawford 1995:585). Within the South Pacific Regional Fisheries Management Organisation, withdrawal rights can be modified by levels of compliance with institutional rules. For example:

Art. 23 Para. 1 (f) – the Commission (A) is permitted (D) to create standards, rules, and procedures for addressing any non-compliance identified (I) when it audits member data compliance and exchange performance (C).

Membership of the SPRFMO imposes upon flag state members the duty to investigate immediately and report fully upon actions taken in response to alleged violations of Convention provisions or Commission conservation and management measures by any of its flagged fishing vessels (SPRFMO Art. 25 Para. 3 (c)). It is the duty of the flag state to enforce compliance with the treaty among its flagged fishing vessels. To this end, and in accord with the UNFSA, the SPRFMO imposes upon the flag state member the duty to secure compliance, discourage further violations and deprive offenders of the benefits of illegal activities (SPRFMO Art. 25 Para. 3 (d)(e)).

In 2011, SPRFMO member states agreed a set of interim measures for pelagic fisheries. These measures were entirely voluntary and not legally binding under international law. They represent a surprising example of the normative processes inherent in collective decision-making. In their general provisions, the agreement acknowledged that implementation of interim measures is necessary for the rebuilding of the jack mackerel stock and compliance with them will be a relevant consideration when taking decisions under the Convention (SPRFMO IM 2011 Para 6). These measures covered regulation of effort, catch, monitoring and control. For example:

Para 10 – The member state (A) is forbidden (D) to exceed the individual quota (IQ) assigned to them (I) [from total allowable catch determined by Commission (C)].

Para 14 – The Secretariat (A) must (D) circulate the monthly catches (aggregated) of each flag state to all other member states (I) every quarter (C).

Para 19 – The Secretariat (A) must (D) inform all member states (I) whenever a member state reaches 70% of their individual catch limit (C).

At this early stage in the SPRFMO, enforcement mechanisms were not explicitly nor strongly linked to penalties. Although, in accord with Convention provisions, the Commission must create standards for

this and flag states must ensure penalties are severe enough to deter violations among flagged fishing vessels. In sum, the preceding analysis shows that there was an emerging structure of norms and rules that increasingly binds the practice of high seas fishing to collectively agreed rules defined in the SPRFMO.

An international regime that creates a common-property system

When a governance system strengthens individual property-rights over a resource, the holders of such rights secure for themselves future benefits from the product of the resource. The anticipation of this future stream of benefits provides the incentive to conserve that base resource over the long-term. Indeed, harnessing this incentive is the core promise of property-rights systems. When dealing with common-pool resources, the common-property approach suggests the obvious remedy: assign catch quotas to individual actors in such a way as to make the aggregate of catch quotas equal maximum sustainable yield. If the institutional design of a RFMO were left to an actor with those principles and policy objectives in mind, an explicitly common-property based governance approach may be evident. Yet, regional fisheries management organisations are multilateral institutions constituted by actors with very different interests. Some are coastal states and some are distant water fishing nations. Some are developing states and some already developed. The goal of this thesis research is to determine the extent to which the studied international treaties that govern high seas fishing in the Pacific region define systems of rules that are characteristic of property-rights. To do so, the methodology of this study focuses upon the institutional principles, norms and rules in practice within regional fisheries management organisations. Tentatively, the study finds that a framework defining common-property rights has largely emerged in high seas governance.

Using the institutional grammar approach and Ostrom's common-property framework, the previous section showed analysis of the institutional statements made in the UNCLOS, UNFSA and the SPRFMO (the most recent Pacific RFMO) that reproduce the following components of a common-property system:

Norms

- *Withdrawal rights*
 - The high seas are open to all States whether coastal or land-locked
 - The member state is forbidden to exceed the individual quota (IQ) assigned to them from total allowable catch determined by Commission
 - The member state must ensure flagged fishing vessels comply with Convention provisions and Commission CMMs
 - Member state must collect, verify and report all relevant data to the Commission always

- *Management rights*
 - All States must cooperate to establish RFMOs for the management of living marine resources in the high seas.
 - All member states are permitted to be a member of the RFMO Commission
 - The Secretariat must circulate the monthly catches of each flag state to all other member states every quarter
 - The Secretariat must inform all member states whenever a member state reaches 70% of their individual catch limit
 - All member states who fail to pay fees are forbidden management rights (participation in management decision-making)

- *Exclusion rights*
 - A state is forbidden access to RFMO fishery resources unless a member, participant, or they agree to apply the conservation and management measures of the competent regional fisheries management organisation
 - Commission is permitted to take into account a member's compliance with flag state duties, compliance with monitoring, control, surveillance, and enforcement measures, compliance with principles of new or exploratory fisheries, contribution to scientific research, and compliance with reporting of scientific research of SPRFMO Convention provisions and Commission measures.
 - Commission is permitted to consider the performance of a member in other international fisheries management organisations.

- *Alienation rights*
 - [No principles or norms articulated in international treaties; therefore no evidence of transferability and development of individual transferable quota (ITQ)]

High seas fishing is governed by international treaties. The UN Law of the Sea and UN Fish Stocks Agreement treaties create the prerequisite mandate and legitimacy for the formation of regional fishery management organisations and their institutional rules. An RFMO is incorporated by a group of state parties with an interest in the fishery who collectively negotiate a set of strategies, norms, and rules which is formalised in a Convention. Once it has achieved entry into force, an RFMO establishes a new, albeit limited, jurisdiction and a collective 'ownership' over a set of defined resources that is enforced among both parties and non-parties. Any fishing by vessels from flag states that have not entered into the agreement are regarded under international law as engaged in illegal, unregulated or unreported fishing. Within its jurisdiction, over a defined area or set of species, the members of an RFMO cooperate to determine resource management objectives, rights to use and the right to govern use of the living marine resource.

This competence informs the two key analytical frameworks of this thesis. The first seeks to understand these international treaties as institutions which incorporate rules whose function is to

reproduce the core principles and norms agreed by the member states. The second regards these sets of rules as characteristic of a system of rights and obligations that define power over property. In particular, the structure of incentives and sanctions that shape behaviour in the management of common-pool resources. Under such a common-property regime, the resource is held by an identifiable community of users who can exclude others and regulate use. This new institutional framework of authority and power over property supplants the traditional open-access conditions. The principles and practice of self-maximising behaviour are assumed to remain as the key motivating forces of actors. Yet, by creating a property-right over fish stocks, as opposed to fish caught, a common-property system has the potential to incentivise sustainable utilisation of the resource. With effective powers over property, rights holders can anticipate the benefits of future benefits from a regenerating resource as opposed to engaging in a competitive race to fish. In anticipation of future rewards, the owners of a property have the incentive to conserve it.

Conclusion

In their analytical framework, Crawford and Ostrom identify three types of institutional statements: strategies, norms, and rules. A shared strategy is a desired action or outcome expressed by the community. This strategy may also be expressed in the form of an action or outcome that is forbidden. The statement of a norm specifies which actions may, must, or must not be undertaken by the actor. A rule is the threat or sanction for violation of institutional norms. In addition to demonstrating the coding sequence of the institutional grammar technique this chapter re-introduced the framework of common-property rights that give meaning to the statements of strategy and norm from the RFMO treaty documentation. These are grouped together in two bundles of rights. First is the right to use a resource. The second is the right to govern use of a resource. This coding is complex because such statements are expressed in a hierarchy of international treaties and are expressed variably among the studied RFMO treaties. A primary goal of identifying such statements of strategy and norm is the evidence that the group of states that constitute these treaties are effectively expressing a shared idea and desired outcome. This validates the institutionalist approach to analysing international treaties. It also works to validate the argument of this thesis that these institutions are expressing powers over common-pool fish-stock resources. In particular, the institutional grammar is revealing that state actors view these high seas fish stocks as a form of common-property. Only this shift from the propertisation of fish-catch to fish-stock as the productive asset of a fishery can shift actor incentives toward achieving sustainable rates of catch.

The next *Chapter 10 - A common-property system* analyses the institutional statements of the four studied RFMOs. It uses the institutional grammar technique and institutional powers over property to show how these treaties create a system of powers over common-pool fish-stocks in practice.

Chapter 10

A common-property system

Introduction

The previous *Chapter 9 - The institutional grammar of high seas property rights* detailed use of the institutional grammar technique to identify how rights of access, withdrawal, management, exclusion, and alienation were distributed amongst the international treaties that govern high seas fishing.

This chapter will apply the same research method to identify the institutional statements of the four RFMOs in the Pacific Ocean of which New Zealand is a member. These are the 1982 Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), the 1994 Commission for the Conservation of Southern Bluefin Tuna (CCSBT), the 2004 Western and Central Pacific Fisheries Commission (WCPFC), and the 2012 South Pacific Regional Fisheries Management Organisation (SPRFMO). Within this chapter, the institutional statements are extracted from these RFMO Conventions and adopted measures. These statements are then organised in accord with Ostrom's formulation of the component rights that construct a system of common-property. This chapter advances the thesis argument by showing that RFMO institutional statements create a system of powers over the common-pool resources under their competency.

This structure of powers over property begins with the global framework treaties for governing high seas fishing. The property rights are created in a nested institutional structure with *rights to use* defined in framework treaties and *rights to govern use* defined within the conventions and adopted measures of the regional fisheries management organisations themselves. *Chapter 7 - Property rights in high seas fisheries* showed that the UNCLOS and the UNFSA treaties provide to all states the right of access to high seas areas and the right of withdrawal to catch high seas fish stocks. These two global framework treaties go on to subject the right to withdraw fish exclusively to states whom are members of multilateral regional fisheries management organisations that govern those high seas fisheries (UNCLOS 1982 Art. 118; UNFSA 1995 Art. 8.2). Every state has the right to fish for straddling and highly migratory stocks and the right to become a member of a RFMO and to be allocated a share of the total allowable catch of that fish stock.³³ This right is modified by the obligation to cooperate with other states over the management of straddling and highly migratory stocks. Catch of high seas fish stocks by non-member states is forbidden (UNFSA 1995 Art. 8.2). These structures of inclusion and exclusion are the foundation of the system of common-property rights that are invested in RFMOs by international law.

³³ The Convention of all studied RFMOs also contains the exclusion provision that only states that are active in the fishery are eligible to be members.

The following sections of this chapter explore the extent to which the studied RFMOs have realised rights of management, rights of exclusion, and rights of alienation over high seas fish stocks in the Pacific Ocean. These RFMOs continue to struggle with historical precedent, contradictory normative obligations, and with non-compliant behaviour by both member and non-member states. The institutional structure of the studied RFMOs is also evolving. Nonetheless, the institutional statements in evidence show that RFMOs are expressing norms and rules that construct a system of common-property over high seas fish stocks. This chapter will detail the contours of those property rights and highlight gaps that must be filled to achieve sustainable rates of fish-catch.

The right to participate in high seas fishing is universal but there are three ways in which it is modified. First, as shown in *Chapter 7 – Property rights in high seas fisheries*, statements identifying rights of withdrawal are evident in the UNCLOS and UNFSA framework treaties. Both these treaties balance withdrawal rights with the obligation to cooperate. Second, in alignment with the UN framework treaties and studied RFMOs, it is useful for this thesis to formally differentiate statements identifying rights of withdrawal into two sub-groups: participation and allocation. Participation rights parallel Ostrom’s definition of withdrawal rights. They identify the holders right to catch fish in the area. This must be made distinct from an allocation right that identifies how much of a resource each actor is permitted to withdraw. Differentiating between these two types of withdrawal right is necessary to highlight the general shift in power evident in the movement from the primacy of individual historical catch to allocation based on collectively determined RFMO management plans.³⁴ The third modification of withdrawal norms centres on those statements that identify compliance actions and outcomes. These demonstrate that the right to catch high seas fish stock is modified by the obligation to comply with RFMO norms on action and outcome.

The rights of a common-property system

In their seminal work on property rights regimes, Ostrom and Schlager organised components of common-property over common-pool resources into ‘rights to use’ the resource and ‘rights to govern use’ of the resource (Ostrom et. al. 1992:250). These Use rights and Governance rights are themselves bundles of more fundamental components. They can be summarised as below:

Rights to use

- *Access to area* (non-subtractive)
- *Withdrawal of resource* (subtractive use)
 - Participation (right to fish)
 - Allocation (right to a certain amount of fish)

Rights to govern use

- *Management of harvest*

³⁴ Which may also be termed management procedures or conservation measures.

- *Exclusion of others*
- *Alienation to others*

The 'rights to use' a resource are made up of the *right to Access* and the *right to Withdrawal*. In the context of high seas fishing, the primary actor who holds use rights is the RFMO member state. Recall that non-member states are forbidden to fish from species under the RFMO competency. In accord with international law, member states must 'flag' individual fishing vessels that catch high seas fish stocks. The flag state is responsible for ensuring flagged vessels fish in accord with its national rules including those treaty obligations to which the state is a party. In the issue area of high seas fishing, it is member states that are permitted to fish high seas resources and it is member states that must cooperate in the collective governance of these RFMO resources. An RFMO is thus a group of states with an interest in and an obligation to govern the fishery. The powers invested in a RFMO Commission give it a collective agency as an entity in its own right.

The 'rights to govern use' of a resource are made up of *Management rights*, *Exclusion rights* and *Alienation rights*. See following Fig. 1 that summarises the right and right holder combinations. In the current international regime, it is the RFMO which holds the rights to govern use. This distinction between use and governance of use is significant. The right of withdrawal possessed by member states is modified by the right to govern collectively possessed by all members of the RFMO. In recognition of that modification, this thesis has further divided Ostrom's right of Withdrawal into two elements that are granted upon membership of a RFMO: the right to catch fish (*participation*) and the right to catch a certain amount of fish (*allocation*). A member state's right to catch high seas fish stocks is its right to participate and is the fundamental right created by the UNCLOS. But the state's right to a certain amount of fish is its allocation. Recall that this allocation is the ownership equivalent to a member state's individual quota. An individual quota is the right to catch a certain *number* of fish, in a certain location, of a certain species, during a certain period. In a capture fishery, the number is the property (Scott 2000b:111). Further, a state's individual quota is entirely historical, path dependent, and is the cause of most tensions among fishing nations. A state's quota allocation is also at the centre of the policy proposals of this thesis to strengthen the property structures of a RFMO regime and finally achieve sustainable high seas fisheries.

Fig. 1: *The right components and right holders in international treaties*

Right Component	Right Holder
Access right	All States
Withdrawal right <ul style="list-style-type: none"> • Participation • Allocation 	Member State Member State
Management right	Member State / RFMO
Exclusion right	Member State / RFMO
Alienation right	Member State / RFMO

The institutional framework: strategy, norm, and rule

This chapter also identifies the institutional statements of strategies, norms and rules that articulate each of the right components. This distinction among institutional statements becomes particularly important in the section on rights of exclusion. Recall from *Chapter 8 - Institution theory and International institutions* that a shared *strategy* is a desired action or outcome expressed by a community. A strategy may also be expressed in the form of an action or outcome that is forbidden. For this thesis, the focus is on the extent to which RFMOs are expressing an institutional structure that is characteristic of a common-property system. The analysis presented in this chapter is thus alert to instances where the studied RFMOs express a shared desire to exercise exclusive withdrawal and management rights over a common-pool living marine resource. In turn, a *norm* specifies which actions may, must, or must not be undertaken by an actor. For example, in a common-property system over a common-pool resource, a core normative statement would forbid any actor who is not a member of the group from withdrawing the benefits from any of that resource. In addition, an analyst may look for additional statements that further determine the contours of a property system such as the allocation of individual quota and the ability to transfer individual quota among group members.

Finally, while institutions are based on shared strategies and norms, they are constructed by *rules* designed to reproduce the desired behaviour. Thus, in Ostrom's approach to institutional structures a great weight is placed on institutional rules. To understand regularised patterns of interaction affected by rules, one needs to examine the actions and outcomes that rules allow, require, or forbid (Schlager & Ostrom 1992:250; Crawford & Ostrom 1995:583). One must also recognise the mechanisms that exist to enforce those rules. It is important to clarify the relationship between rights and rules, and reinforce the weight given to rules the following analysis of institutional statements.

Rights refer to particular actions that are authorised. A property right is the authority to undertake particular actions related to a specific domain (Commons 1968). Whereas, rules refer to the prescriptions that create authorisations. For every property right an individual holds, rules exist that authorise or require particular actions in exercising that right (Schlager & Ostrom 1992:250). For example, the quality of a property right is measured by the extent to which all other actors comply with the norm that they must not exploit the property of the right holder. Rules create rights. Another measure of the quality of a property right exists. Fishers have the right to catch a certain quantity or proportion of a fish-stock. If other fishers catch too much fish then the productive fish-stock is itself eroded.

Rates of fish-catch that exceed the regeneration rates of the fish-stock are the root cause of the depletion of high seas fish stocks. Therefore, the policy problem for achieving a sustainable fishery is how to limit the rate of catch. Command and control mechanisms put the weight of the monitoring and enforcement of individual catch limits on the regulatory authority. In contrast, a policy approach centred on upholding common-property systems may keep the necessary monitoring mechanisms but shift its weight towards harnessing the economic motivation of actors in commercial fisheries. In accord with

the fundamental economic rationale of a commercial fishery, a governance authority must allow actors to keep the future rewards of their decision to limit individual catch. The extent to which a property system can secure this right to future catch is the measure of its potential to create and enable a sustainable commercial fishery. The incentive to limit individual catch is predicated on the actor securing the future benefits from the fish-stock left uncaught. Therefore, the most important outcome in reinforcing this positive behaviour is to enforce the requirement for all actors to similarly limit their fish-catch to the individual quota allocated from the biologically sustainable totally allowable catch (TAC) for that target species.³⁵ Rules are expected to impose a penalty on an actor for violating the group's institutional norms.

The last point to make before moving into the detail of the institutional statements of the studied RFMOs is a reminder that the institutional statements that define the strategies, norms, and rules of high seas fisheries occur within a nested institutional structure of international treaties. The institutional statements that define the right of access and right of withdrawal were explored in *Chapter 8 - Institution theory and International institutions*. While the UNCLOS and UNFSA treaties define the right to participate in high seas fisheries, they make no statements on the allocation of catch among authorised actors. Conversely, RFMOs make no institutional statements on participation rights. They focus instead upon total allowable catch and its allocation among members. The definition and enforcement of rights to catch a certain amount of fish falls to each individual RFMO. For continuity between chapters, participation rights are again briefly covered under the following section on withdrawal rights and a more substantial analysis of allocation practices are covered under a later section on management rights.

Right of Withdrawal

A *right of withdrawal* gives the holder the right to obtain the 'products' of a specified resource (Schlager & Ostrom 1992:250). In a capture fishery, fish stocks have a productive capacity but this output is not owned until it is caught. To represent this relationship formulaically: fish-stock must be converted to fish-caught by fishing effort. For this reason, a right to fish is a withdrawal right like *usufruct* as opposed to an all-encompassing ownership right. Recall from *Chapter 4 – Fishing as a production activity* that a right of usufruct allows an individual or group to hold the right to enter the land of another and take away some natural thing of value, such as by fishing, harvesting, hunting, logging, mining, or pasturing provided it be without altering the substance of the thing. Under international law, all states possess the right to catch high seas fish stocks because the UNCLOS treaty provides universal participation rights. However, the definition of withdrawal rights, in particular the amount that is permitted to be caught, is left to each individual RFMO. This section presents the analysis of the institutional

³⁵ Note that the CCAMLR does not allocate individual quota. Fishing in the Antarctic conditions is an extreme and challenging activity. Nonetheless, the RFMO does require the detailed five and ten day catch reporting that ensures its total allowable catch is enforced. Any vessel whose monitoring system indicates is still fishing after the notification of a fishery closure is engaging in illegal, unreported, and unregulated (IUU) fishing.

statements of the studied RFMOs and organises them as statements of institutional strategy, norm and rule that establish the right of withdrawal.

Withdrawal Strategy

None of the studied RFMOs make any explicit strategy statements on withdrawal rights. Recall that a strategy is a desired action or shared outcome expressed by the group. Indeed, no statements on strategy is an expected outcome because universal participation rights are already provided by the UNCLOS and UNFSA treaties, and the legitimacy of these treaties is the foundation upon which the formation of RFMOs exists. However, recognising the distinction between participation rights and allocation rights in the institutional statements of RFMO treaties reveals the fundamental tension within RFMOs. This tension centres on the total amount of fish that can be caught and the individual amount of fish that each actor is permitted to catch. Note that the CCAMLR is an exception here. This RFMO only has provisions for total allowable catch for each species per sub-area under its competency (CCAMLR COM 2017:57).³⁶ There is no individual quota. Flag vessels of member states must fish competitively within this total allowable catch limit for each specific sub-region. The required submission of five-day, ten-day, and monthly catch documentation from each flag state is used by the CCAMLR to project when each species per sub-area is nearing its total allowed catch and when the fishery will be closed. Nonetheless, the overall implications of this tension over individual catch limits are explored in more detail in the section on rights of management.

Withdrawal Norm

Despite the critical importance of individual catch limits, none of the studied RFMOs have explicit statements that provide the ability of a RFMO to enforce individual catch limits among state actors. This is despite the UNCLOS obligation to create RFMOs as vehicles of cooperation for the governance of high seas fisheries (UNFSA 1982 Art 118.). By creating participation and allocation as two new subcategories of withdrawal right, this thesis has shown how universal withdrawal rights are created then modified within the nested institutional structures of international law governing high seas fishing. Indeed, a member state's right to withdrawal is modified by both its allocation of the allowable catch and the requirement to abide by RFMO norms and rules. A right to catch fish from a RFMO governed fishery is contingent upon compliance with RFMO norms and rules. However, in the studied RFMOs, statements that establish compliance norms are often ambiguous or lack prescriptive strength.

The nature of this weakness is revealed in the movement between the subject of these institutional statements of the RFMO as an actor, the state as an actor, and the fishing vessel as an actor. At the framework treaty level, compliance statements in the UNCLOS are delivered in the context of state obligations. At the RFMO level of analysis, in every studied RFMO, there are complementary institutional statements obliging a state member to enforce compliance among its nationals. A typical example is found in the CCAMLR which mandates that a state must ensure compliance with the its provisions and adopted measures (CCAMLR 1982 Art. XXI). Similarly, the CCSBT requires all members to ensure the enforcement and compliance with this convention and its measures (CCSBT

³⁶ See a map of the CCAMLR Area in Appendix 3.

1994 Art. 5.1). A member of the WCPFC must promptly implement provisions of the convention and adopted measures (WCPFC 2004 Art. 23). Likewise, the SPRMO requires members to ensure effective compliance with management measures (SPRMO 2009 Art. 3.1.a.ix). Typically, and historically, the studied RFMOs require member states to enforce the compliance of their flagged vessels. These are withdrawal norms for a member state to enforce compliance over a flagged fishing vessel.

However, the institutional statements on compliance are presented in a distinctly different way when the subject of institutional rules shifts from the individual state party to the RFMO itself. Some of the studied RFMOs contain statements on individual obligations in the context of flag state or port state to enforce RFMO norms or to prevent behaviour that undermines these norms. But they also add statements permitting the Commission to account for the compliance of members with RFMO norms of behaviour. For example, the CCAMLR must prevent the decrease in the size of any harvested population below the greatest net annual increment (maximum sustainably yield) and stable recruitment (CCAMLR 1982 Art. II). The CCSBT must ensure the conservation and optimum utilisation of southern bluefin tuna (CCSBT 1994 Art. 3).

In contrast, it is the Members of the CCSBT that must ensure the enforcement of the CCSBT and compliance with its measures (CCSBT 1994 Art. 5.1). The WCPFC must ensure the long-term conservation and sustainable use of its fish stocks (WCPFC 2004 Art. 2). It must also adopt measures to ensure the long-term sustainability of fish stocks in its Area and it must ensure it maintains or restores stocks to levels capable of producing MSY (WCPFC 2004 Art. 5.a). Also, at all times the WCPFC Commission must account for compliance with conservation and management measures (WCPFC 2004 Art. 10.3.f). Even the most recent RFMOs continue to be faced with the realities of multilateral treaty making and only define compliance norms with very little prescriptive strength. The SPRFMO must ensure the long-term conservation and sustainable use of fishery resources (SPRFMO 2009 Art. 2). It must take into account historical compliance with flag state duties, monitoring measures, and contribution to scientific research (SPRFMO 2009 Art. 21.1).

One notable article for the SPRFMO has the statement that the commission is permitted to consider member state performance in other RFMOs (SPRMO 2009 Art. 21.5). This norm requires the member to be a good international citizen in order to fish from the RFMO fish stocks. This SPRFMO article is named Participation in Fishing for Fishery Resources. Recall that this thesis introduced two divisions within the right to withdraw in a common-property system. The right to participate is the universal right for a member state to fish on the high seas provided by the UNCLOS. The right to an allocation of total allowable catch must be provided by each RFMO. Note that the deontic used is 'permitted'. Recall the significance the institutional grammar technique gave to this deontic operator. It is used to create an action where none existed before. Recognising the incremental practice of all multilateral treaties this linkage of allocation to compliance history of a state is a significant indicator of changing values within the members that RFMO. The implications of this prescriptive weakness is made clear in the section on rights of management where it is shown that all the studied RFMOs have attempted to strengthen structures for compliance.

Compliance must be proved

An increasingly important implicit norm amongst the studied RFMOs is that compliance must be proved. This provides the confidence among group members that all members are reproducing desired behaviours to achieve the group outcome. All the studied RFMOs have a requirement for detailed reporting of catches. This is necessary to prove that the total allowable catch is being observed, that the productive fish-stock is being preserved, and where relevant that no individual member is breaching their individual quota of fish-catch. For example, the WCPFC compliance committee must receive reports from each member on measures taken to monitor, investigate and penalise violations of provisions (WCPFC Art. 14.2.b). The committee must monitor and review compliance with RFMO measures (WCPFC Art. 14.1.b). This requirement to submit catch documentation is shared by all the studied RFMOs.

These statements to take account of member compliance while lacking prescriptive strength do nonetheless provide the legitimacy for action even if additional incremental strengthening through further negotiated measures. Indeed, the policy proposals presented for the conclusion of this thesis will rely upon the observations that compliance norms do exist in the current regime but that they must be more explicit on the sanctions for violation of catch limits. Specifically, the thesis argument asserts that the norms that allow a RFMO to sanction non-compliance with an allocation withdrawal right must be made to be general administrative work of the RFMO Compliance Committee and not any extraordinary business of the RFMO Commission. That is, a member must not have undue influence over withdrawal compliance sanctions that may be imposed upon it by the RFMO.

Withdrawal Rule

The studied RFMOs contain no institutional statements concerning the threat or actual sanction against high seas fishing participation rights. As already observed in *Chapter 9 – The institutional grammar of high seas property rights*, all statements of participation rights and modifications to participation rights are found in the UNCLOS and UNFSA framework treaties. Participation in a high seas fishery remains a universal right that is only modified by the requirement on a state to be a RFMO member. Historical catch is still a significant factor in the allocation of fish catch among members. In current practice, non-founding states must first be a cooperating non-member and prove willingness to comply with RFMO norms and rules. There is thus great variability in the amount of fish each RFMO member is allowed to catch. Most tensions in high seas fishing come not from the right to fish (participation) but from the right to catch a certain amount of fish (allocation). This reinforces the need for principles of governance that strengthen the rules governing individual catch limits, that create the incentive to limit individual catch, and of sanctions for the violation of these individual limits.

Right of Management

The *right of management* gives the holder authority to determine how and where harvesting of a resource may occur (Ostrom & Schlager 1992:251). Just as in the right of withdrawal, the right of management in the high seas governance regime is granted by the UNCLOS and UNFSA framework treaties. *Chapter 8 - Institutional theory and International institutions* showed how the right of every

state to fish for high seas fish stocks is modified by the obligation to cooperate with other states over the management of straddling and highly migratory stocks (UNCLOS 1982 Art. 118). This obligation creates the right of management and grants it individually to each state actor in a high seas fishery. However, this right can only be exercised as RFMO members and through the collective decision-making processes of a RFMO Commission. While the right to use is granted to individual states, the right to manage is exercised collectively. The right to manage is invested in the RFMO but the RFMO is a body constituted by member states. The right to manage is thus not an individual right but one that is permitted by membership of a multi-lateral RFMO.

Management Strategy

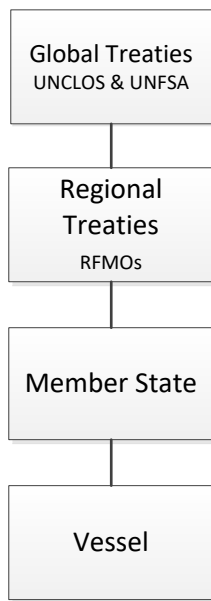
In the four studied RFMOs, the institutional statements of management strategy are evident as aspirational goals. The CCAMLR objective is the conservation of Antarctic marine living resources (CCAMLR 1982 Art 2.2). A typical example is the objective of the CCSBT to ensure, through appropriate management, the conservation and optimum utilisation of the global SBT fishery (CCSBT 1994 Art. 3). The WCPFC management objective statement focuses on the individual member's obligation to ensure the long-term conservation and sustainable use of highly migratory fish stocks (WCPFC 2004 Art. 2). The objective of the SPRFMO agreement is to achieve the sustainable use of living marine resources (SPRFMO 2009 Art. 24.1.e). The language has shifted slightly over the past 20 years yet the aspirational strategy statements of RFMOs have remained focused on conservation and sustainable use.

One issue here is a form of gaming within RFMO institutional rules around new and exploratory fisheries. An example is found within the CCAMLR that uses a precautionary method to restrict quantities of allowable catch in so-called research and exploratory fisheries. With this method, catch limits are calculated by multiplying each estimate of spawning biomass by a 4% exploitation rate (CCAMLR SC 2016:32). In 2017, there were over 30 new and exploratory fisheries currently being undertaken by members in the CCAMLR area. Some members are self-maximising their withdrawal rights by taking advantage of the permission to undertake this type of fishing. Other members and observers are concerned that some of these research programs fail to deliver meaningful research outcomes. Therefore, the CCAMLR is exercising its management right, and has assigned priority to the completion of existing research programs before approving new requests (CCAMLR SC 2017:15). All RFMOs are formed around existing commercial fisheries and all do express aspirational statements on the management of those fisheries. Some are now mindful that there are many forms of self-maximising behaviour. Some member states will stay within the boundaries of permitted activity but still undermine the strategic outcome of the RFMO.

Management Norm

International law grants the right of management to RFMO entities. It is useful here to establish the units of analysis for this study of management norms shown in Diag. 1. One can consider global treaties, regional fishery management organisations, member states, and fishing vessels as responsible actors in norms of behaviour. The global treaties achieved their objectives to create a framework for the governance of living marine resources. They also defined the role of RFMOs.

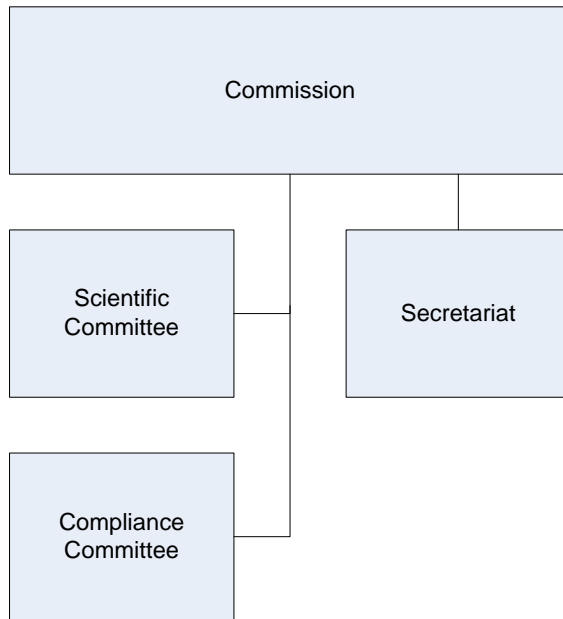
Diag. 1: *Core Units of Analysis*



When moving between the units of analysis in high seas institutions it is useful to treat regional treaty organisations and states as separate unitary actors. Recall, that states have obligations and the RFMO, while a collective, also has obligations and outcomes. These obligations are laid down by the UNCLOS and UNFSA framework treaties and some of these are self-imposed by the RFMO itself.

We may also usefully regard a RFMO as a unitary actor. Especially when considering possession of resources over which it has exclusive rights. In this way, the collective constitution of RFMOs may be considered unitary in the same way that states are considered unitary actors. When the UNCLOS mandated the formation of these collective bodies and it also imposed obligations upon them. Once established, RFMOs are the governing authority of a marine living resource over which it is competent. Further, while RFMOs may be a unitary actor they also have a typical structure. Diag. 2 shows the basic organisational structure of modern RFMOs. This is the context within which statements on management norms for the RFMO are made. Yet, we must also recognise the different organisational units within a RFMO. A RFMO will often express its institutional grammar with specific regard to these organisational units. Recall that norms specify which actions may or may not be undertaken by an actor. Indeed, the institutional grammar syntax seeks to assign actions that are obliged, permitted, or forbidden to a specific actor. Therefore, within a RFMO each of these organisational units has its own institutional strategies, norms, and rules.

Diag. 2: *The basic organisational structure of modern RFMOs*



The Commission of a RFMO is made up of all members. It is the primary decision-making body and in all the studied RFMOs performs the following core functions: (a) set total allowable catch (TAC), (b) set an allocation method, (c) establish a scientific basis for decisions on catch, (d) monitor member performance, and (e) deter violations. A right of management includes powers to determine how and where harvesting of the resource may occur. The detailed control mechanisms of this regulation have already been presented in *Chapter 5 - Fisheries management*. Of these core functions, setting TAC and establishing a scientific basis for catch will be covered in this section because within this context the scientific committee must analyse the effects of catch and methods of catch on target on the resource. The scientific committee must also make recommendations to the commission on TAC.

Chapter 5 - Fisheries management also detailed the curious performance gap in all the studied RFMOs. If the strategy of all the studied RFMOs is to sustain target fish stocks and these stocks remain at historically low levels then why does the commission bodies of these RFMOs ignore scientific advice and set total allowable catch levels that keep the stock levels so degraded. In Ostrom's organisation of common-property systems, a holder of a right of exclusion can regulate access to the resources, thus monitoring of member performance and deterring of violations will be discussed in the Rights of Exclusion section.

RFMOs set total allowable catch

The fundamental modification to the universal right of withdrawal lays in the right of RFMOs to determine the total allowable catch and total allowable fishing effort (TAFE) of the fisheries under their

competency.³⁷ The UNCLOS required each member state to cooperate and determine the allowable catch and establish other conservation measures (UNCLOS 1982 Art. 118). Whereas, in response to falling stocks, the UNFSA obliged every state to prevent or eliminate overfishing and ensure that levels of fishing effort not exceed sustainable use of fishery resources (UNFSA 1995 Art. 5.h). The power to set allowable catch is combined with the obligation to cooperate collectively through RFMOs (UNCLOS Art. 119.1). While the language of each RFMO differs slightly, all RFMO Conventions possess institutional statements on the right and the obligation to set TAC for the fisheries over which they have authority. For example, the CCAMLR Commission must designate the quantity of any species which may be harvested in the Convention Area (CCAMLR 1982 Art. IX.2). The CCSBT Commission must decide total allowable catch and its allocation among Parties (CCSBT 1994 Art. 8.3). The WCPFC must determine total allowable catch or total level of fishing effort for high migratory fish stocks within its convention area (WCPFC 2004 Art. 10.1.a). Finally, the SPRFMO Commission must adopt conservation and management measures that define total allowable catch or total allowable fishing effort, including the determination of precautionary and emergency reference points and the actions triggered by those reference points (SPRFMO 2009 Art. 16.3). In the SPRFMO the TAC setting functions of the Commission body is further distributed amongst an Eastern and Western Sub-Regional Management Committees (SPRFMO 2009 Art. 12.1). Regardless of variations, the conventions of all RFMOs have institutional statements on their right of management to set TAC for the fisheries under their authority.

In addition, all RFMOs require a scientific basis to support TAC levels. In each RFMO it is the role of the scientific committee to determine the status of fishery resource and make recommendations on catch levels to the Commission. In the CCAMLR, the scientific committee must establish the criteria and methods for determining CMMs and must transmit assessments, analyses, reports and recommendations to the Commission (CCAMLR 1982 Art. XV.2.a). In turn, the CCAMLR commission must then take full account of the recommendations and advice of the scientific committee (CCAMLR 1982 Para. 4). In its 1994 Convention, the CCSBT commission is required to take full account of scientific committee reports and recommendations when deciding upon total allowable catch and its allocation among parties (CCSBT 1994 Art. 8.6). For its part, the CCSBT scientific committee must report findings on status of Southern Bluefin Tuna (SBT) and make consensus recommendations on conservation, management and optimum utilisation of SBT (CCSBT 1994 Art. 9.2).

The WCPFC convention is worded more broadly but nonetheless requires the Commission to ensure measures are based on the best scientific evidence available (WCPFC 2004 5.b). While the WCPFC defines no specific role for the scientific committee, its Commission must ensure best scientific information on fish catch is available while maintaining confidentiality (WCPFC 2004 Art. 10.e). Finally, the SPRFMO scientific committee must assess different levels of total allowable catch or total allowable fishing effort and develop management plans for fishery resources based on such reference points (SPRFMO 2009 Art. 10.2.a-b). In turn, the SPRFMO commission must establish TAC and TAFE on the basis of recommendations from the scientific committee (SPRFMO 2009 Annex III.3). There is

³⁷ Both TAC and TAFE are measures to limit individual catch. TAFE is an input control and TAC an output control but for the purpose of this analysis TAC can be read to include TAFE.

a strong correlation between all the studied RFMOs on the role of science as the basis for decisions on total allowable catch by the RFMO.

The contradiction of historical catch

With the key obligations of management rights just established, there is the fundamental contradiction of historical catch that must be explored. The existing practice of basing individual allocation on historical catch is a source of considerable tension amongst RFMO member states. RFMOs form around existing fisheries and even with the universal right to participate in a high seas fishery not all states have an equal allocation of authorised fish-catch. There is no purposive intent to create an institution that shares the costs and benefits of fish-catch among interested member states as there was in the International Seabed Authority. Tensions between sustainable TAC, historical rates of catch, and individual allocation are particularly acute for those RFMOs fish resources that were already experiencing unsustainable rates of catch.

Aspirational strategy statements to conserve fish stocks anchor the convention of every studied RFMO. However, the prescriptive strength and practice of historical allocation remains strong. Two factors are at play. First, RFMOs always form around existing high seas fisheries. Second, securing agreement in any multilateral forum requires compromise. In the formation of international agreements, some actors will have strong interests in maintaining a status quo that preserves the stream of benefits coming to them. Some will hold reservations over any individual cost in contributing to a shared outcome.

Therefore, statements that fundamentally challenge the status quo, or the vested interests of a powerful nation or group of actors, will be prescriptively weak in the first instance. Such agreements are forged on a lowest common denominator of shared acceptance and are thus framed in the most ambiguous terms while appearing to support overarching treaty obligations. Nonetheless, these vague statements are agreed by consensus because concerned group members expect that the overall norm and rule set will “fall forward” in subsequent negotiations and forge incrementally stronger sets of norms and rules (Zartman 1992:117). This mechanism of incremental strengthening of institutional norms and rules by a group is evident in the contrast between the grammatical statements of initial RFMO Conventions and in the relatively more explicit management measures RFMO members have subsequently adopted. But there is considerable inertia around change to allocation proportions based on historical catch.

Institutional statements reproducing norms of historical catch appear in the initial institutional statements of all the RFMO conventions. For example, the CCAMLR does not provide for individual allocations but the extreme conditions facing fishers in the Antarctic provide their own barriers to entry and effort. Any fishing undertaken is largely conducted by developed nations. The CCSBT continues to use historical catch as the basis for setting allocation. The first statements of historical allocation began with the 1985 trilateral agreement between New Zealand, Australia, and Japan. The subsequent 1994 CCSBT convention formalised those allocations. By 2006, some member states argued that the

present allocation system was not consistent with the allocation principles contained in the UNFSA, and no longer defensible (New Zealand CCSBT13 2006).³⁸ However, increases and decreases to the TAC continue to be allocated among members individual quota in accord with each party's nominal percentage level while cooperating non-members are allocated an absolute tonnage (CCSBT 2011b). The WCPFC contains a prescriptively weaker statement but nonetheless the commission must account for historic catch (WCPFC 2004 Art. 10.3.b). Statements of the SPRFMO Convention are unique in specifying that the Commission is permitted to take into account historic catch when determining individual participation rights in the fish stocks under its competency (SPRFMO 2009 Art. 21.1).

This rejection of historical practice was evident from the initial multilateral meetings to negotiate the SPRFMO. Some states were concerned that using historical catch as the basis for allocation created the incentive for actors to inflate or invent levels of catch in order to secure a higher allocation (CPPS 2008). The tension between vested interests in maintaining historical catch allocations and those RFMO members seeking more equitable allocation still persists. Yet, the instinct to self-maximise remains strong even among established distant water fishing nations. For example, a SPRFMO member state remained discontent with an allocation that does not correspond with their nominated historical average catch calculations for a preceding 30-yr period (Russia SPRFMO 2014). The practice of basing allocation on historical catch is increasingly contested as the primary determinant of allocation.

In all the studied RFMOs there is evidence of three primary points of tension between the historical catch by member states and emerging practice. First, new entrants to a high seas fishery do not accept their exclusion from a resource based on first arrival nor of allocation of resources based on historical technological advantage (CCSBT16 2009 Art. 13.1).³⁹ RFMO members often pursue more equitable conditions for participation in the fishery. Second, favouring historical catch encourages gaming of the system by member states to capture a larger share of catch for new and exploratory fisheries (CPPS 2008). Finally, the norm of accounting for historical catch creates considerable impetus for the maintenance of TAC at historical levels. Given the extent of past overfishing and the grievous decline in high seas fish stocks, these historical levels of fishing are no longer regarded as a legitimate institutional basis for determining future effort levels.

New institutional norms on historical catch levels

RFMO Commissions have attempted to override historical catch allocations and reduce total catch to below historical baselines. However, the gap between the collective determination of total allowable catch and individual compliance with catch limits is one with which even the most modern of RFMOs continues to struggle. Icefish fisheries in the CCAMLR area began in the late 1970's with large catches taken by eastern European vessels. Catch volumes have crashed in the intervening years and now the current harvest strategy authorises a catch limit for this fishery has been between 1500 and 5000 tonnes (CCAMLR SC 2016:24). At this level, the fishery was certified as sustainable in 2010 and this

³⁸ See Appendix 4 for the current percentage allocations for each CCSBT member.

³⁹ New entrants are often developing nations.

was recertified in 2016. Nonetheless, historical and unsustainable rates of fishing continue to degrade the current potential of living marine resources in the Antarctic. The other significant fisheries under CCAMLR competency are toothfish species. These species have been heavily fished in the past. It is estimated that only between 51-61% of the unfished spawning stock biomass still exists in 2017 (CCAMLR SC 2016:26; CCAMLR SC 2017:13).

The WCPFC adopted the measure in 2005 that catch must not exceed 2004 levels (WCPFC CMM 2005 Para. 8). Compliance levels were low. In 2008, the Commission responded to continued low levels of tuna stocks by adopting a measure to reduce catch by 30% from the 2004 historical baseline (WCPFC 2010-2011 Para. 31). Similar statements to enact and establish new institutional norms are evident in all the other studied RFMOs.

In the years preceding 2006, the existing level of TAC in the CCSBT was criticised for being nearly double the maximum sustainable yield of the remaining tuna stocks. In 2006, it was revealed that this official unsustainable TAC of 11,810 tonnes per year had been systematically violated. A review of SBT data indicated that there may have been substantial under-reporting of SBT catches and surface fishery bias in the previous 10 - 20 year period and there is currently substantial uncertainty regarding the true levels of total SBT catch over this period (CCSBT24 SC22 2017:102). Even in 2009, the CCSBT scientific committee reported that spawning stock of southern bluefin tuna was critically low at 5% of the unfished stock biomass and under the current TAC of 11,810t per annum could not rebuild until at least 2025 (CCSBT16 2009:72). In accord with scientific committee recommendations, some members pushed for TAC to be reduced (CCSBT15 2008 New Zealand Attachment 4-5; Taiwan Attachment 4-2; South Korea Attachment 4-5). In 2012, the CCSBT Commission introduced new principles for determining TAC. Total allowable catch is now tuned to a level with a 70% probability of rebuilding the stock to 20% of the original spawning stock biomass by 2035 (CCSBT 2011b). But once again an element of dysfunction at the core of RFMO collective decision-making processes is revealed.

Despite the significantly depleted state of the southern bluefin tuna stocks and the above management strategy, the CCSBT commission planned to raise TAC from its 2014 level of 12,449 tonnes to 14,647 tonnes in 2015. Some member states could not resist self-maximising pressures. The decision-making processes of the CCSBT scientific committee was called into question with some members questioning the decision to retain TAC at 2016-2017 levels despite evidence of “significant levels of unaccounted mortality” (CCSBT 2015 Item 47). Historically, the SBT stock has been exploited for more than 50 years, with total catches peaking at 81,750 t in 1961. The CCSBT has formed a working group to resolve uncertainties in estimating growth and catch sampling methods in Australian tuna farming operations and of the Japan Markets Analyses. There remained ongoing and outstanding issues of concern. Other members thanked Australia and Japan for their more constructive and collaborative approach this year. But Australia and Japan were reminded that the burden of these uncertainties was shared by other the RFMO members and this made them not merely interested observers but potentially aggrieved parties (CCSBT24 SC22 2017:23).

The SPRFMO Commission has also sought to push total allowable catch of its jack mackerel fishery below historical and unsustainable baselines. During the negotiation period leading up to its agreement and entry into force, individual allocation among member states was set at a 2007 historical catch

baseline but was in no way endorsed by the Commission as sustainable (SPRFMO 2007:1). Yet, after its entry into force in 2009, some SPRFMO member states unilaterally increased the 'authorised' catch of their flagged fishing vessels by 160,000 tonnes (SPRFMO 2010b, 2010c). In 2011, SPRFMO members agreed upon a new TAC baseline that incorporated increases of another 70,000 tonnes (SPRFMO 2011 Table 1). The Commission adopted measures to reduce individual allocation to 60% of this baseline for 2011 and to reduce individual allocation to 40% of baseline in 2012 (SPRFMO 2011 Para 12.). However, the 2011 fishing season saw some members again 'authorise' catch increases above their baseline allocation (SPRFMO 2011b). In 2013, the SPRFMO scientific committee advised that catch should be kept at or below 440,000 tonnes to achieve any likelihood of an increase the spawning biomass. In turn, the Commission agreed on a TAC of 390,000 tonnes (SPRFMO 2013). For the 2014 season, the Commission reports that TAC looked to, for the first time, fall below the 390,000t limit (SPRFMO 2014). The SPRFMO considered the historically high rates of fish-catch, the need to maintain low fishing mortality, and the high degree of uncertainty of stock recovery (SPRFMO-COMM-03 2015:1). Any assessments on jack mackerel were based on data from 2010.

In 2017, jack mackerel stocks remain at very low levels. Nonetheless, since 2015 TAC has increased 23,000 tonnes to a total SPRFMO allowable catch of 493,000 tonnes (SPRFMO-CMM 01-2017; SPRFMO SC. 2016:7). Jack mackerel TAC for 2018 is set to 576,000 tonnes (SPRFMO SC. 2017:47). This stock has been overfished in the past. Actual spawning stock started at around 10,000,000 tonnes decreased to its lowest point of around 2,000,000 tonnes in 2010. It is since recovering up to 5,000,000 tonnes 2017. This data is based on stronger incoming year classes perhaps due to El Nino effects but is not yet certain to translated to an addition to spawning biomass (SPRFMO SC. 2016:7). Actual fishing mortality peaked at 90% of biomass in the late 1990s. It is now set to 10% of biomass.

The other major fishery in the SPRFMO is Orange Roughy. There are not currently any target or limit reference points for SPRFMO Orange Roughy stocks. The inclusion of 20% of unfished biomass is the limit reference point used by NZ and Australia (SPRFMO SC. 2017:16). Under the precautionary approach adopted by New Zealand and Australia have caught 943 tonnes over the past four years (SPRFMO SC. 2016:7). This is similar to existing estimates of sustainable yield for the orange roughy species.

The grammatical approach reveals the institutional norms of the rights of management in RFMOs. It is evident that RFMOs do express rights of management over high seas fish stocks for which they are competent. The UNCLOS mandates that states must conserve the living resources of the high seas. To do so these same states must take measures which are designed on the best scientific evidence to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield (UNCLOS 1982 Art 119.1). However, it is evident that RFMO determined TAC and individual quota is not rational, not economically optimum, nor is it scientifically determined MSY. This thesis argues that new mechanisms of control are needed. Further, it will argue that these mechanisms must be punitive rules that enforce sustainable rates of catch and allow the fish-stock resources to rebuild.

Management Rule

The Conventions of all the studied RFMOs do permit sanctions for non-compliance. Typically, these are expressed in the most vague and circumspect institutional statements. The one clear feature of those rule statements is the strong prescriptive force of sanctions for vessel violations in contrast to the considerably weaker prescriptive force of sanctions for state violations. Further, there is no precedent and little guidance on member state sanctions for RFMOs from the framework treaties. The UNCLOS makes no rule statement on sanctions against flag states which violate institutional norms. In contrast, the UNFSA does list a set of serious violations that are all specific to vessels (UNFSA 1995 Art. 21.11): fishing without a valid licence, failing to maintain accurate records of catch and catch-related data, serious misreporting of catch, contrary to reporting requirements, fishing in a closed area, during a closed season, after attainment of quota, directed fishing for a stock subject to moratorium or for which fishing is prohibited, using prohibited fishing gear, falsifying or concealing markings of a fishing vessel, concealing or tampering with or disposing of evidence, and multiple violations of which constitute a serious disregard of CMMs.

The UNFSA list is a useful start but the definition of sanctions is applied variably by each RFMO. One common compliance element for all the studied RFMOs is compliance with levels of allowed catch and the provision of catch documentation. These statements essentially specify vessel obligations. For example, the CCAMLR now broadly defines failure to submit catch documentation reports as a violation with a penalty to inform all other RFMO members of the failure (CCAMLR 2005 Five day catch and effort reporting system; CCAMLR 1993 Ten day catch and effort reporting system). In 2008, the commission adopted a new scheme to promote compliance by member states (CCAMLR 2008 Para 4-5). This updated list of violations included vessel fishing without a licence (areas, species, and time periods), false declarations by vessels, transshipments or resupply IUU vessels, and vessel failing to provide valid catch documentation. However, by 2008 there is only one rule statement where a member state is subject to a sanction. A member whose vessels repeatedly violated CCAMLR norms would themselves be considered in violation (CCAMLR 2008 Para 4). Because the sanction allows exclusion from the stream of benefits from such illegal activities it will be revisited in the later Right of Exclusion section under the CCAMLR compliance evaluation procedure.

In its Convention, the WCPFC was initially focused on vessel violations. It refers to the UNFSA violations and requires members to ensure flagged vessels in serious violation cease fishing activities until all sanctions imposed by flag state are complied with (WCPFC 1994 Art. 25.3-4). In addition, members are required to establish sanctions severe enough to discourage violations by individual vessels and to deprive offenders of benefits accruing from illegal activities (WCPFC 1994 Art. 25.7). In 2010, the WCPFC commission introduced measures for an IUU list (WCPFC CMM to establish IUU list 2010 Para. 3). Violations that warrant entry onto the IUU list include: false reporting of catches, undersized catch, catch from a closed area, using prohibited fishing gear, transshipment with vessels on IUU list.

In 2010, the WCPFC shifted the focus of its compliance rule statements from vessels to address consistent non-compliance by member states. These new WCPFC measures considered the type, severity, degree and cause of non-compliance (WCPFC CMM scheme 2010 Para 22). The new

compliance process moves through three phases: the compliance review, the compliance action plan, and the compliance remedy (WCPFC 2010 Annex I). The *compliance review* identifies non-compliance of a technical or minor nature such as: (i) insufficient, unclear or incorrect data or information, (ii) actions or omissions which constitute a minor violation of relevant obligations, (iii) ambiguity or misunderstanding of relevant obligations. The subsequent *compliance action plan* will identify steps to rectify non-compliance behaviours, including the provision of technical assistance or capacity building. More serious non-compliance issues were identified as (i) actions or omissions that constitute a serious violation, (ii) actions that undermine the effectiveness of the Convention, and (iii) failure to comply with previous Compliance Monitoring Report recommendations after sufficient time and assistance has been provided. The final step in the WCPFC scheme is the *compliance remedy* to address instances of serious or persistent non-compliance. This procedure is fundamentally similar to compliance evaluation procedures introduced by the CCAMLR and CCSBT.

In 2010, the CCSBT focused the weight of its compliance measures on the introduction of a new catch documentation scheme to track the catch, landings, sales and trade flows of all southern bluefin tuna. Here, the CCSBT makes a combination of statements on this initiative that begin with a strategy statement. Any catch without complete and valid catch documents is illegal catch (2010 CCSBT Resolution Para 4). From 2010, no SBT would be accepted for domestic sale, export, or import without the correct accompanying catch documentation (CCSBT17 2010:2). Further in 2011, the CCSBT issued normative statements that set out three main sources of non-compliance by member states: (a) administrative failings, including not fully implementing effective systems and processes to support obligations, (b) failure by members to take action against non-compliance by fishers, farmers, processors, exporters or importers within their jurisdiction, and (c) deliberate actions by Members to avoid meeting obligations (CCSBT23 CC11 2016:49). The CCSBT also introduced new rules for corrective actions to violations. For lesser violations these include compliance assistance/capacity building programmes, increased monitoring requirements, and public disclosure. At the upper range of seriousness, sanctions will include quota payback of overcatch with aggravating factors permitting a higher ratio of quota payback, quota reductions in national catch allocations, increased monitoring requirements for inspections, VMS reporting frequency, restrictions on transshipments and landing, public disclosure, trade or market restrictions consistent with international law (2011 CCSBT18 Operational Resolution Corrective Actions Policy: Compliance Policy Guideline 3; CCSBT23 CC11 2016:49). The new CCSBT measures all focused on member compliance as opposed to vessel compliance.

In 2013, SPRFMO introduced a new conservation measure that all members must notify the Commission of vessels authorised to fish each year. A member or non-member state is presumed to have carried out IUU activities when there is evidence that flagged vessels: (a) engage in fishing SPRFMO resources while not authorised, (b) engage in fishing beyond flag state quotas, (c) do not record or make false reports, (d) take on board, tranship or land undersized fish in contravention with SPRFMO measures, (e) engage in fishing during closed fishing periods or in closed areas, (f) use prohibited or non-compliant fishing gear, (g) tranship with vessels included in the SPRFMO IUU vessels list, (h) engage in fishing for SPRFMO resources while unflagged (SPRFMO 2013 CMM1-04:1). There is little public domain information on compliance sanctions imposed. Nevertheless, two

cases of vessel violations were reported by the SPRFMO Compliance and Technical Committee in 2014. Panama opened sanctioning procedures against an offending vessel and asked that the vessel not be included in the SPRFMO IUU vessel list and excluded from the fishery. Liberia indicated its willingness to cooperate in both cases raised against it by the SPRFMO and asked that the vessel not be placed on the SPRFMO IUU list. In all cases the Compliance Committee accepted the commitment of the notified flag states and removed the vessels from the draft IUU vessel list.

But these sanctions are still vessel sanctions. They hold a flag state accountable for the actions of its flagged vessels. But there is still no movement to remove the allocation of a state as the sanction. The right to an allocation is apparently not subject to sanction. RFMOs do exercise their right of management to determine how and where fish catch can occur. But, it is not the practice of the studied RFMOs to put the right of a member state to an allocation quantity into jeopardy. Given the grievous situation of the world's fish stocks and the aspirational strategy statements of every studied RFMO this is curious institutional practice.

Right of Exclusion

A holder of a *right of exclusion* can regulate access to the resources and how this access can be transferred (Schlager and Ostrom 1992:251). Recall that the law of the sea provides all states the freedom of the seas (UNCLOS 1982 Art. 87). We may regard this as the exercise of a right of access. A right of withdrawal is the action of catching fish from high seas fish stocks. While all states hold the right to catch high seas fish stocks they may only do so if members of the RFMO that governs the fishery (UNFSA 1995 Art. 19.2).⁴⁰ Non-members do not hold a right of withdrawal and are excluded from catching those fish stocks over which a RFMO holds authority. All member states have a common-property right and must catch high seas fish stocks in compliance with RFMO norms and rules.

As shown in the section on the rights of management, the primary and most contentious element of RFMO governance is the allocation of catch amongst member states. In this section on the rights of exclusion, the focus turns to the extent to which the studied RFMOs exercise powers to exclude both non-members and non-compliant members. The thesis focuses on this type of sanction because exclusion from the stream of benefits from a shared resource is the most effective threat against non-compliant behaviour. Recall that no state has the sole right to common-pool resources of the high seas. All states who wish to withdraw a stream of benefits from that common-pool resource have already agreed to behave by a set of constitutional rules agreed by the competent RFMO.

⁴⁰ This category includes cooperating non-members who commit to RFMO norms and in return are permitted allocation rights. This situation generally involves flag states that take a governed species as by-catch as opposed to targeted fishing.

Exclusion Strategy

RFMOs are multilateral arrangements with the purpose of giving effect to international law. To this end, when a RFMO enters into force it creates a jurisdiction, albeit specific and limited. Many of the principles and norms that constitute RFMO practice are adopted from global framework institutions such as the UNCLOS and UNFSA. The institutional strategy being enacted is the exclusion of outsiders. But RFMOs individually and variably adopt more specific rules to reinforce norms and principles. These rules can be the suspension of a member state's right to manage because they have not paid membership fees. There are also sanctions for violations in the form of payback of overcatch and reduction of allocation. However, the idea of exclusion must first be examined in its institutional setting.

RFMOs must work within a fundamental contradiction. In the context of high seas fishing, the classification of an outsider is complicated because all states have universal rights to become members. Yet, without some boundary for exclusion a common-pool resource is open-access. Open-access conditions and the competitive impetus to overfish define the 'tragedy of the commons'. If additional actors are able to enter the fishery and demand a share of the resource then the value of the common-property system to existing members is degraded. Recall that all high seas fisheries are commercial. Each actor performs the production activity of fishing effort in order to extract fish-caught from the fish-stock. Each actor takes some fraction of the total catch as their own to exchange at market for profit. The more actors that extract fish-caught the less fish-stock remains.

The failure of RFMOs to provide an allocation to a new member is itself a barrier to entry. Despite the provisions of universal rights of withdrawal the withholding of substantive allocations is evidence of an implicit behaviour by current RFMO members to exclude new members from access to the living marine resources of the high seas. This is categorical evidence to support the argument of this thesis that the collective membership of an RFMO treats high seas fish stocks as a form of common-property.

The biological limit for a living marine resource is maximum sustainable yield (MSY). MSY is the amount of fish that can be extracted without degrading the productive potential of a spawning fish-stock biomass. If the rate of fish-catch consistently exceeds the rate of natural recruitment then the fish-stock itself will degrade. That is, the productive resource will degrade. This is a negative outcome. Consider the economic argument. A commercial fishery exists because a valuable fish-stock exists. The more actors that enter a fishery reduce the fraction of catch for each other actor. Maximum economic yield (MEY) was explained in *Chapter 4 - Fishing as a production activity*. Eventually the economic point of equilibrium is reached where the production costs of a unit of fish-caught equals the market value of that same unit. Each unit of fish-caught beyond this point is not profitable. Returning to biotic measures of sustainability, the fish stock at this point is degraded. This typically low fraction of an original fish stock is the disastrous economic and ecological steady state of a fishery with no barriers to

new entrants.⁴¹ There is no resolution to this contradiction of exclusion facing RFMOs. It is a product of the international framework of high seas freedoms established under the UNCLOS.

Ideas on exclusion contrast with the logic of institutional success. The first point of exclusion to consider is the one mandated by the UNCLOS. A non-member state is forbidden from authorising its flagged vessels to fish for the living marine resources under the competency of a RFMO (UNCLOS 1982 Art. 118). Any fishing conducted by these vessels is regarded as illegal. Flag states' regard exclusion as a negative outcome and seek to become RFMO members (Taiwan Today 2009). However, this statement of exclusion by the UNCLOS contrasts with the logic of institutional success. It does so because the success of a social institution depends upon the reproduction of its behavioural norms by all actors in its specific issue-area. One measure of an institutions success is through universally reproduced behaviours. Threats to an institution exist in the form of outsiders who refuse to comply with behavioural norms of the institution. Thus, institutional success depends upon gathering the greatest number of actors who are active in the issue area as members of the institution.

In contrast to the theory of institutional success, a common-property system has two mechanisms at work. On one hand, the common-property collective works as an institution and collectively defines norms of legitimate actions or outcomes. On the other hand, the core motivating factor behind a common-property collective is to secure long-term access to a valuable finite resource and sustain the future value of the resource to its members. Thus, success of a system of common-property depends upon excluding both outsiders and non-compliant group members from exploiting the resource. Likewise, the success of a system of common-property over high seas fish stocks depends upon the control of catch and the allocation of catch amongst legitimate members of the group. In a high seas fishery, member states must deter fishing by non-parties and non-compliant fishing by members. It is therefore illogical that at the same time members must encourage non-parties to become parties and to adopt laws and regulation consistent with its provisions (UNFSA Art. 17.3; SPRFMO Art. 32.3).

This is a fundamental and unresolved tension in all RFMOs today. It was managed in the past by adopting an approach to recognise existing interests expressed as quantities of fish-caught by those actors already engaged in the fishery. But many interested parties do not accept this status quo and demand new equitable benefits from the naturally occurring high seas fish stocks. This will be an aggravating factor if fish stocks are ever enabled to recover from the current grievously low levels of biomass. It will be aggravating because all RFMOs currently plan to simply increase the proportion of IQ quantities in accord with existing IQ allocation percentages. The challenges facing governance of high seas fish stocks stretch into the future. However, this thesis is concerned with achieving rates of fish-caught that are within rates of fish regeneration. Thus, exclusion in this context is the exclusion of non-compliant actors both inside and outside of the group authorised to extract fish-caught.

⁴¹ Not all states are interested to engage in a particular fishery. But even if a large number of states are interested the negative outcome still applies.

Exclusion Norm

As stated above, to achieve exclusion of non-compliant actors the RFMO common-property institutions must define violations. The UNCLOS and UNFSA have no provisions for sanctions so it is significant that RFMOs are indeed starting to create actions that could result in exclusion outcomes.

Institutional statements on member exclusions are present but they are vague and their prescriptive strength is weak. It is useful to distinguish between sanctions against vessel violations and sanctions against state actor violations of RFMO norms. The essence of power over property is to secure beneficial use of a resource for the right holders and to exclude non-rights holders. In general, the RFMOs studied focused their norms of exclusion upon placing individual vessels onto an IUU list. In 2008, the CCAMLR established an IUU vessel list for vessels that fish in an illegal unregulated and unreported way (CCAMLR 2008 Scheme to promote compliance with Contracting Party vessels Para. 1; CCAMLR 2009 Scheme to promote compliance Para. 2). In its 2000 Action Plan, the CCSBT commission created a list of non-member vessels catching southern bluefin tuna (CCSBT 2000 Action Plan Para 2). The WCPFC Commission established its IUU vessel list in 2010 (WCPFC CMM to establish IUU list 2010 Para. 1). In its founding convention, the SPRFMO was permitted to identify vessels engaging in IUU fishing activities to an IUU vessels list (SPRFMO 2009 Art. 27.1.f). It is the RFMO norm that any non-compliant behaviour by vessels be sanctioned.

This is a fundamental control mechanism for fishery management. However, this thesis is focused on identifying improvements to the governance of high seas fisheries. Therefore, it is focused on identifying the mechanisms of control employed by the governing authority to encourage and ensure compliant behaviour among member states. States are the beneficiaries of streams of benefits from high seas commercial fishing. The commercial fishing of high seas fish stocks is an entirely elective activity. If a state wishes to engage in this activity then by law it must agree to abide by the strategies, norms, and rules of a RFMO.

This research found only two statements identifying a norm for sanctions against a non-compliant member state. One, was found in the SPRFMO. The SPRFMO Commission is permitted to take into account a member's compliance with (i) flag state duties, (ii) compliance with MCSE&R measures, (iii) compliance with principles of new or exploratory fisheries, (iv) contribution to scientific research, and (v) compliance with reporting of scientific research (SPRFMO 2009 Art. 21.1). This statement is ambiguous, there is no context in which this accounting of member compliance would apply, and there is no evidence that the SPRFMO commission has used this capability to enforce compliance or sanction serious violations by member states. In the WCPFC, Australia sought further discussion on how responses to non-compliance might be dealt with (WCPFC14 TC13 2017:54). European Union supported the embedding of existing monitoring, control, and surveillance provisions in the new measure, and it favoured incorporating responses to non-compliance into the final measure. For example, the development of a 'no data – no fish' rule in addition to a pay-back rule if established quotas are exceeded.

Exclusion Rule

It is useful to again recall the emphasis that Crawford and Ostrom place upon rules in their institutional grammar method. They asserted that while institutions are based on shared strategies and norms, institutions are constructed by rules designed to reproduce desired behaviour (Crawford & Ostrom 2005:583). Compliance with shared expectations of behaviour lies at the core of group cooperation and cooperative outcomes. Therefore greater weight is placed upon institutional rules. Compliant actors within the group expect violators to experience some type of cost. In the RFMO setting, violators are excluded through various mechanisms such as entry on an IUU list, through the payback of overcatch (no benefit from violation), and through imposition of a reduction in allocated catch. The next section will explore the prescriptive strength for those sanctions applied by a member to its flagged fishing vessels in contrast to the prescriptive strength for those sanctions applied by the RFMO Commission to its member states.

Vessel sanctions

Vessels in violation of RFMO norms are excluded from the fishery. The prescriptive strength of sanctions against vessels in violation of institutional norms is strong and unambiguous. The CCAMLR forbids a member to licence fishing vessels on the IUU vessel list (CCAMLR 2008 CP-IUU Vessel List Para. 18). Vessels on the IUU list are excluded from the fishery. Other exclusion sanctions centre upon the CCAMLR catch documentation scheme. Basically, members must report on catch so frequently because the CCAMLR does not have a system of individual quota. Recall, that when the secretariat determines that the total allowable catch for a sub-region is close to maximum it issues a notification to all authorised vessels to cease fishing for the notified period onwards (CCALMR 1993 ten day catch and effort reporting system; CCALMR 2005 five day catch and effort reporting system). Further, a member is forbidden to import, export or re-export *Dissostichus*⁴² if a catch document is invalid (CCALMR 2009 Catch Documentation Scheme Para. 4 & 18). For example, a Korean flagged vessel misreported catch and is accused of profiting from this illegal activity. As the flag state, Korea acted to suspend that vessel's fishing authorisation for three years. But this decision was contested by the vessel owners and is still before the Korean courts. Korea might need to re-authorise that vessel for further catch quantities while this matter is still unresolved (CCAMLR Annual Report 2016:144). Thus, vessel exclusion from the benefits of illegal withdrawal from a fishery can sometimes be blocked by inadequate domestic laws within a flag state. The mandate for a flag state to sanction fishing vessels is clearly defined. However, it is not yet clear if Korea will be held accountable for its failure to implement domestic laws compatible with its obligations as a member of the CCAMLR.

The CCSBT seeks to ensure that no financial benefit arises from the sale of seized or confiscated fish-catch to accrue to the perpetrators of IUU fishing (CCSBT Compliance Plan 2011:4). The CCSBT has also established records of authorised SBT vessels, authorised SBT carrier vessels, and Authorised SBT farms (CCSBT24 SC22 2017:106). Members and Cooperating Non-Members of the CCSBT will not allow the landing or trade etc. of SBT caught by fishing vessels and farms, or transhipped to carrier

⁴² A type of cod.

vessels that are not on these lists. This norm is still centred on punishing vessels because members are permitted to sell the confiscated catch. On becoming a member South Africa was already supposed to ratify domestic rules that allowed it to ensure flagged vessels complied with catch limits. South Africa plans to penalise its 2015 overcatch by flagged quota holders. It is still considering penalties to apply to vessels so that South Africa will not exceed its national allocation again (CCSBT24 CC12 2017:2). Indonesia too had overcatch in previous years (CCSBT24 CC12 2017:2). However, the CCSBT agreed that this non-compliance was minor and corrective action was to help Indonesia improve its national catch documentation.

Similarly, vessels that violate SPRFMO norms are excluded from catch of SPRFMO fish stocks. The SPRFMO Convention and its adopted measures explicitly define compliance actions and outcomes. In its Convention provisions, the SPRFMO requires members to immediately cease fishing with vessels in serious violation and deprive offenders of the benefits of illegal activities (SPRFMO 2009 Art. 25.3.d-e). SPRFMO members must also deter the fishing activities of vessels flagged to non-contracting states that fall within the competency of the SPRFMO (SPRFMO 2009 Art. 32.1). Each member of the group must apply adequately severe sanctions for violations; in particular members must deprive offenders from the benefits accruing from fishing vessels (SPRFMO 2009 Art. 3.1.a.ix). Flag states must not flag a vessel on the IUU list and must ensure no transshipment with vessels on the IUU list (SPRFMO 2013 CMM1-04:2). These are directed at vessels and there are no rules define the sanction of a member state.

IUU vessel sanctions

An expanded view of exclusionary sanctions includes controls over both catch and market exchange. The business of commercial fishing has two elements. First is the actual catch of the fish stock. Second, to realise profit the actor must exchange fish-catch at market. The importance of these two elements is reflected by the efforts of RFMOs to engage them as points of control. This is still necessary because illegal catch is intended to be inserted into the supply chain. It must be sold for the best possible price at a legitimate market. Therefore, port states must prohibit the entry, landing, refuelling, resupply or other commercial transactions with vessels on a IUU list. The international framework already permits port states to adopt sanctions that include regulations to prohibit landings and transshipments where it has been established that the catch has been taken in a manner which undermines the effectiveness of RFMO measures on the high seas (UNFSA Art. 23).

Port states

CCAMLR members are forbidden to allow imports, exports and re-exports of toothfish from vessels on its IUU Vessel List (CCAMLR 2008 Proposed and Final CP-IUU Vessel List Para. 18). Therefore, port state members must inspect all fishing vessels carrying toothfish (CCAMLR 2009 Port inspections of vessels). Port state members must determine if the vessel catch agrees with information recorded on catch document. For example, of seventy transshipments by seven vessels in the Convention Area in 2017, only three reports of port inspections had been received by the Secretariat (CCAMLR SC 2016:141). This is a possible non-compliance by member and non-member port states. There has been no public discussion of CCAMLR sanctions against member port states to date. Likewise, the CCSBT adopted a Resolution for a CCSBT Scheme for Minimum Standards for Inspections in Port in

October 2015. The Resolution entered into force on 1 January 2017. The scheme applies to foreign fishing vessels, including carrier vessels other than container vessels. Under this scheme, Members wishing to grant access to its ports to foreign fishing vessels must designate ports, require documentation of landings, inspect at least 5% of foreign fishing vessels in their designated ports (CCSBT24 SC22 2017:106).

The WCPFC requires port states to adopt regulations prohibiting landings and transshipment where catch undermines effectiveness of adopted measures (WCPFC 2004 Art. 27.2). Members must also monitor landing and transshipment ports to assess the amount of catch by species (WCPFC Measures for 2010-2011 Para. 42). Likewise, the SPRFMO treaty requires port state members to give effect to adopted conservation and management measures verify catch landed or transhipped through its ports (SPRFMO 2009 Art. 26.2; SPRFMO 2009a Para 16). SPRFMO exclusionary sanctions have been extended to include reefer (refrigerated) and supply vessel access to member ports (SPRFMO 2011 Para 20). These control mechanisms make it difficult for non-compliant vessels to offload their illegal catch. Recall that it is the ultimate goal of illegal commercial fishing to reinsert that catch into the legitimate supply chain to exchange for profit at the rates of return of a market.

Market states

Similarly, market states must prohibit the import or transshipment of landings from vessels on an RFMO IUU list. The CCAMLR commission is permitted to adopt appropriate multilaterally agreed trade related measures, consistent with obligations as members of WTO, that may be necessary to prevent, deter and eliminate the IUU activities (CCALMR 2008 Proposed and Final CP-IUU Vessel List Para. 25). The CCAMLR reasserted the permission that its members can bring World Trade Organisation (WTO) allowed trade related measures to be brought against seriously non-compliant members and non-member states (CCAMLR COMM 2017:57). In its 2000 Action Plan, the CCSBT commission permitted itself to impose trade-restrictive measures on southern bluefin tuna products from non-members (CCSBT 2000 Action Plan Para 2). The serious non-compliance of Japan as a flag and market state has already been discussed. In 2016, a review of SBT sales in the Chinese sashimi market with a spot sample showing 13% of total tuna movements being SBT (CCSBT23 SC21 2016:22). These samples were lower priced which suggested that the source of product was from illicit rather than official imports (CCSBT23 CC11 2016:16). A world wildlife fund (WWF) study in 2011 found that 26% of sashimi tuna sampled from 97 restaurants in Shanghai and Beijing were found to be SBT (CCSBT23 CC11 2016:18). This issue was added to the CCSBTs ongoing effort to account for global SBT mortality. Further, China was engaged to cooperate with CCSBT catch documentation scheme (CDS). New Zealand and the EU proposed that a minimum precautionary estimate be appropriate with non-cooperating non-member catch be set to 1,000 tonnes (CCSBT23 CC11 2016:18). Other members preferred to use the Scientific Committee estimate of 182.5 tonnes as a starting point.

Similarly, the WCPFC commission must develop procedures for non-discriminatory trade measures against state or entity whose fishing vessels fish in a manner which undermines effectiveness of adopted CMMs (WCPFC 2004 Art. 25.12). While proposed in the draft SPRFMO text, market state measures were subsequently left out of its Convention due to limited support and strong opposition among negotiating states. Nonetheless, the SPRFMO Commission is permitted to establish market-

related measures to monitor transshipment, landings and trade, and to define catch documentation schemes (SPRFMO 2009 Art. 27.1.d). The Commission is also permitted to adopt procedures that enable trade-related measures in relation to fishery resources to be applied by members to any member state whose vessels engage in fishing activities that fail to comply with the conservation and management measures adopted by the Commission (SPRFMO Art. 27.2). These control mechanisms make it increasingly difficult for non-compliant vessels to insert their illegal catch into legitimate markets for exchange. Nevertheless, IUU fishing is still a major problem for the sustainability of high seas fishing and IUU fishing can be conducted by non-member and member states. This thesis is focused on identifying improvements to the behaviour of member states.

Member sanctions: Plan A – Name and Shame

While all the studied RFMOs identify actions that constitute violations they do not yet consistently publicise violations and sanctions against member states. It is often left to the analyst to identify a reference to a violation in official statements and infer evidence in supplementary data such as changes to a nation's allocation of catch. There is some impetus for violations and sanctions to be made public. This is more often expressed in the context of catch documentation schemes which require RFMO secretariats to publish when each member state is approaching and has reached its allocated catch amount. To date however, the CCSBT is the only RFMO to explicitly identify public disclosure as a sanction option and it only did so in 2011. Even if public disclosure became an explicit sanction option, its efficacy as a deterrent would be questionable. In a fashion, public disclosure already exists in the form of the IUU lists maintained by all the studied RFMOs. These lists identify the flag states of vessels which engage in IUU activities.

However, this procedure is weakened by the administrative mechanisms of RFMOs that allows flag states, including non-member flag states, to intervene. These flag states are permitted to declare actions taken against non-compliant vessels, and to request that these vessels and the flag state are not listed in the IUU register. In addition, there is ample evidence that RFMO members consistently 'authorise' catch levels beyond the official allocation by the RFMO. This is a problematic and complex issue area. For example, these additional authorisations occurred in the SPRFMO. They occurred in the conduct of member states that had elected to include their national catch with the total allowable catch of the RFMO for a straddling stock of jack mackerel. Subsequently, these member states have chosen to withdraw their national catch from the oversight of the RFMO.

Nonetheless, it is clear that all the studied RFMOs struggle to maintain sustainable rates of fish-catch amongst member states. Some actors do not appear to be deterred by the 'shame' that is invested into threats of public disclosure of catch beyond an actor's allocation. Focus must therefore shift to more effective deterrents.

Member sanctions: Plan B – Exclusion from future benefits

The sanctions for serious violations of RFMO norms are different approaches to exclusion. Two types of exclusion have emerged in the sanctions for serious violations within RFMOs: (1) violators must not

benefit from overcatch and (2) violators should be excluded from future catch allocations. As in previous examples, the statements in RFMOs range from the prescriptively weak to the prescriptively strong. In this case, examples also range from ambiguous to explicit. In 2009, the CCAMLR introduced a scheme to promote compliance among member states. Here, the commission must deprive participants of benefits obtained and to effectively dissuade the actors of further illegal activities (CCAMLR Scheme 2009 Para. 1). Member states are the subject of the sanctions, but the CCAMLR does not identify which penalty or punishment may be applied to violator. In 2017, the CCAMLR Compliance Committee agreed that members should be made more accountable regarding cases of serious non-compliance that undermines the objectives of the RFMO (CCAMLR SCIC 2017:27). It made the recommendation to strengthen the Compliance Evaluation Procedure (CEP) CM 10-10 (CCAMLR COMM 2017:70). This conservation measure publishes the compliance details of each member with a non-compliance status ranging from minor, to non-compliant, and to serious and frequent non-compliance.

So, there are signs that some members expect all members to be held accountable for serious non-compliance. Yet, some other members expressed apprehension that the compliance committee could annually prioritise the conservation measures that will be the focus of its evaluation procedure. The CEP is intended to evaluate adherence to conservation measures as well as a member's responsive actions (CCAMLR COMM 2017:9). In addition, some members go to great lengths to prevent publication of a compliance report that reflects or exposes them as non-compliant even on procedural issues (CCAMLR COMM 2017:13-14). It remains to be seen if this is an issue specific incident or if there is a more fundamental resistance to the imposition of RFMO sanctions over members. There is still no discussion of common-property approaches to such institutional mechanisms of control.

Sanctions in the CCSBT are much more explicit and backed by prescriptively strong rule statements. Prior to 2006, the CCSBT Convention and its adopted measures did not contain any institutional statements defining compliance actions and outcomes. Then one of its members was exposed in a massive non-compliance. Post 2006, the CCSBT is the only RFMO that shows evidence of exclusion sanctions against a member. Japanese market anomalies revealed that much more southern bluefin tuna was being traded by Japanese vessels than they were legitimately allowed to catch. There was a systematic failure by Japan to regulate fish-catch by its flagged vessels.

In response, the CCSBT Commission reduced Japanese allocation from a historical annual allocation of 5,665 tonnes to 3,000 tonnes for the minimum period of 5 years beginning from 2007. The Commission agreed to review the level of this allocation in 2011 if the stock situation permitted and the compliance measures put in place are deemed sufficient to ensure that all unreported catches are eliminated. In 2011, the Commission agreed return Japan to its nominal catch levels. Japan was set to receive a positive adjustment of its 2014 allocated catch of 10% on any overall TAC increase (TAC has been increased to 12,449 tonnes) (CCSBT 2011 Resolution on Allocation). In 2011, the CCSBT also introduced prescriptively strong sanctions for catch in excess of a Member's national catch limit. Further, it stated that excess catch must be repaid at a ratio of 1:1 over a time period specified by the Commission (CCSBT18 2011a. Operational Resolution). Additional corrective actions should take into account aggravating factors such as harm caused to other Members, ongoing non-compliance without good cause (including systematic under-reporting or over-catch over multiple years), or evidence of

intent to avoid CCSBT obligations. Where there are specific aggravating factors a higher ratio of quota payback may be determined. Depending on the particular circumstances and degree of non-compliance, corrective actions may also include quota pay back, quota reductions in national catch allocations, and trade or market restrictions consistent with international law (CCSBT18 2011a. Operational Resolution). The CCSBT commission expressed serious concerns about South Africa's continued overcatches and the Compliance Committee had requested South Africa implement a plan to remedy its overcatch and to report all information in its Annual Report (CCSBT 2013 Item 94). To date, no sanctions have been discussed and South Africa's allocation amount has remained in place (CCSBT 2013 Item 77). South Africa now has member status and an annual allocation of 450 tonnes.

There is now evidence that some rules are in place to enforce compliance with RFMO exclusion norms. However, as shown in Fig. 2 below, there is little evidence that the exclusion of member states for serious non-compliance is in any way systematic under current institutional practice. This makes the threat of exclusion as a sanction far less credible as a mechanism of control.

Fig. 2: *Violations identified for vessel vs. members excluded from catch*

	Vessel Violations	Vessel Sanctions	Member Violations	Member Sanctions
UNFSA	Yes			
CCAMLR	Yes	Yes + Exclusion	Yes	Yes Exclusion proposed in 2017
CCSBT	Yes	Yes + Exclusion	Yes	Yes Exclusion applied in 2007
WCPFC	Yes	Yes + Exclusion	Yes	Yes
SPRFMO	Yes	Yes + Exclusion	Yes	

There was a final instance of exclusion for a cooperating non-member of the CCSBT. The Philippines advised that it had no SBT catch in 2015 (CCSBT23 CC11 2016:5). However, it had not attended meetings for the last two years. Further, although warned, it did not submit any reports in 2016. In a letter, the Philippines committed to cooperate and participate in future activities. However, the CCSBT agreed that the Philippines cooperating status should not be renewed and its allocation revoked. The Philippines had an annual allocation of 45 tonnes (CCSBT23 SC21 2016:78). Japan stated that it would take several months to stop importing SBT from the Philippines (CCSBT24 2017:30). While not within the scope of this thesis research, this incident shows that the studied RFMOs are capable of revoking allocation rights for their fish-stock.

Right of Alienation

The *right of alienation* gives the possibility of transferring part or the entire withdrawal allocation rights bundle to others (Schlager and Ostrom 1992:251). In a domestic system of property rights, such as in New Zealand, a right of alienation would allow the holder of a fishing license to transfer part of their catch allocation to another license holder. Transferability is the ability to transfer a property-right to another, with varying degrees of restriction on transferees. For example, New Zealand has a quota management system (QMS) in which fishers have a tradeable property right in stock. New Zealand's CCSBT allocation is used as the basis for setting TAC under the QMS (CCSBT17 2011:7). In contrast, the EU allocates portions of its CCSBT allocation to EU member state in accord with its Council Regulation (EU) N. 1224/2009 (CCSBT17 2011:12). Alternatively, Korea allocates its national catch limit to four companies (CCSBT17 2011:9). Each year operators are entitled to a share of Australia's IQ of the CCSBT TAC. Australia allocates its CCSBT quota as statutory fishing rights to national fishers. But these are non-transferable. In domestic fisheries, systems that allow the transfer of catch are often called individual transferable quota (ITQ) systems. Nonetheless, in a domestic setting, transferability can be valuable in economic terms. With the requisite property and market institutions, transferability is a means to realise the value of existing property-rights through enabling a market of sellers and buyers of property-rights. Achieving this degree of economic sophistication is based upon the determination of individual quota as a type of property. Of all the RFMOs studied only the CCSBT is discussing a measure to implement transferable quota. The rest are evolving a system of common-property rights over high seas fish stocks but there are no market institutions or systems for formally transferring individual quota (allocated catch) between states in the international setting.

In any event, market based systems of transferability do not solve the fundamental dilemmas of fish-catch allocations to new entrants, they do not incorporate social values of equity or fairness, nor do they limit catch to sustainable levels. Indeed, in national jurisdictions that have moved their fisheries to property-rights systems the most controversial decisions centre on the allocation of property rights to a limited set of authorised actors with others being excluded. There is no authority or precedent for this type of exclusion in formal international law. All states already hold a universal right for all states to catch high seas fish stocks. All new entrants have the right to catch fish in the high seas and once a member of a RFMO there are no legitimate grounds for a state to be excluded from fishing high seas stocks. This chapter has already explored how RFMOs continue to struggle with the contradictory institutional norms of recognising historical catch and achieving sustainable allocations of catch. This chapter already discussed the informal exclusion of new entrants from existing RFMO fisheries by the refusal of members to agree on sizable allocations to the new member state.

Alienation Strategy

There is no evidence of formal market related or brokered systems of transferability in the studied RFMOs. The SPRFMO does allow states to transfer some or all of their individual allocation to other member states in practice. In 2014, Belize made arrangements to transfer all of its entitlement to Chile, whilst Vanuatu made arrangements to transfer a total of 2100t of its entitlement to Korea (SPRFMO 2013c CMM 1.01). However, the CCSBT is discussing transferability between members and

cooperating non-members as an item of interest. However, it is recorded as a low priority item on the CCSBT strategic plan that has not yet been considered by the Commission but will be considered in the long term (CCSBT 2013).

Alienation Norm

There are no institutional statements for norms of alienation in the studied RFMOs.

Alienation Rule

There are not institutional statements for rules to reinforce norms of alienation in the studied RFMOs.

Conclusion

The studied RFMOs are expressing powers over the common-property fish-stocks under their competency. They formally exclude non-compliant non-member states and non-compliant flagged vessels from withdrawal allocations. At this time, two are attempting to implement rules that exclude non-compliant members for serious and frequent violations that undermine their RFMO objectives. One has already acted to temporarily sanction a seriously non-compliant member state by reducing their annual allocation of fish-caught for three years. One other is experiencing resistance from group members when trying to assign a non-compliant status to them. In addition the studied RFMOs informally exclude new entrants to a fishery by failing to allocate them a meaningful allocation of total allowable catch.

The studied RFMOs are variably attempting to institutionalise their powers of exclusion that allow sanctions against the allocations of non-compliant member states. But while the sanctions process is extra-ordinary versus administrative then one may regard these attempts as ad hoc and lacking the hallmarks of conscious institutional achievements. Essentially, if there is no explicit rule to systematically enforce a norm then the norm may be regarded as a statement of strategy.

Institutional statements to take account of member compliance do exist. While they lack prescriptive strength they do nonetheless provide the legitimacy for action even if additional incremental strengthening through further negotiated measures is required. Indeed, the policy proposals presented for the conclusion of this thesis will rely upon the observations that compliance norms do exist in the current regime but that they must be more explicit on the sanctions for violation of catch limits. The norms that allow a RFMO to sanction non-compliance with an allocation withdrawal right must be made to be general administrative work of the RFMO Compliance Committee and not any extraordinary business of the RFMO Commission. That is, a member must not have undue influence over withdrawal compliance sanctions that may be imposed upon it by the RFMO.

The next and concluding chapter summarises the thesis research and proposes institutional statements that support the proposals of this thesis to achieve sustainable high seas fisheries.

Chapter 11

Conclusion and Policy Proposal

The Research Project

The endemic overfishing of high seas fish stocks is the problem that motivates this research project. New norms and rules of behaviour are needed to reverse the precipitous decline of living marine resources in the high seas. The research has showed that the institutional structures of the international RFMO regime are increasingly characteristic of a common-property system. This thesis argues that reinforcing institutional norms and introducing new rules will strengthen these property characteristics. It thus argues that the current regime of regional fisheries management organisations (RFMOs) does have the potential to achieve sustainable high seas fishing.

Unsustainable fishing practices lie at the confluence of individual forces and structural conditions. The individual forces motivating high seas fishing are straightforward. High seas fisheries exist because fishing nations seek to profit from the sale of caught fish. High seas fishing is a competitive economic activity and fishing nations must compete for a share of a finite and subtractable fish stock. Equally clear are ecological conditions for the sustainable catch of marine resources. A living marine resource may be fished indefinitely as long as rates of catch are kept within rates of natural regeneration. However, the structural institutional conditions within which high seas fishing is undertaken are more complex. These structural conditions centre on international law and two key principles of the 1982 United Nations Convention of the Law of the Sea (UNCLOS). The first is a universal freedom to fish in the high seas. High seas fish stocks are an open-access resource able to be exploited by all states. The second key principle mandates the creation of regional fisheries management organisations (RFMOs) to govern high seas fisheries. Fish stocks within the jurisdiction of a RFMO are common-pool resources able to be exploited only by the states who are members of that RFMO.

There are now seventeen RFMOs worldwide. New Zealand is party to four RFMOs in the central and southern Pacific Ocean: The 1982 Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), the 1994 Convention for the Conservation of Southern Bluefin Tuna (CCSBT), the 2004 Western and Central Pacific Fisheries Convention (WCPFC), and most recently the 2012 Southern Pacific Regional Fisheries Management Organisation (SPRFMO). All of these multilateral organisations share the same aspirational Convention objective to achieve sustainable fishing, and have very similar management measures focused on the science and monitoring of high seas fisheries. Yet, in the Pacific Ocean and in fisheries worldwide, fish stocks continue to be overexploited and in decline. Indeed, the problem of overfishing is so urgent that one of the guidelines for this research project was that solutions must be achieved in the near term and within the parameters of the current international regime.

This final chapter builds upon the analysis and arguments in the preceding chapters to propose a set of rights-based policy prescriptions and the institutional rules most likely to secure sustainable fishing

practices in the high seas. Successful policy must harness the self-interest of each individual actor towards outcomes that still benefit the group overall. A successful institution must cause compliant behaviour to be reproduced by group members. For each target species, the rate of catch must fall within an ecologically determined target rate of recruitment. However, this rate of recovery of the target stock must not be set in reference to any other measure than the objective to achieve a return to full unfished levels of stock biomass. Currently, the studied RFMOs all model total allowable catch targets that are based on 40%-70% probability to achieve 20% of unfished biomass by 2030-2040. These are not regeneration targets worthy of regional fishery management organisations that are formed on the mutually agreed commitment to ensure the long-term conservation and sustainable use of fishery resources and to safeguard the marine ecosystems in which these resources occur. RFMOs must create the incentive to practice sustainable fishing.

There are two elements to building a successful regime. The first is to acknowledge that policy approaches must strengthen property rights as the new institutional mechanism of control. Bringing real change to the practices of high seas fishing requires systems that can harness the inherent profit seeking motivations of individual actors in high seas fishing, and keep secure the living marine resources upon which individual and collective benefits depend. It is not enough to create a rule that limits catch. This is the approach of the existing RFMO governance regime. The current command and control policies impose the full responsibility to achieve and enforce limits upon the governance authority. This type of mechanism fails because RFMOs with limited resources must police vast distances of open ocean. Certainly, technology such as VMS and catch documentation schemes can assist. Yet, the production activity and supply chain is complex. There are many fishing states, the port states and the market states that are actors in a fishery. Command and control policies do correctly target the ecological limits necessary to achieve sustainable fisheries. However, they fail to account for the forces and conditions within which these objectives must be achieved.

This conclusion chapter will thus be presented in two sections. The first section reiterates the primary findings of the research project on the existence and characteristics of a property system in the governance of high seas fisheries. A successful regime must create a property right over fish-stock as opposed to fish-caught. By allocating and enforcing a meaningful share of a total allowable catch a successful regime, based on a system of common-property, can incentivise sustainable utilisation of target fish stocks. The RFMO member states who possess the right to catch a portion of a meaningful total allowable catch can anticipate their share of future benefits from a regenerating resource. This positive outcome is versus a continuation of competitive overfishing that has degraded the fish stock biomass and keeps its productive potential suppressed. Rather, in anticipation of future rewards, the owners of an allocation of individual quota have the incentive to conserve the fish-stock from which it is derived both now and into the future. In this way, the high seas regime to govern the exploitation of living marine resources can fundamentally place its focus on recognised and enforceable common-property rights.

The second section proposes a set of rights-based policy recommendations that build upon the research findings and strengthen the property characteristics of a RFMO. Sanctions must focus on the behaviour of state actors as opposed to individual flagged fishing vessels. Sanctions against catch violations by a RFMO member state remains the main institutional weakness evident in Pacific

RFMOs. While sanctions are explicit and strong against flagged vessels (particularly IUU vessels) they remain non-existent, implicit, or weak against state actors. The current focus of sanctions on fishing vessels by RFMOs is misguided. As long as member states allow flagged vessels to overcatch beyond that state's individual quota (and the total allowable catch of the fishery) then the full potential of the RFMO regime to enable sustainable fishing practices will be undermined. State actors who allow their individual catch limits to be violated must face commensurate restitutive and punitive sanctions. These sanctions must be designed to act against their own right to catch a certain number of fish.

It is only when punishments target the allocation of a member state will any RFMO regime be able to deliver sustainable fishing practices. Actors who share a common-pool resource demand that deviants who degrade the production value of the resource must be punished. The policy approach that can be expected to yield most immediate and sustained benefits is one that reinforces the inherent motivations of the high seas fishing nations. RFMO strategies, norms, and rules must focus on harnessing the individual incentive to profit to secure resource conservation and long-term collective benefits.

This thesis thus proposes new rules intended to ensure that each actor can keep the full benefits of the fish-stock they leave uncaught. This productive biomass is the potential that drives stock recruitment in the next seasonal cycle. A rights based RFMO regime must enable actors to shift their focus to long-term benefits by allowing them to reap the reward from the individual decisions to limit catch and sustain a full capacity fish-stock for future periods. It is only through this achievement that wild fish stocks can support the maximum sustainable yield that is so fundamental to meet the demand of an ever-growing global population.

A common-property system over high seas fish stocks

International law makes high seas fish stocks an open-access resource by providing all states the right to catch high seas fish stocks. Yet, the UNCLOS also mandated that governance of a shared high seas fishery must be conducted through a RFMO. It is the investment of authority and jurisdiction in a RFMO that creates common-property conditions over those living marine resources under the competency of the RFMO. *Chapter 6 - The governance of high seas fisheries* showed how international law and RFMOs make no mention of property rights in their statutes and conventions. The studied regional fisheries management organisations in the Pacific have developed norms and rules that exclude outsiders and secure the beneficial use of a living marine resource only for group members. Within the overarching mandate of international law, these multilateral organisations have created a system of powers over resources that are characteristic of common-property systems. In addition, this thesis argues that there is significant potential in this evolution of institutional norms. Achieving sustainable high seas fisheries requires institutions that motivate commercial fishers to limit individual catch. Property rights over the remaining fish-stock is the only mechanism that can reward fishers for leaving fish uncaught.

Of course, the principles of fisheries management are still important to achieving a sustainable fishery. Fishing gear and fishing periods must be controlled to conserve habitat and spawning periods. Scientific research is necessary to determine reference points for biologically sustainable total

allowable catch. But, any collection of otherwise excellent fisheries control mechanisms will still leave actors with the incentive to overcapitalise and overfish unless it defines the rules for a system of individual quota. This thesis recognises that the CCAMLR does not currently maintain institutional norms for allocating individual quota from total allowable catch. *Chapter 5 - Fisheries management* detailed the difficulties of setting individual allocations. The CCAMLR would have to resolve the challenges for allocation of individual quota. Nevertheless, the argument of this thesis will present the optimum institutional structure and mechanisms of control for achieving sustainable high seas fishing. For this reason, it will count individual quota among these institutional achievements. Recall that individual quota is the number of fish an individual RFMO member is permitted to catch. Individual quota is the pivot point from which the control mechanisms of fisheries management become an institutional mechanism of control over the behaviour of actors.

Control Mechanisms vs. Mechanisms of Control

This research project contrasted control mechanisms to mechanisms of control. Control mechanisms are the provenance of fisheries management. Fisheries management mechanisms such as scientifically determined and biologically sound catch limits, vessel monitoring, and catch documentation schemes are required in any sustainable fishery. The ecological limits of sustainable catch can only be determined from conducting scientific assessments of the living marine resource. The biomass and fecundity of a species within its habitat remain the primary reference points for ecologically sustainable levels of catch. From biological models, various risk sensitive estimates of total allowable catch can be determined. To allow maximum regeneration, important spawning periods and areas that support juvenile development must be discovered and be made free from fishing. The practice of controlling exploitation to within sustainable biotic limits is the foundation of sustainable fishing practice. The fundamental achievement of fishery management is to set a total allowable catch within a fish stocks maximum sustainable yield. Of course, the base fish-stock should also exist in a quantity equal to the carrying capacity of its habitat. But, control mechanisms alone do not directly act upon those factors that incentivise sustainable fishing practices by fishers.

Under command and control schemes, the burden of compliance is left to governance authorities. This situation requires the authorities to enforce compliance upon actors in the fishery. Enforcing rules is always necessary. But for any fishery enforcing compliance is expensive. This is especially true for the vast open spaces, numerous fishing vessels, and numerous state jurisdictions of flag states, port states, and market states that are typical of high seas fisheries. Technology such as mandatory vessel monitoring systems on all flagged vessels does help to mitigate the challenge of monitoring the movements of fishing vessels. It also corroborates the record of legitimate catch. This technology combined with catch documentation schemes that are shared by fishing, port and market states work to increase the likelihood that illegal, unauthorised, and unregulated catch will be discovered. These schemes define reference points, enable monitoring, and create the necessary flow of information among both group members and the governing RFMO authority. However, as long as the structural conditions of a fishery continues to pit fishers in competition to be the first to catch from a common-pool

resource. As long as fishers cannot secure an individual benefit of leaving fish uncaught. Then the incentives to overcatch and its repercussions on the fishery will remain.

Control mechanisms are always an essential component of a sustainable fishery. But on their own, control mechanisms do not create sufficient conditions to incentivise individual limits on catch of a common pool resource. Command and control approaches seek to suppress economic motivations by raising the chances to catch violators through monitoring. They also raise the costs of violations by removing the benefit of overcatch through penalties. However, no RFMO possesses sufficient resources to police and enforce catch limits in high seas fisheries over the long-term. As long as the incentive and burden to enforce sustainable catch limits rests principally with regulatory authorities then current resource constraints upon the Commissions, working Committees, and Secretariats of RFMOs will continue to limit their effectiveness. Critically, the will and resources of member states will also remain largely unmobilised. No effective institution can set a governance authority against the profit maximising motivations of fishers. RFMOs must create the incentive for actors to limit their individual catch by allowing actors to keep the benefits of limiting catch.

The distinction between control mechanisms and mechanisms of control is a most important one for the future of high seas living marine resources and the communities that depend upon them. When seeking to harness the fundamental motivations of actors the policy analyst must in turn build upon naturally developing control mechanisms to create new mechanisms of control. Any authority may introduce licensing of fishers, may then impose a limit on the number of licenses to control fishing effort, and may impose limits on fishing gear and fishing times to control fishing catch. The importance of scientifically based total allowable catch is universal among the studied RFMOs. Catch limits must preserve the productive potential of the target biomass. They are an essential control mechanism for fisheries management. For all the studied RFMOs have introduced individual catch limits (or effort limits) a key transformation in fishery governance can occur.

The importance of individual quota to the creation of rights over fish stocks

The right of access to the high seas and the right to withdraw fish from high seas fish stocks are provided by the UNCLOS. So too is the right of RFMOs to manage high seas fisheries. But the way that universal withdrawal rights have been modified shows that RFMOs have evolved specific characteristics. The exclusion of non-members enabled by the UNCLOS and reproduced in every studied RFMO has created a structure of withdrawal rights that are characteristic of common-property. Within the RFMO, additional norms and rules modify the right to catch. RFMOs all possess the mandate to set a total allowable catch. The basic directive of competent fisheries management is to set a total allowable catch that is within the maximum sustainable yield of the target fish stock. Setting total allowable catch limits is the first phase of transition from common-pool conditions to incentivised self-limits on catch. Yet, the exclusion of non-members and setting of scientific sustainable catch limits has not secured sustainable catch in practice. Nor does this point of development represent the true potential of property rights institutions in high seas fisheries. This potential is only realised when, within a sustainable total allowable catch, each member of a RFMO is allocated an individual quota (IQ) of the TAC. This is the pivotal point when the ownership structures that are invested in individual quota

rules begin to pivot from fish-caught to fish-stock. The creation of individual quota is congruent with the creation of a power over an institutionally meaningful property right.

The expansion of the institutional rules for RFMOs from total allowable catch to individual quota creates the incentive for a quota rights holder to conserve valuable fish-stock property and gain the benefits of future profits from the resource. When RFMOs do not have strong institutional rules to enforce individual quota then actors have the incentive to maximise individual catch. That is, they can put no future value on a fish-stock and can only value fish-caught. All high seas capture fisheries are subject to multiple actors. That is, fish stocks are exposed to exploitation under common-pool conditions. Property rights systems only emerge when use rights to a resource, or share of a resource, are exclusive. Common-pool conditions do limit the number of actors who can withdraw from a common-pool resource and may even impose biologically sustainable catch limits but they still allow individual actors to fully benefit from all fish-caught. The pivotal mechanism to incentivise individual catch limits is enabling the individual to achieve the full benefit of that choice from future harvests.

The introduction of norms and rules to provide individual quota harnesses the incentive to profit inherent in all commercial fisheries to prioritise sustainable fishing practices. This thesis asserts that possession of a right to an individual quota creates the incentive to sustainably manage the fish-stock (resource) upon which the quota of fish-caught (ownership unit) is based. Individual quota is the right to catch a certain number of fish, in a certain location, of a certain species, during a certain period. The number is the property (Scott 2000b:111). However, this thesis argues that the rights-based definition of individual quota is not complete. Rather, a system of individual quota confers the right to a percentage output of a fishery biomass. This is the true economic conception of an individual quota right.

An individual quota rights holder possesses a share of the present and future productive capacity of the fish stock. The fundamental shift in rights systems and behavioural incentives occurs with the allocation of shares of allowable catch amongst group members. The right to catch an individual portion of a sustainable total allowable catch (TAC) allows the group of rights holders to receive the full benefit of decisions to limit catch. Property-rights mechanisms thus create conditions that reward self-compliance among fishers. This reduces the burden of monitoring and enforcement on the regulatory authority, or at least allows the authority to shift effort to other areas such as the exclusion of outsiders and punishment of member violations.

In sum, the key transformations in a system of common-property rights are:

- Ownership principles shifted from fish-caught to fish-stock
- Profit seeking incentives shifted from short term marginal benefits of fish-caught to long term marginal benefits of a productive fish-stock
- Individual maximisation shifted from immediate catch to a confident forecast for a future benefit stream.

Shifting ownership from fish-caught to fish-stock

The potential of strengthening the property characteristics of the RFMO regime is the ability to harness the economic motivations of each actor. The foundation of common-property rights shared by a group is the individual quota of each group member. When conditions are open-access or common-pool, the profit seeking motives of each actor drives them to catch the most fish and to catch them first. When ownership structures in a fishery centre upon fish-caught then the incentive for actors is to maximise individual catch in accord with their individual marginal utility. Shifting ownership rights from fish-catch to the fish-stock is the necessary pivot point for sustainable high seas fisheries. Open-access and simple common-pool fisheries only confer ownership of fish-caught from the finite and remaining biomass. Whereas an individual quota system confers ownership of a number of fish regardless of whether they are caught or not.

This pivot to a new type of property right occurs with the rules to provide an exclusionary component to individual quota. That is, the right to catch a certain number of fish from the stock is conferred into an exclusionary right over preservation of the productive biomass of the fish stock. The core system of norms and rules that create individual quota continue to harness the incentive to profit inherent in commercial fishers to prioritise sustainable fishing practices. Institutional structures that enable sustainable high seas fisheries must strengthen and reinforce the norms and rules of a property system. This fundamental shift in ownership structures from fish-caught to fish-stock is the paradigm shift needed to take the current regime for inadequate governance of high seas fisheries to one that can deliver the practice of sustainable high seas fishing.

Property systems emerge when use rights to a resource begin to become exclusive. Exclusion begins with basic control mechanisms such as fishing licences. Licenses are a broad-based withdrawal right because actors are still numerous. Further, fishing licences are only a withdrawal right. They provide the right to capture fish but do not provide any right to manage practices of the fishery. A licence regime thus creates common-pool conditions by permitting many actors access to a resource but it does not create common-property rights. This is because the holder of a fishing licence is not permitted joint governance of resource use and preservation. Thus, the movement from open-access to common-pool conditions over a resource does not make it any more likely that the stock will be used sustainably. The common-pool conditions that are created by a RFMO are an improvement upon open-access conditions created by the freedom to fish but they still create the incentive to catch fish first by rewarding the individual actor for the full amount of fish-caught. Incentives are oriented on fish-catch even with allowable catch limit control mechanisms.

The full potential for a RFMO common-property system to achieve sustainable fishing practices can only be realised within RFMO rules that include not just a biologically sustainable allowable catch for the whole group but also an individual catch limit for each group member. Only with such an individual quota do withdrawal rights over property orientate on fish-stocks and can the benefit of individual catch limits be realised by harnessing individual incentives to self-maximise profit from fishing.

Systems of common-property rights can enable sustainable fishing practices on the high seas. The priority governance outcome of a RFMO commission must be to recognise and strengthen key pillars of a common-property system within its own management measures. However, it is critical that these

institutional statements also strengthen compliance measures over quota limits. These norms and rules will apply primarily to flag states because they are the direct actor upon a fish-stock. But will also affect to market states and port states because they form an integral component of catch documentation schemes and the general flow of information from the production process to fish-caught, and then the logistics to sale within legitimate markets that is necessary for the exchange of fish-caught for profit.

The RFMO regime creates common property rights

The overarching regulatory framework created by the UNCLOS is characterised by common ownership, collective decision-making and trespassory protection. However, the UNCLOS makes no formal statement on the creation of ownership rights. Nonetheless, the analysis in *Chapter 9 - The institutional grammar of high seas property* and *Chapter 10 - A common-property system on the high seas* showed that the UNCLOS and the studied RFMOs do define norms and rules that create powers over property. Specifically, the common-property characteristics of the RFMO regime are founded upon its formation of a group and the exclusion of outsiders. All nations that are not members of an RFMO are forbidden to catch fish from stocks over which that RFMO has authority. In accord with UNCLOS provisions, a RFMO reserves the fish stocks under its jurisdiction for those states whom are parties to its mandate and commit to comply with its measures. These characteristics of exclusion and trespassory protection are fundamental powers over property.

Under a system of common-property, a resource is 'owned' by an identifiable community of users who can exclude others and regulate use. Thus, when a RFMO enters into force the high seas fish stocks within its jurisdiction shift from 'everybody's property' to 'common-property'. Common-property systems centre upon the exclusive allocation of catch among members of the group and the limitation of catch by the group to ensure they preserve future benefits from the resource. By providing this right of exclusion the provisions of the UNCLOS, and the regulatory structures of RFMOs created in its image, create bundles of rights like property rights over high seas fish stocks.

Regional fisheries management organisations are international treaties that, on achieving entry into force, create a new structure of jurisdiction and authority in international waters. States who agree to abide by the norms and rules of an RFMO Convention are granted the right to participate within the high seas fishery over which the RFMO has competency. Those states who refuse to be party to the agreement – who cannot behave in accord with the rules and procedures of the institution – are excluded from the right to fish in the area. Once an RFMO agreement achieves entry into force, any fishing by vessels from flag States that have not entered into the agreement are regarded as engaged in illegal, unregulated or unreported fishing (IUU).

On the high seas, the creation of an RFMO introduces a boundary for exclusion and the threat of sanction where there previously existed a freedom to fish. The nationals of states who are not party to an RFMO agreement, i.e. those who have not indicated the commitment to abide by its norms and rules of behaviour, are now regarded to be fishing illegally. Membership of a RFMO confers upon a state the right to allow its flagged vessels to access and withdraw resources from the fishery. These characteristics of RFMOs are functionally equivalent to common-property systems.

Rules create property rights

Successful governance requires the development of rules to exert both internal and external control. Within an institution, those governance rules most likely to be successful are those closely aligned with the primary incentives for each actor. In a commercial fishery, the motivation for fishers is to create and sustain future revenues from the fish stocks. An individual quota secures the future benefits of resource conservation (more fish in the future) for the holder of rights to that quota.

Rules that enforce individual quota limits also reinforce the value of the productive fish-stock resource. It also reinforces the strength of the RFMO as an institution. Creating practices for sustainable high seas fisheries also strengthen the RFMO organisation as an institution. But, sustainable fishing practices are only achieved with compliance to rules of behaviour. Thus, successful institutions must achieve two outcomes. They must define necessary rules of behaviour and they must implement the necessary compliance measures.

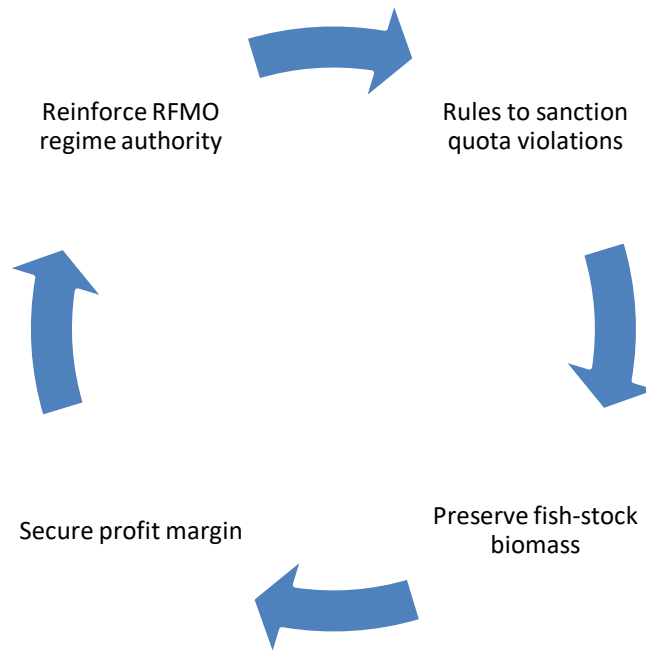
Rights-based sanctions that act directly upon the individual quota of a fishery actor are necessary. Key norms and rules are those that strengthen and preserve the rights to an individual quota of total allowable catch. It is only those rules that enforce catch limits that create property rights over the fish-stock. This is the key point of this thesis because individual quota lays at the intersection of the core motivation of actors in a high seas fishery and the sanction capability that lies at the core of RFMO authority. The policy proposal of this thesis is thus:

If an actor violates its individual quota then they must be sanctioned by loss of their own individual quota.

That is, the sanction for violation of an individual fish-catch limit must be recompense to other members of the group. The instinctive sanction must be a reduction in individual quota for the violator. At its most extreme and most precise, this restitution would also include a mechanism for recovery of stock over multiple spawning cycles. A mechanism for determining compensation must be put in place. This compensation must first guarantee recovery of the fish-stock back to the unfished carrying capacity of the habitat. Alongside this mandatory outcome is the compensation to other group members for the failure of the violator to achieve the agreed behavioural outcomes. This punitive element of a sanction may punish a violator for its failure to meet commitments met by the rest of the group. This is the baseline expectation of institutional agreement and commitment. Violators will be punished.

At the heart of this policy proposal is a so-called 'virtuous circle' shown in Diag. 1 below. Access to resources is the primary motivation of fishery actors. When an actor holds the right to a percentage yield from a fishery biomass then individual decisions to limit catch directly increase individual benefits from the increased biomass. Thus, sanctions must punish the violator and not share the cost of reduced returns from production across all compliant group members.

Diag. 1: *Rights-based sanctions create a virtuous circle*



Sanctions for common-property rights are designed to protect the group benefit and reinforce the individual incentive to limit catch. Rights-based sanctions create a virtuous circle of individual behaviour leading to individual benefits. Even more powerful is the virtuous circle of individual behaviour leading to collective benefits. Increased biomass increases the regeneration rates of the fish-stock. This increased biomass will benefit all other actors by making the fish-stock more available. Thereby reducing the costs of fish-catch for all other actors. Rights-based sanctions that suspend violators from catch will leave more fish-stock. These resources secure the future benefit stream. Further, when the recruitment to a fish-stock is expected to return the stock to its unfished biomass and full productive potential then reduction of individual catch quota remains justified. This is because rules that punish violators are expected by other group members. When an institution punished violators then the value of the institution itself is strengthened. Violators must expect to be punished. In addition, state members have their own legal jurisdiction for allocating and sanctioning flagged vessels. The RFMO may confidently leave the application of second order sanctions to the deviant member state just as it does to compliant member states.

When actors can expect to receive the full benefit of a decision to conserve a fish-stock for future periods then limiting catch is enabled as a rational choice. When all group members commit to the conservation of a common-pool resource then sanctions against individual deviants from this commitment is also a rational choice.

Governance Powers

The potential of property rights structures centres on their causation of a pivotal shift in individual benefit streams from fish-caught to fish-stocks. This thesis is conscious that RFMOs do possess

governance and regulatory powers. There is no higher court for living marine resources like there is in mineral resources. Recall that the international tribunal law of the sea (ITLOS) recused itself from jurisdiction over member disputes. So, RFMOs must rely upon their own administrative sanctions to make violations costly for group members. With no recourse to higher judicial authorities, each RFMO must be given tools to reinforce institutional norms and influence actor behaviours using its own administrative authority.

Studied RFMOs exhibit commonality in institutional norms but variability in institutional rules. Common property exists but the rules to enforce state catch limits lack prescriptive strength. Rights-based sanctions for flagged vessels are currently more explicit and strong for fisher's vessels than sanctions for state members. Generally, the studied RFMOs do articulate institutional rules of behaviour for both member flag states and for flagged vessels. Sanctions for violations by vessels range from obligation of flag state to remove authorisation to suspension of fishing activities in order to rectify infringements. In both cases the allowable catch of a state is not affected by vessel violations. While the obligation to govern vessels rests upon the state, the flag state quota of permitted catch is not affected for flagged vessel violations. Of course, it is reasonable to permit some vessel violations to attract only vessel specific sanctions. Exclusion control mechanisms can sensibly target vessels that violate rules. All RFMOs now maintain and share lists of vessels that are identified in illegal, unregulated, or unlicensed fishing within RFMO areas. In these cases, it is requisite for each RFMO to compile vessel lists and to share these lists with the members of other RFMOs. All RFMOs already forbid a member state to authorise a vessel (or beneficial owner) who has been involved in a violation and placed on a RFMO IUU list. Further, Port and Market state members are required to forbid the landing of fish from vessels on such lists. Nonetheless, the most important statements on sanctions for serious violations must affect individual catch limits of the member state.

Fig. 1: *Violations identified for vessel vs. members excluded from catch*

	Vessel Violations	Vessel Sanctions	Member Violations	Member Sanctions
UNFSA	Yes			
CCAMLR	Yes	Yes + Exclusion	Yes	Yes Exclusion proposed in 2017
CCSBT	Yes	Yes + Exclusion	Yes	Yes Exclusion applied in 2007
WCPFC	Yes	Yes + Exclusion	Yes	Yes
SPRFMO	Yes	Yes + Exclusion	Yes	

A key element to this thesis is the policy proposal for rights-based sanctions as a key mechanism of control. These sanctions must be focused on the individual allocation of state actors. Critically, these sanctions against member states must be the normal administrative work of the compliance committee of a RFMO. This committee must be empowered with definitions of graded violations and sanctions. Explicit guidelines must put in place a straight forward calculus that determines the seriousness of the violation and imposes the proportionate sanction. This work has already started in most of the studied RFMOs. Nevertheless, the practice of rights-based sanctions must not be the cause for extraordinary meetings of the RFMO Commission. Dealing with violations and imposition of rights-based sanctions in a RFMO must be a straightforward administrative procedure. All the studied RFMOs do allow the extraordinary degree of intervention by non-compliant member states. This practice must not continue.

If a member is extraordinary in its behaviour during the compliance evaluation and sanction process then its right to a withdrawal allocation must then come under jeopardy. Currently, the only examples of sanctions that suspend membership rights are for non-payment of fees. Yet, this sanction only results in the suspension of management rights. The full individual quota of that flag state stays in place. Extraordinary rejection of the general administrative duties of a RFMO must be sanctioned to reinforce the institutional strength of the RFMO. This sanction may be financial or may be applied directly to the member's allocation of fish-catch.

RFMOs now maintain rigorous data collection and reporting requirements. Via this flow of information, participants are assured that all other group members are behaving in accord with the agreement. Further, RFMOs are increasingly making public much of the information on the activities of states that are in violation of RFMO rules and procedures. Flag states are required to ensure the individual catch of each authorised vessel does not exceed its individual quota. The most modern RFMOs such as the SPRFMO now require its secretariat to monitor and make public when a member's individual quota has reached 70% of its limit. To date, the only evidence of a state having its allocation reduced is the CCSBT in its sanction of Japan over the period 2006-2013. The CCSBT worked to reduce the allocation of a state which had failed to manage the catch limits of flagged vessels and to ensure its market only took legitimate catch. Indeed, it was in the comparison of records of internally traded vs landed and imported southern bluefin tuna that members of the CCSBT were able to expose evidence of Japan's failure to comply with conservation measure commitments. This difficult and extraordinary sanction was a major upheaval in the conduct of the CCSBT.

Serious non-compliance is grounds for exclusion

The mechanism of control against serial and comprehensive deviation from mutually agreed conservation measures is the definitive point for the requirement to make quota based sanctions part of the accepted administrative powers invested in a RFMO. This principle is observed in the accepted regulatory powers of transport authorities. Road rules categorise traffic violations and make the offender liable for a financial penalty and for loss of a number of demerit points. If a driver's offences were recidivist or of a magnitude that they were to exhaust their list of demerit points then the sanction for that behaviour is loss of the licence to drive. Similarly, a RFMO must have procedures for more

serious sanctions such as longer term suspension of allocation. While these may be recommended by the compliance committee they would be still be exercised by the broader Commission body. Indeed, the provision for such questions of substance within these decision-making scenarios already exist in RFMO conventions. However, it is the argument of this thesis that sanctions that impose quota based sanctions on member states be the normal and expected work of a compliance committee under the governance mandate of a RFMO.

Only when a system of rights shifts ownership to a fish-stock versus fish-catch can the individual incentive to profit from a resource be utilised to preserve its benefits for future use. The virtuous circle is only closed to the extent that each actor can assume they will benefit from the individual choice to limit catch to within their allocation. Here lies the potential of an institution where individual economic rationale is collectively advantageous.

The Policy Proposal

The 'institutional statement' method of analysing and proposing systems of property rights is an important development for establishing the current conventions of high seas fishing and international relations. The framework of mechanisms of control like a common-property system should become central to future scholarly and diplomatic discussions for achieving the practice of sustainable high seas fishing.

The significant contribution of this thesis is the framing of the international governance of high seas fishing as a common-property regime and the evidence that RFMOs are common-property systems. This thesis focused on those rules of behaviour that define the rights and obligations among actors as they relate to a common-pool resource. The current rights and obligations for high seas fisheries are expressed through the conventions and management measures of international treaties. Therefore, as an approach to capture evolving institutional practices, Crawford and Ostrom's institutional grammar was selected as a technique to explore the larger international treaty framework for high seas fishing and the many treaty documents of RFMOs.

The 'institutional statement' method focuses analysis on rules of behaviour. In particular, it enables the identification and assessment of rule sets or systems. Such rule sets are also the form in which proposals for reform or improvement can be delivered. Ostrom et al. provided a structure of common-property systems as the definition of usage and management activities over a resource. The first 'rights to use' relate to access and withdrawal right over the resource. The 'rights to manage use' of a resource are management, exclusion and alienation rights. In this context, institutional statements were analysed to determine what behaviours are obliged, permitted or forbidden. Together, the institutional structure constituted the collectively agreed rules of behaviour as they relate to a resource.

The 'institutional statement' method both enables assessment of existing rule sets and is the form in which proposals can be immediately translated to improved governance. The foundation of a successful common-property system is a comprehensive fisheries management system. However, at the point a governance authority creates individual quota of a total allowable catch it creates a form of

property right. The 'institutional statement' method focuses attention on necessary rules of behaviour to strengthen this right. The rules are core to the study and argument of this thesis because they secure the benefit of limiting catch to the individual by shifting ownership rights from the fish-caught to the fish-stock.

This policy proposal section presents the logical extension of the institutional structure of property rights developed by Ostrom. The thesis has mapped the structures of the international regime to govern fisheries. This research project has focused on the institutions that create property systems over high seas resources. Thus, this policy proposal is focused on those institutional norms and rules that strengthen the shift to the value of fish-stocks. Thereby enabling an actor or group of actors to receive the future rewards of limiting individual catch.

This thesis project recognised the urgency to achieve sustainable fishing practices, and the focused its analysis on the characteristics of the current regime. Therefore, the policy proposal is presented as a set of additional norms and rules within the current institutional structures of RFMO Conventions. Specifically, this section will present the norms and rules to achieve full property rights within the existing institutional structures of the South Pacific and New Zealand's most recent RFMO – the South Pacific Regional Fisheries Management Organisation (SPRFMO).

RFMO conventions and measures are considerably more comprehensive than what is laid out as composition articles below. There are similar strategies and norms in all the studied RFMOs. What follows are selected key statements of strategy and norm from the SPRFMO. Within this structure of convention and measures are the principle statements that express the key argument of this thesis. These are the rules which will reinforce the individual property of each actor in a RFMO common property system. To make the contrast the composition articles are expressed in language of treaty articles while the thesis rule statements are expressed in italic and as statements in the syntax of institutional grammar. Any reader could action and translate these policy proposals back to the quasi-legal syntax that is common to any RFMO treaty.

Composition of the articles from the South Pacific Regional Fisheries Management (SPRFMO)

Article (i)

Objective

This statement of strategy is common to all the studied RFMOs.

The objective of this Convention is to ensure the long-term conservation and sustainable use of fishery resources and to safeguard the marine ecosystems in which these resources occur.

Article (ii)

Conservation and Management Principles and Approaches

This statement of strategy is common to all the studied RFMOs.

1. *In giving effect to the objective of this Convention and carrying out decision making under this Convention, the Contracting Parties and the Commission shall apply, in particular, the following principles:*
 - a. *Fishing shall be commensurate with the sustainable use of fishery resources and the general obligation to protect and preserve the marine environment;*
 - b. *Overfishing and excess fishing capacity shall be prevented or eliminated;*
 - c. *Decisions shall be based on the best scientific and technical information available;*
 - d. *Effective compliance with conservation and management measures shall be ensured and sanctions for any violations shall be adequate in severity to discourage violations wherever they occur and in particular shall deprive offenders of the benefits accruing from their illegal activities.*

Article (iii)

Functions of the Commission

This statement of strategy is common to all the studied RFMOs.

1. *The Commission shall, in accordance with the objective, principles and approaches exercise the following functions:*
 - a. *Adopt conservation and management measures to achieve the objective of this Convention;*
 - b. *Determine the nature and extent of participation in fishing for fishery resources including for particular fish stocks;*
 - c. *Promote the conduct of scientific research to improve knowledge of fishery resources and marine ecosystems in the Convention Area;*

- d. *Establish effective monitoring, control, surveillance, compliance and enforcement procedures, including non-discriminatory market-related and trade-related measures;*
- e. *Develop processes to assess flag state performance with respect to implementation of their obligations under this Convention and adopt proposals to promote implementation of such obligations;*
- f. *Adopt measures to prevent, deter and eliminate IUU fishing;*

Article (iv)

Compliance and Technical Committee

Statements of strategy that define the responsibility of the Compliance Committee may remain common to all the studied RFMOs. A specific inclusion will confirm that sanctions applied against states in violation of catch limits are the responsibility of the Compliance Committee.

1. *The functions of the Compliance and Technical Committee shall be to:*
 - a. *Monitor and review the implementation of, and compliance with, conservation and management measures adopted under this Convention;*
 - b. *Identify member violations of catch limits and determine penalties in accord with Appendix [Schedule of Sanctions].*
 - c. *Provide recommendations on the implementation and compliance with provisions of this Convention and the conservation and management measures adopted by the Commission.*

Article (v)

Decision Making

These statements of norm are common to all the studied RFMOs. A useful inclusion will declare that sanctions for members in violation of catch limits are not questions of substance to be discussed in the commission forum.

1. *As a general rule, decisions by the Commission shall be taken by consensus.*
2. *If the Chairperson considers that all efforts to reach a decision by consensus have been exhausted:*

- a. *Decisions of the Commission on questions of procedure shall be taken by a majority of the members of the Commission casting affirmative or negative votes;*
- b. *Decisions on questions of substance shall be taken by a three fourths majority of the members of the Commission casting affirmative or negative votes.*
- c. In accord with Art. (iv) 1.b, recommendations on the application of the schedule of sanctions against non-compliant members is conducted by the Compliance Committee and notified to the Secretariat.

Article (vi)

Conservation and Management Measures

These statements of norm are common to all the studied RFMOs. They are often vague and ambiguously worded. There is work to strengthen the compliance evaluation process in most of the studied RFMOs. Yet, the institutional statements on what is a serious violation may still defer to the UNFSA list. See Appendix 2. A useful inclusion will declare that actions taken in event of catch reference points exceeded must be referred to the compliance committee.

- 1. *The conservation and management measures adopted by the Commission shall include measures to:*
 - a. *Ensure the long-term sustainability of fishery resources and promote the objective of their responsible utilisation;*
- 2. *The specific conservation and management measures adopted by the Commission shall, as appropriate, include the determination of:*
 - a. *The nature and extent of fishing for any fishery resource including the establishment of a total allowable catch*
 - b. *Catch reference points*
 - c. *The actions to be taken if those catch reference points are approached or exceeded must be conducted in accord with Art. (iv) 1.b. [Schedule of Sanctions]*

Article (vii)

Participation in fishing for fishery resources

Not all RFMOs make statements of norm on participation rights. Participation rights are provided to all states by the UNCLOS. Even when present, statements on the modification of participation rights for non-compliant behaviour are often vague and ambiguously worded. A useful inclusion will make

reference to these violations occurring in the administrative Schedule of Sanctions. Placement of these violations in the schedule will make them an explicit and administrative responsibility of the compliance committee.

When taking decisions regarding participation in fishing for any fishery resource, including the allocation of a total allowable catch, the Commission shall take into account the status of the fishery resource and the existing level of fishing effort for that resource and the following criteria to the extent relevant, in accord with Art. (iv) 1.b.:

1. *Historic catch and past and present fishing patterns and practices in the Convention Area.*
2. *Compliance with the conservation and management measures under this Convention.*
3. *Demonstrated willingness to exercise effective flag state control over fishing vessels*

Article (viii)

Monitoring, Compliance and Enforcement

These statements of norm are common to all the studied RFMOs. They are often expressed as permissions rather than obligations. They are often vague and ambiguously worded. A useful inclusion will make reference to these violations occurring in the [Schedule of Sanctions]. Placement of these violations in the schedule will make them an explicit, obligatory, and an administrative responsibility of the RFMO compliance committee.

The Commission shall establish appropriate cooperative procedures for effective monitoring, control and surveillance of fishing and to ensure compliance with this Convention and the conservation and management measures adopted by the Commission including inter alia:

1. *The establishment and maintenance of a Commission record of vessels authorised to fish in the Convention Area, the recording of fishing activities, and the reporting of vessel movements and activities by a satellite vessel monitoring system.*
2. *The Commission may adopt procedures that enable measures, including trade related measures in relation to fishery resources, to be applied by members of the Commission to any state or member of the commission whose vessels engage in fishing activities that diminish the effectiveness of, or otherwise fail to comply with, the conservation and management measures adopted by the Commission.*
3. *Such measures should include a range of possible responses so that account can be taken of the reason for and degree of non-compliance. All measures and responses must be collected in the [Schedule of Sanctions] Appendix (i)*

4. *In accord with Art. (iv) 1.b, recommendations on the application of the schedule of sanctions against non-compliant members is conducted by the compliance committee and notified to the Secretariat.*

Appendix (i)

Schedule of Sanctions

There are a range of possible sanctions and categorisations of violations. This range should be permitted as long as each RFMO follows the principles of this policy approach:

1. sanctions against serious violations of catch limits must be applied against the offending state's allocation, and
2. sanctions must be administrative and not subject to debate by the broader Commission body.

The compliance committee must select the category of offending.

The following formulations for a schedule of sanctions are proposed by this thesis in accord with the rule sets proposed by Ostrom:

Overall reduction in total allowable catch from any applied allocation reduction

- Allocation reduction as a percentage of overcatch by an individual vessel
- Allocation reduction as a percentage of the member's individual quota.

Other members may be eligible to apply for some portion of the offender's allocation for the period of the sanction instead of an overall reduction. This may be allowed if the Science Committee agrees the overall biomass and general rate of recruitment will achieve carrying capacity of the target stock's habitat.

- Allocation reduction as a percentage of individual quota transferred to other authorised members of the RFMO.

The severity of the sanction may be linked to a calculation of the impact of the violation on the stock. In this formulation, the sanction is in the form of reparation for damage to the common-pool resource (fish-stock).

- Allocation reduction as a percentage of individual quota until stock has recovered to point x in a subsequent season/period.

The severity of the sanctions may be considered on an exponential scale

- Minor violations will result in allocation reduction directly equivalent to the overcatch

- Major violations will result in allocation reduction determined by applying some multiplying factor to the overcatch.

The severity of the sanction may warrant a gradual re-entry to allocation rights by the violator

- Allocation reduction would recover on an incremental increase in %.

The severity of the sanction may warrant permanent re-allocation of an individual catch percentage to another RFMO member

This sanction no longer has a baseline of the biomass recovery targeted by the RFMO Scientific Committee. It may include a punitive factor to the loss of IQ as a permanent punishment for extreme violations of conservation measures. In this case, the remaining allocation may be distributed among other members or those states seeking to become members of the RFMO. Membership and allocation of IQ should not be a permanent and irreversible right for allowable catch among existing members. Nor should the increase in individual quota from a recovered fish stock be a right by those states who were historical fishers. Continuing membership and the benefits that accrue from the change to new and sustainable fishing practices is contingent upon good behaviour.

Serious deviation from conservation measures must attract punitive measures. These measures may well include permanent reallocation of allowable catch among existing and new entrants to the fishery.

Conclusion

Property rights can produce sustainable fishing practices on the high seas. Creating sanctions that focus directly upon the allocations of state actors will support sustainable fishing practices. Any state unwilling to constrain its flagged fishing vessels must not reduce the value of the property right of other member states. In this way, RFMO created property rights can be a mechanism to incentivise restraint and reform. Most importantly an institutional norm and ruleset based on preserving common-property rights will remove the destabilising effects of a non-compliant member.

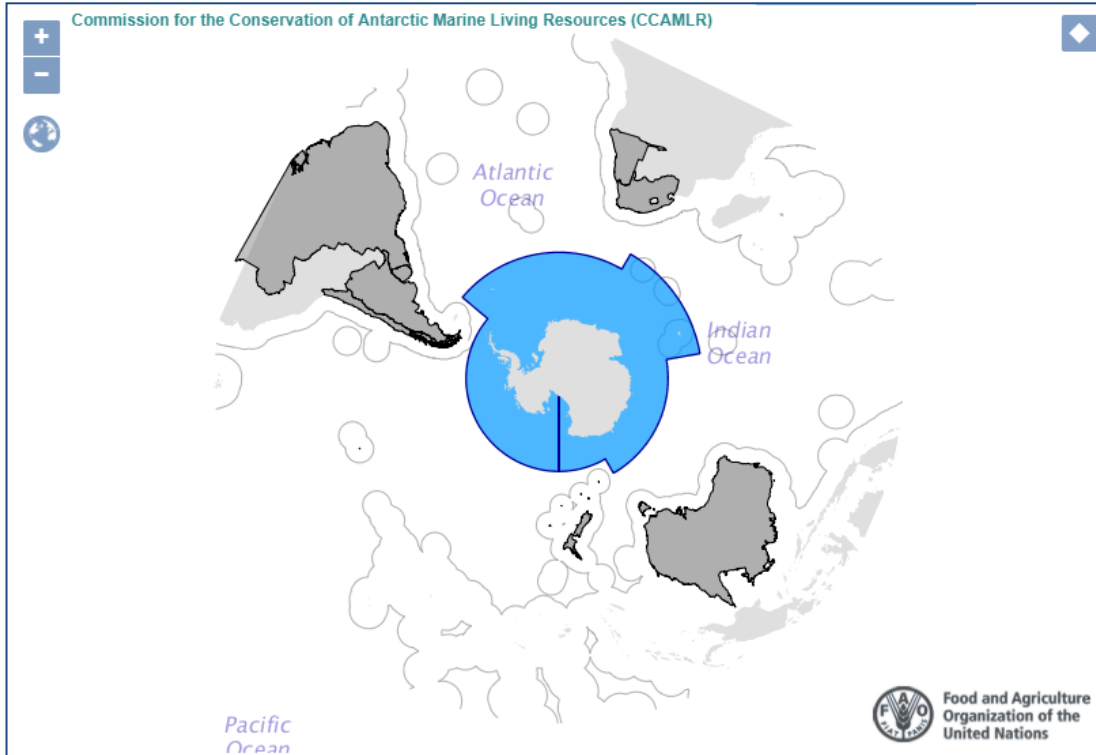
Strengthening property-rights in RFMOs is an extension of existing international principles, norms and practice. Current command and control governance systems fail because they do not exploit the intrinsic motivations of high seas fishery actors and they present the full burden of monitoring and enforcement onto the RFMO authority and motivated members. In contrast, governance based on common-property systems strengthens member state rights to individual catch and limits overfishing externalities through sanctions on non-compliant member states. Governance systems based on property-rights use RFMO authority in a very different way to systems based on command and control.

This thesis has shown that a strong property-rights system can be created as an extension of existing international principles, norms and practice in Pacific RFMOs. In an institution of common-property rights the emphasis is on collective rule-making and strengthening the incentives for individual compliance. Strengthening the property characteristics of the current RFMO regime is a policy proposal that requires only a shift in cognitive emphasis from limitations on behaviour to benefits of behaviour. Such a RFMO institution will build upon existing achievements of fisheries management control mechanisms. It will require the strengthening of existing but currently unfocused control mechanisms to create a new mechanism of control to promote sustainable high seas fisheries. This rights-based mechanism of control reinforces purposive institutions that are designed to structure behaviour. It harnesses the fundamental economic motivation for high seas fishing. Property-rights in high seas fisheries create economic incentives to practice sustainable high seas fishing.

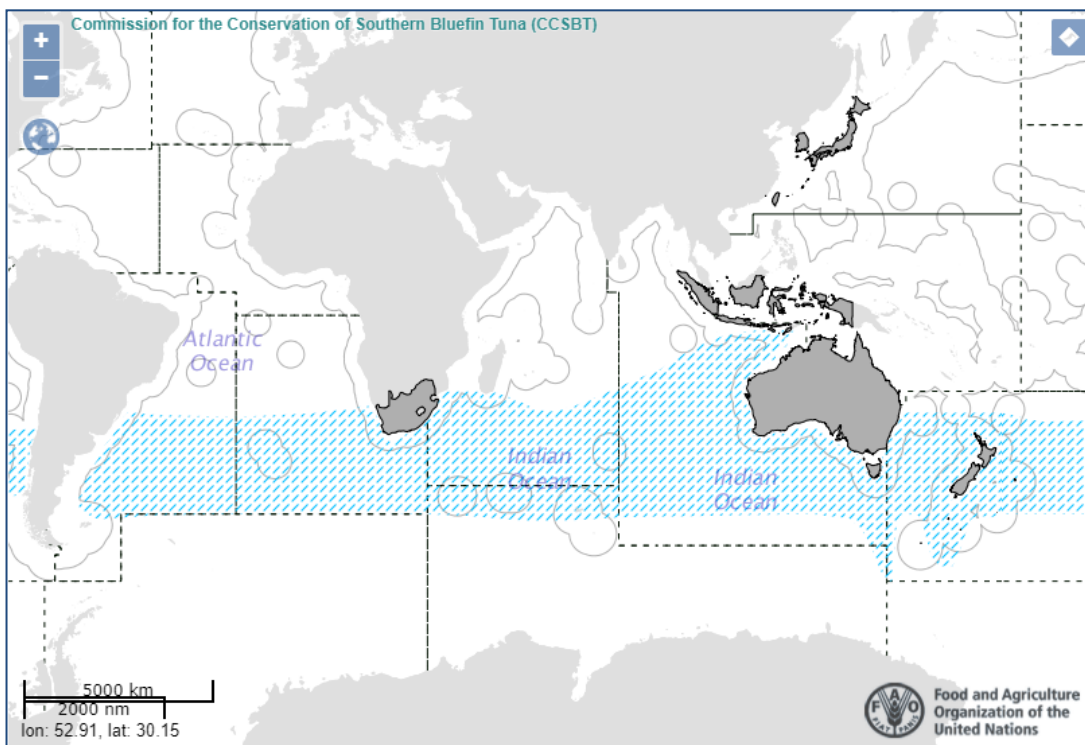
Appendices

Appendix 1 - Areas of competency for studied RFMOs

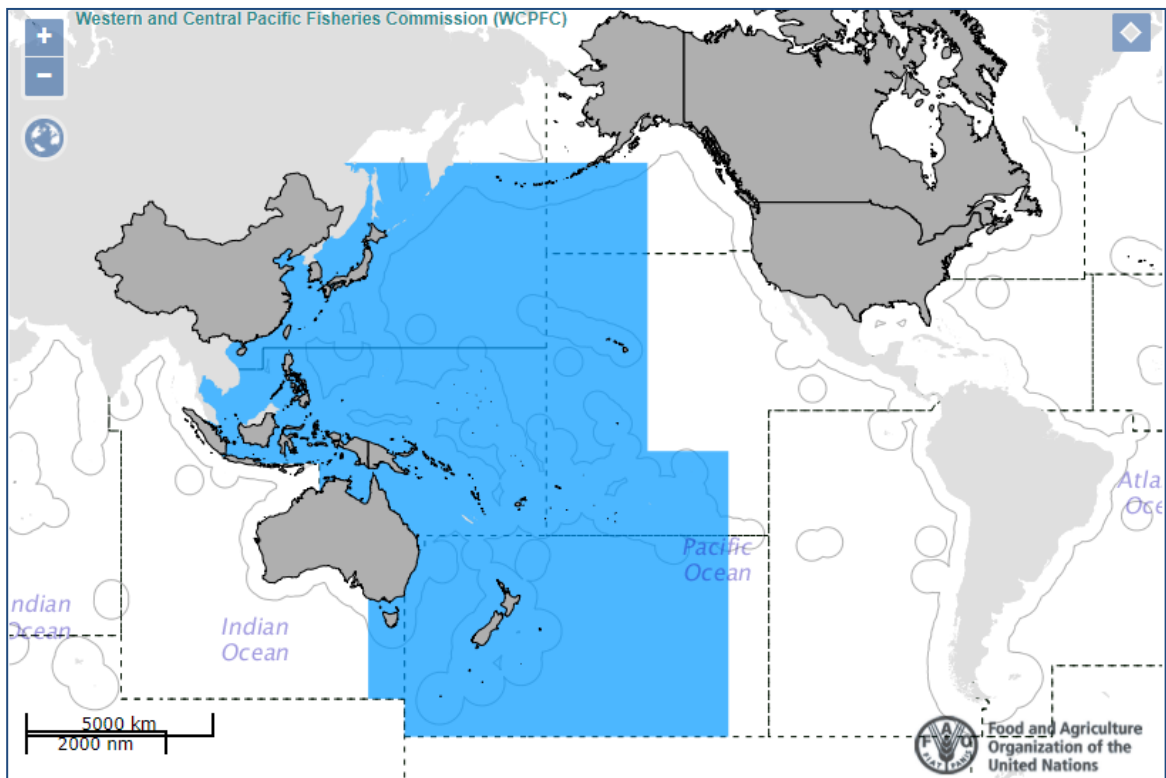
CCAMLR



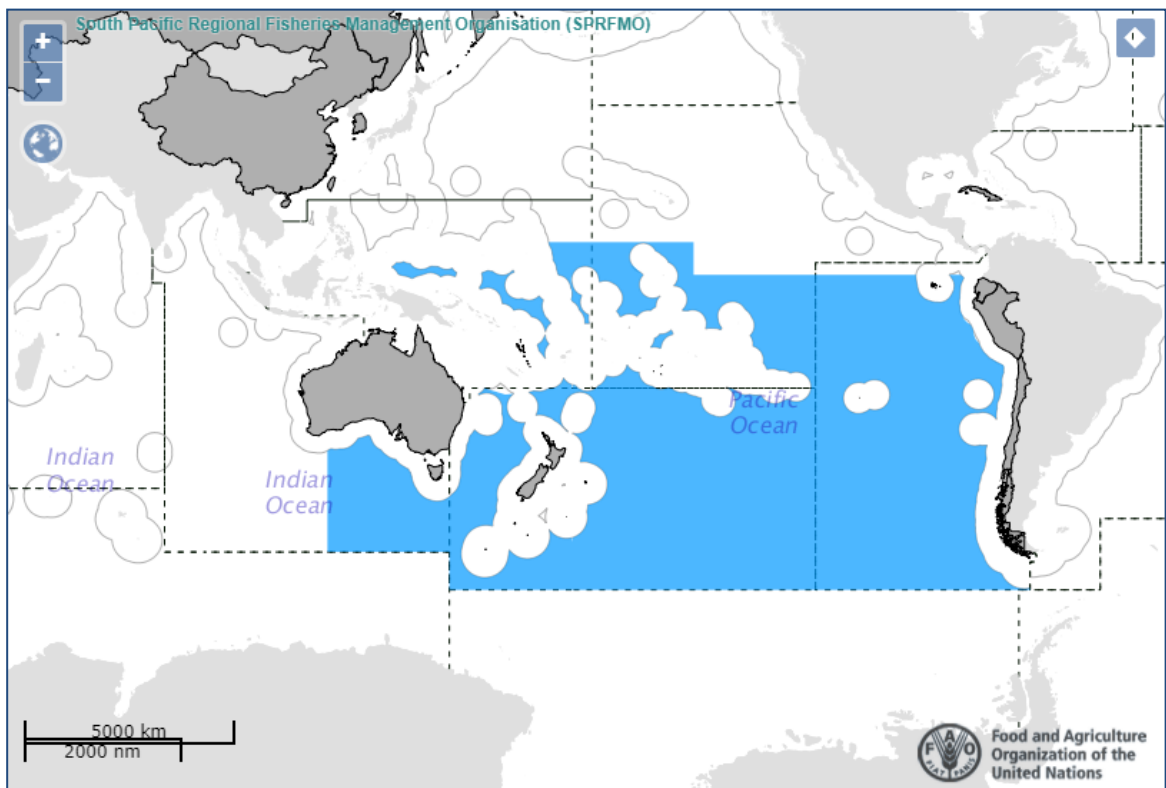
CCSBT



WCPFC



SPRFMO

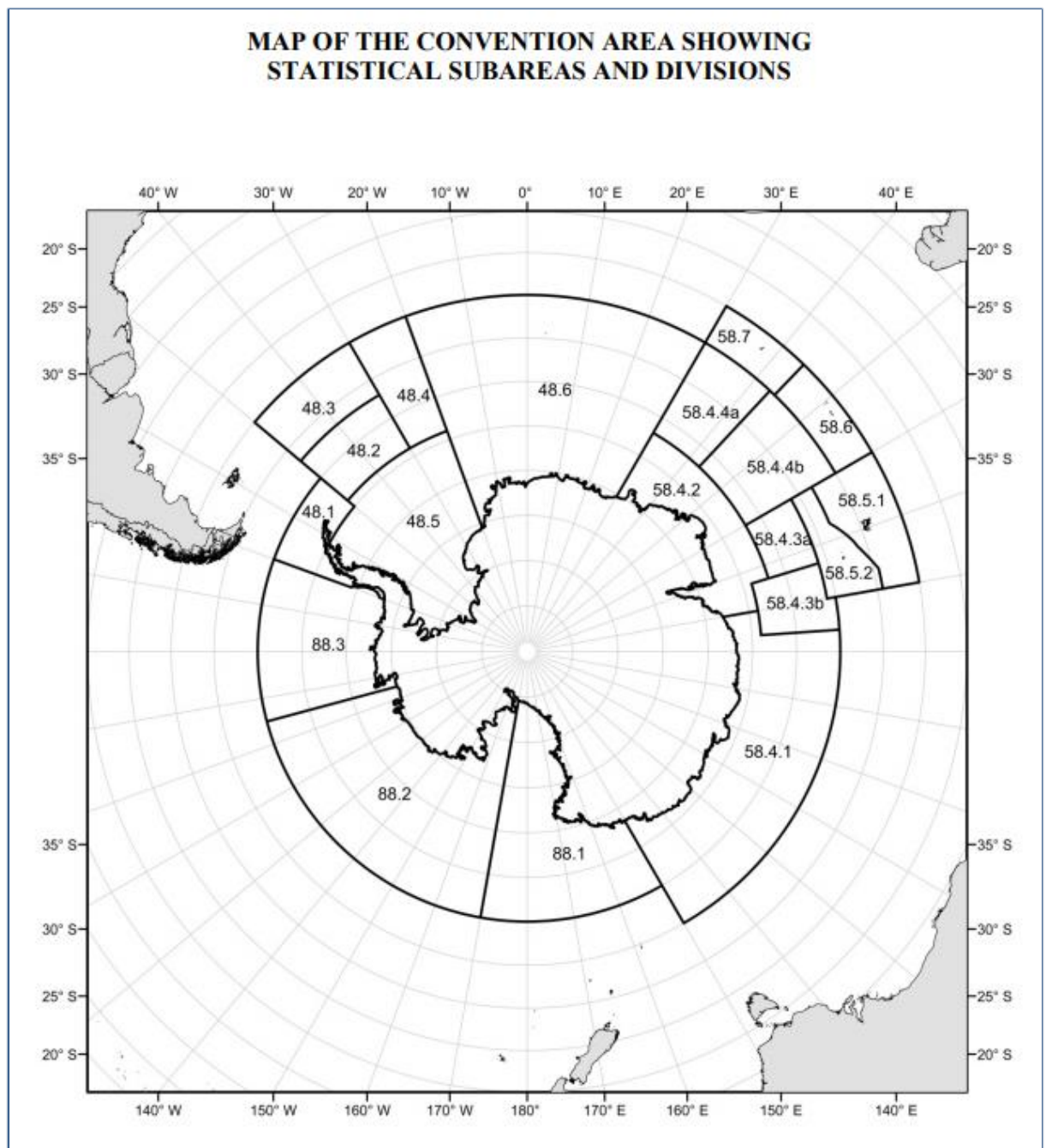


Appendix 2 - Member states of studied RFMOs

<p>CCAMLR</p> <p>Argentina Australia Belgium Brazil Chile China European Union France Germany India Italy Japan Namibia New Zealand Norway Poland Republic of Korea Russian Federation South Africa Spain Sweden Ukraine United Kingdom United States of America Uruguay</p>	<p>CCSBT</p> <p>Australia European Union Indonesia Japan New Zealand Republic of Korea South Africa Taiwan Province of China</p>
<p>WCPFC</p> <p>Australia Canada China Cook Islands European Union Fed.States of Micronesia Fiji France Indonesia Japan Kiribati Republic of Marshall Islands Nauru New Zealand Niue Palau Papua New Guinea Philippines Republic of Korea Samoa Solomon Islands Taiwan Province of China Tonga Tuvalu United States of America Vanuatu</p>	<p>SPRFMO</p> <p>Australia Chile China Cook Islands Cuba Ecuador European Union Faroe Islands (Denmark) New Zealand Peru Republic of Korea Russian Federation Taiwan Province of China Unites States of America Vanuatu</p>

Appendix 3 – CCAMLR subareas

Map of the CCAMLR Area subareas and divisions



Appendix 4 – CCSBT member allocations

CCSBT Members' Nominal Catch and Percentage Levels (CCSBT24 CC12 2017:87)

Member	Nominal Catch Level (tonnes)	Nominal Catch Percentage Level
Japan	6,165.068	35.5643%
Australia	6,165.068	35.5643%
Republic of Korea	1,240.631	7.1568%
Fishing Entity of Taiwan	1,240.631	7.1568%
New Zealand	1,088.273	6.2779%
Indonesia	1,001.705	5.7785%
South Africa	422.741	2.4387%
European Union	10.883	0.0628%

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