A Tale of Two Fisheries: Are Individual Transferable Quotas (ITQs) linked to regulatory capture in Iceland and New Zealand's fisheries management?

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Declaration of Originality

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Abstract

The development of industrial fishing on a global scale has had deleterious effects on the earth's marine environment. Significant observable declines in fish stocks by the 1970s due to overfishing prompted many countries to adopt Individual Transferable Quotas (ITQs) as the basis of fisheries management. These quotas were intended to limit the number of fishers and fish that could be harvested from the sea, thereby preventing a 'tragedy of the commons'. Greater involvement of fishers in regulation was argued to enable a custodial relationship between fishers and the fish stocks that their livelihoods depend on, and thus their sustainability would be ensured. While ITQ management did halt the open-access nature of many countries' marine environments, the proliferation of ITQ management has simultaneously failed to stem the decline of marine life. The greater involvement of industry in fisheries regulation has also raised questions about conflicts of interest between environmental stewardship and profit maximisation. In policymaking, this arrangement may be described as a form of regulatory capture, an undesirable situation wherein the regulator acts on behalf of industry instead of the public interest. This thesis intends to examine whether regulatory capture is linked to ITQ management and what impact ITQ management has had on environmental, social and economic outcomes. New Zealand and Iceland will be used as case studies in order to compare both countries' decades of experience utilising ITQ management.

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Figures, Tables and Abbreviations

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Abbreviations

DOC = Department of Conservation

DOF = Directorate of Fisheries

EEZ = Exclusive Economic Zone

FNZ = Fisheries New Zealand

ITQ = Individual Transferable Quota

MFRI = Marine & Freshwater Research Institute

MPI = Ministry for Primary Industries

QMS = Quota Management System

NIWA = National Institute for Water and Atmospheric Research

RBFM = Rights Based Fisheries Management

RFMO = Regional Fisheries Management Organisation

TAC = Total Allowable Catch

TACC = Total Allowable Commercial Catch

Chapter 1: Introduction

This chapter aims to establish the purpose of this research project by first establishing the wider historical context of fishing in general. This will involve a brief summary tracing the development and growth of fishing from its origins through to the rise of commercial fishing into the modern day. An examination of global fishing trends will be utilized to establish the problem context. The research question and hypothesis will be outlined.

Historical Context

Fishing has played a significant role in the development of human civilisation. The earliest archaeological evidence of seafood use was 164,000 years ago in South Africa (Marean et al., 2007). Many hunter-gatherer groups of humans used protein rich fish as a staple for their diets and survival. Whilst a significant amount of fishing in the prehistoric period was conducted in bodies of freshwater such as lakes and rivers, the expansion of sea fishing coincided with the development of early settled civilisations. The neolithic era (between 10,000-4500BC) saw the development of basic fishing technology such as hooks made from bones (D Sahrhage & Johannes Lundbeck, 1992). The ancient Egyptians in the absence of significant pastoral land utilised the river Nile as a bedrock of their civilisation, bringing further development to fishing technology (D Sahrhage & Johannes Lundbeck, 1992). Nets, baskets and lines made the capture of fish for means beyond survival viable, with excess fish often being used as a form of currency or traded for other goods. The spread of these techniques to the Mediterranean is evident in Minoan art, which depicted the capture of ocean fish for the first time (Castleden, 2016). The growth of fishing continued throughout the Greek and Roman periods, often depicted in mosaics or described in historical accounts. In the east, China experimented with aquaculture around the 1st millennium BC by cultivating carp in ponds, representing some of the first instances of seafood cultivation within a human controlled environment (D Sahrhage & Johannes Lundbeck, 1992).

By medieval times, the growth of seafood trade contributed to the rise of the merchant class who utilised salt to preserve fish for long trade voyages. The trade of herring in the Baltic and North Atlantic seas aided in the creation of the Hanseatic League, which was the first large scale fishing organization that transcended national borders (D Sahrhage & Johannes Lundbeck, 1992). The continued development of superior sailing vessels in both the East and West intensified the financial lucrativeness of commercial fishing. The industrial revolution saw the rise of steam to replace wind as a source of energy for many commercial fishing ships, which allowed for larger fishing gear and greater quantities of seafood to be harvested. Steam energy was subsequently supplanted by combustion engines in the 19th century allowing for even greater efficiency in the expansion of global commercial fishing (Finley, 2019). As these technologies spread throughout the world as a result of globalisation, the amount of fish being taken from the ocean increased substantially. By the 20th century, the development of trawler ships that allowed for the processing of fish onboard enabled many countries to engage in long range fishing expeditions far from their coastal borders.

The ocean throughout most of human history was considered vast enough to sustain the effects of intensified commercial fishing. As the old adage goes, ‘there are plenty more fish in the sea’. By the 20th century however, the global proliferation of commercial fishing began to have evident drawbacks. For one, it became clear that entire fish stocks were being harvested until the point of collapse. This had occurred throughout the 19th century as well, though attempts to mitigate fish stock collapses were seen as unnecessary due to the ability to simply continue fishing in other areas that were plentiful (Hilborn & Hilborn, 2012). The increasing frequency of observable fisheries collapses raised questions about the sustainability of continuous and unlimited intensified fishing. Prominent examples include the collapse of the Far East Asian Kamchatka salmon fishery in the 1950s, the collapse of the Atlanto-Scandian herring fishery in the 1960s and the collapse of the Peruvian Anchoveta in the 1970s (Ferguson-Cradler, 2018).

These worldwide fisheries collapses encapsulated the environmental science concept known as the ‘tragedy of the commons’, which postulates that in the absence of any formal limits or rules on access and use of a resource, individuals will exploit the resource until collapse (Hardin, 1968). Coastal communities that utilised fish for their subsistence for generations were

increasingly and abruptly finding that a resource they had come to rely upon was no longer available. In addition, as the finite nature of fisheries became apparent, countries were beginning to come into conflict over who had the right to fish where and how much. An example of this is the Cod Wars, which saw military engagement between Iceland and the UK over the right to harvest Cod fish in the North Atlantic Sea (Steinsson, 2016). For Europe in particular, the density of countries meant there was significant overlap in areas fished by numerous coastal countries. There became a growing awareness that the 'tragedy of the commons' with respect to fisheries applied to both individuals and countries.

Recognising these problems, many of the world's countries came together to negotiate and address them through international institutions. Exclusive Economic Zones (EEZs) were set up under the United Nations Convention on the Law of the Sea in 1982 to legally define sea jurisdiction as 200 nautical miles off the coast of a given country's coast (United Nations, 1982). Where EEZ's overlapped such as in Europe and Asia, further negotiation was required with some jurisdictions remaining disputed to this day, the South China Sea being one such example (Daniels, 2014). The Food and Agriculture Organisation (FAO) of the United Nations was another international institution set up in 1945 which included the mandate of leading international efforts to maintain food security. The Fisheries and Aquaculture Department of the FAO has the stated mission to "strengthen global governance and the managerial and technical capacities of members and to lead consensus-building towards improved conservation and utilization of aquatic resources" (Fisheries & Aquaculture Division, n.d.). Outside of EEZs are international waters where no country can claim sole ownership of marine resources. Instead, these areas have become managed by multilateral Regional Fisheries Management Organizations (RFMOs) which are comprised of countries that have a vested interest in the fisheries of that region. Over time numerous RFMOs have come to govern the vast majority of the world's oceans (Cullis-Suzuki & Pauly, 2010). It was hoped these measures would be sufficient to maintain the sustainability of the world's fisheries, though research leading into the modern day suggests otherwise.

The Global Fishing Industry Today

The FAO's landmark *The State of World Fisheries and Aquaculture 2020* report paints a dire picture regarding the state of global fisheries (Food and Agriculture Organisation, 2020). While 90% of fish stocks globally were estimated to be within biologically sustainable levels in 1990, this had dropped to 65.8% by 2017. Capture fisheries (fishing in the wild) had increased 14% while fish consumption had increased by 122% within the same 1990-2017 period. The report also emphasised the economic importance of fisheries to the world, with an estimated 39 million people employed in fisheries alone (excluding aquaculture) and an estimated global export value of US$164 billion. In 2017, fish accounted for 17% of animal protein and 7% of all protein consumed globally, indicating its importance to the global food supply chain. Sea Around Us, an international research body from British Columbia had suggested the figures are even worse than what the FAO claims, estimating that fishery catches have been underestimated by 50% since 1950 (Pauly & Zeller, 2016). The figures FAO cites are self-reported by member countries and had previously been assumed to be accurate, though this assumption has increasingly been called into question. In the realm of fisheries science, the notion that global fish stocks are declining in aggregate is mostly unanimous and accepted. If current trends continue, research suggests that 88% of fish stocks will be overfished by 2050 (Worm, 2016).

One perceived cause of this continued degradation is the ongoing use of fishing subsidies, in which governments artificially prop up the fishing industry using taxpayer money. A 2018 study found that the continued intensity of commercial fishing is only possible in large part because of these subsidies (Sala et al., 2018). While it is the case that the majority of fisheries are managed poorly, some countries appear to have bucked this trend. It is claimed that this is due to the adoption of Rights Based Fisheries Management (RBFM) (Costello et al., 2016). RBFMs operate by granting exclusive rights to an entity, individual or organization to fish in a particular place and time, often specifying an amount (generally in tonnage) allowed to be fished too. It has been argued that this form of fisheries management is able to constrain the self-interest of individuals and avoid the collective ruin the 'tragedy of the commons' entails. The thought process behind RBFMs goes that the 'tragedy of the commons' exists because in the absence of private ownership, no single individual or entity is responsible for the resource being used sustainably. The use of the resource then turns into a free-for-all where every individual is incentivised to fully exploit the resource before it is entirely depleted by others. Refraining from exploiting the resource would be irrational in this context, as even if one was aware of the

resource's imminent collapse, as others would continue to exploit it until collapse making individual restraint redundant.

Many scientists, members of industry and even environmental organisations view RBFMs as the solution to the global problem of fisheries mismanagement or lack of. The tide can be turned, it is said, if underperforming countries simply adopt this best practice management technique. This position however is not unanimous. The success of RBFM has been contentious in the scholarship, with accusations of industry interference resulting in the distortion of statistics and obfuscation of how RBFM operates in practice. A recent study claimed that comparatively, the United States, Iceland, Norway, Russia and New Zealand are the top managers of their fisheries, and the more management undertaken the more successful the results (Melnychuk et al., 2016). This ranking of New Zealand specifically has received pushback from other New Zealand scientists who have claimed these rankings in New Zealand's context were established through surveys of experts affiliated with the fishing industry and therefore compromised in their conclusions (Slooten et al., 2017). Other fisheries experts have more concerningly stated most regulation of fisheries internationally by RFMOs is subject to 'regulatory capture', a phenomenon that entails the appropriation of regulatory management by industry for industry (Barkin & Desombre, 2013).

Of the various forms of RBFMs, the Individual Transferable Quota (ITQ) or Individual Fishing Quota has proven the most popular globally. It is estimated that approximately 10% of the fisheries harvest worldwide were managed by ITQ systems by 2009 (Chu, 2009). This thesis intends to investigate and compare two countries experiences with ITQ management. New Zealand and Iceland will be the two ITQ-managed countries investigated in order to gauge the extent of regulatory capture presence and whether outcomes are improving or not. If it is the case that ITQs are subject to regulatory capture, this may cast doubt upon their use as the silver bullet to combat the continuation of overfishing globally. The question this thesis will attempt to address is:

To what extent are Individual Transferable Quota systems of fisheries management subject to regulatory capture in Iceland and New Zealand?

The hypothesis of this thesis will be that:

ITQ systems of commercial fishing management have entrenched regulatory capture in both New Zealand and Iceland.

Having established the meteoric growth in scale of industrial fishing from its ancient origins, the negative global trends we see today with respect to the marine environment begs the question as to whether current fisheries management can reverse them. ITQs have been proposed as the solution to overfishing, but some critics have argued regulatory capture plagues fisheries governance, including ITQ management. Examining whether ITQ management is subject to regulatory capture requires a deeper understanding of both concepts which will be the focus of the next chapter.

Chapter 2: Literature Review

This chapter aims to establish an in depth understanding of the two key concepts that the research question encompasses: regulatory capture and Individual Transferable Quotas. This will involve tracing the historical origins and characteristics of each concept as described in the literature.

Regulatory Capture: A Review

Regulatory capture is a theory created by George J. Stigler in 1971 that characterised regulation of industry as often being created for the benefit of industry itself. Up until this point regulation had been conceived primarily in public interest terms. Public interest theory, which came to prominence in the post-World War 2 welfare state era, stipulated that the intention of regulation should be to maximise social welfare (Posner, 1974). This meant that regulation was generally perceived as state intervention in the area of industry for the benefit of wider society. An example Stigler provides of this is the heavy taxation imposed upon the alcohol industry, which is due to the perceived damage it inflicts upon society. Stigler asserted that while this scenario may ideally be what regulation should do, the reality is regulation in many cases does not follow public interest theory ideals. Instead, industry uses regulation to enhance its own position and self-interest. Stigler identified several ways this could manifest (Stigler, 1971):

- The soliciting of subsidies from the government. Stigler cites American Airlines and Universities as key beneficiaries of this form of regulation.
- The use of regulation by industry to prevent entry into the market by rivals. This can happen both within and between particular industries. Stigler uses the Federal Deposit Insurance Corporation's powers to insure new banks to prevent new commercial bank competitors as an example of this.
- The use of regulation by industry to frustrate competition while aiding complementary industries. An example Stigler uses of this would be the butter industry using regulation

to impact the profitability of margarine, while encouraging the growth of bread production.

- The use of price fixing. Though Stigler admits this is often difficult to implement without public support (for instance to support a war effort) it becomes more tenable when there are less competitors within an industry and therefore room for individual companies to influence prices.

Stigler was a prominent figure of the Chicago School of Economics, which sought to supplant public interest theory with public choice theory. Public choice theory advocates the use of economic tools as a solution to political problems, including that of regulation. Ultimately his argument was that government regulation of industry largely makes situations worse instead of better. An industry empowered by government coercion and rulemaking allows for market distortions that burden the taxpayer and fail to accomplish what the regulation was introduced to address to begin with. Regulation under Stigler's conception should therefore be rolled back where possible. Stigler was primarily concerned with the economic inefficiencies that regulatory capture created. This resulted in 'rent seeking' behavior from industry, wherein industry seeks to gain wealth without adding any productivity to the economy. But subsequent developments in regulatory capture theory have enhanced and expanded our understanding of regulatory capture.

Stigler focused primarily on the creation of regulations by industry for its own interest. But another manifestation of regulatory capture is 'corrosive capture', or in other words the erosion or elimination of regulation by industry for its own interests rather than its creation (Carpenter & Moss, 2014). Corrosive capture is especially pertinent in the area of environmental regulation. The Deepwater Horizon Oil Spill of 2010 can be cited as a prominent example of regulatory capture resulting in significant environmental externalities. The agency charged with regulatory oversight of offshore oil drilling, the Minerals Management Service, had a well-documented close relationship with fossil fuel company employees. It was found that the fossil fuel industry repeatedly interfered with attempts by the agency to implement new safety regulations to BP's operations in the Gulf of Mexico (Union of Concerned Scientists, 2017). This case of regulatory capture helped create the greatest environmental disaster in American history, with enormous

costs not only to the marine environment but also to the economic and social outcomes for the local population.

Regulatory capture can also be thought of in materialist and non-materialist terms (Engstrom, 2013). Materialist accounts of regulatory capture in the conventional sense describe interest groups such as industry competing for regulatory influence in the decision making and administrative arenas. Non-materialist accounts of regulatory capture however state that cognitive and cultural capture play an important role in the process, a role which was long overlooked by the scholarship. Cognitive or cultural capture posits a situation where an interest group is able to capture the regulatory process through the colonisation of ideas. The end result is that the regulator ends up 'thinking like' the special interest group and subsequently pursuing the same interests. In other words, "regulators may come to view the world the way firms do, not because they have been captured through incentives, but because they have been convinced" (Dal Bo, 2006). This can also occur through the revolving door effect, wherein regulators have also worked in the industry and vice versa. An example of this is the deregulation of financial markets in the United States, due in part because the financial industry rubbed shoulders with regulators at the SEC, successfully convincing them that what is good for Wall Street is synonymous with the 'public interest' of America e.g. wealth creation (CFA Institute, 2016).

Arguably a degree of regulatory capture is inevitable; economic considerations of whatever is being regulated will always be in varying degrees of tension with other considerations. Regulatory capture should, for this reason, not be considered binary, i.e. that capture either exists or it doesn't, but rather as on a sliding scale. In line with this, some scholars have suggested that it is useful to differentiate between strong and weak capture (Carpenter & Moss, 2014). Strong capture implies regulation is captured by industry to such an extent that it is either preferable to get rid of regulation altogether as the benefits of regulation are outweighed by the costs of its capture; or that the policy and/or agency requires fundamental overhaul or replacement. Abandoning regulation altogether would be Stigler's solution based on his conception of capture. Weak capture by contrast implies that special interest groups have compromised the public interest, but not to an extent that regulation should be abandoned

altogether. Even flawed regulation under this conception is preferable to no regulation at all, as the net public interest is still being served better than its absence.

Another development of regulatory capture theory is scientific and academic capture. This manifestation of regulatory capture places emphasis on how research and scientists are often funded by industry, thereby creating conflicts of interest that influence methodologies, strategic direction and interpretations of data (Holman & Bruner, 2017). This phenomenon can lead to an industry stranglehold over research and science that informs regulation. When a major source of funding is from industry, this generally means research is conducted with industry interests in mind. This can have the effect of reinforcing industry narratives, as industry is unlikely to fund research which will create negative perceptions of themselves or their practices. The importance of science to understanding how the world operates is crucial. And so the growth of industry funded science raises serious questions about whether objective facts or industry promoted narratives are the end result. There have been several observations about how this phenomenon operates in practice (Saltelli et al., 2022). The use of industry funded scientists can be used to undermine science that has conclusions contrary to industry interest by questioning its legitimacy. Another way this can manifest is the omission of important caveats or methodological aspects of the research conducted. And finally, populating scientific boards with industry sympathetic scientists and influencing the agenda of scientific governance stand as two additional means scientific capture can occur. Discourse on fisheries can then become based upon science and facts conducive to industry interests while omitting scientific advice and facts that are less convenient.

Regulatory capture can be notoriously difficult to identify for not only practical reasons but also conceptual reasons. Some scholars have identified that the label of regulatory capture is often used inconsistently. For instance, interest groups that fail to achieve their regulatory ambitions often accuse the process of rule creation of being ‘captured’ by other interest groups (Yackee, 2021). Accusations of regulatory capture can then be political in nature rather than a genuine concern that the public interest is not being served. In addition, universal definitions of what actually constitutes the ‘public interest’ remain elusive, making measuring regulatory capture difficult to pin down conceptually.

Individual Transferable Quotas: A Review

ITQs have their origin in the form of catch shares, a concept that came to prominence in the 1970s. The theoretical basis for fishery catch shares was based upon H. Scott Gordon's influential essay The Economic Theory of a Common Property Resource. He identified that common property resources (or communal ownership of natural resources) incentivised individuals to rapidly increase their share of the resource before others could, resulting in overcapitalisation and collapse of the said resource (Gordon, 1954). This overcapitalisation led to the depletion of fish biomass (population) which inevitably led to fishing becoming less profitable for individual fishers and ultimately resulting in collective loss. This was perhaps one of the first articulations of the tragedy of the commons as applied specifically to fisheries. Catch shares can in theory alleviate this phenomenon by allocating a legal right to harvest fish from a particular area, or a percentage of a fishery's catch to an individual, community or organisation. It can be thought of as a type of privatisation on the access to and use of fish stocks.

On a fundamental level, the ITQ system is designed around game theory. Game theory posits that individuals are rational, self-interested agents acting within an environment that can alter their incentives (Hollis & Sugden, 1993). Under this logic, if you alter the environment (or the rules of the game) the individuals that operate within it can be induced to act differently. For instance, absent any rules governing fishing, individuals are incentivised to fish as much as possible in a free-for-all leading to the tragedy of the commons. However, enacting rules to distribute fixed fishing rights to a limited catch of fish and punishing those who do not follow these rules alters the incentives of the 'fishing game'. Fishers are willing to accept restraint and cessation of fishing for sustainability reasons only on the guarantee that all others will too. This makes government enforcement of these rules central to the system of incentives ITQ systems create. Individual fishers under ITQs, it is said, can see that the long-term survival of the fish stocks that sustain their families and livelihoods is in their own long-term self-interest.

The concept of ITQs as applied to fisheries was first developed by F.T. Christy, who argued that a system of incentives would be preferable to centralised controls which were used previously

by many governments seeking to regulate fisheries (Grafton, 1996). The thought process behind ITQs goes that only those with quota (or in other words shares) are allowed to harvest the fish stock in question and only proportionate to the amount of quota legally owned. The quota owned are applied to the Total Allowable Catch (TAC) for a particular fish stock in weight. The TAC is set is based upon how many of that fish stock can be sustainably harvested. For instance, if the TAC for snapper is set at 8000 tonnes, that is the amount of snapper that is thought to be sustainably harvested without reducing future catch. If an individual has quota that represent 2% of that fish stock, that means they are allowed to harvest 2% of the 8000 tonnes of Snapper that is designated for fishing, which would translate into 160 tonnes. This framework limits not only who is allowed to fish, but also how much they are allowed to take thereby avoiding the problem of overcapitalisation and overfishing.

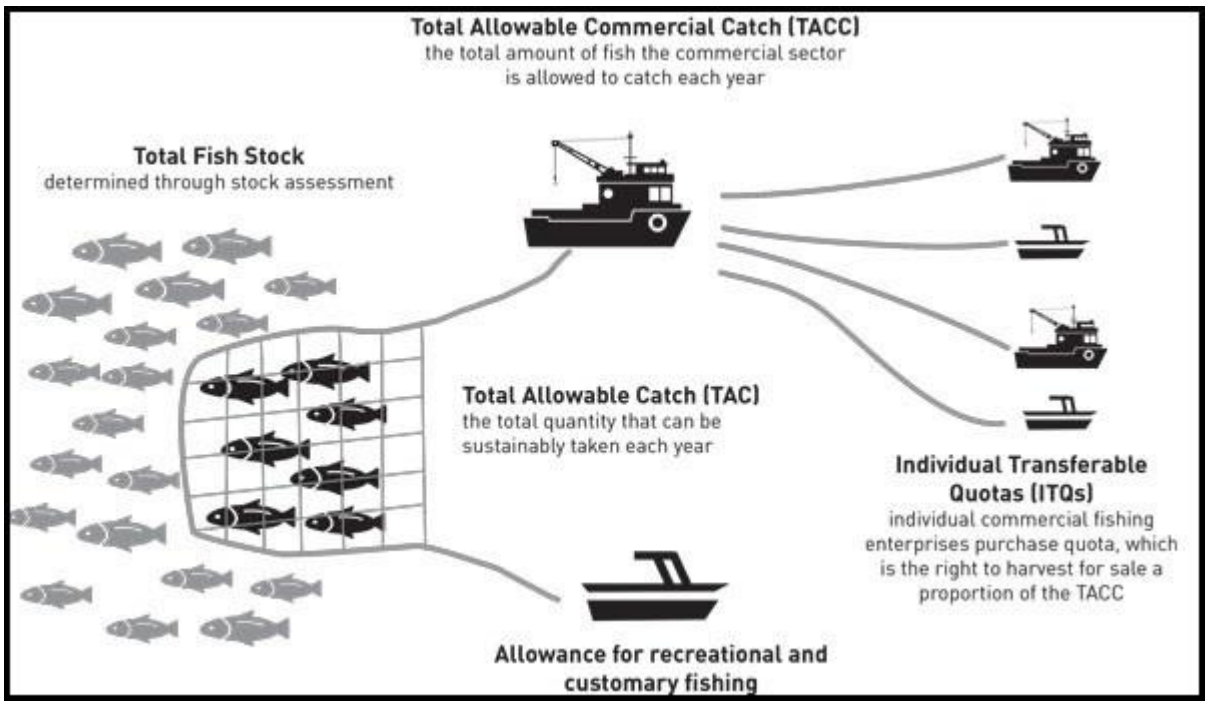

Figure 1. Diagram visualising ITQ management in New Zealand (Source: Ministry for Primary Industries, n.d.-b).

Quota are initially distributed by the regulator to prospective fishers or in some cases distributed based on past harvests or vessel characteristics (Grafton, 1996). Once initial ownership is established, quota can then be leased or sold, subsequently creating a market for quota in which the price of quota is determined by the market. Quota owners can choose to sell their quota as an asset or lease their quota to fishers instead of harvesting their quota amount

themselves. Fishers able to efficiently catch fish will increase their profits over less efficient operators. If less efficient competitors are not, likewise, able to match the efficiency of their competitors, they will leave the market, giving up their quota ownership or lease to more efficient operators. In this sense, the quota market rewards those who fish efficiently while also ring fencing the amount of fishing to sustainable levels set by the TAC.

While still regarded as one of the most effective forms of fisheries management, ITQs have also been subject to significant criticisms. One of the primary criticisms levied at ITQ systems of fisheries management is that they fail to holistically incorporate the wider ecosystem into their management objectives (Branch, 2009). Because ITQs are applied to fish stocks that are of relevance to fishers, this means the focus of management priorities is on the status of economically relevant stock. For instance, it may be the case that stocks assessed under the ITQ system are of good health. But this says nothing about fish stocks and marine ecosystems that are not within the ITQ system. Fishing can often have adverse effects on other species such as depleting their food source. In other cases, ITQ stocks may depend on other parts of the marine ecosystem to survive, meaning simply measuring the biomass of an ITQ fish stock is not providing the full story.

An economic based criticism of ITQ systems is the alleged promotion of rent seeking behaviors. ITQs are said to bring considerable economic benefits through fishers attempting to harvest their limited share of the fish stock in the most efficient way possible. However, the ability for quota owners to lease their quota allows for owners to create value for themselves without actually catching the fish (Torkington, 2016). Fishers who expend resources to lease the quota and pay for the tools and equipment necessary to catch fish are increasingly squeezed out of the market. Rises in fish quota profits can be captured by the owners of the quota rather than the actual fishers by raising the price of the lease, raising valid questions over who should profit from increases in efficiency. The ability to lease quota also raises questions about whether a custodial relationship still exists when the owner of quota does not fish themselves.

Related to the idea of economic distributive justice, the privatisation of public goods stands as another controversial element to ITQ systems (Doering et al., 2016). There were serious questions at the time ITQs were created about the fairness of essentially privatizing commercial fishing access over a nationally owned natural resource. While there was little doubt at the time that fisheries could no longer be open access without limitations due to the threat of overexploitation, there remains apprehension over whether fish stocks should remain a public or private good. Considering fish quota ownership appears to consolidate over time this can result in corporate entities profiting from exclusive use of public goods. This state of affairs can subsequently lead to social unrest and political pressure for a form of royalty paid to the public to compensate for the loss of open access (Gunnlaugsson et al., 2020).

This chapter has sought to establish an understanding of the key concepts of regulatory capture and Individual Transferable Quotas, both necessary for understanding this research project. The methodological approach to answering the research question can now be outlined, which will be the focus of the next chapter.

Chapter 3: Methodology

This chapter aims to introduce a conceptual framework that will be used to answer the research question. The framework employed will be a qualitative comparative case study of two countries, New Zealand and Iceland. This will begin with defining key terms and choosing which variables to measure. The rationale for choosing New Zealand and Iceland for comparison will also be explained. The rest of the chapter will outline the successive chapters and the overall structure of this research project, as well as what kind of sources will be sought out.

For the purposes of defining and identifying regulatory capture in commercial fisheries, the general framework and criteria applied will be primarily based on Daniel Carpenter's chapter 'Detecting and Measuring Capture' in the book Preventing Regulatory Capture: Special Interest Influence and How to Limit it. In order to prove regulatory capture, it is imperative to first establish the public interest that regulatory capture is working against. While what the 'public interest' actually entails may be subjective and dependent on one's belief system, the three pillars of sustainability (environmental, social, economic) provide a sufficient starting point for establishing measurable outcomes (Purvis et al., 2018). Within the context of commercial fisheries regulation and management, the public interest will be defined in this research project as:

The sustainable environmental, economic and social management of the marine environment.

If regulation is not conducive to achieving positive outcomes in these areas, this may suggest regulatory capture is working against this public interest. A further distinction is to be made between four different types of capture that will be sought out. The first two are statutory capture (the capture of legislation) and administrative capture (the capture of agency). Statutory capture indicates industry influence on the legislation that creates regulation. This may include the use

of lobbying, the use of donations or 'gifts' to politicians and industry participation in the creation of legislation itself. Administrative capture indicates industry influence over the regulatory body that oversees the implementation of legislative goals. This may include failure to properly implement legislative goals, members of industry being present in the organisation and the suppression of information that reflects poorly on industry or the regulator. A third form of capture to be examined is the prevalence of cognitive and/or cultural capture. This form of capture includes cultural norms around fishing, both formal and informal which influence the regulatory context. A fourth form of capture that will be examined is scientific and/or academic capture. This more subtle form of capture can include industry influence on the science that regulators and scholars use, including the use of industry funded scientists to advance industry narratives in the academic sphere.

David Carpenter's conception of regulatory capture which will be used in this thesis is defined as "the result or process by which regulation (in law or application) is, at least partially by intent and action of the industry regulated, consistently or repeatedly directed from a defeasible mode of the public interest and towards the interest of the regulated industry". As such, regulatory capture within a commercial fishing context will be defined as:

Fisheries management (in law or application) being influenced by industry in intent and action towards industry interest rather than the public interest

It is important to note that within this definition, outcomes simply being beneficial to industry is not sufficient to prove regulatory capture. There must also be corresponding proof of intent and action by industry interests to achieve these outcomes. This can in many cases be very difficult to prove, as meetings behind closed doors or secret donations are generally not on the public record and hence not available to be incorporated into analysis of whether regulatory capture is occurring or not. In addition, while generalised accounts of regulatory capture are useful as a starting point for identifying whether it is occurring, it can also manifest in different ways depending on the particular industry or area. For instance, within a fisheries context the issue of the 'tragedy of the commons' would not apply to an analysis of regulatory capture within the

banking sector, as a finite environmental resource is not a variable being considered. Similarly, the types of stakeholders and types of regulation involved as well as the problems they present will also vary.

As this project intends to examine whether there are links between ITQs and regulatory capture, it makes sense to examine the two countries that have wholly adopted ITQs as a national framework for fisheries management. New Zealand and Iceland are the optimal cases for examining the relationship between ITQs and regulatory capture. Both countries have adopted ITQ systems on a national level, Iceland in 1984 and New Zealand in 1986. Iceland began by applying ITQs to specific fish stocks in the 1970s, whereas New Zealand went from having no ITQs at all to having a national framework based on them. Both countries' early adoption of ITQs mean there is several decades of data and experience ripe for analysis. While it may be true that other countries have adopted ITQs as a means of fisheries management, this adoption is not as comprehensive as New Zealand and Iceland. For instance, the use of ITQs in Australia and the United States applies only to specific fisheries where deemed necessary (Arnason, 2002). As such, choosing to focus on countries with only partial adoption of ITQ fisheries management makes it difficult to gauge to what extent ITQ management is linked to regulatory capture seen at the national level.

The high ranking in fisheries management conferred upon both New Zealand and Iceland in the literature also provides an opportunity to test the pervasiveness of regulatory capture in fisheries management in general. New Zealand and Iceland have both rated highly in several past quantitative assessments of fisheries management (Melnychuk et al., 2016; The Fisheries Centre, 2008; Marchal et al., 2016). It is already well understood that many poor ranking countries with respect to fisheries management are subject to regulatory capture and poor sustainability outcomes due to a lack of state capacity to create and enforce management. New Zealand and Iceland are, by contrast, considered amongst the best examples of fisheries management amongst developed countries. If there are serious deficiencies in ITQ fisheries management due to regulatory capture, this has important implications for whether ITQs are contributing to or stemming the flow of global overfishing. Claims that some countries are

managing fish stocks well need to be scrutinized for the sake of progressing fisheries management globally.

Examination of both countries' ITQ systems for regulatory capture in the successive chapters will proceed as follows:

1. Chapter 4: The development of ITQ management in New Zealand & Iceland - An historical overview of what led to the adoption of ITQs and how they evolved in both countries. This will be contrasted with an overview of what organisations are involved in the ITQ framework of each country and their roles in the modern day.
2. Chapter 5: Environmental, economic and social outcomes - an overview of environmental, economic and social outcomes in both countries.
3. Chapter 6: Evidence of capture - an overview of what evidence exists in both countries of legislative, administrative, cultural and scientific capture in fisheries regulation.
4. Chapter 7: Comparisons & Conclusions – Outcomes and forms of regulatory capture will be compared and summarized. The limitations and implications of this research project will be discussed, with concluding remarks on what all of this means for the future of fisheries management.

A wide range of sources will be required to evaluate both countries respective ITQ management system. Academic journal articles will be sought out that quantitatively and qualitatively assess ITQ management. These sources will also be useful for tracing the development and basis of ITQ theory. Empirical studies that evaluate outcomes of ITQ management will also provide a strong basis for establishing general trends. Government and NGO reports will also be an invaluable source of information about how ITQ management operates in practice as well as primary data that will inform analysis of outcomes. Specific sources will likely involve reports from government ministries/regulators, multilateral organizations such as the OECD and United Nations, as well as environmental NGOs such as Sea Around Us and World Wildlife Fund. Another valuable source of information will be news articles and investigative journalism. These sources will be useful for establishing links between outcomes and regulation, as well as evidence of industry influence over fisheries management.

This chapter has established the structure and parameters of this research project. The analysis can proceed by examining the historical development of ITQ management in both countries as well as its structure today, which will be the focus of the next chapter.

Chapter 4: The Development of ITQ Management in New Zealand & Iceland

This chapter aims to trace the adoption and development of ITQ management in both New Zealand and Iceland. Successive fisheries collapses due to overcapitalisation led to political pressure to adopt new framework for fisheries management. The organizational setup and structure of fisheries management in each country will also be outlined.

ITQ Background

New Zealand

New Zealand established it's EEZ in 1982, which comprises approximately 1.5 million square miles of ocean (Te Ara, n.d.). The ITQ system of fisheries management was subsequently introduced in New Zealand as the Quota Management System (QMS) on October 1st 1986 for all major commercial fish stocks. Prior to its adoption, approaches to fisheries management varied considerably. Between 1938-1963, inshore fisheries were managed through a licensing system that prescribed what gear could be used and which areas fished from, as well as which ports fishing ships could dock at. In 1963 the inshore fisheries were completely deregulated with the intention of promoting investment and growth in the commercial fishing industry (Clark et al., 1988). This included investment incentives, capital grants, allowances, and tax breaks for new entrants to the fishing industry. As a result, overcapitalisation by the predominantly Pākehā (New Zealand European) fishing industry occurred, which led to many fish stocks such as snapper becoming severely overfished to the point of collapse.

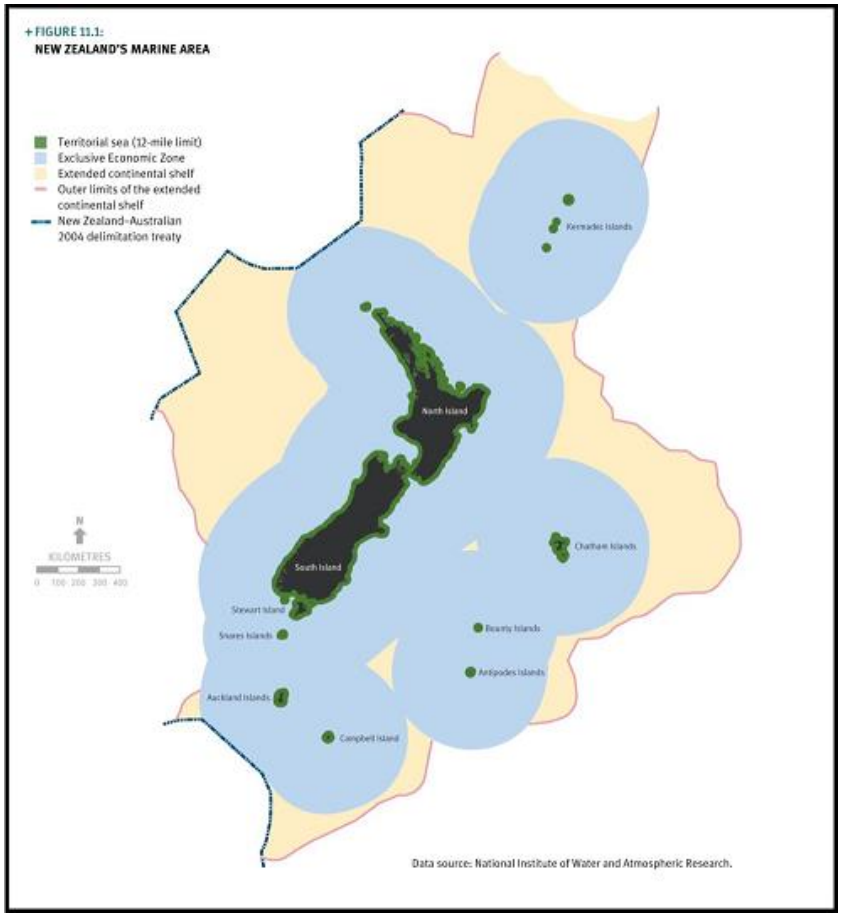

Figure 2. A map of New Zealand's maritime borders (Source: Environment Foundation, 2017).

By the mid-1970s, industry itself along with recreational fishers demanded government intervention to prevent the situation from deteriorating further. This culminated in the creation of legislation in 1977 to establish controlled fisheries and a moratorium in 1982 for all new entrants to the inshore fishing industry (Hale & Rude, 2017). Following from this, the Fisheries Act 1983 was introduced which created a framework for fisheries management based on regulation and input controls. This new act also cancelled all unused or part-time fishing permits which represented 46% of permits assigned at the time. A consequence of this was that many small-time fishers and particularly indigenous Māori were pushed out of the fishing industry.

The economic and political context of the time was highly influential on the creation of the QMS. The introduction of 'Rogernomics' by the Fourth Labour government marked a major transition

from a centrally controlled economy to a market-based economy. This included the removal of subsidies, the floating of the New Zealand dollar, the lowering of tariffs and an overhaul of the tax system. With this came greater scrutiny of government expenditure, and the responsibility of ministers to recover costs of regulation. The proposal of the QMS system in 1983 which adopted a market-based approach to fisheries management was presented to a government that was very receptive to such ideas. In 1986, the Fisheries Act was amended to define quota as property rights granted in perpetuity that can be traded in a new 'fisheries market'. A Total Allowable Catch (TAC) would be announced for each fish stock yearly, which included customary, recreational and commercial fishing. Of the TAC, a significant percentage was designated as Total Allowable Commercial Catch (TACC) that quotas were then applied to.

The allocation of these rights upon the QMS's creation was predicated upon catch history, so the largest fishing entities were given the greatest share of the quota in 1986. This would be subsequently contested by Māori who were largely excluded from being granted quota based on these criteria, along with most part time fishers. While at first quota represented a fixed amount (in tonnes) of a fish stock, in 1990 this was redefined to be a proportionate share of the TACC. This meant the amount of fish that could be harvested through quota was dependent on a yearly assessment of fish stocks. If the TAC of a fish stock was lowered, so too would the amount of fish a quota represented. The 1996 Fisheries Act introduced the Annual Catch Entitlement (ACE) which separated quota ownership rights from the fish access right, giving owners the ability to lease their quota out. The intention behind the ACE's creation was to incentivise fishers to report their catches by allowing for within-season trading of fish access rights (Bodwitch, 2017). A fisher's ACE had to match the fish they reported as caught, otherwise they would receive a fine in the form of a 'deemed value', which is set high enough to discourage fishers catching fish they don't have ACE for but also low enough to discourage non-reporting of catch.

The establishment of ITQ management by the New Zealand government was also contested in court by indigenous Māori on the basis that it represented a breach of the Treaty of Waitangi. The establishment of quota disproportionately favored the Pākehā constituency of the fishing industry, permitting considerable economic benefits. This was perceived by Māori as the government attempting to displace Māori from traditional use of their fisheries. As a result, the

Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 was established. This conferred significant assets in the form of quota and shares in fishing company Sealord to Iwi. In addition, a customary catch allowance would be a component of every future TAC along with recreational and commercial allowances.

Iceland

Icelandic catch figures increased greatly from less than 100,000 tonnes to 500,000 tonnes between the period 1905-1958 (Matthíasson, 2012). In 1975 Iceland increased its EEZ to 200 nautical miles from its coast and asserted the right to exclude foreign fishing ships from its waters. This made Iceland's EEZ approximately 758,000 square miles of ocean, an area seven times larger than its landmass (Popescu & Poulson, 2012). This was hotly contested with nearby countries such as Britain who also wanted access to the same fisheries as Iceland. It was only by declaring exclusive access that Iceland saw the possibility of being able to properly manage localised fisheries, as management could not be unilaterally imposed if multiple countries were fishing in the same area (Government of Iceland, n.d.).

Although Iceland only introduced their universal ITQ system in 1991, there had been limited applications of quota systems prior. These were first introduced in 1976 to the herring fishery and applied to fishing vessels, before being expanded to other fisheries and made transferable in selected fisheries in 1984 (Arnason, 2008). Prior to this, Iceland had experimented with other forms of fisheries management popular at the time such as licensing, vessel buy-back programs, fishing effort restrictions and investment controls. The impetus for the introduction of ITQ fisheries management in Iceland was arguably the collapse of the Atlanto-Scandian Herring fishery. In 1966 a record 2 million tonnes was reported to be caught by Icelandic fishers, but by 1971 only 20,000 tonnes were caught due to extensive overfishing (Sigurdsson, 2006). Herring at the time was a major component of Iceland's export economy, representing at times 40% of the total value of catch annually.

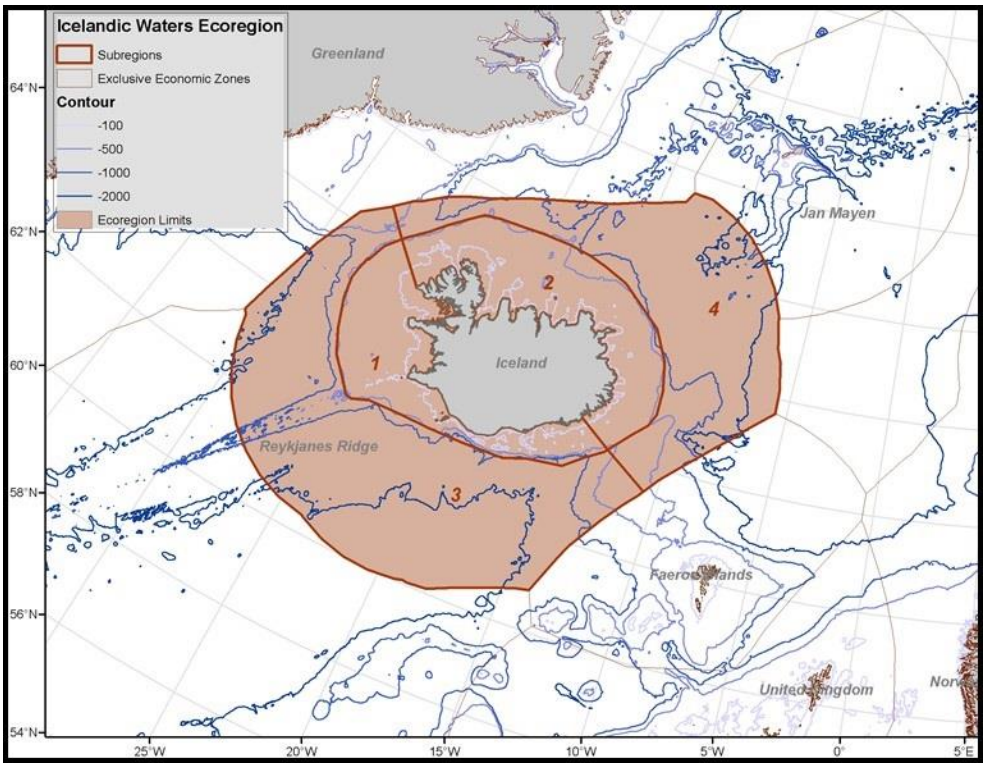

Figure 3. A map of Iceland's marine borders (Source: ICES, n.d.).

The Icelandic government that introduced the comprehensive ITQ system was receptive to the introduction of the ITQ system for 2 main reasons (Wade & Sigurgeirsdottir, 2012). The first was that the Independence Party, Iceland's most historically dominant political party was in power at the time. This party was and still is considered the bastion of fisheries interests in Iceland, with backing from Iceland's most powerful families and the wider Icelandic fishing industry. The second reason was that Iceland was also at the time undergoing major neoliberal economic reforms. This included privatisation of state assets and deregulation of the financial sector. The leader of the Independence Party at the time was Davíð Oddsson, a member of the Locomotive Group, a clique of Icelandic university students that could be likened to the Chicago School in their relative influence on transitioning Iceland into a neoliberal economy. In addition, Hannes Hólmsteinn Gissurarson, who was also a member of the Locomotive Group was the figurehead of the economic reforms much like Milton Friedman was for the Chicago School (Ingimundarson et al., 2016). Gissurarson published a book in 1990 that proposed Iceland adopt an ITQ system of fisheries management which fellow Locomotive Group member and Prime Minister Davíð Oddsson used as the basis for the Icelandic system (Gissurarson & Fiske Icelandic Collection, 1990).

Prior to the introduction of quota because of deteriorating cod stocks, there were strong debates within the Icelandic Fisheries Association (IFA) about how to address this problem, with the majority opinion of the assembly eventually supporting the adoption of quota. It was decided by the then Ministry for Fisheries under the Fisheries Management Act 1983 that initial allocations of quota were to be decided by the catch history of each fishing vessel from the prior 3 years. Parallel to this, fishers were also able to choose instead to fish within a system of "effort quota" which designated a period of time fishers could fish. This was seen as a compromise for fishers who had for various reasons been idle for the last few years, meaning they had received no quota and therefore no ability to fish based on catch history (Eythórsson, 2000). By 1987, most Icelandic fishers had adopted this effort quota alternative. Smaller fishing boats were more liberally treated, resulting in small fishing boats increasing from 964 boats in 1984 to 1956 boats by 1990. More importantly, the stakeholder representation in committees greatly expanded because of growing interest from wider Icelandic society. This was due to the growing realisation that Icelandic fishing rights were becoming permanent, and that management decisions made in these committees would shape the future of national and regional development.

Structure of Fisheries Regulations Today

New Zealand

New Zealand's Fisheries Act 1996 describes the primary purpose of the act as providing for the utilisation of fisheries resources while ensuring sustainability. Sustainability within this context means both maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment (Fisheries Act 1996). The primary organisation responsible for managing New Zealand's commercial fisheries is Fisheries New Zealand (FNZ), which is itself a business unit within the Ministry for Primary Industries (DPMC, 2020). FNZ is charged with managing New Zealand's fisheries sustainably along with developing ocean policy. With respect to commercial fisheries, FNZ manages catch limits, conducts scientific research and monitors fisheries and enforcement of regulations amongst other responsibilities (Ministry for

Primary Industries, n.d.-d). The head of FNZ, the Minister for Oceans and Fisheries, sets the TAC (which comprises recreational, commercial and customary allowances) resulting in each quota owner (or leaser) being designated an annual catch entitlement depending on how much quota is owned. The decisions on what the TAC should be are made based on research done by FNZ and other organisations contracted to do such research, such as the National Institute of Water and Atmospheric Research (NIWA). There is also significant consultation on decisions made with stakeholders interested in fisheries. FNZ maintains powers in collaboration with the Department of Conservation (DOC) to establish Marine Protected Areas (MPAs) as well as the ability to close off a fishery's access if a collapse is perceived to be imminent or has already occurred (Ministry for Primary Industries, 2022c). The monitoring of fishing activities at sea is conducted by fisheries observers employed by FNZ, who collect data on fish types and quantities caught as well as whether regulations are being followed by the fishing vessel. The data these observers collect is compared to the data collected electronically from fishing boats (Ministry for Primary Industries, n.d.-c).

The New Zealand fishing industry has also been given a role in managing New Zealand's fisheries. Fishing boats record their catch data electronically and send this information to FishServe, a subsidiary of the fishing industry that has been contracted by the government to aid in managing fisheries. Cameras have recently been rolled out on commercial fishing vessels in order to provide a greater degree of oversight on fishing activities at sea. The delivery, data collection and monitoring of this service had been contracted out to Trident Systems, a subsidiary of the fishing industry (Trident Systems, n.d.) though this responsibility may have recently been reassigned to FNZ itself. Several other co-management arrangements have been made as well with specific fisheries organizations (Harte, 2007). Management is administered with significant input from these industry groups. The DOC also plays a role in overseeing fisheries management, however this role is restricted to the impacts of commercial fishing on protected species (Department of Conservation, n.d.-a). The DOC employs observers who monitor MPAs and report on instances where endangered or threatened species are caught as bycatch.

Iceland

Iceland's Fisheries Act 1990 describes the objectives of fisheries management as "preservation and efficient use of resources to lay the foundation for long-term employment and settlement in the country" (The Commonwealth, 2020). The primary organisation responsible for managing Iceland's commercial fisheries is the Directorate of Fisheries (DOF). The DOF operates as an agency under the Ministry of Food, Agriculture and Fisheries (MOFAF). The DOF oversees and allocates permits to all commercial fishing operations relating to the Icelandic fishing industry (Fiskistofa, 2022b). This includes commercial fishing within Iceland's EEZ but also for Icelandic vessels fishing in distant waters. All commercial stocks are subject to quotas, with the DOF issuing annual catch quotas to individual vessels that is based on their share of the Total Allowable Catch. The TAC is set by the Minister of Fisheries every year based upon advice and recommendations from the Marine and Freshwater Research Institute (MFRI). Iceland has two types of quota: TAC shares which are owned in perpetuity and annual catch entitlements (Matthíasson, 2012). TAC shares (or quota) represent a percentage share of the fisheries that a fishing vessel is entitled to catch. All quota need to be associated with a vessel, the more quota designated to a particular vessel, the more fish it is legally entitled to catch. Once the TAC for a fishery is set by the minister, ACE for each vessel is distributed proportionate to the amount of quota owned.

The monitoring of fishing activities is one of the key responsibilities of the DOF. This monitoring occurs both at sea and on land. At sea, the DOF has inspectors that accompany fishers on boats to ensure the proper procedures and regulations are being followed. In addition to this, these inspectors collect information of relevance on behalf of the MFRI. Inspectors on land monitor the landing of catches and ensure the recorded weight corresponds to what is reported. The DOF also plays an important role as the collector of data and information pertaining to fisheries management, including fishing vessels, catch quota allocations and recorded catch. All landing ports are connected to the DOF database so the reported catch and weight can be marked against the quota owned (Fiskistofa, n.d.-b). The DOF has recently adopted the use of drones to monitor the activity of fishing fleets, this information is also sent directly to the DOF's database (Ćirić, 2021). The DOF has also set itself the objective of allowing interested parties

easy access to the information that it collects and processes, providing a degree of transparency to interested observers.

The MFRI is a government institute that is charged with conducting research that provides the basis for decisions by the ministry. Their research priorities are research grounded in an ecosystem approach, sustainable exploitation of main fish stocks, fishing technology and seafloor mapping (Marine and Freshwater Research Institute, n.d.-b). The MFRI has been given the legal authority to temporarily close certain fishing grounds if they believe young fish or spawning fish stocks are at risk. These closures are based on data provided by the DOF.

This chapter has sought to establish how ITQ management came to be implemented in each country and how it developed over time. In addition, the organisations responsible in each country for managing fisheries through the ITQ system were also identified. Having established the regulatory framework in each country, we can now measure the effectiveness of fisheries management through the examination of environmental, economic and social outcomes. This will be the focus of the next chapter.

Chapter 5: Environmental, Economic & Social Outcomes

This chapter aims to examine the environmental, economic and social outcomes since ITQ management was introduced in each country. By measuring these outcomes, we can gauge whether fisheries management is beneficial or detrimental to the 'public interest', defined as the sustainable utilisation of fisheries on environmental, economic and social grounds.

Environmental Outcomes

New Zealand

The top 5 main species in the QMS by catch today are Hoki, Jack Mackerel, Arrow Squid, Barracouta and Ling (Fisheries NZ, 2022). Reported catch for Hoki was 158,000 tonnes when it was introduced to the QMS in 1986, rising to 269,000 tonnes by 1997 but has steadily dropped to 97,000 tonnes by 2020 indicating a significant decline trend in population. Reported catch for Jack Mackerel was 25,000 tonnes in 1986 and increased over time to 44,000 tonnes by 2020 (Ministry for Primary Industries, 2022b). Reported catch for Arrow Squid was around 74,000 tonnes in 1986, but dropped to 30,000 tonnes by 2020 (Ministry for Primary Industries, 2022a). Reported catch for Barracouta was around 27,000 tonnes in 1986, this had declined slightly to 21,000 tonnes by 2020. Reported catch for Ling was around 7,000 tonnes in 1986 and although this increased to a high of 23,000 tonnes in 1997, this had subsequently reduced to 16,000 tonnes by 2020. Only Ling and Jack Mackerel have increased or maintained landings since the QMS was introduced.

Important to note too is that when the QMS was introduced, many of New Zealand's fish stocks were estimated by the New Zealand government to have depressed to 20% or less of the original biomass (or pre-fishing population) (Gibbs, 2008). Fisheries New Zealand (FNZ) today reports that as of 2021 85% of scientifically assessed stocks have no sustainability risks (Ministry for Primary Industries, 2021). Statistics New Zealand meanwhile reported that the proportion of fish stocks in New Zealand's exclusive economic zone subject to overfishing

decreased from 25 percent in 2009 to 15 percent in 2015. In addition, 17.2 percent of New Zealand's fish stocks were overfished (below the soft limit) compared with 28.8 percent worldwide in 2015 (Statistics New Zealand, 2016). Since 2009, the total commercial catch in New Zealand has remained stable at less than 450,000 tonnes per year (Ministry for the Environment & Statistics New Zealand, 2019).

The view that the main commercial fish stocks are sustainably harvested is however not unanimous. Environmental non-profit organisation Forest & Bird compiled a 'Best Fish' guide in 2017 which is intended to guide the consumer towards fish stocks that are sustainably harvested (Forest & Bird, 2017). Their methodology consisted of reviewing not only the health of the individual stock but also how fishing impacts the marine ecosystem around it. It is advised that almost two thirds of commercial stocks should be avoided for consumption, while only a handful are labeled as 'good' or 'great' to eat. This difference in opinion appears to be reflective of the different conceptions of what sustainability measures should be used when approaching fisheries management. The Marine Stewardship Council (MSC), which is an international certifier of fisheries health, reports that 50% of New Zealand's wild-caught seafood is MSC certified, along with 70% of New Zealand's deepwater fisheries (Seafood New Zealand, n.d.).

However, recent developments have called these certifications into question. In 2018 it was announced that the West Coast Hoki fishery had seen significant declines, with the estimation of the stock's biomass being as low as 29% of original biomass (Ministry for Primary Industries, 2019). An industry insider recently described New Zealand's biggest Hoki fishery as a 'barren wasteland' (Morrah, 2018). The Orange Roughy was one of New Zealand's most lucrative fish stocks in terms of value per fish with a lifespan that can exceed 150 years. After Orange Roughy began to be harvested by fishers in 1979, their numbers were greatly overestimated and by the end of the 1990s three of the eight fisheries had collapsed (Rykers, 2021). New Zealand's main Orange Roughy fishery dropped below 20% original biomass by 2003, though this has recovered to 38% of original biomass by 2019 (Fisheries NZ, 2019).

There have been several other recent environmental developments that have raised questions about the effectiveness of New Zealand's QMS system. The *State of Our Gulf* report, which outlines the state of the Hauraki Gulf around New Zealand's biggest city, Auckland, estimates that marine life in the region has approximately halved (Hauraki Gulf Forum, 2020). The continued overfishing of Snapper and Crayfish, which are natural predators of Kina, has allowed for Kina to multiply exponentially. Kina feed on Kelp seaweed, which has resulted in Kelp forests disappearing rapidly. This has resulted in the many other species that rely on Kelp as an environment and food disappearing from the local ecosystem. In March this year, it was announced by current fisheries minister David Parker that all scallop fisheries in Northland and the Coromandel would be closed to fishing due to results from the 2021 biomass survey being 'alarming' (Parker, 2022).

A key takeaway from the interpretation of environmental outcomes in New Zealand is the lack of data for many species. 33% of caught species in 2021 are not scientifically assessed, meaning we know little to nothing about 247 species (Ministry for Primary Industries, 2021). In addition to this, there are 290 nominal stocks (economically negligible stocks) that are also not scientifically assessed. Considering 152 stocks were assessed in 2021, this means only approximately 22% of known fish stocks are assessed at all. It is difficult to make judgements about the limits of the marine environment while only possessing only a fraction of the information required to make such decisions.

A 2019 Ministry for the Environment report revealed that many of New Zealand's marine mammals and coastal birds populations are in peril (Ministry for the Environment & Statistics New Zealand, 2019). 22% of assessed marine mammals are threatened with or at risk of extinction. More alarmingly, 90% of seabirds and 80% of shorebirds are at risk of or threatened by extinction. While the impacts of commercial fishing are only in part responsible for these declines, Forest & Bird report that in 2018 up to 4000 birds are estimated to have been caught on lines and nets (Forest & Bird, 2019). As of 2016, marine protected areas comprise 17,430 square kilometers of New Zealand's approximately 4,000,000 square kilometer EEZ, representing 0.004% of the overall marine environment (Stats NZ, 2016). The current New

Zealand government has indicated intentions to expand MPAs, but these attempts have been stalled by legal challenges.

New Zealand has rated poorly on the Environmental Performance Index with respect to fisheries, receiving a score of 7.4/100 (Wolf et al., 2022). This score is due to the prevalence of bottom trawling as the primary fishing technique. It is estimated that 90% of catch by industry, both inshore and in deep waters, utilises the technique of bottom trawling (Vance, 2021). The impacts of bottom trawling (which drags a large weighted net along the sea floor) are understood in general to have significant environmental impacts on the marine ecosystem (Pusceddu et al., 2014). Recent research by the Deep Sea Conservation Coalition which includes input from environmental and recreational fishing organisations implicates bottom trawling in significant destruction to seamounts and seabeds home to many species, both commercial and otherwise (Deep Sea Conservation Coalition, 2021). In the same report, up to 5000 tonnes of seamount coral up to 2000 years old was estimated to be scraped off the bottom of New Zealand's seafloor in the 2019/2020 period alone. The impacts of bottom trawling on the marine ecosystem have been equivocated by some scientists to the impacts of deforestation on a forest's ecosystem (Watling & Norse, 1998).

Iceland

Icelandic catch figures in aggregate increased from less than 100,000 tonnes to 500,000 tonnes between 1905-1958 (Matthíasson, 2012). Catch peaked in 1997 at 2,198,813 tonnes and had reduced over time to 1,153,683 tonnes by 2021 (Statistics Iceland, 2022). Iceland today has approximately 270 known species within its waters, although only 20 are harvested to any significant commercial extent. Of these 20, only a few represent most of the overall catch (OECD, 2017a). The top 5 fish stocks in Iceland today if judged by catch include cod, capelin, haddock, saithe and herring (Marine and Freshwater Research Institute, 2022a).

Prior to the adoption of the ITQ system, the collapse of the Atlanto-Scandian Herring Fishery which was mainly shared between Iceland and Norway provoked a major rethink on how fisheries were managed. Part of the reason for the accelerated decline of this stock were the technological developments that enabled fishers from both countries to dramatically increase their catch (Sigurdsson, 2006). This resulted in a 25-year moratorium on fishing this stock, a heavy blow to Icelandic society considering that, during the first half of the 20th century, Herring represented 30% of Iceland's export income (Carlsen, 2013). Despite a period of rebuilding under the ITQ system, Herring catch reported today is around 68,000 tonnes reflecting that the stock is still a fraction of its former size (Fiskistofa, 2022a). Because Iceland shares the stock with Norway, the UK and Russia, amongst others, disagreement by all parties on how much their share should be has meant that catch is consistently above the scientific advice. This has resulted in the Marine Stewardship Council revoking their certification of the fishery in 2020 (Marine Stewardship Council, 2020).

After the collapse of Herring stocks, Cod became the main Icelandic fishery if judged by catch. The Demersal (cod, haddock and saithe) and Capelin fisheries also experienced significant declines, leading to the application of quota to these fisheries before the introduction of the universal ITQ system (Arnason, 1993). While in 1955 catches of cod were reported at over 500,000 tonnes, the stock went into decline by 1990 prompting introduction to the ITQ system. In 1987, the catch of Cod was 392,000 tonnes compared to 187,000 tonnes by 1995. MFRI further reduced the TAC for cod to 135,000 tonnes by 2007 (Christensen et al., 2009). Today the TAC for cod is 222,737 tonnes, though this has declined again 13% from 2021 (Marine and Freshwater Research Institute, 2022a).

The abundance of Capelin in Icelandic waters has been in decline since the mid-1990s, peaking at over 1,500,000 tonnes in 1996 and resulting in the non-issuance of quota in 2019/2020 after landings dropped to less than 250,000 tonnes (Einarsdóttir, 2021). Despite this, the MFRI has raised the TAC to 869,000 tonnes for the 2022 fishing year (Marine and Freshwater Research Institute, 2022b). The impact of ITQ management on Haddock biomass has been mixed when judged by recorded landings. With landings at just under 60,000 tonnes in 1984 when introduced to the ITQ system, catch increased to around 115,000 tonnes by 2007, though this

fell to 40,000 by 2016 (Iceland Responsible Fisheries Foundation, 2017a). In the last few years, catch has hovered above and below 50,000 tonnes (ICES, 2021a). The impact of ITQ management on Saithe since having been introduced to the ITQ system in 1984 has also been mixed. Saithe catch has fluctuated greatly, with reported catch reaching 99,000 tonnes by 1991 before dropping to 30,000 tonnes by 1998 (ICES, 2017). However, this has improved over time, with the latest TAC being set at 77,000 tonnes (Marine and Freshwater Research Institute, 2022a).

The Sea Around Us reconstruction of fisheries catches since 1950 shows that reported catch in Iceland has largely mirrored the reconstructed estimates (Sea Around Us, n.d.). However recent reports based on the use of drones by the DOF to monitor fishing fleets give reason to believe that dumping and high grading of fish is rife in Icelandic commercial fisheries. Deployed in 2021, the drones uncovered extensive discarding within Icelandic inshore fisheries. Instances of dumping increased from 10 cases to 120 cases of fish dumping annually (Ćirić, 2021). Due to the drones being land based, they are out of range to observe deep sea trawler rates of fish dumping. These revelations put considerable doubt on previous estimates of fish stock biomass, as reported catch is one of the main inputs for setting the TAC.

Assessments of wider environmental impacts outside of commercially relevant species have also shown mixed results. When assessed through the Environmental Performance Index, which assesses purely environmental impacts irrespective of economic considerations, Iceland received a very poor rating of 14/100 (Olafsson et al., 2014). This is due to Iceland disproportionately fishing in its waters relative to other countries as well as utilising bottom trawling as the second most common means of catching fish. In 2021, bottom trawling was used to catch 309,845,604 tonnes or 26% of the total catch of 1,158,284,917 tonnes (Statistics Iceland, 2022b). Pelagic trawl methods represented 587,519,806 tonnes of the total catch, representing around 50% of all catch in 2021.

According to the Marine Conservation Institute, marine protected areas comprise 3,250 square kilometres of Iceland’s 763,239 square kilometer EEZ, representing <1% of Iceland’s overall

marine environment (Marine Conservation Institute, 2022). Iceland has been resistant to further implementations of MPAs to stem overfishing internationally as well as domestically, the latest instance being involvement in the collapse of the UN Biodiversity Beyond National Jurisdiction treaty negotiations (McVeigh, 2022). Iceland alongside Russia sought to exempt fisheries from the agreement due to economic concerns, preventing negotiations from progressing which elicited significant criticism from conservationists (Julin, 2022). There are no current plans to introduce further MPAs within Iceland's EEZ.

Commercial fishing has also had ongoing significant impacts on Iceland's non-commercial endemic marine species. Almost all of Iceland's 22 species of seabirds have been in decline. Between 1985-2008, abundance of breeding for the main seabird species has declined between 12-45% depending on the species (ICES, 2021b). Reduced prey availability is thought to be the primary cause. The seal population has also declined from 33,000 in 1980 to less than 7,000 by 2016 as a result of culling due to concerns over their impact on commercial fish populations (Marine and Freshwater Research Institute, n.d.-a). Minke whales, the most common whale in Icelandic waters, have decreased substantially in abundance also due to reduced prey availability.

Economic Outcomes

New Zealand

In 2022, it was estimated that the Seafood Industry made a direct economic contribution of $818 million to GDP and directly employs 6,314 full time workers (Dixon & McIndoe, 2022). While this may appear significant in absolute numbers, the 2022 seafood industry contribution to GDP was estimated to be only 0.7%. Before the QMS was introduced, the open access nature of New Zealand's fisheries combined with state subsidisation of the commercial fishing fleet had allowed for significantly more fishers to be employed in the sector. However, the increase in

fishers had the effect of not only rapidly depleting New Zealand's fish stocks but also market oversaturation. Inshore fisheries had been rapidly depleted, with stocks such as Crayfish and Snapper reducing in catch greatly despite increased efforts by the fishing industry (Gibbs, 2008). Since peaking in 2002, Seafood industry employment had dropped by 26% by 2016 (Westpac, 2016). In addition, direct contribution to GDP peaked at $940 million in 2003 and had dropped by 16% by 2016.

A negative economic impact of the QMS system is that much of the value of harvested fish is claimed by foreign countries rather than New Zealand. This reflects a major loss of potential revenue for the New Zealand economy. Because quota holders are incentivised to generate as much profit as possible, significant amounts of fish processing as well as fish catching itself has been delegated to foreign owned companies. For instance, with respect to processing, Hoki has been increasingly sent to China and other developing countries for processing due to the significantly reduced labour costs involved (Stringer et al., 2011). While this system of processing may benefit individual quota owners, this entails a significant loss of potential economic activity for New Zealand in aggregate. In addition, foreign charter vessels (FCVs) have been contracted by many quota holders to catch their entitlement on their behalf. As of 2017, as much as 60% of New Zealand's offshore catch is caught by FCVs (Whittaker et al., 2017).

This has, in a sense, promoted institutionalised inefficiency, because the primary means of increasing profits must come primarily from catching more fish or catching them more efficiently. Foreign companies that process New Zealand fish, on the other hand, can increase economic productivity through finding more efficient ways to process fish and utilise fish byproduct. This institutional inefficiency that promotes the export of bulk low-value unprocessed fish is arguably a result of incentives established by the QMS system that promote rent seeking behavior (Torkington, 2016). Quota owners have little incentive to develop economic efficiency locally when Third-World labour can be used to increase profit margins. This focus on quantity over quality goes back to the initial distribution of quota rights, which were determined based on previous catch in weight regardless of quality, meaning those operators who extracted large volumes of low-quality fish were rewarded over those catching less but higher quality fish. The

New Zealand fishing industry has been unable to significantly alter this arrangement over the decades since the QMS was established.

One of the economic benefits of New Zealand's QMS system is the delegation of considerable administrative authority to industry instead of government. The use of industry organisations in key management roles in co-operation with FNZ means the financial burden on the taxpayer is lessened considerably. Such organisations include the Challenger Scallop Enhancement Company, FishServe, the NZ Rock Lobster Industry Council and Deepwater Group (Townsend, 2010). In addition, the Fisheries Act has allowed for a degree of cost recovery from industry to occur to, in part, fund fisheries management. The 2020/2021 budget for the Minister of Oceans and Fisheries totaled just over NZD $84 million, though levies charged to industry mean that NZD $33 million is estimated to be recovered (Kerr, 2021). There have been several limitations set on quota ownership consolidation in the Fisheries Act 1996, the primary being a cap of 45% on quota ownership of a particular species by any one entity. There are several parties exempt from this cap however, including the Crown, the Chatham Islands Trust and Te Ohu Kaimoana (Fisheries Act 1996, s. 59).

Iceland

In 2022, it was estimated that fisheries in Iceland employs 7,500 people (3.9% of the workforce) and the Seafood industry contributed 8.1% to GDP (Iceland Responsible Fisheries Foundation, 2022). The Icelandic economy experienced a prolonged period of economic growth due in part from the 1991 universal adoption of ITQs. Between 1991-2006, economic growth averaged 3.8%, far exceeding the average European Union growth rate over this period of 2% (Arnason, 2008). This was said to be in part because ITQs created new wealth which translated into greater financial capital for investments. Prior to the introduction of the ITQ system, the profitability of fisheries was poor to non-existent. In the 1980s the average loss of the fishing component was approximately 7% of revenues (Gunnlaugsson et al., 2018). After the implementation of the ITQ system in 1991, profitability began to increase. Since 2000, the harvesting sector increased profitability by 12.7% while the processing industry increased profits

by 8.9%. The OECD has a positive view of the economic impact of the ITQ system, citing the increase in quota values over time. The annual quota rental values increased by about 20-fold between 1984 and 1999 (OECD, 2017b). Marine products in Iceland now account for 43% of all exported goods (Iceland Responsible Fisheries Foundation, 2022). While the ITQ system increased the value of fishing resources, the rate of employment in fisheries was significantly affected. Since 1990, approximately 5100 jobs (36% of all fisheries jobs) have been lost. Rural region job losses (38%) have been higher than capital region job losses (27%). Processing has also seen a considerable drop in employment (41%) in comparison to harvesting employment (29%). (Kokorsch & Benediktsson, 2018).

One often ignored aspect of economic outcomes is that the marketisation of fish stock access had led to ITQs being treated as a speculative asset (Matthíasson, 2012). Preceding the Icelandic financial crisis in 2008, the Icelandic stock market saw considerable growth. The Icelandic fishing industry took on significant foreign debt to buy up quota, which had been rapidly increasing in value since 2004. Smaller operators who held quota sold up and left the industry, selling their quota to the bigger players who bought them with cheap credit in a low interest rate environment (Gunnlaugsson & Saevaldsson, 2016). As the price of the stock market index increased, the ITQ price index saw a corresponding rapid increase in price, increasing in value threefold in just a few years. When the Icelandic economy crashed in 2008, the price of the ITQ index over halved. As some critics have argued, this essentially means that downturns in other areas of the economy can create unnecessary volatility for both labour and capital in the Icelandic fishing industry (Matthiasson, 2012). Given Iceland's dependence on fishing, this can and has had a destabilizing effect on the wider Icelandic economy.

Another economic effect of ITQ management is the significant economic consolidation of fish stock quota. The Icelandic government implemented measures in an attempt to ringfence consolidation by introducing a cap or ceiling on how much quota a company can own (Viðarsson & Þórðarson, 2020). The cap is 12% for the main ITQ system and 5% for the coastal fleet. However, because of a loophole, if a company holds a stake of less than 50% in another company, the latter company's quota holdings do not count towards the quota ceiling. This has resulted in many of the larger companies having cross ownership with one another in order to

continue consolidating quota without technically crossing this cap. In the latest statistics on quota consolidation released by the Directorate of Fisheries, it was found that Brim had surpassed the 12% limit on quota holdings by a single company. In response, they sold enough catch shares to drop below this limit to a company called Útgerðarfélag Reykjavíkur. The owner of Útgerðarfélag Reykjavíkur is both the CEO and one of the biggest shareholders of Brim (Logadóttir & Júlíusson, 2022). As of 2020, the fifty largest quota holders are in possession of 90% of the quota (Viðarsson & Þórðarson, 2020).

The economic centralisation of the fishing industry is further emphasised by recent statistics, which indicate that two companies, Samherji and Brim, account for half of all profits in the fishing industry, ISK 88 billion (USD 677 million) in 2019. Profits across the entire industry, meanwhile, also increased by 50% from 2018-2019 (Ćirić, 2020). The process of quota consolidation appears to be rapidly increasing in Iceland since the Covid-19 pandemic. In late 2020, the ten largest fishing companies held 53% of all allocated quota. Just over a year later, this proportion had risen to 67% (Logadóttir & Júlíusson, 2022).

The level of tax fishing companies have had to pay has changed over time, due in part to significant public backlash to this increasing centralisation. In 2004, a levy was introduced to pacify critics of the ITQ system, which charged all commercial fishing companies in order to recover the costs of management (Gunnlaugsson et al., 2018). As time went on however, there were subsequent increases in recognition of the shared nature of fisheries in Iceland. By 2014, the fee had amounted to 52 million euros or 6.0% of the catch value of Icelandic fishing vessels and around 1.2% of the total revenue of the Icelandic Treasury.

The primary focus of many economic arguments in support of the ITQ system in Iceland have been the greater economic efficiency that has resulted. This is presumed to be in the interest of both industry and Icelandic society. However, the economic distribution of these increases in efficiency has been far more controversial. A study that analysed the distribution of resource rent in Iceland's fisheries between 1997-2017 found that much of the rent went to original quota holders and the fishing industry itself (Gunnlaugsson et al., 2020). Original quota holders who

acquired fishing rights through the process of 'grandfathering' received around 40% of the rent, fishing companies received 40%, while the public/government only received 20% through a special fishing fee and corporate taxes.

Social Outcomes

New Zealand

The QMS system was controversial when it was first introduced, due in part to the social consequences that ensued. When the QMS was introduced in 1986, the intention was to reduce overcapitalisation by reducing the total number of fishers. This was arguably necessary to halt the rapid decline of New Zealand's fisheries due to overcapitalisation. A secondary effect of this was the exclusion of small-scale fishers, which included a significant amount of the indigenous Māori population (Bodwitch, 2017). This was primarily due to how quota were initially distributed. To be allocated quota by the government, fishers had to have reported catches of up to 80% of their income for the three years preceding the introduction of the QMS. In addition to this, the New Zealand government also set a minimum amount of quota required to participate in commercial fishing. These two criteria meant that both small scale fishers and part time fishers either did not qualify to receive quota or did not have sufficient quota to participate in the commercial sector. Māori fishers in many cases did not report catch as they perceived these fisheries to be owned and governed by Māori rather than the government.

While agreements relating to sovereignty were ambiguously worded in the Treaty of Waitangi signed in 1840, customary fishing rights had been guaranteed to Māori by the British colonial government unambiguously in both the English and Māori translations (Orange, 2004). Despite significant involvement in the whaling and sealing trades in partnership with early European settlers, Māori were increasingly locked out of the growing fishing industry by a lack of access to capital (De Alessi, 2012) In 1975, the Waitangi Tribunal was established within the context of a movement to rejuvenate Māori culture and an acknowledgement that Māori were becoming

increasingly divorced from their tribal structures. The Tribunal, while not binding, allowed for Māori historical claims to land and resources to be supported with reference to the Treaty of Waitangi (Day, 2004). This had major implications when the QMS was introduced, as the tribunal soundly argued that the establishment of property rights in the form of quota violated their guaranteed ownership of fisheries. In addition, the 1985 Treaty of Waitangi Amendment Act strengthened the Tribunal by allowing claims to be heard leading all the way back to the initial signing of the Treaty in 1840 (De Alessi, 2012).

As a result of this successful legal challenge, the Māori Fisheries Act 1989 was established. Under the act, 10% of all quota in the QMS at the time was granted to Māori, the Māori Fisheries Commission was established to oversee Māori interests in fisheries and $10 million in capital was awarded to help the Māori fishing economy grow (Māori Fisheries Act 1989). The subsequent Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 expanded on this by guaranteeing 20% of the quota for all future fish stocks introduced into the QMS to Māori. In addition, the Māori Fisheries Commission was replaced with the Treaty of Waitangi Fisheries commission (which would later become Te Ohu Kaimoana in 2004). The government also purchased a 50% stake of Sealord which was then given to Māori to help further cultivate the Māori fishing economy. The QMS was highly instrumental in rectifying historical wrongs with respect to fisheries ownership, allowing Māori to advance both socially and economically with their fisheries resources.

While the QMS system improved social outcomes for indigenous Māori by giving their property rights legal standing, other social outcomes have not been as favorable. The increasing prevalence of high-profile fisheries collapses and illegal fishing has led to significant tensions between recreational fishers, Iwi, conservation groups and the fishing industry. One manifestation of this discontent has been the establishment of advocacy coalitions between recreational fishers and environmental groups. Examples of this include efforts to ban bottom trawling on seamounts advanced by recreational fishing group LegaSea, along with environmental groups WWF and Forest & Bird (LegaSea, 2019). LegaSea has been active in campaigns to shut down bottom trawling, reduce the TACC for many fish stocks and launch a full inquiry into the QMS system (LegaSea, n.d.). Tensions have also risen between recreational

fishers and Māori, with Te Ohu Kaimoana stating that “the unregulated growth of sports fisheries presents a direct threat to the property rights held by Māori under the Treaty of Waitangi” (Libecap et al., 2020).

Several polls conducted in recent years about the fishing industry and the QMS in New Zealand also show significant discontent in the public. In 2016, 70% of respondents wanted a fisheries management inquiry (Horizon Research Limited, 2016). In 2020, 67% of respondents said the government should work on fisheries reform (Horizon Research Limited, 2020a). In 2020 and in the wake of the NZ First fisheries donations scandal, 73% believed fishing donations to members of parliament could influence fisheries decisions (Horizon Research Limited, 2020b).

Iceland

The ITQ system of fisheries management remains mired in controversy in Icelandic society with respect to social outcomes. A professor affiliated with the Center of Arctic Studies in Iceland has stated that “Icelandic politics and economics are largely about fish and fishing quotas” (Bye, 2021). This is largely a result of social divisions that have ensued as a result of the ITQ system and the relative importance of fishing to Icelandic society. The public debate around the ITQ system has generally been focused on the initial allocations of quota in 1983, the negative impacts on rural communities and the extent to which fishing companies should share their increasing profits with the Icelandic public (Magnusson, 2006). Icelandic fishers belong to a multitude of unions and associations dependent on their employment status (Eythórsson, 2000). These unions and associations meet through the Iceland Responsible Fisheries Foundation, formerly known as the Icelandic Fisheries Association (Iceland Responsible Fisheries Foundation, n.d.).

When the 1990s Fisheries Act made ITQs the national fisheries policy, fears began to be expressed by these organisations that the adoption of quota would result in de-facto privatisation of fisheries, which could adversely affect Icelandic communities dependent on

fishing. This forecast has largely proven correct. 22 companies held 25.5% of total ITQs in 1991. In 1999, the biggest 5 companies held 25% of the TAC and the biggest 20 companies held 56.6% (Eythórsson, 2000). By 2015, the top 20 companies held 70% of all quota (Chambers et al., 2017). Continued liberalisation of the economy has led to many fishing companies joining the stock market and investors in these companies having no fishing background. The idea that the fishing industry should be locally embedded was gradually diminished. The adoption of ITQs also led to the rise of quota leasing or contract fishing. Vessel owners who did not have enough quota to fish began to lease fish from quota owners. Vessel owners who leased quota were obligated to provide their catch to the quota owner for a fixed price, which in many cases led to depreciating incomes for many fishing crews.

The introduction of quota also led to the marginalisation of many communities in Iceland where fishing was the primary means of employment. This was particularly the case where owners of quota in these communities either sold their quota or moved elsewhere. Quota owners then can be perceived as the arbitrators of prosperity in this context, as their decisions on what to do with their quota have implications for communities that rely on them, despite the communities having no say in it. In recent discourse, Icelandic fishers have been described as “tenants" under the thumb of “quota kings” (Chambers et al., 2017). The development of these unequal power relations has resulted in social conflict and further entrenchment of economic inequality. This has also contributed to the process of rural depopulation, as the limited fishing-based job opportunities in remote villages disappeared. This has been corroborated in interviews with residents in various coastal villages in Iceland (Chambers et al., 2017). Quota holding also has a strong correlation with the housing market in many fishery dependent communities in Iceland. If a community's quota holdings decrease, so too do the prices in the local housing market. (Matthíasson, 2012). Fisheries jobs have largely lost their attractiveness to young Icelanders in these fishing communities, compounding the exodus from the regions into the urban centers (Kokorsch & Benediktsson, 2018). While the number of vessels and fishing companies has continued to decrease, this is mostly symbolic of continued consolidation in the sector, with less numerous but bigger boats supplanting smaller vessels (Chambers et al., 2017).

Another social implication of Iceland's adoption of ITQs is the legal status afforded to quota (Eythórsson, 2000). Fish resources were defined by the Fisheries Act 1990 (which is part of the Icelandic constitution) as public property, which raised questions about the legality of quota creation essentially privatising this public good. But a supreme court decision in 2000 decided that quota are not technically private property, and thus the distribution of quota under the ITQ system did not violate the constitution. Subsequent legal challenges over the right to fish led to the creation of strandveiðar season in 2009, a quota-less system that allowed smaller fishers to engage in fishing between May-August (Chambers et al., 2017). While this was intended to alleviate discontent of smaller fishers without quota, this has resulted in the same open-access problem the ITQ system was set up to end. In addition, because quota holders and those who sold their quota can participate in strandveiðar season as well, this means the quota-less are still significantly worse off.

Evidence of social dissatisfaction with Iceland's ITQ system is significant. In 2015, a petition was signed by 50,000 people, or 20% of Iceland's population, objecting to the creation of a six-year quota plan that would distribute out mackerel quota to various operators in Iceland (Iceland Monitor, 2015). A 2003 poll of the Icelandic public found that 80% opposed the ITQ system, while a later poll in 2007 found that around 70% of the population were in opposition (Gunnlaugsson & Valtysson, 2022). Recent surveys of Icelandic small-boat fishers themselves showed significant dissatisfaction with Iceland's fisheries management. The primary complaints included a lack of decision-making power, distrust of scientific advice and too much focus on economic goals at the expense of protecting fisheries resources (Chambers & Carothers, 2017).

Having established the environmental, economic and social outcomes in both New Zealand and Iceland, there is considerable evidence that the public interest is not being served by current regulations in all three dimensions. The intent of the next chapter is to examine whether there is evidence of industry influence over the legislative, administrative, cultural and scientific dimensions of management. Negative outcomes outlined in this chapter can then be juxtaposed with the influence of the fishing industry over these dimensions.

Chapter 6: Evidence of Capture

This chapter aims to collate evidence of industry influence over fisheries regulation. Both New Zealand and Iceland display outcomes that could be interpreted as being consistent with regulatory capture; i.e. industry interests being served to the detriment of the public interest. Regulatory capture can however only be established through showing industry intent and action that resulted in or contributed to these outcomes. This chapter will contribute to our understanding of whether there are observable links between the outcomes established in the last chapter and the involvement of industry in the realm of fisheries management.

Legislative Capture

Legislative capture can occur through the use of financial lobbying (both legal and illegal), industry participation or influence on the creation of legislation and industry affiliated appointments to key legislative roles. Legislative capture can be more specifically understood as industry influence exerted on parliament and the executive branches of government. Legislative capture can be difficult to observe as backroom deals, undisclosed financial donations or even outright bribes are not subject to public scrutiny. When such displays are observed, they are generally identified through investigative journalism or reports by non-governmental organisations. Examination of publicly available donations from industry to political parties or candidates can lend weight to claims of industry influence over the political system.

New Zealand

There is evidence of legislative capture in New Zealand. The New Zealand system of campaign financing laws can make it difficult to observe the full breadth of special interest influence on the political system. Campaign financing laws stipulated by the Electoral Commission allow for donations under $15,000 to remain hidden from the public forever (Electoral Commission, n.d.).

In addition, outside of the electoral period there is no obligation to declare financial donations publicly (Vowles et al., 2017). 80% of donations to the two biggest parties, Labour and National, are from donors whose identities are undisclosed (Shand, 2017).

A major case study in how the fishing industry influences the politics of fisheries management in New Zealand was seen in 2020 with the New Zealand First Foundation scandal. It was revealed that Talley's and its managing director, Sir Peter Talley, had made secretive donations of $26,950 to the New Zealand First Foundation (Espiner & Newton, 2020a). The payments were made in four amounts in order to avoid the $15,000 threshold, which would necessitate public disclosure. The New Zealand First Foundation was established as a proxy so that there was a degree of separation between the New Zealand First Party and its wealthy donors, who include some of New Zealand's wealthiest rich-listers. The New Zealand First Foundation, after receiving such donations, would then use the funds to pay the bills for the party (Espiner & Newton, 2020b). Leader of New Zealand First, Winston Peters, and deputy leader, Shane Jones, had long been advocates of the fishing industry, with Jones formerly chairing Te Ohu Kaimoana, the organisation charged with overseeing Māori fisheries interests.

Examples of legislative interference by New Zealand First have been raised by Greenpeace (Espiner & Newton, 2020a). These include Jones commenting on the Crown prosecution of Talley's for illegally fishing in a protected area while a minister, stating that the prosecution was a "mere technical issue which would be ironed out when common sense prevails". New Zealand First had also blocked plans for a panel to advise on a fisheries review, while also blocking appointments to that same panel. At the time, Fisheries Minister Stuart Nash told reporters that the independent panel New Zealand First was blocking was not necessary, as Fisheries New Zealand was capable of reviewing fisheries themselves. Speaking at Seafood New Zealand's 2019 conference, Jones described himself and Peters as "two incredibly pro-industry personalities".

New Zealand First became a crucial coalition partner in the newly formed Labour coalition government after the 2017 election, conferring significant influence over policy. The previous

National government and MPI had agreed to put cameras on boats in 2016 after the Heron Ministerial Inquiry found that dumping and misreporting of catch was rife in many fisheries and MPI was failing to prosecute these offenses (New Zealand Herald, 2020). Labour had promised to continue this rollout upon taking power, but the rollout had been delayed several times. In 2020, a leaked recording from Fisheries Minister Stuart Nash explained why. In the recording, he explicitly states that “Winston Peters and Shane Jones have made it very clear they do not want cameras on boats… If Winston wants to have that discussion with Jacinda (the New Zealand Prime Minister), it is had in the public arena and it is almost impossible for him to win it… But if he has it behind closed doors on the 9th floor now, then the public will never know about it”. Nash went on to give his assessment of the fisheries sector: "You think police deal with dodgy buggers? They've got nothing in the fisheries sector" (Morrah, 2020).

Major industry players made their position on cameras on boats clear too in a letter obtained through the Official Information Act to Fisheries Minister Stuart Nash (Young, 2019). In the letter, Talley’s, Sealord, Te Ohu Kaimoana, the New Zealand Federation of Commercial Fishers and other redacted signatories emphasized that: “The purpose of this letter is to dismiss any suggestion that the ‘NZ Seafood Industry" supports the current proposal, is in anyway split in its opposition to it or that our industry has anything less than overwhelming opposition to your Ministry’s current proposal for cameras”.

While New Zealand First is no longer in parliament, due in part to the fallout from these successive scandals, other parties have financial conflicts of interest too. The National government oversaw the suppression of reports implicating Sanford in widespread dumping of Hoki. Peter Goodfellow has been the President of the National Party since 2009 but also has a considerable stake in Sanford, 24% as of 2017 (New Zealand Herald, 2009; BusinessDesk, 2017). In 2014, publicly available candidate donations show that Talley’s contributed a total of $42,000 to 8 National candidates and 1 Labour candidate (Shand, 2017). Three of those candidates were members of Parliament's Primary Industries Select Committee. Members of this committee provide information deemed important to the house for consideration, permitting considerable influence over the fisheries management agenda (New Zealand Parliament, 2016).

The introduction of the QMS system also had a significant impact on the way research was conducted. Prior to 1996, the role of doing research for the purposes of understanding and managing New Zealand's marine environment was in large part conducted by the government. However, this was significantly altered as a result of the Fisheries Act 1996, which transferred research functions from the government to Crown Institute National Institute of Water and Atmospheric Research (NIWA) (Townsend, 2010). NIWA became required to compete for research contracts after this change was made. The primary rationalisation for this change was the same that justified the creation of the QMS: the government was an inefficient manager and these changes "made it easier for industry to lobby against inefficiencies".

Iceland

There is significant evidence of legislative capture in Iceland. Political financing laws in Iceland stipulate that anonymous donations are banned, and all parties are required to report their finances to the National Audit Bureau in relation to election campaigns. These accounts are made public and in specific cases the identity of the donors is made publicly known (Act on the Finances of Political Organisations and Candidates and Their Information Disclosure, 2006). While there are no limits on how much can be donated, the banning of anonymous donations means there is a high degree of transparency with respect to which special interest groups financially back political parties in Iceland.

A significant recent development in the Icelandic fishing industry that could indicate systemic corruption was the release of the Fishrot Files. Released by Wikileaks, the Fishrot Files implicated Iceland's biggest fishing company, Samherji, in intricate and extensive corruption in Namibia (Wikileaks, 2019). Samherji had become the single biggest recipient of quota in Namibia, which also utilises a quota system of management. This was achieved through the spending of millions of dollars in bribes to Namibian officials and politicians. The profits made from these lucrative fishing rights were then processed through tax havens such as the Marshall Islands (Fontaine, 2019b). The bribes to corrupt officials were concurrently laundered through a secret account in Dubai.

The whistleblower who delivered this information to Wikileaks was the former head of Samherji's Namibia operations, Jóhannes Stefánsson. This development has resulted in significant fallout in Iceland, including the Samherji CEO Þorsteinn Már Baldvinsson standing down (Fontaine, 2019a). These revelations also caused Iceland to fall six places behind other countries on the Corruptions Perception Index (CPI) (Jónasson, 2021). The Minister of Fisheries at the time the scandal broke was Kristján Þór Júlíusson, who was also the managing director of Samherji 19 years prior and a lifelong friend of Þorsteinn. Kristján Þór Júlíusson also met with several of the accused corrupt Namibian officials at the behest of Þorsteinn. The ruling party at the time of the scandal, The Independence Party, has attempted to deflect the allegations by claiming Namibia's problems with corruption are largely to blame rather than Samherji's practices (Fontaine, 2019a).

Samherji's extensive donations to Icelandic political parties and politicians have also come under scrutiny, as many of the politicians donated to were the same politicians who decided upon the level of tax that fishing companies should pay (Fontaine, 2019a). The Social Democrats, for instance, were paid ISK 1.6 million from Samherji over 14 years. The contentious mackerel quota bill that elicited significant public ire also revealed major conflicts of interest (Fontaine, 2015). The wife of Progressive Party MP Jóhann Pálsson, who was a member of the ruling coalition, was found to be an owner of a fishing company that stood to gain ISK 50 million in fishing quota if the bill was passed. Jóhann Pálsson sat on the Industrial Affairs committee, which was partly responsible for the mackerel bill's creation. Another Progressive Party candidate, Davíð Freyr Jónsson, who sat on the fishing committee owned a boat that would have its quota tripled as a result of the bill, with the quota valued at ISK 200 million.

The newly appointed Minister of Food, Agriculture and Fisheries Svandís Svavarsdóttir has recently given an interview where she emphasizes in reference to the ITQ system that "We need to take action with regard to the concentration of power and the concentration of wealth in this system" (Logadóttir & Júlíusson, 2022). She further states that fisheries management in Iceland is an "uncomfortably good example" of public power and the forces of capital working together, the result being a "breeding ground for corruption". A working group has been set up with the intention of promoting transparency in Iceland's fishing industry. This includes a

thorough mapping of the management and ownership of Iceland's fishing assets (Pomrenke, 2022). Special attention will be given to the property relationships between fishing companies and the influence of fishing company owners through their exercise of voting rights and board seats in companies.

Administrative Capture

Administrative capture can occur through industry control over regulatory mechanisms and over information and data that informs regulation. There are several ways this can manifest. The legally sanctioned involvement or collaboration of industry in the regulatory body that oversees fisheries is one such means. Another means of administrative capture is the use of appeals, consultations or legal challenges to bog down the regulator's available resources. And yet another means is the use of 'favors' or outside interference when the regulator attempts to enforce fisheries management.

New Zealand

There is significant evidence of administrative capture in New Zealand's management of fisheries. In 2018, a fisheries report called Operation Achilles was leaked that went into detail about extensive under-reporting of Hoki (Young, 2018). It is estimated that hundreds of tonnes were unreported by major New Zealand fishing companies including Sanford and Talley's. These breaches of commercial fishing regulations were not prosecuted by MPI. More concerning was the fact that this report was created in 2011 and kept suppressed from public view for seven years until it was leaked by a ministry insider turned whistleblower. Another report called Operation Hippocamp which detailed dumping and high-grading in the South-eastern trawl and setnet fishery in 2012 was also suppressed until leaked (Morrah, 2021).

The involvement of industry in the administrative structure of fishing regulation in New Zealand's QMS is arguably a legally sanctioned form of regulatory capture, an argument that has been made by environmental NGO Greenpeace (Greenpeace, 2017). FishServe are information mediators that sit between industry and the Minister of Fisheries. FishServe collates much of the necessary data, including crucial catch data, that largely helps decide the subsequent TACC. FishServe even processes Freedom of Information Act requests with relation to QMS data including quota holdings instead of MPI, as Greenpeace found out when attempting to request such information.

The self-reporting of catch by fishers is integral to the QMS system. An electronic system was developed and introduced in 2017, which replaced the written system and allowed fishers to report on their catch and position remotely in New Zealand's marine waters (Ministry for Primary Industries, n.d.-a). This information is sent through to FishServe, which compiles the data for use by FNZ and fisheries scientists. The reliability of this data, however, has been significantly called into question by recent developments. Sea Around Us released a global study in 2016 that sought to fill in gaps in catch data through 'catch reconstruction'. Based on their reconstruction of New Zealand catch data, since the QMS was introduced, actual catch is estimated to be 2.1 times what is reported to the FAO. It is further estimated that over half of industrial catch is not reported (Simmons et al., 2016).

The importance of accurate catch data for setting the TACC combined with the revelations of how widespread industry underreporting and dumping are led to the proposition of cameras being placed on commercial fishing boats as a means of direct regulatory oversight (Guy, 2017). However, much like how data collection and management was contracted out to FishServe, this aspect of management was originally contracted out to a subsidiary of Seafood New Zealand, Trident Systems. This appointment proved controversial enough that the monitoring of cameras appears to have quietly been delegated to FNZ instead (Parker, 2022a).

In 2001, a system of cost-recovery at the level of individual research projects was established, which stipulated that costs should only be recovered from quota holders who are affected or

stand to benefit from the research conducted. The effect of this change was that high-valued species such as Hoki and Rock Lobster received the majority of research resources, while research on species that are not as economically relevant or abundant have largely been neglected (Mace et al., 2013). This, in essence, has meant research has come to be dominated by industry interests, which direct research towards their own interests. When research is proposed for aspects of the marine ecosystem not relevant to commercial interests, "industry members often contend that research is not needed or that it is unaffordable" (Mace et al., 2013). The result of this is that most species in New Zealand's marine environment have received little if any research attention for years. Another effect of the marketisation of marine research has been that the overall research budget has decreased considerably by approximately 50% since the early 1990s in real terms. Alongside research resources halving in this period of time, the amount of species introduced into the QMS has increased 3.5-fold and the need for research on the environmental effects of fishing has also risen substantially (Mace et al., 2013).

The process of assigning the TACC by the Minister of Oceans and Fisheries is also subject to significant industry control. MPI fisheries administrators have reported that a change to a single species TACC can take up to six months, significantly limiting the amount of TACC changes that can occur due to limited resources (Hersoug, 2018). The process is lengthy in major part due to the number of steps needed to be taken to change a TACC:

1. MPI starts by commissioning research
2. Development of a research plan
3. Contracting out of research
4. Consideration of research done by the Science Working Group, which summarises stock status
5. Review of management advice
6. Preparation of Consultation paper which includes public submissions
7. Preparation of decision paper
8. Decision made on TACC

This considerable bureaucratic process can take up to 8 years, which is one of the reasons that management in several areas of fisheries management has been devolved to industry associations such as the National Rock Lobster Management Group. The result of this lengthy and costly process of changing the TAC has meant that 57% of the 350 managed stocks in the QMS have never had the TAC changed. 89% of those 350 stocks have had 2 or less changes to their TAC since being introduced into the QMS (Hersoug, 2018). The process of stakeholder consultation also presents opportunities for the TAC to be influenced by stakeholder interests. In 2021, a High Court judgement found that the Fisheries Minister, Stuart Nash, improperly set the TACC for Tarakihi. Instead of setting a TAC that would enable the regeneration of the fish stock, he based the TACC on a voluntary fishing industry plan developed by industry stakeholders Te Ohu Kaimoana and Fisheries Inshore NZ. This was despite Tarakihi being less than less than 15% of its original biomass (Leonard, 2021).

An additional dimension to TAC management is the fact that decisions by the Fisheries Minister on the TAC can be legally challenged. The fishing industry has made significant use of this function, on some occasions managing to overturn the minister's decisions. One former minister has reported being challenged by the fishing industry 6-8 times a year (Hersoug, 2018). New Zealand environmental NGOs are increasingly utilising this legal mechanism as well. The Environmental Law Initiative (ELI) recently announced legal proceedings to be filed against the New Zealand government for failing to apply bycatch prevention laws and protect marine biodiversity (Environmental Law Initiative, 2022). They identify several areas of administrative failure. These include:

- The delegation of responsibility to industry owned FishServe to receive reports on the bycatch of protected species
- The requirement for commercial fishers to only report bycatch of certain species under the Fisheries Act, while broader reporting requirements of the Wildlife Act and Marine Mammals Protection Act are not met or enforced
- The failure of the Department of Conservation to investigate and prosecute offences in breach of the Wildlife Act and Marine Mammals Protection Act

- The failure of the Department of Conservation to put in place population management plans to protect threatened species from the impacts of fishing

Iceland

Recent research has called into question the Directorate of Fisheries' effectiveness in regulating the commercial fishing industry. A report by the The Icelandic National Audit Office (INAO) in 2018 found several limitations to DOF operations. The report emphasised how monitoring of the fisheries sector is an enormous task that is difficult to carry out. Surveillance of fish catch being weighed was deemed to not be satisfactory due to opportunities by individuals or companies to get away with reporting lower catches than actually caught. It was concluded that the monitoring of catch discarding was weak and unsystematic (Gisladottir et al., 2020). Interviews from the report with several Icelandic government and industry insiders provided a bleak assessment of fisheries management in practice. Many of the interviewees raised concerns about the lack of enforcement mechanisms at the DOF's disposal. A former DOF staffer and employees at the DOF were in agreement that they had little powers: "You know the regulation…or the legal framework is so weak. We can't handle to, you know, close cases. There is always something, and I even know of cases where those that know someone in the Ministry [of Fisheries], can just place a call to the Ministry and get cases dismissed." (Gisladottir et al., 2020). This account is further corroborated by recent media attention on the uncovering by the DOF of extensive dumping within inshore fisheries (Ćirić, 2021). The vast majority of these cases were concluded with a written letter from the DOF to the offender stating catch should not be thrown back into the sea. Of the remaining cases, one case resulted in a temporary suspension of a fishing license and three cases resulted in formal warnings.

DOF monitoring staff also regularly encounter distrust from small-scale fishers who believe they are being targeted instead of bigger industry figures. The interviews further revealed that fishing industry actors have come to expect there to be no consequences for breaking the rules of the ITQ system (Gisladottir et al., 2020). The lack of proper enforcement combined with a lack of consequences has enabled a return to the logic that causes the tragedy of the commons: if

other fishers are breaking the rules and getting away with it, then why shouldn't I? In this sense, Iceland's weak enforcement is likely accelerating the deterioration of Iceland's fish stocks.

The MFRI and how it conducts stock assessments is also subject to considerable industry influence (Marchal et al., 2016). Industry representatives sit on the board of the MFRI and participate in official committees that handle affairs related to fisheries management. In addition, industry representatives are involved in the design and implementation of TACs, which provides ample opportunity to influence the way in which the MFRI conducts the science that informs their stock assessments and conclusions derived from them.

A recent report from the OECD on Iceland's fisheries management has emphasised that the setting of TACs is subject to a considerable amount of political and economic pressure (OECD, 2017a). Fisheries management is often a compromise amongst stakeholders, and stakeholders can influence decisions about the trade-off between economic, social and environmental sustainability. This generally means that the Minister of Fisheries sets the TAC for many stocks higher than recommended by the MFRI. The justifications given for exceeding the scientific recommendations of sustainable catch is the uncertainty of scientific evidence and the economic and social desire to safeguard employment in the fisheries sector.

Cultural Capture

Cultural capture refers to the utilisation of ideas to establish norms, both formal and informal, that influence regulation towards industry interests. Regulation can become captured not due to material incentives, but due to the regulator becoming convinced that industry interests are synonymous with the public interest. One manifestation of cultural capture are the informal cultural attitudes towards fish and the fishing industry. Generations of fishing and fish consumption shapes expectations around management and what priorities should be. Another manifestation is the use of cultural arguments or rights to more formally influence regulation towards industry's favour.

New Zealand

There are several indicators of cultural capture in New Zealand fisheries management. One consideration is the cultural norms around fishing in wider New Zealand society and how they may shape expectations of management. The latest MPI report on New Zealand seafood consumer preferences revealed that 91% of New Zealand respondents purchased seafood, while two in five bought seafood at least once a week (MPI Economic Intelligence Unit, 2019). Another key takeaway in terms of New Zealand's cultural attitudes towards fish is that quality and appearance of seafood are the primary characteristics sought when purchasing seafood. Sustainability factors such as whether it was ethically sourced rated lower than quality and price. This may suggest that appeals to public opinion over poor management of fisheries, such as campaigns to end bottom trawling, will largely be ineffectual.

A unique form of cultural capture evident in QMS management is the role of institutionalized Māori property rights because of Treaty settlements. Under the QMS quota have been designated property rights in the form of quota 'in perpetuity'. When Treaty settlements were concluded, quota became the manifestation of Māori fisheries rights that the Treaty guarantees. This has had the effect of strengthening the resilience of the QMS system to reform or replacement, as these property rights are interwoven into the QMS system. In essence, the taking away or abolishment of quota holdings would be perceived as synonymous with the seizing of Māori assets by the Crown. While this notion is understandable given previous seizures of Māori resources by the Crown without compensation, this presents a considerable problem for any attempts at reforming or replacing the QMS. Former Te Ohu Kaimoana Chief Executive Dion Tuuta has stated that any reforms that challenge the 1992 settlement would likely be opposed by Māori (Evans, 2019).

Complicating matters further is how invested Iwi have now become in the commercial fishing industry as a result of these settlements. Te Ohu Kaimoana, the organisation charged with overseeing Māori fisheries assets on behalf of Iwi, estimates that 50% of all fishing quota in New Zealand are owned by Māori as of 2017 (Te Ohu Kaimoana, 2017). In addition, Māori own

wholly or partially two of the biggest New Zealand fishing companies, Moana NZ (100% Māori owned) and Sealord (50% Māori owned). Fisheries assets established through the QMS now represent a significant amount of some Iwi's income stream (Memon & Kirk, 2011).

While Te Ohu Kaimoana is meant to exercise kaitiakitanga (guardianship over the environment) as part of their ethos with respect to fisheries, economic considerations appear to be taking precedence in its influence over fisheries management. A controversial instance of this was the attempt to establish New Zealand's largest marine protected area in the Kermadec Islands, an area representing 620,000 square kilometers which is greater than all of New Zealand's existing MPAs (Ministry for the Environment, 2021). Proposed by the pro-industry National party and endorsed by environmentalist opponents the Green Party, the bill was successfully argued to be in breach of the 1992 settlement and the Treaty of Waitangi by Te Ohu Kaimoana (Love, 2017). This was in large part because despite the Kermadecs not currently being fished in, establishment of a MPA could impact future commercial earnings for Māori. Te Ohu Kaimoana have largely objected to MPAs on this basis, stating that they have the effect of: "undermining property rights to existing and new fisheries as well as customary access and management by Māori… their implementation does not recognise the actions taken by Māori or other QMS quota holders to safeguard the marine environment" (Libecap et al., 2020).

In effect, the nature of these property rights under the QMS has afforded considerable influence by industry to make successful cultural arguments against environmental objectives. The impacts of overfishing by industry also significantly affect localised Iwi fishers from being able to exercise kaimoana gathering due to the depletion of fish stocks. However, to counterbalance overfishing, local Iwi have been empowered to an extent by the ability to call rāhui (restricting access to a resource or area) for conservation reasons under the 1996 Fisheries Act, a tool that has significant environmental benefits. Although these restrictions are not formally recognised in law without the Fisheries Minister's approval, they have generally been accepted and respected by government, locals and fishers. A recent example of this is Motairehe Marae Trust applying for a 2-year ban on fishing around Great Barrier Island and Little Barrier Island. Both Islands lie within the troubled Hauraki Gulf, with mana whenua describing the local marine ecosystem as under attack from both commercial and recreational fishers (Kowhai, 2022). The Fisheries Act

states that “the Minister may impose such a closure, restriction, or prohibition only if he or she is satisfied that it will recognise and make provision for the use and management practices of tangata whenua in the exercise of non-commercial fishing rights” (Fisheries Act 1996, s. 186A). Exercise of these rights with legal authority could potentially serve as a means of counterbalancing industry influence at a localised level on environmental grounds while also promoting Māori governance of natural resources.

Iceland

Fishing is not only deeply interwoven into Iceland’s economy, it is deeply interwoven into Icelandic culture. Icelandic fishing was first reported during settlement in the 9th century and continued to grow over time as a valuable source of nutrients and wealth for the settler population (Government of Iceland, n.d.). The proportionate economic importance of fisheries to the Icelandic economy arguably gives Iceland one of the most prominent fishing cultures in the world today. Iceland was rated the 18th largest fishing nation in 2017, catching 1.3% of global catch that year (Iceland Responsible Fisheries Foundation, 2017b). The importance of fish to Icelandic society is also one of the cited reasons Iceland has remained outside of the European Union, as joining the EU would likely mean other countries could fish in Iceland’s waters and Iceland would lose a degree of autonomy over setting TACs.

The central point of contention in Icelandic discourse over the ITQ system has largely been the distribution of wealth that has resulted from it. Remarkably little attention by comparison appears to be given to questions of environmental sustainability, such as the long-term viability of bottom trawling for Iceland’s marine economy. This is supported by surveys that have gauged Icelandic public attitudes towards fish and fishing. A 2011 report on Icelandic attitudes towards fish and fishing contains several relevant insights (Sveinsdóttir et al., 2011). Attitudes to fish consumption were found to be very positive, with most saying family influence was a key driver of fish consumption. Over 50% of the study participants consumed fish oil every day. Young people were found to be consuming fish with increasing frequency in the period 2006-2011.

While Iceland does not have an indigenous population, architect of the Icelandic ITQ system Hólmsteinn Gissurarson has defended the controversial practice of whaling on cultural grounds at a recent seminar on Arctic policy. He argues that efforts to prevent whaling on conservation grounds contravene the traditional practice of whaling by indigenous peoples in the Arctic (RCIEG, 2022). In order to further secure their traditional rights to whaling, he suggests Arctic indigenous peoples be given private property rights or (ITQs) to whale populations as well as to other localized fish stocks.

Gissurarson further argued that "what those preservationists are really demanding is that the Icelanders feed the whales for them… in the Icelandic waters whales each year consume according to estimates about six million tonnes of seafood, such as krill and small fish, whereas the Icelanders themselves harvest a little more than one million tonnes of fish". This conception of whales and other fish stocks being in competition with Icelandic fishers by eroding their profits represents the distortion of priorities ITQ management promotes. Other lifeforms are only valuable insofar as their existence is conducive to human consumption and profit. This conception of marine life is diametrically opposed to notions of conservation and biodiversity. If this is the lens through which CBAs are conducted, it makes sense that fishers see birds, whales and other fish stocks that prey on economically valuable stocks as competition. This can be seen in the extensive culling of seals beginning in the 1980s to reduce seal worm prevalence in demersal fish (ICES, 2021b). Despite these cullings having ceased by the 2000s, the MFRI reports that the seal population has failed to rebuild since. Seal populations declined from 33,000 in 1980 to less than 7,000 by 2016 (MFRI, n.d.-a).

Scientific/Academic Capture

Scientific or academic capture denotes the use of science by industry interest groups to provide legitimacy to pro-industry narratives and undermine or discredit science that questions or critiques industry practices. This can occur at multiple levels of policymaking (Saltelli et al., 2022). Epistemic strategies involve the use of specialised firms or agencies, which invalidate the

inferences or influence the methods by which science is produced. Institutional strategies involve colonising the institutional contexts where scientific evidence is produced or delegitimising the institutional contexts in which the evidence is produced if not favorable to industry interests. And political strategies involve influencing the framework or worldview in which the evidence is considered. Academic or Scientific capture is unique amongst the four types of regulatory capture examined in that it transcends national borders. Fisheries science is an international discipline that informs many countries understanding of how they should manage their fisheries. Industry influence over fisheries management scholarship can prove fruitful by undermining critics with scientific legitimacy and influencing the agenda. For this reason, this section will focus on a case study of a prominent fisheries scientist rather than comparing New Zealand and Iceland.

In 2006, a highly publicised and controversial study was published claiming that if current fishing trends continued, global fisheries would collapse entirely by 2048 (Worm et al., 2006). The article was rebuked by some other academics, who criticised the methodology of using reported catch used to arrive at such a conclusion (Hilborn, 2007). The primary author of the 2048 collapse thesis came together with some of his critics in 2009 to publish a successive article agreeing that while the marine environment requires further regeneration, conventional management such as the use of catch shares mixed with the right economic incentives shows the greatest promise for reversing these trends (Worm et al., 2009). Further research in 2012, however, has since reconfirmed the 2048 thesis, though the study emphasised that RBFM remains the best method of restoring the biomass of many diminished fish stocks, as it is primarily states with poor management such as China and underdeveloped countries that contribute the lion's share to global overfishing statistics (Costello et al., 2016). This debate remains without consensus, with other scholars claiming ITQs are failing to achieve sustainability targets in the countries they have been implemented (Garrity, 2020).

As arguably the most prominent marine biologist globally, Daniel Pauly is the most cited scientist concerning fisheries in the world (Ioannidis et al., 2020). He has also written about the influence of industry interests on the area of fisheries science and discourse over overfishing more generally. He identified that the denial of problems in fisheries is often expressed by

government and/or industry affiliated scientists hiding behind the concept of “scientific uncertainty” (Pauly, 2008). Denial of negative trends due to any degree of uncertainty, which is inescapable in science, is utilised to demoralise and paralyse efforts to rectify them. Attacks upon the integrity of those who identify these negative trends are also identified as a means by which industry can deflect criticisms of itself. In a separate article, Pauly identifies that marine ecologists are primarily concerned with the wider ecosystem, working with environmental NGOs and often receiving their funding from philanthropy. By comparison, many fisheries biologists/scientists traditionally work for government agencies or as consultants for industry and are concerned more so with protecting fish species relevant to industry and the fishers under their employment (Pauly, 2009).

The most prominent fisheries scientist in the world by comparison is Ray Hilborn, a fisheries scientist based out of the University of Washington. Hilborn has been the co-author of several major fisheries quantitative assessments which argue that overfishing is not a universal problem, but rather a problem that affects countries with poor management of fisheries (Hilborn & Walters, 2015; Worm et al., 2009; Costello et al., 2016). Hilborn has strongly opposed the establishment of MPAs on the basis that they simply displace fishing effort towards other areas, thereby intensifying the depletion of fish stocks on the outside borders of established MPAs (Hilborn, 2017). This research has been utilised by an alliance of industry interests in Europe recently to argue that bottom trawling in MPAs should continue (Neslen, 2022).

Pauly and Hilborn have clashed several times over the years, representing a microcosm of the struggle between economic and environmental interests in fisheries and academia more generally. The Sea Around Us reconstruction of New Zealand catch which Pauly helped co-author is one such case. The claim that catch in New Zealand is double what is officially reported has been contested by Seafood New Zealand on the basis that it contradicts research conducted by Hilborn which rated New Zealand as one of the top 5 managed fisheries in the world (Blank, 2016).

Hilborn also penned a 2011 opinion piece in the New York Times titled 'Let us eat fish', claiming the Magnuson–Stevens Fishery Conservation and Management Act (the US version of ITQ management) has enabled greater sustainability (Hilborn, 2011). He goes further to state that: "The Magnuson Act regulating federal fisheries has been successful, but it needs to be revised. The last time it was reauthorized, in 2006, it required the rebuilding of overfished stocks within 10 years. That rule is too inflexible and hurts fishing communities from New England to California. A better option is to give the management councils greater discretion in setting targets and deadlines for rebuilding fish stocks." Considering management councils are populated by industry interests, this is essentially advocating for further delegation of management responsibilities to industry.

Hilborn has also critiqued the 2021 Global Fishing Index claim that 50% of world fish stocks are overfished. One of the primary reasons for this refutation is that "many of those assessments used catch-based estimates. Catch-based estimates are a totally unreliable method of stock assessment" (Hilborn, 2021). This notion is especially perplexing considering that catch estimates based upon reported catch constitutes the basis ITQ management, not just in New Zealand and Iceland but in all other countries that utilise ITQ management. Hilborn was one of the primary critics of the 2048 thesis published in 2006, which claimed fish stocks globally were in peril. Hilborn's research essentially encouraged an academic complacency over the impacts of overfishing by claiming there are 'best practice' countries where ITQ management is working as intended.

Hilborn has come under criticism from environmental NGOs for not explicitly disclosing his financial ties to the fishing industry when publishing in academic journals about fisheries management. Between 2003-2015, Hilborn received USD$3.55 million from 69 various seafood companies including the New Zealand Seafood Council (Bernton, 2016). This is not to say that Hilborn has not partaken in valid and illuminating research, which has pushed forward our knowledge of fisheries. But the fact remains that the fishing industry can arguably amplify scientists like Ray Hilborn with their considerable financial and political resources. Hilborn's financial backers structurally benefit from the proliferation of ITQ management, and the research Hilborn conducts reinforces the hegemony of ITQ management globally.

The influence of industry affiliated scientists has also been instrumental in defining scientifically what actually constitutes 'sustainable fishing'. For instance, the concept of Maximum Sustainable Yield (MSY) was developed during the post-WW2 era when industry and governments were working together to grow the global economy. There was great confidence that fisheries scientists could accurately prescribe fishing to the highest extent possible without decreasing the fish stock population (Finley, 2019). This essentially advocated pushing fish stocks to their absolute limit as the basis of fisheries management. This can be seen in New Zealand and Iceland, who both still utilize MSY as the basis for commercial fishing management and defining overfishing (Ministry of Fisheries, 2008). Under MSY, a fish stock is considered overfished if its modelled population falls below the 'soft limit' and considered collapsed if it falls below the 'hard limit'. The soft limit refers to 20% of original biomass whilst the hard limit refers to 10% of original biomass. This means that a fish stock can drop to between 20-25% of its original population and still be considered 'sustainably harvested'. The bar for sustainability is already incredibly low, this being in part due to the influence of industry over fisheries science.

Having examined the various forms of legislative, administrative, cultural and scientific capture, it appears there is a varying degree of industry influence depending on the dimension of management in each country. Many of these negative outcomes can be linked to industry influence or interference with the structures of regulation. Comparing the experiences of both countries can help establish common trends that ITQ management results in. This will be the focus of the final chapter.

Chapter 7: Comparisons & Conclusions

This chapter aims to summarise the outcomes and forms of capture seen in both countries in order to answer the research question and conclude this analysis. Tables will be used to summarise outcomes, while forms of capture will be summarised in paragraphs. Implications and limitations will also be discussed, before making conclusions about the future of marine management.

New Zealand and Iceland share similarities and differences in the way their ITQ systems were implemented and developed. Both countries have significant EEZs by virtue of being island nations, entailing control over considerable marine resources. Both countries introduced ITQs due to alarming population collapses of key fish stocks. And both countries at the time of ITQ introduction were undergoing a transition to a neoliberalism-based economy, with emphasis on utilizing market forces as the basis of regulation. More importantly, many of the same outcomes can be seen in both countries, as shown in the tables below.

Outcomes Comparison

Table 1. Environmental Outcomes in New Zealand and Iceland

		New Zealand	Iceland
Environmental Outcomes	Positive	• The recovery or stabilization of some pre-ITQ collapsed fish stocks. • The closure/altering of TACs to prevent overfishing.	• The recovery or stabilization of some pre-ITQ collapsed fish stocks. • The closure/altering of TACs to prevent overfishing.
	Negative	• A failure to stop fish dumping and high-grading. • The use of bottom trawling as the primary method of fishing. • Several stocks have failed to rebuild or further deteriorated since ITQ management was implemented. • A lack of knowledge about most non-commercial fish stocks. • Continued impact on endangered native birds and mammals as bycatch.	• A failure to stop fish dumping and high-grading. • The use of bottom trawling as one of the primary methods of fishing. • Several stocks have failed to rebuild or further deteriorated since ITQ management was implemented. • Continued impact on endangered native birds and mammals as bycatch.

Table 2. Economic outcomes in New Zealand and Iceland

		New Zealand	Iceland
Economic Outcomes	Positive	• Increased profits despite less fishers and fish caught. • The scaling back of the fishing fleet was accomplished. • Industry involvement in regulation combined with the abolishment of subsidies reduced costs to the government/taxpayer. • Ending of subsidies	• Increased profits despite less fishers and fish caught. • Royalty on fisheries entails a degree of profit return to the Icelandic public. • Significant growth of the economic contribution of the fishing industry. • Ending of subsidies.
	Negative	• Significant centralisation of quota by major fishing entities. • Rent-seeking behavior through the leasing of quota undermining fishers incentives. • Failure to innovate and increase economic productivity.	• Extreme centralisation of quota in the hands of a few companies. • Rent-seeking behavior through the leasing of quota undermining fishers incentives.

Table 3. Social outcomes in New Zealand and Iceland

		New Zealand	Iceland
Social Outcomes	Positive	• The ability to rectify historical inequities to Māori through the distribution of quota and customary management.	• There are few if any positive social outcomes in Iceland.
	Negative	• Rising tensions between recreational/customary fishers, conservationists and commercial fishers. • Significant public distrust of the fishing industry & regulator.	• Significant opposition by the Icelandic public towards the ITQ system. • The decline of fishing villages/towns and small-time fishers due to quota consolidation.

Regulatory Capture Comparison

Legislative Capture

A degree of legislative capture has been made possible in both countries through the centralisation of quota by several major fishing companies. This centralisation has enabled the fishing industry to foster industry resources in unison to influence political decisions rather than compete with one another. The manifestations and extent of this legislative capture however differs in both countries and remains difficult to measure. Iceland appears to have stronger legislative capture than New Zealand.

In New Zealand, evidence for legislative capture is characterized by fishing industry lobbying of individual candidates and parties. As the case study with New Zealand First Party shows, targeted funding of a fisheries-sympathetic small political party that ends up in coalition with a bigger political party can prove influential on fishing regulations. Small parties can exercise significant leverage over larger coalition partners when their presence in the coalition is crucial to the continued stability of government. But this leverage is tenuous as continued influence necessitates continued re-election, as seen with the ousting of NZ First from parliament. Other strategies involve targeted donations towards select-committee members who draft fisheries policy. The strong unity of the New Zealand fishing industry is exemplified in dialogue between major fishing industry leaders to the fisheries minister indicating unified industry opposition to cameras on boats. These observable tensions between industry and the fisheries minister indicate industry penetration has had limited success in the legislative dimension.

In Iceland, legislative capture is characterized as an entrenched web of connections that connects politicians directly to the fishing industry. Many Icelandic politicians or their families have quota themselves, including former ministers for fisheries. There have been several observed instances of politicians making decisions on fisheries that have resulted in greater wealth for themselves or family members. Legislative capture has also extended to other countries jurisdictions, wherein Icelandic fishing companies with government assistance have bribed government officials in Namibia to acquire lucrative fish stock quota. The unification of the Icelandic fishing industry is exemplified by cooperation and trading of quota between the major Icelandic fishing companies to avoid the maximum quota threshold.

Administrative Capture

A degree of administrative capture is evident in both countries. Industry influence over regulatory powers permits considerable influence over the direction of regulation, even if the legislative branch of government is genuinely committed to sustainable governance of fisheries and the marine environment. It appears New Zealand has a stronger degree of administrative

capture than Iceland. In Iceland, administrative capture is characterized as the informal influence of industry on decision making and a lack of enforcement ability by the DOF. Despite the TACC being in theory decided upon independently by the DOF and based upon research from the MFRI, industry along with social and economic pressures often mean the TACC is set higher than it should be. In addition, it appears the DOF is largely under-resourced and toothless to enforce fisheries regulations based upon direct interviews with DOF staff and government officials. Fishers are able to have fines or violations easily dismissed. There is little belief among fishers interviewed that they will be prosecuted.

In New Zealand, administrative capture is characterized as pervasive, with multiple instances of the regulator acting on behalf of industry, industry influence on TAC decisions and the formal delegation of administrative roles to industry. MPI has been implicated multiple times in covering up reports about industry non-reporting of catch, systemic dumping and high-grading. Aspects of administration, such as the collection of catch data and localized management have been delegated to industry bodies, conferring additional influence over administrative duties. The ability for industry to legally challenge TAC changes, which occurs often, also has the effect of influencing decisions and eating into the limited resources and staff FNZ have. This could in a sense be interpreted as a form of corrosive capture, wherein industry is able to mire the regulator in legal appeals to direct its limited resources away from more meaningful regulation.

Cultural Capture

Cultural capture is evident in both countries, albeit in different forms. It appears that while Iceland displays a stronger informal cultural capture, New Zealand has a stronger formal legal cultural capture. Iceland's long history of fishing and its economic importance have created a strong informal type of cultural capture, wherein most of the country views fishing and fish consumption as intertwined with Icelandic identity. These considerations mean that pressure to set higher TACs than recommended often comes from wider Icelandic society and not simply from the fishing industry. Cultural arguments are utilized to justify whaling, and there are current attempts to safeguard continued whaling through the introduction of ITQ rights to indigenous

communities in the Arctic. While this could be interpreted as attempting to achieve more equitable outcomes for indigenous communities, a more cynical take is that by introducing indigenous property rights into the ITQ system, this will both strengthen ITQ system resilience to reform/replacement as well as create a new market for Icelandic fishing companies, similar to the situation in Namibia.

In New Zealand, the economy is proportionately much less reliant on the fishing industry than Iceland. As a result, there is far less public attention given to fisheries management than Iceland. However New Zealand has developed a strong formal type of cultural capture that is supported by legal arbitration. In an attempt to safeguard Māori property rights under the Treaty of Waitangi, Te Ohu Kaimoana was established to represent Māori with respect to marine environment and achieve greater self-sufficiency to Māori communities. While successfully achieving positive social outcomes for Māori, this influence has also been used to continue overfishing, oppose MPAs, oppose fishing restrictions that protect endangered species and oppose camera oversight of commercial vessels. Because QMS quota are a legal representation of Māori property rights as guaranteed by the treaty, this significantly limits prospects of reform or replacement of ITQ management in New Zealand.

Limitations

There are several significant limitations to this research project. For one, the uncertainty and ambiguity of information and data is a major theme of fisheries management, and thus this uncertainty can justifiably be applied to much of what is discussed here. As we have seen, much of what is reported by industry is fabricated, so the reported catch figures used to compare environmental outcomes (which are already mostly negative) are likely even worse than portrayed. This mirrors our global knowledge about fish stocks and the marine environment, which is also largely uncomplete and pales in comparison to our knowledge of the land environment. Fisheries scientists and regulators are often forced to make decisions predicated upon assumptions and flawed data. This flawed information must then be interpreted

by academics attempting to assess ITQ management, undermining its reliability. The result is that much of our knowledge about fisheries can justifiably be treated with a high degree of scepticism. It is unfortunate that this fact has been utilised by industry in many instances to advocate for the opposite of a precautionary approach to fisheries management.

Another limitation of this research project is the difficulty in properly defining the 'public interest'. For the purposes of this research project, the public interest was defined as: The sustainable environmental, economic and social management of the marine environment. This definition should be considered a normative claim of what the public interest is. Furthermore, what sustainable outcomes along these dimensions would actually look like in practice would be up for considerable debate. Other interpretations of what actually constitutes the public interest or how dimensions should be weighted are equally valid and should also be taken into consideration.

Another limitation is the difficulty of establishing definitive causality between industry and negative environmental outcomes due to the presence of confounding variables. The impacts of recreational fishers on fish stocks are even more difficult to determine than the commercial fishing industry. Much like the commercial sector, regulators are near completely reliant on accurate self-reporting by recreational fishers. Given how rife overfishing is in the commercial sector due to a lack of transparency and oversight, it is reasonable to assume recreational catch is also far higher than is reported. While making deductions about recreational fishing impacts is outside of the remit of this research project, the extent of these impacts on fish stocks and the marine environment also warrants further investigation.

Another confounding variable is the impacts of climate change on fish stocks and the marine environment. The world's oceans have absorbed up to 30% of carbon emissions since pre-industrial times, but this absorption has also resulted in significant acidification of the oceans reflected by decreasing pH (IPCC, 2022). This continuing acidification reduces the concentration of carbonite ions which are essential components of skeletons and shells for many forms of marine life. Current projections hold that if this acidification is not stemmed, by

2045 80%-90% of all marine life will be lost, which will also result in the food supply for 2 billion people simply vanishing (Dryden & Duncan, 2021). The warming of the ocean has recently been implicated in the sudden collapse of Alaskan snow crabs, dropping from an estimated 11 billion to 2 billion in just four years (Bryce, 2022). It is likely that these impacts are also playing out in New Zealand & Iceland's marine environment, making it difficult to assess whether overfishing, warmer temperatures or acidification is responsible for declines in observable fish stocks. These additional pressures on fish stock populations should prompt further caution in how many fish we take from the sea.

Implications

One implication of this comparative assessment of New Zealand and Iceland's ITQ systems is that regulatory capture is indeed strongly evident at multiple levels of ITQ management in both countries. While conventional regulatory capture focuses on interactions between industry and the regulator (or administrative capture), a more complete understanding how regulatory capture dynamics operate require investigation of dimensions that surround the regulatory context. The legislative dimension, the academic and scientific dimension as well as the cultural dimension play important roles in understanding how fisheries management under ITQs has become subject to regulatory capture. While it may be tempting to simply blame the fishing industry alone for negative ITQ outcomes, the political system, economic system and cultures of both countries have also played key roles in the continued decline of the marine environment.

Another implication of this research project is that much of the theory that underpins ITQ management has simply not materialised. Underreporting of catch has significantly distorted our understanding of fish stock health for decades, resulting in subsequent and continued declines and collapses of fish stocks. ITQ management has been overly reliant on theoretical assumptions that fishers are the best custodians of fisheries due to an economic incentive to preserve future profits. Some academics have proposed that discounting and short-termism have played a major role in the failure of ITQ incentives to materialise (Garrity, 2020). 'Discounting' refers to the notion that a fish today is worth more than a fish tomorrow which can

influence individual fishers incentives away from sustainability. ‘Short-termism’ along these same lines proposes that contemporary fishing companies at are concerned moreso with short term profits over long term profits hundreds of years from now. This is why fishing industries in both countries have instead played a role in the prioritization of their own economic self-interest over environmental sustainability while actively promoting a facade of environmental stewardship to the public. If the theoretical foundations of ITQ management are rotten, so too will be the outcomes that ensue.

Another implication of this research project is that subsidies are not solely to blame for overfishing. While it may be true that the introduction of ITQs positively contributed to the abolishment of subsidies in both countries, New Zealand and Iceland’s inability to stem overfishing shows that subsidies are a contributing factor to but not the primary cause of overfishing. Greater profits means fishing companies no longer require government support. Because quota have been significantly consolidated by a few entities in each country, this means a greater proportion of resources available to influence the TAC through the means discussed in this project. This power imbalance is key to understanding how fisheries management has come to be dominated by industry interests.

Another implication of this research is the importance of whistleblowers and investigative journalism to identifying and understanding regulatory capture in fisheries. We would have little knowledge of how captured MPI is in New Zealand without internal whistleblowers leaking suppressed reports to the media, who then transmitted this information into the public consciousness. In the absence of these leaks, we would believe MPI had been doing its job as a regulator, unaware of why managed fisheries stocks continue to collapse. The same goes for the NZ First scandal, in which leaked documents and recordings exposed how the fishing industry was attempting to kill attempts by the government to put cameras on boats. In Iceland, whistleblowing was crucial to our understanding of why the fishing industry strongly supports other countries and cultures adopting ITQ management. The privatization of marine resources that ITQ management entails enables lucrative opportunities for large fishing companies/corporations to exploit third-world countries’ natural resources. From an outside perspective, this arrangement between corrupt Icelandic fishing companies and Namibian

officials would be invisible and observers would justifiably believe that nothing is amiss. The Fishrot Files scandal should prompt greater scrutiny of the proliferation of ITQ management in developing countries, as well as greater scrutiny of fishing companies' practices in foreign jurisdictions.

Another implication of this research project is the necessity of transparent political financing laws to identify regulatory capture. The banning of anonymous donations in Iceland of course does not rule out clandestine 'palm greasing', but it does allow policymakers, academics and journalists to ascertain the level of (legal) special interest group influence on their political parties and political system. Having this information available resulted in significant public backlash that has translated into political pressure to both reform and further map out the power relations within the Icelandic fishing industry. The extent of fisheries influence in New Zealand is far more difficult to grasp due to less publicly available information about donations and the ability to donate in piecemeal amounts to avoid disclosure rules. Having more transparency in this area may fuel similar demand for change in New Zealand.

Conclusion

The intention behind this research project was to investigate: 'To what extent are Individual Transferable Quota systems of fisheries management subject to regulatory capture in Iceland and New Zealand?' The difficulties of identifying the presence of regulatory capture mean that giving a definitive answer to this question will always be difficult. However, it seems clear from what evidence we do have that regulatory capture has a significant presence in both countries' ITQ management systems. The primary beneficiaries of ITQ systems appear to be fishing companies and quota owners in the current day, who have directed regulation through a variety of means, both conventional and unconventional, towards their own interest and away from the public interest. This has been to the detriment of small fishers, future fishers, the health of fish stocks and the marine environment more generally.

Perhaps the main benefits of ITQ management have been the selective increases in economic efficiency and the halting of open access to fisheries which threatened their complete annihilation. It has become clear though over time that ITQ management is insufficient to stem the decline of both fisheries and the wider marine environment. Much of the growth in economic efficiency is based upon the simultaneous growth in destructive fishing techniques such as bottom trawling that cannot be sustainably utilized long-term. The emphasis on economic efficiency appears to have blinded both industry and regulators alike to the dangers of overcapitalization. Short of declaring significant amounts of the ocean as MPAs and attempting to enforce them, it is unclear what form of management could even replace ITQ management. Even then, fishers, consumers of fish and fishing companies will likely provide significant resistance to any attempts to do so, making such an objective politically untenable.

Discussions in fisheries management are generally predicated on the notion that large scale commercial fishing can continue indefinitely. This notion is incorrect. If commercial fishing is not reigned in and scaled back, fisheries collapses will end ITQ management anyway as there will be no more fish left to catch. Governments have given far too much leeway to economic and social considerations in their applications of cost-benefit analyses, neglecting the fact that all these considerations stem from the continued existence of fish as a natural resource. Continually making trade-offs will lead fisheries and those who depend upon them into oblivion. Positive economic and social outcomes can then be understood as contingent on positive environmental outcomes, and thus environmental outcomes must be weighted far higher in importance relative to the other dimensions in policymaking, regardless of any protests from fishers and the wider public.

The problems seen in fisheries management are indicative of the wider problem of radical anthropocentrism that permeates most areas of human existence (Kopnina et al., 2018). This underlying and often unquestioned philosophy that sees other lifeforms as valuable insofar as they achieve human ends has put enormous pressure on earth's natural world. Human encroachment on the natural world has resulted in 50% of all marine life being wiped out in the last 70 years and about 70% of all wildlife being wiped out in the last 50 years (Dryden &

Duncan, 2021 & WWF, 2022). The inevitable result of this mentality unless altered will likely be a complete ecological collapse in the near future with devastating consequences for humankind.

The utility of technological development also poses interesting philosophical questions when it results in overcapitalisation of natural resources. Fishing equipment has become so effective that humanity's growing appetite for fish has become a serious threat to many fish stocks globally. The use of less effective but also far less damaging fishing techniques has been forwarded as a solution to overcapitalisation. Though this would almost certainly entail a significant increase in the cost of fish, as the effort relative to catch would substantially increase relative to the current industrial methods employed.

Another relevant question may be whether ITQ management enables regulatory capture or if the inverse is true, that ITQ management is a result of regulatory capture. Based on the evidence in this project, it would seem that both variables are mutually reinforcing rather than one being solely responsible for the other. Industry played an active role in the creation and operation of ITQ management, which allowed considerable influence over the outcomes it created. Similarly, ITQ management appears to gravitate towards consolidation and centralisation, which means far less competition as a barrier to co-ordination by industry. ITQs may be predicated on game theory, but it appears industry in both New Zealand and Iceland are winning the fisheries management game.

Based upon his understanding of regulatory capture, George Stigler would likely advocate the dissolution of both countries' regulatory agencies and fisheries management altogether. However, this thesis would argue ITQ management represents a case of weak capture in both countries; the public interest is better served by its presence than its absence. A return to the open-access free-for-all that preceded attempts by governments to regulate fisheries is simply not viable. While George Stigler was correct that regulatory capture is enabled by government control, it is clear that simply delegating to industry while governments relinquish regulatory controls will fail to stem overfishing. Flawed regulation is therefore better than no regulation at all when it comes to fisheries. The question then becomes how to reform or replace ITQ

management so that the future of fish can be secured for generations to come. It is clear that whatever forms this takes, more must be done to insulate fisheries regulation from the penetration of corporate interests.

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