Chapter 3

Fish and Fishing Knowledge(s) as Vibrant Matter

Abstract Having outlined the theoretical background behind the notion of matter and matters as vibrant or lively in the introduction, this next chapter uses the theoretical framework provided by Jane Bennett, Sarah Whatmore and others to more deeply explore what its deployment within the realm of fishing would mean. Contrasting recent work on the intersection between human form and matter and the bacterial and viral realm, an intersection which is inescapable for humans and has begun to suggest a meshing and merging of humanity's apparently independent nature with other, unexpected forms of nature, the chapter considers the importance of knowledge and statistics about fish and their geographies in wider histories of fishing. The changing form and shape of available and known fishing resource, as well as the individual and collective behaviours focused on the extraction of fish and their importance to geopolitics is considered. Fish and other creatures of the sea and of the seabed themselves, therefore, are held to be vibrant matters in the web of political and developmental life. Knowledge, therefore, as ephemeral matters with real impact on both fish and human communities and political groupings focused on fishing. Given the previous chapter on histories and geographies of fishing, those histories and terrains will be further considered in this chapter, the embedded vibrant and lively statistical and living materials active at different levels of temporality and materiality, providing a sense in which fishing interactions from the past and future impact on the geographies and communities of the present, especially those in forthcoming chapters of the book.

Keywords Fishing • Fishing statistics • Vibrant matter • Empires of fishing • Fisheries development

3.1 Introduction

Becoming an academic or becoming a writer deeply focused on a subject in a way means becoming an expert on that thing or the academic field in which that thing is situated. It might not surprise the reader to know that the author of this book has not

always been academically knowledgeable or capable when it comes fish or fishing. My previous work on North Korea focused first on its forests and mountains and then on the developmental work to transform its coasts and coastlines. While working on North Korean issues is always a little psychologically draining, nothing has prepared me for what working on fish and fishing would be like. In the previous chapter, I described the available histories and geographies of fishing, both general work and writing and research specific to Asia more widely, East Asia and the Korean peninsula. While these works and research have been vital to framing the past academic focus on this topic, they were for the most part historical, geographic (in its cultural sense), or anthropological. While they complete or extend at least some of the story of fishing and fishing history on or near the shore, they seldom go onto the water and never go under it. But to really understand fish and fishing that is precisely what must be done. If this book is really to encounter fish and the creatures of the sea as vibrant matter, lively participants in the web of life that includes their capture, extraction and later utility for these fishing communities, then it will have to go with them under the waves.

This chapter, therefore, engages with fish themselves. But it does not do so by reporting on them in an ecological or natural sense. Keeping an eye on the spaces and places of the communities and practices involved in harvesting them, it is necessary for this chapter to connect with the development of ideas and sciences around fish and fishing. Extracting value from the sea has transformed over the centuries from an artisanal, subsistence-level exercise in survival to a global industry replete with extraordinary technology and a complex network and ecosystem of data focused on what is under the waves. This has allowed humans to go beyond historical efforts close to or on the shore, to voyage out into the deep oceans and work in the most challenging and remote of places. This is the fishing that now dominates the globe, that is literally changing the geographies of the seafloor, transforming the ecologies and ecosystems of the water. In short, this chapter connects with the development of knowledge about fish in the sea. How many there are, what species they are, how much they weigh and how many it is possible and acceptable to catch without impacting ‘negatively’ upon their ecosystems. The science of fish, fishing and fishing statistics is extraordinary, dry and perhaps a little dull sounding at first to readers, really has been one of the enablers of the global fishing industry. Hand in hand with technological developments in fishing has been developed in statistical knowledge and techniques, techniques which would underpin not only the industries sense of itself as a progressive force for good in the global economy but also conversely its utterly devastating overreach of exploitation.

Along with data and science about the numbers of fish in the sea, there have been scientific developments about the fish themselves. As this book has already recounted in a little detail, historical works on fishing often contain what sounds like fantastical visions of the number or size of fish encountered in the sea in the past. Sometimes, this literally ends up asserting that there were so many or they were so big that it was possible to almost walk upon the water. Today we dismiss these accounts as fanciful. We know how many fish there are in the sea and we

know how big they are, how much they weigh and what they look like—it is impossible for the sea to have been like that. The fishy vibrant matters that we know are of a size and a scale we are used to and familiar with, they fit in nets, can be caught, can be handled and picked up without a great deal of effort (except for Tuna, Sharks and a few other species). More recent and open-minded research with a forensic or archaeological sensibility, however, has begun to tell a different story about the fish in the sea. This story has a truly depressing denouement that in fact perhaps the fish we know from historical stories we once dismissed as fanciful, may well have been that size. They are not the same fish that we know today, because frankly we have eliminated them, debased them and denuded them. The science related to fish themselves tells us that the fish of our time are the fish we deserve in our age of environmental crisis, stunted and for the most part doomed.¹

Finally, this chapter will explore another aspect of fishing which is primarily untouched by anthropological or historical considerations of either local or regional industries. Fishing technology, that is a technology which is not about theoretically knowing the statistical possibilities of fish or fishing, has developed enormously over the past two centuries. One might count these days global positioning satellites as part of the network of technology behind fishing, as such satellites make the sea knowable like never before. We marvel at stories of but a few centuries past when seamen and fishers would set sail armed only with a sextant and a paper map, navigating by the moon and stars across the sea. For the most part fishers of this time did not set out across the globe or enter the deep sea but stayed reasonably close to land or hugged the coast. It was dangerous to go far; the weather could get bad quickly and a boat could easily get lost. Not even fish were worth that, and they were unknowable anyway out in the deep. In the nineteenth century the technology of boat and shipbuilding developed to first include metal so that ships were more robust, and then to include steam and then petrol engines so that they could go further and be relied upon huge distances away from port. It was possible to go out further into the sea and as ships got larger to catch larger fish and larger amounts of fish. Finally, it was possible to have refrigeration on board so that fishers did not have to head back to port to return they catch as frequently and equipment such as nets, harpoons and other technologies could itself be powered and much more functional. Fishing expanded across the globe, and expanded across all species, including to the largest, whales. By this point fish had really become abstracted to vibrant matters seemingly disconnected from their bodies, to become lamp oil and baleen material. Such technologies have completely transformed fishing and the capabilities and capacities of fishers and work in tandem with technologies of vision and observation alongside statistical analysis and inference to build the industry we know today. All of these elements are themselves vibrant, energetic matters, all deeply embedded in the wider story of this book and key to this chapter.

¹Stokstad (2007).

3.2 Numbers as a Lively Matter: Vibrant Statistics

The reader will have encountered the notion of things and materials being vibrant and lively in the introduction, and in the previous chapter we have explored an outline of both the general history of fishing across the globe and more locally to this book in parts of the Pacific and East Asia, settling finally on Japanese and Korean fishing histories. While these narratives and the stories, people and fish they contain are all in themselves lively and interesting, the book has not delved down into the depths of implication to really consider the material and non-material objects which are themselves important to the interaction between the human and watery realms. Humans after all, while they can be brief visitors to the sea are not of this domain and so require physical and conceptual protection in order to properly engage with its depths. This protection is both structural, in that humans require technologies and materials around them and to support them on or in the sea, and more perceptual, human sense and knowledge gathering potential is extremely limited below the surface. Technologies, knowledge production practices and the outcome of such practices are therefore absolutely vital to develop a real engagement with the seas. That essentially is why this section has both the words lively and vibrant in the sub-heading. Technological aspects and knowledge production revolve, primarily when it comes to fishing and the business and enterprise of the oceans, around numbers. How much will I get for this fish, how big is it, how much does it weigh, how many can catch, how many should I leave so that I can catch more tomorrow, which latitude and longitude can I catch them best at, and in recent years what are the GPS coordinates I have to navigate to in order to most efficiently extract my quarry from the water.

Fishing is, of course, not all about numbers, it is also about beauty, strength, energy and endurance. Historically fishing and engagement with the sea was a life or death battle for the underprepared human against the enormity of the water. Navigating by the stars or the moon, early fishers would make precarious journeys across the ocean in frankly very fragile boats using the energy of their own bodies. This is not to say that humans did not travel a long way in these early times, St. Patrick, St. Cuthbert and early Celtic missionaries made enormous journeys in small coracles across the North Sea and the North Atlantic. Polynesians somehow crossed huge spans of the Pacific in canoes and outriggers and the Norsemen island hopped from Europe to North America in their oar-powered Longships. For the most part however, early human engagements with the sea were focused on in shore waters and shallow seas and enclosed seas such as the Black Sea, the Caspian Sea, the Mediterranean and Japan's Inland Sea. It would be developments in technology accompanied by mathematics and navigation science that would enable humanity to span the world's oceans and to connect to the deep sea. While North Korea, of course, is not conventionally understood as part of the global academic scientific conversation, Pyongyang has absorbed many of the tropes of international fishing science over the years. While North Korean fishing policy may have a necessary

socialist or Juche spin on it, as the reader will see, much of its statistical and scientific presumptions are shared across the planet.

While the physical–technological aspect of this story surely begins earlier, when it comes to the statistical elements of fisheries development, this book, following the great work of Tim Smith begins in summer 1883 in London.² Between the May and October 1883, in South Kensington London in the grounds of the Royal Horticultural Society was held the International Fisheries Exhibition (IFE). The IFE is perhaps one of the lesser known of the Victorian scientific spectacles designed to showcase Britain’s Imperial efforts across the globe. While it is less well known that the Great Exhibition of 1862, it was no less spectacular. The exhibition hosted the largest aquarium seen in the world up to this point, containing some 65000 gallons of freshwater, three saltwater tanks and nine freshwater, four hundred fishermen in attendance an aviary of fish-eating birds, a pond for otters and seals and a resident community of Canadian beavers.³ 2.6 million people visited the exhibition which was also opened by the Prince of Wales and had Queen Victoria as its patron.⁴ As fishing capabilities and technologies had developed across the globe, aided, abetted and very much driven by the nexus of various colonial projects and the rise and development of investment capital and the marketisation and commodification of natural products and resources, records began to be better kept of the materials and living things pulled from the sea. At the same time as this record keeping developed, the growth in fleets and capabilities had begun to put the first waves of pressure on fish populations and ecosystems. Now that the market and empires were global, as well as communication technology such as the telegraph, institutions and governments for the first time had something of a global sense of both fishing resources and the vagaries of catch and capacity. While historically fishing capacity and numbers had been thought stable and infinite, because there always appeared (as the saying goes), to be ‘plenty more fish in the sea’, unexpected fluctuations began to be seen across the globe in a variety of species and in a variety of fishing contexts.

But how to explain them? There was much scientific interest in fishing and in the intersections between technology and organisational efficiency. 1883’s International Fisheries Exhibition is itself one of a series of exhibitions on fisheries science, and therefore naturally included a series of scientific lectures from various luminaries in the field and more widely from other developing scientific disciplines. Smith records an extraordinary appearance by Thomas Henry Huxley, known as ‘Darwin’s Bulldog’ for his enthusiasm for the theories of natural selection. Huxley believed that global fisheries were essentially without limits: ‘the Cod fishery, the Herring fishery, the Pilchard fishery, the Mackerel fishery, and probably all the

²Smith (1994, p. 53).

³“The International Fisheries Exhibition. Second Paper.” *Science* 1, no. 20 (1883): 564–65. <http://www.jstor.org/stable/1759709>.

⁴Ibid.

great sea-fisheries are inexhaustible...'.⁵ Nothing that human science, technology or endeavour could possibly do to the fish of the sea would impact on them, reduce their number or cause disadvantage to those seeking to extract them from the waters. To Huxley, it appeared that humans could never dominate global fish populations or outweigh the impacts of natural predation on a planet-wide scale. Smith, describes Huxley's opinion as being that the global mass of fish and sea species was like a 'perpetual motion machine', always replenishing itself, never declining in speed, size or mass.⁶ Huxley shared a sense of a world without limits, even in spite of the extraordinary power of scientifically and technologically minded, rational humanity, with much of Victorian science. It was against natural law and the natural order of things for there to be an end or an edge to nature's bounty, what liberated man was doing through the efforts and enterprises of his mind and body could simply not be negative or counter to his own interests.⁷ Smith points out that even Huxley however was not without nuance and he did suggest that the inexhaustibility of global fish populations was not spread evenly across the planet and that it might be possible for particular fisheries in particular geographic places to be impacted, he also suggested that not enough was known at the time scientifically to expand his assumptions beyond the realm of pelagic fishing, trawling for instance was a new realm.⁸

In the same series of lectures however was one at its end by Sir Ray Lankester, third Director of the British Museum, scourge of anti-rationalists and spiritualists and theoriser of degeneration within the wider field of Evolutionary Biology. Lankester was concerned about simplistic understandings of the bounty of the oceans. He had no time for understandings of fish populations that equated them to natural products on land, such as wheat or barley. Fish were simply more complex species and therefore human and technological impacts on them would also be more complex: 'the thousands of apparently superfluous young produced by fishes are not really superfluous, but have a perfectly definite place in the complex interactions of the living beings within their area...' (Lankester quoted in Smith 1994, p. 54).⁹ Instead, however, Lankester had developed a theory that fish populations struggled for equilibrium with predators and predation in a highly complex web of relation, and one that was not yet understood. Simply removing huge numbers of fish from the sea, especially young (apparently superfluous), fish would have a huge negative impact on this equilibrium and potentially cause collapse and reduction in populations. Measures would have to be taken, grounded on scientific understanding and rational experimentation and measurement in order to undertake the sorts of fishing and resource extraction that were underway.¹⁰

⁵Smith (1994, p. 53).

⁶Ibid, p. 54.

⁷Ibid, p. 53.

⁸Ibid, p. 54.

⁹Ibid.

¹⁰Ibid, p. 55.

These measures would involve a network of fisheries research and science stations that had begun to emerge in tandem with both the development of fishing capabilities and technologies and the development of nation state institutions dedicated to scientific inquiry. For the most part, these would revolve around American and European efforts including Russia. While Japan would become one of the three great Pacific fishing nations, its fishery science institutions would not emerge until later in the nineteenth century and after the defeat of the Russian Empire in 1905. Efforts in the United States had been hamstrung for many years by the failure of the constitution and founders of the nation to articulate a vision for science or research in their new nation which did not concern security or military capacity. The death of the eclectic British scientist James Smithson had in complicated circumstances left a legacy focused on the promotion of scientific knowledge which became the Smithsonian Institution. After much toing and froing about its budget, the Smithsonian found its first Curator as Spencer Baird in 1850.¹¹ Baird was tasked with the protection and development of the institution's collection in the face of much disinterest, and the complications of the American Civil War. Baird like Smithson himself was an eclectic scientist of multiple interests from herpetology, to ornithology, however he was also a committed ichthyologist. His love for the sea led Baird to holiday at Woods Hole, Massachusetts and he developed a real focus on maritime research, becoming more and more concerned about the impact of increasing levels of fishing on fish populations. In 1871, Baird was appointed the Director of the United States Fish Commission, tasked with maintaining stocks both in river systems and the seas surrounding America.¹²

Along with Woods Hole, the Fisheries Board for Scotland, the Scottish Association of Marine Science, a variety of French research institutes, the Norwegian fisheries researchers and the Prussian fisheries ministry began to build the institutional and scientific base from which much of the earliest systematic science was undertaken. These institutions were not only places of intellectual enquiry and theory but were very much practical organisations tasked with the development of methodologies through which fieldwork could be managed and expeditions organised. It was immediately obvious to all involved that very little was really known about the sea, that even less was known about the numbers of fish and virtually nothing known about the lifestyle of fish and the journeys taken by them and the geographic spread of particular populations. It was not even clear initially that there were even particular populations of fish and many, like Huxley saw fish as a gigantic, unquantifiable mass.¹³ These new research institutions and organisations needed to be able to begin the process of determining how many fish there were not just in all seas but in particular parts of seas. They would need to develop ways of knowing what the size range of those fish were, their ages and any differences on a yearly or seasonal basis. But to do so, they would need to develop

¹¹Rivinius and Youssef (1992).

¹²Smith (1994, p. 47).

¹³Ibid, p. 38.

processes for catching a useful proportion of those fish so as to meet the needs of the developing field of statistics. When it came to assessing the journeys or spread of fish even more practical concerns would have to be met. How, for example, does one mark a fish in such a way that it can be caught in one place, returned and then caught again in a different place, and that the fish is not hurt or disadvantaged in such a way that its behaviour or life cycle becomes artificially impacted and therefore the science is made void?

These methodologies became necessary across the globe as the nineteenth century progressed due to the developing fluctuations in fish species in a variety of different places. These included Cod around the Lofoten islands in Norway, whose numbers collapsed by some 50% towards the end of the century, Sardines off the coast of Brittany whose populations became highly erratic in the 1860s before disappearing entirely at the turn of the twentieth century, Herrings in the North Sea, the silver darlings completely vanishing from the fisheries of Cornwall and Sockeye Salmon in British Columbia.¹⁴ Previous assumptions appeared challenged by such economically impactful variations, and scientists and research institutions seeking to catch up with the new realities of their present.

While ingenious technologies had developed to better extract fish and other living creatures from the sea, including by the turn of the twentieth century explosive harpoons to capture whales, similarly interesting technologies would develop to ascertain the realities behind these numbers.¹⁵ These included extensive experimentation on the tagging of fish, and the place on the fish's body these tags would be placed, in order as previously suggested to track their movements.¹⁶ It would be quite possible to spend an entire book talking about these technologies, which is not what this author intends of course. In tandem with these developing material, technologies was a set of numerical and statistical practices to make better sense of what was actually been recovered by these technologies. The research institutions and scientists I have already mentioned in this chapter become key proponents and developers of this particular aspect of research. Just as it was the development of technology which initially impacted on fish populations and distributions, so it would be statistical methodologies which both sought to correct or mitigate for these impacts, and in fact later drive these impacts to their contemporary terrible conclusions and realities—the sort of realities which now face North Korea, and which, along with all other nations involved in fishing across the globe, it is partly responsible for.

John Cleghorn's assertion from 1854 of 'overfishing' which had served as the precursor to Lankester's later worries and one of the first moments of concern from scientific or intellectual communities, focused on the reduction of quality and quantity of catches of Herring.¹⁷ But given now the available technology and institutional capacity to ask questions of available fish in the sea, what numeric or

¹⁴Southward et al. (1988) and Smith (1994).

¹⁵Smith (1994, p. 77).

¹⁶Ibid.

¹⁷Ibid, p. 71.

statistical data might be sought? One of the key early concerns of fishermen had been numbers related to the size of fish they were catching. Smith terms this the ‘small plaice problem.’¹⁸ The fishermen of the east of England appeared concerned about the fact that they were, as technology developed catching quite a lot of small fish, and that being small such fish they must have been immature fish. Therefore, the fishermen were catching either fish that were too young to be of useful or saleable value, or the replacement for the generations of larger fish they had already been catching. But it was unclear how big fish should be, or how big they would have to be in order to not be classed as immature. To figure this out scientists would have to get a sense of the range of sizes of fish, a sense of the total population and some sense of the natural ages of fish and when they might stop being considered immature. Eventually through both analysis of both scales and gonads, scientists arrived at ways of assessing the age of fish and then by the 1890s Sidney Holt managed to collect extensive statistics from catches at Grimsby and Cleethorpes which allowed him to theorise both ‘trade limits’ and ‘biological limits’ for a number of fish species in the North Sea.¹⁹

With a sense of size, maritime scientists began to move on to consider the numbers at large in areas of sea, and the movements of fish populations in those seas, in tandem with knowledge of the age of the fish. Danish work from Petersen in the 1880s and 1890s and Norwegian work from Hjört in the last decade of the nineteenth century on Icelandic Cod populations show great variations in population across years, and extensive movement across the North Sea and Scandinavia’s Kattegat.²⁰ This developing numerical sense and data availability dovetailed with the developments in statistical theory that was moving on from simple averages into Gaussian distribution to calculations based on least squares. Frederick Heinke, later Director of the Royal Prussian Biological Station at Helgoland would use least square analysis to, intriguingly given his own ethnicity, develop a ‘racial theory’ of fishes.²¹ This added further complexity to the statistical analysis and the geographic distribution with its idea that these races of fish, even though mixed in the sea, would separate at spawning time to reside with their own kin, in a geographic location important and very much locally specific to them. Walter Garstang at the turn of the twentieth century working in Scotland’s Firth of Forth would complicate things statistically still further by developing theories following extensive experimental collections at sea by the Garland and other boats, of efficiency of catch based on an extrapolation of the size of a fish population and the capability of the boats in an area to catch those fish.²² In particular, this caused extreme problems politically for one of the most rapidly developing technologies in the fishing industry, trawling. It appeared, given all of the developing knowledge around fish

¹⁸Ibid, p. 72.

¹⁹Ibid, p. 75.

²⁰Ibid, p. 76.

²¹Ibid, p. 82.

²²Ibid, p. 98.

population size, their ages and sizes, their movements over time and spawning habits, trawling was fatally efficient to communities of fish. It was absolutely possible for fishing communities focused on trawling to produce an instability not only of catch but of populations of fish themselves.²³

Trawling in the North Sea and Northeast Atlantic was not new, but boat technology and capabilities had rapidly developed and increased still further with the invention of better and better engines. The historical research focused on this area gives a real sense of the vulnerability in both real and statistical terms of the populations of fish in these areas to these new technologies and practices. However, efficiency became very much a keyword for industrial fishing across the globe and any concerns from its earliest experimenters were forgotten in the rush to develop a planet-wide industry.²⁴ Extraordinarily just at the moment when populations and communities of fish became knowable through sampling and testing techniques rather than an unknowable indistinct mass, statistical development would render the residents of the sea abstract and diffuse once more. Statistical research designed to solve the issues of efficiency of boats inexplicably conceptualised fish populations in such a way that what was caught became termed the surplus population, simply by virtue of having been caught. This statistical analysis held that any population that was not caught, even though it was categorised as the core population, would become itself surplus once caught.²⁵ In a bizarre and counterintuitive echo of the 'small plaice problem,' statistical scientists held that in fact by removing big fish, who were known to be old, from the sea and therefore from the population, fishers could only ever help the smaller fish. After all the removal of larger fish necessarily meant more resources and space for smaller fish.²⁶ A strange notion of sustainability began to be articulated in the literature which crystallised around a statistical methodology known as Maximum Sustainable Yield.²⁷ This was the point at which it was safe, given the knowledge of potential for overfishing, for fishers to remove fish from the sea. The calculation of these statistics, however, was highly problematic, and at the end disastrous to the global populations of the oceans...yet it is first and foremost what modern, scientific and rational fishing is based on.²⁸

Maximum Sustainable Yield and more complex statistical analysis were developed throughout the first half of the twentieth century. Questions which such work sought to answer included the perennial concerns over potential overfishing, where, when and how appropriate levels of fish might be caught, if indeed there were such things as appropriate levels or inappropriate levels, what sought of fish to catch, which sorts of fish to avoid and since it was apparent that it was possible to tell the ages of fish, what age was it acceptable, for the remaining population to take

²³Ibid.

²⁴Ibid, p. 100.

²⁵Ibid, p. 109.

²⁶Ibid.

²⁷Finley (2011).

²⁸Smith (1994, p. 329).

fish at. All of these questions had been spurred by what appeared in the nineteenth century to be anomalies such as the ‘small place problem’ and unexplainable and unexplained fluctuations in catches and the occasional disappearance of once resilient and necessary populations. Given the development of technology and the agglomerations of capital and enterprise around that technology, the longer these issues remained unexplained the more expensive it was for those seeking an answer to them. Naturally, the technical solutions outlined a little in the previous section were complicated, though they were being overcome, the debates around them were long and passionate, though they too were being overcome. A sense of the impact of fishing and fishing development in various maritime geographies across the North Atlantic, the North Sea and the Baltic Sea was developing, as well as a greater handle on the nature of the fish populations of those waters. However, what was lacking was a way of viewing all of the impact and all of the data about the impact as a cohesive whole. As is common with much technological and scientific transformation, the opportunity unexpectedly was presented by the outcome of the most destructive and appalling war yet seen by Europe.

When what became known to Western Europeans as the First World War broke out on the 28 July 1914 the seas around Europe which had been an international hubbub of nations and their fishing enterprises quickly became the preserve of the various state’s militaries. While a great deal of agricultural land was lost to the war and much more food required by states committed to the fight than normal, German policies towards the United Kingdom and the rapid development of submarine and other naval technologies meant that it was virtually impossible for European fishing fleets to put to sea from 1914.²⁹ Thus, one of the most heavily exploited fishing areas on the planet was virtually left alone for some 5 years, the fish and sea life bothered only by the occasional submarine, depth charge and sinking cruiser or destroyer. In hindsight, it is a truly extraordinary moment in recent fishing history, Smith and others even describing it as ‘the Great Fishing Experiment.’³⁰ While no scientist could possibly have planned the exercise in this way (at least hopefully not), the virtually complete cessation of fishing in northern European waters competes with the outcome of the Pacific War and its resulting status quo for impact.³¹

Scientists and fishers were aghast in 1919 when fishing fleets again left port following the conflagration to find that fish populations which had been under severe pressure before 1914 had seemingly regenerated. It was not just the number of fish caught by the first boats at sea that astonished, but the size of the fish caught and the geographic spread of species. The fish were much larger than prior to the war, and populations which had retreated or found small niches to survive trawling, had spread out again across the seas.³² There was a size and population boom, which meant these fish, born between 1914 and 1919 were larger afterwards and

²⁹Ibid, p. 158.

³⁰Ibid.

³¹Ibid.

³²Ibid.

population diagrams included a bulge around them for many years to come.³³ Unlike any planned analysis, the unlikely experiment of the war drove home to many scientists and statisticians the power of fishing impact upon populations, and the propensity of fish themselves to recover given the chance. It would have of course been the time to set up a continent-sized network of fishing and sea reserves, but governments and fishing industries in 1919 were not in a listening mood and after many years of deprivation and poverty were keen to get out to sea and to haul in as much as possible.³⁴ Therefore, no matter how many scientists called for such measures and for further investigation into the impact of the European ocean's fallow period, they were not going to be given the chance. Statisticians though were intrigued by the potential for analysis of the data provided from the year or two after the war and bridging the gaps between the pre-war years.³⁵ How might it be possible to explain the seemingly rapid shifts in population and species spread in this great fishing experiment, what might they tell in statistical terms about those populations and their numerical relations with fishermen and their boats?

By this time, statisticians and fishing scientists had also moved on from simply the near or in shore waters of the North Sea, but instead were studying the populations of Icelandic Cod in the Northeast Atlantic and more particularly the impact of industrial fishing on whale populations.³⁶ When it came to whales, this research was first in the areas controlled by Norway. Later however as whaling expanded to become a virtually global industry with boats exploiting populations as far apart as the Barents Sea and the waters south of the Falkland Islands and South Georgia, these studies adopted a global outlook.³⁷ Whales it seemed had relatively small populations, complicated social patterns, very long lives and a tendency for their populations to be extremely heavily influenced by new fishing endeavours. They were almost model species in terms of responsiveness for scientific study. Johan Hjört, the Norwegian who had long been integral to the developing science of fisheries research, and who had published a landmark paper in 1914, just before the outbreak of hostilities, on the statistics behind the fluctuation in fish populations had found himself back at university (Cambridge), following his resignation from the role of Norwegian Director of Fisheries following a dispute over fishing cooperation with Germany during the war.³⁸ His previous work on population fluctuations in mind, Hjört became exposed to new work from Julian Huxley, Charles Elton and Raymond Pearl (an American statistician based at Johns Hopkins University in Washington DC), in the field of population dynamics.³⁹ Hjört considered this new work, with data focused on the population of bears and other

³³Ibid.

³⁴Ibid, p. 162.

³⁵Ibid, p. 30.

³⁶Ibid, p. 31.

³⁷Ibid, p. 37.

³⁸Smith (1994, p. 215).

³⁹Ibid, p. 216.

animals hunted by the Hudson Bay Company and analysed by Bjørn Helland.⁴⁰ Ultimately whales were extremely vulnerable to new endeavours. Examining past data from Norway and Iceland, it was clear that once a population had started being hunted catches would only ever decline to the point at which either the local whale group was extinct or was spread so sporadically it was uneconomic for a conventional whaling enterprise to continue.⁴¹ Research in the Pacific into the lifespan and population dynamics of Halibut, Herring in the North Sea and Cod in the Atlantic had gained a more detailed sense of the stratification of age groups and sizes within populations of fish.⁴² This research had also suggested that quite often for fishermen to get a better catch it would be better to let all the fish in the area simply live for another year; this way the increased size of this group of fish persisted for many years to come and was more profitable for fishermen.⁴³ Whales it seems grew very slowly and reproduced according to completely different metrics than fish. With the conventionally increased pressure of a whaling enterprise, local populations simply could not reproduce themselves and mitigate for the loss of population year to year and so would inevitably collapse.⁴⁴ Hjört thought however, building on Helland and other's work, that it might be possible to know the rates of population replenishment, size against age and the dispersal of populations locally and arrive at what he termed an 'optimum catch'.⁴⁵ This was a statistically knowable number of whales that might be caught by whalers and which would not result in the depletion of the population but work in tandem with whale's natural death rates to come to an equilibrium of sorts. Hjört also did suggest that it would be difficult for empirical evidence to be gained through testing for whaling and fishing grounds to prove his theory, but predictive work could be done that would help fishing grounds and local enterprises aim for a viable number.⁴⁶

Michael Graham, Director of the United Kingdom's Ministry for Agriculture, Fisheries and Food Fisheries Laboratory at Lowestoft between 1945 and 1958, was deeply involved in the work which Hjört had built on collecting the data on fishing and fishing capacity in the North Sea following the cessation in activity during the 1914–1918 war. He was deeply disappointed in the response of governments to the science which suggested the need for a reduction in catch and intensity in the European waters. He would later conclude that essentially the fish populations of the North Sea had been destroyed by efforts since 1918 and that as a body of water it was completely overfished.⁴⁷ He articulated this most famously in what has become known as his 'great law of fishing', published in its most succinct form as 'The Fish Gate' in 1943. 'The inherent weakness of all mechanized fishing is that

⁴⁰Ibid.

⁴¹Ibid, p. 217.

⁴²Ibid, p. 219.

⁴³Ibid, p. 221.

⁴⁴Ibid, p. 220.

⁴⁵Ibid.

⁴⁶Ibid.

⁴⁷Ibid, p. 230.

one day's trawling...continually becomes less profitable. The trouble starts right at the beginning of the fishery: the stock becomes reduced at once by what the fisherman takes; and the catch per net...starts to fall' (Graham, quoted in Smith 1994, p. 230).⁴⁸ Applying an adaptation of Hjört's work on optimum catch which was expressed using statistics mainly focused on the amount of fish taken out of the sea against a particular local population, Graham considered other key aspects.⁴⁹ In particular, these focused on the number and size of boats, the amount of fishing technology deployed and the size of nets, as well as the length of time and the number of days boats were out at sea. These were constructed statistically into measures of fishing intensity. It appeared that when one applied catch, impact and intensity onto the statistics, the very fact of beginning fishing creating a drop in catch.⁵⁰ This drop in catch was then responded to by greater levels of intensity and effort by fishermen, which itself facilitated ultimately greater drops in fish populations.⁵¹ While fishermen and fishing enterprises could mitigate for drops in catch and their profitability by increasing effort, intensity and time out at sea, they could not do so indefinitely. It appeared also that fishermen mitigated against declining catches by moving to a different area of the sea, then deploying exactly the same intensity of effort.⁵² Thus, it might appear that overall catch and profitability was maintained, without increased or impossible levels of effort, but in reality fishing enterprises would run out of sea and run out of fish. This was particularly true of whales and whaling, as it had been with seals and the Stellers' Sea Cow in the northern Pacific. Ultimately, fishing without limits and recognition of a restricted optimum would result in the complete collapse of a fishery and ultimately unemployment and bankruptcy for the humans involved.

Hjört and Graham's statistically grounded warnings have always sounded extremely salient and powerful to this author. However, they were ignored as the late 1920s and 1930s wore on, and it was only with the obvious collapse of fish resources in the North Sea that their analysis was considered seriously by governments, and then only moments before the outbreak of the second European war.⁵³ Graham was tasked with leading the main scientific research organisation focused on the sea, the International Council for the Exploration of the Sea (ICES), through the 1939–1945 war, with hope presumably that his ground-breaking work would be picked up after the conflagration. The notion of 'optimum catch' however was, following the war put to use in ways that Graham could perhaps not have envisaged.⁵⁴ So far I have told a very European side of this story, focused mainly on the North Sea and the Northeast Atlantic. Given that this book is primarily

⁴⁸Ibid.

⁴⁹Ibid.

⁵⁰Ibid.

⁵¹Ibid.

⁵²Ibid.

⁵³Ibid, p. 235.

⁵⁴Finley (2011).

concerned with the vibrant fishing matters of a nation in East Asia, addressing elements of the narrative on the Pacific would surely make sense. The pressure of scientific and statistical developments and their uncomfortable nexus with politics, business and free enterprise would come to bear on Graham and his colleagues after 1945, and these would have their root in the Pacific and connect to Asia.

Aside from whaling fishing in the Pacific, or at least deep-sea fishing, had been focused with the primary nations involved at the advent of industrial fishing, namely, Canada, the United States and Japan, on salmonids and species of tuna. These large fish were radically different in lifestyle, tuna being primarily a fish of the deep and warm seas, salmon what is known as anadromous in nature, migrating from their birthplaces up continental rivers to the deep sea and then back again as adults to the same spawning grounds from which they were born. Both tuna and salmon have complicated lives, long journeys to make and relatively low levels of population growth. In the early twentieth century, it was found in an extraordinary moment in British Columbia how impactful human development could be on seemingly unconnected salmon populations. Just as the United States had sought to do in settling its western reaches, Canada aimed to build railway lines that would span its continent. Crossing the rocky mountains in British Columbia to reach Canada's foremost Pacific port, Vancouver was essential and both the Canadian National Railway and Canadian Pacific Railway sought to use the valley created by the Fraser River to cut through the deep mountains and by 1911 both railways had reached the narrowest part of the river's canyon, building a double track all the way through.⁵⁵ Blasting the rock out to allow a functional embankment and then ballasting the tracks meant that there was a huge amount of stone and spoil in a tight space and much of that went directly into the river. Neither the railway nor the engineers tasked with building the railway considered that the waterway below their enterprise was perhaps the most important routes to spawn for Pacific Sockeye Salmon, and between 1911 and 1914 the river became almost entirely blocked, a rock slide in particular in 1914 completely altering the form and flow of the water.⁵⁶ Local residents and even company workers noticed quickly that the salmon found it virtually impossible to make their way through the raging waters and tight spaces. A huge collapse in the spawning and breeding numbers of Sockeye Salmon that year and in the years around it, meant that across the Pacific Sockeye numbers were dramatically down for some 17 years after that.⁵⁷ The normal pattern of large and small years for spawning amongst the salmon was disrupted and in many ways the population never recovered; this is despite an effort by the railway companies in 1915 to clear the blockage and the invention of 'fishways' and 'fishgates' to allow safe passage for migrating salmon in future years.⁵⁸

⁵⁵Ibid, p. 30.

⁵⁶Ibid, p. 31.

⁵⁷Ibid, p. 32.

⁵⁸Ibid, p. 31.

After the Hells Gate disaster (as it was known), it became very clear that the fish sought by fishermen in the Pacific and in the waters and rivers of the continental United States and Canada could be heavily impacted by human actions. This created a sense of possessive paternalism amongst the nations whose fishermen sought these fish, even while in the case of tuna they would develop new technologies which would allow them to harvest them much more thoroughly from the sea. The United States, Canada, Japan and Russia came to see the salmon in the Pacific as their fish, a feeling much amplified around Bristol Bay in Alaska, a bay which was a favourite ground of Sockeye Salmon and once under the control of Russia.⁵⁹ Since it had become clear from incidents like Hells Gate, that particular groups of migratory fish in the Pacific relied on physical terrains in specific countries to maintain their populations, those nations sought to essentially claim those populations of fish.⁶⁰ Just as in the North Sea it was difficult to solve the 'small plaice problem' and get a sense of the geographic spreads of fish populations and any human impacts upon them, it was a real problem essentially for Japan, Canada and the United States to get a sense of whose fish were both whose and where they were.⁶¹ It was easy in a sense to know a Canadian salmon when it was fighting its way back up the Fraser River, much harder when perhaps fish who would one day aim for that same river, might be found out towards the Aleutian Islands or even further across the ocean. Might it be possible to know where these different populations were when not heading home, did they mix with other national populations, would it even be possible to restrict other nations from accidentally or purposefully catching one's fish, even when they were a long way from 'home'. The United States and Canada in fact sought to set out to do just that with the foundation in 1937 of the International Pacific Salmon Fisheries Commission, later the Pacific Salmon Commission and after the war they would be joined by Japan and Russia in these efforts as part of the North Pacific Anadromous Fish Commission.⁶² These nations set out on a huge research exercise to map the spread and travel of salmon from either side of the Pacific, and eventually through not just statistics, but developments in the knowledge of fish biology and their parasites it became possible to determine that particular groups of salmon were indeed Canadian, Japanese, Russian or American (particular rivers had specific types of parasites and mineral markers in the fishes digestive systems).⁶³ This embedded a certain form of national politics into perhaps ephemeral or diffuse matters, namely, the journeys of fish, matters which became a great deal less diffuse following Japan's entry into conflict with the United States in 1941.

⁵⁹Finley (2011, p. 27).

⁶⁰Ibid, p. 39.

⁶¹Ibid.

⁶²North Pacific Anadromous Fisheries Commission (2018).

⁶³Sindermann (1983).

These Pacific facing nations now had, following the extensive research, a real geographical sense about where the ocean's communities of large and migrating fish were. As I suggested earlier, this did not exempt those fish from many of the same imperatives of extraction that beset fish from European waters. Even though it was now quite possible to know where fish originated, resided and moved as well as a good sense of the numbers of their populations, politics and geopolitics impacted the fish and other marine life of the Pacific again hugely. Political trends which had emerged early in the twentieth century in which nations surrounding the ocean exerted their sovereignty over the less tangible and concrete spaces of the water, influenced by colonial imperatives and concepts of statehood post-Westphalian settlement, would carve out dominions in the more unlikely and previously inaccessible places. It could be possible to read these trends back to 1838–1842 and the United States Exploration Expedition encouraged by President Jackson or the pressuring, harassment and eventual overthrow of the Kingdom of Hawaii in 1898 by the United States.⁶⁴ Americans were, of course, not the only nation involved in the Pacific, the United Kingdom had long enabled the colonisation and settlement of Australia and New Zealand, France and Germany were also deeply engaged in the Pacific islands. Imperial Germany, of course, fell foul of world politics following the 1914–1918 war and its extensive territories known as German New Guinea were divided among the victors by the new League of Nations.⁶⁵ While some of these divisions are familiar, such as Australia's trusteeship over Papua New Guinea, Japan's place in these divisions is perhaps less well known or remembered. Japan, of course, had become a nation with imperial ambitions following its conflict with Imperial Russia in 1904–1905 and its annexation of Korea between 1907 and 1910.⁶⁶ Prior to this, Japan had extended its interests beyond the home islands of the archipelago co-opting the Ryukyu Kingdom and Okinawa and then aiming its acquisitive gaze to the south incorporating the Bonin and Volcano Islands, part of the same chain which includes the Marianas Islands. Fishing, of course, had always been important to Japan, and the reader will have a sense of that maritime history from elsewhere in this book, and the fantastic work of Jakobina Arch, however it had primarily been around the home islands and focused on fish and whales passing by Japan.⁶⁷ The Bonin islands had presented Japan with an opportunity to engage in deep-sea fishing and trawling for the first time, and its acquisition of what are now the Marshall Islands, Palau and Micronesia presented Tokyo with enormous further opportunities. Aside from the efforts of the South Seas Development Company (Nan'yō Kōhatsu K.K. (南洋興発株式会社), often referred to as the Mantetsu of the south (referencing the South Manchurian Railway (南滿洲鐵道) responsible for colonisation efforts far to the north), to extract phosphate from the islands, plant and manage sugar cane plantations, Japanese fishing enterprises built an extensive

⁶⁴Devine (1977).

⁶⁵Burkman (2008).

⁶⁶Shin and Robinson (2001).

⁶⁷Arch (2018).

fishing infrastructure on islands such as Saipan.⁶⁸ Harbours were reconfigured and extended and a number of fish processing plants built. Japan would keep its southern mandate until the end of the 1941–1945 Pacific war.

The sudden attack on Pearl Harbour on 7 December 1941 not only brought the United States directly into conflict with the Japanese Empire, but also brought the extent of Tokyo's territory across the Pacific very much to the forefront of the American institutional mind. While the Guano Islands Act of 1856, the 1899 Tripartite Convention (which gave half of Samoa to the United States) and later efforts to lay telegraph and telephone cables across the Pacific and the needs of international airlines to have places for their flying boats and other aircraft to stop on flights across the ocean had meant that the United States had extended its interests and sovereignty in the ocean, the war fixed in its government mind that it was not simply its northern Pacific boundary between Alaska and Russia which might be problematic.⁶⁹ It would be necessary to prevent the disaster of 1941 and any other threat across the Pacific to the United States ever happening again. Japanese territories such as those of the South Sea Mandate, but also others including Midway, Guam, Henderson and Wake would be brought firmly under the sovereignty of the United States. The South Pacific Mandate was removed from Japan, becoming a United Nations Trust Territory with the United States as the mandate holder, which existed until 1994 (when Palau finally gained its independence).⁷⁰ Many of the islands integral to Japanese sovereignty such as the Bonin Islands, Okinawa and Iwo Jima were not returned to Japan on the final settlement with the Treaty of San Francisco in 1952, but held by the United States as militarily useful for a number of decades afterwards (Okinawa was not returned to Japanese control until 1972 and still hosts, very uncomfortably, extensive American military infrastructures).⁷¹

President Harry Truman (President between 1945 and 1953), responsible for the unwinding of the American war effort, and setting the course for the future of United States interests in the Pacific, is renowned for the difficult decisions made across the former field of conflict. Korean's were astonished in 1945 when the United States Army Military Government in Korea, for example, decided to utilise much of the Japanese imperial government personnel and infrastructure on the peninsula, rather than build up local Korean capabilities, essentially because the United States was concerned about the influence of communist agitators, and felt the Japanese had been effective administrators.⁷² Similarly while policy towards the Japanese government and its priorities after 1945 had initially been very harsh in tone, within 2 years American policy became more malleable and supportive of Tokyo, perhaps again influenced by the fear of communist success in Asia and

⁶⁸Brookfield (1971).

⁶⁹Iriye (1984).

⁷⁰Firth (1989).

⁷¹McCormack and Norimatsu (2018).

⁷²Seth (2016, p. 93).

requiring a functional and useful ally in the area to serve as a bulwark and a base for American force projection against both communist China and the Soviet Union in the future.⁷³ Truman it seems was profoundly concerned with extending the maritime sovereignty of the United States across the Pacific, not simply to support its military and diplomatic capacities, but also to create opportunities for American business and enterprise.⁷⁴ Quite contrary to this, Truman and the Supreme Commander of Allied Powers (SCAP) (which occupied and governed Japan until 1952), were also concerned that Japan should not be too expensive and costly to occupy and that it should be capable of servicing its own food supply and other material needs.⁷⁵ Thus, while American restrictions on Japanese fishing boats were quite severe in the initial months following surrender, by the end of 1945 SCAP gave Japanese boats opportunities to fish further offshore.⁷⁶ Within 18 months, SCAP was infuriating former war allies in Australia and New Zealand by allowing the Japanese whaling fleet to travel to access its former whaling grounds in Antarctic.⁷⁷ Carmel Finley describes the extraordinary policy shifts relating to tuna fishing and control in the Pacific, which had long been hugely important to the Californian fishing industry.⁷⁸ Former Japanese colonies such as those next to American Samoa and Guam became vitally important to the supply chain for maritime products in the Pacific, but rather than exclusively as sites of enterprise for American companies were declared duty free areas and this included Japanese companies.⁷⁹ Thus, Japanese-owned tuna fishers were allowed to land catches in American Samoa and ship their product to the American mainland free of tax or import charges. This put mainland American tuna canneries and other businesses at a distinct disadvantage and this aspect of the United States fishing industry followed its predecessor the sardine canning industry into decline and eventual extinction.⁸⁰ However, the policy served greater American aims by reducing the cost of fish products in the American food industry, securing notions of maritime sovereignty and control over the Pacific for the United States, underpinning the economic functionality and future of American colonial territories such as Samoa, and finally, integrating Japanese business and enterprise wider Japanese diplomatic interests into the post 1945 status quo.

These extraordinary themes of new colonial ambitions, America maritime dominance beyond America's western shores, and the integration of new modes and practices of capitalism and free enterprise following 1945 produced a malleable and flexible developmental landscape which as well as being underpinned and

⁷³Cha (2000).

⁷⁴Cowhey (1993).

⁷⁵Johnson (2000).

⁷⁶Supreme Commander for the Allied Powers (1946, p. 88).

⁷⁷Supreme Commander for the Allied Powers (1946, p. 68).

⁷⁸Finley (2017).

⁷⁹Ibid, p. 69.

⁸⁰Ibid, p. 74.

funded by this new geopolitical reality found itself energised and enabled by developing scientific and statistical models derived in part from the work of Hjört and Graham on the other side of the world.⁸¹ Graham's 'optimum catch' had developed following what Hjört and others referred to as the 'second great fishing experiment,' namely the European war of 1939–1945. While Hjört would not live long after the end of the war, Graham, now a vital figure in the infrastructure of fishing and maritime research, and other scientists such as H.R. Hulme continued working on a statistically minded and empirical approach which might counter the practices of overfishing, damaging to both fishers and fish populations alike.⁸² Graham's young protégé's Raymond Beverton and Sidney Holt ensconced at the United Kingdom Ministry of Agriculture, Fisheries and Food, Lowestoft Fisheries Laboratory, developed the theories of population dynamics as they pertained to fish.⁸³ These theories, first published in the journal *Nature* as 'Population Studies in Fisheries Biology' in 1947 (later reworked into 1957's book length *On the Dynamics of Exploited Fish Populations*), took into account both fluctuations in population, fishing effort projected onto or at them, and the carrying capacity of the environment itself to articulate what has been described as the 'steady-state yield'. This calculation was a twin of the analysis which produced notions of 'optimal yield'.⁸⁴

President Truman's declarations of 28 September 1945 extending United States claims over the sea bed and rights to fisheries in waters contiguous to it, made a dramatic impact on the geopolitics of the Pacific, however they also provided the opportunity for this geopolitics to become further enmeshed in science and to begin reconfiguring statistical methodologies for political goals. Just as Hjört and Graham drove forward development of the scientific basis behind fisheries research and were heavily involved in the creation and foundation of new institutions and places of empiricism, the United States was home to an academic who would become central to the research and management framework befitting the new needs of the expansionist nation.⁸⁵ Wilbert M. Chapman a scientist from Washington State who had extensive experience of working within the state and federal fishing agencies, was tasked after 1945 with building the practical institutions on the ground in the United States new Pacific mandates and new semi-colonies. Briefly Director of Fisheries at his alma-mater (and that of William Thompson who had done much of the research on Sockeye Salmon populations in the Pacific, directing the Pacific Salmon Commission and essentially a foil to the European scientists), the University of Washington in 1948, he was appointed to the State Department in Washington DC as an undersecretary for fisheries policy.⁸⁶ Within the State

⁸¹Finley (2011).

⁸²Smith (1994, p. 296).

⁸³Ibid, p. 310.

⁸⁴Ibid, p. 312.

⁸⁵Finley (2011, p. 55).

⁸⁶Ibid, p. 87.

Department, Chapman appears as a tireless organiser of the realities of US focus on the ocean, and very much at the behest of the close nexus between state power and business interest, as Carmel Finley recounts ‘Chapman and the Pacific Fisheries Congress had tirelessly lobbied to create the undersecretary position at the State Department...The fishing industry’s support had placed him within the State Department; now the industry had to get behind his policies’ (Finley 2011, p. 88).⁸⁷ Chapman is known for his energy directed at two principle elements of United States ocean policy, first the creation for multinational agencies to manage fishery and maritime resources, but which essentially placed scientific principle second behind geopolitical needs.⁸⁸ Second, he was famous for the rationale that lay behind the activity which the United States would apply in, on and under the high seas.⁸⁹

On the 16 January 1949, via a State Department Bulletin, Chapman articulated how fishing was to be undertaken in this new geopolitical and business world, including a graphic curve known as the Maximum Sustainable Yield curve in the document.⁹⁰ While the curve looked, and still looks classically scientific, there were absolutely no statistics given and no references listed in the bulletin.⁹¹ In fact, the mathematical formulae which underpinned the curve were not made accessible for another 5 years, however the curve was essentially used as scientific fact by the United States from the moment it was released. Contrary to the science and approach that the Europeans had been seeking, Chapman was articulating an extremely utilitarian view of fisheries and the seas in which methodologies derived from industrial management were applied to the sea. Fish and the other living things in the sea are, as crops in a field, products to be harvested. Just as one would not leave wheat grown in a field to fail and rot, so to leave any more fish than were strictly necessary in the sea was to waste them.⁹² Chapman even configured this message into one which fit a humanitarian frame: ‘So long as the resource is underfished there is room for more fishermen to fish and it would be morally as well as legally unjustifiable for a resource of the high seas to be fenced off and not fished to the full extent that is needed to produce the maximum sustained harvest from the resource’ (Chapman, in Finley 2011, p. 96).⁹³ Chapman’s concept included an assumption that fish populations would as Graham, Holt, Beverton and others had ascertained, fluctuate and fall, but that they would at some point recover and return to a useful or functional level.⁹⁴ Maximum Sustainable Yield held to the strange tautology that young fish are helped by the capture of old and large fish and the reduction in a population’s food requirements, because that leaves more food and

⁸⁷Ibid, p. 88.

⁸⁸Ibid.

⁸⁹Ibid.

⁹⁰Ibid, p. 94.

⁹¹Ibid.

⁹²Ibid.

⁹³Ibid, p. 96.

⁹⁴Ibid, p. 95.

resources for the young fish.⁹⁵ This is strictly counter to an earlier analysis done of Sockeye populations, which suggested that removing the large and old fish from a population or impacting on their ability to create more generations of young fish, means that there will in future simply be less fish of any size around.⁹⁶ One of the fundamental problems of modern fishing has been that fish are simply not allowed or left to get old or large, so notions of what is a large fish or what is an old fish begin to change and fishermen themselves begin to misread and misremember species potential for growth and length.⁹⁷

Maximum Sustainable Yield held that it was the impact of fishing and human effort according to Chapman's model that would stabilise populations; not going to sea or vigorously harvesting them would even result in less efficient, smaller, less useful stocks.⁹⁸ While the United States demarcated its own maritime territories, the policy of the State Department with Chapman at the helm was to internationalise everything else, to the extent that local governments could only exert control over coastal waters—international waters were free game for the practices and policies of Maximum Sustainable Yield, no matter where they were in the world.⁹⁹ The United States even pushed the idea in the face of considerable pressures from Latin American countries reacting against increased American tuna fishing and whaling in the oceanic commons. By 1955, the United Nations having been so concerned about these ructions across the globe called the International Technical Conference on the Conservation of the Living Resources of the Sea.¹⁰⁰ At this conference Chapman and his scientific colleague Schaefer, who had attempted to better theorise Maximum Sustainable Yield essentially defeated the arguments of the Europeans such as Graham and Holt, by appealing to the industrial and economic interests of their own countries.¹⁰¹ Disregarding aspects of the theory which might make overfishing worse or reduce catches, the Americans succeeded (supported unexpectedly throughout the conference by the Soviet Union, which was looking out for its own deep-sea interests across the globe), in maintaining the deep sea as a commons, though allowing for offshore economic zones, and in placing the concept of Maximum Sustainable Yield at the heart of the conference's conclusions, which were to form the bases for international law of the sea.¹⁰² Two of the conclusions of the conference are in this regard especially worth remembering:

'2. The immediate aim of conservation of living marine resources is to conduct fishing activities so as to increase, or at least maintain, the average sustainable yield of products in desirable form... 3. The principle objective of conservation of the

⁹⁵Ibid, p. 96.

⁹⁶Ibid.

⁹⁷Stokstad (2007).

⁹⁸Finley (2011, p. 95).

⁹⁹Ibid, p. 96.

¹⁰⁰Ibid, p. 134.

¹⁰¹Ibid, p. 146

¹⁰²Ibid, p. 148

living resources of the sea is to obtain the optimum sustainable yield so as to secure a maximum supply of food and other marine products...'¹⁰³ (International Technical Conference on the Conservation of the Living Resources of the Sea, Conclusions, quoted in Finley 2011, p. 148.)

The conference outcomes have with the benefit of hindsight been utterly disastrous for the world's oceans, and for fishing communities themselves. In geopolitical terms, the Rome Conference's framework would after a decade or so, collapse into the current status quo of EEZ's. Iceland's engagements with the United Kingdom between 1958 and 1976, known forever colloquially by the author's home country as 'the cod wars' (*Þorskastríðin* in Icelandic), were but among the first fractures in Chapman and the United States vision of a global fishing system open to American, British and Soviet exploitation and power with no limits on catch or effort.¹⁰⁴ Iceland was willing sacrifice its relations with the United Kingdom and even its membership of NATO in order to reclaim control of the 200 miles of sea from its coast.¹⁰⁵ The future of Iceland's fishing community is perhaps not an ideal example as the neoliberal experiment of the Kvoti has meant that control of rights and fishing territories has accumulated to only a few powerful enterprises there, and traditional fishing communities have been decimated, but in a sense this has been no worse than what befell the fishing communities of the United Kingdom such as Hull and Grimsby.¹⁰⁶ At the moment of final editing of this book in 2019, what remains of fishing communities in Great Britain are profoundly dedicated to the process of Brexit and whatever neoliberal energies and animal spirits can be unleashed by the free market and sovereignty over the nation's waters after the watery tyranny of the European Union. There is as much energy now to banish the foreigners boats and to reclaim the territorial waters of the United Kingdom as there must have been in the 1960s, 1970s and 1980s as country after country made the effort to reject the domination of their local seas by the industrial motherships of global fishing. However, there is just as much misguided thinking about how this will protect local fish populations now as there was then. European Union quotas have been complicated, sometimes irrational and when it comes to bycatch and discards as wasteful as many of the other institutional functions of neoliberal governmentality.¹⁰⁷ However unlike Chapman, Rome and the consensus surrounding Maximum Sustainable Yield, the Common Fisheries Policy of the EU cannot really be said to have demonstrably contributed institutionally to the collapse of world fishing resources. While it is true that the CFP certainly did not stop the decline or mitigate the impacts of industrial fishing, it has always held that fish

¹⁰³Ibid.

¹⁰⁴Ingimundarson (2003).

¹⁰⁵Ibid.

¹⁰⁶Eythórsson (1996).

¹⁰⁷Daw and Gray (2005).

stocks are finite, vulnerable and that catches and quotas must be carefully planned, including by subsidising fishing industries not to go fishing, but instead to not go fishing, be laid up and reduce both their fleet and days at sea.¹⁰⁸

3.3 Conclusion

In 2019, the most misguided of fishers look to a golden age essentially of limitless pillage. Maximum Sustainable Yield policies from the Rome conference asserted, as is common with much free-market or laissez faire thinking, that through the process of its own functioning, global fishing would produce an equilibrium in stocks, an equilibrium which was also to produce the maximum possible profit for global fishing enterprise. When fishing communities and corporations invested in their fleets and committed greater effort to the exercise of fishing, this would necessarily result in larger catches and increased profit. However, this increased effort would eventually impact on fish populations, which would mean less catch and less profit. Fishing effort would thus be reduced through a self-regulating principle and the fish population would naturally recover, at which point extra effort could be exerted again by fishers. This sounds fantastic and very simple on paper, as these things tend to do, however as Holt, Beverton and Graham made clear in the 1940s and 1950s, the scenario is hugely complicated by the fact that fishing people and the institutions of both fishing governance and private enterprise, are not entirely rational in scope. Fishing enterprises when encountering a reduced catch do not immediately reduce effort and allow stocks to recover, they have a tendency to push the envelope of both numbers and profitability in the hope that a bad season or a bad couple of seasons can be made up by better times in the future. Technology is also not taken wholly into account by the methodology. As fishing technologies and boats become more and more advanced, the effort used becomes more and more effective. The effort spent at sea by a group of fishers in their small beam trawler in the 1930s is nothing compared to the computer and GPS-controlled behemoths that cross the seas in our present.¹⁰⁹ Whatever effort modern fishing boats commit to the catch they will harvest a much greater percentage of the marine life present below it, than was possible in decades past. Geopolitical interests are also not taken into account, which is an interesting and bemusing fact given how geopolitically important fishing was to the United States and theoreticians such as Chapman who moulded the global fishing consensus of the 1950s. Given these interests, the line between profitability and unprofitability which is necessary for the proper function of the theory, because highly blurred. Governments and other interests are very concerned for more reasons than simple profit, for fishermen to keep working, for

¹⁰⁸Jensen (2002).

¹⁰⁹Robins et al. (1998).

the boats to still ply the seas, and thus extensive subsidies were deployed to make up the difference between profit and loss. This was, of course, a disaster to over-fished stocks, which rather than having a relief from fishing effort at moments of collapse or struggle were further subjected to heavy fishing by fishing boats for whom making a direct profit was no longer strictly necessary. Finally, as anyone familiar with free-market economics will attest to, setting a limit to price in market virtually guarantees all players in the market reach the limit. So it was in the world of Maximum Sustainable Yield. Rather than enterprises and fishing bodies attempting to fish down to limits, there was a real tendency to fish up to the limit, so that the absolute maximum stress point of fishing populations was almost necessarily reached...because otherwise what was left was a bigger surplus than strictly necessary and profit left unrealised.

Fishing up to the Maximum Sustainable Yield, the notion of fish and fish populations as surplus if not caught and the absurd ideas that catching the larger and older fish in the ocean helps the smaller fish has led to the decimation of the global oceans. The seas and fish we have today are profoundly different from those of the past, by the hands of mankind and through the scientific, statistical and rational lens of the ideas encountered by this chapter, the vibrant and lively spaces of both the sea and knowledge about the sea are to some degree much less lively than they have been. In 2019, the most lively and energetic aspect of fishing, is not fishing up to the Maximum Sustainable Yield, but fishing down the Trophic Level.¹¹⁰ Where once humans caught whales and tuna, now fishing enterprises are seeking to capture the profit in populations of Jellyfish, Urchin and even Krill.¹¹¹ Controversial efforts to extract krill from the Southern Ocean near South Georgia have already it seems led to issues of food supply and availability for seal and whale populations in this area, for example.¹¹² Maximum Sustainable Yield and the other theoretical frames discussed in this chapter are essentially vibrant matters by themselves, these bodies of knowledge and scientific development are certainly energetic, and as we have seen energetic for many of the wrong reasons. However, for the most part, these bodies of knowledge and both the practical infrastructures they inspire, and the global infrastructures of governance they enable have been rooted in capitalist principle. How might they be applied to different political structures and principles, North Korean principles for instance?

¹¹⁰Pauly et al. (1998).

¹¹¹Nicol et al. (2012).

¹¹²Forcada et al. (2012).

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Photo Section

Sorting Shrimp in Tong Shui Gou (通水沟), People's Republic of China, 20 March 2017—Photo credit: Robert Winstanley-Chesters

Sorting nets in Gageodo (가거도), South Korea, 18 June 2017—Photo credit: Robert Winstanley-Chesters

Suzan Pizza, Jinshitan (金石滩), People's Republic of China, 20 March 2017—Photo credit: Robert Winstanley-Chesters

Watching If You Are the One 缘来非诚勿扰 (Fei Cheng Wu Rao) in the Fisherman's cabin, Tong Shui Gou (通水沟), People's Republic of China, 20 March 2017—Photo credit: Robert Winstanley-Chesters

Boiling Seaweed in Yanchangxincun (盐场新村), People's Republic of China, 19 March 2017—Photo credit: Robert Winstanley-Chesters

Lüshun (旅顺), Port Arthur, People's Republic of China, 19 March 2017—Photo credit: Robert Winstanley-Chesters

End of the line for Dalian's old fishing harbour, Dalian, People's Republic of China, 17 March 2019—Photo credit: Robert Winstanley-Chesters

Watching at the summit of Doksilsan, Gageodo (가거도), South Korea, 18 June 2017—Photo credit: Robert Winstanley-Chesters

Building the last road in South Korea (가거도), Gageodo, South Korea, 18 June 2017—Photo credit: Robert Winstanley-Chesters

From Gageodo 2 boatlift, Gageodo (가거도), South Korea, 19 June 2017—Photo credit: Robert Winstanley-Chesters

Gageodo 3, 21 June 2017, Gageodo (가거도), South Korea—Photo credit: Robert Winstanley-Chesters

Stocking up for climate change, Gageodo (가거도), South Korea, 22 June 2017—Photo credit: Robert Winstanley-Chesters