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THIRTEEN

Beyond the North Atlantic

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Fisheries have long been conducted over a wide geographical range. European fishers first exploited the cod stocks that live off Newfoundland in the early sixteenth century (Innis 1940: 11-2), by which time Icelandic waters had been fished by the English for a century. International trade in fish products was also established at an early stage, with 'sack' ships carrying fish processed in Newfoundland to southern Europe from the late sixteenth century (Candow 2009: 403). Nevertheless, although fisheries were a component of the Atlantic economy in its formative stages, there was virtually no movement beyond the North Atlantic on the part of north European states. Further south, however, Spain and Portugal deployed a proportion of their fishing effort in the South Atlantic. From the early sixteenth century, Spanish vessels prosecuted a successful fishery for tuna (Carmona and López Losa 2009: 262), and during the eighteenth and nineteenth centuries the Spanish state supported attempts to find substitutes for salt cod, which included the salting of hake extracted from the waters off west Africa (López Losa 1999: 66). Even so, it was not until the second half of the twentieth century that fishers based in the North Atlantic region extended their fishing efforts to other seas and oceans on a significant scale.

This chapter examines such extra-regional activity in three stages. First, it identifies the reasons why expansion beyond the North Atlantic was limited before the second half of the twentieth century. An overview of the main developments in this business during the 1950-2010 period is presented in the second section, followed by a discussion of the reasons why expansion happened when and how it did. The main contention of the chapter is that the spatial extension of the North Atlantic fisheries after 1950 was driven by the rising global demand for food, and facilitated by organisational and technological changes in the catching and processing sectors of the business.

Fishing Beyond the North Atlantic before 1945

Before the Second World War the fishing effort of all of the countries bordering the North Atlantic was primarily expended in its waters. Much fishing was, as it still is, conducted near home, and distant-water fishing generally involved operations off the coasts of other North Atlantic states, and in northern waters. There were several reasons why this was so, of which technology was probably the most important. With the exception of distant-water fisheries at Iceland and Newfoundland, in which visiting fishers set up shore bases to process the catch, the distance from home at which fishing vessels could operate was limited by the need to return with the catch in a marketable condition. Sailing vessels were especially constrained, dependent as they are on favourable weather to make progress. British trawlers operating from the ports of the east coast were tied to the increasingly depleted North Sea until the development of a successful steam trawler enabled them to open up grounds further north during the 1890s. After this, their range was restricted by the limitations of fish preservation technology. No artificial refrigeration or freezing equipment existed, and fish packed in ice will remain fit for human consumption for no longer than about two weeks, restricting distant-water trawlers to trips of a maximum of three weeks (Robinson 1996: 104-5; Cutting 1955: 262; Robinson 2000: 214). This inability to preserve and process catches at sea limited fishers of all nations to waters relatively near home. Technological restrictions were sometimes heightened by government regulation. Spanish fishermen in the early eighteenth century had used the 'Bou' trawling system when working grounds in the South Atlantic, but this was prohibited in 1761, and catchers only regained the right to use it in the 1880s (López Losa 1999: 67-8).

As the example of Newfoundland shows, fishing far from home waters for sustained periods of time was possible, but only if the catch could be landed and processed close to the

fishing grounds. Had there been opportunities to market the catch near to the grounds, distant-water fresh fishing might have been viable, but at this time there were not. With the exception of the Newfoundland cod trade, fishers were very much tied to their domestic markets and there is little evidence that fresh fish was sold outside them to any appreciable extent. Fish was traded, of course, and on quite a large scale, but it was generally landed at or near the home port, processed and then sold on. The fish trades were complex and international in scope, but the starting point for most fish products lay in the home country of the catcher.

However, perhaps the most important, although the most prosaic, explanation for the lack of expansion beyond the North Atlantic prior to the mid-twentieth century is simply that there was no need. Although some demersal species in some areas began to show signs of overfishing before 1945, stocks in the North Atlantic region as a whole were not a cause of serious concern. New fishing grounds were opened up, but principally in the Arctic, with British trawlers beginning to exploit grounds around Bear Island and Spitsbergen in the 1920s (Tunstall 1962: 35). Meanwhile, the Icelandic grounds continued to provide a good living for British and German trawlers, attempts to limit their efforts between the wars being largely unsuccessful (Thór 1995: 107), and trawlers from many nations continued to exploit profitably the Newfoundland grounds (Hutchings and Myers 1995: 52). Pelagic fisheries all around the North Atlantic, too, showed little sign of depletion. Some, such as the North Sea herring fishery, stagnated in the interwar period, but this was due to difficult economic circumstances and the loss of key export markets in Russia after the Revolution rather than overfishing (Jenkins 1927: 123-7). Since the waters of the North Atlantic and its surrounding seas contained abundant stocks of the principal commercial species, the incentive to seek out new grounds elsewhere was limited. The nations of southern Europe – Spain, Portugal, Italy and, to a lesser extent, France – deployed a proportion of their fishing effort in the Mediterranean and in the south Atlantic, as they had done for centuries, but for most the North Atlantic area was sufficient. There was little need to take the risk of seeking out new grounds, in waters whose potential was not well appreciated, when longstanding grounds nearer home could provide a good living. All of this was to change, however, in the decades after the Second World War.

Expansion and Territorialisation since 1945

Poul Holm aptly remarks that 'the post-war years were characterised by worldwide operations and the ruthless exploitation of marine resources' (Holm 1998: 119). The North Atlantic and the Arctic remained key sources of fish, but the catching effort also expanded southwards, down the coasts of West Africa and South America, and into the Antarctic, as well as into the Pacific and Indian Oceans. Expansion was driven in large measure by the communist states of the 'Eastern Bloc,' which expended a great deal of money on expanding their distant-water fleets in the postwar era (Borgstrom 1961: 282-97; Fruczek et al 1961: 88-97), and to a lesser extent by European powers which exploited their existing and former colonial ties with West African states, and islands in the Indian Ocean, to access their waters (Alder and Sumaila 2004: 157). Spatial expansion continued steadily on an open-access basis until the 1970s, when concerns about the effects of unrestricted fishing provoked many coastal states into asserting control over the waters off their shores through the introduction of Exclusive Economic Zones (EEZs). The process of spatial expansion continued thereafter, but it was slowed down, and shaped increasingly by political and biological considerations.

For the nations of southern Europe, the fertile waters off northwest Africa are within easy reach, meaning that even relatively small and primitive vessels could exploit them. The northwest African coast had been exploited by the French since at least the fourteenth century, when fishers from Dieppe and Rouen began to work grounds off Senegal. In subsequent centuries French and Iberian fishers slowly extended their efforts down the west coast of the continent (Herubel 1912: 178). The fact that many present-day West African states were European colonies facilitated access. French catchers, for example, operated off the Ivory Coast, while Italian, Greek, French, Spanish and Portuguese vessels were all working in the area by the mid-twentieth century. Activity increased sharply from the 1960s, however, as fishers from the Eastern Bloc began to take an interest. Soviet factory trawlers

began to work African grounds after losing access to Argentine waters in 1967, and during the 1970s Poland made agreements with Senegal and Morocco to allow its vessels into their waters. Throughout the 1980s, Eastern Bloc states remained the largest catchers in the east and south Atlantic (Gelchu and Pauly 2007: 29; USNMFS 51(2): 55; 44(2): 23; 46(3): 92), accounting for 70-80 percent of landings from African waters (Alder and Sumaila 2004: 165), followed by those of southern Europe. The Portuguese fleet had expanded its activities in African waters in the 1950s and 1960s (Catanzano et al 1999: 11), and more than doubled its catch from the waters of Mauritania and Senegal between 1945 and 1960 (Coull 1972: 88). By the late 1970s, the fleet was regarded 'old, small and primitive' (USNMFS 44(1): 25-6), but it remained a significant presence. Overall, because no West African state, with the short-lived exception of Ghana, has developed an industrial fishing capability, and most have instead concentrated on developing their artisanal fishing industries, catches in African waters have been dominated by foreign distant-water fleets (Gelchu and Pauly 2007: 62). Although the distant-water fleets of the former Eastern Bloc largely ceased operations after the break-up of the USSR, European fishing effort in African waters, now conducted through EU Fisheries Partnership Agreements, remains considerable. In 2008, 154 bottom trawlers and 12 large pelagic trawlers were operating in African waters, of which the majority were Spanish (European Commission 2008: 4). European exploitation of African fishery resources has become increasingly controversial in the last decade (Clover 2004: 59).

In the mid-twentieth century, the Atlantic coast of Latin America represented an under-utilised and potentially rich source of fish, and as such it attracted the attention of the Eastern Bloc states. Soviet trawlers first experimented with trawling in Argentine waters in 1961, and the success of the early ventures led to a rapid expansion of the activity. The Argentine government, however, became concerned about the environmental impact and the implications for its own nascent fishing industry, and attempted to limit the catching effort via a licensing scheme. When this proved ineffective, it declared a 200-mile Exclusive Economic Zone in 1967, effectively expelling the interlopers. In response, Soviet catchers shifted their efforts northwards into Brazilian waters, until the Brazilian government, too, declared an EEZ. After this the catching effort shifted southwards again, into the Antarctic krill fishery. The South American EEZs did not cause a complete cessation of foreign fishing, the United States signing a bilateral agreement with Brazil in 1972 for experimental shrimp fishing, which proved successful and continued into the following decade (USNMFS 45(4-6): 1-3), but it did entail a dramatic cut in the catching effort. Argentine waters were re-opened to Soviet vessels in the early 1980s, however, as relations between the two states improved after the USSR gave discreet backing to Argentina in its territorial dispute with the United Kingdom, over the Falkland Islands (USNMFS 51(2): 55-68). Polish vessels, too, began to fish for squid in Argentine waters. Meanwhile, the 150-mile 'protection zone' that the United Kingdom maintained around the Falklands after recapturing them in 1982 represented an opportunity for European fishers, especially the Spanish, who by 1988 were prosecuting an extensive squid fishery, which compensated for declining catches in the northwest and eastern Atlantic (USNMFS 44(11): 27; 52(2): 40).

Another area of expansion for the Eastern Bloc states was the Pacific coast of South America, whose waters, enriched by the Humboldt Current, support a vast array of marine life. Here, Soviet activity increased markedly after the expulsion from Argentine waters, and by the 1980s Soviet and Polish vessels were both working in the Peruvian EEZ (USNMFS 51(1): 62; 44(2): 24; 51(2): 57). As with other Eastern Bloc distant-water fisheries, this activity declined sharply during the 1990s. The Pacific is still the setting for extensive multinational fisheries, however, including a proportion of the European Union's external fleet, principally Spanish, Portuguese and French long liners targeting swordfish (EC 2008: 5).

European catchers, both eastern and western, have also fished the Indian Ocean. France annexed the Kerguelen Islands in 1893. Exploitation of their waters by French fishermen commenced during the following decade, Herubel remarking in 1912 that the fishery was 'scarcely two years old' (Herubel 1912: 163), and became firmly established thereafter. The Kerguelen Islands remain a French territory, now surrounded by an EEZ, and

the scene of a substantial fishery targeting Patagonian Toothfish (Bez et al 2006: 532-42). Further north, French and Spanish vessels began to fish experimentally for tuna around the Seychelles in the early 1980s, and the initial success of the fishery attracted further participants. Within a few years there were approximately 50 French and Spanish vessels operating within the islands' EEZ, which had been declared in 1978 in an attempt to limit the depredations of Japanese, Taiwanese, Korean and Soviet catchers. Nevertheless, some limited fishing by Russian vessels continued under licence (USNMFS 52(2): 25-7). The Indian Ocean remains the second largest source of global tuna catches, with activity dominated by French and Spanish purse seiners (Garrett and Brown 2009: 21). French, Spanish and Portuguese long-liners are also present (European Commission 2008: 5). Piracy has become a major issue in recent years for fishers in the western Indian Ocean, and there have been several attacks on fishing vessels. Indeed, fishing in Somali waters has played some part in provoking a surge in piracy, as the political vacuum in the country and complete inability to enforce its EEZ have allowed foreign fishing vessels severely to deplete the grounds formerly worked by artisan fishers. Dumping of toxic waste has also occurred, to the further detriment of the ecosystem (Lennox 2008: 8; Gelchu and Pauly 2007: 65-6). Piracy was blamed in late 2009 for a significant decline in catches (McConnell 2010; *Guardian* 7 February 2010).

The decades after the Second World War thus witnessed a dramatic spatial expansion of the catching effort, but not all national fleets participated. The Canadian and USA fishing industries continued to operate mainly in the waters surrounding the continent of North America, which became their preserve with the establishment of their EEZs. On the other side of the Atlantic, the West German and British distant-water fleets largely focused on Iceland and the Arctic. As access to those fisheries was seriously circumscribed from the mid-1970s, the fishing effort switched back to European waters (Heidbrink 2010: 102-3; Robinson 1996: 246). In effect, many distant-water operators failed or declined to make the transition to globalised operations. Among those who did participate in the expanding catching effort, however, the leading national fleets were those of the Eastern Bloc, which deployed factory vessels to prey upon a wide variety of species in the search for cheap protein for the home market, and of France and Spain, whose fisheries generally targeted higher-value species, both for domestic consumption and international trade. Such broadening of the range of operations was encouraged by a range of incentives provided by states

Profits, Politics and Subsidies

The spatial expansion of the catching effort can be seen as the logical extension of a very deep-seated tendency in the fishing industry, as in many other areas of human activity: migration in search of profit. In the twentieth century, fishers with the ability to do so extended the range of their operations partly for the same reason as their forebears in the medieval and early modern periods made long and hazardous voyages to Iceland and Newfoundland: distant fishing grounds offered the chance of good catches and high profits, and sometimes the chance to exploit species that were not available nearer home. In the second half of the twentieth century, however, to the 'pull' of distant opportunities was added the 'push' of overfishing and declining yields on domestic grounds. Overfishing and the consequent depletion of marine resources have a long history (Roberts 2007: 373; Jackson et al 2001: 629-37), and one of the principal responses of catchers to declining yields has frequently been to seek out new grounds and new fisheries to enter (Iudicello, Weber and Wieland 1999: 39). This process gathered pace after 1945.

The waters around northwest Europe are some of the most productive in the world, but they are also bordered by densely populated and affluent states, and as such they have been subject to heavy fishing pressure for over a millennium. The North Sea, in particular, has been exhibiting signs of depletion of demersal species since the late nineteenth century (Garstang 1901: 21-9). Fish stocks in the less productive Mediterranean have also been severely overexploited (Lleonart and Maynou 2003: 1-13). Overfishing of European waters has certainly played some part in the increasing movement of European Union vessels into African waters. During the 1960s and 1970s, the expansion of the Italian trawler fleet, beyond a level which the Mediterranean could support, was based on the exploitation of grounds off

northwest Africa (Catanzano et al 1999: 11). During the 1980s, as noted above, declining catches off West Africa and in the northwest Atlantic encouraged a shift in the Spanish squid fishing effort towards the south Atlantic, in the Falkland Islands protection zone.

If the depletion of nearby stocks was a factor in the movement of some fishers into distant waters, the process was slowed and redirected from the late 1970s, with the establishment of EEZs on the part of many states seeking to forestall the same problem. The first EEZ had been declared by the USA in 1945, followed by Chile and Peru two years later (Jacobson and Reiser 2007: 157). However, it was Iceland's unilateral declaration of an EEZ in 1975, in an attempt to curtail foreign exploitation of its only natural resource, the cod stock, which started a 'domino effect', leading to a rapid territorialisation of large tracts of the world's oceans, including some of their most productive fishing grounds (Holm 1998: 120). Canada declared an EEZ in 1977, closing off much of the Grand Banks fishery, in which much of the distant-water catching efforts of several European nations, among them Spain, Portugal, Italy, Romania, Poland and the USSR, were engaged (Hutchings and Myers 1995: 85). Given that in the early 1970s the Grand Banks had accounted for a third of Portuguese and a quarter of Spanish catches, compared to a sixth from African waters (Coull 1972: 87), it is small wonder that the partial closure of this fishery sent trawlers from several nations searching for other grounds further south. The eastern seaboard of the United States offered some opportunities, but tightened quotas for visitors fishing in its EEZ during the 1980s prompted fishers to look further south still, until various Latin American states also declared EEZs in attempts to preserve their fishing grounds and build up their own, heavily export-orientated, fishing industries (USNMFS 46(3): 93; 45(7-9): 74; Reid 2001: 144; Gelchu and Pauly 2007: 50).

The proliferation of EEZs sometimes served to push fishing effort eastward, with the Italian government negotiating bilateral agreements in the Far East during the early 1980s to compensate for the loss of fishing grounds in the western Atlantic (USNMFS 45(4-6): 56). This may well have played some part in the growing deployment of European vessels in the Indian Ocean. African states' waters would also have been targeted, but many of them moved swiftly to establish their own EEZs. The Yaoundé Conclusions of June 1972, arising from a meeting of 16 governments, asserted that 'African states have equally the right to establish beyond the territorial sea, an economic zone over which they have exclusive jurisdiction' (Nandan 1987: 9). Accordingly, many coastal states declared EEZs in the next decade or so, among them Angola and Cameroon in 1974, South Africa in 1977, Mauritania and Nigeria in 1978, and Gabon in 1984 (http://www.seaaroundus.org/eez/). By the time the United Nations Convention on the Law of the Sea endorsed the authority of coastal states to control activities up to 200 miles from their shores, many of the most productive fishing grounds in Africa, as elsewhere, were already covered. As we have seen, however, many states were willing to grant access to their waters, albeit with conditions attached. An exception was Namibia, whose waters were open to all and heavily fished until independence from South Africa in 1990, after which it declared an EEZ and pursued a 'Namibianization' policy in relation to its fisheries, aiming to place foreign exploitation of its grounds within tight limits. This policy was a success and stocks recovered well (Alder and Sumaila 2004: 158; van Zyl 2002: 6-14; Mora et al 2009: 6). In many African states, however, the capacity for effective enforcement of EEZs is not present, and Illegal, Unreported and Unregulated (IUU) fishing in African waters is a major issue, one estimate suggesting that actual catches are 40 percent above reported levels (Mora et al 2009: 5-6; EC 2008: 8; Agnew et al 2009: 1-2). This has serious implications for the sustainability of commercial stocks and the health of the ecosystem as a whole.

The spatial expansion of the catching effort was, and is, facilitated by political support for catchers in many countries. This support has frequently been financial, but has also extended to political assistance with finding and accessing fishing grounds. Subsidies to fishers were not a significant factor before the Second World War, but they assumed great significance in subsequent decades. They have been used both to support unprofitable catchers and give them breathing space to restructure and re-equip, and to develop previously

small and/or backward catching sectors. The European Union has played the subsidy game assiduously, as Brown notes:

> EU fisheries subsidies were introduced in 1970 with the aim to support and encourage increased fish production, primarily by supporting investment in larger and more 'efficient' fleets, and adapting production and marketing conditions. The result was that engine power of the fishing fleets increased threefold between 1970 and 1987 and the industry became increasingly capital intensive and technologically productive (Brown 2006: 1)

During the 1980s, assistance was directed particularly towards Greece (which joined the EU in 1981), Spain and Portugal (1986), all of which were facing difficult economic circumstances as they made the transition to democracy and EU membership. Supporting primary production, fisheries included, was a political imperative (Coffey 2001: 8). However, all members of the EU received varying degrees of support, some estimates suggesting that subsidies to fishermen totalled $580,000,000 by 1990, although since many are indirect or hidden the actual level is difficult to gauge (Holm 1998: 120; Stone 1997: 515-8). Subsidies have tended to 'settle down', and have become politically extremely difficult to remove (Anyanova 2008: 151-2).

West European support for its fisheries, however, was dwarfed by that of the Eastern Bloc. During the 1950s, Soviet economists argued that protein from fish could be produced more cheaply than from meat. Accordingly, very large sums were invested in the latest catching and processing technology. By 1975, of 900 factory trawlers fishing worldwide, 400 were Russian. They were vessels of over 1,000 gross tons, capable of operating up to 8,000 miles from home and making trips of up to 18 months (Longhurst 2010: 136; Holm 1998: 119). The satellite states followed the Russian model: the German Democratic Republic possessed 50 factory trawlers by 1975, and activity also stepped up sharply in Poland and Romania (Longhurst 2010: 136; Fruczek et al 1961: 89-90; Solecki 1979: 97-123). The early deployment of these fleets was principally on the Grand Banks, but in subsequent decades their operations became global in scope, and they acquired a reputation for 'ruthless' exploitation of resources (USNMFS 50(2): 65). An FAO estimate in the early 1990s suggested that in the latter days of the USSR the fleet may have operated at a loss of $5-8 billion, a very imprecise figure but one that illustrates the sheer scale of the subsidy that the Eastern Bloc afforded its catchers. Inevitably, subsidies everywhere helped to increase catching capacity and maintain it at a level far greater than stocks could support (Safina 2007: 139). The Eastern Bloc distant-water fleets largely ceased to operate during the 1990s (Holm 1998: 120), but subsidised excess fishing capacity remains a serious issue.

Governments can subsidise fishing vessels, and they can also lend them support by negotiating or forcing access to fishing grounds. Again, this has a long history. The British government, for instance, helped the burgeoning distant-water catching sector to access Icelandic grounds around the turn of the twentieth century, culminating in the Anglo-Danish convention on fishery limits signed in 1901, which stood for another 50 or so years (Thór 1995: 46; Robinson 1996: 106-9). The need for states and supra-national organisations such as the EU to negotiate access to foreign coastal waters became much greater, however, as the process of territorialisation set in from the 1970s. As we have seen, fleets responded to the establishment of Exclusive Economic Zones partly by moving to where fishing was less regulated, or not regulated at all, and partly by negotiating what access to EEZs they could. They have also in some instances negotiated access to territorial waters, within 12 miles of coasts. The European Union began negotiating bilateral Fisheries Agreements (FAs) in the late 1970s, the first being concluded with Senegal in 1979. The number of agreements expanded rapidly in the 1980s, with the accession of Spain and Portugal to the EU and the ratification of UNCLOS, reaching 18 by 1990, the majority with developing countries bordering the Indian Ocean and eastern Atlantic. Most of these agreements allowed access to fishing grounds within EEZs, in return for monetary payments and various forms of aid, technical assistance to the indigenous catching sector and supplies to local markets

(Walmsley et al 2007: 5-6). Since 2003, the FAs have been replaced by Fisheries Partnership Agreements (FPAs), which aim to move beyond straightforward commercial agreements to a more participatory role in sustainable management of local fisheries (Walmsley et al 2007: 8-9), through enhanced monitoring and control of fishing effort, promotion of joint enterprises and transfer of technology, expertise and capital. FPAs have been criticised, however, on the grounds that they simply represent the EU exporting its excess fishing capacity to low-income states, which have little option but to jeopardise the long-term sustainability of their fisheries for short-term financial inducements. Another criticism is that the agreements are routinely broken because the capacity to enforce them is absent, and that FPAs, like the agreements they replace, amount to 'robbing the poor to feed the rich' (Clover 2004: 37-46; MRAG 2008: 2-3; Alder and Sumaila 2004: 171). Although sometimes couched in the strong language of the campaigning journalist, these criticisms are not without substance. There have also been direct, targeted interventions in support of particular fishing ventures, such as the controversial incident of the new £50 million *Atlantic Dawn* in the late 1990s, which the Irish government temporarily added to its merchant shipping register while it negotiated a deal to allow it onto the EU register, despite the fact that the Irish fleet was already well above its agreed level under fleet limitation agreements. Another vessel owned by the same concern was transferred to the Panamanian flag, despite the EU's stated commitment to discouraging 'flagging out'. *Atlantic Dawn* continued to fish in Mauritanian waters until 2005, when after a series of alleged infringements of its agreement and a coup d'etat in the country, it was forced to leave (Clover 2004: 123-7; *Sunday Business Post*, 19 February 2006; *The Times*, 5 July 2009). The incident illustrates the extent to which the European states, with the acquiescence of the EU, have been prepared to relax the rules to assist catchers.

Global Markets, Worldwide Operations

Fish has been an article of international and intercontinental trade for several centuries. Herring was a staple of trade around the North Sea in medieval times (Smylie 2006: 36; Dyson 1977: 43-8), and from the outset, European participants in the Newfoundland fishery shipped its products to markets in their home countries, to give but two examples. In the post-1945 period, however, there was a dramatic increase in the quantity and value of fish traded, in line with the general growth, or 'reglobalization' of world trade (Findlay and O'Rourke 2007: 505-6). Between 1950 and 1980 the proportion of landings entering international trade rose from 20 to 33 percent, and between 1980 and 1993 its value rose from $2.9 billion to nearly $40 billion (Iudicello, Weber and Wieland 1999: 14). Increasingly, the fish trade is a global business, its most visible (and currently controversial) aspect being the lucrative trade in highly sought-after, and increasingly endangered, bluefin tuna. In January 2010, a large individual was auctioned at Tokyo's Tsukiji fish market for a record $177,000 (*Boston Globe*, 6 January 2010). This latest in a long line of record breakers had been caught off northern Japan, but Tsukiji market receives supplies of bluefin by air from around the world, including Indonesia and the Mediterranean, where it is fattened after capture (Garrett and Brown 2009: 25). The bluefin trade receives a great deal of attention, especially because of the bluefin's threatened status, but less valuable tuna are also traded extensively, global trade in all species increasing from 425,000 tonnes in 1976 to 1,800,000 tons some 30 years later (Garrett and Brown 2009: 12). Tuna is, of course, of high value, but even marine creatures of much lower value are traded over long distances. Since the early 1980s, an international market in fish products has taken shape, with frozen fish blocks its basic currency unit (Holm 1998: 122; Coull 1972: 193-4). In 2009, shrimps accounted for 25 percent of fish and fish products imported into the EU, of which the largest share, 14 per cent, came from Ecuador; 13 percent came from India and 12 percent from Argentina, with smaller percentages coming from sources as diverse as Greenland and Madagascar (EC 2010).

However, the extent of global trade does not correlate with the globalisation of operations or the integration of foreign catchers into domestic markets. Globalisation of markets has proceeded more quickly than of production (Schmidt 2003: 2). Historically, as noted above, the majority of even distant-water catchers have supplied their domestic markets and landed fish at their home ports, or at least in their home countries. Fresh fish landings at

foreign quaysides have been relatively uncommon, partly because of lack of marketing opportunities and/or lack of knowledge of what foreign markets will take, and partly because much fishing effort is undertaken in response to domestic demand and is shaped by the needs of the domestic market. The British distant-water vessels working off Iceland, Greenland and in the Arctic invariably returned to their home ports on the Humber, and Spanish and Portuguese vessels working off Africa in the 1950s and 1960s ran their catches back to their home ports (Laevastu 1961: 29), as many still do. And, of course, the thinking behind factory freezer trawlers was that they would be able to make much longer trips than conventional fresh fish vessels, but still return to their home ports with their catches in saleable condition, which is precisely what the Soviet factory vessels did. While their endeavours were developed and financed principally to supply the domestic market (Borgstrom 1961: 302), the European distant-water fleet still places the bulk of its fish on the EU market (European Commission 2008: 6).

Nevertheless, landings at foreign ports have always happened to some extent, and perhaps increasingly since the 1950s. European vessels working off West Africa have long landed some of their catches there, one example being French vessels working off the Ivory Coast in the 1970s and early 1980s, which landed a proportion of their catches at Dakar and Abidjan, either for export or for processing by local firms (USNMFS 43(12): 23-4). This and similar arrangements involved agreements with local processors, which have become increasingly common. Present-day FPAs frequently include commitments to land at local markets. The FPA with Morocco from 2006 to 2010, for instance, mandated that 25 percent of pelagic and 50 percent of demersal catches must be landed locally, whilst that with the Cape Verde islands includes a €5 reduction in the licence fee per tonne of fish landed locally, with a further €5 cut if it is sold to local processors. Much of this is designed to support local processing industries, with the aim of helping the coastal state integrate into the global economy. Lower labour costs in less developed countries provide another incentive to land locally. Nevertheless, the results have been mixed. In Mauritania, proximity to EU ports and inadequate infrastructure have discouraged local landings, whereas the Seychelles derive significant foreign exchange revenues from processing industries supplied in part by foreign catchers. It should be noted that not all FPAs include stipulations on local landings, as those agreed with Guinea-Bissau and Mozambique exemplify (Walmsley et al 2007: 20, 49-52). Several European concerns have acquired interests in processors overseas: for instance, some French and Spanish tuna landings in the Seychelles are processed at a French-owned cannery (McConnell 2010). Meanwhile, as the distant-water catching sector in some countries has declined, former fishing ports have come to depend increasingly heavily on processing plants supplied with imported fish. Grimsby, once the largest whitefish port in Britain, now possessed of a negligible catching sector but extensive fish processing industries, is a classic example (Holm 2000: 241; Reid 2003: 134-5). Further south, tuna canneries in Italy, Spain and France largely draw in supplies from Africa (Garrett and Brown 2009: 28).

Another, also controversial, aspect of the globalisation of catching is the flagging out of fishing vessels to Flag of Convenience (FOC) registries, mentioned above in relation to the *Atlantic Dawn* episode. Flagging out need not imply that a vessel is unseaworthy or engaged in Illegal, Unreported and Unregulated (IUU) fishing, but suspicions are sometimes raised, and not without some justification. Flagging out does impair traceability, since many vessels are owned by shell companies whose links with the actual owners are deliberately opaque. It also enables a national fleet to be considerably larger than it appears on paper. Among North Atlantic fishing nations, Spain was estimated in 2005 to have 41 vessels flagged out, half the EU total, mainly to Panama, Sierra Leone, Honduras and Netherlands Antilles. Many are thought to be working, or have worked, in the Indian Ocean fisheries, but some vessels owned in Spain and operating under FOCs have been implicated in IUU activity in the lucrative Patagonian toothfish fishery in the Southern Ocean (Gianni and Simpson 2009: 15, 23-7, Annex 1). Some, too, have featured on the Commission for the Conservation of Antarctic Marine Living Resources' lists of vessels fishing illegally in the Antarctic region (CCAMLR 2003-9).

The globalisation of the fish trades, and to a lesser extent the catching sector, have had profound effects on the fishing industry in the North Atlantic region and around the world. Global markets for fish and its products have become increasingly integrated, trade has grown dramatically and the range of the catching effort has widened. In part, this has been a demand-led transformation. Fish remains a very popular foodstuff in many parts of the globe, and in the developed world consumption has increased as health-conscious consumers have come to view it as a palatable and low-fat alternative to meat (Holm 2000: 239), and as methods of marketing it have changed (ter Brugge 2006: 122-35; Heidbrink 2006: 144-52; Schmidt 2003: 4). Some governments have aided the process, especially in the Eastern Bloc, seeing in the creatures of the sea a resource of cheap protein for their populations. There has, however, also been a revolution on the supply side of the business.

The Technology of Catching and Processing

Technology has long enabled catchers to work further from home. European participation in northwest Atlantic fisheries would have been impossible without the development of the ocean-going sailing ship in the fifteenth century. In the nineteenth and twentieth centuries, steam power extended catchers' range again. Steam trawlers allowed Spanish fishermen to expand their activities in the eastern central Atlantic before the First World War, and then to move further south still in the 1920s (López Losa 1999: 73-4). Before 1945, however, much of this increased capability was deployed in the north Atlantic and Arctic, around Iceland, Spitsbergen, Greenland and off the Grand Banks. After the Second World War, overfishing, territorialisation and the lure of lucrative grounds elsewhere encouraged movement out of the area, which was facilitated by another step-change in the technology of catching.

The exigencies of war had encouraged rapid technological development in various fields, and in the postwar decades some of the resulting innovations were directed to civilian ends. The classic case in point is electronics. Sonar, or Asdic as it was initially known, had greatly aided the Allied powers in hunting down submarines preying on the Atlantic convoys. With further development it proved equally adept at identifying fish (Safina 2007: 137). Such fish-finding systems, which have become highly sophisticated, have been a decisive factor in tipping the balance of advantage away from the prey in favour of the predator. Innovations in other areas have been no less significant. Freezing catches at sea had been tried between the wars with limited success, but the development of vertical-plate freezing equipment in the 1950s finally made it viable, vastly extending the range of operations (Cutting 1955: 300-4). A linked development, in part borrowed from the whaling industry, was the stern trawler. Although costly and initially problematic, the stern trawler was safer and more comfortable than the traditional side trawler, and could also be built much larger, allowing the true 'floating factory' to emerge (Robinson 2000: 215; Jenkins 1967: 103-7), a development taken up with particular enthusiasm by the Eastern Bloc states, some of which also built specialised 'mother ships' to service and extend the range of fleets of more conventional fishing craft (Hardy 1961: 58-9). The development of the purse seine and the mid-water trawl has greatly increased the catching power of vessels targeting pelagic species (Coull 1972: 69). There have also been less spectacular and more incremental, but still important, changes in fishing gear itself. The development of synthetic fibres such as nylon and terylene in the 1950s and 1960s, far stronger than the natural fibres previously used, has allowed much larger nets to be deployed, whilst the increasing power and efficiency of the diesel engine and the development of the power block has enabled them to be handled effectively (Burgess 1961: 65; Garcia and Grainger 2005: 30). In the last few decades, fishing for demersal species beyond continental shelves has become possible, with catchers working on the high seas, to which access remains unrestricted, and sometimes exploiting species whose biology is poorly understood and whose abundance might be jeopardised before any protective action can be taken (Gianni and Simpson 2009: 9).

Ashore, longstanding means of preserving fish such as drying, salting and canning have been supplemented or supplanted by freezing. This has facilitated the rise of the large processing firm, such as Bird's Eye in Britain. Modern processors buy fish on the international market and turn it into easily prepared, branded products sold largely through

chains, whose growing dominance of food retailing has been another feature of the postwar economy (Holm 2000: 241; Wilcox 2006: 70; Oddy 2003: 173-83). There has also been a vast increase in the quantity of fish, principally small pelagics, taken for processing into fishmeal, one example being the Peruvian anchoveta fishery prior to its collapse in the early 1970s (Gelchu and Pauly 2007: 50). Less directly, the rise of air transport, consequent upon the development of the jet aeroplane, has cheapened and quickened long-distance transport. Without it, intercontinental trade in fresh fish would have been largely impossible. Aeroplanes are also used as 'spotters' to direct catchers, especially in the bluefin tuna fishery. Finally, much of this has been enabled by changes in the financing of the industry. Fishing has, in Europe, been financed primarily through ploughed-back profits, the nineteenth-century expansion of the British sailing smack fishery, for instance, proceeding on this basis. The development of capital-intensive steam trawlers made this self-financing structure unviable and banks took a greater role in financing new construction in Britain and elsewhere (Herubel 1912: 298). A not dissimilar process has happened across a much wider range of countries and fishing sectors during the twentieth century, with finance from outside the industry being directed to the construction of larger and more capital-intensive vessels (Cottrell 2002: 235-9). Much of this comes from the private sector within the catcher's own country, and many states restrict foreign direct investment in fishing ventures (OECD 2003: 299-307; Wright 1997: 728), but much also comes from the subsidies to the catching sector discussed above.

This clutch of technological developments, aided by changes in the industry's financing systems, the political imperatives that lead governments to subsidise their catching sectors and the general economic globalisation of the late twentieth century have facilitated the spatial expansion of fishing all around the world, and the countries bordering the North Atlantic have been affected as much as anywhere.

Conclusion

Since 1945, the relative importance of the fishing grounds of the North Atlantic and its surrounding seas has declined, while those elsewhere in the world have assumed much greater prominence. The operational range of catchers from the North Atlantic region, and indeed other parts of the developed world, has widened greatly, and with it the distances over which fish and its products are transported to their eventual points of consumption. This has, in large measure, been a transformation instigated and sustained by demand for fish as food, especially in the developed world. It has been facilitated by great changes on the catching side, organisational and technological, that have enabled vessels owned in one country to operate in another, land fish in a third, from where it is transported elsewhere for processing and consumption. Fishing, despite the artisan image it retains in many places, is a global business. It is also one that is attracting growing public attention, through the increasingly urgent warnings on the part of scientists that current levels of fishing effort cannot possibly be sustained (Worm et al 2006), aided by various writers, journalists and campaigners (Ellis 2003; Clover 2004; Roberts 2007; Grescoe 2008). Aside from the excessive catching capacity of the global fishing fleet, especially in the developed world, they point to the damage done to marine ecosystems, the complex problems of IUU fishing and how to suppress it, the potential impacts of climate change and ocean acidification, and the influence of the global fish market on food security in some of the world's poorest countries. The fishing industry has changed greatly since 1950: there is no doubt that it will do so again, indeed that it will have to do so, in the coming decades.

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