International Fishery Management: Pre-200 Mile Limits

This section describes the historical development of fishery management in the North Atlantic during the international commission phase prior to 1977. The modern role of international commissions is described later. After a brief historical overview, the present section describes, for the Northeast and Northwest Atlantic commissions, their authorities, organization and scope, the regulatory actions taken and the measures adopted to achieve compliance with these. Resource trends are not described here but chapters below provide illustrations of these from 1960 (where data allowed) for stocks of the primary species associated with each post-1976 jurisdictional zone.

The term "Contracting Parties" is used here to describe those parties that are bound by the terms of a particular international convention (treaty) which establishes an international commission. The use of this general term avoids the need to distinguish between nation states (countries) and other possible members such as groups of states, the EU being a prime example. Although there are a number of legal terms to describe the procedure by which a party signifies its agreement to be bound by a treaty, ratification and accession being the most common in the case of North Atlantic fishery conventions, this is of no practical significance to this study with respect to their rights and obligations under these conventions.

Historical Overview

The first step toward international management of fisheries was the development of a scientific basis for management actions. The inaugural meeting of the International Council for the Exploration of the Sea (ICES) was held in 1902, and concern about the effects of fishing on fish stocks was a primary motivation for its establishment (Went, 1972). The functions of ICES, however, were (and remain) to promote and encourage marine research related to living resources, develop and organize relevant cooperative research programs involving its member countries, and publish or otherwise disseminate the results of research conducted under its auspices. Thus ICES is exclusively a scientific organization and carries no regulatory authority. The original eight members of ICES (Denmark, Finland, Germany, The Netherlands, Norway, Russia, Sweden, United Kingdom (UK)) were northern European states, and early scientific interest concerned adjacent waters. Western North Atlantic states decided to form their own fishery science organization after the First World War. The North American Council on Fishery Investigations was established in 1920, with a membership consisting of Canada, Newfoundland (which had yet to join Canada), and the United States of America (USA) (NACFI, 1932). France joined in 1922. This too was purely a scientific organization but, like ICES, could advise the governments of member states on the technical basis for regulatory actions.

The results of ICES research were first used in support of international conservation actions with the conclusion of the Baltic Convention in 1929, which provided for protection of European plaice and flounder stocks in the Baltic Sea through area and seasonal fishery closures, minimum fish size limits, and requirements to return small fish to the sea. A second international convention in 1932 provided protection of European plaice in the Skagerrak, Kattegat and Sound, again using fish size limits. However, these conventions were of limited scope with regard to species, area and participating states (Tomasevich, 1971). A general convention concluded in 1937 in London, UK, by 10 northern European states, was titled the "International Convention for the Regulation of the Meshes of Fishing Nets and the Size Limits of Fish". It applied from the equator north and from 80°E to 80°W longitude, and minimum mesh and fish size restrictions were specified for most of the important species fished. The 1937 Convention did not legally come into force and was overtaken by the Second World War. Nonetheless, this convention was an important milestone in the development of international regulation of fisheries. The types of regulation proposed were, however, not new as similar regulations were already embodied in various national regulations. Indeed, mesh size and minimum fish size restrictions already had a long history; incorporation into English regulations occurred as early as the 1500s (Burd, 1986).

In anticipation of the end of the Second World War, another conference was convened in London in 1943 to draw up a draft convention for regulation of North Atlantic fisheries. This draft was intended to serve as a basis for a further conference after the war which would conclude a final convention. Unlike the 1937 conference, North American states also participated, although the USA only as an observer. Despite full participation, Canada shared USA doubts that North American interests would be well served by a North Atlantic-wide convention dominated by European states. The meeting was successful in concluding the "Draft Convention relating to the Policing of Fisheries and Measures

for the Protection of Immature Fish". Despite North American reservations it applied to the whole North Atlantic, north of the Tropic of Cancer (23°27'N). Conservation regulations were essentially the same minimum mesh and fish sizes contained in the 1937 Convention.

The follow-up conference after the war was indeed held, again in London, in 1946, and by this stage it was clear that separate solutions to conservation issues in the eastern and western North Atlantic were preferred. The 1946 conference concerned only the eastern North Atlantic east of 42°W and north of 49°N (but excluding the Baltic Sea and Belts). The conference successfully concluded the "Convention for the Regulation of the Meshes of Fishing Nets and the Size Limits of Fish". Similarity to the 1937 Convention extended beyond its title to the measures proposed for minimum mesh sizes and fish sizes, although the minimum levels were set rather higher in some cases. During the conference the UK had pointed out that these measures would not in themselves solve the overfishing problem and proposed a reduction in the total tonnage of the fishing fleets. This, and various alternative measures proposed by other delegations, did not prove acceptable but the Convention provided for creation of a Permanent Commission to consider extensions or alterations to the Convention's provisions. It was seven years before the Convention came into effect and the first meeting of the Permanent Commission was not held until 1953. A number of changes were made to mesh and fish size regulations by the Permanent Commission but no new approaches were adopted to deal with conservation issues.

Dissatisfaction with the limitations of the 1946 Convention resulted in yet another conference being held in London in 1959. The resulting "North-East Atlantic Fisheries Convention", when it entered into force in 1963, established the North-East Atlantic Fisheries Commission (NEAFC) as a successor to the Permanent Commission. Extensions of fisheries jurisdiction in 1977 greatly reduced the relevance of NEAFC and precipitated the withdrawal of many members. A new NEAFC Convention, with provisions appropriate to the new political circumstances, was agreed to and came into effect in 1982. The regulatory authorities and actions of the Permanent Commission and the original NEAFC are discussed below.

The western boundary of NEAFC at 42°W remained the same as that in the 1946 Convention. The southern boundary was extended to the Straits of Gibraltar at 36°N. Again, the Baltic Sea and Belts were excluded. States adjacent to the Baltic recognized the need for cooperation in conservation actions by concluding the "Convention on Fishing and Conservation of the Living Resources in the Baltic Sea and the Belts" in 1973 which established the International Baltic Sea Fishery Commission. The regulatory scope of the Baltic Sea commission was wide, including regulation of gear and catching methods, fish size limits, closed areas and seasons, regulation of total catches and amount of fishing effort and their allocation between states and, indeed, "any other measures related to the conservation and rational exploitation of the living marine resources". The Convention applied to waters within national jurisdiction as well as international waters and thus its provisions remained relevant after extensions of jurisdiction. As mentioned in the Introduction, the management of Baltic Sea stocks is not discussed further in this paper.

In the western North Atlantic, meanwhile, action was also taken to establish a regional fisheries commission. At the invitation of the USA, a conference was called in Washington, D.C., in 1949. This resulted in formulation of the "International Convention for the Northwest Atlantic Fisheries", which came into force in 1950. This convention established the International Commission for the Northwest Atlantic Fisheries (ICNAF), and applied to an area the eastern boundary of which was 42°W coincident with the western boundary of the 1946 Convention area and, subsequently, with that of NEAFC. Its southern boundary was at 39°N. This brought all the major international fisheries in the North Atlantic under the regulatory authority of one or other of the fisheries commissions. As was the case with NEAFC, extensions of fisheries jurisdictions in 1977 made inappropriate the provisions of the ICNAF Convention. A new international agreement, the "Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries", was concluded in Ottawa, Canada, in 1978 and ratified in time to come into effect on 1 January 1979. This Convention provided for creation of the Northwest Atlantic Fisheries Organization (NAFO) which, after a transition year, replaced ICNAF. The regulatory authorities and actions of ICNAF are discussed below.

The role of ICES in provision of scientific advice on conservation of eastern North Atlantic fish stocks became entrenched by inclusion in the 1946 Convention of a requirement for the Permanent Commission to consult ICES. This provision was perpetuated in the 1959 Convention establishing NEAFC and this paved the way for ICES to become the authoritative scientific voice regarding fishery management in the eastern North Atlantic. In contrast, the North American Council on Fishery Investigations became defunct with the outbreak of

the Second World War. The scope of ICES interest extended to the western North Atlantic but, when the ICNAF Convention was formulated in 1949, neither Canada nor the USA were members of ICES and were of an independent state of mind. It was decided that ICNAF itself would be responsible for ensuring that appropriate scientific advice was available in support of its regulatory functions in the western North Atlantic, primarily by coordinating the work of national research agencies of member states. ICNAF established a Standing Committee on Research and Statistics (STACRES) for this purpose. The subsequent NAFO Convention explicitly established a Scientific Council with broad responsibilities for promoting international cooperation in fisheries science and for provision of advice both to the NAFO Fisheries Commission and to coastal states. The scope of the NAFO Scientific Council with regard to fisheries research is thus comparable to that of ICES, although the NAFO Scientific Council, unlike ICES, does not enjoy the automony of its own separate international Convention, being subordinate to the NAFO General Council, and operates on a much smaller scale than ICES.

The entire North Atlantic was subdivided into fishing areas (Fig. 1), initially for statistical purposes, by ICES in the northeast and by ICNAF's STACRES in the northwest (Halliday and Pinhorn, 1990; ICES, MS 1982). These statistical units were subsequently used to define management areas when catch controls were introduced by the international commissions, and continue to be used for this purpose by both domestic and international agencies with only minor modifications.

The Permanent Commission and North-East Atlantic Fisheries Commission (NEAFC)

Authority, Organization and Scope. The 1946 "Convention for the Regulation of the Meshes of Fishing Nets and the Size Limits of Fish" did not in itself specify any conservation or other objectives to be obtained through the Convention. The Permanent Commission established under the Convention was charged simply with consideration of whether the provisions of the Convention should be extended or altered. It is clear, however, from the Final Act of the conference which agreed upon this Convention that the purpose was to solve the problems caused by overfishing. The Convention Area extended from the northwest coast of France (48°N) northwards and including the east coast of Greenland (to 42°W) in the west and the western Barents Sea (to 32°E) in the east (Fig. 2).

Contracting Parties were required to give effect to any recommendations for changes in the Convention if these received unanimous approval in the Permanent Commission. There was an immediate challenge by some Contracting Parties to the scope of the Commission's powers based on the legal viewpoint that any recommendations of the Commission could concern only mesh sizes and size limits of fish. This greatly restricted the scope for conservation actions and caused steps to be taken immediately to initiate work on a replacement Convention. However, although the limitations of the Permanent Commission were recognized during its first meetings in 1953, it took until 1959 to agree on a new Convention and it was 1963 before NEAFC came into force.

The North-East Atlantic Fisheries Convention did specify its objective as being "to ensure the conservation of the fish stocks and the rational exploitation of the fisheries of the North-East Atlantic Ocean and adjacent waters". The Convention Area extended north from the southern tip of Spain (36°N). The western boundary was the same as that of the Permanent Commission but the eastern boundary was at 51°E and thus included virtually all of the Barents Sea (Fig. 2). Contracting Parties were required to apply the provisions of the Convention and the Commission's recommendations within their own territorial waters. The Convention Area was divided into three regions. Region 1 encompassed northern waters off eastern Greenland, Iceland, Faroe Islands, northern Norway and the Barents Sea, Region 2 was the North Sea and west of the British Isles, and Region 3 was the waters of the Bay of Biscay and off the Atlantic coasts of Spain and Portugal (Fig. 2). Headquarters of the Commission was specified as London, UK.

The Commission was organized on the basis of committees, one for each of the three geographical regions defined in the Convention. Contracting Parties had the right of representation on a Regional Committee if they had a coastline adjacent to that region or exploited regional fisheries. Contracting Parties which exploited elsewhere a stock which was also exploited in that region could also be represented. The regional committees performed the duties of the Commission with regard to their region and made draft recommendations to the Commission as a whole. The Commission could, however, modify the recommendations of regional committees before forwarding those for action by Contracting Party governments. The Commission could make recommendations on the basis of a two-thirds majority of delegations present and voting.

It was the responsibility of the government of a Contracting Party to establish domestic regulations implementing the Commission's recommendations by the date established by the Commission.

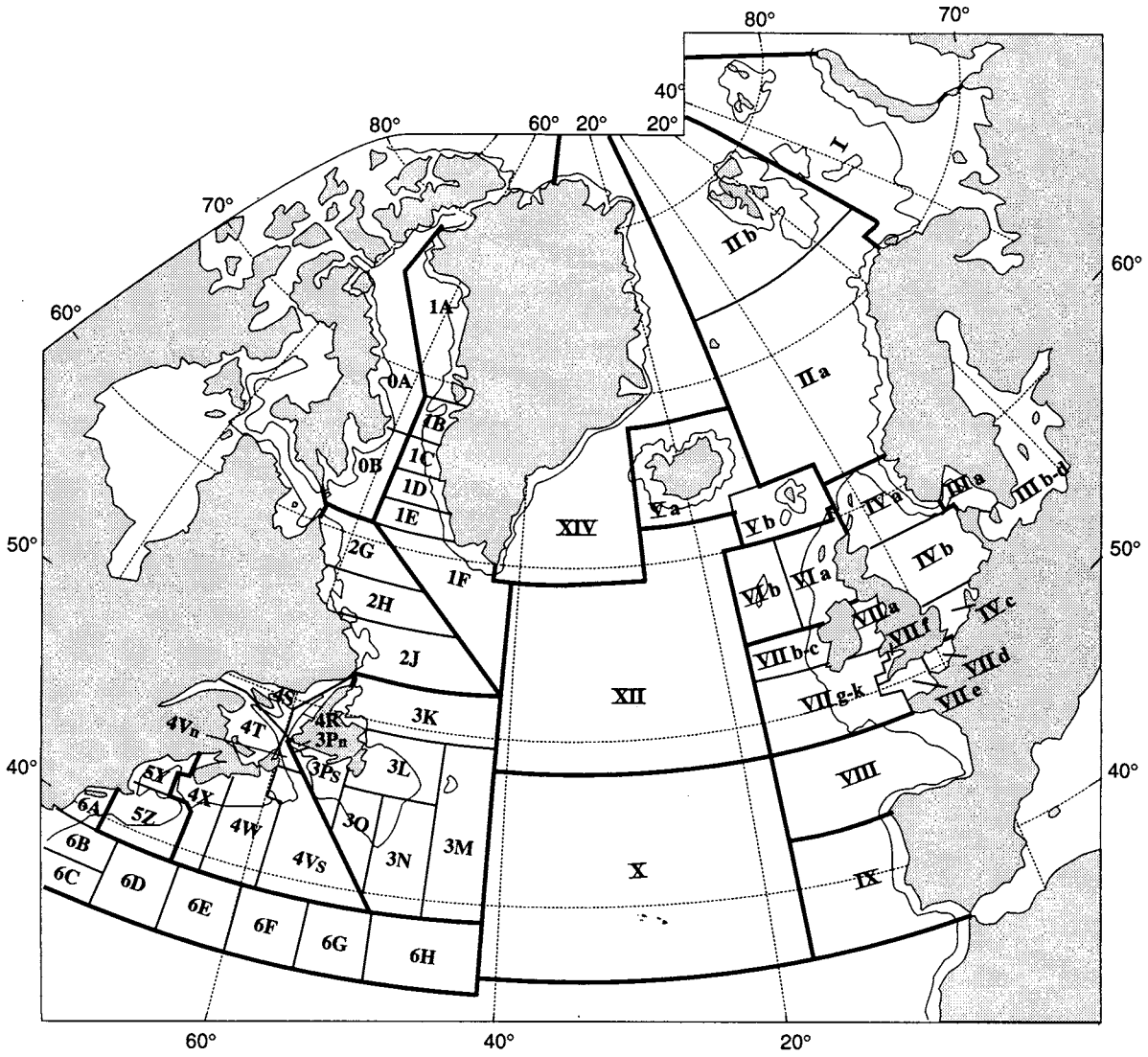

Fig. 1. Statistical Areas defined by ICES and ICNAF for the Northeast and Northwest Atlantic (east and west of 42°W) respectively. (Heavy lines are Subarea and Statistical Area boundaries, light lines are Division and Subdivision boundaries.)

However, a Contracting Party had 90 days within which to lodge an objection to a Commission recommendation and, if it did so, was under no further obligation. Furthermore, once one objection was received, others had a period during which they could also object. If three or more objections were received, the non-objecting Parties were not obligated to implement the recommendation either.

Compliance of vessels with NEAFC regulations was the responsibility of the flag state but the Commission also had the authority to make recommendations for national control measures, and for international control measures on the high seas. This allowed a scheme of joint international enforcement to be established in 1970 under which inspectors from one Contracting Party could inspect at sea, in international waters, vessels of other Parties. Any legal proceedings regarding alleged infractions of NEAFC regulations were, however, a matter for the flag state of the vessel involved.

The primary purpose of NEAFC, as specified in its Convention, was to consider, in the light of the technical information available, what measures were required for the conservation of the fish stocks and for the rational exploitation of the fisheries in the area. With regard to conservation of fish stocks, the

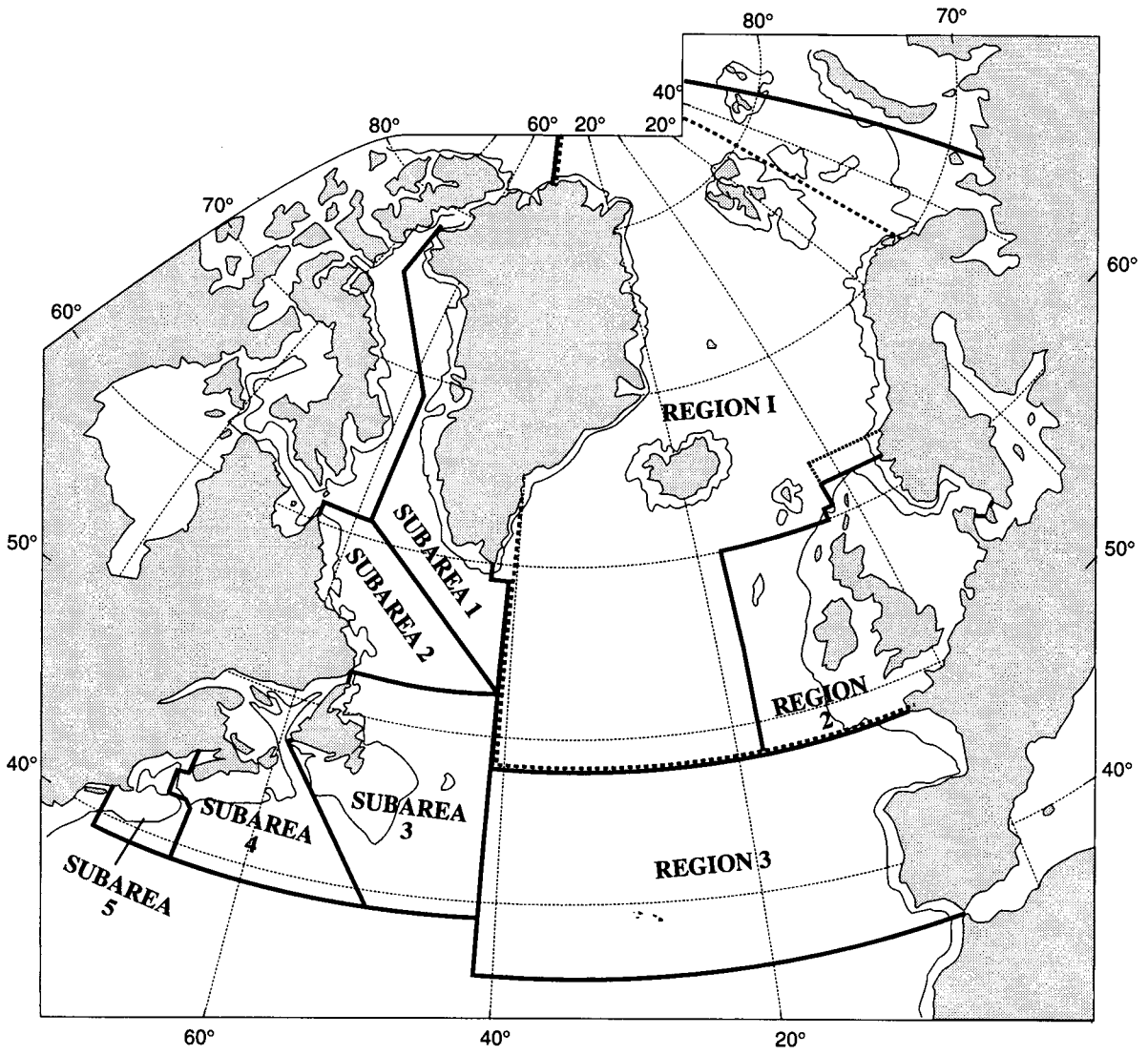

Fig. 2. Convention Areas of North Atlantic fisheries commissions; ICNAF and its Subareas used for administrative and regulatory purposes in the Northwest Atlantic, NEAFC (1959 Convention) in the Northeast Atlantic and its administrative and regulatory Regions (boundary revision of 1970 between Regions 1 and 2 shown by dotted line), and the regulatory area of the Permanent Commission (1946 Convention) (dashed lines).

Commission was also required to seek the scientific advice of ICES, when possible.

The Convention allowed the following regulatory measures to be proposed:

a) regulation of the size of mesh of fishing nets;
b) regulation of the size limits of fish that may be retained aboard vessels, or landed, or exposed or offered for sale;
c) establishment of closed seasons;
d) establishment of closed areas;
e) regulation of fishing gear and appliances, other than regulation of the size of mesh of fishing nets; and
f) measures for the improvement and the increase of marine resources, which could include artificial propagation, the transplantation of organisms and the transplantation of young.

The Convention also allowed for regulation of the amount of total catch, or the amount of fishing effort in any period, or any other conservation measures, to be added to this list, but only on the

basis of a two-thirds majority in the Commission and subsequent acceptance by all Contracting Parties. The Commission agreed in 1970 to add the following regulatory measures to the list of possible actions:

g) regulation of the amount of total catch and its allocation to Contracting Parties in any period; and

h) regulation of the amount of fishing effort and its allocation to Contracting Parties in any period.

However, obtaining the required approvals by the governments of all Contracting Parties proved difficult and NEAFC was not empowered to set TAC or fishing effort regulations until 1974. As a result, a number of international agreements were reached outside the framework of the Commission on catch and effort limitations to deal with pressing conservation issues.

It was clear in 1976 that the jurisdictional extensions planned by coastal states for 1977 made NEAFC an inappropriate vehicle for future negotiations on international management. However, a process initiated by NEAFC in 1976 to prepare a new or amended Convention more suited to the new circumstances was successful in arriving at a new NEAFC convention which came into force in 1982. Although many countries, including all the then EU countries, withdrew from the old NEAFC, the organization continued to function through 1981 until the new NEAFC could take over.

When the Permanent Commission was established in 1953, ICES set up a special Liaison Committee to consider and provide advice on issues relevant to the Commission. This Liaison Committee consisted of the chairmen of relevant ICES committees and a number of co-opted experts in population dynamics. With the change in the political situation in 1977, ICES replaced the Liaison Committee with an Advisory Committee on Fishery Management (ACFM). This committee was constituted mainly of national members nominated by the delegates from ICES member governments and approved by the Council. These members are scientific experts who are expected to serve ICES, not national interests, during their tenure. The ACFM has, in addition, a chairman and the chairmen of ICES fish committees are also members. Many ICES Working Groups determine the status of various stocks and their reports provide the basis for ACFM advice. The role of the ACFM is to give scientific information and advice to fisheries commissions and to ICES member governments, or groups of governments (such as the EU) on such matters on which they may request advice, or on such matters as the Council or the ACFM may consider relevant. The Permanent Commission agreed in 1958 to reimburse ICES for the work undertaken on its behalf and this practice was continued by successor commissions.

Regulatory Actions. *Trawl regulation*s: The 1937 convention required that a mesh size of 105 mm be used in waters off northern Norway and in the Barents Sea, and of 70 mm elsewhere. Exceptions were provided for specific fisheries for pelagic and small bodied fishes and invertebrates, i.e. the regulation was directed at the groundfish fisheries. These measures applied to all trawls, seines or other nets towed at or near the bottom of the sea irrespective of material of construction. The nets were to be measured when wet and with the meshes stretched diagonally in a fore and aft direction, a technique which became the standard in international regulation. Although the convention did not formally come into operation, a number of countries nonetheless implemented national regulations which were more or less in conformity with the agreement.

Forty years later, when jurisdictions were extended, the minimum mesh size allowed in trawl nets (which then included midwater trawls) in the Barents Sea and off Norway, Faroe Islands, Iceland and eastern Greenland had increased to 120 mm (110 mm for seine nets) but in more southern areas, the North Sea and west of the British Isles, remained at 70 mm, and further south had been established at 60 mm. (A chronology of changes is provided in Appendix Table 4.) The principle resistance to a larger mesh size in southern waters came from countries with important fisheries for European sole, a small-bodied species which was well regarded as a food fish and consequently highly valued.

In the 1950s differentials were introduced into mesh size regulations as scientific research showed that selection properties of netting varied with material and method used in netting construction. Great complexities arose with the introduction of synthetic netting materials in the mid-1950s. Manila was adopted as the standard material and the selection properties of all other materials were referenced against it. Thus regulations expressed mesh size for manila netting and defined differentials for other materials which would result in a trawl constructed from them having a size selection equivalent to that of one made from manila. The manila standard continued to be used long after synthetic materials completely replaced natural fibres in netting construction in the early-1960s. The first differential introduced was actually for gear type. It was thought that seine nets selected for larger fish than did trawls using the same mesh size. (Reference to seine nets here means Danish or Scottish seine nets used to catch bottom dwelling

fish.) However, the tests on which this conclusion was based used cotton netting in the seine nets and the differential observed was perhaps a netting material, rather than a gear, effect. There continues to be relatively little information on selection of seine nets. However, much research was conducted on the selection of trawl nets and it was learned that many aspects of net construction affected selection, and the proliferation of synthetic twines made it impractical to measure their diverse selection properties. It also became impractical for enforcement officers to identify in the field the type of synthetic material being used. By the 1970s scientists were advocating dispensing with differentials, a view which was generally welcomed in enforcement circles, but their removal from regulation was gradual and did not start until after 1977.

Mesh size regulations in herring, mackerel and capelin fisheries *per se* were not adopted. However, these species were included in mesh size regulations adopted generally for industrial fisheries, discussed below.

Minimum fish size regulations: In the Northeast Atlantic minimum fish size regulations were consistently used as supplements to mesh size regulations in groundfish trawl fisheries conducted to provide fish for human consumption. These regulations specified the size, in total length, below which fish could not be retained aboard a vessel, landed or sold. No tolerances were provided for any undersized fish. In the 1937 Convention the minimum size for cod and haddock was 24 cm, whereas in the 1946 Convention it was 30 cm for cod and 27 cm for haddock (Appendix Table 5 provides a chronology). In 1963 the Permanent Commission established higher minimum lengths in areas where large mesh nets were specified by regulation. These regulations were carried forward to NEAFC. Size limits were adopted for pollock (saithe) in the mid-1970s, and in this case a tolerance was provided for undersized fish at least for a transition period.

Size limits were adopted in the mid-1970s also for pelagic species. A size limit for mackerel of 30 cm, approximately the size at first maturity, was adopted for the North Sea, Skagerrak and Kattegat, and subsequently extended to the west of Scotland, to reduce catches of immature fish. This regulation applied to the industrial fishery for mackerel only, and by-catches of 20% by weight of undersized fish were allowed. A size limit of 20 cm was established for herring to the west of Scotland, and this was extended to the North Sea and Kattegat. This size corresponded to the size required by the industry for food consumption markets. A by-catch of 10% by weight of undersized herring was allowed.

Rapid development of industrial fisheries in the North Sea and adjacent areas after the Second World War introduced a new dimension to the issue of minimizing the catches of small specimens of species which supported directed human consumption fisheries. The 1946 Convention, which required discard of all undersized fish caught in industrial fisheries, was modified at the time its regulations came into effect in 1954 to allow for retention of up to 10% by-catch, by weight, of undersized fish of controlled species. This provision was carried forward to NEAFC and maintained for the duration of its existence.

Catch controls: As already noted, NEAFC took steps in 1970 to acquire the authority to establish limits on total catches and on fishing effort and to allocate shares to Contracting Parties, but did not receive the necessary approvals until 1974. During the intervening period Contracting Parties were encouraged to enter into conservation agreements on a bilateral or multi-lateral basis. A number of such agreements were reached (Appendix Table 6). The first of these concerned Norwegian spring spawning herring. Iceland, Norway and the Union of Soviet Socialist Republics (USSR) agreed to restrict catches in the 1971–73 period (Anon., 1973). Subsequently, NEAFC prohibited fishing on this stock, although exemptions allowed some fishing to continue in Norwegian coastal waters. An agreement was reached on catch controls for Northeast Arctic cod in 1974 between Norway, UK and the USSR (Anon., 1975a), but regulation was taken over by NEAFC for 1975 and 1976. An agreement was also reached concerning limitation of groundfish catches in the Faroe Islands area, particularly of cod and haddock, and which also established subareas seasonally closed to trawling and placed limits on the gross registered tonnage (GRT) of trawlers fishing in the area (Anon., 1975b). The primary fisheries were conducted by Faroe Islands and the UK but seven countries were parties to the agreement, which came into effect for 1974 and was continued in effect through 1975 and 1976. No need was seen for NEAFC to become involved in catch regulation in the Faroe Islands area.

Prior to acquiring authority to establish catch limitations, NEAFC itself attempted to limit catches indirectly through the use of seasonal closures, or of complete fishery closures, complemented by exemptions which amounted to *de facto* catch allocations. The first such closure was implemented in 1971 for North Sea herring when fishing was prohibited in May and from 20 August to the end of September. Similar regulations were agreed to for 1972 to 1974. North Sea herring was the first stock for which NEAFC established a TAC and national catch allocations, regulations coming into effect for the year 1 July 1974 to 30 June 1975. Prior to these

dates NEAFC had also adopted a prohibition on fishing for Celtic Sea herring, with exemptions equivalent to catch allocations, as well as the already mentioned prohibition on fishing for Norwegian spring spawning herring. With acquisition of authority to establish catch limits directly, NEAFC established such limits for about a dozen stocks for 1975 in addition to those for North Sea and Celtic Sea herring (Appendix Table 6). These included North Sea cod and haddock, and West of Scotland herring as well as the already mentioned regulation of Northeast Arctic cod. Restrictions were also imposed on the catch of mackerel in the industrial fishery in the North Sea, although only during the first half of the year. All of these catch restrictions were extended to 1976 and some new ones added. In particular, catch restrictions on the mackerel industrial fishery were extended to include the west of Scotland, and indirect limitations were placed on the catch of Northeast Arctic haddock by prohibiting directed fishing for haddock once Northeast Arctic cod allocations were taken. The imminence of extensions of jurisdiction and resultant changes in approaches to regulatory issues prevented agreement through NEAFC on catch restrictions for 1977.

Other measures: Although NEAFC acquired authority in 1974 to directly regulate fishing effort, this power was not used. There was occasional use by NEAFC of seasonal and area closures (other than as devices to limit total catches). Two areas in the Bay of Biscay were closed to trawling in 1970–73 to protect small hake, apparently as a more acceptable approach than mesh size regulation. Also closure of the spawning area during the spawning season of herring at the West of Scotland was implemented for 1974 and subsequent years to protect the spawning stock.

One of the biggest regulatory challenges in the Northeast Atlantic arose from the conflicting interests of those engaged in traditional human consumption fisheries and those participating in the industrial fisheries. The focus of these industrial fisheries was NEAFC Region 2, particularly the North Sea, Skagerrak and Kattegat. The industrial fisheries were directed towards small-bodied species which occurred in high densities, giving high-volume catches, and required the use of small mesh nets. Conflicts arose when industrial fisheries were directed towards species which already supported important human consumption fisheries, but also as a result of by-catches of human consumption species in fisheries directed towards other species suitable only for industrial use. These by-catches could include large quantities of small fish, below legal size limits, because of the small mesh nets used.

The original 1946 Convention required all by-catches in small mesh fisheries of undersized fish of protected species, i.e. those for which minimum sizes had been established in the Convention, to be discarded. This apparently created an impractical situation for those countries developing industrial fisheries for herring and sprat, and these Contracting Parties were successful in having the Convention modified in 1954 to allow for 10% by weight of undersized fish in non-human consumption fishery landings (N.B. in landings, not in catches). This provision was carried forward into NEAFC regulations. Steps were taken in 1973 and 1974 to regulate the industrial fishery for mackerel by imposition of a minimum size limit and by prohibition of fishing in the first half of the year, as already mentioned, but these measures related to optimizing yield from the mackerel industrial fishery itself. The prohibition of industrial fishing for herring in 1975 reflected the priority placed on the human consumption fishery at a time of severe resource conservation problems. A series of further restrictions was placed on small mesh fisheries in 1976 involving specific minimum mesh sizes, by-catch limits on protected species of all sizes as well as on undersized fish and application of these to catches on board as well as in landings. Closures of areas to small mesh fishing were also instituted, the most important of which was closure to industrial fishing for Norway pout of an area in the North Sea off the northeast coast of the UK. This last measure did not come into effect, however, as an objection lodged by the primary industrial fishing nation, Denmark, resulted in several other nations also objecting. Several other elements of these regulations did not apply to Denmark, also as a result of Danish objection, which reduced the overall effectiveness of the new regulations.

Surveillance and Compliance. The NEAFC Scheme of Joint Enforcement came into effect in 1970. Not all countries were able to participate in the initial years and Portugal and Ireland were still unable to do so in 1974. Several countries placed reservations on below-deck inspections, the last of which (that of the USSR) was withdrawn in 1974. The scheme allowed inspectors to examine catch, nets or other gear, and any relevant documents, as deemed necessary to verify observance of the Commission's regulations. At the time of the scheme's initiation, NEAFC regulations concerned mesh size and minimum fish size and it was not until 1974 that NEAFC clarified that inspectors were entitled to carry out inspections relating to all the recommendations in force at any time, not only those relating to nets and fish size.

In addition to the international joint enforcement activities, each country had longstanding schemes of regulatory enforcement for their domestic fleets

and, as well, inspected foreign vessels fishing within national fishing limits. According to NEAFC meeting reports, its Standing Committee on Infractions appeared to be generally satisfied with the level of compliance with mesh and fish size regulations in the early-1970s.

Activities under the joint enforcement scheme did, by 1975, give rise to expressions of concern in NEAFC about the level of compliance with regulations, however. Norway drew attention to the fact that its inspectors had detected mesh size violations in 23 of 59 vessels of five nationalities (Underdahl, 1980). Norway also seriously questioned the adequacies of national controls of catches against quotas. However, the published NEAFC reports clearly do not reflect all of the concerns about regulatory compliance. Leigh (1983) for example states "the Soviet and east European fleets --- notoriously disregarded NEAFC recommendations concerning conservation measures". The Commission's own investigations into the accuracy of catch statistics, reported to the 14th annual meeting of July 1976, caused UK and Norwegian delegations to comment that, without improvement in catch reporting, the Commission's quota schemes were in fact all but worthless.

The International Commission for the Northwest Atlantic Fisheries (ICNAF)

Authority, Organization and Scope. The International Convention for the Northwest Atlantic Fisheries which came into force in 1950 was "for the investigation, protection and conservation of the fisheries of the Northwest Atlantic Ocean, in order to make possible the maintenance of a maximum sustained catch from those fisheries". The ICNAF Convention Area extended from western Greenland to New England (Fig. 2) and was divided into five Subareas. At later dates two additional areas were defined for statistical purposes, Statistical Area 0 east of Baffin Island, and Statistical Area 6 off the mid-Atlantic of the USA (Fig. 1). These were not part of the Convention Area, however, and thus ICNAF did not have regulatory authority in these areas. The Convention Area also excluded waters three miles from the coast, the breadth of the Territorial Sea when the convention was negotiated in 1949, in contrast to the eastern North Atlantic where NEAFC authority extended to the coast. The convention required that the seat of the Commission be in North America. Permanent headquarters were established in Halifax–Dartmouth, Nova Scotia, Canada.

The Commission was organized on the basis of Panels, one for each of the five Subareas. Membership of the Commission did not provide automatic representation on Panels. That representation was determined annually on the basis of current substantial exploitation of resources in the Subareas, except that coastal states had automatic membership. As conservation measures were first considered and decided upon in Panels, membership in these was important. The Commission could require reconsideration of regulatory proposals made by Panels but could not prevent their transmittal to the governments of Contracting Parties. Decisions were made by the Commission and its Panels on the basis of a two-thirds majority of the votes of all Contracting Parties. This had the effect of attributing to absentees a negative vote on all proposals. Hence proposals often required a majority of more than two-thirds of those actually present and voting if they were to pass.

Initially, the Convention required that Contracting Parties notify their acceptance of proposals, and proposals came into effect only after four months subsequent to acceptance by all Contracting Parties represented on a Panel. This requirement for action by a substantial number of governments resulted in long delays in proposals taking effect. Thus, the procedure was changed, effective 1969, so that proposals automatically took effect after six months unless an objection was received. Once one objection was received, other Contracting Governments had a period during which they could also object. Nonetheless, if objections remained in the minority, proposals came into effect for the non-objectors.

Compliance of vessels with ICNAF regulations was the responsibility of the flag state. In 1969 ICNAF acquired the authority to make proposals for national and international control measures to ensure that ICNAF regulations were being applied. This allowed a scheme for joint international enforcement to be established in 1971 under which inspectors from one Contracting Party could inspect at sea vessels of other Parties. Nonetheless, prosecution and assessment of penalties for alleged infractions remained the responsibility of the flag state of the vessel involved.

The initial objective of ICNAF was, on the basis of scientific investigations, to make possible the maintenance of the maximum sustained catch (which is the same as the maximum sustainable yield – MSY). This objective was broadened in 1971 by modifying the Convention to one of achieving optimal utilization of the stocks rather than MSY. The Commission, in most cases, continued to aim for MSY as representing optimum utilization in its view. Also, although this amendment broadened the basis for making proposals to include economic and technical considerations, biological considerations remained the primary basis for regulation.

The Convention initially restricted the regulatory measures the Commission could propose to:

a) establishing open and closed seasons;
b) closure to fishing of spawning areas or areas populated by small or immature fish;
c) establishing size limits for any species;
d) prohibiting the use of certain fishing gear and appliances;
e) prescribing an overall catch limit for any species of fish.

The Convention amendment which broadened the objective of management and the basis for proposals in 1971 also provided much greater scope in the nature of regulatory measures which could be proposed. The itemized list was eliminated and replaced by the word "appropriate" in front of "proposals" in the text of the Convention. The primary significance of this was to allow for national allocation of overall (or global) catch quotas which paved the way for acceptance of a comprehensive catch quota control scheme. It also allowed proposals for direct regulation of fishing effort which, although extensively considered, did not receive wide application.

With announcements by coastal states of intentions to extend fisheries jurisdiction in 1977, ICNAF, in 1976, recommended development of a new international framework for cooperation on fisheries management in the Northwest Atlantic. As an interim measure ICNAF proposed to amend its convention to exclude all waters within national fishery limits from the Convention Area, while providing for coastal states to receive scientific advice on management of resources within their zones if they asked for it. Although this amendment did not formally come into force, the Commission functioned effectively on this basis. The new international order was implemented 1 January 1979 when the NAFO convention came into force. The members of ICNAF who had not already withdrawn from the organization were requested by ICNAF to do so effective 31 December 1979. Thus there was an orderly transition between the organizations with an overlap of one year.

The ICNAF convention made provision for the Commission to conduct the scientific research necessary for the support of its work. The Commission chose to obtain the information it required by coordination of the work of national research agencies through its Standing Committee on Research and Statistics, the members of which were scientists employed by Contracting Parties.

Regulatory Actions. *Trawl Regulations*: The ICNAF Commission was established at a time when there was already a recognized need for regulation of haddock fishing on Georges Bank. Trawl mesh size in common use in this fishery was 73 mm and large quantities of fish too small to market were being caught and discarded (Graham, 1952). A minimum mesh size of 114 mm was proposed in 1952 and came into effect in June 1953. Mesh regulation was expanded to include cod and extended to the Scotian Shelf, Gulf of St. Lawrence and the Grand Banks in 1957 (Appendix Table 7). In 1968 trawl regulations were extended to the waters off western Greenland, where a mesh size of 130 mm was established to match that recently established off eastern Greenland by NEAFC, and to Labrador, and a variety of species, particularly flatfish, was included in the regulations. Pollock was included in the 1968 revisions as a regulated species but only off Newfoundland, whereas the main fishery for pollock was further south off Nova Scotia and New England. In the early-1970s, a mesh size of 130 mm was applied in all areas. All ICNAF mesh regulations were specified in manila equivalents from 1957 with equivalents identical to those of NEAFC being adopted in 1968. In southern areas, where small mesh fisheries also occurred, by-catch allowances of mesh regulated species were generally 10% of the catch on board or 5 000 lb. No gear regulations were adopted for pelagic species.

Catch Controls: In the early-1960s, at the same time that ICNAF was formulating the comprehensive trawl regulations which came into force in 1968, the Commission was concerned that those measures would not in themselves be adequate to meet its objectives. A scientific report, prepared on the request of the Commission, advised in 1965 that "there must... be some direct control of the amount of fishing" (Templeman and Gulland, 1965). The first measures to control the amount of fishing, and hence the level of fishing mortality, were agreed to in 1969 for application in 1970. The method chosen was to control the total catch from each stock. Haddock stocks off Southwestern Nova Scotia and New England were the first to be placed under Total Allowable Catch (TAC) controls and, once the Commission acquired the authority to propose national allocation of TACs in 1971, catches from many other stocks were also regulated (Appendix Table 8). By 1974 virtually all stocks subjected to a significant directed fishery were under TAC control.

In Subarea 5 and Statistical Area 6 an overall "second tier" TAC was established in 1974, in addition to single stock "first tier" TACs. This second tier TAC was set at a level below the sum of the first tier TACs to address mixed fishery and by-catch problems and to allow for species interactions (O'Boyle, 1985).

These actions put ICNAF at the forefront among international fisheries commissions worldwide as the first to establish control of overall level of exploitation, to adopt TAC regulations, national allocation of catch possibilities, and, in the case of second tier TACs, the first to attempt multispecies management.

Other Measures: Gear regulations and TAC controls were the primary measures used by ICNAF to regulate exploitation of Convention Area resources. However, minimum fish size, fishing effort, and closed area and season regulations were also adopted.

Minimum fish size regulations were considered to be more effective than mesh size regulations for reducing the catches of small fish in the case of pelagic species. A regulation prohibiting the taking or possession of herring less than 22.7 cm (the regulation specified 9 inches) total length was implemented for Subareas 4 and 5 and Statistical Area 6 in 1972. However, the areas which supported the juvenile herring fisheries which supplied the "sardine" industries of coastal states were exempted. In 1976 the taking or possession of mackerel less than 25 cm total length was prohibited. In the case of both herring and mackerel, by-catch allowances of 10% by weight or 25% by number of undersized fish were provided for. Minimum fish size regulations were not considered necessary for groundfish species.

Area and seasonal closures were used by ICNAF for several purposes; to reduce by-catch problems in small mesh fisheries, to reduce the level of fishing for particular stocks, to protect spawning fish from disturbance, and to reduce interference between fisheries. The most important use was to address by-catch problems, which were most severe off Nova Scotia and to the south. A series of regulations were enacted from 1974 to close increasingly large portions of the shallow water areas on Georges Bank and further south to bottom trawling by large vessels. A large vessel, the definition of which was initially 47.2 m (155 ft) but was gradually reduced to 36.9 m (130 ft), resulted in exclusion of the large distant-water factory trawlers which were the primary vessels used in the high volume small mesh trawl fisheries for herring, mackerel, the hakes and squid. The intention was to protect the species fished with regulation large mesh gear, particularly yellowtail flounder and haddock. In 1977 these area closures were repealed in favour of open window regulations. These regulations defined the areas and seasons when fishing for particular species could take place, i.e. the converse of closed area and season restrictions. A window regulation was adopted also for silver hake, argentine and squid fisheries on the Scotian Shelf from 1977 which restricted these small mesh gear fisheries to deep water along the shelf edge during April to November, again to reduce by-catches of large-mesh regulated species. In both cases, although adoption of windows was negotiated through ICNAF in 1976, these could be looked upon as coastal state regulations, as they applied to areas which came entirely under USA and Canadian jurisdiction in 1977. Closure to fishing of overwintering areas of red and silver hakes off Georges Bank were implemented from 1970, initially as an alternative to TAC control of exploitation level, as there was inadequate scientific knowledge to establish appropriate catch restrictions. Closures of haddock spawning areas during the spawning season were enacted for the same year on Browns Bank off Southwestern Nova Scotia and on Georges Bank and in the Gulf of Maine. These closures were ostensibly to protect against disturbance of mature fish during the spawning act in the hope of improving spawning success, but were part of a package of measures intended to reduce fishing mortality (Halliday, 1988). Finally, capelin fishing off the south-east coast of Newfoundland was not allowed in a band adjacent to the coast from 1975. This was to reduce the interference of the offshore fishery in the ICNAF Convention Area with the inshore migration of capelin, and the cod associated with it, which supported the coastal fisheries (within three miles and hence outside the Convention Area).

Proposals for direct control of fishing effort were abandoned in relation to Subarea 5 and Statistical Area 6 fisheries, because of difficulties in resolving the technical issues involved, in favour of the second tier TAC approach. However, regulation of fishing effort was implemented in 1976 for Subareas 2–4 groundfish fisheries of non-coastal states. This was a simpler regulation than that proposed for the southern areas, although a substantial reduction, 40% of 1973 effort levels, was called for. Effort was measured as days fished and reductions were effected by scaling on the basis of each vessel tonnage class and major gear type category for each Contracting Party in each of five fishing areas. Effort could be reallocated between vessel/gear categories within Contracting Party fleets using agreed conversion factors based on relative catch-per-day fished. Limited transferability between the defined fishing areas was also allowed. This regulation was in effect for only one year, so there is insufficient evidence on which to judge its effectiveness.

Surveillance and Compliance. The ICNAF Scheme for Joint International Enforcement of the

Fishery Regulations, which became operative in 1971, provided for inspectors to examine catches, fishing gear and relevant documents to verify that the Commission's regulations were being observed. There were initial reservations by some countries to below-deck inspections but these were largely removed by 1973, and the scheme was progressively strengthened.

Active participation in at-sea inspection activities was limited, most inspections being conducted by Canada and USA – the coastal states. The lack of authority of inspectors to take direct, immediate, remedial action when apparent infringements of regulations were discovered also limited the effectiveness of the scheme. Attempts were made to rectify this problem by requiring representatives of flag state authorities to be available to receive reports of inspectors on a real-time basis so that immediate action to prevent continuation of violations by their fleets would be possible.

Although the ICNAF enforcement scheme did not provide adequate deterrence to prevent serious violations of its conservation regime, the scheme did prove capable of establishing that disregard for ICNAF regulations was widespread. The USA inspectors discovered that fishermen were often not even aware of the regulations in force for the area in which they were fishing. In addition, USA authorities concluded that most member nations had no effective direct control over their vessels from the time they left port until their return, a situation they characterized as negligent (USA, MS 1976). Violations were by no means restricted to the catch controls which were implemented at the same time as the inspection scheme was instituted. Infractions also involved mesh size regulations which had been in place for many years. Deficiencies found in log record keeping also suggested that the historical record of catch and fishing effort, maintained by ICNAF from the mid-1950s, could not be taken entirely at face value.