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A Review with Some Proposals for Amendments of the Catch Statistics  
for the Cod Fisheries in Greenland Waters Since 1911

by

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**Abstract**

In preparation of a review of the cod fisheries in Greenland waters after the Second World War it was found necessary to review and partly revise country by country the catch statistics for the cod fisheries at West as well as at East Greenland for the whole period when cod fishing has occurred there in this century. Estimates of the proportion taken at Greenland are made for catches reported from the Northwest Atlantic but not broken down by ICNAF/NAFO Subareas. Likewise, estimates of catches at East Greenland are made.

Changes of conversion factor for fish products to round fresh weight have lead to revision of figures recorded in ICNAF/NAFO and ICES statistics. However, several questions on conversion factors and of spatial distribution of catches are still open.

Estimates of catches not included in the official nominal catch figures such as discards and non-registered local sale are discussed.

**Foreword**

The first issue of this paper was distributed in April 1993 by the NAFO Secretariat as a Working Document to national representatives of the NAFO Scientific Council requesting them to comment and advise on the proper sections of the country-by-country review of the catch statistics. Responses were received during 1993 and 1994 from most of the countries addressed. Although not all responses solved the questions raised for the country in question most of them resulted in substantial revision, specifically in the text but also in the tables of the first issue.

**Introduction**

In 1991, a small international group of oceanographers and biologists discussed plans for a special volume of the NAFO Journal of Northwest Atlantic Fishery Science, the topic being West Greenland cod in the second half of the 20th century. The fisheries, the scientific assessment and advice, and special biological topics such as migration are planned to be parts of the volume. Work is in progress but not yet completed.

The author of the present paper undertook to review the fisheries. As the main material for this serve the ICNAF/NAFO and the ICES catch and effort statistics. However, it soon became clear that the statistical records needed a critical review including quite many assumptions on, for instance, spatial distribution of various countries' catches before a proper estimate of catches in Greenland waters could be presented.

This review of the fisheries statistics soon convinced the author of the need for reviewing the statistics over the whole period throughout which cod fishing at Greenland has occurred in the present century. Such a review could also meet recent demands for retrospective stock assessment, e.g. attempts to carry virtual population analysis (VPA) further back in time at least to around 1950, if possible even further back.

The work of reviewing the statistics thereby grew out of scale with the planned review of the fisheries and would make the intended volume of the Journal much too detailed and heavy to read. It was, therefore, proposed that the present review should not occur in the Journal but be available upon request as a NAFO document as here presented.

#### Materials and Methods

(This section is duplicated from the draft manuscript which will be submitted later on to the Journal)

#### 1. Fisheries Statistics.

Regular annual reporting of Greenland's own fisheries started in 1910 right after the "Tjalfe" expeditions and has since then been published in the official annual reports on Greenland which under various titles have been issued by Danish ministries and governmental offices responsible for the administration of Greenland. From 1946, the statistics include not only landings but also information on effort (number of fishermen, fishing days etc.). Since 1990, the Annual Report on Greenland has been issued by the Greenland Home Rule authorities.

The international statistics of commercial landings and effort of the fisheries in Greenland waters are based on individual national reporting schemes which have been coordinated and the data published annually, first by the International Council for the Exploration of the Sea (ICES) in its Bulletin Statistique des Pêches Maritimes, started in 1903 and with the fisheries in Greenland waters included from 1925, later (from 1951) by the International Commission for the Northwest Atlantic Fisheries (ICNAF) and its successor the Northwest Atlantic Fisheries Organization (NAFO, from 1979) in their Statistical Bulletin. The ICNAF and NAFO issues cover fisheries at West Greenland (Statistical Subarea 1) while ICES since 1962 covers only East Greenland (and other ICES areas). Both organizations participate in the world-wide scheme set up by the United Nations Food and Agriculture Organization (FAO). These publications are hereinafter referred to as ICES Bull. Stat. and ICNAF (or NAFO) Stat. Bull.

Statistical information on the fisheries for cod off East Greenland is found primarily in ICES Bull. Stat. (from 1925). For the period 1925-57 catches in Greenland waters are, however, not broken down by areas but are for the Statistical Areas XIV (East Greenland) and XV (West Greenland) combined. Furthermore, catches at Greenland (XIV plus XV) for the years 1934-38 are combined with those at Newfoundland (Area XX). Only for the years 1958-61 has ICES recorded catches separately for East and West Greenland, since 1962 only catches at East Greenland.

It is thus difficult to achieve figures before 1958 for the East Greenland area separately, except for Greenland itself whose catches are reported district by district in the official Annual Reports on Greenland. For some other countries a minimum figure for catches at East Greenland may be achieved by subtracting their West Greenland catch recorded by ICNAF from their total catch at Greenland recorded by ICES. This has been tried for the Federal Republic of Germany, Iceland and the United Kingdom but has far from always been possible (negative catches at East Greenland sometimes result from this exercise). However, the author had valuable comments from colleagues in these countries allowing some estimates. For other nations (the Faroes, Norway, Portugal and Spain) catches at East Greenland are considered nil or negligible before 1958. For France, it is known that in some years a small proportion of its catch was taken just east of Cape Farewell but reported together with catches in the ICNAF area (ICNAF Stat.Bull. Vol.2, p.16). No attempts have been made here to separate French catches for West and East Greenland from each other.

Catch figures in the above mentioned publications are all intended to be so-called nominal catches, defined as landings converted to live weight (round fresh) of the landings. The figures do, therefore, not give the actual removal of fish from the stocks. They do, for instance, not incorporate fish discarded at sea of which many are dead or likely to die due to the handling, nor fish used for consumption on board, and not either fish sold directly on local markets in Greenland. The nominal catch figures will, therefore, usually be minimum figures for the actual catch.

It should also be remembered that conversion of fish products to live weight usually is done by applying established standard conversion factors so that although nominal catches are recorded by metric tons the actual accuracy is rather by hundred or even thousand of tons, and the accuracy in terms of actual catches even less.

In a few cases (e.g. for the years 1977-80) there is strong evidence that some figures published in the statistical bulletins are misleading, and in such cases the NAFO Scientific Council and relevant scientific working groups of ICES have used (usually much higher) estimates of the catches for their assessment of the stocks (see for instance NAFO Sci. Council Reports, 1979-80, p.72-73, and 1981, p.32). Unless otherwise stated such estimates for the total catch are adopted in the present paper.

The author has reviewed the statistical information available in the above mentioned bulletins and in various reports. In quite a number of cases when the statistical information was not informative enough the author had to estimate the catches in Greenland waters, e.g. when a country reports a catch in the ICNAF/NAFO Statistical Area without breaking down the catch on subareas. In all such cases and in other cases when the author's figures differ from those in the above mentioned publications notes on how the estimates were arrived at have been made. To incorporate these notes directly in the present publication would, however, make the publication very lengthy. It has, therefore, been decided to present basic tables and comments as a special NAFO Document obtainable at the NAFO Secretariat upon request. The basic tables and comments in the document are given country by country in alphabetical order.

One of the more general considerations leading to revisions should, however, be mentioned here, namely the use of conversion factors to achieve live weight of landed products.

## 2. Revision of catch statistics due to changes of conversion factors.

Few, if any, catches of cod from Greenland waters are landed as round fresh fish, and although some vessels record a qualified estimate or even a measured weight of their catch as round fresh fish in their logbooks most catches are weighed as the landed product, e.g. gutted with or without head, fillets, and salted fish. Hence conversion factors are needed to convert landed weight to equivalent fresh round weight on which international statistics are based.

Whatever state of fish in the landings the true conversion factors are bound to vary, for instance between seasons due to seasonal variation in condition factor of the fish, and between size categories of fish. For practical reasons it is, however, necessary to simplify the conversion by using a standard average factor for each category of product landed. In the reporting to ICNAF/NAFO each country has usually been requested to report its catch as round fresh weight, i.e. conversion is to be made by each country. Conversion factors used by each country were listed annually in ICNAF Stat.Bull. through the 1950s-60s. FAO (1971) in its Bulletin of Fisheries Statistics Vol.25 for 1970 has a comprehensive list of conversion factors to which ICNAF and NAFO has since referred.

However, ICNAF also made attempts to standardize some of the important conversion factors, e.g. from salted cod to round fresh weight. At its Annual Meeting June 1955, the Commission adopted with effect from 1954 two factors for cod for converting from green salted wet fish to round fresh weight, one for European landings of 3.0 and one for Canadian landings of 2.7. However, these factors were considered tentative and no official revision of back statistics were made at that time. In fact, such a revision seems never to have been officially published except for the year 1953 (ICNAF Stat. Bull. Vol.4, p.8).

For most European countries the factor 3.0 was a change from factors of 2.25 (Iceland), 2.4 (Norway), 2.5 (the Faroes, France, Portugal and Spain) and 3.25 (Italy) (ICNAF Stat. Bull. Vol.2 and 3). In fact, the ICNAF Working Group of Scientists on Fishery Assessment in Relation to Regulation Problems, hereinafter referred to as the ICNAF Ass. Work. Group 1961 and its report as the Assessment Report (Beverton and Hodder eds. 1962) took the consequence of this shift in conversion factors and revised catches prior to 1954 accordingly (see the unpublished Appendix to the report, ICNAF Serial No. 932, Dec. 1961, notes to Table 4.1 (Anon. 1961) extracts of which are also appended to the present document).

The author of the present contribution has also considered that the factors introduced in 1954 should be used in years prior to that when salted fish was the product for most fleets fishing at Greenland.

Other revisions of officially published catch figures may also be required. For instance, Portuguese figures for catches of cod listed in ICES Bull. Stat. until 1952 (incl.) were thought to be round fresh fish, but an easily overlooked footnote in Bull. Stat. for 1953 states that previous figures for Portugal were, in fact, for salted fish. When such special needs for revision occur they are mentioned in the review of the fishery by the relevant country in the NAFO Document mentioned in Section 1 above.

### Results and Discussion

The results are presented in Tables 1a-1b, 2a-2b, 3 and 4a-4b. Table 4a compares the author's estimates for the West Greenland cod fisheries (including adopted estimates by other people or working groups) with figures found in ICNAF Stat.Bull. and by the ICNAF Assessment Working Group. It will be seen that the major differences are for years prior to 1966 and in the years 1977-80 and 1988. Table 4b compares the author's estimates with figures found in ICES Bull.Stat. for the cod fisheries at East Greenland since 1958. Except for the years 1977-82 and 1988, when ICES working groups made quite different estimates which are adopted by the author, the two sets of figures are practically the same, simply because in most cases the author has adopted the ICES figures.

The discussion of how estimates were arrived at is given as a short review in the next two sections, most detailed in the country-by-country section. Finally, following that section, estimates of catches not included in the official nominal catch figures, nor in the tables of this document, are discussed.

### Major and Minor Questions and Assumptions

The review country by country in the following section will show that some assumptions made have negligible or little influence on the estimates of the total catch of cod in Greenland waters in the year under review while other assumptions are highly important for achieving a reliable estimate of the catch. The following is a list of various questions and assumptions set up in order of importance with the most important first.

a. Question of state of fish registered and of conversion factors applied to get round fresh weight.

This question concerns several countries (see p.4 and the country-by-country review p.6 ff).

b. Spatial distribution of catches on subareas when only figures for the total NW Atlantic (the ICNAF/NAFO Convention Area) are recorded.

Also this question concerns many countries but mainly Portugal. Rather substantial allocations are made also for France, the German Democratic Republic, Italy, and Spain.

c. Other sorts of questions and assumptions.

Compared to the above mentioned two categories other questions and assumptions have less influence on the estimates of catches at Greenland. Such questions will occur in the country-by-country section.

### Review of Catch Statistics Country by Country

#### CANADA (incl. Newfoundland).

At West Greenland: Hansen and Hermann (1953) mention that schooners from Newfoundland had an insignificant dory fishery on Store Hellefiskebank in 1931. An arbitrary figure 50 tons is proposed here. In ICNAF Stat. Bull. are records of Canadian catches of cod at Greenland in 1952 (679 tons) and in 1968 (8 tons).

At East Greenland there is only one record (2 tons in 1976).

C.A.Bishop (pers. comm +) did not suggest any changes to the above given information on Canadian fisheries at Greenland.

+ ) Claude A. Bishop. Fisheries and Oceans, P.O.Box 5667, St. John's, Newfoundland, Canada A1C 5X1

## DENMARK.

Fisheries statistics for the Kingdom of Denmark are reported separately for the Faroe Islands, Greenland and Denmark. Statistics for the Faroes and Greenland are commented under each their heading following this section on the Danish cod fishery at Greenland.

At West Greenland: The first Danish commercial fishing for cod at Greenland in this century was initiated in 1925 (Hansen and Hermann, 1953). The fishing was by hand lines but was not very successful partly due to bad weather, and it was not repeated in the following years. No catch figure is found in Hansen and Hermann (l.c.). An estimate of 20 tons is proposed here.

The next Danish fishing at Greenland was organized by the fishing company "Grønland" in 1929 and 1930 (Hansen and Hermann l.c.). The catch in 1929 was rather good while the 1930 catch may have been lower since the company's fishing was not continued thereafter. Estimates of 100 and 30 tons for 1929 and 1930, respectively, are proposed here.

Hansen and Hermann (l.c.) record the Danish catches thereafter as:

1936 by the "Arctic" and the Faroese "Soli Deo Gloria" a catch of cod of 141 tons (plus 123 tons of Atl. halibut). ICES Bull. Stat. has a figure of 70 tons of cod. Not knowing what conversion factor was used to get round fresh fish Hansen and Hermann's figure is adopted here.

1937 by the "Steady" a catch of 53 tons salted cod, corresponding to 159 tons round fresh fish by factor 3.0 (see section on conversion factors p. 4). No figure in ICES Bull. Stat. for that year. Hansen and Hermann's figure is adopted.

1938 by the "Steady". Bad weather and only 14 tons salted fish (42 tons round fresh). No figure in ICES Bull. Stat. Again Hansen and Hermann's figure is adopted.

No Danish fishing occurred at Greenland during 1939-47. Danish fishing was, however, taken up again in 1948, introducing the pound net at Greenland. The Danish expeditions generally faced climatic, technical and economical difficulties, and private Danish fishing for cod at Greenland came to an end in 1951. The Royal Greenland Trade Department took over some of the facilities established ashore.

The nominal catches for the years 1948-51 are recorded in ICES as well as in ICNAF Stat. Bull. Apart from a minor difference for 1949 the two series are identical. The ICNAF figures are used here but are raised by factor 1.2 (see remarks on conversion factor under the Faroes).

At East Greenland there are no records of any Danish cod fishing.

## THE FAROES.

At West Greenland: Some Faroese fishing experiments for cod and halibut took place in 1906 and 1914 but virtually no cod were caught then (Andreassen, 1906; Hansen and Hermann, 1953). The commercial Faroese cod fishing at Greenland started in 1925 (Jensen and Hansen, 1931). Catch figures have been reported to ICES since 1926 and to ICNAF since 1939 (Second Ann. Report, 1952, p.40). For 1926-38 the figures from ICES Bull. Stat. are used here, while figures after 1938 are from ICNAF/NAFO Stat. Bull. The figure for 1925 reported by Jensen and Hansen (l.c.) is 143 tons salted fish corresponding to 358 tons round fresh by applying conversion factor 2.5 (which fits when comparing Jensen and Hansen's figures for salted fish in 1926-28 with the ICES figures for round fresh fish). However, the conversion factor was changed from 2.5 to 3.0 in 1954 (ICNAF Stat. Bull. 1954). The ICNAF Assessment Working Group 1961 (Beverton and Hodder eds., 1962) therefore raised the Faroese catch figures for 1939-53 by factor 1.2 (see the appended extract of ICNAF Ser. No. 932). The author has followed that approach and raised Faroese catches for 1925-53 by the same factor.

For the years 1954-59 the Faroese conversion factor for salted fish is listed as 3.0 in ICNAF Stat. Bull. However, for years thereafter 2.5 is again quoted, also in FAO Bull. Fish. Stat. Vol.25 for 1970. It is possible, therefore, that also Faroese catches since 1960 ought to be raised by factor 1.2 to be comparable to those before then as they stand here. The author has, however, not been able to solve this question and has adopted the figures recorded in

ICNAF Stat. Bull. as they stand since 1954. Raising the totals after 1959 by 1.2 would also incorporate the assumption that all fish were used for and recorded as salted fish, an assumption which seems doubtful for those years.

Up to 1940 most, if not all Faroese fishing at Greenland was by lines (hand- and long lines). Trawlers have operated at least since 1948, but catches reported to ICNAF were not broken down by gear until 1952 when approximately 1/3 of the total catch was taken by trawlers. From 1970, the break down by gear is again missing for most years. Gill nets came into operation during the 1970s.

Special notes: In ICNAF Stat. Bull. Vol. 2 for 1952 the Faroese catch is recorded as 43,085 tons on pages 14 and 40 but as 48,085 tons on p.28. The latter figure is here regarded as a misprint. For 1964, there is no break down on gear. The allocation on liners and trawlers here used for 1964 assumes the same proportional catches by gear as in 1963.

At East Greenland: The records in ICES Bull. Stat. of Faroese catches at East Greenland after 1958 show relatively small catches only, and no information points to any higher catches at East Greenland before that time. If any, they are probably recorded as part of the catches at West Greenland. Like for the catches at West Greenland the catches at East Greenland probably ought to be raised by factor 1.2. The figure for 1989 is taken from Anon. 1992 and that for 1991 from vessels' reports to the Greenland Home Rule authorities..

#### GREENLAND.

The reporting of fisheries statistics for Greenland is described in section on Materials and Methods. Records have also been submitted to ICNAF/NAFO and to ICES.

At West Greenland: Figures for the years 1911-51 are those found as revised figures in ICNAF Second Ann. Rep., 1952, p.42. Figures for the years 1952-86 and for 1989 are those recorded in ICNAF/NAFO Stat. Bull. while the figures for 1987 and 1988 include revisions reported to the Greenland Fisheries Research Institute by the Greenland Home Rule Statistical Office in 1990. Figures for 1990-91 are those reported to NAFO by the Greenland Home Rule as final figures (on form STATLANT 21B), and those for 1992-93 are provisional figures (on STATLANT 21)A. The ICNAF Assessment Working Group 1961 (see the appended extract of ICNAF Ser. No. 932; Table 4.2) revised the Greenland figures for 1953 and 1954 by factors 1.08 and 27/26, respectively, due to changes in conversion factor for salted fish from 2.5 in 1953 and 2.6 in 1954 to 2.7 in the following years. However, fish were seldomly landed (sold by fishermen) as salted fish. Rather, salting took place after the catch was sold and recorded as gutted or split fish. Hence no adjustment of the official figures have been made in the present paper.

Four liners for offshore fishing were introduced during 1966-67, but they were sold or phased out from cod fishing few years later, their last record of cod fishing being for 1970. Trawlers were introduced in 1968, operating offshore only. Their catch is listed separately (Tables 1a-1b and 2b). The non-trawler fleet, consisting largely of boats less than 50 GRT, operates mainly inshore or in coastal waters when fishing for cod although also sometimes offshore. However, their records are not so detailed as to allow a break down on inshore and offshore catch components. All catches of these small vessels are, therefore, listed here as inshore or coastal catches.

Inshore and coastal catch figures are thus maximum figures, especially since the mid 1960's, while offshore catch figures are minimum figures.

At East Greenland: The local communities at East Greenland are likely to have exploited cod for many years for local consumption and for fodder (dried fish) for sledge dogs (mentioned in Beretn. vedr. Grønland for 1953). However, the first record of a commercial fishery is from 1956 when 23 tons split fish was bought by the Royal Greenland Trade Department producing dried fish. By conversion factor 1.62 this corresponds to 37 tons round fresh fish. For 1957 the catch is 197 tons. Figures for 1958-88 are those recorded in ICES Bull. Stat. including catches by chartered Japanese trawlers in 1986 and 1987 (see footnote to Table 1b). Figures for 1989-92 are those reported to ICES on form STATLANT 27 B, while the distribution on gear is based on vessels' weekly radio reports to the Greenland Home Rule authorities. The figure for 1993 is provisional.

## FRANCE.

France has a long tradition for cod fishing in the Northwest Atlantic. Statistics back to 1874 was submitted to ICNAF Second Annual Report.

At West Greenland: Two French schooners fished at Greenland in the years 1926-28 (J.Hersart de La Villemarqué, pers.comm.) while Jensen and Hansen (1931) state that French fishing at Greenland started in 1928. In the first years dories were used (ICNAF Stat.Bull. Vol.2, p.16). Dories were, however, phased out during 1947-51 when fishing shifted to be by trawlers only.Stat. Bull. Vol.2, p.16).

Having no figures for the French fishery at Greenland 1926-28 I have estimated an annual catch of 700 tons (round fresh weight) for those years noting that two schooners from the same port (Paimpol) as in 1926-28 landed 225 and 229 tons of salted fish from Greenland in 1929 and 1930, respectively (Stat. des Pêches Maritimes).

Catch statistics for the years 1928-38 are found in ICES Bull. Stat. with figures for Greenland waters separately from 1929, and for 1929-38 in ICNAF Second Annual Report (Table 2e) for the Convention Area as a whole, in both publications listed as round fresh fish. A third list of figures for Greenland is found in Table 4.1 of the unpublished Appendix 1 to the ICNAF Assessment Report 1962 (see the appended extract of ICNAF Ser. No. 932). This latter series for 1929-38 is based on the French "Statistique des Pêches Maritimes", converted by factor 3.0 by the ICNAF Assessment Working Group. Converting backwards the figures are as presented below. This series is identical to figures found in Stat. des Pêches Maritimes and practically similar to the ICES figures. The larger discrepancies between the two series could indicate that the Assessment Working Group overlooked the fact that for some years the figures for Greenland in the French publication include catches taken at Spitzbergen or in the Barents Sea, and that in the report to ICES only catches at Greenland were recorded as taken there. On the other hand, fish caught at Greenland landed directly in ports outside France and Algeria (if any such landings took place) may not have been included in the statistics (see remarks for the years 1946-56 next page).

French catches of cod (tons).

Year	ICNAF Sec. Ann. Rep. NW Atl.	ICES Bull. Stat. Greenl.	ICES Bull. Stat. NW Atl.	Ass.W.Group Greenl. ( x 1/3)	Author's estimate
1926	185,213	-	-	-	700
1927	154,948	-	-	-	700
1928	148,848	-	21,088	-	700
1929	128,951	2,745	49,670	2,737	8,235
1930	77,902	15,520	44,147	15,515	46,560
1931	19,476	27,146	34,302	27,142	81,438
1932	17,810	19,964	26,508	19,946	59,892
1933	72,288	6,149	32,711	6,143	18,447
1934	76,032	11,221	39,158	11,221	33,663
1935	103,538	9,301	47,345	11,360	27,903
1936	65,858	26,991	50,782	29,122	80,973
1937	105,926	14,723	53,382	15,280	44,169
1938	152,958	9,269	55,747	10,209	27,807

The figures for French cod fishing in the NW Atlantic found in ICNAF Sec. Ann. Rep. are explained as being "official figures converted to round fresh fish". With the exception of the figures for 1931 and 1932 they are, in fact, considerably higher than the figures for the NW Atlantic (Greenland and Newfoundland) in ICES Bull. Stat. although not so high as to lead to a conversion factor of 3 between the two series. A footnote to Table 2e in the ICNAF report states that factor 2.5 was used. The 1931-32 ICNAF figures are mysteriously low when compared to ICES figures for the same years and to figures for other years in the ICNAF series. The French Stat. des Pêches Maritimes has figures of 71,561 and 65,442 tons of salted fish from Newfoundland for these two years, respectively. In fact, it seems that a comma fault crept in when converting, and that the figures for 1931 and 1932 in the ICNAF report should be raised by factor 10.

From this it seems that the figures in ICNAF Sec. Ann. Report are for round fresh fish obtained by converting salted fish by factor 2.5, while figures in ICES Bull.Stat. for the years listed are for landed weight, from Greenland presumably all as salted fish.

Under these circumstances the author has used the ICES figures converted by factor 3.0 for the years 1929-38 (Table 2a).

For 1939, a figure of 44,159 tons for French cod fishing in the whole North Atlantic is found in ICES Bull. Stat., and there are figures for 1944-45 in ICNAF Stat. Bull. Vol.2 (p.16) for French catches of cod in the NW Atlantic. However, no French fishing took place at Greenland during the war 1939-45 (J.Hersart de La Villemarqué, pers. comm.+).

For the years 1946-54 the following figures (in tons) are found in ICNAF and ICES statistical bulletins and in the French Stat. des Pêches Maritimes.

Year	ICNAF Stat. Bull.			ICES Bull. Stat.		St.P.M.
	Greenl.	Newfoundl.	ICNAF Area	Greenl.	Newfoundl.	
1946	-	-	57,878	-	-	1,702
1947	-	-	77,343	11,817	-	5
1948	-	-	106,728	-	25,320	0
1949	-	-	118,142	-	29,634	1,050
1950	-	-	125,046	-	-	85
1951	-	-	112,469	21,647	-	962
1952	-	-	142,647	-	112,534	980
1953	19,980	22,415	112,970	119,633	-	720
1954	64,095	50,460	155,685	20,084	112,910	17,404

Figures in Stat. des Pêches Maritimes are for salted fish landed in France and Algeria. Landings directly in foreign ports are not included and may be significant. For the years 1956-58 it is thus stated that 5251, 7331 and 3031 tons of salted fish for the three years, respectively, were landed in foreign ports. These may well all have been fished at Greenland. The 1946 figure is adopted as a minimum figure to give 5106 tons when converted by factor 3.0.

For the ICES records it seems very doubtful whether the distinction between fishing at Greenland and at Newfoundland is based on realities. Rather, the figures for 1947-51 when compared to the ICNAF figures for the total NW Atlantic could well be figures for Greenland or indicate that figures supplied to ICES until 1951 (incl.) were not converted to round fresh fish, but even so there are still significant discrepancies between the ICNAF and the ICES figures for the NW Atlantic. The remark in ICNAF Stat. Bull. Vol.2 (p.16) that French fishing usually takes place in ICNAF Subareas 1-2-3 and partly east of Cape Farewell, and the ratio between the ICES and the ICNAF figures lend support to the supposition that the ICES figures for 1947-51 are for Greenland (as round fresh weight). Although a lot of speculation is involved the resultant figures may be as good as any other guessed figures.

The proportion of French NW Atlantic catches of cod taken at Greenland may thereafter be as follows:

Year	Total NW Atl. (ICNAF Stat.Bull.)	Greenland	% at Greenland
1947	77,343 tons	11,817 tons	15.3
1948	106,728 -	25,320 -	23.7
1949	118,142 -	29,634 -	25.1
1950	125,046 -	?	?
1951	112,469 -	21,647 -	19.3
1952	142,647 -	?	?
1953	112,970	19,980 -	17.7

Following this it is proposed to adopt a 21 % proportion for the catch at Greenland in 1950 and 1952 giving rounded estimates of 26,000 and 30,000 for the two years, respectively. These figures are to be raised, see below.

Another way of estimating the 1952 catch could be to take the figure for French catch in the total NW Atlantic (142,647 tons) and deduct the catch at Newfoundland (112,534 tons in ICES Bull. Stat. which at least from this year seems to record whole round weight) which also leads to a rounded figure of 30,000 tons.

No explanation is offered for the discrepancies between ICES and ICNAF records for 1953 and 1954, but ICNAF records have been used here for years since 1953 (incl.) and considered representing round fresh weight. However, for the years 1947-53 the conversion factor used was 2.5 for salted fish. Factor 3.0 was adopted from 1954. Hence the catches during



1947-53 given above have been raised by factor 1.2. The resultant figures for French cod fishing at Greenland 1946-53 then are proposed to be

1946	5,106 tons	1950	31,200 tons
1947	14,180 -	1951	25,976 -
1948	30,384 -	1952	36,000 -
1949	35,560 -	1953	23,976 -

For years since 1954 the figures in ICNAF/NAFO Stat. Bull. have been used.

At East Greenland there are no records of French fishing after 1958 when ICES started specifying East Greenland in its statistics, and it seems, therefore, unlikely that France had any significant fishing there before that time although in some years part of the catch registered as NW Atlantic catch was taken just east of Cape Farewell (ICNAF Stat. Bull. Vol.2, p.16).

#### THE FEDERAL REPUBLIC OF GERMANY.

At West Greenland: Hansen and Hermann (1953) note that German liners fished for Atl. halibut in 1929 and 1930, and that in 1937 a German vessel carried out experimental fishing at Greenland with longlines and trawl. Figures in ICES Bull. Stat. for those years are 49, 41 and 46 tons, respectively. H.-P.Cornus (pers. comm.+) thinks that these figures are for landed fish. Assuming that cod was salted a conversion factor of 3.0 is applied (Table 2a).

H.-P.Cornus kindly supplied copies of tables of official German statistics for the years 1951-57. It occurs from these that German fishing at Greenland after the war started in 1952.

There are several tables for each year in the German material supplied:

i) Anlandungen deutscher Fischdampfer im Jahre xxxx in kg im Fanggebiet Grönland (Landings of German trawlers in (year) in kg, fishing ground Greenland). Hereinafter referred to as the national table of landings.

ii) Reisen, Reisetage, Fangtage und Anlandungen der Dampferhochseefischerei nach wichtigsten Fischarten und Fangplätzen (in t). (Voyages, days of voyage, fishing days and landings of the Deep Sea trawlers by the most important species of fish and fishing grounds (in t). Hereinafter referred to as table of trips and landings.

iii) Die Fischerei unter Grönland (Jahre) einschliesslich der Anlandungen im Ausland; Mengen in t. (Fishery off Greenland in (year), direct landings in foreign ports included; quantities in metric tons). These tables are from Lundbeck (1953-58), hereinafter referred to as Lundbeck's tables or figures.

H.-P.Cornus (pers. comm.) thinks that Lundbeck's tables give the most correct figures because they include landings in foreign ports. However, in footnotes to the tables for 1953 and 1954 Lundbeck states that the totals include salted fish converted to fresh (in German: frisch) fish by factor 2.0. For 1956 it is stated that the total includes 1890 tons salted fish equal to 4423 tons fresh fish (i.e. converted by factor 2.34). The same conversion factor is used in 1957 (2861 tons salted fish corresponding to 6694 tons fresh fish).

However, the German term "frisch fisch" can be taken as fresh but not necessarily round, fresh fish. For instance, for 1953 Lundbeck states that on three summer trips salted fish was produced except from the last hauls on the trips from which fish were landed "frisch" on the German market. That means they were gutted. This becomes clear in the text for 1957 (p.117) where it is stated that 2861 tons salted fish were landed, corresponding to 6694 tons fresh gutted weight (in German: Frischgewicht (geschlachtet)). To convert the gutted weight to round fresh weight would require a conversion by at least factor 1.2, the conversion factor listed for Germany in ICNAF Stat. Bull. Vol.4, p.19. It also seems that for years prior to 1956 salted fish should have been converted by at least factor 2.34 (as used in 1956-57) rather than by 2.0 to obtain fresh gutted weight and thereafter by factor 1.2 to get round fresh weight. This would correspond to a conversion factor of 2.81 for salted fish to round fresh weight, still less than the factor 3.0 set by ICNAF as from 1954 (see section on Material and Methods).

Trying to use all these pieces of information to convert the figures in the German tables for 1952-57 the author came up with the following conclusions.

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For 1952 and 1953 the ICNAF figures (2072 and 2099 tons, respectively) are identical to those found in Lundbeck's tables. For 1952 Lundbeck's figures indicate that landings in foreign ports were 1284 tons, presumably all salted fish converted by factor 2.0. For 1953 fish landed abroad accounted for 451 tons to which came 377 tons salted fish landed in Germany (according to national table of landings), altogether 828 tons salted fish (factor 2.0). Changing conversion factor for salted fish to 2.34 and thereafter applying factor 1.2 to the total landing (in terms of gutted weight) gave figures of 2750 and 2688 tons for the two years, respectively. These figures are listed in Table 2 b.

For 1954 the ICNAF figure is 1475 tons. Both the national table on landings and Lundbeck's table give 982 tons (gutted weight) of which 566 tons stem from salted fish. These may not have been converted in Lundbeck's table. The same procedure as used above leads to a total figure of 1294 tons. In this case the author has adopted the higher ICNAF figure.

In 1955, the Federal Republic of Germany started to fish also at East Greenland. However, neither the national table of landings nor Lundbeck's table separate catches from the two regions, and the table of trips and landings covers only part of the fishery. The author used the latter table as the proportion between landings from West and East Greenland both for gutted and salted fish and then converted to whole round weight. However, resultant figures for 1955-57 were not dramatically different from those listed by ICES for East plus West Greenland, and they did not suggest revision of figures in ICNAF Stat. Bull.

For years after 1957 the ICNAF/NAFO figures are adopted. So far as total catch by all nations for the years 1977-80 is concerned the ICNAF Standing Committee on Research and Statistics and the NAFO Scientific Council did, however, consider that some misreporting of catches had taken place and for their assessment of the state of the stock estimated a total catch well above that which would result from summing national figures in ICNAF/NAFO Stat. Bull. for those years (see Table 2b).

At East Greenland: The Federal Republic of Germany has been by far the most active country of those exploiting the cod stock off East Greenland. For 1958, when ICES started specifying catches at East Greenland 5,919 tons were reported, but Germany started fishing at East Greenland already in 1955 (see above under West Greenland). A comparison between catches recorded by ICES for West plus East Greenland (ICES Fishing Areas XV and XIV, respectively) with those recorded by ICNAF for West Greenland (ICNAF Subarea 1) for the years 1955-57 may lead to estimates for the catches at East Greenland. The figures are as follows (tons):

Year	ICES XIV + XV	ICNAF SA 1 (= ICES XV)	Difference
1955	10,893	7,248	3,645
1956	41,174	29,082	12,092
1957	19,005	10,537	8,468

The figures (differences) for 1955-57 are here used as estimates for catches at East Greenland.

Figures for years since 1958 are those recorded in ICES Bull. Stat. (for 1991-93 from Anon. 1994). For the years 1977-82 the ICES Working Group on Cod Stocks off East Greenland did, however, judge that the total catch of cod there by all nations was well above the figures that would result from summing the national figures listed in ICES Bull. Stat. and used higher estimates of the total for its assessment of the state of the stock (Anon. 1987 and 1992), see Table 3.

Special note: For the years 1978-84, the Federal Republic of Germany has reported catches of cod in ICES Fishing Area XII. The ICES Working Group on Cod Stocks off East Greenland has considered these catches to have been taken in East Greenland waters and so has the author of the present paper.

#### THE GERMAN DEMOCRATIC REPUBLIC.

The German Democratic Republic became member of ICNAF in 1974. In 1958-59 its catches in the ICNAF Area were recorded under Germany (E) in ICNAF Stat. Bull., thereafter, until 1971 (incl.), under Non-member (A). From 1972 to 1990 it was listed under its correct name, thereafter it has been part of the Federal Republic of Germany.

At West Greenland: So far as cod fishing at Greenland is concerned the first records are from 1958 (607 tons) and 1959 (35 tons). The catch for 1960 was 69 tons while for 1961-63 no cod catches are recorded in ICNAF Stat. Bull., not even for other parts of the ICNAF Convention Area. However, Biester (1964) reports a catch of 22,984 tons of cod at West Greenland for 1963. Since there was some fishing there by the German Democratic Republic in 1958-60 and since it started fisheries research at Greenland in 1961 (Biester and Mahn, 1963) it seems highly likely that it had commercial catches there also in 1961 and 1962.

For 1961, the total catch (all species) in the ICNAF Convention Area by the German Democratic Republic was 14,125 tons (ICNAF Stat. Bull. Vol.11, Table 5, Non-members landed in Rostock). Biester (1964) lists the German Democratic Republic's catch in 1963 in Subarea 1 as 22,984 tons of cod, 34,933 of all species. ICNAF Stat. Bull. for 1964 has the following figures for the German Democratic Republic: Convention Area, all species 92,276 tons; Subarea 1 15,092 tons of cod, 22,615 tons all species. If, for 1961, the Subarea 1 proportion of all species were as in 1964 and the percentage of cod there were as in 1963 then the Subarea 1 catch of cod in 1961 was approximately 2,200 tons. This estimate is suggested here.

For 1962 no specific information is available, but supposing an activity level between that in 1961 and that in 1963 a figure of 10,000 tons is suggested. Catches thereafter (Table 2 b) are those recorded in ICNAF Stat. Bull. including revisions in Vol.22.

At East Greenland the only fishing activity reported by the German Democratic Republic was in 1973-75. Figures in Table 3 are from ICES Bull. Stat.

#### ICELAND.

At West Greenland: Cod fishing at Greenland by Iceland started in the mid 1930s by longliners with poor results (Hansen and Hermann, 1953; ICNAF Stat. Bull. Vol.2, p.16). The exact year for this experiment is not given in the references made. However, in the magazine "Ægir", issued by the Fisheries Association of Iceland, Vol.29, No.6 of June 1936 it is mentioned that a fishing vessel went to Greenland in June 1936; by 20 June it had still no catch due to bad weather and lack of fish (Sigfús Schopka kindly supplied copy of the "Ægir"). The trip lasted more than two months (Schopka, pers. comm.+). An arbitrary figure of 50 tons for 1936 is suggested here.

Hansen and Hermann (1953) state that the next experiment was by the trawler "Akranes" in 1948. Schopka (pers.somm.) states that the name of the trawler was "Akurey". Anyway, the fishery was not successful and an estimate of 50 tons is made here. In 1949 a trawler and three longliners participated, the trawler with good results, the liners with a poor catch. Hansen and Hermann (l.c.) give a figure of 150 tons for the largest liner. ICES Bull. Stat. has a figure for West and East Greenland combined of 1,150 tons for that year. Since catch per trip was in the order of 500-700 tons in 1951-52 (ICNAF Stat. Bull. Vol.2, p.17) the ICES figure for 1949 seems realistic and is therefore used, but like figures for 1951-53 converted by factor 4/3, the conversion factor for salted fish to round fresh being 2.25 before 1954 when it was changed to 3.0. From 1954 onwards figures are from ICNAF/NAFO Stat. Bull.

At East Greenland Iceland has reported cod catches throughout the period 1958-76. For 1958 (the first year when ICES recorded catches at East Greenland separately) 4,099 tons were reported. On the basis of files of the Fisheries Association of Iceland Schopka (pers. comm.) found that Iceland started fishing at East Greenland in 1954. Although the target species was redfish also cod was taken. Schopka's estimates of cod catches are

1954	432 tons (round fresh)
1955	1490 -
1956	758 -
1957	1788 -

These estimates are adopted (Table 3) although the conversion factor for salted fish used by Schopka was 2.495. However, not all fish were salted, some were landed fresh gutted and converted by factor 1.25.

Figures for years since 1958 are from ICES Bull. Stat. (for 1992 from Advance Release of Bull. Stat.Stat.. (ICES C.M. 1993/Gen:5).

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## ITALY.

At West Greenland: Hansen and Hermann (1953) state that Italy has shown little interest in fishing at Greenland although there were some large Italian trawlers there in 1953 and possibly also in 1952.

In ICNAF Second Ann. Rap., Table 29 there are some relatively small figures for Italian catches of cod in the NW Atlantic 1938-40. None of these are thought to be from Greenland waters. For 1950, the table gives a figure of 5,305 tons of cod for Subareas 1, 2 and 3 combined, and for 1951 a figure of 5,700 tons for Subareas 1-2. These catches have here been distributed evenly between the subareas, giving for Subarea 1 1,770 tons in 1950, 2,850 tons in 1951. For 1952, ICNAF Stat. Bull. gives figures of 6,891 tons for Subareas 1-3, giving 2,300 tons for Subarea 1 on the even-share basis.

The figures for 1950-52 given above have been converted by factor 0.92 to take account of the change of the Italian conversion factor for salted fish from 3.25 in those years to 3.0 from 1953. The revised figures are 1,630, 2,620 and 2,120 tons for 1950, -51 and -52, respectively.

For 1953, a figure of 8,830 tons is given for Subarea 1 and 2 combined (ICNAF Stat. Bull. Vol.3, Table 16). 4,415 tons for Subarea 1 on the even-share basis.

For 1954, the Italian catch of cod in the ICNAF Convention Area is recorded as 12,410 tons with a note that fishing took place in Subareas 2, 3 and 4. However, the Greenland Fisheries Research Institute received from Italy six of the institutes cod tags reported as recaptured at Greenland that year. The author has, therefore, arbitrarily set a catch of 2,000 tons for Italy in Subarea 1 for 1954.

For 1955, the Italian catch of cod in the ICNAF Convention Area is 9,564 tons. It is likely that part of this catch was taken in Subarea 1, see note re. 1954 above and 1956 below. The author has estimated about 1/4 or 2,400 tons for Subarea 1.

For 1956, the Italian catch of cod in the ICNAF Convention Area is 9,441 tons. According to Stat. Bull. Vol.7, footnote on p.67 one of two trips goes to Subareas 1 and 3. The even-share method would then give 1/4 or about 2,400 tons for Subarea 1. Exactly the same reference and principle used on the 1957 total catch (6,624 tons of cod) leads to an estimate for Subarea 1 of 1,600 tons.

For 1958, the Italian catch of cod in Subarea 1 is recorded directly as 1,100 tons (ICNAF Stat. Bull. Vol.8, p.69) out of 3,200 tons for the ICNAF Convention Area, while for 1959 the catch of cod in the Convention Area is 4,902 tons. Taking the 1958 proportion for Subarea 1 leads to a figure of about 1,700 tons for that Subarea in 1959.

In the years after 1959 Italian cod fishing at Greenland has been negligible. Figures for Subarea 1 are recorded only for 1960 (32 tons) and 1965 (1,251 tons).

At East Greenland there are no records of Italian fishing.

## JAPAN.

At West Greenland: Japan has shown very little interest in the cod fisheries at Greenland. The only records found in ICNAF Stat. Bull. for the West Greenland area are from 1968 and 1969 (Stat. Bull. Vol.22, p.220). The catch of cod was probably by-catch in search for other species.

At East Greenland: There are no Japanese catches of cod recorded in ICES Bull. Stat. (latest issue seen is that for 1988). In 1986 and 1987 Greenland Home Rule chartered some Japanese trawlers to fish for redfish. Their by-catch of cod was 97 and 74 tons for the two years, respectively. These catches are listed in brackets under Japan in Table 3 but are also incorporated in the Greenland catch figures in that table. Japanese experimental fishing in recent years has been for species other than cod, but negligible by-catches of cod have been taken. Figures listed are those reported directly by vessels to Greenland authorities.

## NORWAY.

At West Greenland: Norwegian fishing at Greenland in this century began in 1924 (Hjort and Ruud, 1929). Although Atl. halibut was the target species in the 1920s also some cod were landed as salted fish, but many were also discarded.

For 1924 no precise figure is found. Mr. Baldersheim reported "a cargo of salted fish" (Baldersheim's report is part of Hjort and Ruud, *l.c.*). The graph in ICNAF Stat. Bull. Vol.2, p.18 does not allow precise estimates but indicates a catch less than 500 tons (round fresh). From this the author has estimated a catch of 200 tons.

For 1925, ICES Bull. Stat. has a figure of 445 tons (probably salted fish) for the Iceland-Faroes-Greenland area. The graph in ICNAF Stat. Bull. mentioned above indicates about 3,500 tons. However, Baldersheim's report (*l.c.*) does not indicate a successful expedition, rather the contrary, and the author of the present paper has chosen an estimate of 1,000 tons.

For 1926, Hjort and Ruud (*l.c.*) report 300 tons salted fish, while for 1927 they report that no cod were caught (fishing was for Atl. halibut) though the fish was present in as large quantities as in 1926. The ICES figure for 1926 is 519 tons (probably salted fish), again for the Iceland-Faroes-Greenland area. The graph in ICNAF Stat. Bull. mentioned above indicates less than 1,000 tons (round fresh). The estimate here used is 750 tons. Hjort and Ruud's statement for 1927 (no cod caught) may mean that no cod were kept and landed but rather discarded. Their statement for 1928 (see below) lends support to this possibility. The author has, however, refrained from guessing a catch for 1927.

For 1928, Hjort and Ruud (*l.c.*) ascertain that about 800-900 tons of salted cod were landed although every effort was made to avoid taking cod (instead of halibut), but a great deal of cod had to be thrown away all the same. The figure of 3,000 tons round fresh fish proposed here may well be an underestimate of the actual removal of cod by fishing, including discards not surviving.

For 1929-30, neither ICES Bull. Stat. nor information in ICNAF Stat. Bull. Vol.2 point to Norwegian cod fishing at Greenland.

For the years 1931-48 figures from ICES Bull. Stat. are used. They seem to follow the graph in ICNAF Stat. Bull. reasonably well except for 1933 and 1946 when ICES has nil while the graph indicates about 100 and 400 tons for the two years, respectively. Here the latter figures are used.

For 1949, the ICNAF graph mentioned above indicates about 15,000 tons, while ICES Bull. Stat. has the figure 10,686 tons. However, ICES may not have included catches from the ICNAF Convention Area not broken down on Subareas. This seems at any rate to have been the case in 1950-51 for which ICNAF figures as revised (Stat. Bull. Vol.3, p.51) are 30,615 and 43,178 tons, respectively. The author has, therefore, chosen 15,000 tons as the estimate for 1949.

For years since 1950, the figures from ICNAF Stat. Bull. are used, applying, however, a factor 1.25 for the years 1951-53 due to the change in 1954 of the conversion factor for salted fish from 2.4 to 3.0. This follows the revisions made by the ICNAF Assessment Working Group 1961 (see the appended extract of ICNAF Ser. No. 932. The appendix has no figures for Norway for the years 1929-49).

Since 1950, catches have been reported separately for trawlers and liners. Catches prior to 1950 are here regarded as taken by liners solely.

For 1965, the figure for liners includes 6,376 tons allocated (in the same proportion as specified catches) from catches not specified on subareas (Subarea NK (for not known) 6,384 tons), see ICNAF Stat. Bull. Vol. 15, p.90. For 1964 all Subarea NK catches by liners (2,080 tons) have here been included in the catch from West Greenland.

Figures for 1968 include corrections given in ICNAF Stat. Bull. Vol. 19, p.121, while figures for 1974 include corrections given in Vol. 25, p.231.

At East Greenland: For the years since 1958, when ICES started separating East and West Greenland statistics, there are no records of Norwegian catches of cod at East Greenland until 1975. Figures in ICES Bull. Stat. prior to 1958 are close to those given above for West Greenland. It does, therefore, occur that Norwegian catches at East Greenland were negligible or nil until 1975. Figures for 1990-93 are provisional from Anon. 1994.

#### POLAND.

The only records of Polish catches of cod at Greenland are those in ICNAF Stat. Bull. for the years 1960 and 1962-69 when small amounts of cod were caught at West Greenland, all

by trawlers.

# PORTUGAL.

At West Greenland: Like France, Portugal has a long tradition for fishing cod in the Northwest Atlantic. The traditional fishing was by hand lines from dories. Trawlers were introduced in 1936 (ICNAF Stat. Bull. Vol.2, p.18). Portugal supplied statistics for years since 1896 to ICNAF Second Annual Report.

Hansen and Hermann (1953) state that Portuguese fishing at Greenland started in 1931. However, the ICES Bull. Stat. which started to include fisheries at Greenland and Newfoundland in 1925 does not list any Portuguese fishing in these areas until 1932, and figures up to 1951 are for Greenland and Newfoundland combined. However, Hansen and Hermann must have had some evidence for their statement, probably personal observations by Hansen.

For the years 1931-46 there are series of catch statistics in ICNAF Sec. Ann. Rep., p.45 and Stat. Bull. Vol. 2 (in the latter back to 1936 only), and in ICES Bull Stat. None of these series give catches by Subareas for that period but cover the whole Northwest Atlantic (the ICES figures for 1931-32 are listed as taken at Newfoundland, those thereafter as taken at Newfoundland and at Greenland combined). The ICES series is for salted fish according to a footnote in Bull. Stat. for 1953. For comparison to the ICNAF series (as raised by factor 1.2) the ICES figures have here been raised by factor 3.0. The two series (in tons) are as follows with figures for 1947-52 added as taken from ICNAF Stat. Bull. (incl. revisions in various volumes and converted by factor 1.2 to take into account the change in conversion factor for salted fish from 2.5 prior to 1954 to 3.0 thereafter).

Year	ICNAF			ICES all vessels
	dories	trawlers	total	
1931	11,978	-	11,978	11,097
1932	14,978	-	14,978	13,791
1933	25,064	-	25,064	23,139
1934	26,946	-	26,946	24,903
1935	30,606	-	30,606	28,338
1936	35,390	3,031	38,961	31,113
1937	43,340	4,454	47,794	19,515
1938	41,344	2,260	43,604	46,290
1939	52,500	5,244	57,744	57,975
1940	52,584	8,608	61,192	61,623
1941	51,371	10,213	61,584	62,106
1942	53,579	9,475	63,054	63,048
1943	55,196	13,218	68,418	68,412
1944	54,913	19,118	74,031	74,037
1945	58,350	26,575	84,925	84,927
1946	61,903	31,570	93,473	93,468
1947	63,965	37,430	101,395	101,157
1948	65,822	40,151	105,973	105,975
1949	66,707	65,468	132,175	132,189
1950	73,975	79,938	153,913	154,416
1951	73,094	73,045	146,139	158,836
1952	70,060	89,286	159,346	166,305

Apart from in the year 1937 the two series show good agreement, from 1942 to 1950 practically full agreement. The ICNAF series is used here. To get guidance as to what proportion of the catch was taken at Greenland the figures from 1947-52 are used for dories while for trawlers no figures for individual subareas are available in the ICNAF Statistics until 1952. The 1952-53 figures are used to estimate the proportion taken at Greenland by trawlers. The figures are (catches in tons):

Year	Dory vessels			Trawlers		
	Greenl.	ICNAF area	Greenl. proportion	Greenl.	ICNAF area	Greenl. proportion
1947	37,924	63,965	0.59			
1948	41,930	65,822	0.64			
1949	52,361	66,707	0.78			
1950	48,227	73,975	0.65			
1951	58,033	73,094	0.79			
1952	51,965	70,060	0.74	14,468	89,286	0.16
1953				7,975	116,070	0.07

On the basis of these figures it is estimated that trawlers took 10% of their NW Atlantic catch at Greenland during 1936-51 (figures in this paper rounded to nearest hundred tons).

For dories, it is noted that the ICNAF Ass. Working Group 1961 lists figures for catch at Greenland since 1929 (see the appended extract of ICNAF Ser. No. 932). The figures listed for dories by the Ass. W. Gr. for 1929-46 make up 70% on average (range 37-92 %) of their total NW Atlantic catch of cod. Unfortunately, the Assessment Working Group's background working paper for its assessment seems no longer to exist (in the NAFO Secretariat) but from the above findings and recognizing that the Assessment Working Group had a Portuguese member the author has adopted the figures from the Working Group for the years 1929-46 for dories and for 1929-51 for trawlers (catch recorded in only some of the years). Figures thereafter are those found in ICNAF Stat. Bull., those for 1947-52 converted by 1.2.

In the first draft of this paper it was questioned whether Portugal (as the only country besides Greenland) carried out fishing at Greenland during the Second World War. However, the figures by the Assessment Working Group, a note in Hansen and Hermann (1953) and personal observation by Jens Fynbo (pers. comm.+) substantiate such Portuguese activity.

At East Greenland there seems to be no records of any Portuguese fishing.

#### SPAIN.

At West Greenland: Spanish fishery in the Northwest Atlantic has a long tradition. However, statistics have been reported only since 1927 (ICNAF Stat. Bull. Vol.3, p.15). A Spanish vessel was, however, fishing in the NW Atlantic during 1925-27 but probably at Newfoundland rather than at Greenland (A.Vasquez, pers. comm.+). At Greenland only trawlers, mainly otter trawlers, have been used.

Hansen and Hermann (1953) state that a few Spanish trawlers fished at Greenland in the 1930s but not in the beginning of the 1950s. Fig.13 in ICNAF Stat. Bull. Vol.3 shows cod landings by Spanish otter trawlers in the 1930s in the range of 14 - 26 thousand tons for the whole NW Atlantic. The author of the present paper has not found it possible to estimate the evidently small quantities for Subarea 1 (if any at all) for specific years.

After the war, the graph mentioned above shows that cod landings from the NW Atlantic by otter trawlers increased from about 6,000 tons in 1943 to about 36,000 tons in 1947 while in 1950 and 1951 their catches were about 30,000 tons.

The first record in ICNAF Stat.Bull. specifying Spanish catches at Greenland is from 1952. However, this may correspond to the start of an organized statistical service rather than to the effective commencement of a fishery there (A.Vasquez, pers. comm.).

ICNAF Stat. Bull. Vol 2, p.21 and corrections from Vol.3, p.51 say that Spain fishes in Subareas 1, 2, 3 and 4. However, since for 1951 only Subareas 2, 3 and 4 are mentioned (Second Ann. Rep., p.45) and for 1952-53 only a minor part of the cod catch was taken at Greenland (in 1952 4,879 tons out of 34,851 (ICNAF Stat. Bull. Vol.2, p.47), in 1953 2,932 tons out of 58,620 (Vol.3, Table 24)) relatively small catches are regarded taken at Greenland by Spain in the period 1944-51. A review of the archives of Spanish fishing companies operating in those years would probably allow better estimates (A.Vasquez, pers. comm.). However, such a review has not been possible for the time being. Arbitrary figures of 1,000 tons are set for the years 1946-50, 2,000 tons for 1951 (Table 2b).

For 1952, 4,879 tons are reported for Subarea 1 (ICNAF Stat. Bull. Vol.2, p.47) but according to page 28 (same volume) with corrections from Vol.3, p.51 there is a further estimate of 8,424 tons of cod not specified on subareas. The (corrected) footnote (Vol.2, p.28) indicates that the major part of this unallocated catch is from Subarea 3 but with a part also from Subarea 1. 1,000 tons has here been allocated to Subarea 1, giving a figure of 5,879 tons.

Both figures (for 1952 and 1953) have thereafter been raised by factor 1.2 due to the change of conversion factor for salted fish from 2.5 to 3.0 in 1954. The figures then become 7,055 tons for 1952 and 3,519 for 1953. For years since 1954 figures from ICNAF Stat. Bull. are used directly.

At East Greenland: There are no figures in ICES Bull. Stat. for Spanish fishing at Greenland until 1957 when 18,933 tons were recorded for West plus East Greenland.

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However, since the ICNAF figure for West Greenland for that year is 22,875 tons it cannot be concluded that Spain had any catches at East Greenland. Rather, no Spanish catch there would be the logic. A. Vasquez (pers. comm.) states that Spain has no tradition and no records for fishing at East Greenland.

#### UNION OF SOVIET SOCIALIST REPUBLICS (USSR).

At West Greenland: A recapture of a cod tagged by the Greenland Fisheries Research Institute and reported taken in Div 1B by a Soviet vessel in 1958 indicates some fishing by USSR at Greenland already that year. However, until 1959 there are no records in ICNAF Stat. Bull. nor in ICES Bull. Stat. of Soviet fishing at Greenland. No guess of the possible catch in 1958 is made here.

Generally speaking, USSR has had very limited fishing activity in the cod fisheries at Greenland, evidently being more interested in redfish than in cod. Figures from West Greenland are from ICNAF Stat. Bull.

At East Greenland: Except for 1963 there is very limited Soviet fishing for cod recorded in ICES Bull. Stat. Figures are from that bulletin, for 1992 from Advance Release of Bull. Stat. (ICES C.M.1993/Gen:5).

#### UNITED KINGDOM.

The following statistics for the British cod fisheries at Greenland were available to the author:

Figures in ICES Bull. Stat. since 1925. West and East Greenland combined for 1925-1957 and including catches at Newfoundland for 1934-1938. According to B. Jones (pers.comm.) figures gave landed weight prior to 1951.

For the years 1928-1952 the United Kingdom supplied figures to ICNAF Stat. Bull. Vol.2 (p.22) for liners and trawlers separately (those for 1952 for trawlers were revised in Stat. Bull. Vol.3, p.55)

For years after 1952 figures are found in the annual issues of ICNAF Stat. Bull.

Figures for 1929-57 for the West Greenland area were listed by the ICNAF Assessment Working Group 1961 (see the appended extract of ICNAF Ser. No. 932).

Figures supplied by B. Jones (pers. comm.) for the years 1928-1957 for England, listing figures for West and East Greenland separately.

Figures from these sources are listed in the text table below.

Year	ICES Bull.Stat.		B. Jones		Ass. Subcomm.		ICNAF Stat.B.	
	Engl.	Scotl.	Engl.	W.Grl. E.Grl..	Line	Trawl	Line	Trawl
1925	-	352						
1926	-	102						
1927	-	315						
1928	485	15	583	-			553	-
1929	945	328	1,135	-	1,134	-	1,081	-
1930	2,488	264	2,988	-	2,986	-	2,861	-
1931	2,648	283	3,180	-	3,178	-	3,063	-
1932	1,297	135	1,558	-	1,557	-	1,517	-
1933	-	81	276	-	275	-	262	-
1934	214	282	238	-	238	-	226	-
1935	2,037	25	1,746	-	564	1,181	536	1,122
1936	5,326	281	6,331	-	443	5,584	421	5,590
1937	681	233	724	94	723	-	687	-
1938	532	224	585	53	585	-	555	-
1946	45	-	55	-	73	-	52	-
1947	58	39	70	-	93	-	94	-
1948	8,426	286	10,118	-	-	13,484	16	11,444
1949	12,526	373	15,041	-	-	20,043	-	16,812
1950	1,406	309	1,688	-	367	1,883	367	1,323



1951	13,282	182	12,948	9	58	12,883	55	12,238
1952	55,927	347	54,581	21	-	55,455	25	55,455
1953	35,247	20	34,372	-	-	32,635	-	32,635
1954	17,848	91	17,405	-	-	17,916	-	17,916
1955	3,789	37	3,797	-	-	5,044	-	5,044
1956	1,641	15	1,604	-	-	1603	-	1,603
1957	9,777	2	9,962	-	-	9565	-	9,565

ICES figures for 1934-1938 include catches at Newfoundland

At West Greenland: The British fishery at Greenland in this century started as a longline fishery for Atl. halibut although with by-catches or even direct catches of cod (Hansen and Hermann, 1953). Longline fishing was phased out after the war, and trawlers have dominated since 1948.

For the years 1925-27 figures in Table 2a are those from ICES Bull. Stat. converted by 1.2. According to B. Jones (pers. comm.+) British figures prior to 1951 in ICES Bull. Stat. are for landed weight. If, as evidently presumed by Jones, fish were landed gutted, head on, a conversion factor of 1.2 should be used. If also salted fish was produced the resultant figures are underestimates.

For the years 1928-38, Jones' figures are practically identical to those by the Assessment Working Group (differences of few tons may be due to rounding practice). Both series seem to have the same basis as figures supplied to ICES for England. Both Jones and the Working Group converted by factor 1.2. Both series seem, however to have ignored Scottish catches. Figures in ICNAF Stat. Bull. for this period are lower (by 3-5 %) than those by Jones and the Assessment Working Group. The reason for this seems to be that the ICNAF figures were achieved by using a conversion factor of 1.14 (for gutted fish) until 1954 (Stat. Bull. Vol. 4, p.19) thereafter 1.20 (Stat. Bull. Vol. 5, p.13). Whether all fish were landed as gutted or also some as salted fish is an open question. If the latter is the case the figures are underestimates. From these findings the figures in this paper for 1928-38 (Table 2a) are taken as those by the Assessment Working Group (for 1928 Jones' figure) plus figures for Scotland from ICES Bull. Stat. converted by 1.20 (assuming Scotland fished by trawlers only and (in 1934-38) not at Newfoundland).

There was no British fishing in Greenland waters during 1939-45.

For the period 1946-50, Jones' figures still are based on those landed weights reported to ICES for England (converted by 1.20), ignoring catches reported for Scotland. His figures for 1946 and 1950 are practically identical to the ICNAF figures while those for other years in this period are lower than those in ICNAF Stat. Bull. Vol. 2. Both Jones figures and the ICNAF figures are generally lower than those listed by the Assessment Working Group. Assuming that the Working Group had the same basic figures as Jones (English catches only) the group used 1.60 as conversion factor for these years. Jones (pers. comm.) converting by 1.20 under the assumption that fish were landed gutted, head on, states: "... in a few years after the war some vessels were landing fish from distant water grounds with heads off because of high catch rates and high demand. However, I have no information to determine to what extent this occurred at Greenland although we have some estimates for other areas. It is just possible that such corrections may have been attempted in earlier statistical submissions to scientific fora." The submission to the Assessment Working Group seems to have been such a case. Consequently, the author has adopted the figures for 1946-50 by the Assessment Working Group adding figures for catches by Scotland (from ICES Bull. Stat.) converted by 1.60 assuming all such catches were by trawlers and from West Greenland. The resultant figures are presented in Table 2b (the small catch by liners in 1948 is taken from ICNAF Stat. Bull. Vol.2).

For 1951, figures in ICES Bull. Stat. are supposed to be round fresh weight. They are slightly higher than both Jones' figures and those by the Assessment Working Group as well as those in ICNAF Stat. Bull. Here the figures by the Assessment Working Group are adopted adding catches by Scotland from ICES Bull. Stat., assuming these were by trawlers at West Greenland.

Figures for the years 1952-57 differ somewhat between the sources listed above. The Assessment Working Group adopted those listed in ICNAF Stat. Bull. (with footnote: not adjusted). The author also adopts the ICNAF figures since 1952 but has adjusted figures for 1952-54 by factor  $1.20/1.14 = 1.0526$ , see above for explanation (Table 2b).

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**Special note:** For 1957, the ICNAF Stat. Bull. Table 8, p.31 indicates a catch of 70 tons in Div.1C. However, in Table 1, p.18 that catch (and a parallel catch of 3,048 tons of redfish) is attributed to the Federal Republic of Germany. The catch has here been considered as being German.

**At East Greenland:** A comparison between the ICNAF series for West Greenland for the years 1928-57 with the ICES series for West plus East Greenland for the same period does not indicate any significant fishing at East Greenland by the United Kingdom, probably with the exception of the years 1951-53 when in fact the British cod fishery was concentrated near Cape Farewell (ICNAF Stat. Bull. Vol.2, pp. 15-16). In some other years the ICNAF series show higher figures than the ICES series (e.g. in 1948-49) and the author has, therefore, refrained from making estimates of the likely relatively small catches east of Cape Farewell prior to 1958. The two series are as follows with ICES covering West plus East Greenland, ICNAF West Greenland only (figures in tons):

Year	ICES	ICNAF	Year	ICES	ICNAF	Year	ICES	ICNAF
1928	500	553	1936	5,607	6,011	1950	1,715	1,690
1929	1,273	1,081	1937	914	687	1951	13,464	12,283
1930	2,752	2,861	1938	756	555	1952	56,274	55,480
1931	2,931	3,063	1939-45	0	0	1953	35,267	32,634
1932	1,432	1,517	1946	45	52	1954	17,939	17,916
1933	362	262	1947	97	94	1955	3,826	5,044
1934	496	226	1948	8,712	11,460	1956	1,656	1,603
1935	1,532	1,658	1949	12,899	16,892	1957	9,779	9,565

B. Jones (pers. comm.) supplying figures for the English fisheries 1928-57 lists catches at East Greenland only in the years 1937, 1938, 1951 and 1952. These are found in Table 3.

For years since 1958 the figures from ICES Bull. Stat. are used. Figures for 1989-93 are from Anon. 1994.

#### UNITED STATES OF AMERICA (USA).

**At West Greenland** USA had some fishing, mainly for Atl.halibut in the last half of the 19th century. In terms of cod fishing at Greenland in the 20th century there are just two records in ICNAF Stat. Bull.: 200 tons in 1969 and 278 tons in 1970, both in Div. 1A. The author initially thought that these were spatially wrongly reported or recorded, especially since the catches are recorded as from Div. 1A, where few nations fished for cod in 1969, and no other (except Greenland) in 1970, and since also 1 ton of haddock, seldomly reported in the West Greenland fisheries, was recorded for 1970. However, the USA Research Reports to ICNAF for those years specifically mention these catches (Graham, 1969; Hennemuth and Posgay, 1970), and R.Mayo (pers.comm.+) confirms that during 1969 and 1970 a large USA trawler made five trips to West Greenland and fished in Div.1A. The catches are, therefore, maintained in the tables of this paper.

**At East Greenland:** There are no records for USA.

#### Catches usually not Reported in Catch Statistics

##### Fish consumed on board.

There are few reports on the amount of fish consumed on board fishing vessels. In the cod fisheries at Greenland the amount is thought to have been relatively high on vessels without freezers, for instance on liners producing salted fish. Portugal reports that, in 1952, 1,017 tons of cod were consumed on board dory vessels, 652 tons on trawlers operating in the ICNAF Convention Area (ICNAF Stat. Bull. Vol.3, pp. 51-52). This compares to landings of 67 and 90 thousand tons for the two fleets, respectively (figures for landings raised by factor 1.2 as explained under Portugal in the preceeding section). Looking at the proportion of the catch taken at Greenland by these fleets it seems likely that a total of about one thousand tons was consumed annually by Portuguese fishermen at Greenland in the years when Portugal had an important fishery there.

A relatively high consumption of fish is likely also to have occurred on board Faroese and Norwegian liners, but probably less on other fleets. A total consumption by all fleets of

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about 5,000 tons annually does not seem unrealistic in the 1950s and -60s, but it has probably been decreasing much thereafter.

Fish consumed by Greenlanders on board or after non-registered local sale.

Cod is common food on board Greenlandic fishing vessels but the major part of cod not registered as nominal catch is probably made up of fish sold directly by fishermen on the local markets in Greenland.

Borreby (1956 a) interviewing thirteen Greenland families found the average daily consumption of fish and fish products to be about 400 g per person of which 51 g of cod. However, only four of these families were from districts where cod could be regarded the most important local fish, the remainder being from areas in the north where Greenland halibut and Greenland cod (*Gadus ogace*) are more important than cod. An average daily intake of about 50 g per person could, therefore, likely be an underestimate.

Borreby (1956 b) also investigated consumption on two Greenland hospitals and found the average daily consumption of cod per patient to be 20 g for the Jakobshavn hospital in November and 71 g for the Julianehåb hospital in July. This could also point to an overall average figure of at least 50 g cod per person per day, probably corresponding to about 100 g round fresh fish.

With a population of about 20,000 persons at West Greenland at that time this would point to a local consumption of about 700 tons of cod annually. The population has increased much since then (55 thousand inhabitants at West Greenland by 1993) but at the same time the mean intake per person of local food has probably dropped due to the concentration of the population in cities with access to much increased quantities and a great variation of imported food. Also a relatively higher sale of local food via fish plants whereby this part of the food has been registered in the fishery statistics has to be taken into account. An estimate of about 1,000 tons non-registered cod annually in the 1950s and -60s does, however, not seem unlikely for the consumption in Greenland.

Fish discarded, not surviving.

For cod fishing at Greenland a minimum mesh size regulation for trawls was set through ICNAF in 1966 (130 mm, effective from 1969). Domestically, a minimum size of 42 cm total length for landed cod, reasonably well corresponding to the 50% retention length for the prescribed trawls, was introduced in 1969 and changed to 40 cm in 1973. However, in periods with large landings some fish plants temporarily have had to refuse landings of cod smaller than 50 cm or even 55 cm.

Although no prescribed minimum size for cod exist for the non-Greenlandic fleets these may nevertheless sometimes discard small fish. Modern vessels may turn such fish into fishmeal whereby the fish ought to be registered in the nominal catch. However, the ICNAF system for reporting discards and industrial fish never came to work properly so reliable figures are not available. For the cod fisheries at Greenland the discards (by definition not included in the nominal catch) are likely to be found mainly in the Greenlanders' fishery, especially in that by pound nets. Although careful release of undersized fish caught by this gear can ensure survival of the discards careless handling is probably as common as careful handling. The discarding problem is highest in years when relatively abundant year classes are recruiting (generally at age 2-4 years). In such previously not uncommon cases more than half the catch in a pound net may be undersized fish to be discarded. For instance, in a pound net catch, Div 1F, July 1967, when the abundant year-class 1963 was round the minimum landing size, only about 1/3 of the catch by numbers was above the 42 cm minimum size (Horsted, 1968. See also ICNAF Sampling Yearbook, Vol. 12, p.63). It is, however, extremely difficult to judge year by year the amount of fish discarded and dead, but the amount may be considerable (some thousand tons ?) in some years.

In total, besides the catches reported and recorded as nominal catch there are legal catches which for the cod fisheries at Greenland may have been in the range of one to ten thousand tons annually, highest probably in the 1950s and -60s. The author has not added estimates of such catches to the catches listed in this paper. Such catches do, however, contribute to the total mortality of the stock.

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#### Abbreviations and Symbols for Tables.

GNS Set gillnets (anchored)

LLS Set longlines

LX Hooks and lines (not specified)

MIS Miscellaneous gear

OTB Bottom otter trawl

(-) Some catch by the gear likely, but the catch is included under miscellaneous gear (MIS).

Table 1 a. Nominal catches of cod by Greenland at West Greenland 1911-1955. All catches considered taken in inshore or coastal waters and by gears other than trawls. Tons round fresh weight.

Year	Tons	Year	Tons	Year	Tons
1911	19	1926	2,224	1941	8,622
1912	5	1927	3,570	1942	12,027
1913	66	1928	4,163	1943	13,026
1914	60	1929	7,080	1944	13,385
1915	98	1930	9,658	1945	14,289
1916	193	1931	9,054	1946	15,262
1917	154	1932	9,232	1947	18,029
1918	441	1933	8,238	1948	18,675
1919	501	1934	9,468	1949	17,050
1920	454	1935	7,526	1950	21,173
1921	508	1936	7,174	1951	18,200
1922	602	1937	6,961	1952	16,726
1923	690	1938	5,492	1953	20,651
1924	843	1939	7,161	1954	18,698
1925	1,024	1940	8,026	1955	19,787

Table 1 b. Nominal catches of cod by Greenland at West and at East Greenland 1956-1993. Tons round fresh weight. 1992-93: Provisional figures.

Gear: Year	WEST GREENLAND			Total	EAST GREENLAND			TOTAL
	Inshore	Offsh.			Insh.	Offsh.	Total	
	MIS	MIS	OTB		MIS	OTB		
	(see footnote 1)							
1956	21,028	-	-	21,028	37	-	37	21,065
1957	24,593	-	-	24,593	197	-	197	24,790
1958	25,802	-	-	25,802	882	-	882	26,684
1959	27,577	-	-	27,577	607	-	607	28,184
1960	27,099	-	-	27,099	1,609	-	1,609	28,708
1961	33,965	-	-	33,965	1,199	-	1,199	35,164
1962	35,380	-	-	35,380	903	-	903	36,283
1963	23,269	-	-	23,269	904	-	904	24,173
1964	21,986	-	-	21,986	1,120	-	1,120	23,106
1965	22,922	1,400	-	24,322	887	-	887	25,209
1966	25,776	3,300	-	29,076	880	-	880	29,956
1967	25,124	2,400	-	27,524	753	-	753	28,277
1968	19,755	832	129	20,716	628	-	628	21,344
1969	21,236	256	2,129	23,621	627	-	627	24,248
1970	15,563	50	4,394	20,007	501	-	501	20,508
1971	13,506	-	5,924	19,430	533	-	533	19,963
1972	14,645	-	8,757	23,402	108	171	279	23,681
1973	9,622	-	8,093	17,715	191	-	191	17,906
1974	8,638	-	11,294	19,932	68	-	68	20,000
1975	6,555	-	12,759	19,314	224	-	224	19,538
1976	5,174	-	11,108	16,282	272	100	372	16,654
1977	13,999	-	10,221	24,220	965	868	1,833	26,053
1978	19,679	-	17,791	37,470	616	731	1,347	38,817
1979	35,590	-	10,794	46,384	1,195	1,560	2,755	49,139
1980	38,571	-	7,267	45,838	1,551	227	1,778	47,616
1981	39,703	-	13,336	53,039	318	572	890	53,929
1982	26,664	-	21,029	47,693	270	628	898	48,591
1983	28,642	-	16,328	44,970	47	391	438	45,408
1984	19,958	-	4,499	24,457	9	1,042	1,051	25,508
1985	8,441	-	4,210	12,651	47	59	106	12,757
1986	5,302	-	1,247	6,549	18	588	606	7,155
1987	8,402	-	3,882	12,284	43	1,507	1,476	13,760
1988	22,829	-	29,306	52,135	185	160	345	52,480
1989	38,529	-	53,623	92,152	259	3,611	3,870	96,020
1990	29,026	-	30,017	59,043	487	4,003	4,490	63,533
1991	18,311	-	1,927	20,238	639	6,038	6,677	26,915
1992	5,723	-	-	5,723	-	-	1,283	7,006
1993	1,924	-	-	1,924	-	-	198	2,122

1) Offshore catches at East Greenland include also catches by longliners: 656 tons in 1984, 2729 tons in 1991. Catches off East Greenland in 1986-87 include catches by Japanese trawlers chartered by Greenland: 97 tons in 1986, 74 tons in 1987.

Table 2a. Nominal catches of cod at West Greenland 1924-45 by country and gear category. Metric tons.  
Includes estimates as mentioned in the text. Abbreviations see text p. 30.

COUNTRY	GREEN- LAND	DENMARK	FAROE ISLANDS	CANADA	FRANCE	GERMANY	ICELAND	NORWAY	PORTUGAL	UNITED KINGDOM	TOTAL		GRAND TOTAL
GEAR	MIS	MIS	LX	LLS	LX	OTB	LLS	LX	LX	LLS	MIS	OTB	
YEAR													
1924	843							200			1043	0	1043
1925	1024	20	429					1000		422	2895	0	2895
1926	2224		2880		700			750		122	6676	0	6676
1927	3570		3359		700					368	7997	0	7997
1928	4163		1570		700			3000		601	10034	0	10034
1929	7080	100	12294		8235	147				1528	29237	147	29384
1930	9658	30	29696		46560	123				3303	104257	123	104380
1931	9054		25086	50	81438			89		3517	129912	0	129912
1932	9232		18022		59892			236		1719	96505	0	96505
1933	8238		21647		18447			125		372	62589	0	62589
1934	9468		30256		33663			603		576	97590	0	97590
1935	7526		20965		27903			803		584	72161	1211	73372
1936	7174	141	19169		80973		50	3175	15800	443	126925	6221	133146
1937	6961	159	29081		44169	138		2546	13200	1003	97119	138	97257
1938	5492	42	30364		27807			6975	24000	854	95534	0	95534
1939	7161		30562					14445	17800		69968	0	69968
1940	8026		16722						26400		51148	0	51148
1941	8622								35000		43622	0	43622
1942	12027								38600	2214	50627	2214	52841
1943	13026								47400		60426	0	60426
1944	13385								49000	2627	62385	2627	65012
1945	14289								45800		60089	0	60089

Table 2b. Nominal catches of cod at West Greenland 1946-93 by country and by gear category. Metric tons.  
Includes estimates as mentioned in the text. Abbreviations see text p.30.

COUNTRY YEAR	GREENLAND		DENMARK		FAROE ISLANDS		CANADA		FRANCE		FED. REP. OF GERM.		GERMAN DEM. REP.		ICELAND		ITALY		JAPAN		NORWAY	
	MIS	OTB	MIS	OTB	MIS	OTB	OTB	OTB	MIS	OTB	OTB	OTB	OTB	OTB	OTB	GNS	OTB	OTB	OTB	MIS	OTB	
1946	15282				2716				5106	(-)											500	
1947	18029				7900				14180	(-)											2299	
1948	18675		2265		18696				30384	(-)											703	
1949	17050		4187		21884				35590	(-)											18750	
1950	21173		8307		35730				31200	(-)											36216	2053
1951	18200		8414		41232				25978	(-)											53873	300
1952	18726				32916	18766	876			38000											23847	4368
1953	20851				16103	16960				23976											33977	5391
1954	18998				17115	14245				64095											38508	10745
1955	19787				17344	16487				34121											39076	3900
1956	21028				13804	17871				30461											39257	1709
1957	24593				11993	21172				27194											18237	1668
1958	25802				19285	24267				23720				807							33273	3195
1959	27577				21916	18399				30376				35							25674	937
1960	27099				23347	25290				21014				69							30980	793
1961	33985				32516	23886				39623				2200							41904	1584
1962	35380				55482	37206				52974				10000							31917	
1963	23298				48088	29718				36168				22984							28821	3144
1964	21886				40463	25016				34797				15062							25603	8783
1965	24322				44949	20759				40081				12980							30980	7480
1966	28076				48789	17759				41406				8734							28106	11720
1967	27524				41664	22017				43348				8603							30277	22913
1968	20587				22763	23043	8			46587				28449					60		22794	28151
1969	21492				18344	(-)				25185				78580					5		15138	2911
1970	19613				7733	(-)				4740				40667							8293	
1971	13506				16440	(-)				4108				40816							4020	2240
1972	14645				9948	(-)				5515				18833							11331	20209
1973	9622				4499	(-)				38				5944							5917	9850
1974	8638				4911	(-)								1681							3084	411
1975	6555				5355	(-)								10842							3086	
1976	5174				3390	70								5842							2828	
1977	13999				7348	(-)								2009							1683	
1978	19879					(-)				138				1057								4
1979	35590				38	(-)								1344								
1980	38571					(-)								1024								
1981	38703					(-)								417								
1982	28664					(-)								8139								
1983	28642				1339	(-)								10156								
1984	19658					(-)								8941								
1985	8441					(-)								2170					13		8	(-)
1986	5302					(-)								41					54		1	(-)
1987	8402					(-)								55					11		2	(-)
1988	28829					(-)								8574					33		1	(-)
1989	38529					(-)								12892					10		7	(-)
1990	28028					(-)								7816							2	(-)
1991	15311					(-)								82							948	(-)
1992	5723					(-)																
1993	1924					(-)																

... Cont.



Table 2b continued.

COUNTRY	POLAND	PORTUGAL	SPAIN	USSR	UNITED KINGDOM	USA	TOTAL		GRAND TOTAL	Estimates for assessment when differing from grand total	Foot-note No.
YEAR	OTB	MIS	OTB	OTB	LLS	OTB	MIS	OTB			
1946		35000	1000		73		66637	1000	66637	66637	
1947		37824	1000		93		60425	1002	60425	81487	
1948		41930	1000		16		112738	14992	127731	127731	
1949		82361	1000		20640		140892	23173	173065	173065	
1950		48227	1000		367		178220	21351	200571	200571	
1951		56033	2000		58		203586	30854	240440	240440	
1952		81905	7055		28		125580	206891	334271	334271	
1953		87421	3519				128182	117516	245698	245698	
1954		70664	2202		18101		144985	159075	304060	304060	
1955		80818	7451		5044		137025	130963	267918	267918	
1956		87073	31550		1603		142802	180743	323545	323545	
1957		74702	22875		6585		128228	141410	270635	270635	
1958		86078	43878		8377		147438	172483	319921	319921	
1959		48697	18968	74	12212		125034	110208	235242	235242	
1960	10	58036	7313	1490	11920		142372	100554	242926	242926	
1961		85688	2064		8238		174078	173518	347591	347591	
1962	484	80883	10081		18103		203472	257186	460658	460658	
1963	273	81562	1831		28591		161720	206580	428710	428710	
1964	92	52228	985	8083	28738		140481	208257	348738	348738	
1965	36	57048	2737		13650		158177	206540	364717	364717	
1966	708	73357	253	224	178310		178310	186098	364408	364408	
1967	823	80474	2237	570	16438		159938	209540	429478	429478	
1968	861	18461	14284	1850	10289		84873	308727	393600	393600	
1969	364	2428	13370	21	542	200	57788	158887	214685	214685	
1970		2078	8832	648	3307	278	31714	81790	113504	113504	
1971		4960	1305	59	2432		30856	82224	121180	121180	
1972		8485	12951	1021	646		44410	86208	110618	110618	
1973		8328	10235	120	493		28382	34580	62962	62962	
1974		10081	5897	578	1206		28724	21210	47934	47934	
1975		4940	4017	214	189		18618	27981	47600	47600	
1976		2486	2060	137	185		13694	19402	33286	33286	
1977		1052		1066			24080	13818	37908	37908	2
1978							18683	18846	36531	36531	2
1979							35528	12277	47805	47805	2
1980							38571	8261	46832	46832	2
1981							36703	13753	50456	50456	
1982							28694	28188	56882	56882	
1983							29861	27680	57541	57541	
1984					1174		18983	13483	32466	32466	
1985							8442	6434	14876	14876	
1986							6304	1289	6603	6603	
1987							8403	3970	12373	12373	
1988					927		22836	36817	60653	60653	3
1989					3780		38531	70295	108826	108826	3
1990					1631		29874	38214	68188	68188	
1991							18311	2009	20320	20320	1
1992							8723	0	8723	8723	1.4
1993							1924	0	1924	1924	4

3) The ICES Working Group on Cod Stocks off East Greenland considered that some catches (3000 tons for 1988; 2741 tons for 1989) reported as taken at East Greenland were, in fact, taken at West Greenland (Div.1F). (ICES C.M. 1989/Assess:8, Table 7.1 and C.M. 1990/Assess:12, Table 6.1).

4) Provisional figures.

Provisional figures (except for Greenland) from NAFO SCS Doc. 92/25 and 93/22. Figures for Greenland are those reported to NAFO on form STATLANT 21B.

The Scientific Council of NAFO considered the actual catches to be much higher than those recorded in ICNAF/NAFO Stat. Bull. and used the estimates listed for its stock assessment.

Table 3. Nominal catches of cod at East Greenland 1954-93 by country. Metric tons.

COUNTRY	GREENLAND	FAROE ISLANDS	FED. REP. GERMANY ICES XIV	ICES XII	GERMAN DEM. REP.	ICELAND	JAPAN	NORWAY	POLAND	UNITED KINGDOM	USSR	TOTAL	Estimates for assessment when differing from total	Foot- notes No.
YEAR														
1954						4321						4321		
1955			3645			1490						5135		
1956	37		12092			758						12867		
1957	197		8468			1788						10453		
1958	882		5919			4099				15		10815		
1959	607	543	12588			5385				45		19178		
1960	1809	425	19069			2543				268		23914		
1961	1199	1221	15021			1381				868		19690		
1962	903		14299			298				1815		17315		
1963	904		13877			1804				775	5897	23057		
1964	1120		30823			2846				988		35577		
1965	887		10965			4713				932		17497		
1966	880		7786			3977				227		12870		
1967	753		12117			10474				1383	5	24732		
1968	628		8323			8723				27		15701		
1969	627		12635			4473				36		17771		
1970	501		13930			5461			841	140	34	20907		
1971	533		25644			4580			419	28	312	31516		
1972	279	924	21592			3185			318	184	137	26628		
1973	191	167	9262		8	1446			17	881		11752		
1974	68	952	2309		15	3008			1	489		6553		
1975	224	581	1552		328	785		1884	18	575		5925		1
1976	372	440	7075			3133		364		1514	127	13027	18000	2
1977	1833	1407	3564			25		537		1383	18	8775	26000	2
1978	1347	6	3936	2465		13		17		43		7827	34000	2
1979	2755		1082	5154		3						8974	12000	3
1980	1778		3183	6254		19						11244	16000	3
1981	890	282	7387	1831		1						10381	27000	3
1982	898		8940	11091								20928		
1983	438	368	8238	4334								13378		
1984	1051		7035	34				784				8914		
1985	108		2008									2112		
1986	606	86	4063				(97)					4755		4,7
1987	1550		6358			1	(74)					6908		4,7
1988	345	12	12049			9	42					12457	9457	5,7
1989	3870	40	10813				94					15910	14688	6,7
1990	4490		28419				129	12		1283		33508		7
1991	6677	9	8557				18	838		2458		21598		7,8
1992	1283		5893			22		1030		2995	128	11349		8
1993	198		164					597		178		1135		8

1) Total includes 2 tons by Canada.

2) Estimates for assessment include estimates of unreported catches (Anon. 1981).

3) Estimates for assessment include estimates of discards (Anon. 1981, 1982 and 1983).

4) Figures listed under Japan are included in the Greenland catch figures (Japanese vessels chartered by Greenland).

5) 3000 tons reported taken at East Greenland are considered caught at West Greenland (Anon. 1989).

6) 2741 tons reported taken at East Greenland are considered caught at West Greenland, while 1500 tons caught in other ICES areas are

7) Figures for Japan are based upon vessels' weekly reports to Greenland authorities. See also footnote 4.

8) Provisional figures.

Table 4a. A comparison of figures for nominal catches of cod at West Greenland as listed by the ICNAF Assessment Working Group, 1961 (for the years 1929-58) and in ICNAF/NAFO Stat. Bull. (summary tables in Vol.20, 30 (revised) and 38) for years since 1952 with those estimated by the author. Estimates by the NAFO Scientific Council (and adopted by the author) are also listed when differing from other figures in the table. Thousand tons.

Year	Assess.	Author	Year	Assess.	Stat.	Author	Scient.
	Work.Gr.			Work.Gr.	Bull.		Council
1929	31	29	1952	289	294	334	
1930	70	89	1953	246	242	246	
1931	101	130	1954	299	302	304	
1932	84	97	1955	265	265	268	
1933	50	63	1956	321	321	324	
1934	58	98	1957	269	269	271	
1935	59	73	1958	320	320	320	
1936	114	133	1959		234	235	
1937	78	97	1960		243	243	
1938	55	96	1961		345	348	
1939	64	70	1962		451	461	
1940	60	51	1963		406	429	
1941	47	44	1964		350	350	
1942	62	53	1965		359	367	
1943	62	60	1966		366	366	
1944	62	65	1967		430	429	
1945	44	60	1968		394	394	
1946	54	60	1969		215	215	
1947	64	81	1970		113	114	
1948	97	127	1971		121	121	
1949	115	173	1972		111	111	
1950	167	201	1973		63	63	
1951	210	241	1974		48	48	
			1975		48	48	
			1976		32	33	
			1977		38	(38)	73
			1978		38	(39)	73
			1979		48	(48)	99
			1980		47	(47)	54
			1981		53	53	
			1982		56	56	
			1983		58	58	
			1984		33	33	
			1985		15	15	
			1986		7	7	
			1987		19	12	
			1988		56	(60)	63
			1989		109	(109)	112
			1990			68	
			1991 (provisional)			20	
			1992	--		6	
			1993	--		2	

Table 4b. A comparison of figures for nominal catches of cod at East Greenland as listed in ICES Bull. Stat. since 1958 with those estimated by the author. Estimates by the ICES Working Group on Cod Stocks at East Greenland and by the ICES North Western Working Group (and adopted by the author) are also listed when differing from other figures in the table. Thousand tons.

Year	ICES Bull. Stat.	Author	Year	ICES Bull. Stat.	Author	Work. Groups
1958	11	11	1974	7	7	
1959	19	19	1975	6	6	
1960	24	24	1976	13	13	
1961	20	20	1977	9	(9)	18
1962	17	17	1978	5	(8)	26
1963	23	23	1979	4	(9)	34
1964	36	36	1980	5	(11)	12
1965	17	17	1981	9	(10)	16
1966	13	13	1982	10	(21)	27
1967	25	25	1983	9	13	
1968	16	16	1984	9	9	
1969	18	18	1985	2	2	
1970	21	21	1986	5	5	
1971	32	32	1987	7	7	
1972	27	27	1988	12	(12)	9
1973	12	12	1989	16	(16)	15
			1990	33	34	
			1991		22	
			1992		11	
			1993		1	

The following pages (APP.p.1-5) are extracts from

APPENDICES TO THE ICNAF ASSESSMENT REPORT, SUPPLEMENT TO ANNUAL PROCEEDINGS VOL. 11,

TABLE 4.1. Subarea 1 Cod: Landings (tons) by countries and gears, 1929-58.

YEAR	OTTER TRAWL					LINE					GRAND TOTAL
	DENMARK (Faroes)	FRANCE	GERMANY	ICELAND	NORWAY	PORT. SPAIN U.K.	TOTAL TRAWL DORY (Greenland)	DENMARK (Faroes)	NORWAY	U. K.	
1929	-	8210	-	-	-	-	8210	15010	7080	-	31434
30	-	46546	-	-	-	-	46546	10678	9658	1134	69868
31	-	61425	-	-	-	-	61425	7404	9054	2986	101061
32	-	59837	-	-	-	-	59837	13760	9232	3178	84386
33	-	18430	-	-	-	-	18430	23024	8238	1557	49967
34	-	33664	-	-	-	-	33664	14600	9468	275	57946
35	-	34082	-	-	-	1181	35263	15800	7576	564	59203
36	-	87367	-	-	-	5884	93251	13200	7174	443	114068
37	-	45841	-	-	-	-	45841	24000	6961	723	77525
38	-	30627	-	-	-	-	30627	17800	5492	585	54504
39	-	-	-	-	-	-	-	26400	7161	-	64123
1940	-	-	-	-	-	-	-	35000	8026	-	59748
41	-	-	-	-	-	-	-	38600	8622	-	47222
42	-	-	-	-	-	-	2214	47400	12027	-	61641
43	-	-	-	-	-	-	-	49000	13026	-	62026
44	-	-	-	-	-	-	2627	45800	13385	-	61812
45	-	-	-	-	-	-	-	29600	14289	-	43889
46	-	-	-	-	-	-	-	35000	15262	-	53594
47	-	-	-	-	-	-	-	36300	18029	73	63902
48	-	-	-	-	-	-	-	44200	18675	93	97390
49	-	-	-	-	-	-	-	51400	17050	-	114664
1950	-	-	-	-	-	2053	14291	49200	21173	-	167220
51	-	-	-	-	-	-	-	58000	16200	367	209829
52	18786	?	2072	64093	4369	15346	5555	165970	49335	58	288501
53	10960	23970	2099	18241	5392	11522	3519	11444	57137	-	246123
54	14245	64095	1475	3377	10745	43554	2202	17916	157639	-	298604
55	18467	34121	7248	5130	3500	42882	7451	5044	128293	-	265318
56	17571	30461	29052	8994	1709	57073	31550	1603	176343	-	321245
57	21172	27194	10537	9719	1666	37080	22875	9565	139810	-	269035
58	24267	23720	29910	9636	3195	43676	26995	9377	172483	-	319921*

\* Trawl Total and Grand Total for 1958 include: Italy 1100 tons and E. Germany 307 tons. Further notes on next page.

NOTES

Table 4.1. Subarea 1 Cod.

Trawl

Denmark (F)	- ICNAF Statistical Bulletin (1939-53 x 1.2.)
France	- 1929-38 from Stat. Pêches Maritimes (landings cod x 3.0). 1953-58 from ICNAF Statistical Bulletin (1953 x 1.2).
Germany	- ICNAF Statistical Bulletin (1952-54 not adjusted).
Iceland	- ICNAF Statistical Bulletin (1961-53 x 4/3).
Norway	- ICNAF Statistical Bulletin (1950-53 x 1.25).
Portugal	- From paper "Portugal" (Keir ICNAF).
Spain	- ICNAF Statistical Bulletin (1952-53 x 1.2). 1956 total 31550 includes 333 tons by pair trawlers.
U. K.	- 1929-51 from paper "Greenland Cod", Table 2. 1952-58 from ICNAF Statistical Bulletin. (Not adjusted).

Line

Denmark (F)	- ICNAF Statistical Bulletin ( ) = total of trawl, longline and handline. (1939-53 x 1.2).
Denmark (G)	- Small boats, from "The Greenlander's output of the cod fishery from 1924 to 1958", Table 1.
Norway	- ICNAF Statistical Bulletin. (1950-53 x 1.25).
Portugal	- From "Portugal" (Keir, ICNAF) (average of 1st and 2nd sets).

TABLE 4.2. Subarea 1 Cod: Landings (tons) by countries, gears and divisions, 1952-58. Notes (conversion factors) on back of Table 4.2. cont..

Division Year	LINE															
	OTTER TRAWL										LINE					
	DENMARK (F)	FRANCE	GERMANY	ICELAND	NORWAY	PORT.	SPAIN	U.K.	TOTAL TRAWL	DENMARK (F)	DENMARK (G) Inshore	LL	HL	DL	TOTAL LINE	GRAND TOTAL
A 1952 3 4 5 6 7 8	+	+	+	+	-	+	+	-	+	+	646	4239	-	+	4885	4885
	+	+	+	+	-	670	-	-	670	+	1179	2163	-	2002	5344	6014
	+	-	+	+	-	151	-	-	151	+	987	2471	10	-	3468	3619
	+	9	-	+	-	-	-	-	9	+	591	764	-	-	1355	1364
	+	-	-	+	-	-	-	-	+	+	475	15	-	-	490	490
	+	-	-	-	-	-	-	-	+	+	277	-	-	-	277	277
	+	-	+	-	-	1	-	-	1	+	19	165	-	2	186	187
	+	+	+	+	1114	+	+	246	1360	+	4443	6251	-	+	10694	12054
B 1952 3 4 5 6 7 8	+	+	+	+	510	8077	3519	-	12106	+	5432	5147	-	33280	43859	55965
	+	37472	+	+	533	9088	899	-	47992	+	6401	3321	273	41981	51976	99968
	+	9163	-	+	-	2436	7	-	11606	+	5523	4126	641	33733	44023	55629
	+	10096	-	+	-	4990	4204	-	19290	+	5373	2007	2868	31846	42094	61384
	+	9614	2164	-	401	1677	4305	638	18799	+	6146	491	348	38937	45922	64721
	+	13529	+	-	609	4512	2716	1700	23066	+	6178	754	306	31500	38738	61804
	+	+	+	+	388	+	+	2846	3234	+	2906	6409	-	+	9315	12549
	+	5083	+	+	159	58	-	664	881	+	3956	6906	-	3070	13932	14313
IC 1952 3 4 5 6 7 8	+	6913	-	+	64	1833	13	680	7609	+	3238	8622	26	1446	13332	20941
	+	6555	-	+	92	10540	2060	-	19577	+	3225	3781	121	9350	16477	36054
	+	4887	833	+	92	10850	12219	-	29716	+	3175	1132	250	7330	11887	41603
	+	5224	+	1790	49	5498	9017	-	22074	+	3282	50	-	10470	13802	35876
	+	+	+	-	64	11071	15786	-	32145	+	3724	165	151	8613	12653	44798
	+	+	+	+	2809	+	+	17270	20079	+	2437	863	-	+	3300	23379
	+	+	+	+	4319	1776	-	7666	13761	+	3794	4991	-	18606	27391	41152
	+	21540	+	+	7755	32506	1290	3032	66123	+	3401	3343	4	22198	28946	95069
ID 1952 3 4 5 6 7 8	+	17590	6904	+	3653	29900	5384	1152	64583	+	4061	4972	37	17735	26805	91388
	+	13175	28403	+	1535	37673	13729	-	94515	+	5127	4168	35	29537	38867	133382
	+	7915	6383	6612	382	9876	3953	292	35413	+	5257	1872	8	24813	31950	67363
	+	4098	17228	5141	612	9450	5265	1222	43016	+	5456	1049	49	28953	35507	78523
	+	+	+	+	2809	+	+	17270	20079	+	2437	863	-	+	3300	23379
	+	+	+	+	4319	1776	-	7666	13761	+	3794	4991	-	18606	27391	41152
	+	21540	+	+	7755	32506	1290	3032	66123	+	3401	3343	4	22198	28946	95069
	+	17590	6904	+	3653	29900	5384	1152	64583	+	4061	4972	37	17735	26805	91388

TABLE 4.2. (continued)

Division

Year

OTTER TRAWL

LINE

FRANCE

GERMANY

ICELAND

NORWAY

PORT

SPAIN

U. K.

TOTAL

TRAWL

DENMARK

(F)

INSHORE

(G)

L.L.

H.L.

DORY

TOTAL

LINE

GRAND

TOTAL

1952

3

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1952

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NOTES

TABLE 4.2. Subarea 1 Cod:

CONVERSION FACTORS TO ROUND FRESH

	Conversion Factors Used		Factors to convert original data to Conversion factors used.						
	Green Salt (wet)	Gutted Head on	1952	1953	1954	1955	1956	1957	1958
DENMARK F	3.0		1.2	1.2	-	-	-	-	-
DENMARK G	2.7		?	1.08 <sup>27/26</sup>	-	-	-	-	-
FRANCE	3.0		1.2	1.2	-	-	-	-	-
GERMANY	3.0	1.2	?	?	?	-	-	-	-
ICELAND	3.0		4/3	4/3	-	-	-	-	-
NORWAY	3.0		1.25	1.25	-	-	-	-	-
PORTUGAL			-	-	-	-	-	-	-
SPAIN	3.0		1.2	1.2	-	-	-	-	-
U.K.	3.0	1.2	-	-	-	-	-	-	-

+ No reference to division

- No fishing reported

1NK Division not known

PORTUGAL Data from "Portugal" paper (Keir ICNAF)

OTHER COUNTRIES Data from ICNAF Statistical Bulletin.