II. Materials and Methods

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1. **Fisheries Statistics.**

Regular annual reporting of Greenland fishery statistics by Greenland's own fisheries started in 1910 immediately after the "*Tjalfe*" expedition. Landing statistics have since then been published in the official annual reports on Greenland, issued under various titles by Danish ministries responsible for the administration of Greenland. Since 1990 this has been done by the Greenland Home Rule authorities. From 1946, the statistics included not only landings but also information on effort (number of fishermen, fishing days, etc.). Catch figures for the period 1911–50 were revised in 1952 due to revision of the conversion factors from products to round fresh weight of fish (Anon., 1952) (see also *ICNAF Second Annual Report*, 1952, page 42).

The Greenland fisheries statistics are collected for each "landing place" separately and summed up for each of the old administrative districts separately (see for instance Hansen and Hermann, 1953). To a very great extent the International Commission for the Northwest Atlantic Fisheries (ICNAF)/Northwest Atlantic Fisheries Organization (NAFO) statistical divisions (Fig. 3) introduced in 1952/53 were delimited to correspond with some amalgamation to these districts (see Halliday and Pinhorn, 1990, page 32). Using the Danish names in Hansen and Hermann (1953) Julianehåb District became ICNAF/NAFO Div. 1F, Frederikshåb became Div. 1E, Godthåb became Div. 1D, Sukkertoppen became Div. 1C, Holsteinsborg part of Div. 1B, the other part being Egedesminde, although some minor places of that district became Div. 1A. The Christianshåb District at the borderline between Div. 1B and Div. 1A was counted as Div. 1A together with the rest of the places in Disko Bay and places further north (Uummannaq and Upernavik). Figure 3 shows ICES/ICNAF statistical areas.

Greenland reports of its own fisheries statistics have been traditionally submitted to the International Council for the Exploration of the Sea (ICES) for East Greenland data, to ICNAF/NAFO for West Greenland and to United Nations Food and Agriculture Organization (FAO) for all data.

The international statistics of commercial landings and effort of the fisheries in Greenland waters are based on individual national reporting schemes. Originally they were coordinated and published annually by ICES in its *Bulletin Statistique des Pêches Maritimes* (*ICES Bull. Stat.*). The Bulletin started in 1903 and data on the fisheries in Greenland waters were included from 1925. Later, from 1951, these data were published by ICNAF and its successor NAFO (from 1979) in the Statistical Bulletin (*ICNAF/NAFO Stat. Bull.*), with the ICNAF and NAFO issues covering fisheries at West Greenland (Statistical Subarea 1). ICES since 1962 has covered only East Greenland (and other ICES areas). Both organizations participate in the worldwide scheme of reporting fisheries statistics set up by FAO in 1955. The relevant 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.* For the period 1925–57 these catches in Greenland waters were not broken down further than for the Statistical Areas XIV (East Greenland) and XV (West Greenland) combined. Furthermore, for the years 1934–38 catches at Greenland (Areas XIV plus XV) were combined with those at Newfoundland (Area XX). Only for the years 1958–61 have ICES recorded catches separately for East and West Greenland and since 1962 catches at East Greenland only.

It is thus difficult to achieve catch figures before 1958 for the East Greenland area separately, although the total for Greenland itself is available. For some countries a minimum figure for catches at East Greenland may be achieved by subtracting their West Greenland catch recorded by ICNAF from the total catch at Greenland recorded by ICES. This was tried by the author for the Federal Republic of Germany, Iceland and the United Kingdom but was not always successful (sometimes, negative catches at East Greenland result from this exercise). For certain other nations (Faroe Islands, Norway, Portugal and Spain) catches at East Greenland were considered nil or negligible before 1958. For France, it is known that in some years a small

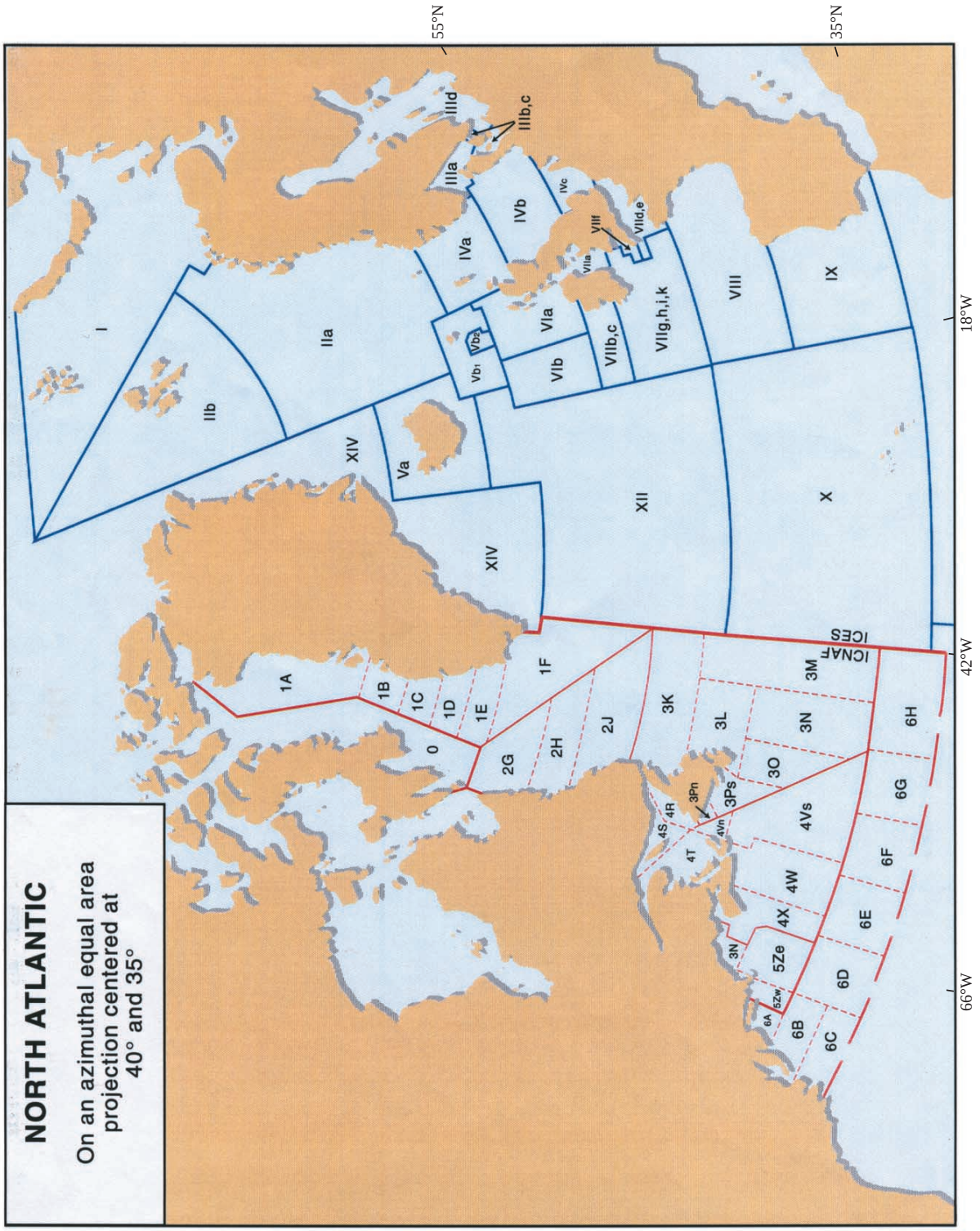

Fig. 3. Map showing North Atlantic fishery statistical areas (from *ICNAF Statistical Bulletin* of early-1960s).

the ICNAF area (*ICNAF Stat. Bull.*, Vol. 2, page 16). No attempt has been made here to separate French catches for West from East Greenland.

All catch figures in the above mentioned publications are intended to be nominal catches, which are defined as landings converted to live weight (round, fresh) of the landings. The figures do not, therefore, give the actual removal of fish from the stocks. For instance, they do not incorporate fish discarded at sea (many could be dead or likely to die due to the handling), fish used for consumption on board, recreational fishing, nor fish sold directly on local markets in Greenland. The nominal catch figures will, therefore, usually be minimum figures for the actual catch. A discussion of quantities not included in nominal catches is found in *NAFO SCR Doc*. 94/38 (Horsted, MS 1994), where it was concluded that besides the recorded nominal catch, these other legal catches may have been in the range of 1 000–10 000 tons annually, highest probably in the 1950s and 1960s.

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

In a few cases (e.g. for the years 1977–80) there was strong evidence that some figures published in the statistical bulletins were 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 the assessment of the stocks (see for instance *NAFO Sci. Coun. Rep*., 1979–80, pages 72–73 and 1981, page 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 *ICES Bull. Stat*. and *ICNAF/NAFO Stat. Bull.* 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 country reports of catch in the ICNAF/NAFO Statistical Area were not broken down to Subareas. In all such cases and in other cases when the author's figures differed from those in the above-mentioned publications, notes on how the estimates were arrived at are given. 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 NAFO Scientific Council Research Document (Horsted, MS 1994). The basic tables and comments in that document are given country by country in alphabetical order. Only some of those tables are reproduced here, updated to include years up to 1995 and with a few minor revisions

When analyzing the spatial and temporal distribution of the fisheries the catch figures as they occur in the *ICNAF/NAFO Stat. Bull*. and *ICES Bull. Stat.* was usually used, but not all catches recorded there are broken down by Division or month. Unless otherwise stated, only catches specified by place and/or time are used in those analyses.

The section on vessels and their effort is based upon information in ICNAF/NAFO "List of Fishing vessels over 50 GRT..." issued as meeting documents and/or publication every three years starting with the fishing year 1952/53. Since 1982, the vessel reports to Greenland authorities (The Fishing Licensing Office) of their activity have also been used.

2. Revision of Catch Statistics Due to Changes of Conversion Factors

One of the more general considerations in the use of conversion factors to achieve live weight of landed products should be mentioned here.

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, salted fish. Hence

conversion factors are needed to convert landed weight to equivalent round, fresh weight on which international statistics are based.

Whatever state of fish are 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 reports 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 the reporting country. Conversion factors used by the countries were listed annually in *ICNAF Stat. Bull*. through the 1950s and 1960s. FAO (1971) in its *Bulletin of Fisheries Statistics* Vol. 25 for 1970 has a comprehensive list of conversion factors to which ICNAF and NAFO have since referred. Recent attempts by FAO to update this list (see *NAFO Sci. Coun. Rep*., 1995, page 132) have not been taken into account in the present paper.

ICNAF also made attempts to standardize between countries some of the important conversion factors, e.g. from salted cod to round fresh weight. At its June 1955 Annual Meeting, 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 was 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, page 8).

For most European countries the factor of 3.0 was a change from factors of 2.25 (Iceland), 2.4 (Norway), 2.5 (the Faroe Islands, 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 Assess. 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., MS 1961) extracts of which are also appended to *NAFO SCR Doc*. 94/38).

The author of the present contribution has also considered that the factors introduced in 1954 should be used for 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 weight, 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 *NAFO SCR Doc*. 94/38 (Horsted, MS 1994).