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Exploration of the Sea

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Fish Committee

REPORT OF THE STUDY GROUP ON THE NORWEGIAN SEA AND FAROES SALMON FISHERY

Dublin, 4-7 March 1991

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TABLE OF CONTENTS

1 INTRODUCTION

1.1 Terms of Reference

The terms of reference for the Study Group were set out in C.Res. 1990/2:4:7 as follows:

"The Study Group on the Norwegian Sea and Faroes Salmon Fishery (Chairman: Mr. E.C.E. Potter, UK) will meet in Dublin from 4-7 March 1991 to prepare the relevant data for presentation to the Working Group on North Atlantic Salmon at its meeting in March 1991."

The terms of reference for the Working Group on North Atlantic Salmon are given in Appendix 1. The Study Group addressed the relevant questions under item 1 of these terms of reference, the remaining items being the responsibility of other Study Groups or the Working Group. As agreed at its last meeting (Anon., 1990a) the Study Group adopted a more rigid format for the compilation of national reports on homewater fisheries and stocks; this is shown in Appendix 2. An attempt has been made to compile these data (Section 5) in a way that allows comparison of similar time series of data between areas. Data from France, Finland and USSR were submitted after the meeting, but were incorporated into the report with the agreement of participants.

1.2 Participants

J. Browne	Ireland
W.W. Crozier	UK (Northern Ireland)
D.A. Dunkley	UK (Scotland)
L.P. Hansen	Norway
A. Isaksson	Iceland
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N. O'Maoileidigh	Ireland
E.C.E. Potter (Chairman)	UK (England and Wales)

2 THE FISHERY AT THE FAROES

2.1 Gear Used in the Faroes Fishery

Gear in use in the Faroes fishery did not change in 1990. Fishing is carried out by means of floating long-lines, 800 to 3,000 hooks being set each day per vessel.

2.2 Changes in Effort in the Faroes Fishery

The numbers of licences issued for the 1989/90 and 1990/91 seasons were 14 and 13, respectively, but, of these, only 11 and 8, respectively were used. This shows a continuing reduction in the number of vessels participating in the fishery from 1988/89, when 19 licences were issued, 12 of which were used.

In the 1989/90 season, vessels over 50GRT were allowed to fish from 1 November to 20 December and 3 January to 12 April. [In 1990, the season for one vessel of less than 50GRT was 20 January to 30 April and 1 November to 20 December, but this vessel did not fish in the first part of the year.]

Few vessels started fishing early in November, but after some good catches most vessels joined in, resulting in high effort until the Christmas closure. The weather in January was poor with the result that few vessels went out and catches were low. Fishing effort then increased in February and was high for the rest of the season, especially in late March and April.

As in 1988/89, no fishing took place outside the Faroes EEZ. (The extent of the Faroes EEZ is shown in Figure 1). At the beginning of the season, the fishery was concentrated in an area about 50 miles northwest of the Faroe Islands. Later in the season, most fishing took place in the northern and north-eastern parts of the EEZ.

2.3 Catch at Faroes in the 1989/90 and 1990/91 Seasons

The total nominal catch in the 1989/90 season was 361 t. This was considerably lower than the catches reported for the 1981/82 to 1986/87 seasons (Tables 1 and 2), but was 50 t greater than in 1988/89 and 150 t greater than in 1987/88. The catches in numbers by statistical rectangle are shown by month in Figures 2-7 and for the whole season in Figure 8. The best catches were recorded in December and April (Table 3) when 36% and 26% of the total catch, respectively, were landed.

The catch for the calendar year 1990 was 312 t (Table 2) and the preliminary catch figure for the first half of the 1990/91 season (1 November - 20 December 1990) was 120 t taken by 6 vessels. (The estimated catch to the end of February 1991, however, was only 160 t, suggesting that the total catch for the 1990/91 season is likely to be low).

2.4 Discards in the Faroes Fishery

Only limited sampling was carried out to estimate discard rates in the Faroes fishery in the 1989/90 season (Table 4). Four vessels were asked to land all their catch, including discards, and a further, small sample was recorded by an observer; three of these samples were taken in December and one each in January and April. No additional data were collected by coastguard vessels.

The discard rates for the five samples ranged from 3.6% to 18.5%. These samples comprised a total of 16,357 fish of which 1,533 were less than 60 cm; no discards of fish greater than 60 cm were reported. The overall (unweighted) discard rate for all the samples was, therefore, 9.4%. This is within the range observed in the seasons 1982/83 to 1988/89, and no trend is apparent over this period (Table 5).

The samples in 1989/90 represent approximately 12% of the total landings for the fishery. However, because of the variability of the discard rate with both time and area and the difficulty of ensuring that the data are reliable, they may not reflect the overall rate for the fishery. It is not considered necessary at this stage to mount the extensive sampling programme necessary to obtain more reliable discard estimates, but it is recommended that sampling is spread more evenly over the season.

2.5 Catch per Unit Effort in the Faroes Fishery

The catch in numbers per 1,000 hooks (CPUE) by statistical rectangle is shown by month in Figures 9-14 and for the whole season in Figure 15. The CPUE was high at the beginning of the season, decreased in January and February but improved again for the remainder of the season (Table 6a). In December, the highest CPUE was recorded close to the islands, but as the season progressed, the best catch rates were recorded further to the north. Thus, it is apparent that fishing effort tends to be highest in the areas where the CPUE is best.

The CPUE has been calculated for the areas south and north of latitude $65^0 30'$N for each month of the 1981/82 to 1989/90 seasons (Table 6a and 6b). The southern area includes most of the Faroes EEZ; no fishing has been reported by Faroese vessels outside the EEZ since 1988. The CPUE data in these tables have been compiled from log books, but records have only been used where the catch reported in the logbook is within 10% of the number of fish landed from that trip. As a result, these CPUE data may differ from those given in earlier reports. Tables 6a and 6b show the great variability in the distribution of CPUE from season to season. At most times when fishing took place to the north of $65^0 30'$N, the CPUE was higher than to the south.

It is evident that the CPUE has increased in the past two seasons, particularly at the beginning and end of the season. However, this increase does not necessarily imply that the abundance of salmon in the Faroes area has increased. This is because the small number of vessels that participate in the fishery tend to stop fishing when catch rates become too low. This tendency has been reinforced by the falling price of salmon.

The Study Group noted that more detailed CPUE data were available to the Faroes Fisheries Laboratory and considered that these may provide useful information on the movements of stocks in the area. However, the logbook data need to be carefully verified before a more detailed analysis can be carried out. The Study Group felt that it would be very useful if the data could be verified and some analysis undertaken for their next meeting.

2.6 Biological Characteristics of the Catch at Faroes

Details of the catches examined in the 1989/1990 market sampling programme at Faroes are given in Table 7. During this programme, scales were taken from a sample of fresh landed fish in November 1989. Another sample was collected by an observer on board a Faroese fishing vessel during January 1990. These samples were used to construct age/length keys, with which the age composition of the catch in the fishery during the 1989/1990 season was estimated to be 2% 1SW, 92% 2SW, and 6% 3SW (Table 16).

The fork length distribution of landings at Faroes by month in 1989/1990 is shown in Table 8. These distributions have been divided into sea age classes using the length splits shown below; the length splits for previous years are shown for comparison.

	1986/1987	1987/1988	1988/1989	1989/1990
1SW to 2SW	-	58 - 59cm	57 - 58cm	55 - 56cm
2SW to 3SW	85 - 86cm	83 - 84cm	84 - 85cm	83 - 84cm
3SW to 4SW	102 - 103cm	113 - 114cm	-	-

The results (Table 9) are similar to those calculated from the scale data (Table 16). The Study Group, therefore, agreed that the age composition of the Faroes catch could henceforth be determined using length data.

Tables 10-16 show the sea age distribution by month in the Faroes salmon fishery for the seasons 1983/84 to 1989/90. Table 22 summarizes these data, giving the sea age distribution by fishing season. In all years, the total catches were dominated by the 2SW age class with the 3SW group next most numerous in all seasons except 1987/88, when the 1SW group was second largest. 4SW fish appeared in samples in only three seasons (1983/84, 1985/86, and 1986/87). The sea age distribution by month was similar in all seasons except for 1987/88 when the proportion of 1SW fish in the catch increased from 3% to 20% in the second half of the season (Table 14); there was a corresponding decline in the 2SW component. This change is also reflected in the weight distribution of landed fish in the 1987/1988 season compared with other years (Table 18). The large change in weight distribution of the catch between the periods up to and after 1985/1986 probably reflects the move of the fishery closer to the Faroe Islands.

The smolt age distribution of the fish from which scale samples were taken during the 1983/1984 to 1989/1990 seasons is given in Table 19. These samples have not been weighted according to the catch. The increase in the proportions of river age 1 and 2 and the decrease in the proportions of river age 3 and 4 fish caught in the fishery have continued. This may reflect changes in the stocks contributing to the fishery, including an increase in fish farm escapees.

The Study Group noted that the river age data were based on relatively few scale samples in recent years. However, it did not consider it worthwhile to increase the scale sampling rate because of the high cost involved now that nearly all the catch is frozen at sea.

2.7 Origin of Salmon in the Faroes Fishery

Microtagging

The data on microtag recoveries in the Faroes fishery were rechecked and updated for the period 1984 to 1990 (Table 20). The number of tags recovered in 1989/1990 (56) was only slightly less than in the previous season (59), and these returns greatly exceeded the returns from any other seasons. The raising factors generated for each year for the discards and the fishery are also included, and the method for calculating these factors is shown in Table 21.

The estimates of the total numbers of microtagged fish from each country caught in the Faroes fishery for each year of release have been corrected and updated for the 1989/90 season (Table 22). The following points were noted for recoveries by country:

Faroes: The recapture rates were from fish tagged in the Faroe Islands; the majority of these recaptures were 2SW fish.

Iceland: Recaptures rates have only been calculated for smolts released into northern rivers, as the contribution of fish from other areas to the Faroese fishery is negligible. Smolts from only two releases (1984 and 1987) have been recorded in the fishery. Although the recapture rate in 1987 was quite high (1.06), overall they have been modest.

Ireland: As in previous years, the majority of Irish tagged fish were caught as discards or 1SW fish. The recapture rate in 1989 (0.58) was similar to the previous year (0.60) (Table 22). The highest recapture rate has been from releases in 1987 (0.99).

UK (England and Wales): It was noted (Anon., 1990a) that many of the fish microtagged in UK (England and Wales) are released as parr and may not migrate as smolts until the following year; the number of recoveries per 1,000 smolts is, therefore, underestimated. Tags from UK (England and Wales) have been recovered from discards, 1SW and 2SW fish although the number of recaptures is generally low (max = 0.38 per 1,000 released). The recapture rate for 1989 releases was also low (0.10).

UK (Northern Ireland): Tags of Northern Irish origin have been recovered for two smolt release years, i.e., 1986 when the recapture rate was high and 1987 when it was low. Most tags recovered have been from the discards.

UK Scotland): Tagged salmon of Scottish origin have been recaptured as both 1SW or 2SW fish (Table 20). Recapture rates are generally moderate to high (0.17-1.42) (Table 22).

North America: One microtag from each of the USA and Canada were recovered in 1988/1989 but tags of this type from these countries have not been recovered in the fishery in any other year.

External tagging

The number of external tags recovered in 1990 is shown in Table 23. Of the 221 tags recovered, 205 (93%) were of Norwegian origin. Tags were also recovered from Sweden (11) and Scotland (4). Data are presented for the external tag recoveries from the North Esk in Scotland for a 10-year period (Table 24). The data suggest an increased recapture rate since 1986 although this rate is still below values obtained in 1981 and 1982.

As recommended in 1990 (Anon., 1990a), members of the Study Group provided lists of external tags recovered in the Faroes fishery. It was recommended that the Faroes Fisheries Laboratory should provide a check list of tag recoveries from each country recorded in their data base in order that national records could be validated. A similar analysis to that shown in Tables 20 and 22 should then be conducted for the external tag data.

2.8 Exploitation Rates in the Faroes Fishery

Full details of the run-reconstruction estimates of extant exploitation rates for fish tagged at various experimental units in the northeast Atlantic are given in Tables 28 to 34 and discussed in Section 5.8. The estimates of exploitation rates in the Faroes fishery are summarised in Table 25.

Exploitation rates on 2SW salmon from the Imsa (Norway) have generally been high (up to 50%), although there has been a fairly steady decrease from the 1982/83 season to 1989/90. The decrease in recent seasons probably reflects the lower total catches in the Faroes fishery and possibly the cessation of fishing outside the Faroes EEZ. However, there appears to have been a corresponding increase in the exploitation of 2SW salmon from the R. Drammen.

New data have been provided on the River Lagan stock (Swedish west coast) showing that exploitation rates on 2SW salmon in the Faroes fishery have averaged about 10% in the last three seasons. Data from Ireland and all parts of UK confirm the conclusion (Anon., 1990) that those countries are relatively minor contributors to the Faroes fishery with exploitation rates on both 1SW and 2SW fish being <1%, although exploitation rates on R. North Esk salmon have been higher at some times in the past.

2.9 Effects of Fish Farm Escapees on Catches at Faroes

The Workshop on Identification of Fish Farm Escapees and Wild Salmon (Anon., 1991) agreed that the least expensive and most discriminatory method for identifying farmed fish was that using morphological and scale characters. However, it was noted that this was likely to underestimate the true numbers of escaped fish in mixed groups of farmed and wild salmon. In some instances, tissue pigment analysis has been a successful diagnostic test for farmed escapees and even for the identification of the progeny of escaped farmed females (but not males). The use of genetic methods has also been shown to be applicable in some cases, but further work is required, particularly to follow the introgression of genes from fish farm escapees into wild populations.

Hansen *et al*. (1987) reported on an experiment to investigate the migratory behaviour of farmed fish. Of 497 fish which were tagged and released in Norway, 98 were recaptured, 7 of them in the Faroes fishery. Thus, there is direct evidence that farmed fish from Norway contribute to the Faroes fishery.

Detailed examination of fish caught in the Faroes fishery was not carried out in the 1989/90 season. However, a proportion of the 200 scale samples collected in the Faroes fishery in November 1989 were said to appear to be slightly abnormal, possibly indicating artificial rearing. This suggested that 13.5% may have been of hatchery origin, including stocked fish and farm escapees. A similar analysis of 282 fish caught in January 1990 indicated that 21.6% may have been of reared origin. Dorsal fin measurements were taken for 73 of these fish and the relationship between fin length and fork length is shown in Figure 16. About 15% of the fish had abnormally short dorsal fins, possibly indicating that they were hatchery reared. However, there was little agreement between the groups identified as abnormal by the two techniques. This sample of 73 scales was also examined using the method in Anon. (1991); 42% were identified as farmed, although the method has only been calibrated for Norwegian fish. These results can only be taken to confirm that there is likely to be a substantial catch of reared fish including farm escapees, at Faroes.

3 EFFECTS OF MANAGEMENT MEASURES AT FAROES

At the 1989 meeting of the North-East Atlantic Commission of NASCO the following regulatory measure was agreed for salmon fishing in the Faroe Islands for the calendar years 1990 and 1991:

> "The fishing effort shall be targeted at an average annual catch so that the total nominal catch for the duration of the trial period shall not exceed 1,100 t. However, in any given year the annual catch shall not exceed 15% more than the annual average."

The following additional measures also apply to the Faroes fishery for 1990 and 1991:

1) "Areas with salmon below the length of 60 cm will be closed for salmon fishery at short notice, following the general rules for closing areas with undersized fish already in force in the Faroese fisheries zone.

2) The number of boats licensed for salmon shall not exceed 26.

3) The salmon fishing season will be limited to 150 days between 1 January and 30 April and 1 November and 31 December. The Faroe Authorities shall inform NASCO before 15 December of the fishing season for the coming calendar year.

4) Subject to the maximum annual catch the total allowable number of fishing days for salmon fishery in the Faroese Islands zone shall be set at 1600 each year."

The Study Group assessed the operation of these measures. The nominal catch of 312 t in the Faroes fishery in 1990 was only 49% of the permitted maximum of 632.5 t. Discard rates were estimated for 2 landings during 1990 (in January and April) as part of the biological sampling programme (Section 2.3). No additional data were collected by coastguard vessels, and no area closures were ordered. The Study Group again noted that this was unlikely to be an effective measure without extensive monitoring or the cooperation of the fishermen.

Licences are issued for the fishing season November to April. The numbers of licences issued for the 1988/89 and 1990/91 seasons were only 54% and 50% of the permitted maximum, respectively. In 1990, salmon fishing was permitted for 150 days for vessels over 50GRT. Effort data are not available for the calendar year of 1990. A total of 532 sets was estimated to have been fished in the 1989/90 season. This is 33% of the total of 1600 permitted in both 1989 and 1990.

The Study Group, therefore, concluded that, as effort had been restricted to well below that permitted, the catch had not been limited by the effort or quota measures agreed by NASCO.

4 SALMON FISHING IN INTERNATIONAL WATERS

The Study Group were aware of reports circulated by the NASCO Secretariat that vessels registered in countries that are not Parties to the NASCO Convention were continuing to fish in international waters to the north of the Faroes EEZ, although it was understood that measures have been taken to prevent Panamanian registered vessels from fishing. In 1990, it was suggested that the potential unreported catch from this source in the 1989/90 season was of the order of 630 t, although this might not have been realised because of adverse weather conditions. There were no new data to allow this estimate to be updated or improved.

5 FISHERIES IN HOMEWATERS IN 1990

5.1 Changes in Gear Used in Homewater Fisheries

No changes in regulations affecting fishing gear for salmon were reported for Ireland, Norway, UK (England and Wales), and UK (Northern Ireland). Elsewhere the following changes were reported:

Iceland: Changes affecting mesh sizes of sea charr nets, length of net and identification of net ownership were introduced to reduce illegal salmon fishing. The minimum mesh size (formerly 45 mm knot-to-knot) was reduced to 35 mm knot-to-knot. A maximum mesh size of 45 mm knot-to-knot was introduced where there was formerly no maximum size. The total length of net was restricted to 50 m and each net must now be labelled to identify the owner.

Sweden: Areas closed for fishing were extended around the mouths of a number of small rivers, the area of closure being related to the local geography.

UK (Scotland): Regulations prohibiting the use of natural prawns or shrimps as baits or lures in rod and line fisheries were introduced in the Rivers Ness, Nairn, Spey, and Deveron.

5.2 Changes in Effort in Homewater Fisheries

Small reductions in fishing effort were reported for fisheries in the six countries shown below; however, most of these reductions could not be quantified. There was also a widespread feeling that the low price of wild salmon, which is probably linked to the availability of farmed fish, was resulting in a gradual decline in netting effort in many areas.

Iceland: There are some indications that rod fishing effort was reduced because of reduced runs of salmon.

Ireland: Fishing effort was reduced, particularly at the end of the season, due to poor catch rates; this was despite a reduction in policing by patrol vessels at sea.

Sweden: There was a reduced fishing effort in coastal fisheries due to an algal bloom which made fishing difficult and less efficient.

UK (England and Wales): Temporary netting restrictions continued to apply on the estuaries of the Taw, Torridge and Camel as part of salmon rehabilitation schemes on these rivers. The number of drift net licences issued in the Yorkshire area was reduced from 23 to 22. River levels were generally very low during the summers of both 1989 and 1990. This led to reduced catches and a resulting decrease in fishing effort relative to preceding years.

UK (Northern Ireland): The number of net licences issued in 1990 was reduced from 245 to 235. The weather at the usual peak of the season was very calm and thus unsuitable for drift netting. These factors, together with a perception of low abundance of salmon in the sea, probably led to a reduction in fishing effort.

UK (Scotland): Effort in some net fisheries was reduced because of poor catch rates; this led to an early cessation of fishing in some areas.

USSR: The fisheries on the Rivers Mezen and Onega were closed and no fishing was carried out in the Rivers Umba and Luvenga.

5.3 Nominal Catches of Salmon in Homewaters

Total nominal catches of salmon by country in all homewater fisheries in the Northeast Atlantic area for 1980-1990 are given in Table 26. Catches of ranched fish and fish farm escapees are included in these statistics. Data for 1990 for Ireland and UK (Scotland) are incomplete.

The updated total catch for 1989 of 4,025 t is lower than for any previous year. Figures for 1990 are provisional, but it is likely that the total catch will show a substantial decrease from 1989. Total landings are well below the 5- and 10-year averages and show decreases for most countries, although catches for UK (England and Wales), France, and Sweden were similar to 1988. The following specific points were noted:

Iceland: Catches were well above the 5- and 10-year average, reflecting increases in the contribution of ranched salmon to the fishery, but returns to rod and net fisheries in the rivers were poor.

Norway: Catches remained low as in 1989. This was caused by the reduction in fishing effort due to the new management measures.

UK (England and Wales): Rod catches were particularly poor (down over 50% on the 5-year average) due to low river flows.

UK (Northern Ireland): Catches were only 66% of the 1989 value but similar to the 5-year average. Reduced catches generally reflected low abundance at sea, combined with some reduction in fishing effort.

UK (Scotland): The decrease in catches over recent years is partly due to a substantial reduction in fishing effort.

5.4 Catch per Unit Effort in Homewater Fisheries

Catch per unit effort data were available for some net fisheries in UK (England and Wales) for 1988 and 1989. (CPUE data are not available for 1990 prior to the full compilation of the catch data.) These data showed a general reduction in CPUE for most drift and trammel net fisheries in 1989 and a small increase in CPUE for most beach traps and seine net fisheries. This is mainly attributed to the calm, dry weather conditions in 1989.

The Study Group recommends that all countries should endeavour to collect effort data from net and rod fisheries wherever possible as this would aid in the interpretation of catch statistics.

5.5 Catches in Numbers by Sea Age and Weight

Reported national salmon catches for several Northeast Atlantic countries by sea age are summarised in Table 27. In several countries there was a reduction in the proportion of 1SW fish in the catch. In UK (England and Wales), 1SW fish accounted for 65% of the catch, compared to 69% in 1989, while Scotland showed a reduction from 63% to 47%, and France from 51% to 43%. In Scotland there were reports of smaller than normal 1SW fish and some of these fish were said to be in poor condition. In Sweden, however, 1SW fish accounted for 70% of the catch in 1990, compared to 41% in 1989. In Norway, 1SW fish accounted for 73% of the catch in 1989 and this declined to 68% in 1990. In USSR, 73% of the catch in both 1989 and 1990 was 1SW salmon; this was 7% greater than for 1987-1988.

5.6 Exploitation Rates in Homewater Fisheries

The Study Group examined updated estimates of exploitation rates using the run-reconstruction model for tagging data from various experimental units in the north-east Atlantic. These data are given in Tables 28 to 33 and summarised in Table 34 along with additional data from Iceland and UK (England and Wales).

Exploitation rates in Ireland, Norway, Sweden and UK (Northern Ireland) were considerably lower than the averages for recent years, while estimates for one stock in Iceland and two in UK (England) were within the ranges previously observed. The following additional points were noted:

<u>Ireland and UK (Northern Ireland)</u>: Exploitation on the River Burishoole and River Bush stocks in coastal fisheries decreased in 1990. This is partly attributed to reduced effort (see Section 5.2).

<u>Norway</u>: The regulatory measures introduced in Norway in 1989 have resulted in a considerable decrease in the exploitation rate on Norwegian stocks. The effects of these management measures are discussed in Section 6.

<u>Sweden</u>: The estimated exploitation rate for the River Lagan stock is based on the recapture of salmon bearing external tags. As it is likely that further recaptures will be reported for 1990, the calculated exploitation rate is probably an underestimate.

<u>USSR</u>: Exploitation rates in most rivers were about 50%, except for the Kola river, where all fisheries were closed and the Keret and Varzuga, where it was 25-30%.

5.7 Status of Stocks

There are numerous factors affecting freshwater and marine production of salmon stocks. Low escapement, acid rain, diseases and parasites as well as environmental and climatic conditions can all affect freshwater productivity. Natural variations in oceanic conditions can have great influence on marine survival, especially in northern latitudes.

As no targets for stock production were available, the Study Group considered that they could only assess the status of particular stocks on the basis of changes in production or survival at different life stages. They, therefore, compiled available time series of counts (or estimates) of smolt and adult runs and estimates of juvenile production (Tables 35 and 36). Estimates of marine survival (smolt to return to freshwater) were also compiled on the basis of returns of tagged smolts to freshwater as 1SW and 2SW fish (Tables 37 and 38).

Freshwater survival

Counts and estimates of wild smolt runs were provided for five stocks (Table 35). Although these may not be representative of groups of stocks they might indicate trends in freshwater production. However, in most stocks, there have been irregular fluctuations in smolt production with no clear trends between years. Smolt production in these rivers has varied between 2 and 7 times over the past 10 years, with variation being greater in smaller stocks. The following specific points were noted for individual studies.

Iceland: Productivity in Icelandic streams has remained relatively stable in the last few years. However, there are indications that cold conditions in the early part of 1988 and 1989, with great quantities of snow melt far into the summer, have affected smoltification, timing of migration and smolt abundance in some Icelandic streams, particularly on the north coast. This may partly explain, along with poor marine survival, the low abundance of grilse and salmon in many Icelandic streams in 1989 and 1990.

Electrofishing is used to give qualitative data in Icelandic streams, but does not seem to be a good quantitative index of smolt production in future years, possibly due to the high freshwater age of Icelandic smolts (2-5 years).

Ireland: The Burrishoole system has been producing fewer smolts in recent years. There are indications that this may be due to inadequate egg to smolt survival over a long period. These data would not necessarily be representative for other parts of Ireland.

UK (Northern Ireland): Wild smolt production in the River Bush has varied in response to variable ova deposition (range 1.6 - 4.8 million ova). Ova to smolt survival in recent years has been lower than previously, possibly reflecting additional effects of environmental conditions.

Juvenile counts by electrofishing were provided for the River Bush. These counts are not necessarily indicative of the number of spawners in the previous year, but have proved to be good indicators of the smolt runs in subsequent years.

Norway and Sweden: Acid rain continues to be a real threat to salmon populations in Norway and Sweden. It has been reported that, in Norway, over 25 salmon stocks have been lost to acidification, amounting to 345-1,150 t of salmon annually (Hesthagen and Hansen, 1991). Most salmon producing streams on Sweden's west coast are partly dependent on liming for successful production.

In Norway over 30 rivers are affected by the fluke *Gyrodactylus salaris*, with some stocks threatened by extinction. Furunculosis (*Aeromonas salmonicida*) introduced with hatchery smolts from Scotland to Norway in the mid-1980s is a potential threat to wild stocks. Diseases are not known to be a threat in other countries although careful precautions are taken with infected reared stocks.

Escapees from fish farms pose an increasing threat to wild stocks, particularly in Norway, where the farmed salmon production, mostly from sea cages, was about 160,000 t in 1990. Farm escapees and strays from ranching programmes are also a potential threat to salmon populations in most other countries in the Northeast Atlantic (see Section 5.8).

Marine survival

The Study Group felt that there were more likely to be common trends in marine survival between stocks over a larger geographical area. Members, therefore, provided time series for adult counts and estimates of marine survival. Adult salmon counts for seven rivers in the Northeast Atlantic are shown in Table 36. Runs have been very variable in all rivers, but there are no apparent trends during this period and no clear common patterns between systems. Changes in the spawning escapement in the USSR in 1990 are summarised in the text table below:

Rivers	Number of spawners	Change from 1989
Barent Sea rivers	10,874	+10%
White Sea rivers	48,977	-20%
Pechora river	60,000 (estimate)	(50% less than in late 1970s)

Wild and hatchery smolts are tagged and released on various rivers in the north-east Atlantic area. Estimates of marine survival for wild smolts from six such river stocks are shown in Table 37, and returns of hatchery smolts into fresh-water in five rivers are shown in Table 38. These data show considerable variation between years, but the marine survival of the 1983 smolt year class appears to have been poor for most stocks examined, while survival of the 1987 smolt year class appears to have been good in many areas. The following additional observations were made:

Iceland: Returns of 1SW salmon into the River Ellidaar during the 1989 and 1990 fishing seasons have averaged 10%. Comparable figures for the Ellidaar in the 1976 season exceeded 20% (Isaksson, Rasch and Poe, 1978). Return figures for the north and east coast stocks, such as Rivers Midfjardara and Vesturdalsa (Table 37) have been much lower (0.4-4.6%), indicating a problem in estuarine or marine survival.

Marine survival of Icelandic salmon stocks have been depressed in the 1989 and 1990 seasons. North coast stocks have been especially hard hit. Similar low periods were observed in the 1965-70 and 1984-85 seasons. Icelandic marine stocks, such as capelin and cod, seem to have been affected by adverse marine conditions which are the result of unusually high influx of cold and less saline seawater from the polar seas.

The data from Kollafjordur demonstrate clearly the low survival of hatchery smolts in the 1983 and 1988 release years, and similar results were obtained for the 1989 releases. A substantial decrease in the size of 1SW salmon and an increase in the 2SW contribution was also noted in those years, demonstrating effects on growth and maturity.

Ireland: Returns of 1SW salmon to the Irish coast from the 1987 and 1988 smolt years were very high but were seriously depressed for the 1989 smolts.

Norway: Returns of 1SW salmon into the River Imsa trap have been considerably higher for the 1988 and 1989 smolt years than recorded prior to 1987, demonstrating the continued effect of the 1989 management measures.

UK (Northern Ireland): The high survival of 1SW salmon from the 1987 smolt migration was followed by a record low survival to the River Bush catchment from 1988 smolt migration. This was possibly due to low river flows, which prevented fish from entering freshwater. In 1990, the survival of 1SW salmon to the R. Bush was 9.6%. This is greater than the average (7.8%) for the period 1974-1989 and reflects the low catch in homewaters (see Section 5.6).

UK (Scotland): Estimates of marine survival are not available for all years as smolt production estimates have not been possible for every year. Survival to 1SW for 1989 smolts (2.1%) was the lowest in the time series and less than 50% of that reported for 1987 smolts. Survival to 2SW and 3SW has remained similar throughout the time series.

5.8 Effect of Fish Farm Escapees on Stocks and Catches in Homewaters

Salmon escape from fish farms at all life stages. The survival of such fish is highly dependent on their size and the time of their escape. Experiments in Norway have shown that there is a seasonal variation in survival. Survival of salmon which escaped as smolts during the spring was much higher than for those escaping from the same locality during the rest of the year. Older fish escaping during the summer seem to enter rivers at random. Smolts and post-smolts escaping from marine sites return as adults to the area from which they escaped and enter local rivers to spawn. However, salmon which escape during February and March in their first sea-year stray more and farther than fish escaping during the rest of the year. It has been observed in both Norway and Scotland that farmed salmon spawn in freshwater, although preliminary results suggest that their spawning success, especially the males, is low compared with wild fish.

Estimates of the incidence of farmed fish in catches and stocks in 1990 are summarised in Table 39. Additional information and records of escapes of salmon from fish farms are discussed below:

Iceland: Estimates of the proportion of ranched and farmed salmon in angling catches were obtained for five rivers in southwestern Iceland (Table 40). The fish were classified using scale pattern analysis. In total, the estimated proportion of farmed fish in these rivers varied between 9.6% and 25.2% whereas the proportion of ranched fish was estimated at between 16.1% and 36.1%. The proportion of both ranched and farmed salmon in the catches tended to increase towards the end of the fishing season.

Ireland: three accidents resulting in escapes from salmon farms were reported in 1990; these are listed below:

Date	Site	Quantity	Age/Average Weight
30.3.90	Donegal	144,798	1.2
1.2.90	Donegal	1,212-4,242	1SW
4.10.90	Galway	4,200	?

Norway: The rapid increase in the fish farming industry in Norway has resulted in large numbers of farmed fish escaping from the cages. These fish appear in marine and freshwater fisheries and in spawning stocks in freshwater. Systematic surveys in Norwegian salmon fisheries and spawning stocks have been carried out since 1986, but these were considerably extended from 1989. The reared fish are identified using a combined method of external morphology and scale characters. In the marine fisheries, whole catches have been sampled over the entire fishing season while in rivers, point estimates have been obtained from samples taken during a limited time period and in parts of the rivers. Samples were obtained by angling and netting both within and outwith the angling season. The geographical locations of the sampling programme are shown in Figure 17. The estimates of farmed fish were highly variable among sites. However, catches in outer coastal fisheries contained a higher proportion of farmed fish during the fishing season than did catches at fisheries in fjord areas (Table 43). The incidence of farmed fish was much lower in samples taken in freshwater during the angling season than in samples taken during the autumn after the angling season had finished. The reason for this is that farmed fish enter the fjords and the rivers later in the season than wild fish.

Farmed salmon have no home rivers and may not be motivated to enter a particular river before sexual maturation forces them. The proportion of reared salmon in the marine catches increased significantly with the number of smolts stocked in cages in the same area during the previous year (Figure 18). Furthermore, there was negative correlation between the mean distance to the nearest 5 and 10 fish farms and the proportion of reared fish in the catch (Figure 19).

UK (Northern Ireland): An unknown number of 1SW fish escaped from a salmon farm on the Co. Antrim coast in October 1990. A total of 86 escaped fish was subsequently removed from the nearby Glenarm River by electrofishing (they had been reared to smolt in this river), while 20 were reported taken by netting in the sea around the site of escape. Electrofishing in adjacent rivers failed to find any escaped fish.

UK (Scotland): Details of a study of the behaviour of wild and farmed salmon following an escape of almost 200,000 farmed salmon into Loch Eriboll on the north coast of Scotland in February 1989 were described in Anon. (1990a). Examination of rod catches in the River Polla (which flows into Loch Eriboll) during 1990 showed that of a total of 20 fish caught, 1 was of cultured origin. In an experimental netting exercise, 10% of the catch was of farmed origin. However, the proportion of the catches of salmon in other rivers in the area which was of farmed origin was negligible.

The incidences of abnormal scales in samples collected in Scottish net fisheries have been recorded since 1981 (Table 42). These show an increasing number of reared fish in the north and north-west coast samples in recent years.

Sweden: There are no salmon farms on the Swedish west coast. Although no systematic surveys have been carried out, it is suspected that some fish caught in fisheries and rivers are of farmed origin. Identification of farmed fish is difficult, however, as a result of the extensive salmon restocking programme in this area; about half of the smolts that leave western Sweden are of reared origin.

6 MANAGEMENT MEASURES IN NORWAY

Full details of the management measures introduced in Norway in 1989 are given in Anon. (1990a), Appendices 2 and 3. The most significant of these measures was the total ban on drift netting. Additional measures restricted effort in other net fisheries, especially those using bend nets, while salmon fishing by all methods was banned in 74 out of a total of approximately 500 rivers.

The impact of the measures on catches in Norwegian homewaters in 1989 and 1990 is shown in Table 43. In the period 1982-1988, the total nominal catch of salmon fluctuated between 1,076 and 1,623 t. It decreased to 905 t in 1989 and 908 t in 1990, probably as a result of the new management measures. In 1989 and 1990, the marine catches of salmon were 488 and 504 t, respectively, which is much lower than for 1982-1988, when this catch varied between 841 t and 1,324 t. The catch in the marine salmon fisheries, excluding drift netting, was close to the average for this period.

It is likely that the ban on drift netting in 1989 has resulted in a larger number of salmon being available to the other marine homewater fisheries. The additional regulation of these fisheries has probably resulted in a substantial increase in freshwater escapement suggested by increased catches in freshwater. In 1989 and 1990, freshwater catch accounted for 46% and 44% of the total nominal catch, respectively, compared to between 18 and 27% over the years 1982-1988. Increased freshwater escapement is also suggested by the reduction in marine exploitation rates on most components of the River Imsa salmon stock. This was not the case for salmon of the River Drammen stock, however, because drift net exploitation on this stock has always been low.

The salmon fishery on the west coast of Norway intercepts stocks from Finland, USSR and the Swedish west coast on their return to their home rivers. Exploitation on 1SW fish tagged as smolts on the River Lagan (Sweden) was lower in 1989 and 1990 (av 2%) than in 1985-88 (av 7%) (Table 44). This suggests that the management measures introduced in Norway in 1989 also affected Swedish west coast stocks.

The frequency of net marked salmon entering a river may also give information about changes in netting effort on the migration route. The proportion of net marked salmon has been recorded in several Norwegian rivers since 1978. In most of these rivers sampling took place from 1978 to 1986 and was then re-established in 1990. Table 45 shows unweighted means of the proportion of net marked salmon in angling catches from 10 rivers in the period before the extensive homewater regulations were introduced, and the proportion of net marked salmon in the same rivers in 1990. In all rivers, the proportion of net marked salmon recorded in 1990 was much lower than the unweighted means during the period 1978-1988. The proportion of net marked salmon in 1990 was within the range from the earlier years in only two rivers. The reduced proportion of net marked fish may be accounted for by the management measures introduced in the Norwegian homewater fishery in 1989.

7 DEVELOPMENT OF MODELS OF NATIONAL STOCKS

The Study Group reiterated the view expressed in its 1990 report (Anon., 1990a) that it was important to maintain the momentum in the development of models to describe salmon stocks in the North Atlantic. It was noted that if 'index' river data could not be used to provide more general assessments of national stocks such data would be of limited value for management.

The Study Group felt that a useful first step was to attempt to use data from index river studies and other tagging experiments to estimate the contribution of national stocks to interception fisheries outside national homewaters. They, therefore, considered ways in which data from index rivers could be scaled up to national stock levels.

In the simplest situation, an index river would be entirely representative of the national stock. All the results of tagging experiments on the river could thus be scaled up by the same factor (f):

where 'f' = homewater net catch/number of tags recovered in the net fishery.

It was recognised, however, that salmon/grilse ratios for index stocks would often be significantly different to the ratios for national stocks. Nevertheless, it was considered reasonable to assume that 1SW fish from an index river would behave in a similar way to other 1SW fish from the same region or country, and that the same would be true for MSW fish. The results of tagging experiments on the index river could, therefore, be scaled up if age groups were treated separately. In addition, a correction factor could be introduced if data were available to suggest that exploitation rates on the index stock were different to those for national stocks.

This approach was developed into a revised version of the spreadsheet model used by the Working Group in 1990 (Anon., 1990b). In this model, the basic input data are the tag recapture data required for the run-reconstruction model and the catch in numbers by sea age in the homewater net fisheries. The run-reconstruction model provides estimates of the exploitation rates on each sea age class in each fishery. These estimates are then used to scale the tag data to the national stock level using the following formulae.

Fishery	Sea age	Exp. rate	Catch of national stock
Homewater	1	E_{h1}	C_{h1}) input data
Homewater	2	E_{h2}	C_{h2})
Other Interceptions	1	E_{i1}	$C_{i1} = (C_{h1}/E_{h1}*f1)*Exp^{Mt}*E_{i1}*g1$
Other Interceptions	2	E_{i2}	$C_{i2} = (C_{h2}/E_{h2}*f2)*Exp^{Mt}*E_{i2}*g2$
W Greenland	1	E_{w1}	$C_{w1} = (C_{i1}/E_{i1}*g1)*Exp^{Mt}*E_{w1}$
NE Atlantic	1	E_{n1}	$C_{n1} = [(C_{w1}/E_{w1})*Exp^{Mt}+(C_{i1}/E_{i1}*g1)*Exp^{Mt}]*E_{n1}$
NE Atlantic	2	E_{n2}	$C_{n2} = [(C_{w2}/E_{w2})*Exp^{Mt}+(C_{i2}/E_{i2}*g2)*Exp^{Mt}]*E_{n2}$

where -

suffixes 'h','i','w' and 'n' refer to homewater, other interceptions, West Greenland and NE Atlantic fisheries, respectively;

suffixes '1' and '2' refer to sea age groups 1SW and 2SW, respectively;

't' in each case is the time in months between the fishery and the previous fishery affecting the year class (as used in the run-reconstruction model);

'M' is the instantaneous rate of natural mortality for salmon after the first sea year (taken as 0.01/month).

'f1' and 'f2' are correction factors for the exploitation rates on 1SW and MSW fish in homewaters where the exploitation rate on national stocks in homewater fisheries is known or thought to be different from that on the index stock.

'g1' and 'g2' are similar correction factors for exploitation rates in the interception fisheries.

Data were provided for the model by all members of the Study Group present at the meeting. Each national representative prepared an average data set based on smolt tagging carried out in 1985, 1986, 1987. Data for France, Finland, and USSR were estimated on the basis of information available to the Group. As the numbers of 3+SW salmon were generally very small, data for all MSW salmon were combined in this exercise. The results of these analyses are combined in Table 48. The total catches of European fish in the Faroes and West Greenland fisheries are estimated to be as follows:

	Modelled		Observed	
	1SW	MSW	1SW	MSW
Faroes	4,782	101,435	11,836*	91,741
Greenland	119,779	-	145,152	

*Includes 10% discard rate.

The Study Group were encouraged that the total catches for the Faroes and West Greenland fisheries derived from the model were fairly close to the recorded catches. However, the fact that most of the Faroes catch appears to come from Norway and USSR and most of the Greenland catch from UK and Ireland means that the overall result is very much dependant upon the reliability of the tagging data from these countries.

The Study Group emphasised that this was a very preliminary assessment and noted that some of the data used in the national models were very limited. In particular, it was noted that the model was very sensitive to the parameters 'f' and 'g' which effectively has a direct scaling effect on the estimated contributions of national stocks to the high seas fisheries. Scaling factors for external tag recoveries, which are generally only roughly estimated or guessed, can also have a very significant effect on the results. However, it was noted that there were some independent checks on the results, such as the national rod catch.

The Study Group recommended that further attempts be made to refine each national model before 1992. Further, it was agreed that all members should review their tagging experiments and consider what additional data were required to improve the reliability of the national models.

8 RECOMMENDATIONS

1) The Study Group should meet for 3 days, prior to the Working Group meeting unless additional questions are asked, in which case they should meet at Lowestoft (UK) for 4 days at least one full week prior to the Working Group.

2) Discard samples should be collected throughout the fishing season in the Faroes fishery.

3) All countries should attempt to collect effort data from net and rod fisheries wherever possible.

4) Members should review the data used in their models of national stocks and consider what new data are required in order to refine the NE Atlantic model in 1992.

5) The Faroes Fisheries Laboratory should provide a check list of external tag recoveries for each country from their data base in order that national records can be validated.

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Table 1 Nominal landings of Atlantic salmon by Faroes vessels 1968/1990 from the Faroes area and northern Norwegian Sea, north of latitude 67°N. Catches by vessels of other countries fishing in the northern Norwegian Sea are also given.

Year	Faroes catch (t)		Other catches from Northern Norwegian Sea (>67°N)					Total catch
	Faroes	>67°N	Denmark[4]	Finland	Fed.Rep.of Germany	Norway	Sweden	
1968	5[3]		177	0	0	100[2]	126	408
1969	7	0	419	0	24	450[2]	24	924
1970	12[3]		481	0	21	420[2]	24	958
1971	0	0	162	0	9	300[2]	17	488
1972	9	0	182	0	4	300[2]	20	515
1973	28	0	233	0	0	250[2]	50	561
1974	20	0	148	0	0	200[2]	25	393
1975	28	0	245	0	0	200[2]	30	503
1976	40	0	264	0	0	0	25	329
1977	40	0	192	0	0	0	0	232
1978	37	0	138	0	0	0	0	175
1979	119	0	193	0	0	0	0	312
1980	508	28	277	0	0	0	0	873
1981	1,025	0	313	0	0	0	0	1,338
1982	606	259	408	29	0	0	0	1,302
1983	678	-	445	21	0	0	0	1,144
1984	628[3]	-	72	29	0	0	0	729
1985	566[3]	-	-	-	-	-	-	566
1986	530	-	-	-	-	-	-	530
1987	576[3]	-	-	-	-	-	-	576
1988	243[3]	-	-	-	-	-	-	243
1989	364	-	-	-	-	-	-	364
1990[1]	312	-	-	-	-	-	-	312

[1] Preliminary figures.
[2] Estimated catch.
[3] A small part of the catch taken outside the Faroes EEZ.
[4] Including some catch taken in Faroes area.

Table 2 Nominal landings of Atlantic salmon by Faroes vessels in years 1982-1990 and the seasons 1981/1982 - 1989/1990.

Year	Catch (t)	Season	Catch (t)
1982	606	1981/1982	796
1983	678	1982/1983	625
1984	628	1983/1984	651
1985	566	1984/1985	598
1986	530	1985/1986	545
1987	576	1986/1987	539
1988	243	1987/1988	208
1989	364	1988/1989	309
1990[1]	312	1989/1990[1]	361

[1] Preliminary catch.

Table 3 Catch in number of salmon by month in the Faroes fishery for the seasons 1983/1984 to 1989/1990.

Season	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1983/1984	8,680	24,882	12,504	26,396	32,712	12,486	6,849	0	124,508
1984/1985	5,884	20,419	14,493	24,380	26,035	25,471	19,095	0	135,776
1985/1986	1,571	27,611	13,992	50,146	25,968	21,209	14,057	0	154,554
1986/1987	1,881	19,693	5,905	15,113	35,241	21,953	39,153	1,365	140,304
1987/1988	4,259	27,125	5,803	9,387	9,592	4,203	4,642	0	65,011
1988/1989	17,019	24,743	2,916	4,663	12,457	31,698	-	-	93,496
1989/1990	13,079	40,168	5,533	11,282	11,379	29,504	570	-	111,425

Table 4 Sampling of undersized salmon in the 1989/1990 season.

Date	Place	Vessel	Catch	No >60	No <60	Obs.	Scale	Meas	Finc	Micr	Ext	Disc(%)
04.12.89	Torshavn	Polarlaks	2,146	1,750	396	2,146	0	396	12	8	2	18.5
19.12.89	Norddepli	Hvitiklettur	6,704	5,937	767	6,704	0	0	15	8	0	11.4
18.12.89	Klaksvik	Turid	3,977	3,835	142	142	0	0	3	3	3	3.6
27.01.90	At sea	Hvitiklettur	290	266	24	290	282	282	3	0	0	8.3
09.04.90	Torshavn	Polarlaks	3,258	3,054	204	3,258	0	0	2	0	1	6.3
Total 1989/1990			16,375	14,842	1,533	12,540	282	678	35	19	6	9.4

Table 5 Estimation of discard rates in the Faroes fishery 1982/1983 to 1989/1990.

Season	No. of samples	Number sampled	No. <60cm	Discard rate %	Range %
1982/1983	7	6,820	472	6.9	0 - 10.4
1983/1984	5	4,467	176	3.9	-
1984/1985	12	9,546	1,289	13.5	3 - 32
1985/1986	7	14,654	286	1.8	0.6 13.8
1986/1987	13	39,758	2,849	7.2	0 - 71.3
1987/1988	2	1,499	235	15.6	-
1988/1989	9	17,235	1,804	10.7	0.4 - 31.9
1989/1990	5	16,375	1,533	9.4	3.6 - 18.5

Table 6a Catch of salmon in number per unit effort (1,000 hooks) by month in the Faroes longline fishery south of $65^{0}30'$N in the seasons 1981/1982 - 1989/1990.

Season	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Season
1981/1982	-	38	41	49	58	51	34	-	46
1982/1983	19	120	-	61	50	39	36	40	48
1983/1984	85	80	86	58	45	28	26	-	51
1984/1985	38	38	32	32	37	39	40	-	36
1985/1986	64	52	68	54	48	78	61	-	56
1986/1987	31	43	34	44	70	111	102	-	64
1987/1988	56	51	-	47	34	25	22	-	43
1988/1989	63	80	48	68	61	76	-	-	71
1989/1990	81	86	38	56	87	77	-	-	76

Table 6b Catch of salmon in number per unit effort (1,000 hooks) by month in the Faroes longline fishery north of $65^{0}30'$N in the seasons 1981/1982 - 1989/1990.

Season	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Season
1981/1982	-		72	69	73	64	65	-	69
1982/1983	-	-	-	-	68	41	-	54[1]	60
1983/1984	102[1]	-	-	-	34[1]	-	-	-	70
1984/1985	-	-	-	46	31	37	43	-	37
1985/1986	-	-	-	-	38[1]	82	84	-	80
1986/1987	-	-	67[1]	64	77	-	94	-	77
1987/1988	48	68	73	71[1]	31[1]	32[1]	-	-	65
1988/1989	-	-	-	-	71[1]	-	-	-	71
1989/1990	-	-	-	-	-	103	-	-	103

[1]Data from less than 6 sets.

Table 7 Faroes salmon sampling data in the 1989/1990 season.

Date	Place	Vessel	Catch	Obs.	Scales	Meas.	Finc.	Micro	Extern
Market sampling:									
14.11.89	Klaksvik	Polarlaks	2,830	2,100	0	200	8	2	0
23.11.89	Klaksvik	Glyvraberg	1,082	1,082	200	200	4	2	2
29.11.89	Klaksvik	Borgarin	4,154	4,154	0	0	9	4	1
30.11.89	Klaksvik	Jokul	1,785	1,785	0	0	20	2	0
04.12.89	Torshavn	Polarlaks	1,750	1,750	0	200	4	2	0
19.12.89	Norddepli	Hvitiklettur	5,937	5,937	0	0	43	6	2
19.12.89	Norddepli	Sundaenni	2,131	1,500	0	0	3	0	0
19.12.89	Norddepli	Svabo	2,408	1,952	0	0	5	1	0
16.02.90	Leirvik	P. A Regni	3,268	3,268	0	202	20	1	1
21.02.90	Norddepli	Svabo	166	166	0	0	2	0	0
21.02.90	Norddepli	Svabo	2,719	2,719	0	0	12	3	0
20.02.90	Torshavn	Polarlaks	694	694	0	0	8	0	0
27.02.90	Klaksvik	Borgarin	3,419	3,419	0	0	18	0	0
19.03.90	Torshavn	Polarlaks	2,509	2,509	0	200	22	3	4
27.03.90	Norddepli	Svabo	3,341	3,341	0	0	18	3	0
05.04.90	Klaksvik	Turid	3,674	3,674	0	0	25	2	1
09.04.90	Torshavn	Polarlaks	3,054	3,054	0	0	21	6	6
11.04.90	Glyvrar	Hvitiklettur	6,371	3,720	0	204	16	0	10
20.04.90	Leirvik	P. A Regni	5,048	1,262	0	0	6	0	0
Sampling at sea:									
27.01.90	Norddepli	Hvitiklettur	266	266	259	259	3	0	0
Total 1989/1990 season			56,606	48,352	459	1,465	267	37	27

Table 8 Fork length distribution (%) of landings at Faroes by month in the 1989/1990 season.

Length	Nov	Dec	Feb	Mar	Apr	Total
50	0.0	0.0	0.7	0.0	0.0	0.2
52	0.3	0.0	0.7	0.0	0.0	0.3
54	0.3	1.0	2.2	0.0	0.0	0.9
56	0.0	2.0	0.5	1.0	0.0	0.6
58	1.6	3.0	1.2	0.5	0.5	1.4
60	3.6	2.0	3.6	0.5	0.5	2.5
62	5.7	3.5	5.8	4.5	1.5	4.7
64	8.2	8.1	5.1	3.5	4.0	6.0
66	7.1	10.6	6.8	6.1	3.5	6.8
68	14.2	11.1	9.7	6.6	7.4	10.3
70	16.9	15.7	11.2	7.1	15.3	13.4
72	13.9	13.6	12.7	12.6	16.3	13.7
74	12.6	11.6	10.5	13.1	15.3	12.3
76	7.7	8.6	6.3	11.6	13.4	8.8
78	3.6	5.6	7.5	8.6	8.4	6.5
80	1.6	2.0	3.4	2.5	6.4	3.1
82	0.8	1.5	3.9	7.1	2.0	2.9
84	0.3	0.0	1.2	4.0	1.0	1.2
86	0.5	0.0	1.0	1.0	0.5	0.7
88	0.0	0.0	1.5	1.0	1.5	0.8
90	0.5	0.0	1.2	2.5	0.5	0.9
92	0.0	0.0	0.5	1.5	0.5	0.4
94	0.3	0.0	0.7	0.5	1.0	0.5
96	0.3	0.0	1.0	1.5	0.0	0.6
98	0.0	0.0	0.2	2.0	0.5	0.4
100-	0.0	0.0	0.7	0.5	0.0	0.3
Number sampled	366	198	411	198	202	1375

Table 9 Percentage sea age distribution of landed catch by month in the 1989/1990 season determined by fork length method, see text for details.

Month	Sea age			Total
	1	2	3+	
Nov	0.5	97.5	1.9	99.9
Dec	1.0	99.0	0.0	100.0
Jan/Feb	-	-	-	-
Mar	3.6	88.3	8.0	99.9
Apr	0	85.4	14.6	100.0
May	0	94.6	5.4	100.0
Weighted mean	1.4	92.8	5.8	100.0

Table 10 Catch in number by sea age class by month in the Faroes salmon fishery in 1983/1984.

Month	Sea Age								Total
	1	%	2	%	3	%	4	%	
Nov	219	2	10,582	96	215	2	0	0	11,016
Dec	456	1	29,985	95	1,138	4	0	0	31,579
Jan	209	1	14,094	89	1,567	10	0	0	15,870
Feb	2,269	7	27,207	81	4,024	12	0	0	33,500
Mar	979	2	34,821	84	5,657	14	59	0	41,457
Apr	652	4	12,741	80	2,454	15	0	0	15,847
May	358	4	6,988	80	1,346	15	0	0	8,692
Total	5142	3	136,418	86	16,401	10	59	0	157,961

Table 11 Catch in number by sea age class by month in the Faroes salmon fishery in 1984/1985.

Month	Sea Age								Total
	1	%	2	%	3	%	4	%	
Nov	0	0	6,505	100	0	0	0	0	6,505
Dec	97	0	21,429	95	1,049	5	0	0	22,575
Jan	88	1	14,885	93	1,051	7	0	0	16,024
Feb	0	0	22,566	84	4,388	16	0	0	26,954
Mar	0	0	26,285	91	2,499	9	0	0	28,784
Apr	87	0	26,378	94	1,696	6	0	0	28,161
May	109	1	20,327	96	675	3	0	0	21,111
Total	381	0	138,375	92	11,358	8	0	0	150,114

Table 12 Catch in number by sea age class by month in the Faroes salmon fishery in 1985/1986.

Month	Sea Age								Total
	1	%	2	%	3	%	4	%	
Nov	0	0	1,704	95	98	5	0	0	1,802
Dec	0	0	29,960	95	1,704	5	0	0	31,665
Jan	223	1	14,851	93	885	6	87	1	16,045
Feb	811	1	56,257	98	438	1	0	0	57,508
Mar	461	2	29,100	98	219	1	0	0	29,779
Apr	526	2	21,961	90	1,835	8	0	0	24,322
May	0	0	15,628	97	492	3	0	0	16,120
Total	2,021	1	169,462	96	5,671	3	87	0	177,241

Table 13 Catch in number by sea age class by month in the Faroes salmon fishery in 1986/1987.

Month	Sea Age								Total
	1	%	2	%	3	%	4	%	
Nov	0	0	1,683	96	79	4	0	0	1,762
Dec	0	0	18,063	98	380	2	0	0	18,443
Jan	0	0	5,267	95	248	4	15	0	5,530
Feb	71	1	13,139	93	914	6	29	0	14,153
Mar	0	0	30,321	92	2651	8	31	0	33,003
Apr	0	0	20,040	97	519	3	0	0	20,559
May	0	0	34,891	95	1776	5	0	0	36,667
Jun	0	0	1,224	96	54	4	0	0	1,278
Total	71	0	124,628	95	6,621	5	75	0	131,395

Table 14 Catch in number by sea age class by month in the Faroes salmon fishery in 1987/1988.

Month	Sea Age								Total
	1	%	2	%	3	%	4	%	
Nov	140	3	3,974	93	145	3	0	0	4,259
Dec	839	3	25,492	94	794	3	0	0	27,125
Jan	905	16	4,617	80	281	5	0	0	5,803
Feb	499	5	8,509	91	378	4	0	0	9,387
Mar	1,439	15	6,918	72	1,234	13	0	0	9,592
Apr	1,027	24	2,849	68	327	8	0	0	4,203
May	984	21	3,367	73	291	6	0	0	4,642
Total	5,833	9	55,728	86	3,450	5	0	0	65,011

Table 15 Catch in number by sea age class by month in the Faroes salmon fishery in 1988/1989.

Month	Sea Age								Total
	1	%	2	%	3	%	4	%	
Nov	300	2	16,138	95	581	3	0	0	17,019
Dec	272	1	23,503	95	968	4	0	0	24,743
Jan	75	3	2,731	94	110	4	0	0	2,916
Feb	102	2	4,301	92	260	6	0	0	4,663
Mar	247	2	10,858	87	1,352	11	0	0	12,457
Apr	355	1	28,886	91	2,457	8	0	0	31,698
May	0	0	0	0	0	0	0	0	0
Total	1,351	1	86,417	92	5,728	6	0	0	93,496

Table 16 Catch in number by sea age class by month in the Faroes salmon fishery in 1989/1990.

Month	Sea Age								Total
	1	%	2	%	3	%	4	%	
Nov	182	1	12,424	95	412	3	0	0	13,019
Dec	731	2	38,203	95	1,234	3	0	0	40,168
Jan	193	3	5,150	93	189	3	0	0	5,532
Feb	393	3	10,087	89	802	7	0	0	11,282
Mar	184	2	10,011	88	1,185	10	0	0	11,381
Apr	464	2	26,456	90	2,586	9	0	0	29,506
May	8	1	469	87	65	12	0	0	542
Total	2,155	2	102,800	92	6,473	6	0	0	111,430

Table 17 Catch in number by sea age class by fishing seasons in the Faroes salmon fishery since 1983/1984.

Season	Sea Age								Total
	1	%	2	%	3	%	4	%	
1983/1984	5,142	3	136,418	86	16,401	10	59	0	157,961
1984/1985	381	0	138,375	92	11,358	8	0	0	150,114
1985/1986	2,021	1	169,462	96	5,671	3	87	0	177,241
1986/1987	71	0	124,628	95	6,621	5	75	0	131,395
1987/1988	5,833	9	55,728	86	3,450	5	0	0	65,011
1988/1989	1,351	1	86,417	92	5,728	6	0	0	93,496
1989/1990	1,560	1	103,407	93	6,463	6	0	0	111,430
Total	16,359	2	814,435	92	55,692	6	221	0	886,648

Table 18 Percentage distribution by weight category (kg) of salmon landed at Faroes in the 1989/1990 season.

Fishing Season	Weight category (kg)						
	<2.5	2.5-3	3-4	4-5	5-7	7-9	> 9
1983/1984	9.7	20.1	41.5	14.2	4.7	6.2	3.6
1984/1985	13.3	21.4	42.3	11.7	3.6	4.9	2.8
1985/1986	9.6	18.3	46.4	16.4	5.3	2.8	1.2
1986/1987	24.4	26.5	30.9	9.1	4.1	3.5	1.5
1987/1988	35.8	26.6	24.3	5.6	4.6	2.3	0.8
1988/1989	26.4	26.2	33.9	7.9	3.2	2	0.4
1989/1990	24.4	23.8	37.8	8.9	3.2	1.5	0.4

Table 19 Smolt age composition from samples taken in the Faroes fishery from 1984/1985 to 1988/1989.

Season	1	2	3	4	5	6	Unknown	Total
1984/1985	1.5	37.9	46.9	12.3	1.5	0.1	0	2194
1985/1986	0.8	20.4	52.7	24.4	1.7	0	0	951
1986/1987	0.2	16.2	48.5	31.8	3.1	0.2	0	575
1987/1988	1.2	35.9	49.5	13.2	0.4	0	0	680
1988/1989	3.5	47.0	40.5	7.0	0.3	0	1.8	798
1989/1990	3.9	52.2	35.5	6.7	1.1	0	0.6	358

Table 20 Number of microtags recovered at Faroes from European countries.

Season	Country of Origin	Discards Recovery	1SW	2SW	Total
1981/1982	Ireland	1	-	2	3
	UK (Scotland)	-	-	2	2
1982/1983	Ireland	4	2	2	8
	UK (Scotland)	-	-	1	1
1983/1984	UK (Scotland)	-	-	1	1
1984/1985	Iceland	2	-	-	2
	Ireland	15	-	3	18
	UK (Scotland)	3	-	-	3
	Raising Factors	14.2	3.55	3.55	
1985/1986	Ireland	8	-	5	13
	Faroe Islands	-	-	3	3
	UK (England + Wales)	-	-	1	1
	Raising Factors	10.4	3	3	
1986/1987	Faroe Islands	-	-	29	29
	Ireland	8	-	1	9
	UK (England + Wales)	1	-	5	5
	UK (N. Ireland)	4	-		4
	UK (Scotland)	2	-	1	3
	Raising Factors	3.5	3	3	
1987/1988	Faroe Islands	-	-	20	20
	Iceland	-	1	-	1
	Ireland	3	1	4	8
	UK (England + Wales)	1	-	3	4
	Raising Factors	51.5	2.7	2.7	
1988/1989	Faroe Islands	2	-		2
	Iceland	-	-	15	15
	Ireland	17	-	2	19
	UK (England + Wales)	2	1	13	16
	UK (N. Ireland)	-	-	1	1
	UK (Scotland)	2	-	2	4
	Raising Factors	5.4	1.8	1.8	
1989/1990	Faroe Islands	-	-	30	30
	Ireland	14	-	3	17
	UK (England + Wales)	3	1	5	9
	Raising Factors	7.7	2.3	2.3	

Table 21 Calculation of Raising Factors for the Microtag data from the Faroes Fishery 1984/1985 to 1989/1990

			A	%	B	C	Discard	D	1SW 2SW
Season	No. trips	Total sample	No. of discard	Discard rate	Total landed	Total discard	Raise by C/A	Total observed	Raise by B/D
1984/1985	12	9,546	1,289	13.5	135,776	18,330	14.2	38,276	3.55
1985/1986	7	14,654	368	1.8	154,554	2,782	10.4	52,186	2.96
1986/1987	13	39,758	2,849	7.2	140,304	10,102	3.5	47,347	2.96
1987/1988	2	1,264	235	18.6	65,011	12,092	51.5	24,160	2.69
1988/1989	9	17,235	1,840	10.7	93,496	10,004	5.4	51,562	1.81
1989/1990	5	16,375	1,533	9.4	111,430	11,811	7.7	48,352	2.30

Table 22 Estimated numbers of discards, 1SW and 2SW microtagged salmon caught in the Faroese fishery for smolt releases between 1984 and 1989 (year of fishery for 2SW is n+1).

Year of migration yr(n)	Country of origin	Number released	Discards yr(n)	1SW yr(n)	Number in catch All SW yr(n)	2SW yr(n+1)	Total	Rec./rel x 10^{-3}
1984	Faroe Islands	19,620	-	-	-	9	9	0.46
	Ireland	260,816	213	-	213	15	228	0.87
	N. Iceland	72,352	28	-	28	-	28	0.39
	UK (Engl.+ Wales)	39,780	-	-	-	3	3	0.08
	UK (Scotland)	30,040	43	-	43	-	43	1.42
1985	Faroe Islands	30,079	-	-	-	87	87	2.89
	Ireland	220,000	83	-	83	3	86	0.39
	UK (Engl.+ Wales)	53,347	-	-	-	15	15	0.28
	UK (Scotland)	13,497	-	-	-	3	3	0.22
1986	Faroe Islands	43,000	-	-	-	54	54	1.26
	Ireland	143,866	28	-	28	11	39	0.27
	UK (Engl.+ Wales)	177,071	4	-	4	8	12	0.07
	UK (N. Ireland)	26,320	14	-	14	-	14	0.53
	UK (Scotland)	16,217	7	-	7	-	7	0.43
1987	Ireland	162,189	155	3	157	4	161	0.99
	N. Iceland	27,978	-	3	3	27	30	1.06
	UK (Engl.+ Wales)	195,373	52	-	52	23	75	0.38
	UK (N. Ireland)	20,145	-	-	-	2	2	0.09
	UK (Scotland)	20,876	-	-	-	4	4	0.17
1988	Faroe Islands	43,481	11	-	11	69	80	1.84
	Ireland	165,841	92	-	92	7	99	0.60
	UK (Engl.+ Wales)	189,913	11	2	13	12	25	0.13
	UK (Scotland)	31,331	5	-	5	-	5	0.41
1989	Ireland	185,439	108	-	108	N/A	108	0.58
	UK (Engl.+ Wales)	256,342	23	2	25	N/A	25	0.10

Table 23 Provisional numbers of external tags recovered in the Faroes fishery in the 1989/1990 season.

Country	Number of tags
Norway	205
Sweden	11
Scotland	4
Unknown	1
Total	221

Table 24 Numbers of North Esk salmon tagged as smolts (1980-1989) reported to have been recaptured in the Faroes fishery.

Smolt year	No. tagged	No. tag recoveries				No.rec. per 1000 rel.
		1SW	2SW	3SW	Total	
1980	11,475	1	8	1	10	0.87
1981	10,371	0	19	3	22	2.12
1982	11,848	7	22	1	30	2.53
1983	1,456	0	1	0	1	0.69
1984	6,527	0	3	0	3	0.46
1985	6,210	1	3	0	4	0.64
1986	1,124	0	0	0	0	0
1987	4,976	0	0	0	0	0
1988	3,874	0	2	0	2	0.52
1989	4,967	1	2	0	3	0.60

Table 25 Estimated exploitation rates of 1SW and 2SW salmon in the Faroes fishery. Reporting rates for external tag recoveries assumed to be as follows: Faroese fishery 75%, North Esk area 100%, elsewhere in Scotland 75%, Norwegian home water fisheries 50% and Sweden 65%

Exploitation Rates %

	Norway						Scotland			Sweden	
	R. Drammen		R. Imsa				North Esk			R. Lagan	
	Hatchery		Wild		Hatchery		Wild			Hatchery	
Season	1SW	2SW	1SW	2SW	1SW	2SW	1SW	2SW	3SW	1SW	2SW
1981/1982			0	-	1	-	<1	0	0		
1982/1983			0	25	2	38	0	6	0		
1983/1984			0	50	1	45	<1	13	7		
1984/1985	5	-	0	33	2	39	0	9	29	0	
1985/1986	0	30	0	38	0	30	0	0	9	3	22
1986/1987	0	3	0	13	1	28	<1	4	0	2	0
1987/1988	0	6	0	5	1	21	0	5	0	0	9
1988/1989[1]	0	36	0	3	0	10	0	0	0	0	13
1989/1990[1]	0	45	0	5	0	15	0	<1	0	2	9

[1] Provisional exploitation rate estimates.

Table 26 Nominal homewater catch of salmon by country (in tonnes round fresh weight) 1980-1990.

Year	Eng.+ Wales	Finland	France	Iceland	Ireland[2]	Northern Ireland[3]	Norway	Scotland	Sweden (w.coast)	USSR	Total N.E. Atlantic
1980	360	34	30	249	947	122	1,830	1,134	17	664	5,387
1981	493	44	20	163	685	101	1,656	1,233	26	463	4,884
1982	286	54	20	147	993	132	1,348	1,092	25	364	4,461
1983	429	57	16	198	1,656	187	1,550	1,221	28	507	5,849
1984	345	44	25	159	829	78	1,623	1,013	40	593	4,749
1985	361	49	22	217	1,595	98	1,561	913	45	659	5,520
1986	430	38	28	310	1,730	109	1,598	1,271	54	608	6,176
1987	302	49	27	222	1,239	56	1,385	922	47	564	4,813
1988	395	34	32	396	1,874	114	1,076	882	40	419	5,262
1989	296	52	14	278	1,079	142	905	895	29	359	4,025
1990[1]	297	59	15	421	442	94	908	542	33	316	1,922
5 year average	356.8	44.4	24.6	284.6	1,503.4	103.8	1,300.2	976.6	43.0	521.8	5179.2
(+ S.D.)	(58.2)	(7.9)	(6.9)	(73.5)	(334.3)	(31.3)	(312.2)	(165.3)	(9.3)	(127.6)	(793.7)
10 year average	369.7	45.5	23.4	233.9	1,262.7	113.9	1,450.8	1,057.6	35.1	520	5122.6
(+ S.D.)	(67.3)	(8.1)	(6.0)	(77.6)	(419.7)	(35.9)	(286.6)	(152.2)	(11.8)	(115.0)	(647.0)

[1] Provisional figures.
[2] Catch on River Foyle allocated 50% Ireland and 50% Northern Ireland.
[3] Not including angling catch (mainly grilse).

Table 27 Reported homewater catch of Salmon in numbers and weight in tonnes (round fresh weight). Catches reported for 1990 are provisional. Some countries divide 1SW from MSW salmon based on weight.

Country	Year	1 SW		MSW		Total	
		No.	Wt.	No.	Wt.	No.	Wt.
Engl.+ Wales	1985	-	-	-	-	95,531	361
	1986	-	-	-	-	110,794	430
	1987	66,371	-	17,063	-	83,434	302
	1988	76,521	-	33,642	-	110,163	395
	1989	65,450	-	19,550	-	85,000	296
	1990	53,000	-	28,000	-	81,000	297
France	1985	1,074	-	3,278	-	4,352	22
	1986	-	-	-	-	6,801	28
	1987	6,013	18	1,806	9	7,819	27
	1988	2,063	7	4,964	25	7,027	32
	1989	1,351	4	1,296	6	2,647	10
	1990	1,840	5	2,474	10	4,314	15
Iceland	1985	50,000	125	16,300	94	66,300	217
	1986	67,300	174	22,300	136	89,600	310
	1987	42,550	114	18,840	108	61,390	222
	1988	112,000	288	19,000	108	133,500	396
	1989	72,382	161	18,253	115	90,635	276
	1990	-	-	-	-	131,826	421
Ireland	1985	498,333	1,495	19,608	100	517,941	1 595
	1986	498,125	1,594	28,335	136	526,450	1 730
	1987	358,842	1,112	27,609	127	386,451	1 239
	1988	559,297	1 733	30,599	141	589,896	1 874
	1989	331,544	947	32,875	132	354,419	1 079
	1990	-	-	-	-	147,593	442
Norway	1985	299,037	638	162,403	923	461,440	1 561
	1986	264,849	556	191,524	1,042	456,373	1 598
	1987	235,703	491	153,554	894	389,257	1 385
	1988	217,617	420	120,367	656	337,984	1 076
	1989	220,170	436	80,880	469	301,050	905
	1990	191,617	380	91,437	528	283,054	908
Scotland	1985	158,012	399	114,648	514	272,660	913
	1986	202,861	526	148,398	745	351,259	1 271
	1987	164,785	419	103,994	503	268,779	922
	1988	149,098	381	112,162	501	261,260	882
	1989	174,941	431	103,886	464	278,827	895
	1990	68,135	168	76,650	374	144,785	542
Sweden	1989	3,181	7	4,610	22	7,791	29
(west coast)	1990	7,428	18	3,133	15	10,561	33

MSW includes all ages >1.

Table 28 Estimated number of 1SW and 2SW salmon of the River Imsa stock available to the Norwegian Sea fishery and Norwegian homewater fishery, and estimated exploitation rates. The number of salmon caught in the trap in River Imsa is considered to be the total river escapement. The estimates are based on 75% and 50% tag reporting rate in Norwegian Sea and Norwegian homewaters respectively. Exploitation rates in 1990 are provisional.

			1SW					2SW				
			Norwegian Sea		Norwegian homewaters			Norwegian Sea		Norwegian homewaters		
Released	Smolt type	No. tagged	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No. in trap	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No. in trap
	R. Imsa wild	3,214	776	0.00	555	0.88	66	177	0.25	127	0.93	9
1981	R. Imsa 2+	5,819	757	0.01	586	0.80	114	125	0.38	74	0.92	6
1982	R. Imsa wild	736	61	0.00	39	0.87	5	18	0.50	9	0.89	1
	R. Imsa 1+	5,581	130	0.00	73	0.99	1	48	0.33	31	0.97	1
	R. Imsa 2+	8,501	712	0.03	524	0.95	25	129	0.57	54	0.93	4
1983	R. Imsa wild	1,287	211	0.00	174	0.82	31	27	0.33	17	0.94	1
	R. Imsa 1+	5,861	27	0.00	23	0.96	1	3	0.31	2	1.00	0
	R. Imsa 2+	6,052	205	0.02	172	0.93	12	19	0.47	10	1.00	0
1984	R. Imsa wild	936	150	0.00	113	0.73	30	29	0.38	17	0.82	3
	R. Imsa 1+	1,863	40	0.00	21	0.76	5	16	0.19	12	0.83	2
	R. Imsa 2+	7,445	413	0.04	335	0.86	48	43	0.40	25	0.96	1
1985	R. Imsa wild	892	121	0.00	91	0.79	19	23	0.13	19	0.95	1
	R. Imsa 1+	9,160	782	0.00	561	0.77	128	177	0.16	142	0.90	14
	R. Imsa 2+	1,950	97	0.00	82	0.78	18	10	0.40	6	1.00	0
1986	R. Imsa wild	477	42	0.00	18	0.56	8	21	0.05	20	0.80	4
	R. Imsa 1+	10,048	603	0.00	469	0.73	123	103	0.17	83	0.92	7
	R. Imsa 2+	1,976	110	0.01	93	0.92	7	12	0.25	9	0.89	1
1987	R. Imsa wild	480	119	0.00	83	0.51	40	29	0.03	27	0.74	7
	R. Imsa 1+	3,980	527	0.00	447	0.80	87	55	0.07	49	0.86	7
	R. Imsa 2+	3,902	373	0.01	322	0.75	80	32	0.13	27	0.44	15
1988	R. Imsa wild	1,700	259	0.00	226	0.65	76	21	0.05	19	0.42	11
	R. Imsa 1+	9,896	1,085	0.00	928	0.53	435	107	0.30	72	0.69	22
	R. Imsa 2+	1,991	220	0.00	205	0.35	130	6	0.00	6	0.67	2
1989	R. Imsa wild	1,194	76	0.00	73	0.22	56					
	R. Imsa 1+	983	21	0.00	20	0.50	10					
	R. Imsa 2+	1,994	36	0.00	35	0.86	5					

Table 29 Estimated number of 1SW and 2SW salmon of the River Imsa stock available to the Norwegian Sea fishery and Norwegian homewater fishery, and estimated exploitation rates. The number of salmon caught in the trap in River Imsa is considered to be the total river escapement. The estimates are based on 75% and 70% tag reporting rate in Norwegian Sea and Norwegian homewaters respectively. Exploitation rates for 1990 are provisional.

			1SW					2SW				
			Norwegian Sea		Norwegian homewaters			Norwegian Sea		Norwegian homewaters		
Released	Smolt type	No. tagged	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No. in trap	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No. in trap
	R. Imsa wild	3,214	592	0.00	416	0.84	66	142	0.32	93	0.90	9
1981	R. Imsa 2+	5,819	596	0.01	452	0.74	114	105	0.46	55	0.89	6
1982	R. Imsa wild	736	48	0.00	29	0.83	5	16	0.56	7	0.86	1
	R. Imsa 1+	5,581	98	0.00	52	0.98	1	39	0.41	22	0.95	1
	R. Imsa 2+	8,501	549	0.04	382	0.93	25	115	0.63	40	0.90	4
1983	R. Imsa wild	1,287	163	0.00	133	0.76	31	22	0.41	12	0.92	1
	R. Imsa 1+	5,861	20	0.00	17	0.94	1	2	0.50	1	1.00	0
	R. Imsa 2+	6,052	154	0.03	126	0.90	12	16	0.56	7	1.00	0
1984	R. Imsa wild	936	122	0.00	90	0.66	30	25	0.44	13	0.77	3
	R. Imsa 1+	1,863	30	0.00	16	0.69	5	12	0.25	9	0.78	2
	R. Imsa 2+	7,445	322	0.05	255	0.81	48	36	0.47	18	0.94	1
1985	R. Imsa wild	892	93	0.00	70	0.73	19	18	0.17	14	0.93	1
	R. Imsa 1+	9,160	645	0.00	438	0.70	128	138	0.21	105	0.87	14
	R. Imsa 2+	1,950	77	0.00	64	0.72	18	8	0.50	4	1.00	0
1986	R. Imsa wild	477	35	0.00	15	0.47	8	17	0.06	15	0.73	4
	R. Imsa 1+	10,048	478	0.00	371	0.66	123	82	0.23	61	0.89	7
	R. Imsa 2+	1,976	80	0.02	68	0.90	7	10	0.30	7	0.86	1
1987	R. Imsa wild	480	100	0.00	71	0.42	40	23	0.04	21	0.67	7
	R. Imsa 1+	3,980	407	0.00	345	0.74	87	43	0.09	37	0.81	7
	R. Imsa 2+	3,902	296	0.01	253	0.68	80	29	0.14	24	0.38	15
1988	R. Imsa wild	1,700	211	0.00	184	0.58	76	18	0.06	17	0.35	11
	R. Imsa 1+	9,896	930	0.00	795	0.44	435	93	0.34	58	0.62	22
	R. Imsa 2+	1,991	197	0.00	184	0.28	130	5	0.00	5	0.60	2
1989	R. Imsa wild	1,194	71	0.00	68	0.16	56					
	R. Imsa 1+	983	18	0.00	17	0.41	10					
	R. Imsa 2+	1,994	27	0.00	26	0.81	5					

Table 30 Estimated exploitation rates of hatchery-reared Atlantic salmon of the the River Drammen in the different sea fisheries Tag reporting rate in Norwegian home-waters = 0.50. Exploitation rates for 1990 are provisional.

			1SW							2SW				
			Faroes		Norw. homewaters			Greenland		Faroes		Norw. homewaters		
Released	Smolt age	No. released	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No.in Drammen river	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No.in Drammen river
1984	2+	984	87	0.10	44	0.45	24	39	0.03	36	0.42	20	0.30	14
	1+	1,472	121	0.01	41	0.68	13	73	0.00	68	0.18	54	0.70	16
1985	1+	1,437	90	0.00	49	0.81	9	31	0.19	29	0.03	27	0.52	13
1986	1+	2,972	269	0.00	182	0.64	65	76	0.04	71	0.06	64	0.47	34
1987	2+	2,289	103	0.00	55	0.73	15	33	0.03	30	0.30	20	0.60	8
	1+	1,498	23	0.00	9	0.67	3	13	0.00	12	0.42	7	0.57	3
1988	1+	7,531	37	0.00	35	0.40	21	40	0.00	38	0.45	20	0.40	12
1989	2+	1,676	21	0.00	20	0.05	18							

Table 31 Estimated exploitation rates of hatchery-reared Atlantic salmon of the River Drammen stock in the different sea fisheries. Tag reporting rate in Norwegian homewaters = 0.70. Exploitation rates for 1990 are provisional.

			1SW							2SW				
			Faroes		Norw. homewaters			Greenland		Faroes		Norw. homewaters		
Released	Smolt age	No. released	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No.in Drammen river	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No. of fish available	Expl. rate	No.in Drammen river
1984	2+	984	88	0.10	38	0.37	24	37	0.03	34	0.44	18	0.22	14
	1+	1,472	99	0.01	33	0.61	13	61	0.00	57	0.21	43	0.63	16
1985	1+	1,437	74	0.00	38	0.76	9	33	0.18	25	0.04	23	0.43	13
1986	1+	2,972	227	0.00	149	0.56	65	69	0.04	62	0.06	55	0.38	34
1987	2+	2,289	76	0.00	44	0.66	15	28	0.04	27	0.33	17	0.53	8
	1+	1,498	20	0.00	7	0.57	3	12	0.00	11	0.44	6	0.50	3
1988	1+	7,531	33	0.00	31	0.32	21	38	0.00	36	0.47	18	0.33	12
1989	2+	1,676	20	0.00	19	0.05	18							

Table 32 Total marine exploitation (% of extant stock) in Irish coastal waters of R. Bush hatchery-reared and wild salmon released as microtagged smolts.

1SW exploitation of hatchery-reared and wild smolts released in 1985-1989

Release year	Release group HR(1+)	HR(2+)	Wild
1983	93.7	94.6	-
1984	93.3	-	-
1985	81.9	75.4	-
1986	93.9	77.5	68.5
1987	72.3	57.1	65.3
1988	92.3	83.4	89.0
1989[1]	63.5	69.8	61.4

2SW exploitation of hatchery-reared and wild smolts released in 1985-1988.

Release year	Group	Exploitation (%)
1985	HR(1+/2+)	46.3
1986	HR/wild	36.5
1987	HR(1+/2+)	60.0
1988[1]	HR/Wild	37.9

[1] Provisional figures.
HR = Hatchery reared.

Table 33 Estimated exploitation rates (in %) of wild Atlantic salmon of the River N. Esk stock in the homewater net and cable fishery.

Year	Fishing Season		Whole Year	
	1SW	MSW	1SW	MSW
1981	47	65	23	59
1982	59	62	30	48
1983	37	42	15	31
1984	72	60	28	42
1985	39	39	23	35
1986	55	36	40	29
1987	50	49	29	37
1988	55	48	35	37
1989	72	47	25	26
1990	53	48	37	37

Table 34 Estimated exploitation rates (in %) of salmon in homewater fisheries. Reporting rates for external tags shown below.

	Iceland	Ireland	Norway						Sweden		UK(Engl.+ Wales)			UK (N.Ireland)		UK (Scotland)	
	R.Ellidaar wild	Burrishoole wild all ages	R.Drammen HR[2]		R.Imsa Wild		R.Imsa HR[2]		Lagan HR(2+)		Itchen Wild all ages		Test Wild all ages	R. Bush Wild	R. Bush Wild/HR	North Esk[3] Wild	
Year	1SW		1SW	2SW	1SW	2SW	1SW	2SW	1SW	2SW	net	rod	rod	1SW	2SW	1SW	2SW
1985		82	57	-	73	94	81	100	77							23	35
1986	34	85	81	50	79	82	78	90	92	82						40	29
1987		75	64	52	56	95	83	95	66	25				69	46	29	37
1988		76	70	47	51	80	78	91	73	82				65	36	35	37
1989	41	82	40	59	65	74	44	65	76	84	9	45	29	89	60	25	26
1990[1]	44	54	5	40	22	42	68	68	45[1]	22[1]	19	49	37	61	38	37	37
Average	40	76	53	50	58	78	72	85	72	49	14	47	33	71	45	32	34

[1] Provisional figures.
[2] HR in R. Drammen and R. Ims are pooled groups of 1+ and 2+ smolts.
[3] In-river netting only.

Reporting rates for external tags:

Faroes 75%
Scotland - N.Esk area 100%
 - elsewhere 75%
Norwegian coast 50%

Table 35 Wild Smolt Counts and Estimates on various Index Streams in the NE Atlantic Area including juvenile counts in the River Bush catchment.

Year	Iceland R. Ellidaar	Ireland R. Burrishoole	N.Ireland R. Bush	Norway R. Imsa	Scotland N.Esk	N. Ireland R. Bush
	Estimate	Total count	Total count	Total count	Estimate	juvenile surveys[2]
1981		11,208	14,509	3,214	195,000	-
1982		9,434	10,694	736	160,000	-
1983		10,381	26,804	1,287	-	32.6
1984		9,383	30,009[1]	936	220,000	19.5
1985	29,000	7,270	30,518[1]	892	130,000	7.6
1986		6,268	18,442	477	-	11.3
1987		5,376	21,994	480	199,000	10.3
1988	23,000	3,817	22,783	1,700	-	8.9
1989	22,500	6,554	17,644	1,194	141,000	16.2
1990	?	6,563	17,133	1,822	175,000	5.6

[1] These smolt counts show effects of enhancement.
[2] Juvenile surveys represent index of fry (0+) abundance (number per 5 minutes electrofishing) at 137 sites, based on natural spawning in the previous year.

Table 36 Wild Adult Counts to various rivers in the NE Atlantic Area.

Year	England R. Severn	Iceland R. Ellidaar	Ireland R. Burrishoole	N. Ireland R. Bush	Norway R. Imsa	Scotland N. Esk	Sweden R. Högvadsån	USSR R. Tuloma
	Counter	Estimate	Total Trap	Total Trap	Total Trap	Counter	Total Trap	
1981	3,884		831	1,538		8,731	512	3,467
1982	1,875		347	1,492	66	7,764	572	4,252
1983	1,232		509	966	14	8,434	447	9,102
1984	1,711		602	592[2]	32	6,597	629	10,971
1985	3,257		319	2,376	31	9,036	768	8,067
1986	2,129	2,726	567	2,836	22	6,326	1 632	7,074
1987	1,206	-	495	2,386	9	6,240	1 475	5,470
1988	1,958		467	3,005	44	10,208	1 238	6,069
1989	5,207	2,921	458	993	83	10,215	480	-
1990	1,006	1,822	655	1,843	67	4,000[1]	879	-

[1] Provisional.
[2] Partial count.

Table 37 Estimated survival of wild smolts (%) into freshwater in various rivers in the NE Atlantic area. R. Bush and R. Imsa data are actual counts.

Smolt migration year	Iceland[1]				Ireland[1]	N. Ireland		Norway[2]		UK (Scotland)		
	R.Ellidar	R.Midfjardara[5]		R.Vesturdalsa	R.Burrishoole	R.Bush		R.Imsa		North Esk[4]		
	1SW	1SW	2SW	1SW	1SW	1SW	2SW	1SW	2SW	1SW	2SW	3SW
1981					5.4	9.5	0.9	2.0	0.3	2.9	1.4	0.1
1982					5.8	7.8	0.8	0.7	0.1	4.1	1.3	0.1
1983				Ca 2.0	3.4	1.9[3]	1.7	2.4	0.1	-	-	-
1984					7.8	6.4	1.4	3.2	0.3	3.0	1.5	0.1
1985	9.4				7.9	7.9	1.9	2.1	0.1	3.6	1.8	0.2
1986					8.7	9.7	1.9	1.6	0.4	-	-	-
1987		4.6	2.6		12.0	12.0	0.4	8.3	1.5	4.4	1.5	0.1
1988	12.7	1.0	2.0		10.1	3.9	0.8	4.3	0.6	-	-	-
1989	8.1	0.4	-	1.1	3.5	9.3	-	4.7	-	2.1	-	-

[1] Microtags.
[2] Carlin tags.
[3] Minimum estimate.
[4] Before in-river netting.
[5] Assumes 50% exploitation in rod fishery.

Table 38 Survival (%) of Hatchery smolts (1+, 2+) into freshwater, released into various rivers in the NE Atlantic area. Included are exact counts and estimates.

Smolt migration year	Iceland[1]				Ireland[1]	N. Ireland[1]		Norway[2]			
	Kollafjordur		R. Midfjordara[4]		R. Burrishoole	R. Bush		R. Imsa		R. Drammen	
	1SW	2SW	1SW	2SW	1SW	1SW 1+ smolts	1SW 2+ smolts	1SW	2SW	1SW	2SW
1981	5.6	3.1			1.3	-	-	2.0	0.1		
1982	8.7	1.6			1.6	-	-	0.2	0.03		
1983	1.2	0.9	0.04	0.15	0.5	0.1	0.4	0.1	0.0		
1984	4.5	0.5	0.45	0.18	3.0	0.9		0.6	0.03	1.5	1.2
1985	ca 7.3	ca 0.7	0.77	0.15	3.7	2.8	4.3	1.3	0.13	0.6	0.9
1986	0	0	0.34	0.66	1.7	0.1	2.1	1.1	0.07	2.2	1.1
1987	7.0	0.5	2.68	0.68	3.5	1.8	8.2	2.1	0.3	0.4	0.3
1988	ca 1.0	ca 0.7	0.88	0.10	3.3	0.4	1.0	4.8	0.2	0.3	0.2
1989	ca 1.0	-			2.5	2.9	6.8	0.5	-	1.1	
1990	-	-				-	-	-			

[1] Microtagged.
[2] Carlin tagged.
[3] Minimum estimate.
[4] Return rates to rod fishery with constant effort.

Table 39 Summary of estimates of the incidence of fish farm escapees in catches and spawning stocks by country in the North-East Atlantic.

Country	Location	No. sites examined	Net catch	Rod catch	Spawning stock
Iceland	Southwest	5	-	9.6-25.3	-
Ireland	Donegal	1	0.03%	-	-
	Galway	2	<3%		
Norway	Outer coast	9	16-64%	-	-
	Fjords	5	6-36%	-	-
	Fresh water[2]	23	-	0-55%	8-65%
UK (Engl.+ Wales)		10	0	0	0
UK (N. Ireland)	Bush	1	-	-	0.1%
UK (Scotland)	R. Polla	1	10%[1]	5%	-
	West coast	1	21%	-	-
	Northwest coast	1	4.7%	-	-
	North coast	1	3.8%	-	-
	Kyle of Sutherland	1	0	-	-

[1] Experimental netting.
[2] Provisional data.

Table 40 Estimates of the proportion (%) of ranched and farmed Atlantic salmon in angling catches in five rivers in southwestern Iceland 1990.

River	June	July	August	September	Total
Ellidaar	n=54	n=171	n=173	n=70	n=468
Ranched	7.4	12.3	26.0	25.3	18.8
Farmed	7.4	12.3	20.8	26.8	17.0
Ulfarsa	n=4	n=69	n=21	n=21	n=115
Ranched	50.0	14.5	23.8	28.6	20.0
Farmed	0.0	24.6	38.1	19.0	25.2
Leirvogsa	n=9	n=184	n=157	n=62	n=412
Ranched	0.0	14.1	31.2	37.1	23.8
Farmed	0.0	16.3	25.5	12.9	18.9
Laxa i Kjos	n=66	n=190	n=163	n=17	n=436
Ranched	3.0	10.0	25.8	41.2	16.1
Farmed	0.0	8.4	16.0	0.0	9.6
Botnsa	n=0	n=13	n=48	n=11	n=72
Ranched	-	23.1	39.6	36.4	36.1
Farmed	-	15.4	27.1	27.3	25.0

Table 41 Proportion (unweighted mean) of reared salmon in marine and freshwater fisheries in Norway 1989 and 1990. N= number of salmon examined. The data from freshwater 1990 are provisional.

Group	Period	N	No. of sites	Mean (%)	Range
1989 Marine Outer Coast	Summer	1217	7	45	7-66
1990 Marine Outer Coast	Summer	2481	9	48	16-64
1989 Marine Fjords	Summer	803	4	14	8-29
1990 Marine Fjords	Summer	940	5	15	6-36
1989 Freshwater	Summer	5744	39	7	0-26
1990 Freshwater	Summer	1941	14	10	0-55
1989 Freshwater	Autumn	1791	16	38	2-77
1990 Freshwater	Autumn	749	9	37	8-65

Table 42 Percentage of non-wild salmon in samples from five commercial fisheries in Scotland in 1981-1990. - = no sample

Year	Sampling Site			
	Moray Firth	Kyle of Sutherland	North coast	Northwest coast
1981	0	0	1.0	0
1982	0	0	0.3	0
1983	0	0	0	1.1
1984	-	0	0	0
1985	-	0	0	0
1986	-	0	0	0.6
1987	-	0	0	1.3
1988	-	0	0.6	1.5
1989	-	0.7	6.1	6.6
1990	-	0	3.8	4.7

Table 43 Nominal catches in Norwegian homewaters 1982-1989 (t round weight) broken down to drift net fishery, marine fishery excluding drift nets (other nets) and freshwater fishery and the proportion of the total catch taken in freshwater.

	1982	1983	1984	1985	1986	1987	1988	1989	1990
Drift nets	590	826	866	667	795	552	527	0	0
Other nets	469	418	458	572	497	461	314	488	504
Freshwater	289	306	299	322	306	372	235	417	404
Proportion in freshwater	0.21	0.20	0.18	0.21	0.19	0.27	0.22	0.46	0.44
Total	1,348	1,550	1,623	1,561	1,598	1,385	1,076	905	908

Table 44 Exploitation of River Lagan stock in Norway. Reporting rates assumed to be 50%.

Year of fishery	1SW	2SW
1985	5%	-
1986	6%	0%
1987	5%	11%
1988	12%	0%
1989	0%	0%
1990	4%	0%

Table 45 Frequency of net marks on Atlantic salmon in 10 Norwegian rivers sampled during 1978-1988 (unweighted mean) and in 1990.

River	1978-1988 (Data from Lund and Heggberget, 1991)				1990	
	Number of sampling years	Total number of fish examined	Net marks %	Range %	Number of fish examined	Net marks %
R. Malselv	9	2,590	44	12-75	206	31
R. Vefsna	8	2,220	33	16-68	102	12
R. Namsen	9	4,036	25	12-36	239	4
R. Stjordal	4	889	43	32-63	69	6
R. Orkla	2	132	71	66-76	73	19
R. Orsta	7	2,094	73	48-90	78	17
R. Gaular	5	1,522	37	23-56	77	27
R. Suldal	7	1,025	18	8-43	425	1
R. Imsa	11	2,886	16	6-47	2,324	5
R. Figgjo	4	950	24	12-38	305	9

Table 46. North-east Atlantic Salmon Model. Preliminary estimates of the contribution of national stocks to Faroes, West Greenland and other fisheries.

Fishery	UK(E&W)	Finland	France	Iceland	Ireland	UK(NI)	Norway	UK(Sc)	Sweden	USSR	Totals
Faroes 1sw + discards	796	58	184	595	651	249	1163	895	190	0	4782
Faroes 2sw	935	2801	296	842	341	0	54294	2873	877	38175	101435
West Greenland 1sw	11037	330	3490	281	19807	100	6388	77641	706	0	119779
West Greenland 2sw	0	0	0	0	0	0	0	0	0	0	0
Other interception 1sw	12857	5333	1164	0	0	45996	0	49620	538	32632	148140
Other interception 2sw	518	5933	109	0	0	1902	0	0	98	0	8561
Homewater net 1sw	22000	5333	3100	8124	420000	59024	239000	126152	4760	76141	963634
Homewater net 2sw	8500	5933	2700	6856	28848	8509	234000	56178	2588	39376	393488

Totals:

Fishery	UK(E&W)	Finland	France	Iceland	Ireland	UK(NI)	Norway	UK(Sc)	Sweden	USSR	Totals
Faroes catch	1731	2860	479	1436	992	249	55458	3768	1067	38176	106217
West Greenland catch	11037	330	3490	281	19807	100	6388	77641	706	0	119779
Other interception	13375	11266	1273	0	0	47898	0	49620	636	32632	156700
Homewater net	30500	11266	5800	14980	448848	67533	473000	182330	7348	115517	1357122

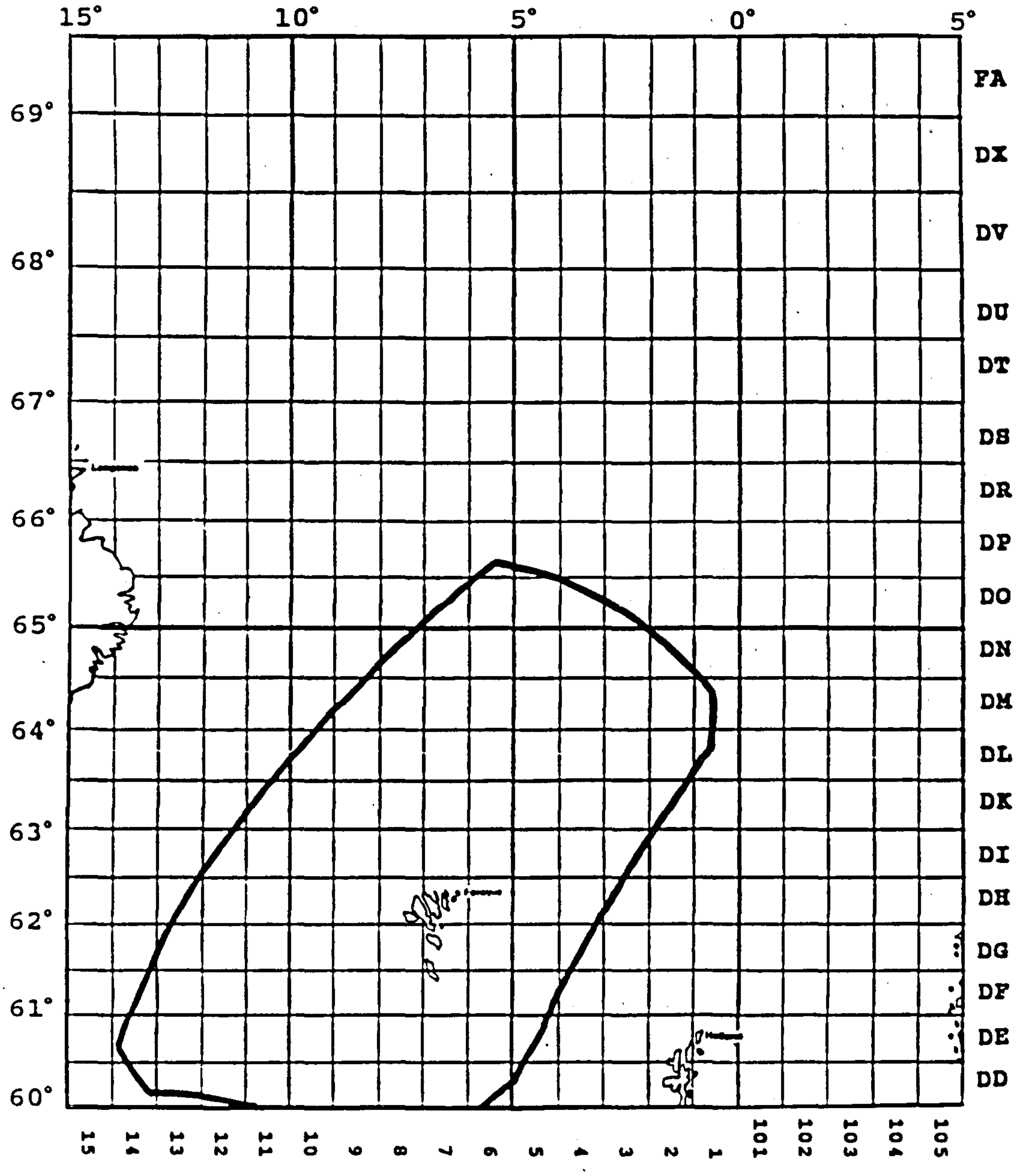


Figure 1 . The Faroese Exclusive Economic Zone (EEZ).

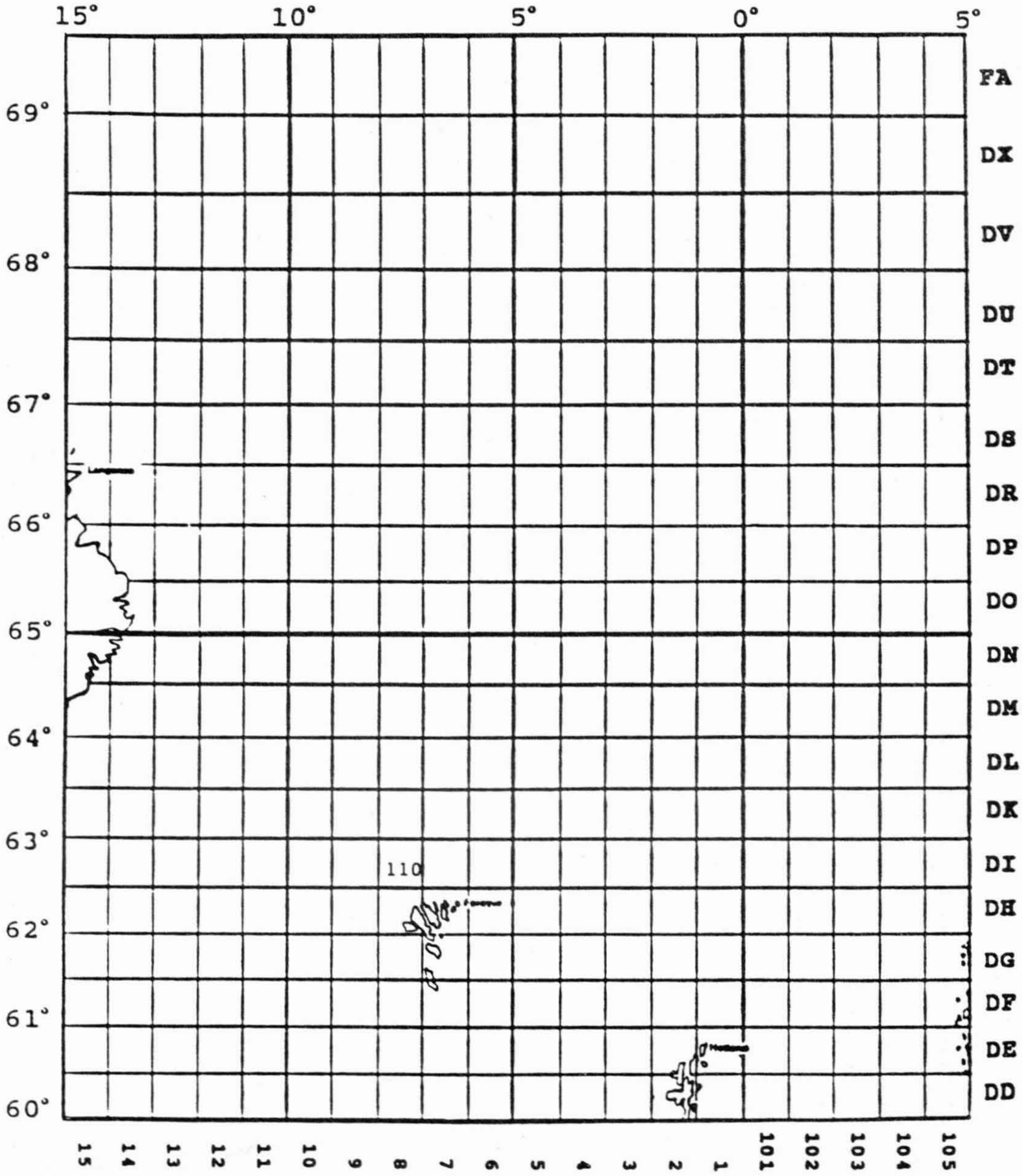


Figure 2. Catch in number*10^{-1} by statistical rectangle from logbooks in November 1989.

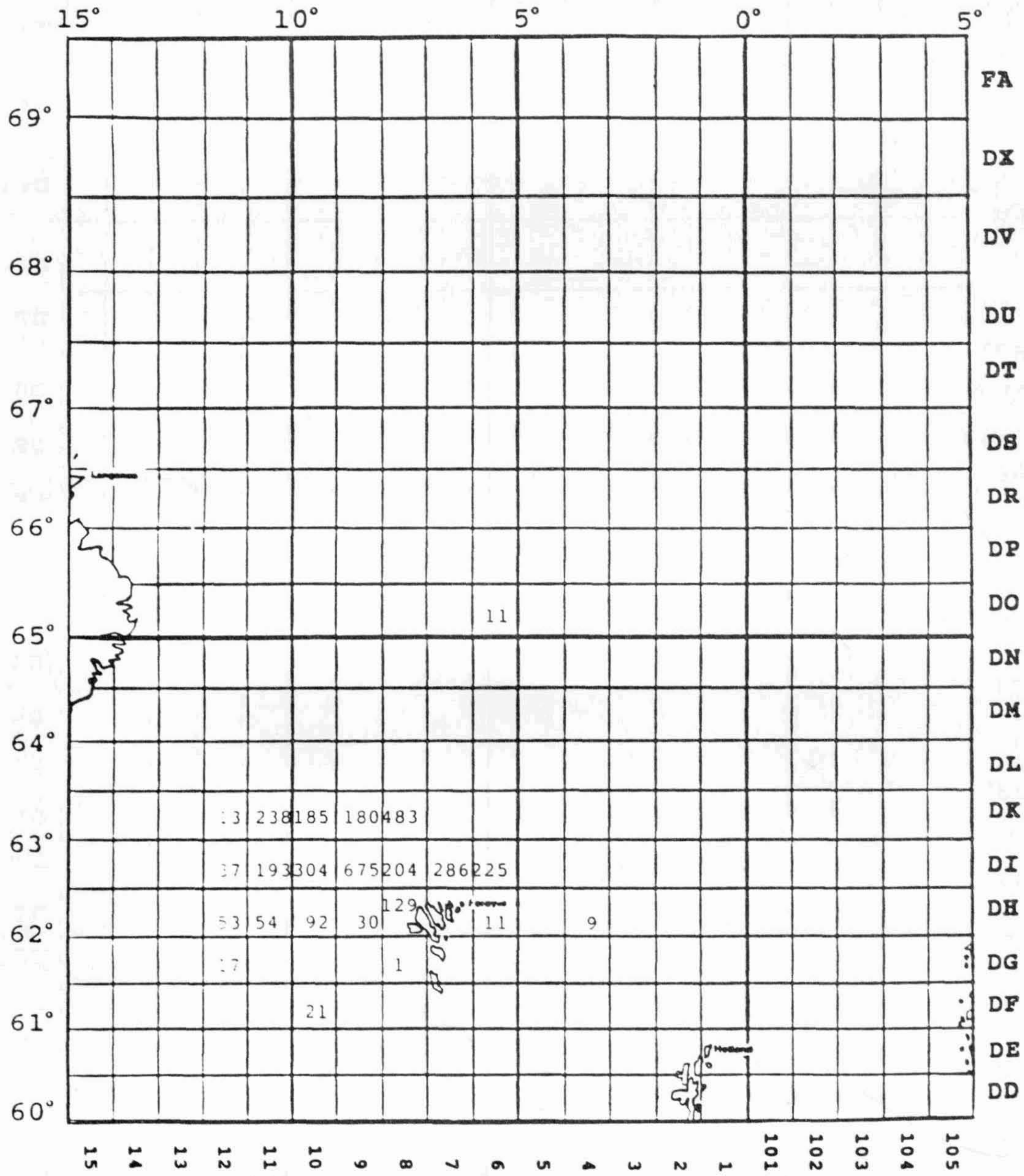


Figure 3. Catch in number*10^{-1} by statistical rectangle from logbooks in December 1989.

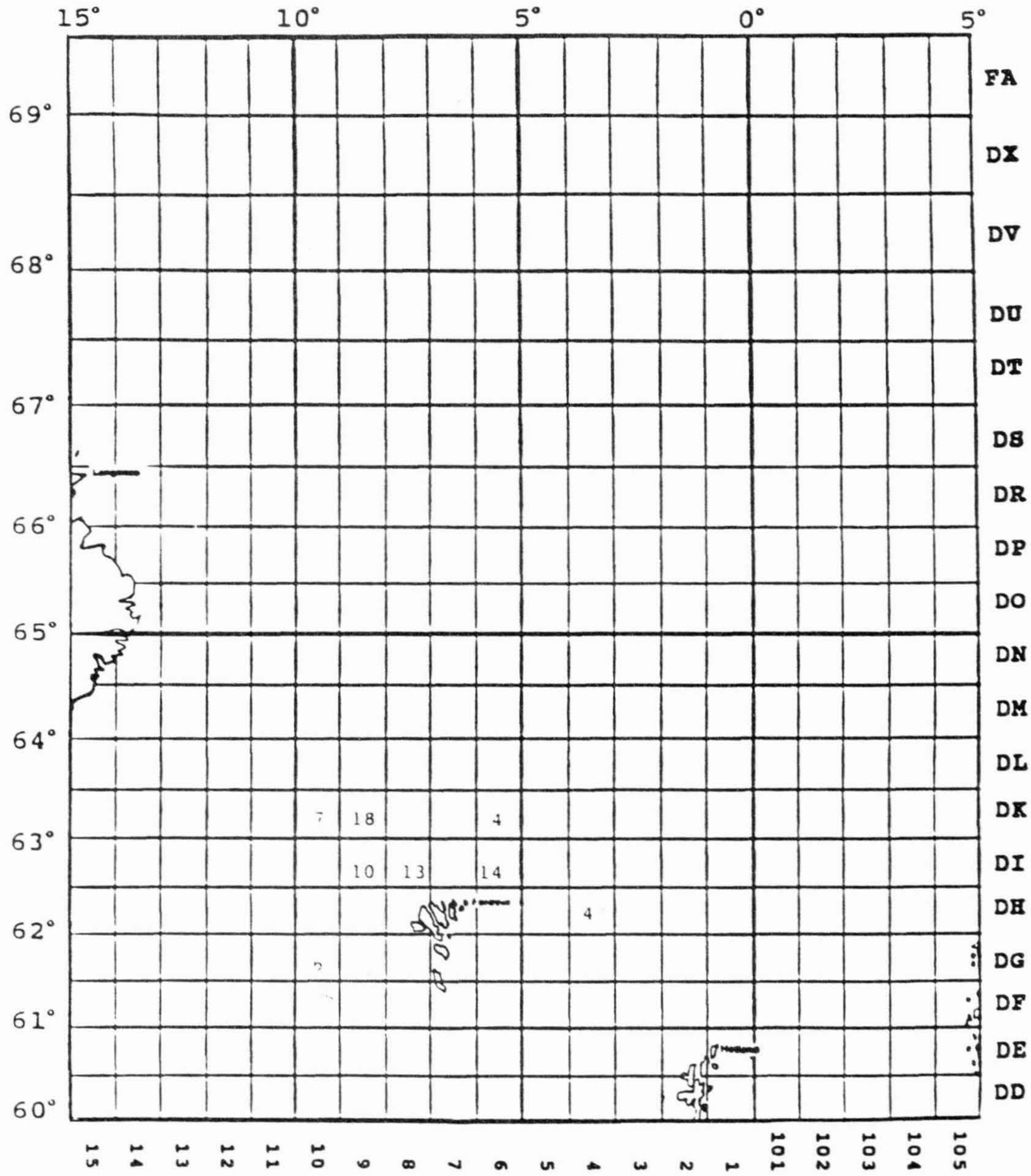


Figure 4. Catch in number*10^{-1} by statistical rectangle from logbooks in January 1990.

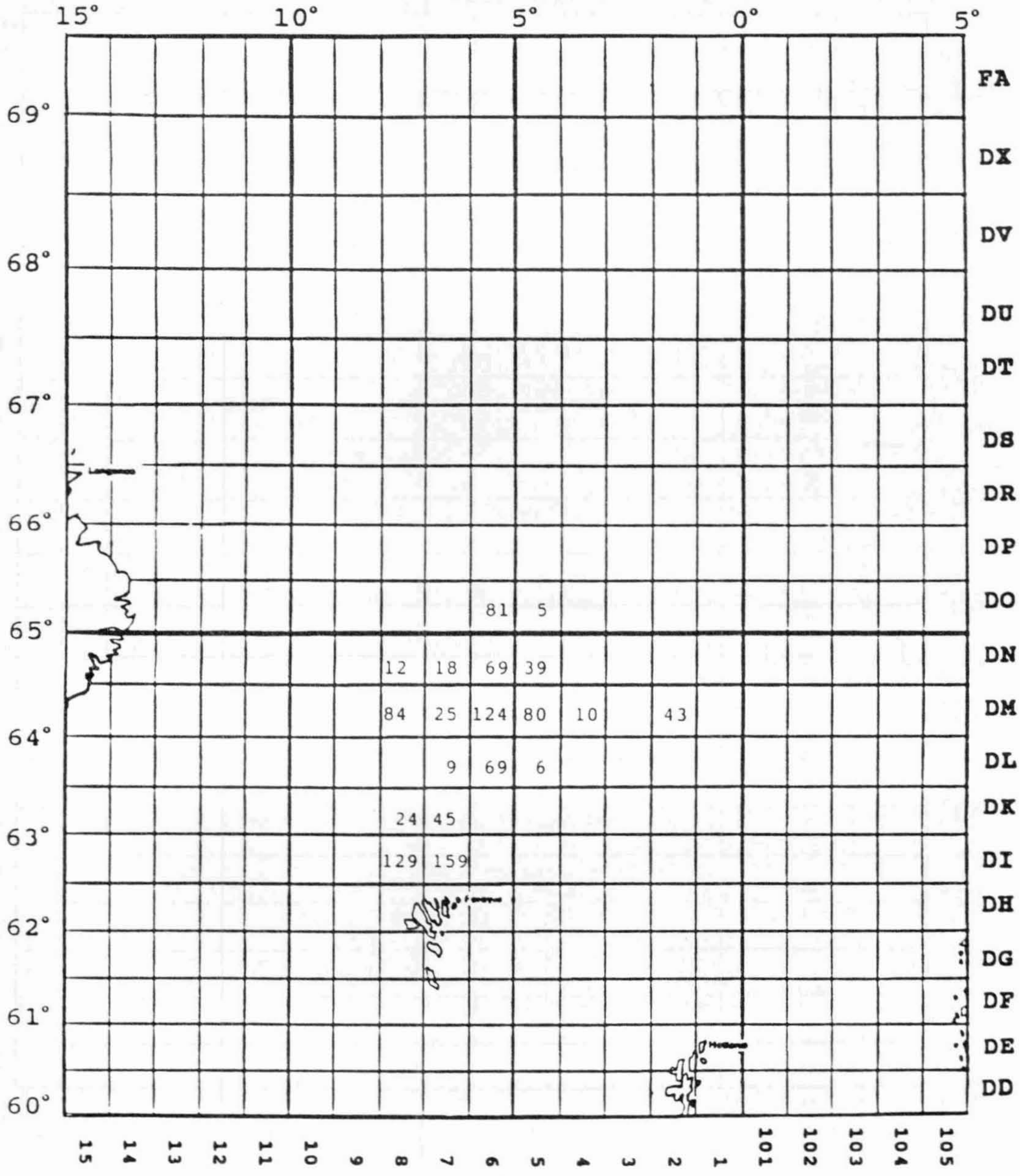


Figure 5. Catch in number*10^{-1} by statistical rectangle from logbooks in February 1990.

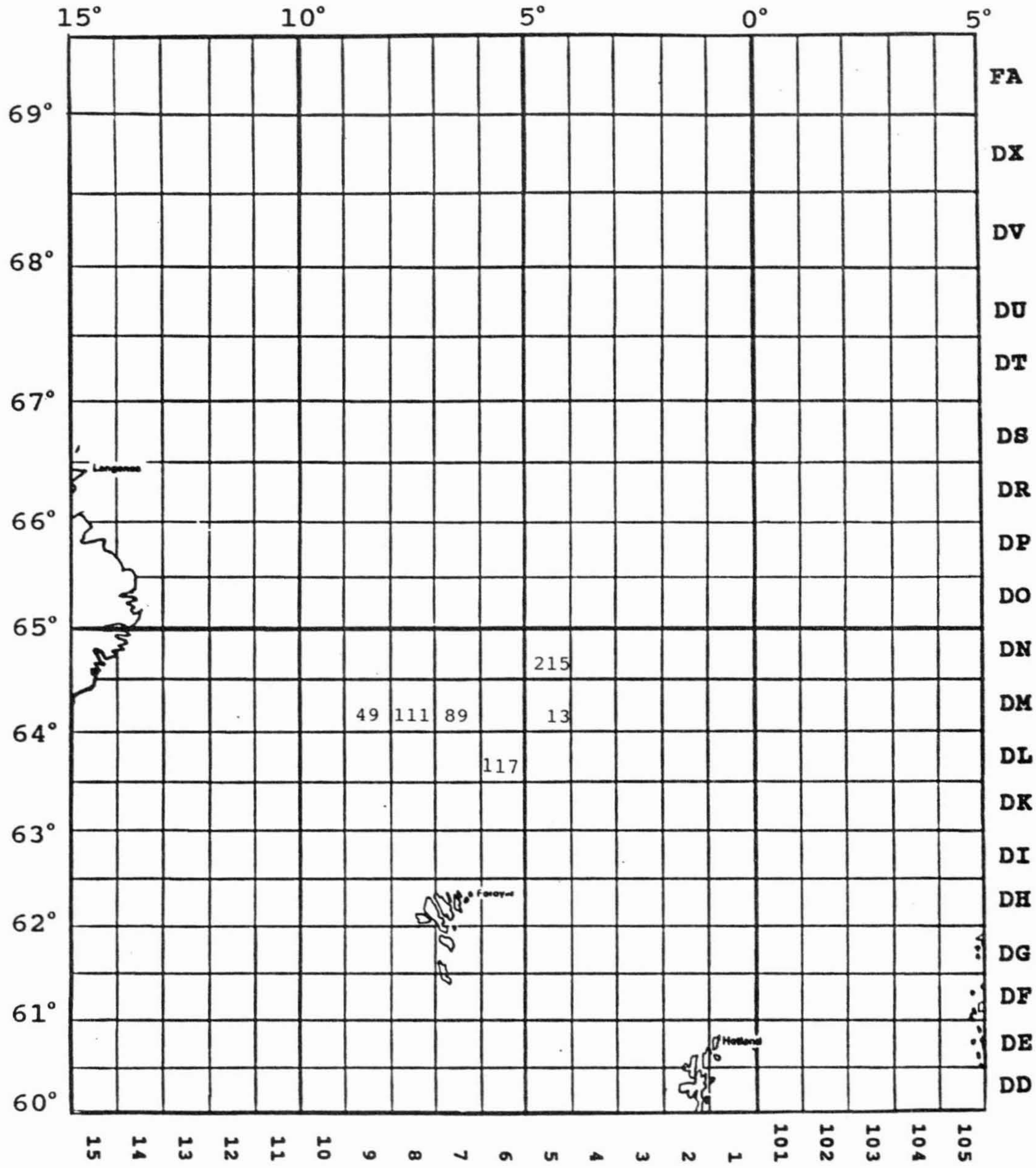


Figure 6. Catch in number*10^{-1} by statistical rectangle from logbooks in March 1990.

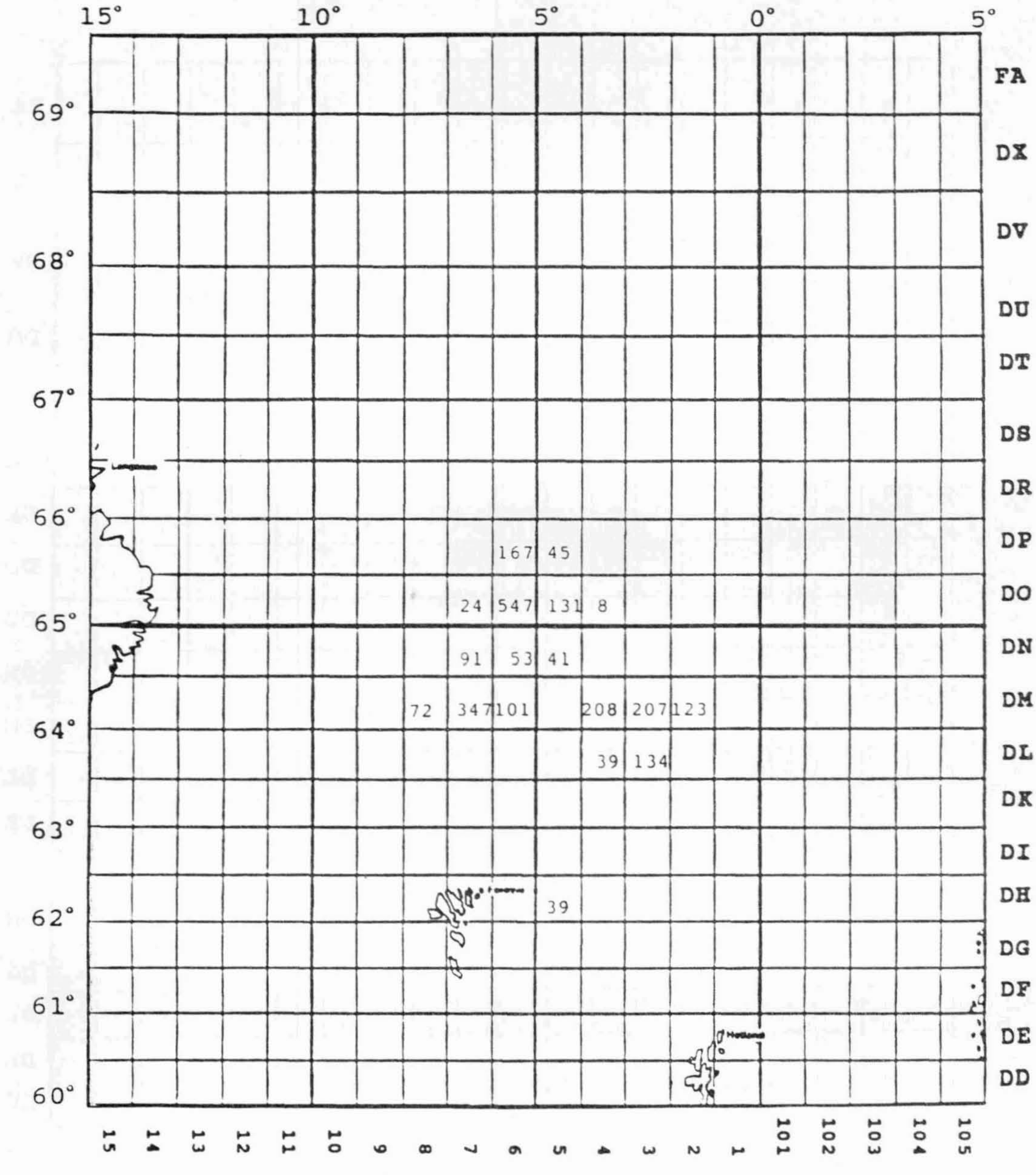


Figure 7. Catch in number*10^{-1} by statistical rectangle from logbooks in April 1990.

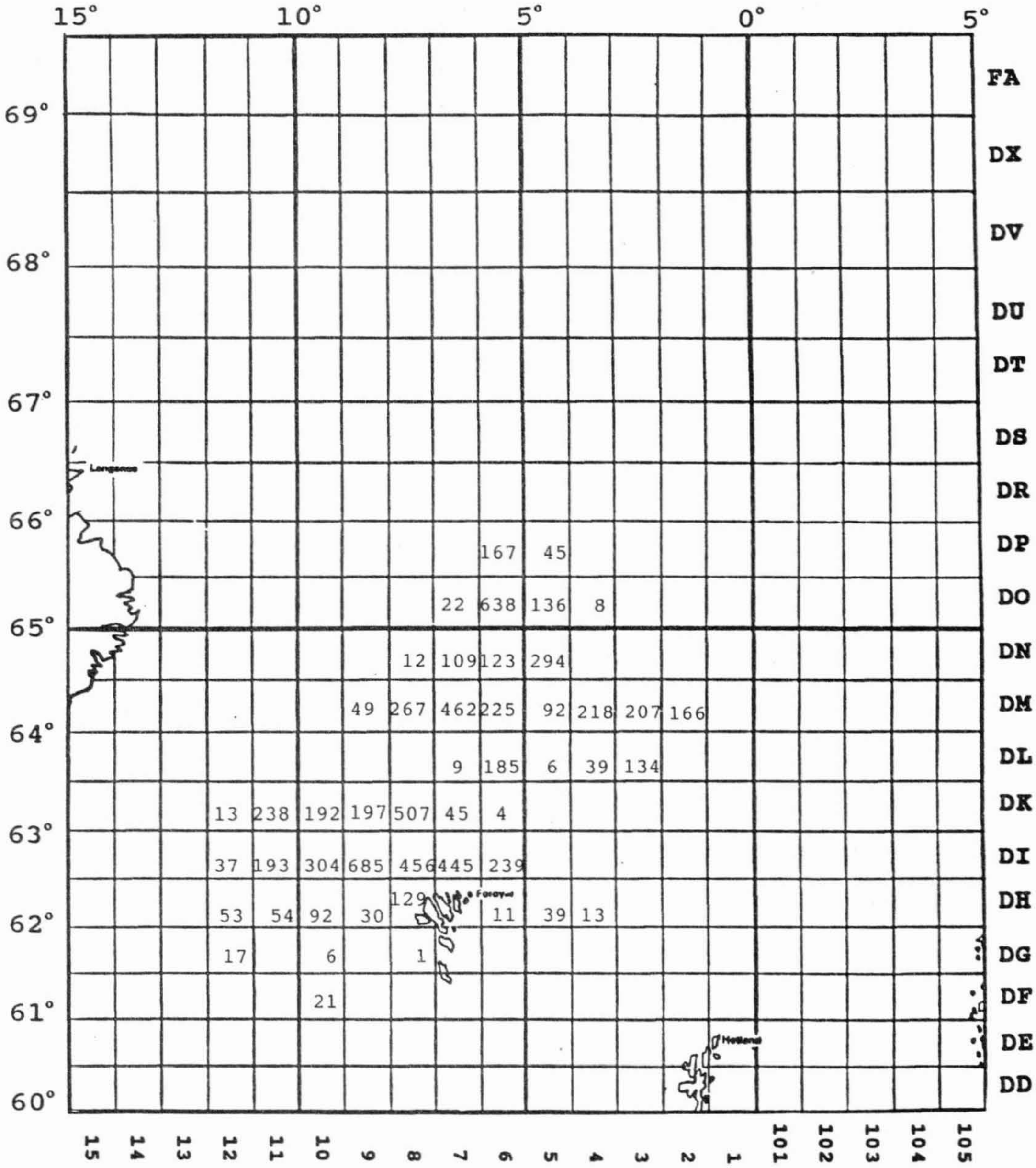


Figure 8 Catch in number*10^{-1} by statistical rectangle from log-books, 1989/90 season.

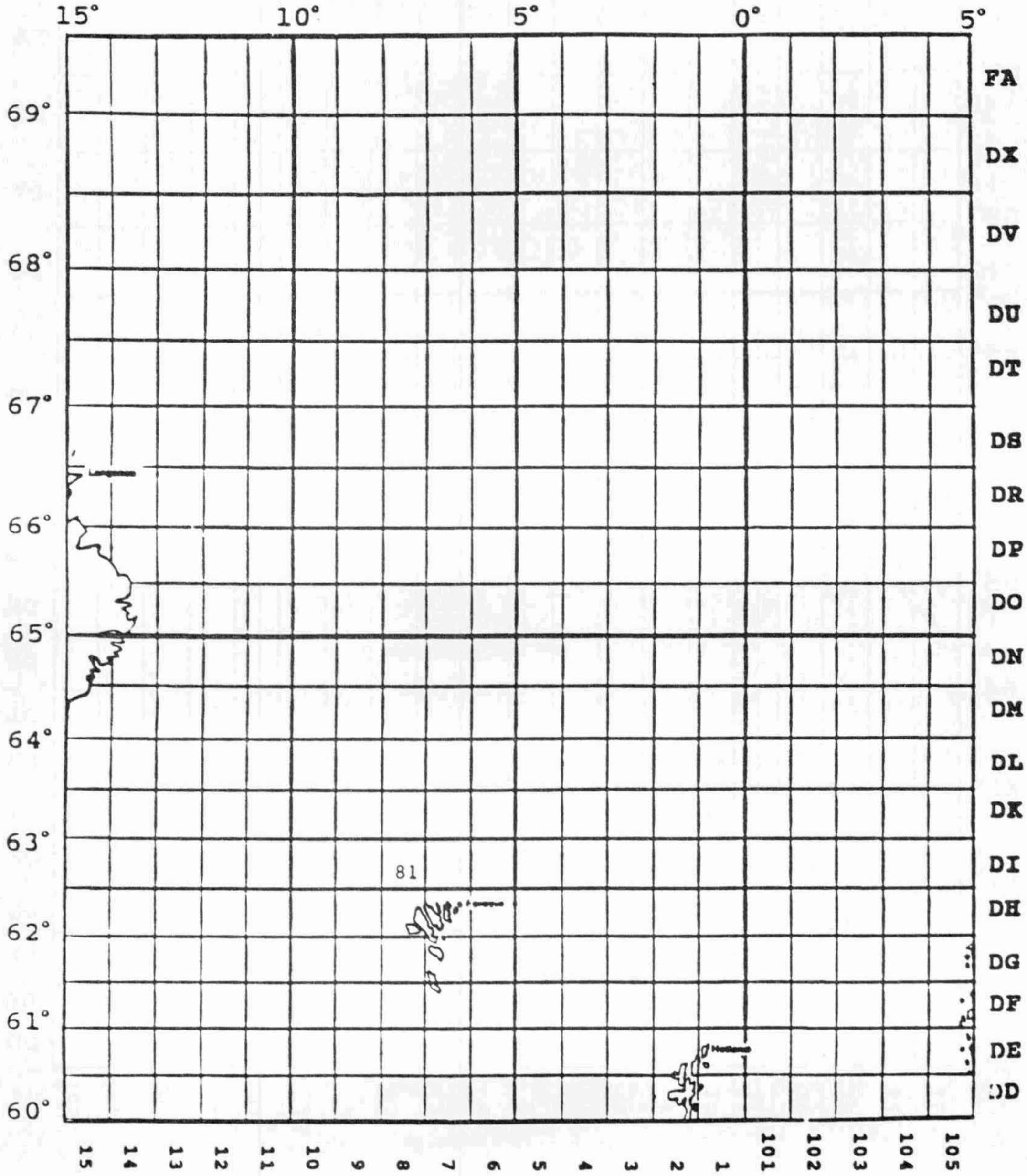


Figure 9. Catch per unit effort (1000 hooks) by statistical rectangle from logbooks in November 1989.

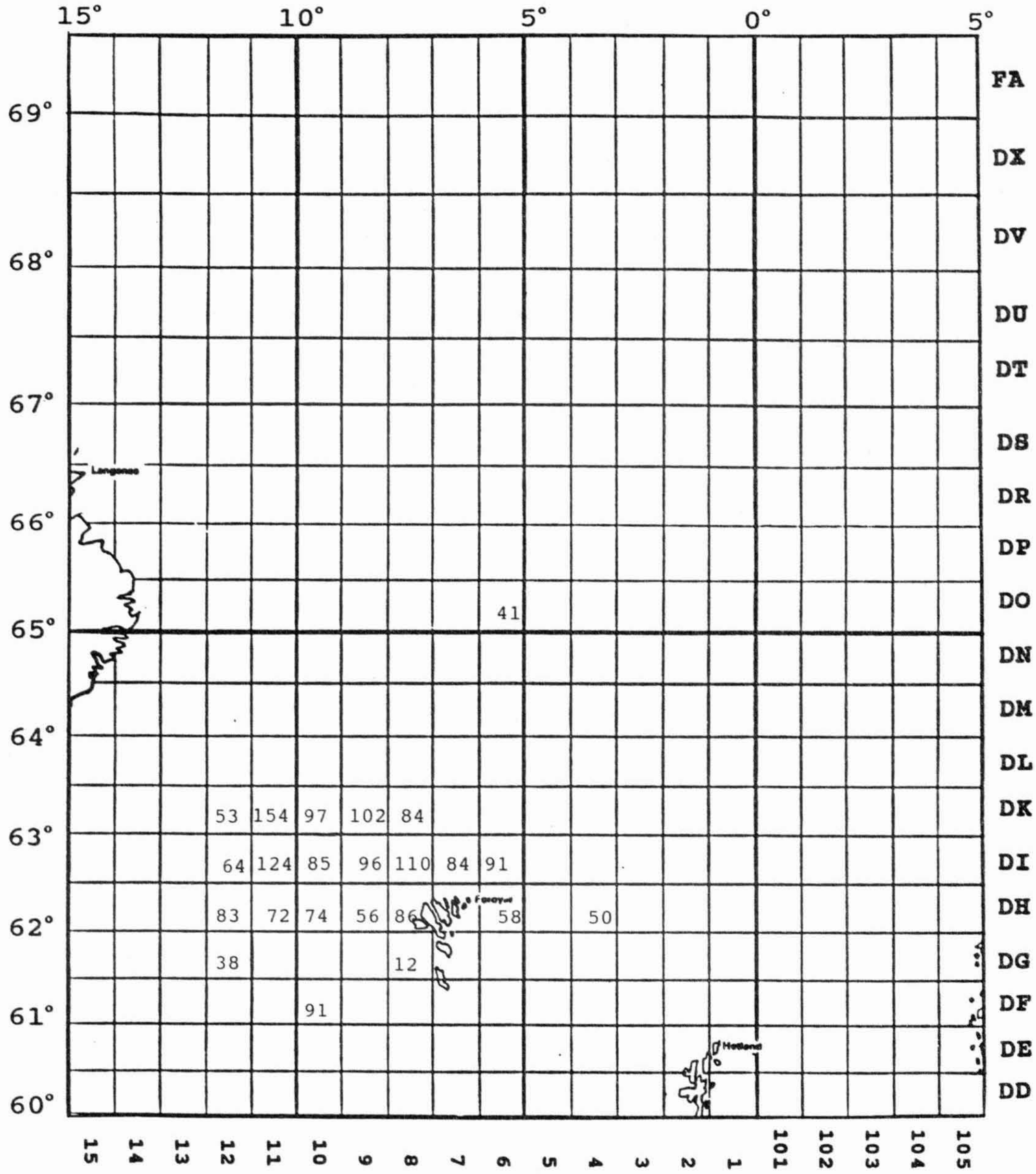


Figure 10. Catch per unit effort (1000 hooks) by statistical rectangle from logbooks in December 1989.

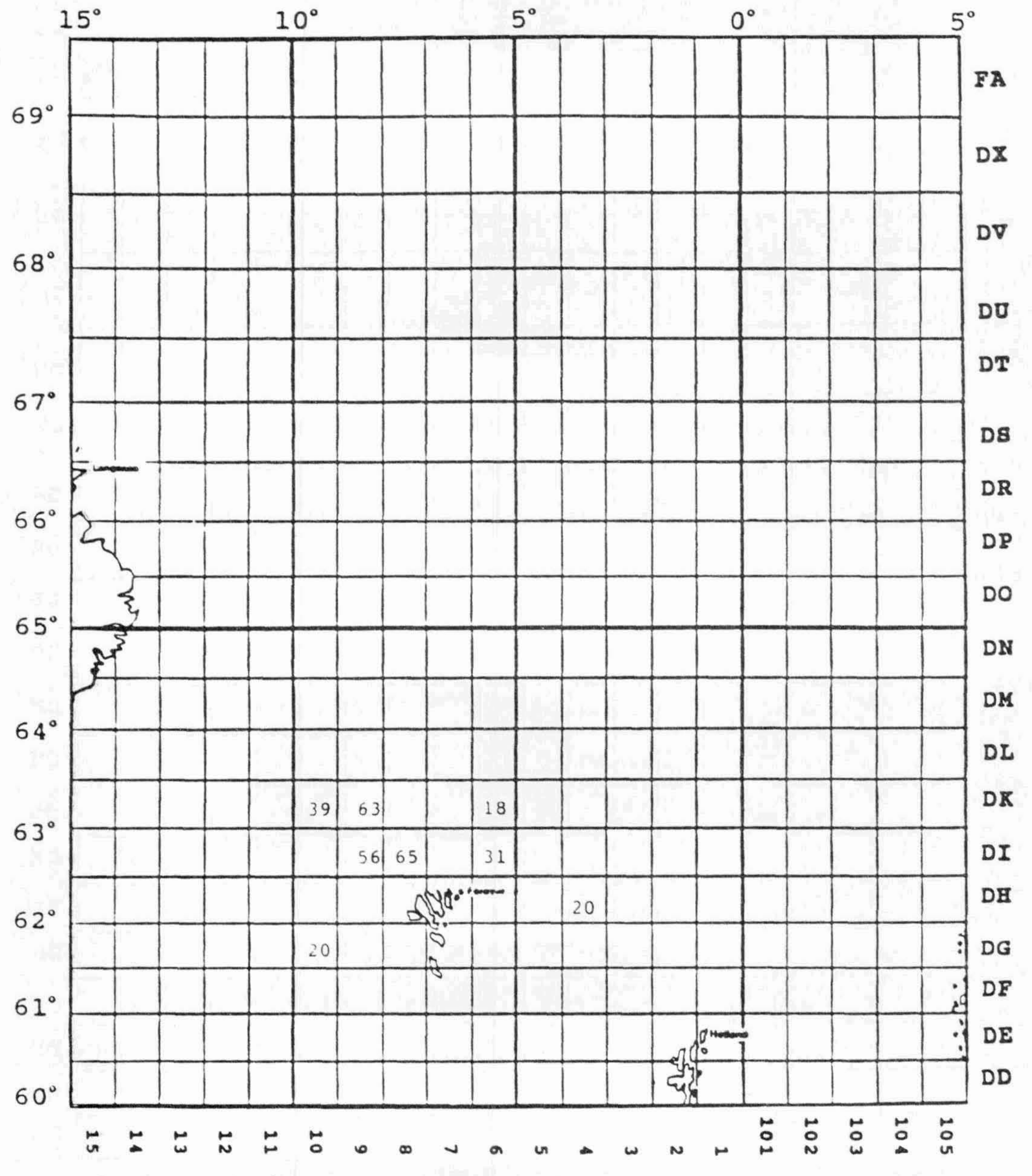


Figure 11. Catch per unit effort (1000 hooks) by statistical rectangle from logbooks in January 1990.

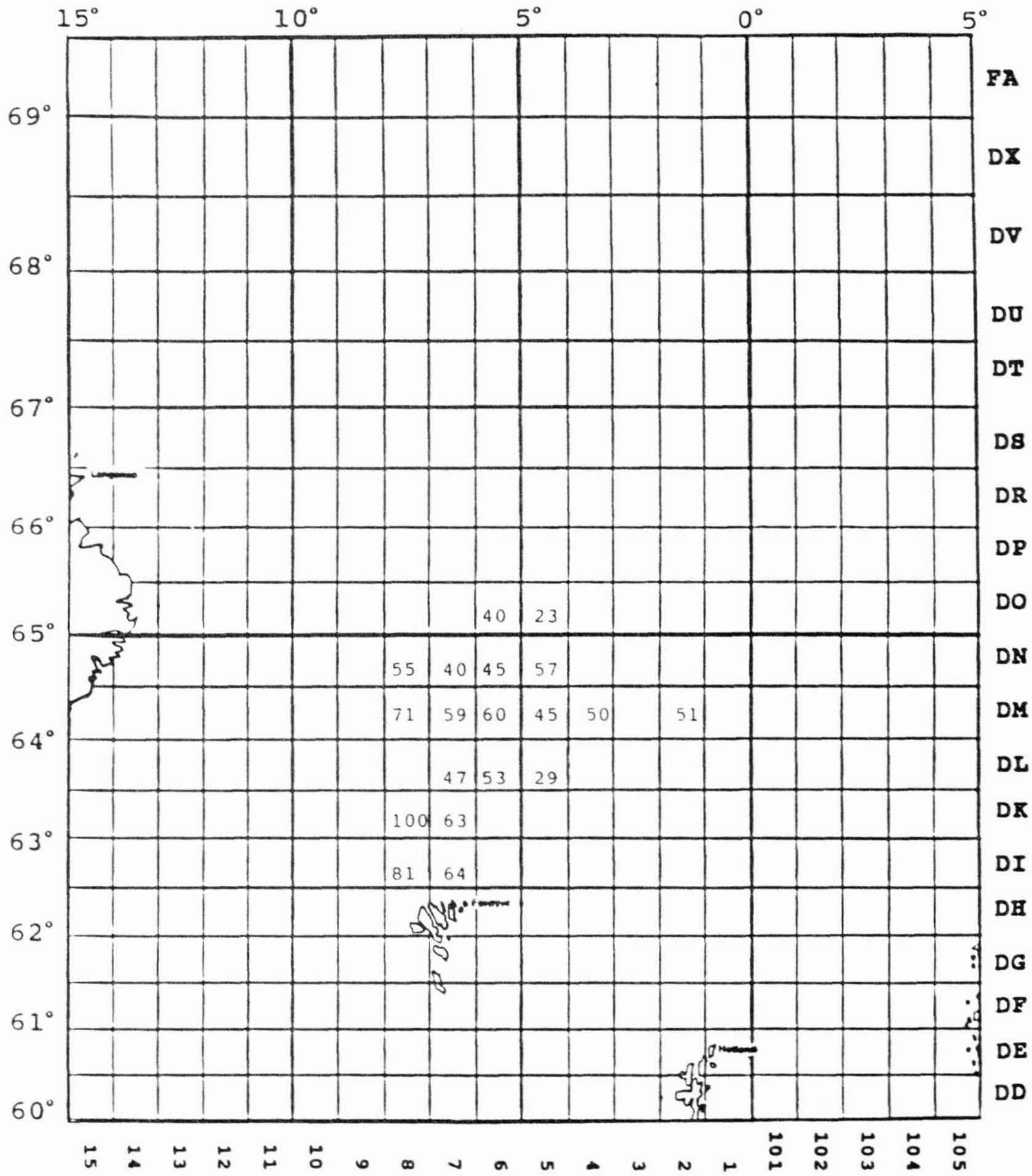


Figure 12. Catch per unit effort (1000 hooks) by statistical rectangle from logbooks in February 1990.

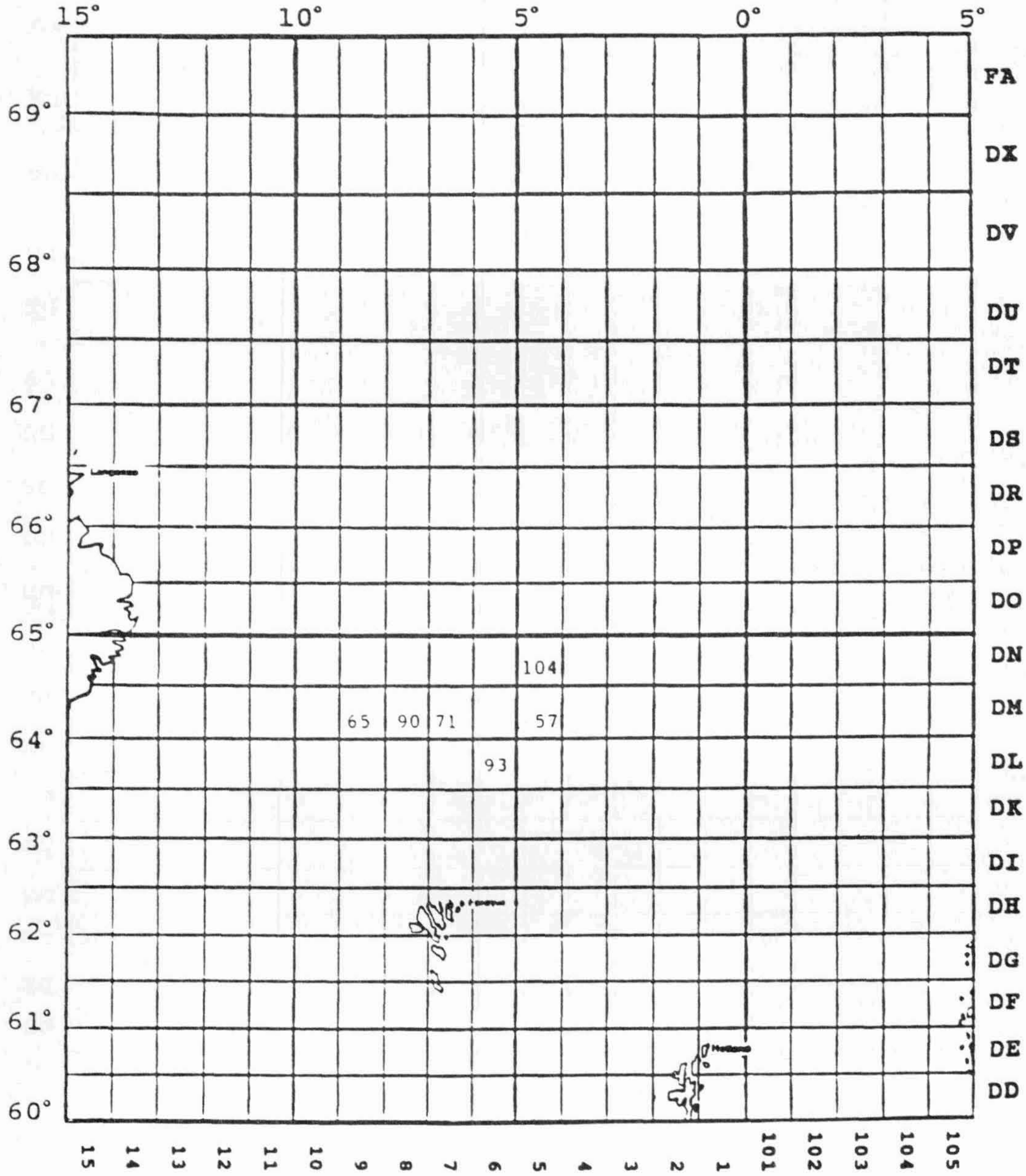


Figure 13. Catch per unit effort (1000 hooks) by statistical rectangle from logbooks in March 1990.

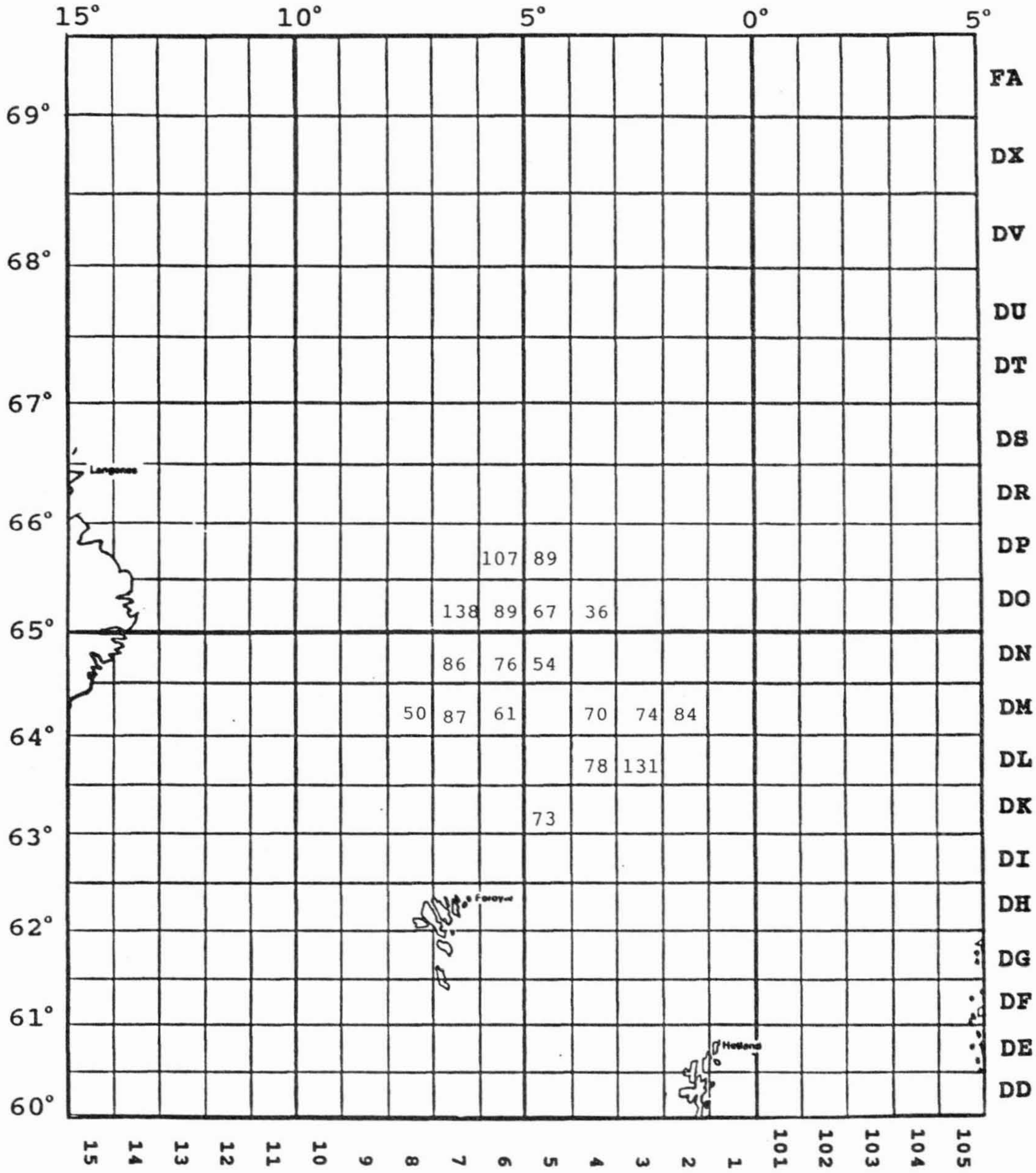


Figure 14. Catch per unit effort (1000 hooks) by statistical rectangle from logbooks in April 1990.

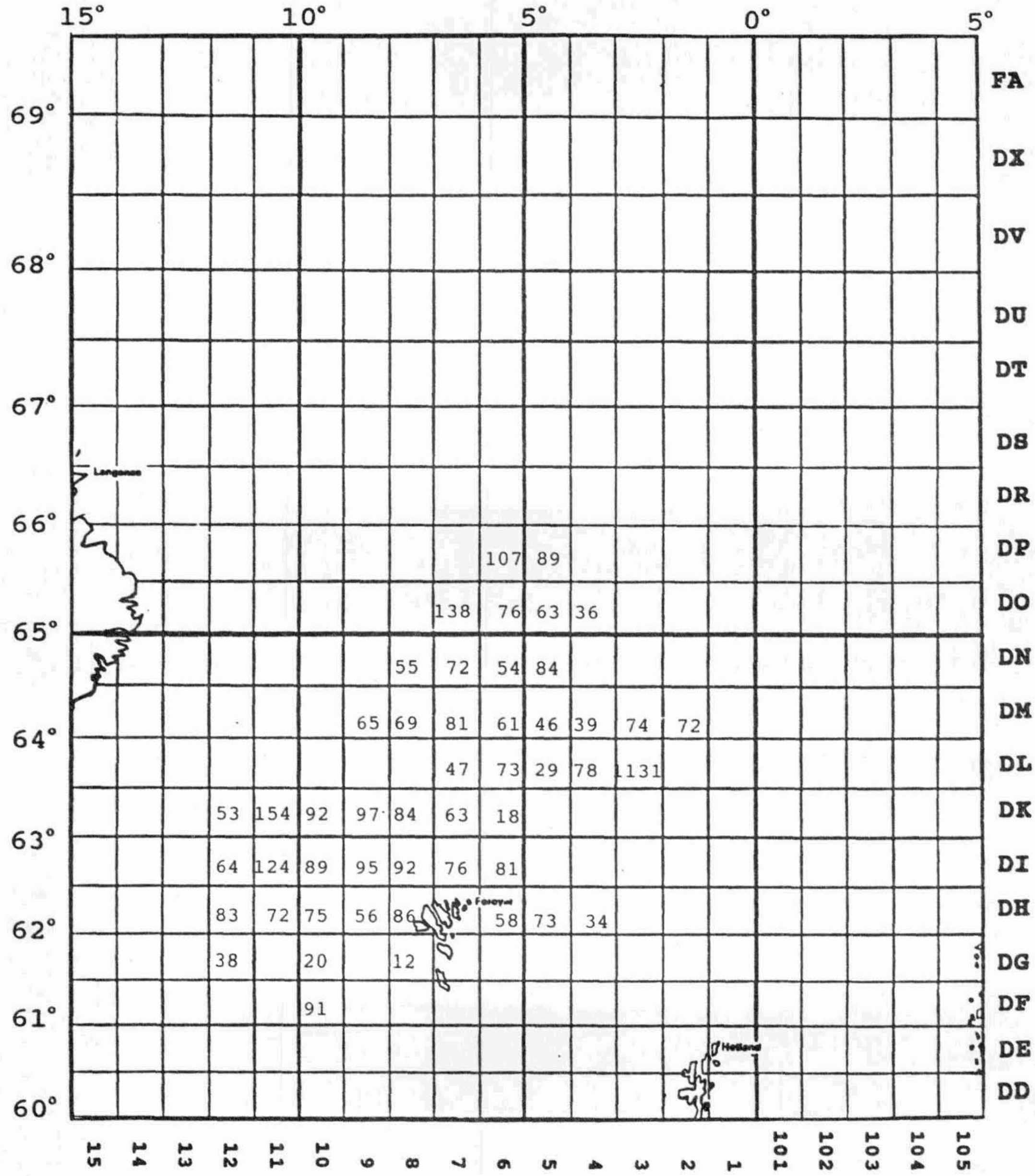


Figure 15 Catch per unit effort (1000 hooks) by statistical rectangle from logbooks, 1989/1990 season.

Figure 16 Fork length and dorsal fin length from 73 salmon sampled in the Faroes fishery in January 1990.

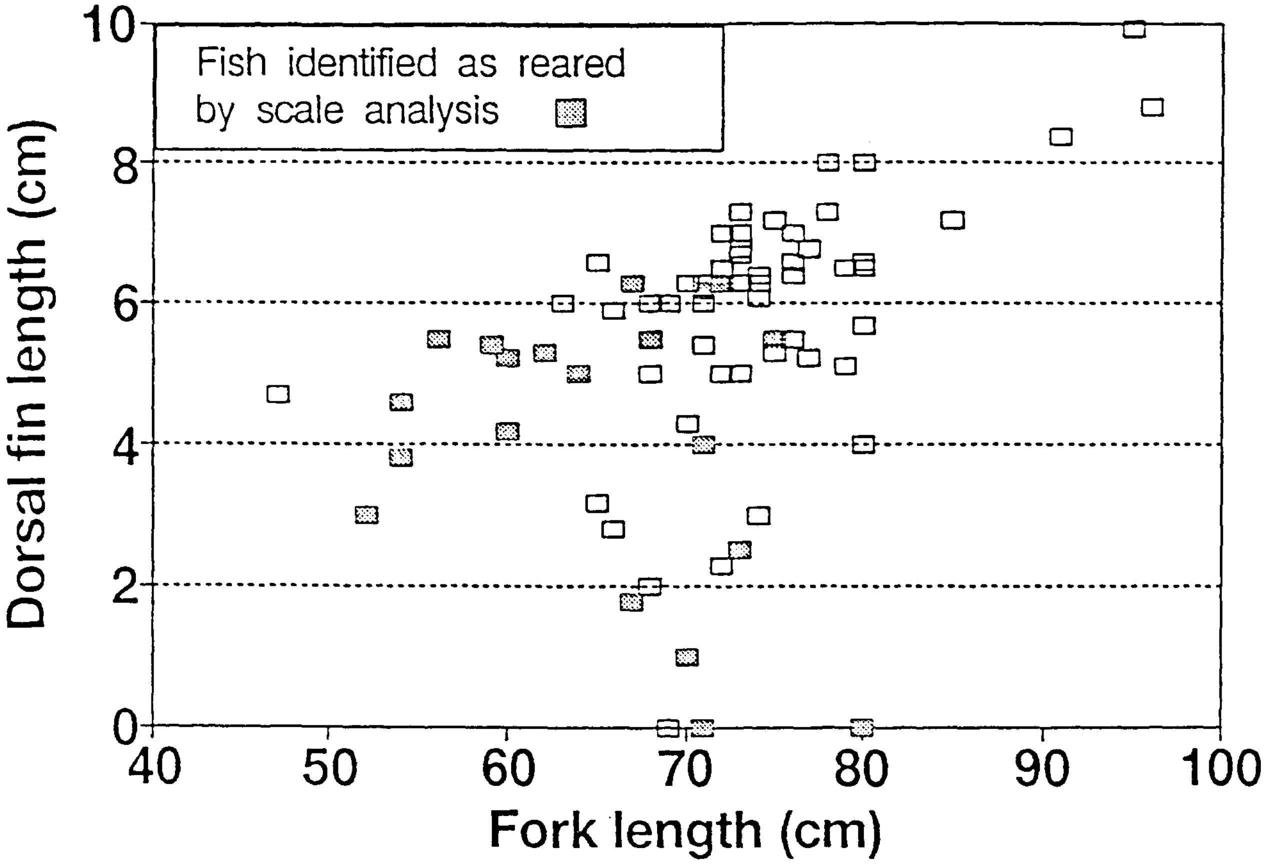
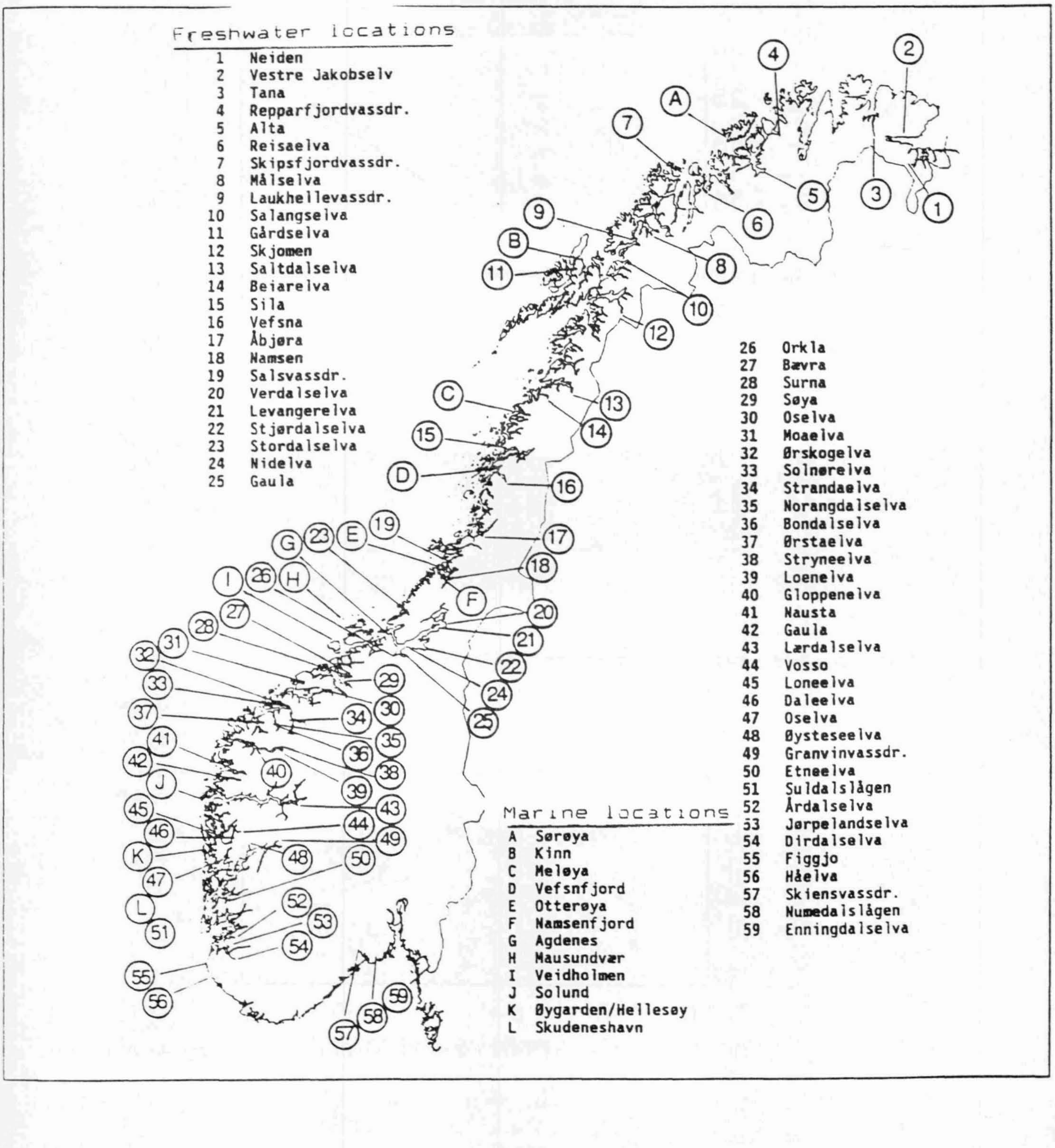


Figure 17 Location of sampling sites for fish farm escapees in Norway.



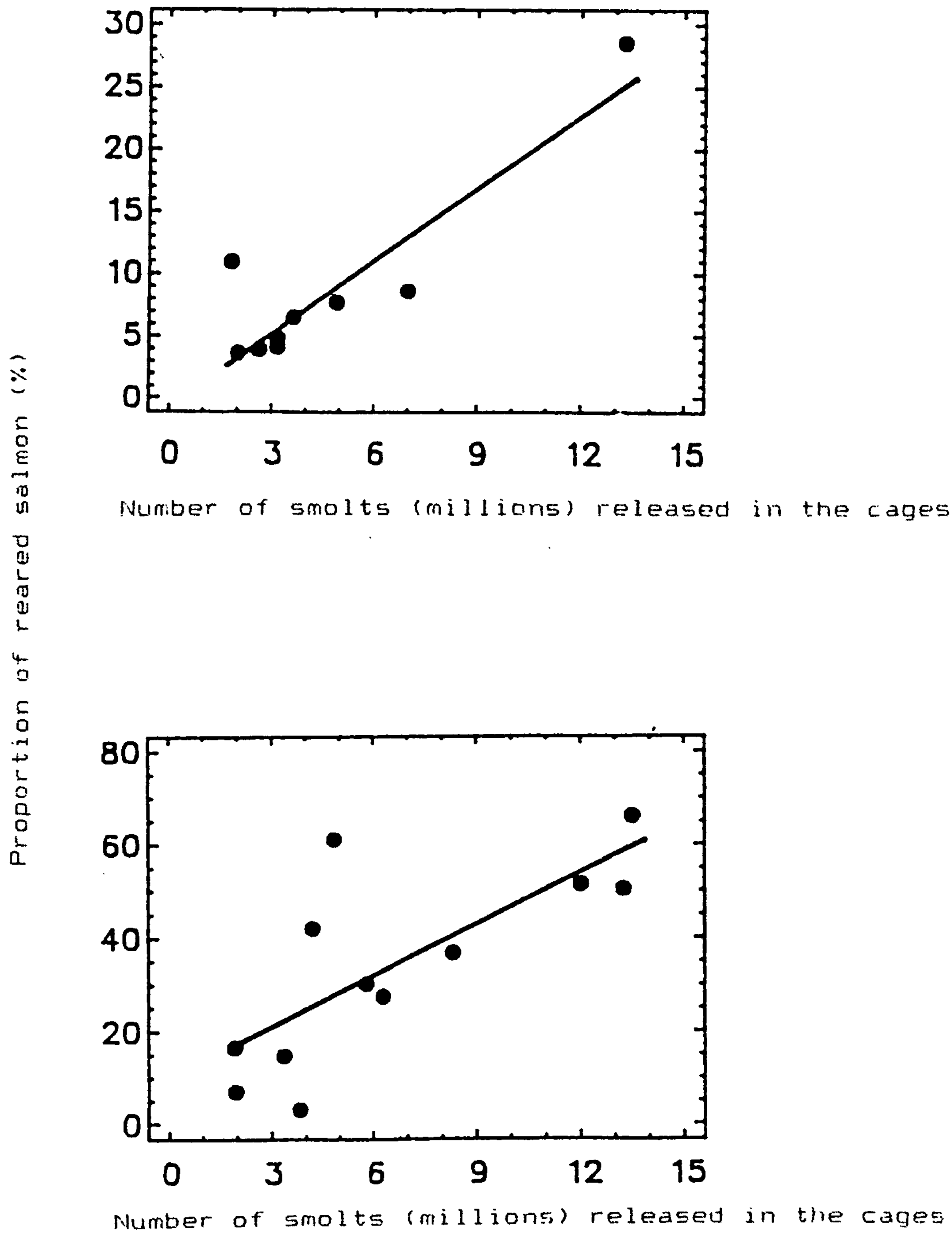


Figure 18 Relationship between the proportion of reared salmon in marine sampling sites and the number of smolts stocked in cages in the same county the previous year in Fjord locations (A) and coastal sites (B). Data from 1986-89 pooled. (Oakland et al 1991)

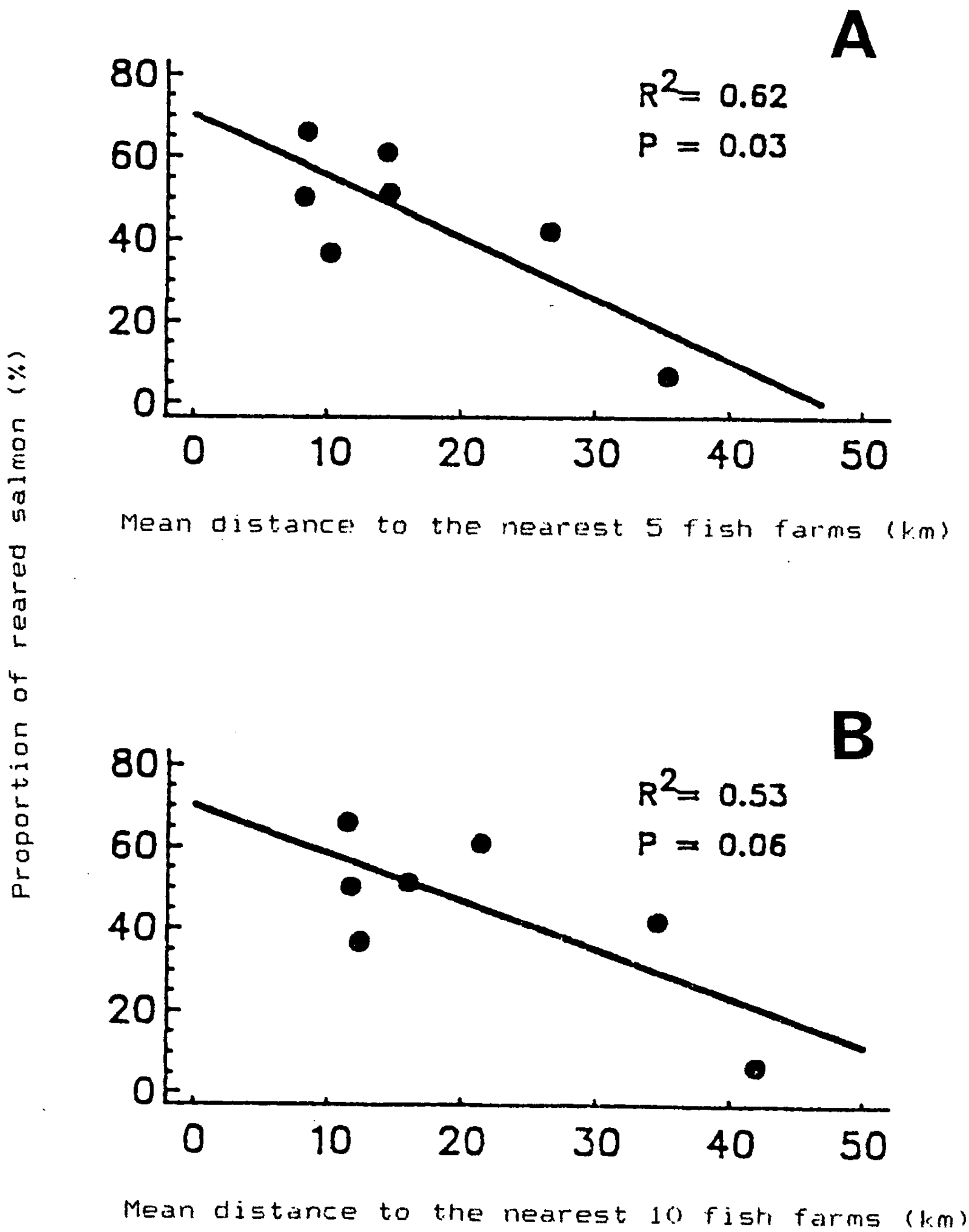


Figure 19 Relationship between the proportion of reared salmon in marine sampling sites on the coast and the mean distance to the nearest 5 (A) and 10 (B) fish farms. Data are from 1989 (Oakland et al 1991)

APPENDIX 1

TERMS OF REFERENCE FOR NORTH ATLANTIC SALMON WORKING GROUP

The Working Group on North Atlantic Salmon (Chairman: Dr K. Friedland, USA) will meet at ICES Headquarters from 14-21 March 1991 to:

1. With respect to Atlantic salmon in each Commission area, where relevant:

   a) describe events of the 1990 fisheries with respect to gear, effort, composition, and origin of the catch;

   b) continue the development of run-reconstruction models of national stocks for input to a North Atlantic salmon model to describe fisheries interactions and stock dynamics;

   c) estimate exploitation rates and status of the stocks in homewater and interception fisheries for stocks occurring in the Commission area;

   d) evaluate the effects of the management measures in the salmon fisheries at Faroes and West Greenland on stocks occurring in the Commission area;

   e) evaluate the effects of the newly-introduced quotas in the commercial salmon fishery of Newfoundland and Labrador and the regulations introduced into Norwegian salmon fisheries in 1989 on stocks occurring in the Commission area;

   f) specify data deficiencies and research needs;

   g) provide quantitative estimates of the effect of fish farm escapees on salmon stocks and catches.

2. With respect to Atlantic salmon in the North-East Atlantic Commission and West Greenland Commission areas, describe the distribution of parasites and diseases that are harmful to Atlantic salmon and assess their effects on wild salmon stocks.

3. With respect to Atlantic salmon in the NASCO area, provide a compilation of microtag, finclip, and external tag releases within ICES Member Countries in 1990.

4. With respect to Atlantic salmon in the NASCO area, provide a definition of the term "Index Rivers" and provide a commentary on how they could be used to assess the status of salmon stocks.

5. With respect to Atlantic salmon in the NASCO area, meet jointly with the Study Group on Genetic Risks to Atlantic Salmon Stocks to discuss the experimental design for a research programme to evaluate the possible effects (including genetic, ecological, and behavioural interactions) of fish farm escapees of Atlantic salmon on wild stocks.

APPENDIX 2

ICES STUDY GROUP ON THE NORWEGIAN SEA AND FAROES SALMON FISHERIES

National Reports on Salmon Fisheries and Stocks for 1990.

1. Fisheries

   1.1 List any changes in fishing methods/gear used in 1990
   1.2 List any changes in regulations controlling fishing effort in 1990 and estimates effect on total effort
   1.3 Describe other changes in fishing effort in 1990 compared with 1985-1989 (e.g., resulting from weather conditions)

2. Catches

   2.1 Give nominal catch (in tonnes) in 1989; and in 1990
   2.2 Give age composition of catch in numbers in 1989; and in 1990
   2.3 How does 1990 catch compare with previous 5 years (weight and composition)?
   2.4 Give reasons for any significant change, by method if appropriate (e.g., climate etc.)

3. Exploitation Rates

   3.1 Provide exploitation level estimates for stocks/fisheries in 1990 where available. Use the following format:

   Stock Fishery 1SW 2SW (and/or all ages)

   3.2 How do 1990 exploitation levels compare with previous 5 years?
   3.3 Give reasons for significant changes (e.g., effort etc.)

4. Status of Stocks

   4.1 Provide data on the status of stocks where comparable surveys (e.g., juvenile surveys, adult counts etc.) have been conducted for at least 5 years. Use following format:

Stock	Survey method	1985	1986	1987	1988	1989	Mean	1990
A	Counter	..	..	..	..	..		..
B	Smolt trap	..	..	..	..	..		..

   etc.

   4.2 Provide assessment of stock status based on catch data if no independent surveys available
   4.3 Give explanation for significant changes

5. Fish Farm Escapees

   5.1 Estimate total contribution (by numbers and/or percentages) of farm escapees to net and rod fisheries and to spawning stocks (also give regional data if appropriate). Use following format:

Region	Fishery/Stock	Numbers	Percentage
All			
	Net	..	..
	Rod	..	..
	Spawning stock	..	..

6. Compile complete records of external tag recoveries in the Faroes fishery for smolts released in your country (Ref: 1989 Study Group, recommendation 5).