



Serial No. 2984  
(B.g.14)

ICNAF Res.Doc. 73/45  
(also ICES/ICNAF Salmon Doc. 73/10)

ANNUAL MEETING - JUNE 1973

Distribution and relative abundance of Atlantic salmon at West Greenland and Labrador Sea during August-October 1972

by

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Introduction

During August-October 1972 research vessels from Canada, Denmark, France and Scotland participated in an International Salmon Tagging Experiment at West Greenland. One of the aims of this experiment was to provide estimates of the distribution and relative abundance of salmon in the West Greenland area. This preliminary report presents the indices of relative abundance and describes the distribution pattern with time of salmon as determined from catches with 5-inch (130-mm) and 6-inch (150-mm) mesh gillnets. It also presents preliminary results of data describing the selectivity and efficiency of the two mesh sizes in as much as they affect the sizes and numbers of salmon caught.

Gear and Fishing

Drift nets used by all vessels were of standard design. Equal numbers of 5-inch and 6-inch monofilament nets were used in each set. Each net was 25 fath long. The 5-inch nets were 35 meshes (13.0 ft) deep while the 6-inch nets were 25 meshes (10.7 ft) deep. The monofilament webbing was green, No. 15 twine with a breaking strength of 45 lb (20 kg). The floats were mounted every 3 ft on the floatrope. The nets fished by the Adolf Jensen had a floating headrope instead of mounted floats. The other research vessels used a 1/2 inch diameter polypropylene headrope fastened to the braided floatrope to act as a strengthener for the floatrope and to act as a hauling rope for the mechanical net hauler.

The basic gear unit consisted of 20 nets arranged as follows: 10 monofilament, 5 inch (130 mm); 10 monofilament, 6 inch (150 mm). The number of units fished per set varied from 1 to 6 depending on weather conditions. The nets were usually set at dawn and were patrolled in small rubber boats if the weather was suitable. Fish in suitable condition were tagged and released and those not suitable for tagging were kept for biological specimens. The nets were usually hauled back on board in the early afternoon.

In all, 97 drift net sets were made by the four research vessels in the West Greenland-Labrador Sea area (Fig. 1).

For each set a record was kept of position fished, surface temperature, light intensity, wind direction, wind force (Beaufort Scale), height of the waves, numbers of salmon caught and tagged, tag numbers of any salmon tags recovered and the numbers of other species caught.

The catch per unit effort is expressed as the catch per mile-hr. This is the number of fish caught per mile (1000 fath) of net per hr fished.

### Survey Area

The area covered by the tagging program was those waters within 70 nautical miles of the West Greenland coast and which lie between 61°N and 70°N (Fig. 1). For reference purposes this overall area was divided into four smaller areas:

|          |              |
|----------|--------------|
| Area I   | 68°N to 70°N |
| Area II  | 66°N to 68°N |
| Area III | 64°N to 66°N |
| Area IV  | 61°N to 64°N |

One set made by the F.R.S. Scotia at 60°25'N; 50°13'W has been included with the Area IV data.

The two stations fished in the Labrador Sea were located at positions: 56°45'N; 50°30'W and 58°05'N; 52°20'W.

### Results

#### (a) Distribution and Relative Abundance

Salmon were relatively abundant in the central Labrador Sea and near the southern Greenland coast in Areas III and IV (Table 1, Fig. 2, 3 and 4). There was a relatively low abundance of salmon in Area II and an extremely low abundance in Area I especially in Disko Bay and off Disko Fjord compared to 1969 catches by the A.T. Cameron. Also there was a low abundance on Store Hellefiske Bank as compared to 1971 catches by the A.T. Cameron (0.22 to 4.29 per mile-hr during Sept. 12-15, 1971). There was a steady decrease in the relative abundance of salmon in all areas as the season progressed. This was especially evident in the catches from 5-inch mesh nets in Areas III and IV from August to September (Table 1, Fig. 4).

#### (b) Length Distribution by Area

An analysis of variance indicated that there was no significant difference between areas in average fork lengths of Atlantic salmon caught in 6-inch mesh nets during August and September. There was no significant difference in fork lengths of salmon between Areas I and II for the 5-inch mesh. There were significant differences ( $P < .001$ ) between Areas II and III during August, Areas II and IV during August; Labrador Sea and Areas I, II, III (August), III (September), IV (August), IV (September-October); and Area III during September and Area IV during August. The average fork lengths of salmon caught by 5-inch mesh nets increased from the Labrador Sea to Area I (Table 2, Fig. 5).

#### (c) Selectivity of Gear

In Areas II, III, IV (during August) and in the Labrador Sea the salmon taken with 6-inch mesh nets had significantly greater fork lengths than those taken with 5-inch mesh nets. In Areas I and IV (during September-October) there was no significant difference between the average fork lengths of salmon caught with 5- and 6-inch mesh nets.

#### (d) Relative Efficiency of Gear

The 5-inch mesh nets caught only 0.6 times as many salmon per mile-hr as the 6-inch mesh nets in Area I, 1.3 times as many in Area II, 1.9 times as many in Area III, 1.8 times as many in Area IV and 8.2 times as

Table 1. Salmon catches per mile-hour by area, half-monthly periods and mesh size and relative efficiency of 5 inch and 6 inch mesh monofilament nets. Data of A.T. Cameron, Adolf Jensen, Scotia and Cryos combined. LS = Labrador Sea.

| Area | Month       | Date  | No. of sets | 5 inch mesh | 6 inch mesh | Relative efficiency 5 inch/6 inch |
|------|-------------|-------|-------------|-------------|-------------|-----------------------------------|
| I    | Aug.        | 1-15  | 1           | 0.1000      | 0.2100      | 0.48                              |
|      |             | 16-31 | 1           | 0.0700      | 0.0700      | 1.00                              |
|      | Sept.       | 1-15  | 5           | 0.0860      | 0.1400      | 0.61                              |
|      |             | 16-30 | ..          | ..          | ..          | ..                                |
|      | Oct.        | 1-15  | ..          | ..          | ..          | ..                                |
|      | Total       |       | 7           | 0.0857      | 0.1400      | 0.61                              |
| II   | Aug.        | 1-15  | 7           | 1.6014      | 0.9414      | 1.70                              |
|      |             | 16-31 | 7           | 0.2571      | 0.1743      | 1.48                              |
|      | Sept.       | 1-15  | 5           | 0.6560      | 0.8320      | 0.79                              |
|      |             | 16-30 | 4           | 0.3575      | 0.4775      | 0.75                              |
|      | Oct.        | 1-15  | ..          | ..          | ..          | ..                                |
|      | Total       |       | 23          | 0.7704      | 0.6035      | 1.28                              |
| III  | Aug.        | 1-15  | 4           | 2.1700      | 1.1400      | 1.90                              |
|      |             | 16-31 | 13          | 1.3346      | 0.6408      | 2.08                              |
|      | Sept.       | 1-15  | 7           | 0.8114      | 0.4057      | 2.00                              |
|      |             | 16-30 | 8           | 0.7650      | 0.4938      | 1.55                              |
|      | Oct.        | 1-15  | ..          | ..          | ..          | ..                                |
|      | Total       |       | 32          | 1.1822      | 0.6150      | 1.92                              |
| IV   | Aug.        | 1-15  | 5           | 3.6400      | 1.4460      | 2.52                              |
|      |             | 16-31 | 13          | 2.1554      | 1.2785      | 1.69                              |
|      | Sept.       | 1-15  | 6           | 0.9000      | 0.5083      | 1.77                              |
|      |             | 16-30 | 3           | 0.7600      | 0.7600      | 1.00                              |
|      | Oct.        | 1-15  | 5           | 1.3780      | 0.8160      | 1.69                              |
|      | Total       |       | 32          | 1.8997      | 1.0394      | 1.83                              |
| LS   | Aug.        | 1-15  | 1           | 3.3700      | 1.1000      | 3.06                              |
|      |             | 16-31 | 2           | 4.8450      | 0.2450      | 19.78                             |
|      | Sept.       | 1-15  | ..          | ..          | ..          | ..                                |
|      |             | 16-30 | ..          | ..          | ..          | ..                                |
|      | Oct.        | 1-15  | ..          | ..          | ..          | ..                                |
|      | Total       |       | 3           | 4.3533      | 0.5300      | 8.21                              |
| All  | Aug.        | 1-15  | 18          | 2.3089      | 1.0939      | 2.11                              |
|      |             | 16-31 | 36          | 1.5814      | 0.7425      | 2.13                              |
|      | Sept.       | 1-15  | 23          | 0.6430      | 0.4674      | 1.38                              |
|      |             | 16-30 | 15          | 0.6553      | 0.5427      | 1.21                              |
|      | Oct.        | 1-15  | 5           | 1.3780      | 0.8160      | 1.69                              |
|      | Grand Total |       | 97          | 1.3402      | 0.7154      | 1.87                              |

many in the Labrador Sea (Table 2). In all areas combined the 5-inch mesh nets caught 1.9 times as many salmon per mile-hr as did the 6-inch mesh nets.

The relative efficiency of the 5-inch mesh as compared to the 6-inch mesh nets decreased as the season progressed, in particular from August 1-15 to September 16-30. This was possibly because of a decreased abundance of fish which were vulnerable to the 5-inch mesh nets due to fishing exploitation or migration from the area. Also the fish may have grown sufficiently in a month to be more vulnerable to the 6-inch mesh nets during the latter part of the season.

However, in both cases it must be noted that the relative abundance of salmon as determined from the catch per mile-hr of both 5-inch and 6-inch mesh nets decreased very sharply from August 1-15 to September 16-30 in Areas II, III and IV.

Table 2. Average fork lengths of Atlantic salmon caught by 5-inch and 6-inch mesh nets at West Greenland and Labrador Sea during August-October, 1972.

| Area         | Month      | 5-inch mesh              |                    |             | 6-inch mesh              |                    |             |
|--------------|------------|--------------------------|--------------------|-------------|--------------------------|--------------------|-------------|
|              |            | Average fork length (cm) | Standard deviation | No. of fish | Average fork length (cm) | Standard deviation | No. of fish |
| I            | Aug.-Sept. | 69.71                    | 4.15               | 7           | 69.00                    | 6.77               | 11          |
| II           | Aug.-Sept. | 67.58                    | 5.58               | 227         | 69.54                    | 5.98               | 171         |
| III          | Aug.       | 65.97                    | 4.88               | 330         | 68.90 <sup>a</sup>       | 5.33               | 209         |
| III          | Sept.      | 67.18                    | 4.62               | 89          | ..                       | ..                 | ..          |
| IV           | Aug.       | 65.04                    | 5.03               | 271         | 68.51 <sup>b</sup>       | 5.91               | 201         |
| IV           | Sept.-Oct. | 67.07                    | 4.28               | 68          | ..                       | ..                 | ..          |
| Labrador Sea | Aug.       | 61.98                    | 5.03               | 138         | 69.30                    | 5.06               | 20          |

a - August and September frequencies combined. Not significantly different.

b - August, September and October frequencies combined. Not significantly different.

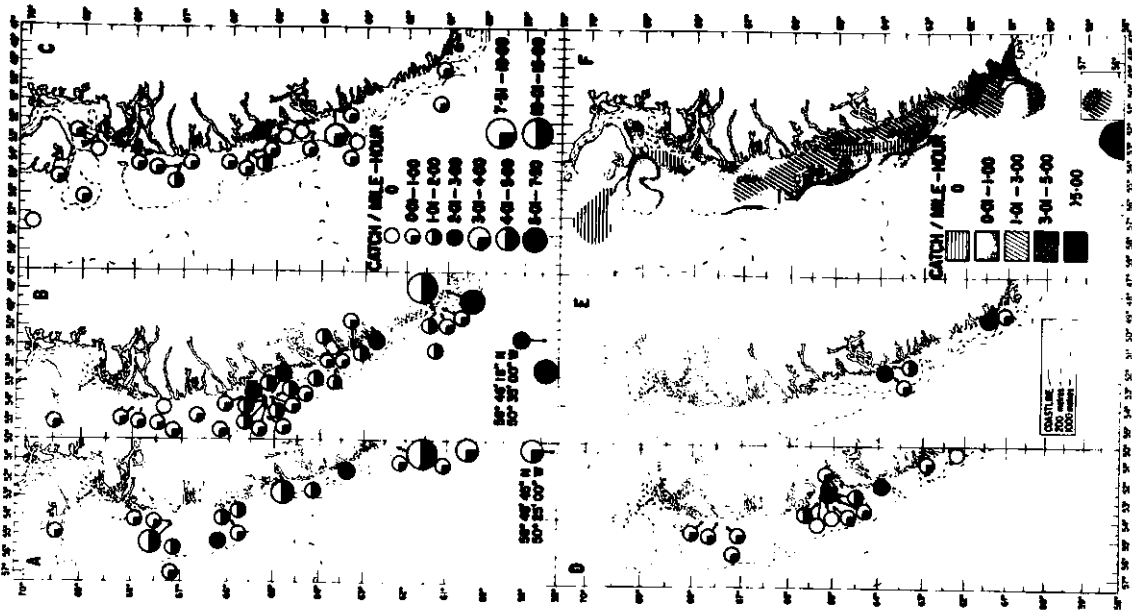


Fig. 2. Distribution and relative abundance of Atlantic salmon at West Greenland and Labrador Sea during: A - August 2-15, B - August 16-31, C - September 1-15, D - September 16-30, E - October 1-15, and F - August 2-October 15, 1972 as determined by catches of 5-inch mesh monofilament nets.

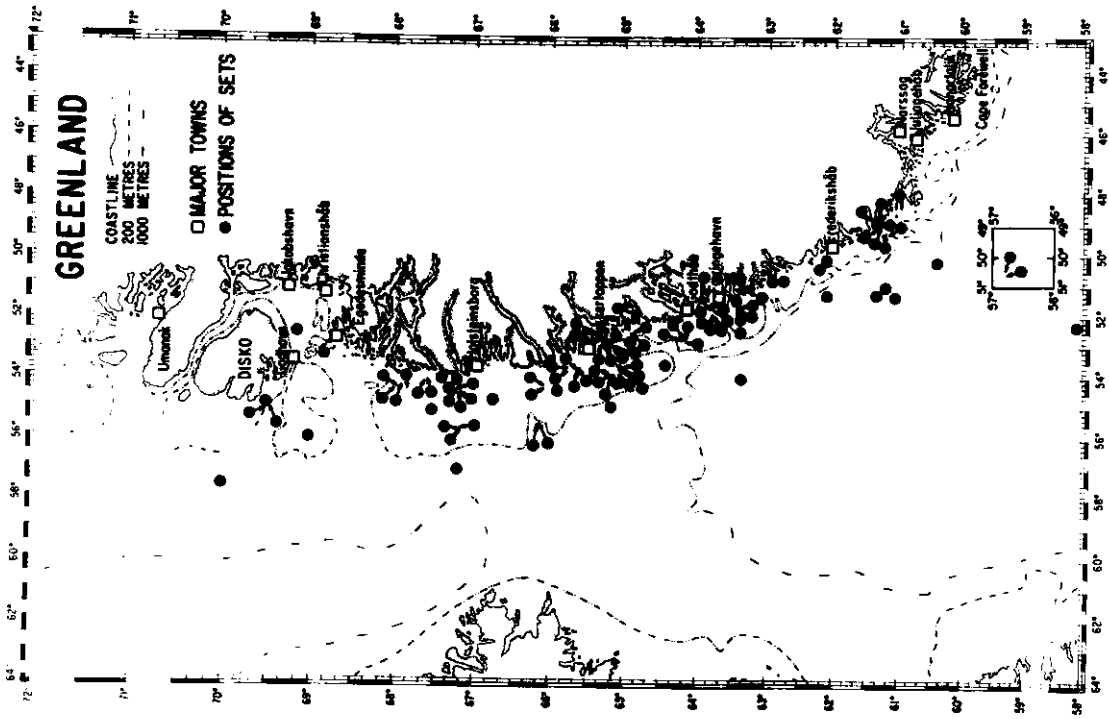


Fig. 1. Area map of West Greenland showing major towns and positions of all drift net sets fished by A.I. Cameron, Adolf Jensen, Cryos and Scotia during August 2-October 15, 1972.

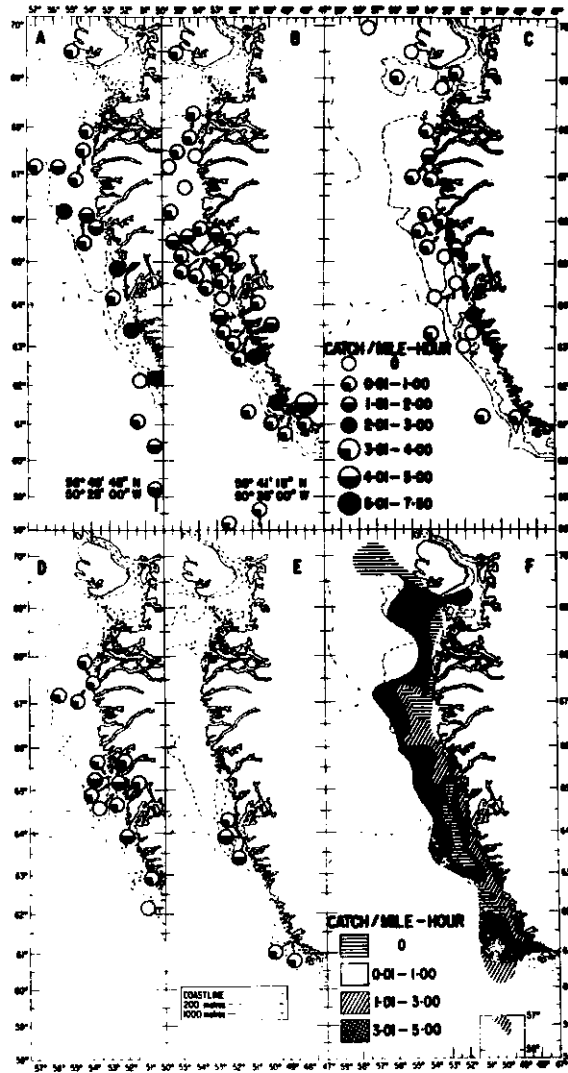


Fig. 3. Distribution and relative abundance of Atlantic salmon at West Greenland and Labrador Sea during: A - August 2-15, B - August 16-31, C - September 1-15, D - September 16-30, E - October 1-15, and F - August 2-October 15, 1972 as determined by catches of 6-inch mesh monofilament nets.

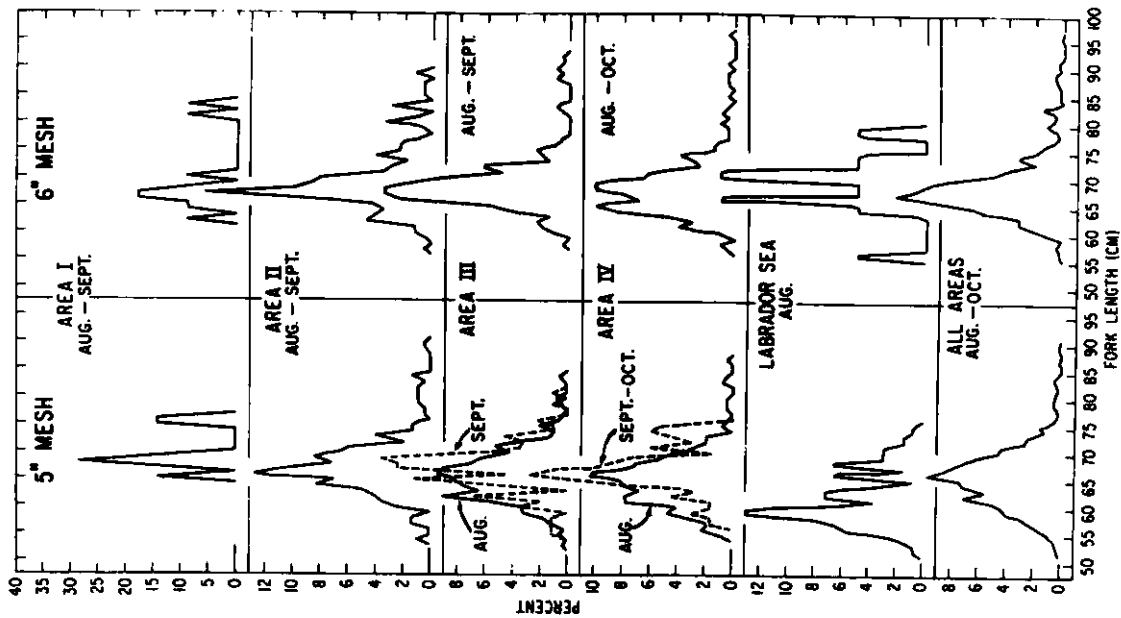


Fig. 5. Length distribution of Atlantic salmon caught by 5- and 6-inch mesh monofilament nets by area.

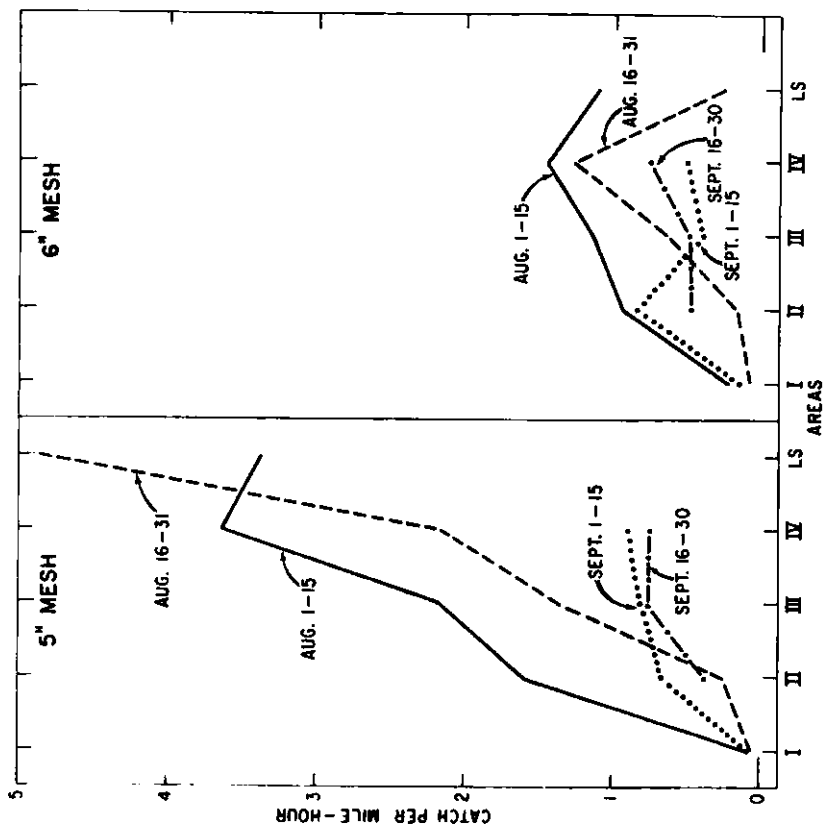


Fig. 4. Relative abundance of Atlantic salmon expressed as catch per mile-hour of 5- and 6-inch mesh monofilament nets by area and half-monthly period.

