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by

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A. Status of the Fisheries

The French(M) provisional catch statistics and the French(SP) definitive catch and effort statistics for 1979 were communicated to the NAFO Secretariat on 5 June 1980. In the following section, the main pattern of the French fisheries is described.

1. Subarea 1

a) Shrimp

The French(M) fishery for northern deepwater shrimp off West Greenland was again conducted in 1979 by one freezer trawler during two trips, one from 4 July to 4 September and the other from 18 September to 30 October. The fishery took place mainly in Div. 1B where reported catches were 346 tons (97% of the total catches). From the trawler logbooks and samples collected on board before commercial sorting, numerous detailed data were obtained on catch, effort and biological characteristics of shrimp. These results were presented (SCR Doc. 79/XI/5) and discussed at the NAFO Special Meeting of the Scientific Council, Dartmouth, Nova Scotia, in November 1979.

b) Cod

Catches of 139 tons were reported from Div. 1F in September-October 1979 by two French(M) freezer trawlers.

2. Subarea 2

No fishery was conducted in this subarea in 1979. Preliminary figures indicate only a catch of 2 tons of cod by a French(M) trawler in Div. 2J during the first quarter of 1979.

3. Subarea 3

a) Cod

As in previous years, the French fishery in 1979 operated on Ritu Bank (Div. 3K), Grand Bank (Div. 3LNO), Flemish Cap (Div. 3M), Rose Blanche Bank (Subdiv. 3Pn), Saint-Pierre and Burgeo Banks (Subdiv. 3Ps).

- i) In Div. 3KL, the fishery was mainly conducted (98%) by the French(M) trawlers during the first quarter of the year, and reported catches were 1067 tons. Length distribution of cod sampled on board in Div. 3L were sent on CFS-1 forms to the NAFO Secretariat on 17 December 1979.
- ii) In Div. 3M, the French(M) trawlers reported cod catches of 1417 tons, while in Div. 3NO, French(M and SP) trawlers reported catches of 528 tons.
- iii) In Subdiv. 3Pn, a catch of 557 tons was reported from the French(M) fishery conducted during the first quarter of the year.
- iv) In Subdiv. 3Ps, the offshore (M and SP) fishery operating during the autumn and winter periods reported catches of 5784 tons while the inshore (SP) fishery conducted during the

summer period reported cod catches of 495 tons. Length distribution sampled on board the French(M) trawlers in Subdiv. 3Ps were sent (on CFS-1 forms) to the NAFO Secretariat on 17 December 1979.

b) Squid

In 1979, the squid (*Illex*) offshore fishery was conducted by French(M) trawlers in Div. 30 and Subdiv. 3Ps, in September-October. The inshore (SP) fishery was conducted in Subdiv. 3Ps from June to September. The reported catches were respectively 810 tons in the offshore fishery and 1846 tons in the inshore fishery. From the logbooks and samples collected on board before commercial sorting, numerous detailed data on catch, effort, discard and biological characteristics of squid were obtained from the offshore fishery. The same data were obtained in the inshore fishery from systematic sampling on the landings in St. Pierre. These combined results were presented (SCR Doc. 80/II/12) and discussed at the NAFO Special Meeting of the Scientific Council, Lisbon, Portugal, in February 1980. Previously, length distribution of squid sampled on board the French(M) trawlers in Div. 30 had been sent on CFS-1 forms to the NAFO Secretariat on 17 December 1979.

c) Yellowtail

Small catches were reported from the French(SP) trawlers in Div. 3NO during the summer months (202 tons) and in Subdiv. 3Ps in spring and autumn (248 tons). Length distribution of this flounder in Div. 3NO sampled on the landings of two trawlers in St. Pierre were sent on CFS-1 forms to the NAFO Secretariat on 17 December 1979.

d) Redfish

In 1979, French(SP) trawlers had a small directed fishery on redfish in Subdiv. 3Pn in February (58 tons) and in Subdiv. 3Ps in June and July (65 tons). By-catches were also reported by French(M) trawlers fishing for cod in Div. 3P.

e) American plaice

Small catches were reported from the French(SP) trawlers operating in Div. 3LNO in summer (112 tons) and in Subdiv. 3Ps during autumn and winter (45 tons). Length distribution of American plaice in Div. 3L sampled on board the French(M) trawlers and in Div. 3N sampled in St. Pierre on landings of French(SP) trawlers were sent on CFS-1 forms to the NAFO Secretariat on 17 December 1979.

4. Subarea 4

a) Cod

As in previous years, the French(M and SP) fishery operated mainly in 1979 in the eastern Gulf of St. Lawrence (Div. 4R) and on Scatari Bank (Subdiv. 4Vn).

i) In Div. 4R, the fishery was conducted during the first five months of the year by the French(M) trawlers (11,040 tons) and St. Pierre trawlers (2170 tons). Length distribution of cod in Div. 4R sampled on board four French(M) trawlers and on landings of one French (SP) trawler in St. Pierre were sent on CFS-1 forms to the NAFO Secretariat on 17 December 1979.

ii) In Subdiv. 4Vn, the fishery took place mainly at the same period. The reported catches were respectively 2074 tons for the French(M) trawlers and 838 tons for the French(SP) trawlers. Length distribution of cod in Subdiv. 4Vn sampled on board three French(M) trawlers and on landings of one French(SP) trawler in St. Pierre were sent on CFS-1 forms to the NAFO Secretariat on 17 December 1979.

American plaice, witch flounder and haddock were reported as by-catches in the cod fishery in Div. 4RS. Length distribution of these three species sampled on board the French(M) trawlers were sent on CFS-1 forms to the NAFO Secretariat on 17 December 1979.

b) Squid

The 1979 squid (*Illex*) fishery was mainly conducted on the Scotian Shelf (Div. 4W) by four French(M) freezer trawlers from 19 August to 29 September. The reported catches were 1926 tons. Here again, from the trawlers logbooks and samples collected on board before commercial sorting, numerous detailed data on catch, effort, discard and biological characteristics on squid were obtained. These results were presented (SCR Doc. 80/II/12) and discussed at the NAFO Special Meeting, Lisbon, Portugal, in February 1980. Previously, length distribution of squid sampled

on board two French(M) trawlers in Div. 4W had been sent on CFS-1 forms to the NAFO Secretariat on 17 December 1979.

c) Redfish

In 1979, the French(SP) trawlers had a small directed fishery in Div. 4R in July. The catches reported were 51 tons. By-catches of redfish in the French(M) cod fishery were also reported (49 tons) from Div. 4R during the first quarter of the year. Length distribution of redfish sampled on board two French(M) trawlers and on landings of one French(SP) trawler were sent on CFS-1 forms to the NAFO Secretariat on 17 December 1979.

B. Special Research Studies

1. Statistical Area 0

Research was carried out in Div. OB in September-October 1979 during a survey of the R/V *Thalassa*.

a) Hydrographic studies

In this division, arctic waters were distributed from 30-50 meters depth down to the level of 350 m. Temperatures were ranging between -1.5 to 0°C. Below this level, the Atlantic water mass (temperatures between 0 and 2.5°C) was present. The relationships between this thermic structure and distribution of the northern deepwater shrimp was presented (SCR Doc. 79/XI/6) during the Special Meeting of the Scientific Council, Dartmouth, Nova Scotia, in November 1979.

b) During this survey, biological characteristics of the shrimp *Pandalus borealis* were studied. The results on population structure and on minimum biomass estimates were presented respectively in SCR Doc. 79/XI/8 and 79/XI/6 during the November Special Meeting. To summarize, it was indicated that three components were present in the stock: the first group consisted of males with mean length of 22.5 mm, the second group was composed of males, transitionals and females with mean length of 26.5 mm, and the third of ovigerous females at 30.5 mm. The minimum trawlable biomass estimated from the random stratified method was 2500 tons in Div. OB, that is consistent with the value of 3500 tons found during the 1977 survey of the R/V *Cryos* (ICNAF Selected Papers No. 4, 1978).

2. Subarea 1

During the same September-October survey of the R/V *Thalassa*, Div. 1B was studied.

a) Hydrographic studies

Two transects (10 and 8 stations) were occupied in the Davis Strait, indicating clearly the influence of the West Greenland current on shrimp distribution and abundance. Results were presented in SCR Doc. 79/XI/6 indicating that the best catches were obtained between 2.2 and 4.1°C, from 200 to 400 m depth.

b) Biological studies

During the same survey, biological data and biomass estimates were obtained on shrimp of Div. 1B, and presented in the documents cited above. Four groups were identified in the stock: a group of immatures at 10.5 mm mean l_c ; a second at 17.5 mm composed of males; a third at 21.5 mm composed of mixed males, transitionals and females; and the fourth at 27.5 mm of females. From this random stratified survey, the minimum exploitable biomass was estimated at 42,000 tons in this area, that is close to the estimate obtained from the commercial French catches using the area expansion method (46,000 to 52,000 tons), as indicated in SCR Doc. 79/XI/5.

3. Subarea 2

Very little research was carried out in this Subarea in 1979, mainly due to the bad weather conditions prevailing during the winter survey of the R/V *Cryos*. The objective of this survey being the study of the Labrador-Northeast Newfoundland cod stock complex, few days (28 January-4 February) were dedicated to Div. 2J (Hamilton Bank), period during which it was possible to occupy only 4 trawling stations and 4 hydrographic stations.

4. Subarea 3

As in 1978 research was carried out during four surveys of the R/V *Cryos* in Div. 3KL (February), Div. 3NOPs (August), Subdiv. 3Pn (February) and Subdiv. 3Ps (March and October)

a) Hydrographic studies

- i) On Ritu Bank (Div. 3K) and on the northern Grand Bank (Div. 3L), 22 hydrographic stations were occupied from 1-15 February. As in Div. 2J, no ice covered the area (surface temperatures around 0°C) no thermic gradient was identified as the water column and bottom temperatures were close to 2-3°C.
- ii) In the southern parts of Div. 3NOPS (43° to 46° N and 47° to 55°W), 10 hydrographic stations were occupied from 4-9 August. The thermic structure was determined by a warm surface layer (15° to 21°C) of 30 to 50 m wide, under which the cold water mass from Labrador current region (0° to 5°C) was laying. These two adjacent water masses lead to a very important thermo clime generally located between 30 and 50 m, with more than a 10° change in temperature over a few meters.
- iii) On Rose Blanche Bank (Subdiv. 3Pn) 11 hydrographic stations were occupied from 22 to 24 February. No ice was observed and bottom temperatures ranged from 5 to 6°C, as noted during the last winter.
- iv) On Saint-Pierre and Burgeo Banks (Subdiv. 3Ps), 107 hydrographic stations were occupied: 53 from 4-19 March and 54 from 12-31 October. In spring, the thermic conditions were very similar to those observed at the same period in the two previous years. From the surface to the level of about 100 m depth, temperatures were homogenous from -1° to 1°C. Below 200 m depth, relatively warm slope waters (5 to 8°C) were still present and separated from the former layer by a strong thermic gradient at about 150 m depth. In autumn, 3 layers were clearly identified: a surface layer (0 to 35 m) of temperatures close to 10°C, an intermediate layer (50 to 100 m) of temperatures close to 0°C separated from the former by a very strong gradient, and a bottom layer (130 to 370 m) of temperatures close to 6°C.

b) Biological studies

i) Cod

On Ritu Bank (Div. 3K) the survey catch rates were greater than those observed in 1978. The mean yield was 528 kg per half-hour. The catch rates according to depth were as follows:

250-300 (m)	- 558 (kg/half-hour)
300-350 "	- 623 "
350-400 "	- 215 "
>400 "	- 164 "

The abundance of cod was larger in the northern part of the Bank (best yield of 3430 kg/half-hour), but in the eastern and southern parts of the Bank large catches were also observed (respectively 1072 kg and 539 kg per half-hour).

A total of 4131 fish were measured and 405 otoliths sampled. Two modal appeared in the research catches (42 and 50 cm), representing the two predominant year-classes (1975 and 1974). However, the 1973 year-class was still abundant in the research catches.

The examination of the sexual stages indicated that most of the fish were in ripening or in pre-spawning conditions. The examination of 102 stomach contents was carried out, indicating that 60% of them were empty.

On Northern Grand Bank (Div. 3L), the research catch rates were lower than in Div. 3K but higher than those observed in 1978. The mean yield was 375 kg per half-hour. The catch rates according to depth were as follows:

150-200 (m)	- 49 (kg/half-hour)
200-250 "	- 278 "
250-300 "	- 562 "
300-350 "	- 74 "
350-400 "	- 70 "

Cod was more abundant in the northern part of the Grand Bank (best catch of 2036 kg/half-hour).

A total of 1942 fish were measured and 240 otoliths sampled. Only one modal length (45 cm) appeared in the research catches. Here again, the 1973, 1974 and 1975 year-classes were predominant. The examination of the sexual stages and of the stomach contents (100 samples) indicated the same pattern as in Div. 3K.

On Rose Blanche Bank (Subdiv. 3Pn), cod was very scarce in late February, as last year at the same period. It represented 21% of the total catch with a mean catch rate of 117 kg per half-hour.

A total of 866 fish were measured and 99 otoliths sampled. Three modes were apparent in the research catches (45 cm, 63 cm and 87 cm) and the 1972 and 1974 year-classes were dominant.

On St. Pierre and Burgeo Banks (Subdiv. 3Ps), the mean catch rates were respectively 65 kg and 57 kg per half-hour in spring and autumn.

A total of 1790 and 1711 fish were measured at the two seasons and 550 and 531 otoliths sampled. One modal length was observed in the research catches (50 cm in spring and 54 cm in autumn). In both seasons, the 1973 and 1974 year-classes were dominant, while the 1976 and 1977 year-classes were relatively poor, indicating bad recruitment in this stock.

Assessments on the status of this stock indicated it was still at a low level, considerably under the equilibrium level (MSY = 60,000 tons) since fishing at F_{max} produced only catches of 28,000 tons (1980 TAC).

ii) Squid

During the research survey of the R/V *Cryos* in October 1979, squid (*Illex*) was the most abundant species on the St. Pierre and Burgeo Banks (Subdiv. 3Ps). The mean catch rate was 118 kg per half-hour. From this random-stratified survey, the minimum trawlable biomass of squid was estimated at 70,000 tons in 3Ps, after correction taking into account the emigration rate. These data combined with the biological characteristics of the species were presented (SCR Doc. 80/II/11) and discussed at the Lisbon Special Meeting.

iii) Redfish

On Burgeo and St. Pierre Banks (Subdiv. 3Ps), redfish was mainly observed in the spring research catches, the mean catch rates being 179 kg per half-hour compared with only 35 kg per half-hour in autumn. From length measurements, it appeared that most of the fish were ranging between 15 and 25 cm (85% and 86% in the two surveys). One modal length (19 cm) was observed during the two seasons, with however a second mode during the fall (32 cm for males and 38 cm for females).

5. Subarea 4

Research was carried out during a survey of the R/V *Cryos* in the Gulf of St. Lawrence (Div. 4R), from 11 to 26 January 1979.

a) Hydrographic studies

As during the winter of 1978, the eastern Gulf of St. Lawrence was again free of ice during the survey. However, during the second week of February, this area was completely covered with ice. In this division, 41 hydrographic stations were occupied. Most of the surface temperatures ranged between -0.5 and -1.0°C. As in the previous survey, the cold water layer extended down to 60-75 m deep, but with a more important thermic gradient located between 100 and 200 m.

b) Biological studies

In Div. 4R, 38 trawling stations were occupied during this survey, 17 using a research trawl with 50 mm mesh in the codend and 21 using the same trawl with 140 mm mesh in the codend, in order to carry out a new selectivity study.

In the research catches, cod represented 91% of the total and the mean catch rate was 1428 kg per half-hour. The catch rates according to depth were as follows:

<100 (m)	3100 (kg/half-hour)
100-150	1613
150-200	1490
200-250	657
250-300	443

A total of 16,604 fish were measured and 745 otoliths sampled. With the 50 mm mesh trawl, the modal length was ranging between 42 and 51 cm and the 1974 and 1975 year-classes comprised the majority of the research catches. With the 140 mm mesh trawl, one mode at 51 cm was observed and the 1973 and 1974 year-classes were the most abundant.

The examination of 9256 individuals indicated that most of the fish were ripening, some being ripe as observed in 1978 at the same period. From the study of 199 samples, the stomachs were mainly empty (60%). As in the previous year, this observations can be related to the lower abundance of capelin in this area.