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France Research Report for 1980

by

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Subarea 1

1. Status of the Fisheries

The French (M) fishery for northern deepwater shrimp off west Greenland was again conducted in 1980 by one freezer trawler during one trip in July and August. The fishery took place mainly in Div. 1B on the Store Hellefiske Bank where catches represent 241 tons (98% of the total catches in Subarea 1). From the trawler logbook and data collected on board during the trip by a scientific observer from the St. Pierre laboratory, numerous details were obtained on catch and effort for shrimp, on by-catches of finfishes and on distribution of the shrimp fishery. These results were presented (SCR Doc. 80/XI/159) at the November special assessment meeting together with information on the experimental fishery for shrimp off east Greenland (SCR Doc. 80/XI/173).

2. Special Research Studies

Biological data on shrimp were collected on board by the scientific observer during the trip of "Finland III" at west Greenland. About 9000 measurements on 65 samples collected from 164 tons were used to present the biological characteristics of shrimp on the Store Hellefiske Bank according to sex and maturity stages (SCR Doc. 80/XI/159).

From 1000 measurements on shrimp caught at 24 tons off east Greenland, the biological characteristics of the species in this area were also presented (SCR Doc. 80/XI/173).

Subarea 2

1. Status of the Fisheries

Only 23 tons of cod were reported from the French (M) fishery in this area in 1980.

2. Special Research Studies

During a survey of the R/V Cryos off eastern Newfoundland and Labrador in February 1980, hydrographic and biological studies were carried out in Division 2J.

a) Hydrographic studies

During the research survey, the open pack was found on the first days of February south of

Hamilton Bank. From 20 XBT casts made in this area from 2-6 February, the thermal structure was as follows: An upper cold layer (temperatures below -1°C) down to 45 m depth and then a progressive increase in water temperature with depth to reach 2°C around 120 m, 3°C around 240 m and 4°C around 420 m.

b) Biological studies

i) Cod

On the 21 trawling stations (30 min. duration) occupied during this research survey in the Hamilton Bank area, 2 were to be considered because of trawl damages during the tow. In the catches, cod represented 92% in weight. The largest catch rates were obtained at depth around 400 m. However, cod was also abundant in shallower waters between 150 and 300 m as indicated below:

Strata (m)	No. sets	Catch-rates (kg/30 min)
151-200	2 (1)	334
201-250	7	279
251-300	2	371
301-350	2 (1)	17
251-400	6	364
>400	2	744
TOTAL	21 (2)	354

From the research catches, 3,789 cod were sexed and measured, 312 specimens weighed individually and 203 otoliths sampled for length and weight at age analysis.

Length distribution were unimodal ranging mainly from 40 to 70 cm LT with a mode at 52 cm. The 1974 and 1975 year-classes were the more abundant in the research catches, the younger 1976 and 1977 year-classes being weak compared with the previous ones at age 3 and 4.

The biological data collected during this survey were added to previous data collected in 1976, 1977, 1978 and 1979 to present a yield assessment of the Div. 2J=3KL cod stock complex presented at the June 1980 Assessment Meeting (SCR Doc. 80/VI/89).

Subarea 3

1. Status of the Fisheries

a) Cod

As in previous years the French fishery operated at a low effort level in 1980 off eastern Newfoundland (Div. 3K), on the Grand Bank (Div. 3LNO), on Flemish Cap (Div. 3M), on Rose Blanche Bank (Div 3Pn) and on St. Pierre and Burgeo Banks (Div. 3Ps).

i) In Div. 3KL a small fishery was conducted both by French (M) trawlers (9459 tows) and French (SP) trawlers (234 tows).

ii) In Div. 3M, French (M) trawlers reported cod catches of 301 tons, while in Div. 3NO

French (SP) trawlers reported small catches of cod (173 tons) as by-catches in the flatfish fishery.

iii) In Subdivision 3Pn, small catches of 204 tons and 271 tons were taken by St. Pierre and Metropolitan trawlers respectively.

iv) In Subdivision 3Ps, the offshore (M and SP) fishery operating during the winter and autumn periods reported catches of 4040 tons while the inshore (SP) fishery conducted during the summer period reported cod catches of 575 tons.

b) Squid

In 1980, the squid (Illex) offshore fishery was conducted by French (M) trawlers in Subdivision 3Ps, mainly in September. The reported catches were only 248 tons apparently due to low abundance of squid. The inshore (SP) fishery was conducted around the islands of St. Pierre et Miquelon (Subdivision 3Ps) from July to October, i.e. one month later than in 1979. The inshore catches reached 1880 tons, approximately the same level as in the previous year with similar catch rates.

From the logbooks of the offshore trawlers, detailed data on catches, efforts and by-catches were obtained. The catch and effort data as well as biological characteristics of squid (length frequencies by sex and sexual stage) for the inshore fishery were also gathered during all the fishing period. The combined results of these observations were presented at the ad hoc working group on squid held during this June 1981 Meeting of the Scientific Council (SCR Doc. 81/VI/37).

c) Other finfish

Small directed catches of yellowtail flounder were also reported from the French (SP) trawlers in Div. 3NO (360 tons) and in Subdivision 3Ps (245 tons), where catches of American plaice were also reported (212 tons).

Skates (Raja spp.) were also reported as by-catches in the cod fishery in Subdivision 3Ps (336 and 272 tons for French (M) and (SP) respectively).

2. Special Research Studies

As in 1979, research was carried out in Subarea 3 during several surveys of the R/V Cryos :

- in Div. 3KL in February
- in Subdivision 3Ps in February, March, September, October and November.

a) Hydrographic studies

i) On Ritu Bank (Div. 3K), where 21 hydrographic stations were occupied from 21 January to 10 February, no ice was observed and the upper water layer (temperatures between -1 and 0°C) extended to 75 m. Temperatures above 1°C were observed below 100 m depth and increased progressively to reach 3°C at 320 m.

- ii) On the western and northwestern slopes of the Grand Bank (Div. 3L), where 23 XBT casts were made, an important cold water layer was observed (temperatures below -1°C) and reached at some stations depths of 100 m.
- iii) On the Burgeo and Saint Pierre banks (Subdivision 3Ps), 40 XBT casts were made from 4-11 March and 113 from 25 September-30 October.

In March, as in previous years at the same period, the cold water layer (-1 to 1°C) occupied the first 100 meters and after a thermic gradient from 1° to 6° between 100 and 200 meters, water temperatures were ranging from 6 to 7°C between 200 and 300 m depths.

During the autumn 1980 survey, four water layers were again observed - the surface layer (0-30 m) with temperatures close to 10°C - the intermediate cold water layer (temperatures between -1°C and 0°C) between 50 and 130 m depth and separated from the former by an important thermic gradient (0.35 to 0.50°C per meter) - the slope warm water layer (temperatures around 6 and 7°C) between 160 and 320 m depths - the bottom trawl layer (temperatures close to 5°C) below 380 m depths in the Laurentian Channel.

This observation was presented in more detail during this June 1981 meeting of the Scientific Council, together with recent hydrographic data collected in March 1981 (SCR Doc. 81/VI/45).

b) Biological studies

i) Cod

On the 22 trawling stations (30 min duration) occupied in Div. 3K in February 1980 during the research survey of R/V Cryos, cod represented 54% of the total catches compared with 88% in 1979. The larger catch-rates were observed in the eastern slope of Ritu Bank, between 250 and 300 m as shown in the following table

Strata (m)	No. sets	Catch rates kg/30 min
251-300	7	280
301-350	9	163
351-400	4	67
>400	2 (1)	18
TOTAL	22 (1)	177

From the research catches in Div. 3K, 2422 cod were sexed and measured, 322 specimens weighed individually and 251 otoliths sampled for length and weight at age analysis. Length distributions were similar to those observed in Div. 2J, with a modal length at 51 cm LT. Here again the 1975 and 1974 year-classes were the most abundant in the research catches and the weakness of the 1976 and 1977 year-classes was observed.

On the Grand Bank (Div. 3L), 19 trawling stations (30 min duration) were occupied in February 1980 along the northern and eastern slope of the bank during the survey of the R/V Cryos. The mean research catch-rates observed in 1980 were lower than those observed

in 1979 at the same period (137 kg/30 min and 414 kg/30 min respectively). The largest catch rates were observed in the northern part of the Grand Bank at depths between 250 and 350 m where capelin appeared also in the catches. The research catch rates by stratum are indicated below:

Strata (m)	No. of sets	Catch rates (kg/30 min)
151-200	4	0
201-250	4	45
251-300	6	240
301-350	4	240
351-400	1	15
TOTAL	19	137

From the research catches in Div. 3L, 2192 cod were sexed and measured, 318 specimens weighed individually and 252 otoliths sampled for length and weight at age analysis.

In this division, the same length and age distributions as in Div. 2J-3K were observed from the research catches.

In the Burgeo and St. Pierre banks (Subdivision 3Ps), two random stratified surveys were carried out onboard the R/V Cryos in winter and autumn 1980. A total of 153 trawling stations of 30 min duration were occupied in the 32 strata of this area. In March, the largest catch-rates were observed in the Hermitage Channel and Burgeo bank (250 kg/30 min and 230 kg/30 min respectively) while during the September-October period, the largest catch rates were observed on the shelf of St. Pierre bank (439 kg/30 min).

As observed earlier, the bulk of the research catches were composed of cod varying between 38 and 75 cm total length. The 1972, 1973 and 1974 year-classes were the main components of the stock, while the 1975, 1976 and 1977 year-classes were found to be relatively small, and the 1978 year-class appeared relatively abundant at age 2 in the research catches. During the autumn survey, 974 cod have been tagged on St. Pierre bank and all details on location and tagging operations were provided in time to the NAFO Secretariat (SCS Doc. 81/VI/6).

ii) Squid

Biological observations on squid (Illex) were carried out during the period of inshore migrations in the waters of St. Pierre from July to October. This migration occurred one month later than in 1979 and this was related to the delay in elevation of temperature above 7°C. The length distributions were unimodal and indicated a growth rate of 12 mm and 16 mm per month for males and females respectively. The sex ratio was dominated by males until mid-September, approximately a month later than in 1979.

The results obtained on this species in this area were presented in detail (SCR Doc. 81/VI/37) during the meeting of the ad hoc squid working group held during this June 1981 assessment meeting.

Observations on squid were also made during the autumn survey of the R/V Cryos on St. Pierre bank (Subdivision 3Ps). The mean research catch-rate was very low compared with 1979 (4 kg/30 min and 119 kg/30 min respectively). The largest catch-rates occurred in the northern slope of St. Pierre bank near the Island of Miquelon.

iii) Redfish

From the winter and autumn surveys carried out on board the R/V Cryos in Div. 3P, abundance indices and biological data were collected on this species (S. mentella).

The largest catch-rates were obtained in winter in the warm waters along the slope mainly off Burgeo bank and northwestern part of St. Pierre Bank (1589 kg/30 min). In autumn, the same abundance was observed on the slope of Burgeo bank (1236 kg/30 min) while similar catch-rates were obtained on the southern slope of St. Pierre bank (1212 kg/30 min).

Also noted was the high research catch rates of redfish (S. marinus) in September-October 1980 on Burgeo bank (1191 kg/30 min). Even if this species is always observed in this area, such large catch-rates are unusual.

Length distributions indicated an important mode around 21 cm LT and that 74 to 88% of the individuals were ranging between 15 and 27 cm. This group, observed in the research catches since 1976, probably corresponds to the 1973 year-class.

iv) American plaice

From the winter and autumn surveys carried out on board the R/V Cryos in Subdivision 3Ps, abundance indices and biological data were also collected on this species.

In March, the highest research catch rates were observed in the Halibut Channel (from 133 kg/30 min to 862 kg/30 min according to the strata) while in September-October larger catch rates were observed on the eastern part of St. Pierre bank and northern Green bank (226 kg/30 min and 776 kg/30 min respectively).

Length distributions for males and females indicated two modes at 21 and 31 cm total length.

In the research catches, the 1972 and 1974 year-classes were predominant in both surveys.

v) Witch flounder

Highest catch-rates of witch were observed in the autumn research survey on the slopes of the banks and in the channels (25 to 45 kg/30 min).

Length distribution indicated large abundance of small individuals (around 17 cm total length) indicating a relatively good recruitment in the offshore stock.

vi) Other finfish

Among the other species observed during the two research surveys in Div. 3Ps, the skates (Raja spp.) were the most abundant, mainly in the September-October cruise. On the slopes of St. Pierre and Green banks, the research catch rates ranged between 31 and 87 kg/30 min. Abundance estimates and biological data were also obtained for silver hake in this area.

Unusual high reserach catch rates were observed during the September-October survey on the western slope of St. Pierre bank (833 to 1298 kg/30 min). Total length of silver hake was distributed between 20 and 60 cm with two modes at 30 and 42 cm.

Observations on haddock were also made during these surveys, indicating very small catch rates on the western slope of St. Pierre bank (58 kg/30 min) and length distribution between 25 and 82 cm, the bulk of the sizes ranging from 50 to 70 cm LT.

vii) Shellfish

During the September-October survey carried out in Subdivision 3Ps on board the R/V Cryos abundance indices and biological data were also obtained on saclopps (Placopecten magellanicus and Chlamys islandicus) from the St. Pierre shelf using standard dredging tows. Highest abundance indices of Chlamys were observed in the northwestern portion of the shelf (50 to 275 kg/10 min) and on the southwestern part (70 kg/10 min). Lengths were ranging from 3 to 11 cm HL corresponding to age groups 0 to 12.

As for Placopecten, highest abundance indices were observed on the southwestern part of the shelf (30 kg/10 min). Lengths were ranging between 2 and 16 cm HL with 4 predominant groups corresponding to age groups 2, 3, 6 and 12 respectively.

Subarea 4

1. Status of the fisheries

a) Cod

As in previous years, most of the French catches for cod were reported from Subarea 4. The French (M and SP) fisheries operated mainly in the eastern Gulf of St. Lawrence (Div. 4R) and on Scatarie Bank (Subdivision 4Vn).

i) In Div. 4R the fishery was conducted during the first five months of the year by the French (M) trawlers (8275 tons) and by French (SP) trawlers (646 tons). Length distributions of cod in the commercial catches from this area were observed by sampling on board the French (M) trawlers and data from 52 samples were sent on CFS-1 forms to the NAFO Secretariat on 29 April 1981.

ii) In Subdivision 4Vn the fishery was also conducted during the first two quarters of the year by the French (M) trawlers (7141 tons) and the French (SP) trawlers (1965 tons). Length distribution of cod in the commercial catches from this area were also observed by sampling the landings in St. Pierre (2 samples) and on board the French (M) trawlers (40 samples). All data were sent to the NAFO Secretariat on 29 April 1981.

Redfish and American plaice were also reported as by-catches in the cod fishery in Div. 4R and Subdivision 4Vn. Data on length distributions of these species sampled on board the French (M) trawlers or in the landings of the French (SP) trawlers (3 samples) were sent

to the NAFO Secretariat on 29 April 1981.

b) Squid

The 1980 squid (Illex) fishery was also conducted on the Scotian Shelf (Div. 4W) by one French (M) trawler in September. The reported catches were 348 tons only, representing 18% of the 1979 catches in this area. This decrease was related to the lower abundance of squid in 1980.

Abundance indices of biological characteristics of squid in this area during the fishing period were presented at the ad hoc working group on squid held during this June 1981 meeting of the Scientific Council (SCR Doc. 81/VI/37).

2. Special Research Studies

In 1980 research was carried out in Subarea 4 during two surveys: in Div. 4R in January on board the R/V Cryos - in Div. 4VWX, in September on board the R/V La Perle.

a) Hydrographic studies

i) In the eastern Gulf of St. Lawrence (Div. 4R) 16 XBT casts were made from 12 to 23 January. From the sections occupied west of Bonne Bay and off St. George Bay, it was observed that cold water surface layer (-1° to 0°C) down to about 60 meters depth was present in the area. After this depth, water temperatures were increasing progressively with depth without any strong thermic gradient as observed in some years. Also, no ice covered the area surveyed in January except for the northern part of the Gulf where young ice was found at the level of Pointe Riche.

ii) On the Scotian Shelf (Div. 4VWX), 75 XBT casts were made from 4 to 24 September. The results of the observations made in this area at this time were presented (SCR Doc. 81/VI/38) in relation to the distribution and abundance of squid (Illex) at the ad hoc working group held during this June 1981 meeting of the Scientific Council.

During this survey, 3 water layers were observed: - a surface layer (0 to 30 m depth) with increasing temperatures from 14 to 17°C from the east to west of the Scotian Shelf - an intermediate layer (30 to 100 m depth) covering most of the Shelf, with temperatures ranging from 1 to 6°C - a slope water layer characterized by temperatures between 6 and 12°C along the slope and entering the central area of the Shelf by the depression between Emerald and La Havre banks.

b) Biological studies

i) Cod

On the 36 trawling stations (30 min duration) occupied in the eastern Gulf of St. Lawrence (Div. 4R) in January 1980 during the research survey of the R/V Cryos, cod represented 91% of the total catches. The highest catch-rates were observed off the Port au Port Peninsula between 76 and 122 m and west of Bay of Islands between 66 and 130 m. The mean research catch rates observed by strata during the survey were as follows:

Strata (m)	No. of sets	Catch rates (kg/30 min)
66-100	3	2718
101-150	14	1173
151-200	9	561
201-250	4 (1)	214
251-300	3 (2)	44
TOTAL	33 (3)	1010

From the research catches, 11,171 cod were sexed and measured, 627 specimens weighed individually and 738 otoliths sampled for length and weight at age analysis. Also, 123 cod stomachs were collected for further feeding studies.

The length distribution of cod in the research catches were unimodal (modes between 48 and 51 cm LT) corresponding to the 1974 year-class. The 1973 and 1975 year-classes were also well represented in the research catches.

ii) Squid

A random stratified bottom trawl survey was carried out on the Scotian Shelf (Div. 4VWX) from 4 to 24 September 1980 on board the R/V La Perle. A total of 75 trawling stations (30 min duration) were occupied in daylight only during this survey.

The detailed results from this survey on distribution, abundance and biological characteristics of squid (Illex) were presented (SCR Doc. 81/VI/38) at the ad hoc working group held during this June 1981 meeting of the Scientific Council.

It was clearly indicated that the distribution of squid was related to water temperatures and especially to the slope water (6 to 12°C). The minimum trawlable biomass was calculated using the areal expansion method. It was indicated that this total value was 153,000 tons, the biomass being mainly distributed between 50 to 100 fathoms (108,700 tons).

The length distributions, each sex apart, indicated three components in the research catches in this area at that period: - a group of small immature squid (8 to 13 cm mantle length) representing only 2% of the catches - a group of medium immature squid (13.5 to 19.5 cm ML) - a group of maturing or mature (19 to 30 cm ML) representing 80% of the weighted number of individuals caught.

Also presented were the length-weight relationships for males and females separately.

