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DISTRIBUTION OF SQUID *(Illex illecebrosus)* ON THE SCOTIAN SHELF 1970 - 1976

by

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ABSTRACT

The distribution of squid *(Illex illecebrosus)* from Canadian research catches in the years 1970-1976 on the Scotian Shelf is described. Squid were widely distributed in all years, but mean catch rates varied erratically from year-to-year, with 1976 showing much the highest catches, associated with exceptionally high mean bottom temperature.

INTRODUCTION

Starting in 1970, the staff of the Department of Fisheries and Environment Biological Station, St. Andrews, New Brunswick, has carried out an annual summer (June- August) bottom-trawling survey of groundfish on the Scotian Shelf. Each survey extended from the Fundian Channel and Bay of Fundy in the southwest to the Laurentian Channel in the northeast (Fig. 1A). The outward limit was the 200-fathom contour on the slope of the continental shelf. The inner limit was dictated by the suitability of the sea bed for trawling. It was about the 50-fathom contour between the Nova Scotia coast and the offshore banks, but extended into about 20 fathoms in the Bay of Fundy. The areas off southwest Nova Scotia and the continental slope (100-200 fathoms) in the northeastern part of the Shelf were excluded because of excessively rough bottom and consequent difficulties in operating the fishing gear.

The extensive area covered (approximately 43,500 square nautical miles) and limited vessel time available resulted in minimal sampling coverage of the area with an average of one fishing station per 300-350 square nautical miles on each

annual survey. This coverage was sufficient to provide a gross measure of annual changes in relative abundance of the various fishes and a general picture of fish distribution in each year. Aggregate catch distribution of finfish for the years 1970-74 was reported previously (Scott, 1976). Squid catches were not included in the report, but indications of exceptionally high abundance of squid in 1976 from research cruises, fishing vessels and other sources suggested an examination of annual distribution and abundance of squid in the research surveys, which is presented here.

MATERIALS AND METHODS

The survey was based on a depth-stratified random sampling design (Halliday and Kohler, 1971) using the same vessel (*A.T. Cameron*), a standard #36 Yankee otter trawl with a 1/2-inch mesh cod end liner, and standard 1/2-hour trawl tows. At each preselected station, the total weight and number of each fish species and squid were recorded as well as the starting and ending position of the tow, depth to bottom, surface and bottom temperatures and numerous other data. No distinction was made between day and night tows but fishermen's observations suggest that squid concentrate on the bottom in daylight and disperse at night so that day-time catches should be higher than night-time catches.

RESULTS AND DISCUSSION

The number of trawl sets made in each survey ranged from 124 in 1971 to 165 in 1974 (Table 1) and mean numbers and weights of squid caught per tow ranged from 5.25 with a mean weight of 0.37 kg in 1970, to 187.14 with a mean weight of 35.16 kg in 1976 (Table 1).

Table 1. Mean numbers, weights and frequency of occurrence of squid *(Illex illecebrosus)* and mean bottom temperatures from summer (June-August) research survey cruises on the Scotian Shelf, 1970-76.

Year	Mean no. per tow	Mean wt. per tow (kg)	No. of tows	No. of tows with squid	% tows with squid	Mean bottom temp. (C)
1970	5.25	0.37	143	47	32.9	5.3
1971	23.46	2.41	124	62	50.0	5.6
1972	7.61	0.82	156	65	41.7	5.6
1973	7.73	1.10	146	53	36.3	5.8
1974	11.61	1.61	165	71	43.0	5.7
1975	35.03	4.05	145	64	44.1	5.4
1976	187.14	35.16	141	116	82.3	6.9

Fig. 1 near here

The geographical distribution of squid catches for each annual survey is expressed graphically in Figs. 1A-G as weight (kg) per tow. Most of the catches were small (<10 kg per tow), possibly a reflection of the inefficiency of the bottom trawl for capture of squid.

In general, squid appeared to be widely distributed on the Scotian Shelf in all years, with the greatest concentrations in the central part of the area, particularly in deeper water off the edges on the banks, and along the edge of the continental shelf. There was an apparent preference for intermediate depths between 50 and 100 fathoms with relatively few and smaller catches on the Banks and in the deep basins, but squid were notably absent from the catches, in most years, from the Bay of Fundy and the northeastern part of the Scotian Shelf to the north of Banquereau Bank (Fig. 1A), which area was characterised by particularly low bottom temperatures from 1970 to 1974 (Scott, 1976).

The research catches indicate that there was considerable variation in abundance of squid on the Scotian Shelf in the period under review (Table 1). In 1970 (Fig. 1A), squid were sparsely distributed with no major concentrations encountered; the mean catch rate was 5.25 squid per tow. In 1971 (Fig. 1B), squid were relatively abundant (23.46 per tow), but catch rates were again low in 1973 and there was little improvement until 1975 when the catch rate increased to 35.03 per tow. This was followed in 1976, evidently a year of exceptional abundance, by a catch rate of 187.14 squid per tow. In keeping with the increase in the number of squid per tow, the weight per tow increased from 0.37 kg in 1970 to 35.16 kg in 1976, and the percentage of tows in which squid were present increased from 32.87 in 1970 to 82.27 in 1976 (Table 1), indicating a much more dense distribution in the latter year. There was also an extension of the area of distribution of the catches into the Bay of Fundy in 1976 (Fig. 1G); catches were small, but extended to near the head of the Bay where they had not been made in previous years.

There is an apparent relationship between squid abundance and bottom temperature on the Scotian Shelf. The exceptionally high catches in 1976 were accompanied by exceptionally high bottom temperatures: in 1976, the mean bottom temperature for the stations sampled over the whole of the Scotian Shelf was 6.9C compared with a range of 5.3-5.8C for the years 1970-75.

REFERENCES

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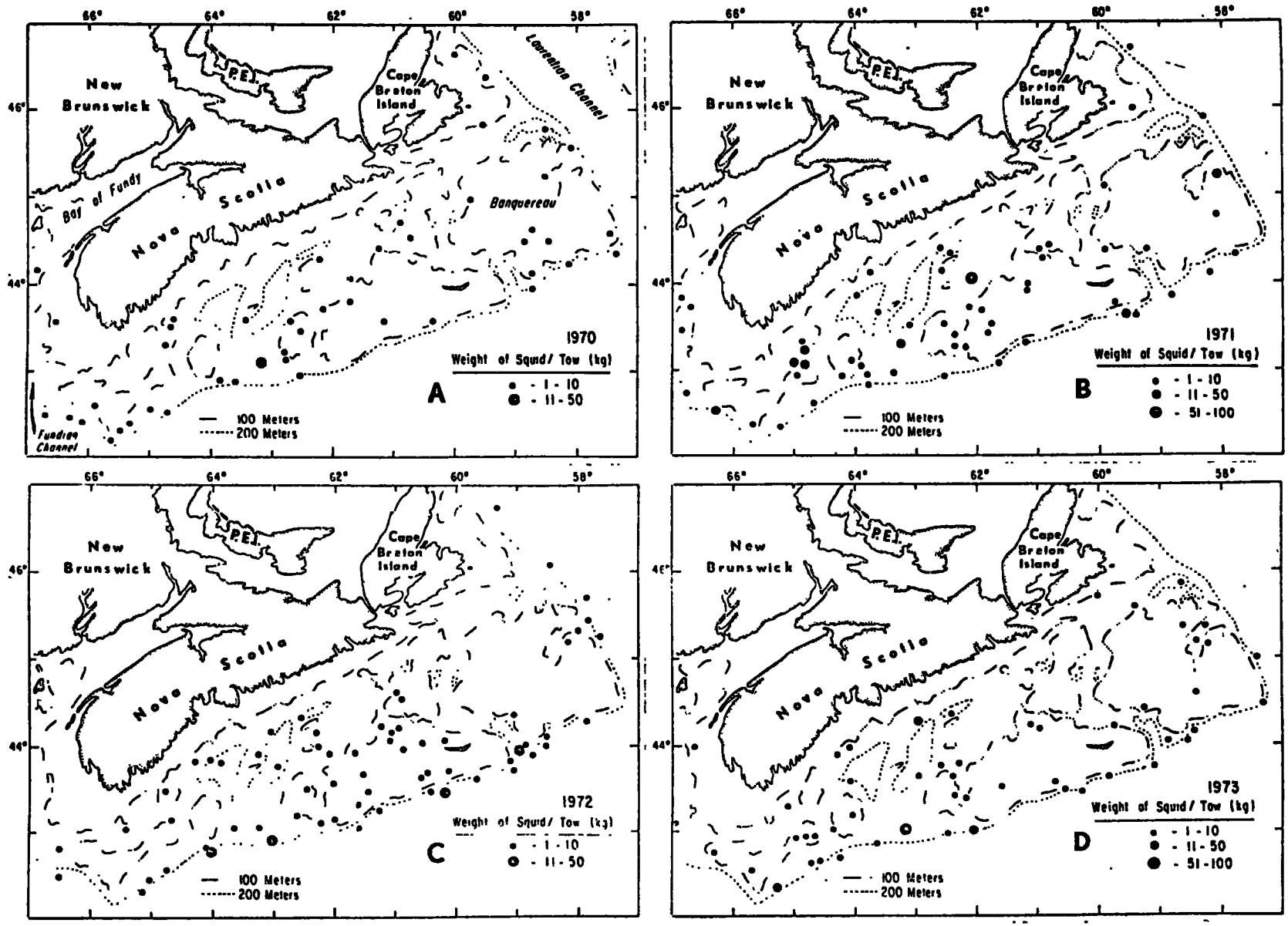

Fig. 1 A-G. Squid *(Illex illecebrosus)* 1/2-hour tows on research vessel bottom trawl surveys in the summers of 1970-1976

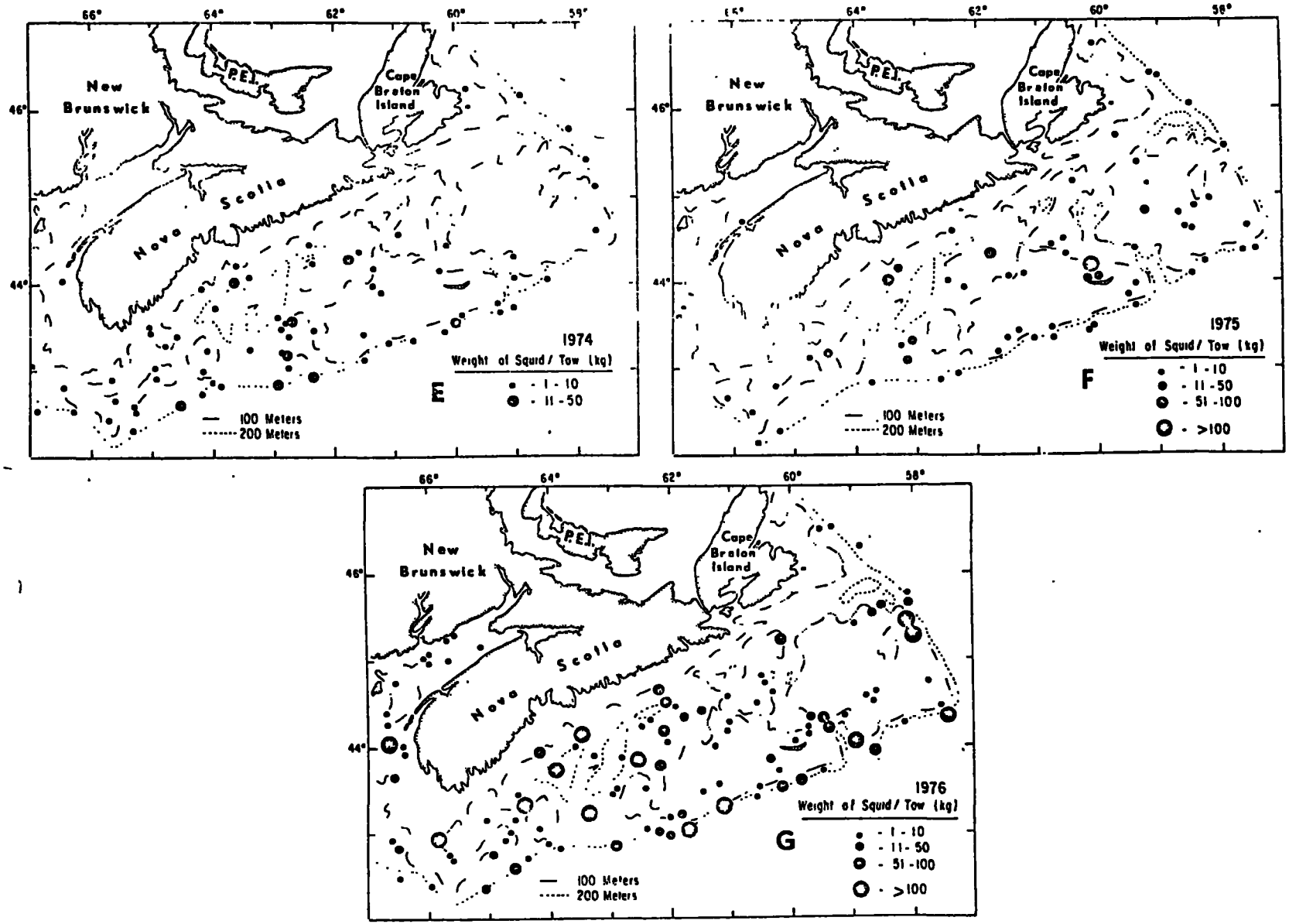

Fig. 1 (continued)