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RECENT SCALLOP RECRUITMENT AND APPARENT REDUCTION IN CULL SIZE BY THE CANADIAN FLEET ON GEORGES BANK

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INTRODUCTION

Trends in the Georges Bank fishery since the high abundance years of 1961-62 have reflected a continuing decline in scallop stocks. This lower abundance of scallops and consequent increase in landed price has led to changes in fishing practice by certain sections of the Canadian industry and, following a small recruitment to the Northern Edge of the Bank in the fall of 1969, smaller scallops were being exploited in 1970 than during years of good to average abundance.

Population densities of scallops on the Northern Edge were assessed in June 1970 by experimental fishing and bottom photography, and the sizes of landed meats in commercial catches surveyed at three main ports in July-August 1970. These surveys considered together showed that small scallops being landed by the fleet were probably caught within a limited area of new recruits on the Northern Edge.

STATUS OF THE FISHERY

Combined Canadian and U.S. landings from Georges Bank reached a peak in 1962 at 15.6 million kg of meats (130,000 metric tons whole weight) following the abundant recruitment of 1959 (Bourne, 1964) and have since declined by 64.5% to the 1970 figure of 5.5 million kg (46,000 metric tons whole weight) (Table 1). This decline in overall landings has not been so evident from Canadian landed figures, since Canada's share in the overall landings has increased from 36% to 73% of the total between 1962 and 1970 as U.S. effort on the grounds has fallen off. Canadian landings continued to go up until 1964, and since then have only declined by 32.6%. However, in order to maintain landings at the present level of 4 million kg of meats (34,000 metric tons whole weight), the Canadian fleet has had to extend its operations from the productive Northern Edge and Peak to less productive areas well within the 50-fath contour, and to deep water below 50 fath on the northeastern edge of the Bank.

Canadian effort both in days fished per year and in hours dragged per day has increased by 20-40% since 1962, the peak year for landings (Caddy and Lord, in press).

Because an increasing proportion of the day has been spent dragging, catch per day has underestimated the decline in abundance since the early 1960's. Thus, while catch per day dropped by 44% between 1961 and 1969, catch per hour (as determined by log book analysis) fell by 80% over the same period (Fig. 1).

Table 1. Landings of scallop meats (millions of kg) from Georges Bank, 1957 to 1970.

	1957	'58	'59	'60	'61	'62	'63	'64	'65	'66	'67	'68	'69	1970
Total (U.S. & Can.)	8.6	7.7	10.4	13.3	15.3	15.6	13.9	12.1	6.0	5.9	6.4	6.0	5.8	5.5
Canada	0.8	1.2	2.0	3.4	4.6	5.7	5.9	6.0	4.5	4.9	5.0	4.8	4.4	4.0

RECENT RECRUITMENT TO THE FISHERY

Late in 1969, reports were received of appreciable numbers of young scallops on Georges Bank for the first time since 1959-60. Positions given by fishermen suggested that the area of recent recruits was confined to the Northern Edge of the Bank between 66°35' and 67°15' Long. W. This area was surveyed in June 1970 and a population consisting predominantly of recent recruits was estimated to occupy approximately 80 square miles (274 sq km) of the Northern Edge of the Bank between 66°45' and 67°12' W. in 25-35 fath (50-70 m) (Fig. 2). Bottom photographs within the area showed population densities averaging 0.98/sq m, corresponding to a population of about 270 million scallops within the area of the concentration.

Calibration of the underwater camera allowed scallops in the photographs to be separated into three size groups: <50 mm, 50-100 mm, and >100 mm (Table 2).

Table 2. Numbers and sizes of scallops in bottom photographs and dredge tows on the Northern Edge of Georges Bank (June 1970).

Size group:	<50 mm	50-100 mm	>100 mm	Total
	%	%	%	no.
Dredge contents	6.5	71.2	22.3	18,580
Bottom photos	25.0	65.7	9.3	2,830

From bottom photographs it was estimated that only 10% of the population exceeded the commercial cull size noted in 1960-62 of 95-100 mm (Bourne, 1964); 25% of the population were smaller than 50 mm. In comparison, 22.3% of the dredge catches (using 3-inch internal diameter commercial rings) were larger than 100 mm, and only 6.5% smaller than 50 mm. Although some selection for larger scallops was being exerted by the gear,

most of the fishable population in this area was smaller than 100 mm, and the largest catches contained the smallest scallops (Fig. 3). Three-ring scallops, with a modal size of 72.5 mm, were the dominant year-class in dredge hauls from within the area of high concentration. A small proportion of 2-ring scallops were also caught, although the actual abundance of this year-class was underestimated as judged from the bottom photos.

MEAT SIZES LANDED BY THE COMMERCIAL FLEET

Information on landed meat sizes was obtained for a single trip by 35 boats, representing 70% of the 50 Canadian vessels making regular trips to Georges early in 1970.

From each vessel, two 36-lb (16.3 kg) bags of scallop meats were picked at random from each third of the catch, and a 1-lb (0.45 kg) sample of meats weighed from each bag and counted. A 1-lb meat sample from each boat was frozen for later individual weighings of meats.

The mean numbers of meats per pound landed at three principal ports of landing for the offshore fleet were 43, 49, and 26 for ports A, B, and C respectively, although counts of up to 79 meats per pound were recorded at port B. A highly significant difference in the mean numbers of meats/lb was found between ports A and C, and B and C ($p < 0.001$). The total weight of landings was significantly correlated ($p < 0.01$) with the mean number of meats per pound in the catch, confirming research findings that largest catches were made in the area of recent recruits, landings per trip at ports B, A and C diminishing in that sequence (Fig. 4).

Meats per pound were converted to mean weights per sample (gm) and since no data are available for the shell sizes shucked by the fleet, estimates of mean shell lengths per sample were obtained using length-weight data published by Haynes (1966 - Table 2) for Georges Bank scallops in the period April to September.

Mean shell lengths were plotted as histograms for each port (Fig. 5) and compared with mean shell sizes observed in unculled research tows on the Northern Edge in June 1970. Some culling for size seems to have taken place, as judged by comparison of the ascending side of the distributions from the three ports with that for the unculled research catch. However, since approximately half of the calculated mean shell lengths are below 85 mm for ports A and B, cull sizes for these two ports must be smaller than 85 mm, and probably fall between 70 and 85 mm. Half of the mean lengths for port C are below 100 mm, so that cull size for this port has probably remained close to the 95-100 mm cull size recorded for the Canadian fleet in the early 1960's.

Examination of log records from ports A and B for the first half of 1970 revealed a considerable expenditure of effort within the area of recent recruits, while boats from port C appear to have largely avoided this area (Caddy and Sreedharan, in press).

SUMMARY

Evidence from port surveys and research catches suggests that following a period of poor recruitment and an 80% drop in scallop abundance on the Bank, a limited recruitment of 3-ring scallops to the fishable population occurred on the Northern Edge of Georges Bank in 1969-70. Although the area of the concentration was small (approx. 270 sq. km), the standing stock within it was estimated by bottom photography to be about 270 million scallops in June 1970. The mean length of scallops in the photographs was calculated to fall within the range 65-70 mm. From data in Haynes (1966), this corresponds to an average meat weight of 5 gm, and hence to a standing stock of approximately 1.4 million kg of meats in the area of the concentration. This is approximately one third of the Canadian catch from the Bank in 1969 (4.4 million kg meats). This recruitment was being exploited by vessels from two Canadian ports in 1970, and for these two ports cull size had fallen well below that being observed in the early 1960's. Vessels from a third major port were fishing elsewhere on the Bank and landing smaller catches of predominantly large scallops.

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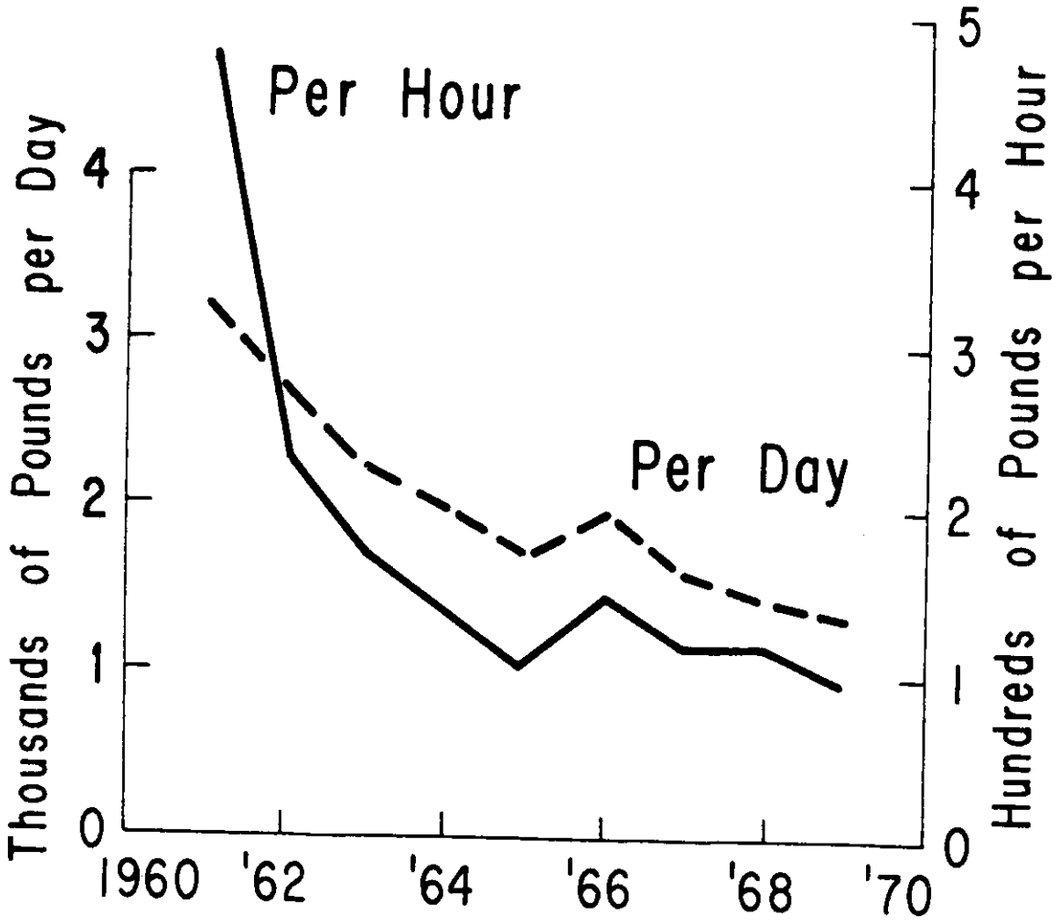

Fig. 1. Decline in two measures of catch/unit effort (Canadian fleet) on Georges Bank since 1961 (1 lb scallop meats = 0.454 kg).

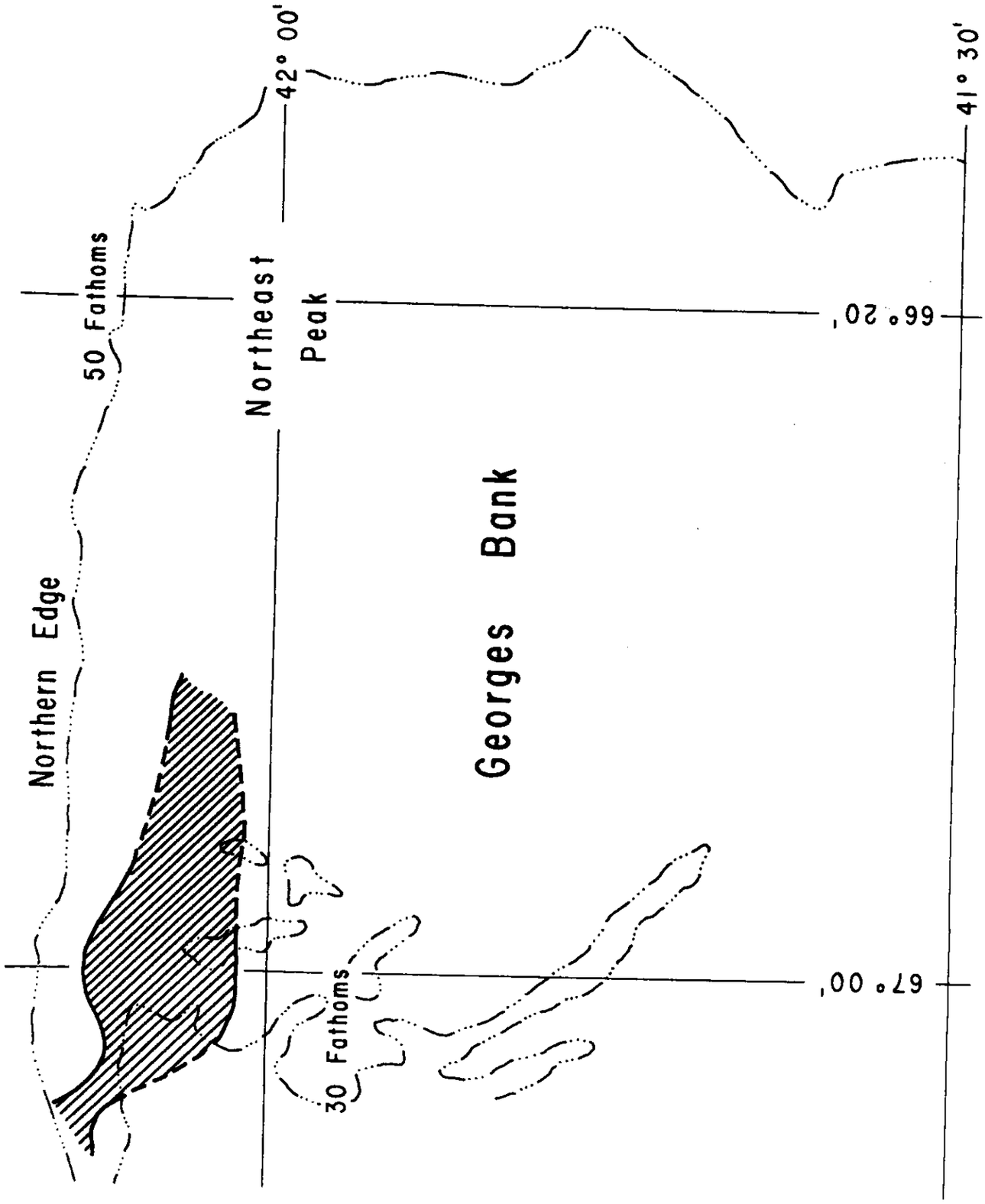

Fig. 2. Area of recent recruitment of scallops to the Northern Edge of Georges Bank discovered during a research cruise in June 1979 (1 fath = 1.83 m).

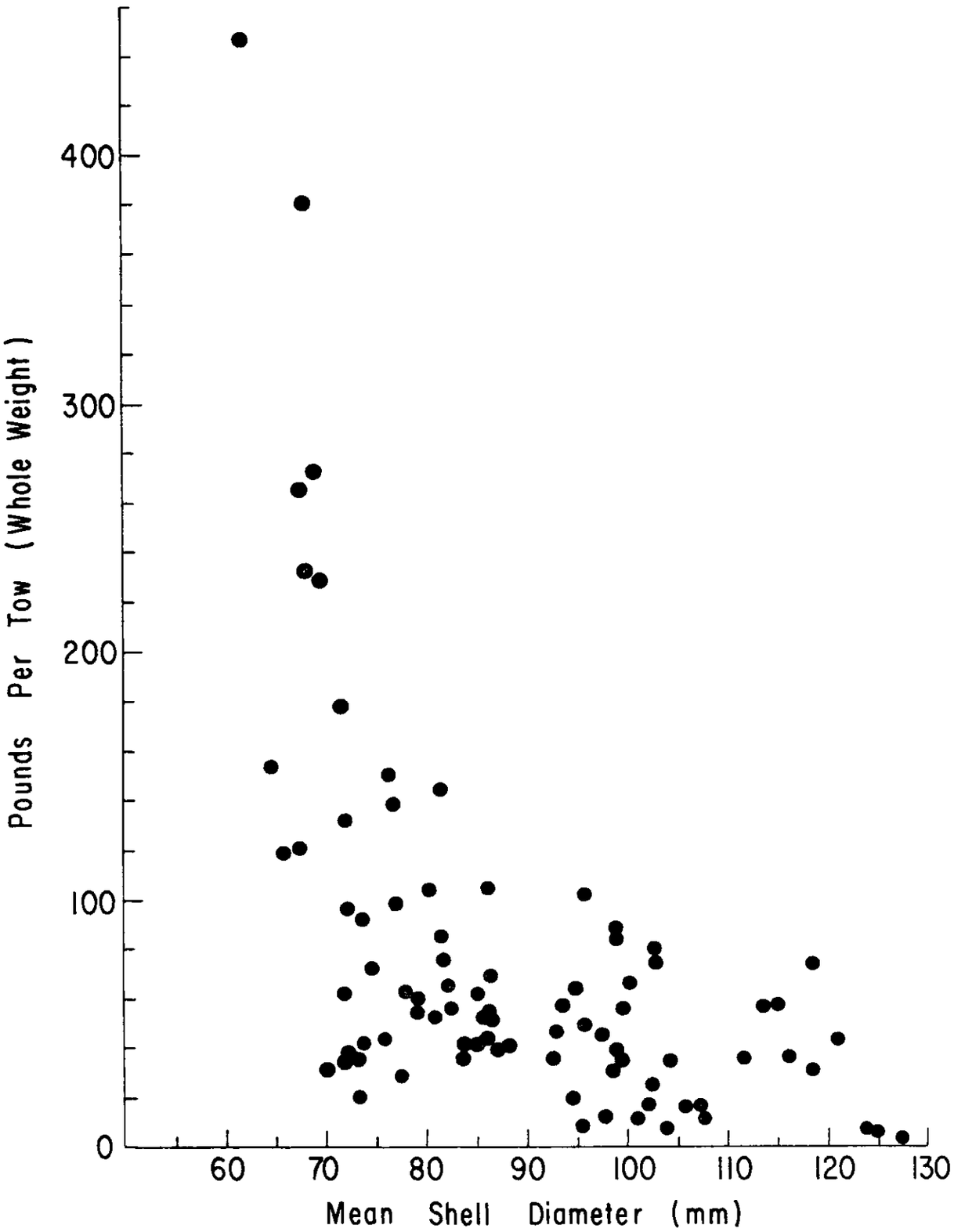

Fig. 3. Relationship between shell length and whole weight (1 lb = 0.454 kg) of scallops per tow made in June 1970 with a 2.4 m wide drag.

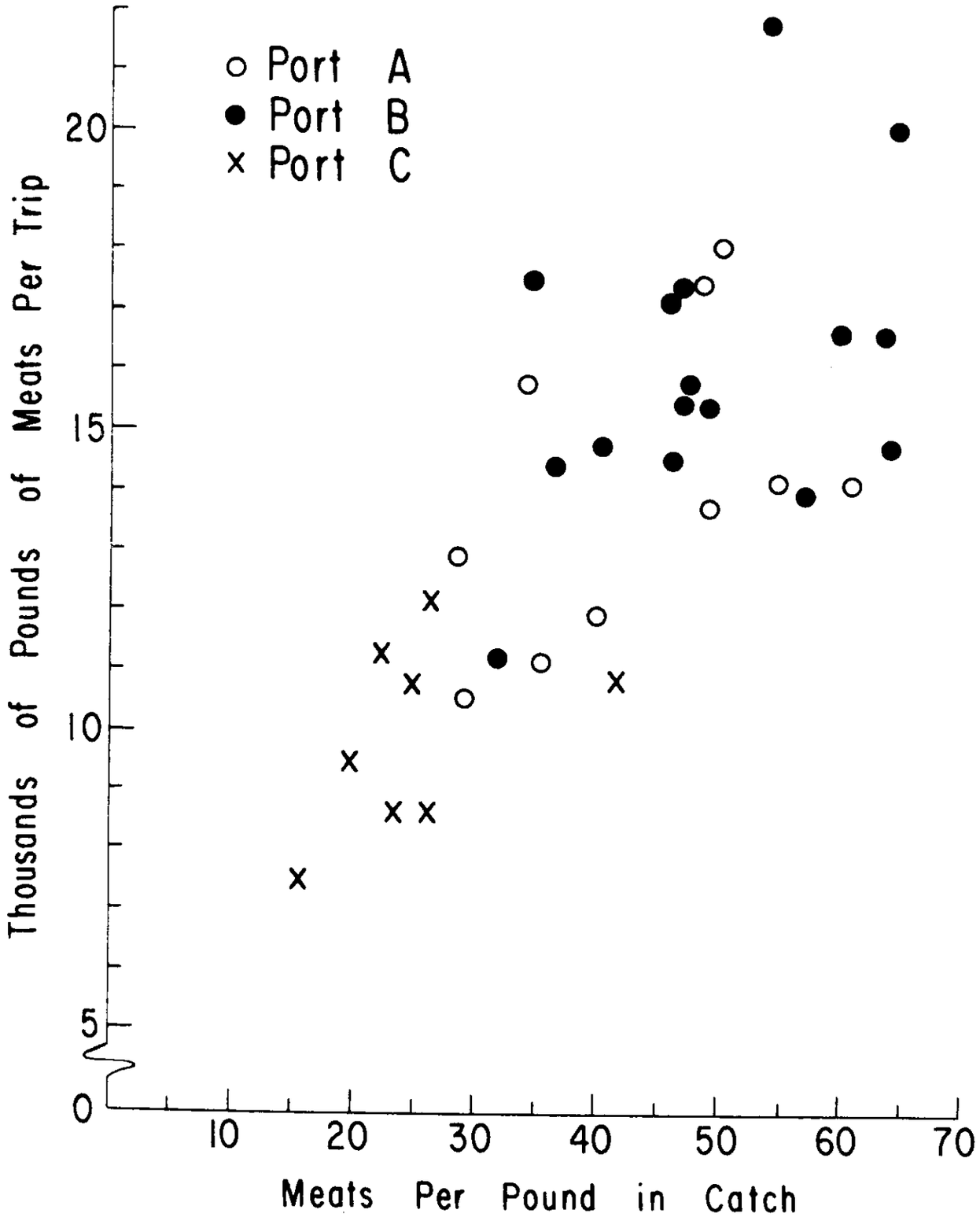

Fig. 4. Relationship between mean number of meats/lb in the catch, and weight of meats landed per trip at three Canadian ports by 34 vessels fishing Georges Bank in the period July-August 1970.

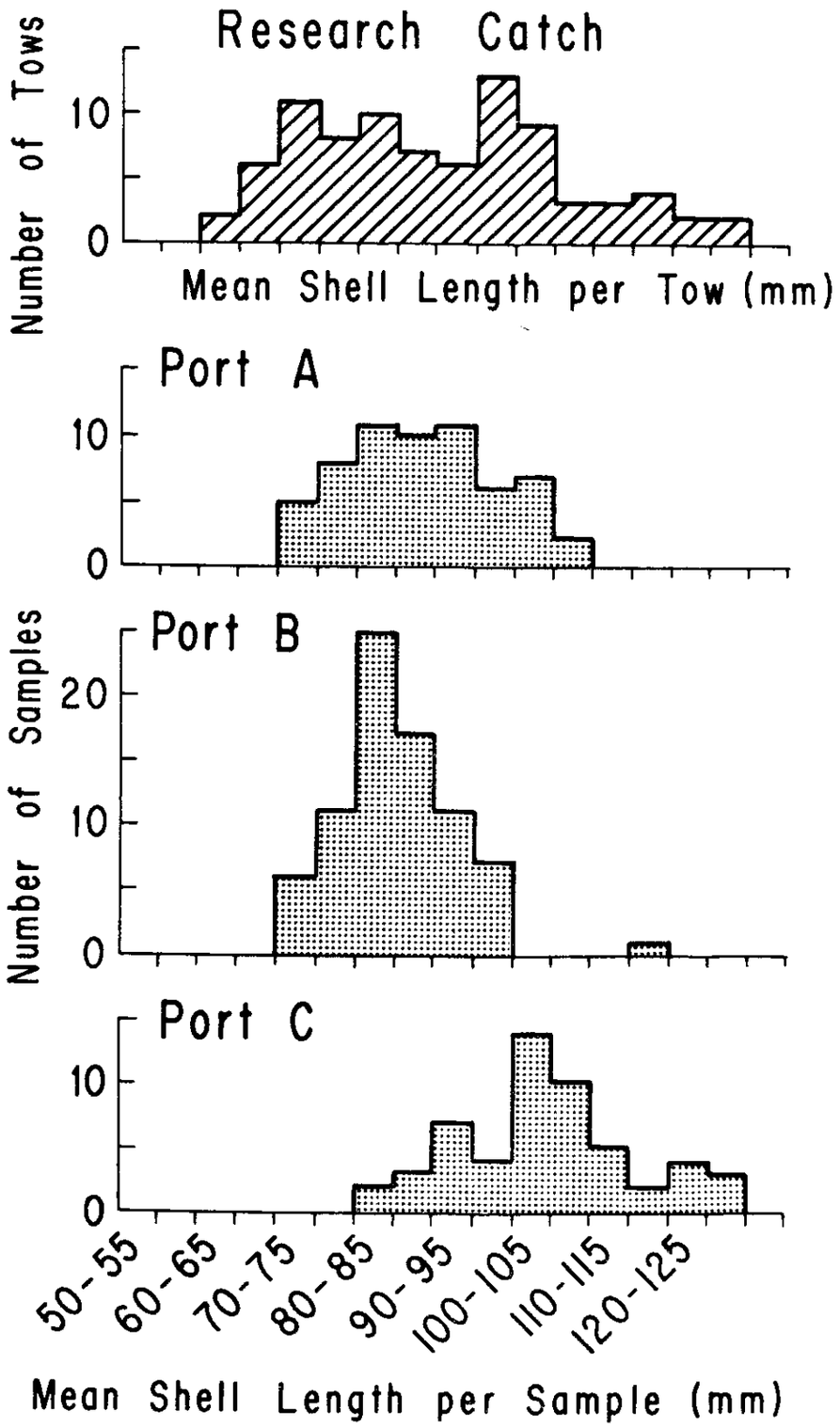

Fig. 5. Mean lengths of scallops caught on Georges Bank in the summer of 1970, based on measurements of shell size in the research catch, and conversions of mean numbers of meats per lb to estimates of mean shell lengths, using data from Haynes (1966).